
Appendix E

Biodiversity development assessment report

Birriwa Solar and Battery Project Modification Biodiversity Development Assessment Report

Prepared for ACEN Australia Pty Ltd

June 2025

Birriwa Solar and Battery Project Modification

Biodiversity Development Assessment Report

ACEN Australia Pty Ltd

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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

Approved by



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5 June 2025

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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).

Joshua Smart

Signature:



Date: 5 June 2025

BAM Assessor Accreditation no: BAAS23005

The associated BAM-Calculator development cases:

- 00046709/BAAS22017/25/00057713 – Birriwa MOD – Bus Route South (ELA, 2025)
- 00046709/BAAS18117/24/00046710 – Birriwa MOD – Additional Lots (EMM, 2025)

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 Luke O'Brien (BAAS22017). Several staff 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 and certification of BDAR
Luke O'Brien	Senior Ecologist Accredited Assessor (BAAS22017)	BDAR report preparation, BAM calculations, vegetation mapping, undertake BAM plot survey, targeted threatened flora survey
Philippa Fagan	Associate Ecologist Accredited Assessor (BAAS18117)	Review of BDAR, vegetation mapping, undertake BAM plot survey, targeted threatened flora survey
Louise Neville	Professional Ecologist	BDAR reporting, targeted threatened flora survey
Madeleine Hunt	Professional Ecologist	Undertake BAM plot survey, targeted threatened flora survey, BDAR reporting
Luke Haeusler	Graduate Ecologist	Undertake BAM plot survey, targeted threatened flora survey
Dallas Milburn	Principal consultant (Coolburn)	Owl surveys
Fidelma Gurnett	GIS Analyst	Undertake GIS mapping and calculations

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 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).

The proposed upgrades to the section of the existing Birriwa Bus Route South Road have been independently assessed for biodiversity impacts by Ecological Australia Pty Ltd (ELA). The biodiversity assessment completed by ELA (ELA 2025) is provided in Attachment A, with sections incorporated into this report where relevant.

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

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 the majority 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 m assessment area. Smaller occurrences of additional NSW (Mitchell) Landscapes also within the 1,500 m assessment area include:

- Liverpool Range Valleys and Foothills
- Goonoo Slopes.

The 1,500 m assessment area is considered highly fragmented with native vegetation 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 1,500 m 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 9%, based on the NSW State Vegetation Type Map (SVTM), and aerial imagery. The patch size was assumed to be 99 hectares (ha) for every vegetation zone mapped within the additional lots as a conservative approach to threatened species assessment.

For the Birriwa Bus Route South, patch size was determined to be 5 ha for every vegetation zone mapped with the Birriwa Bus Route South (ELA 2025).

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 plant community types (PCT) occur within the subject land:

- 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.

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 avoidance of significant 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.

Residual impacts to biodiversity values will be mitigated through pre-clearance surveys and weed hygiene measures.

ES7 Impact assessment

After avoidance and minimisation, the modified project will result in residual impact to:

- 1.29 ha of PCT 277, which will require offsetting under the NSW BOS, and associated habitat for flora and fauna species
- 67.76 ha of PCT 281, which will require offsetting under the NSW BOS, and associated habitat for flora and fauna species
- 29.83 ha of foraging habitat for Southern Myotis
- 0.99 ha of habitat for Masked Owl
- 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.

The TEC has been assessed in accordance with Section 9.1 of the BAM (DPIE 2020).

A summary of the additional impacts associated with the modified BDAR are provided in Table ES1.

Table ES1 Summary of impacts – modified BDAR

Entity	Area (ha)/count	Number of credits
PCT 277 DNG	0.72	13
PCT 277 woodland	0.57	12
PCT 281 DNG	66.38	750
PCT 281 woodland	1.38	56
Southern Myotis	29.83	301
Masked Owl	0.99	30
Total credits	-	1,162

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 the following *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) listed TEC:

- White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland Critically Endangered Ecological Community (comprising 2.9 ha).

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 following biodiversity credits are required:

- 13 ecosystem credits for PCT 277 – Blakely's Red Gum - Yellow Box grassy tall woodland of the NSW South Western Slopes *DNG*.
- 12 ecosystem credits for PCT 277 – Blakely's Red Gum - Yellow Box grassy tall woodland of the NSW South Western Slopes *woodland*.
- 750 ecosystem credits for 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 *DNG*.
- 56 ecosystem credits for 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 *woodland*.
- 301 species credits for Southern Myotis.
- 30 species credits for Masked Owl.

One vegetation zone within the subject land (the vegetation zone consisting of exotic planted trees and exotic pasture) 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.

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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 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) has been prepared to support the application to modify SSD-29508870. This 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 Birriwa Bus Route South
- 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 Birriwa Bus Route South Road from the Golden Highway via Merotherie Road, for use as an alternative access route. It also includes a public road crossing along Birriwa Bus Route South to allow construction and operation traffic to access different areas of the project with limited impacts on Birriwa Bus Route South. 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 Birriwa Bus Route South 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: ¹Partial 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 Report (hereafter referred to as the Modification 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.

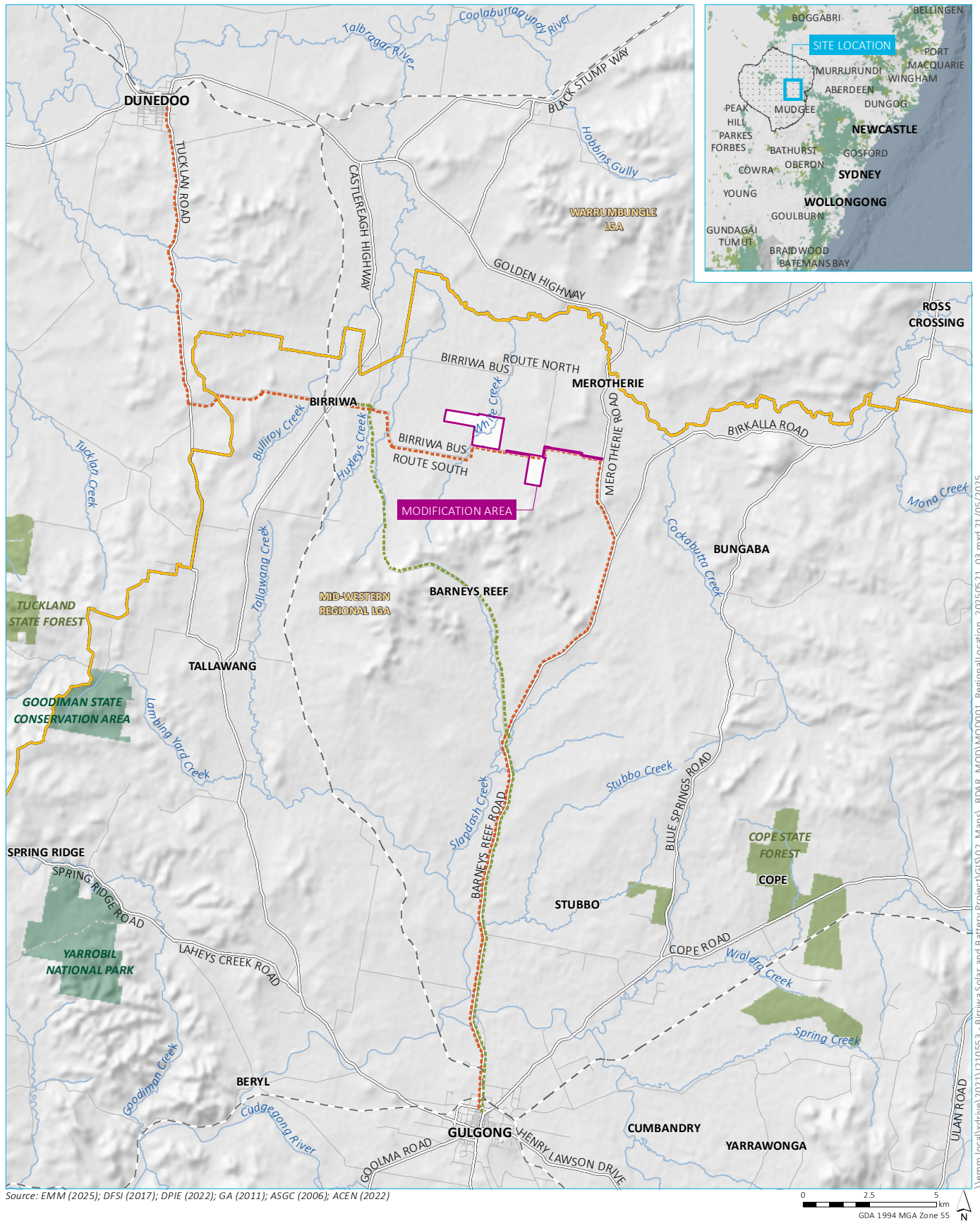
EMM Consulting Pty Limited (EMM) has conducted the necessary biodiversity assessments required under the Biodiversity Offset Scheme (BOS) (with the exception of Birriwa Bus Route South refer to Section 1.5.1) to assess impacts of the modification under the BC Act, FM Act and the EPBC Act.

1.5.1 Birriwa Bus Route South

One aspect of the proposed modification has been separately assessed by Eco Logical Australia Pty Ltd (ELA). ELA has assessed the portion of the subject land relating to the proposed upgrades to the Birriwa Bus Route South Road as part of the proposed alternative access to the project area (refer to Figure 1.1).

ELA prepared the assessment of the Birriwa Bus Route South upgrade under the BAM, including all vegetation, flora and fauna surveys, and subsequently prepared a separate BDAR outlining survey methods and results of the Birriwa Bus Route South Road investigations (Appendix A). Upon consultation with the Conservation Programs, Heritage and Regulation Group (CPHR) of the NSW Department of Climate Change, Energy, the Environment and Water (NSW DCCEEW), formerly Biodiversity, Conservation and Science (BCS), CPHR requested that a sole BDAR be submitted for the biodiversity assessment for the modification. As such, the methods and results of the Birriwa Bus Route South Road investigations (ELA 2025) have been incorporated into this BDAR to satisfy this requirement.

Note, EMM has not undertaken biodiversity surveys of the Birriwa Bus Route South, and all information related to its assessment has been provided by ELA. The Biodiversity Development Assessment Report (BDAR) prepared by ELA (2025) is not intended for formal submission in support of the modification but is provided in Attachment A for reference.

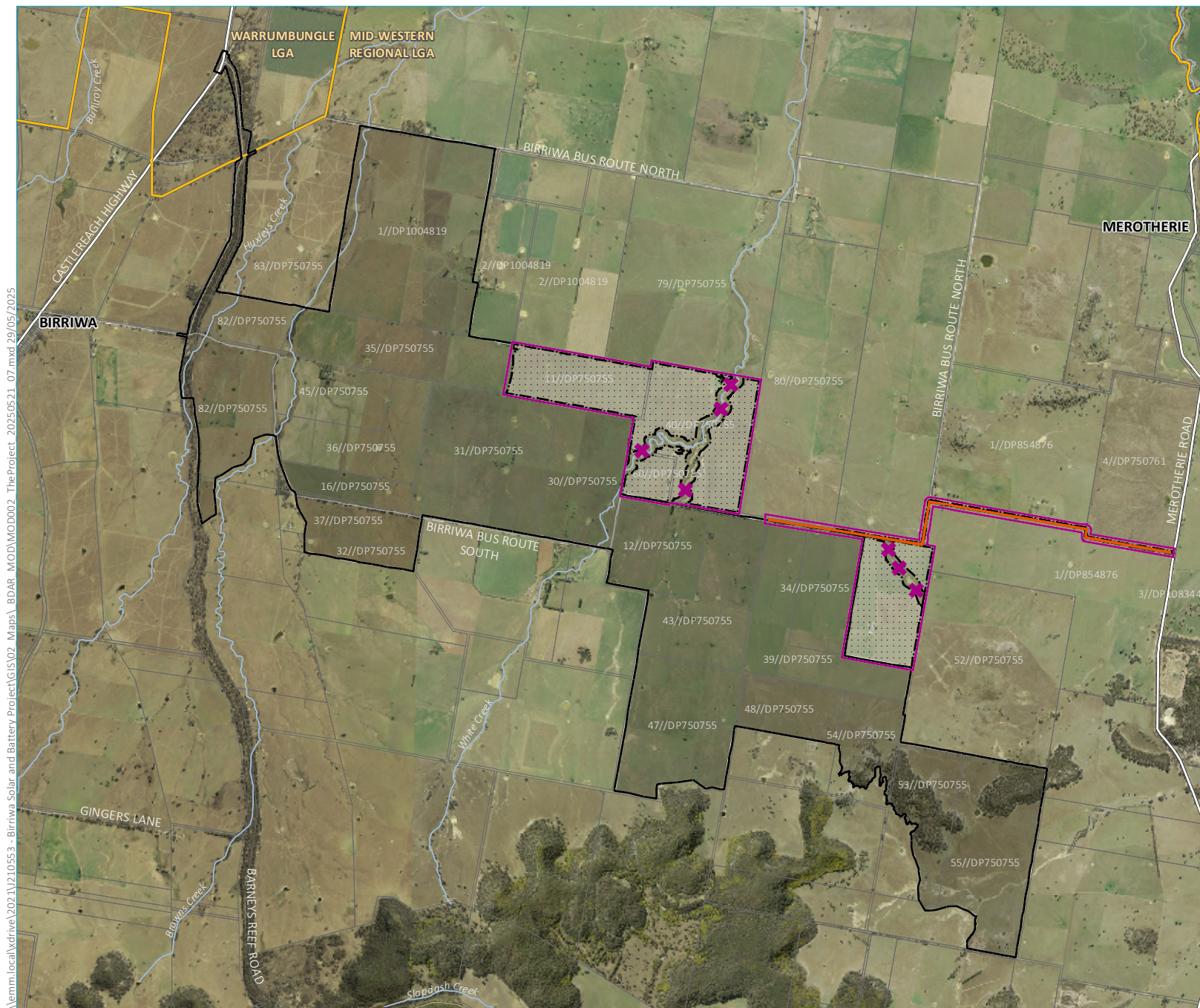


KEY

- Modification area
- Existing environment
- Rail line
- Major road
- Minor road
- Named watercourse
- Local government area
- Central West Orana Renewable Energy Zone (see 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 Farm Modification
Biodiversity Development Assessment Report
Figure 1.1



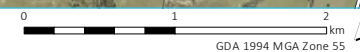
- KEY**
- Study area (modification area)
 - Birriwa Bus Route South (Assessed by ELA)
 - Subject land (modification development footprint)
 - Approved project area
 - ✕ Proposed creek crossing point
- Existing environment
- Major road
 - Minor road
 - Named watercourse
 - Cadastral boundary
 - Local government area boundary

The modification

Birriwa Solar Farm Modification
Biodiversity Development Assessment Report
Figure 1.2



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



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 hectares (ha)), and the area of potential impact associated with the upgrade of Birriwa Bus Route South 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 Birriwa Bus Route South Road was assessed separately, additional terminology has been used throughout the modification to differentiate the Birriwa Bus Route South from the remainder of the subject land. Herein, the term **Birriwa Bus Route South** refers to the portion of the subject land that has been assessed by ELA (2025; refer to Figure 1.2). The **remainder of the subject land that is not included within the Birriwa Bus Route South, and that has been assessed by EMM, will herein be referred to as the 'additional lots'.**

Project elements referred to in this BDAR are described in Table 1.2.

Table 1.2 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)
500 m assessment area	500 m buffer of the Birriwa Bus Route South (as per the BAM for linear assessments)
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 *Environmental Planning and Assessment Act 1979*. 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 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 1.3 lists the biodiversity assessment requirements relevant to the study area and describes where these are addressed in the BDAR.

Table 1.3 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 <i>Biodiversity Conservation Act 2016</i> (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 <i>Fisheries Management Act 1994</i> , 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 NSW *Environmental Planning and Assessment Act 1979* (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 NSW Department of Planning, Housing and Infrastructure (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 local government areas (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 Biodiversity Conservation Act 2016 (BC Act) and *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act).

2.3 Biodiversity Conservation Act 2016

The *Biodiversity Conservation Act 2016* (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 Biodiversity Offsets Scheme (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 *Fisheries Management Act 1994* (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

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.

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 Foothills
- Goonoo Slopes.

As the majority of the subject land and assessment area is located 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.

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 a number of 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 the majority of 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 a number of 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. 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
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

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 Birriwa Bus Route South were assessed independently, the native vegetation cover and patch size were calculated differently. 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 Birriwa Bus Route South). 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	293.55	3351	8.8	0–10

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

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

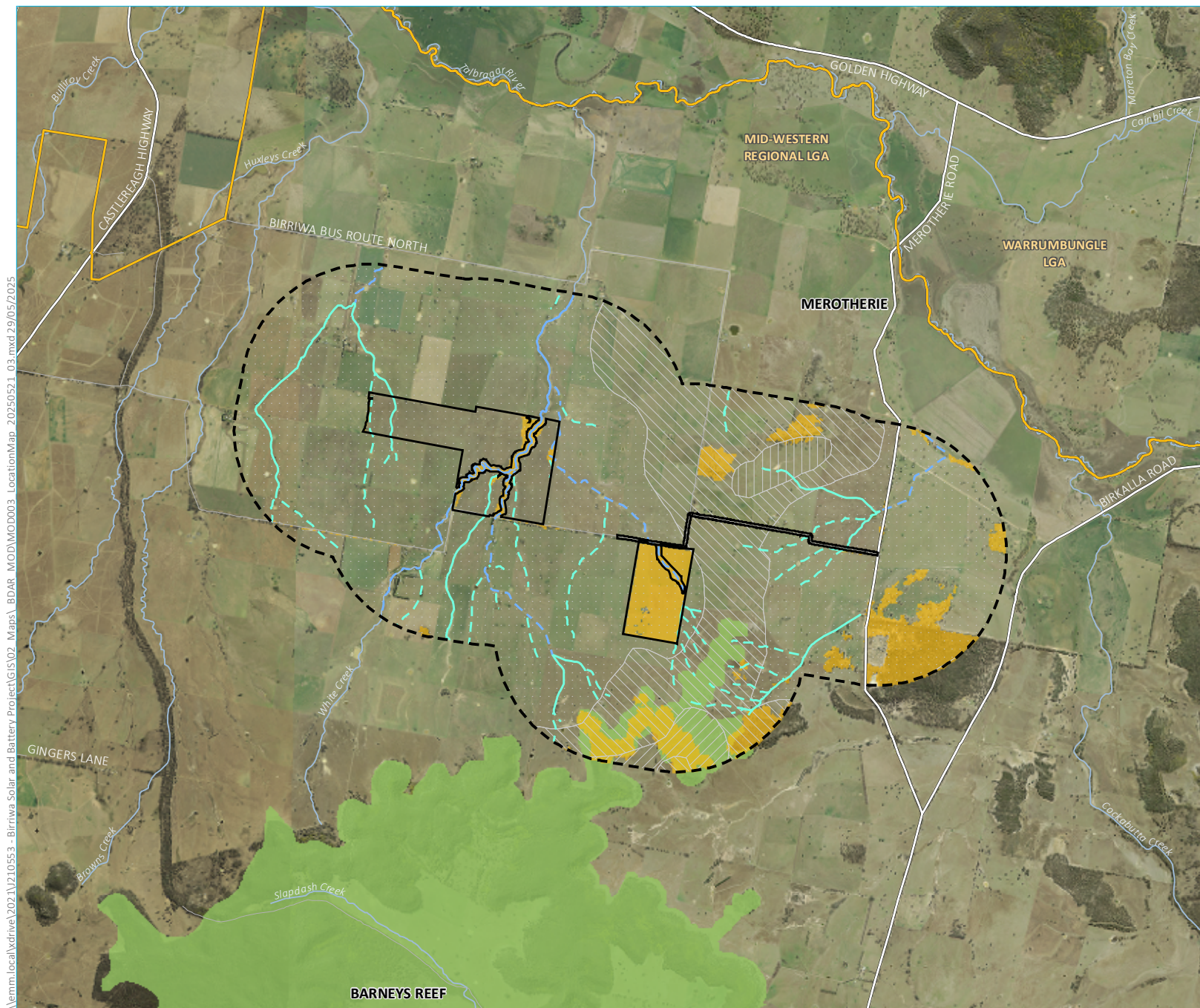
Table 3.3 Percentage native vegetation cover (500 m assessment area; ELA 2025)

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	14.26	489.7	3.0	0–10

3.2.2 Patch size

For the additional lots, patch size was assumed to be 99 ha for every vegetation zone mapped within the additional lots as a conservative approach to threatened species assessment. This enabled the Biodiversity Assessment Method Calculator (BAMC) to filter in the maximum number of candidate species for consideration.

For the Birriwa Bus Route South, patch size was determined to be 5 ha for every vegetation zone mapped with the Birriwa Bus Route South (ELA 2025).

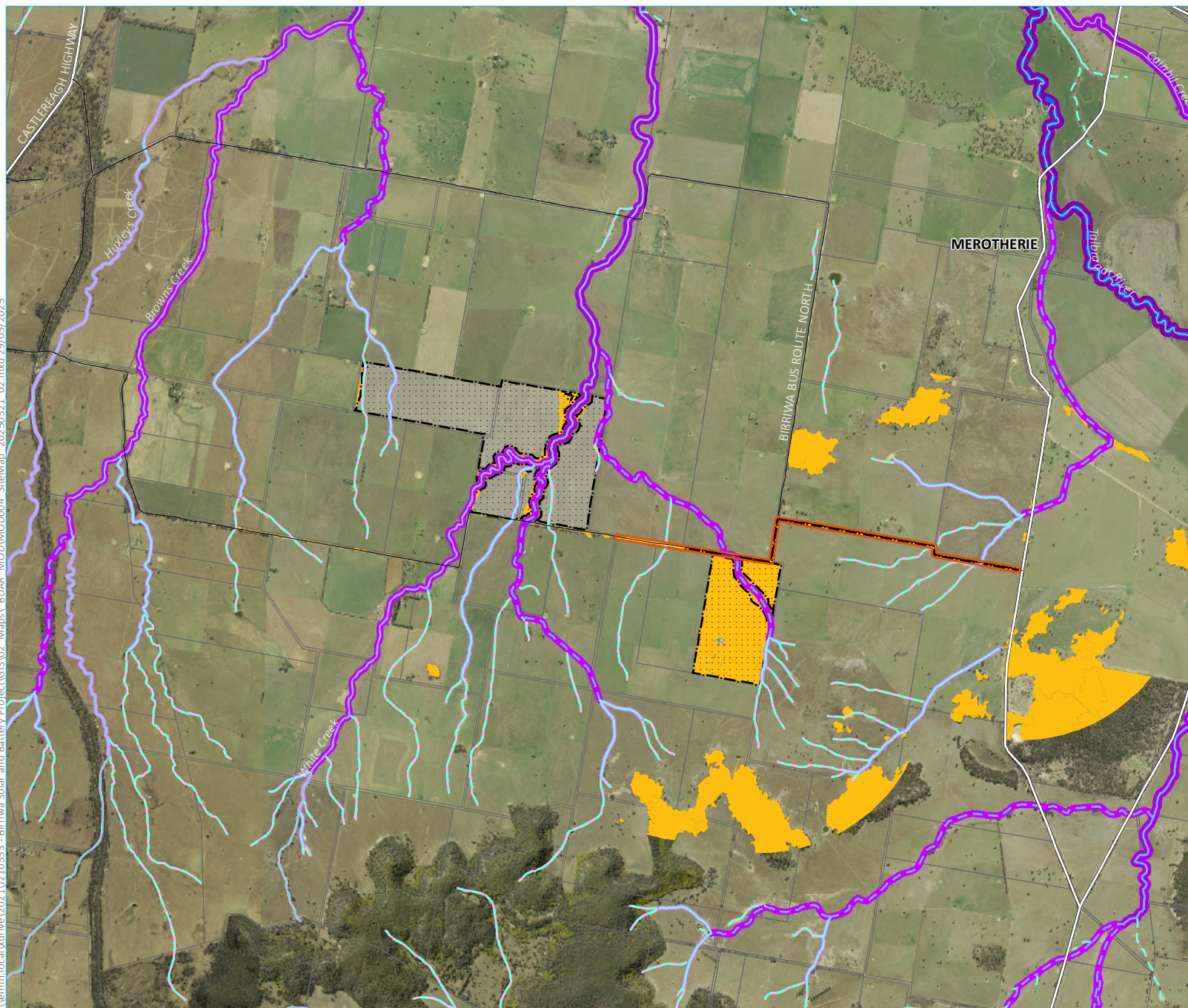


- KEY**
- Subject land
 - Assessment area (3,351 ha)
 - Existing environment**
 - Major road
 - Minor road
 - Named watercourse
 - Local government area boundary
 - Native vegetation cover (293.55 ha - 8.8%)
 - Barney's Reef rock formation
 - Strahler stream order**
 - 1st order
 - 2nd order
 - 3rd order
 - 4th order
 - Mitchell landscape (v3.1)**
 - Cope Hills Granite
 - Goonoo Slopes
 - Liverpool Range Valleys and Foothills
 - Talbragar - Upper Macquarie Terrace Sands and Gravels
- Note:** entire view extent is within the:
 - NSW South Western Slopes IBRA7 region
 - Inland Slopes IBRA7 subregion

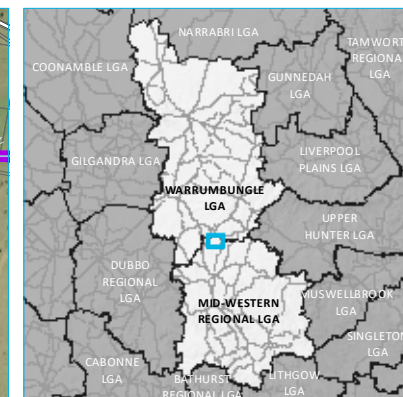
Location map

Birriwa Solar Farm Modification
 Biodiversity Development Assessment Report
 Figure 3.1

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



- KEY**
- Birriwa Bus Route South (Assessed by ELA)
 - Subject land
 - Existing environment
 - Major road
 - Minor road
 - Cadastral boundary
 - Native vegetation cover
 - Strahler stream order
 - 1st order
 - 2nd order
 - 3rd order
 - 4th order
 - 6th order
 - Riparian buffer
 - 10 m
 - 20 m
 - 30 m
 - 40 m
 - 50 m

Site map

Birriwa Solar Farm Modification
Biodiversity Development Assessment Report
Figure 3.2



0 1 2
km
GDA 1994 MGA Zone 55

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 9–13 October 2023, 23–25 January and 20–21 May 2024 by EMM which involved detailed vegetation mapping and habitat assessments. The assessment of the Birriwa Bus Route South 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. In areas of pasture, a series of rapid vegetation assessments (RVAs) were undertaken, with the three dominant species in the overstorey (where applicable), midstorey and groundcover recorded. Vegetation was mapped in the field using GPS-enabled tablet computers using Collector for ArcGIS™.

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 23-25 January 2024 and 20-21 May 2024 by EMM and 3-4 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.

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 (1-5%) or estimated to the nearest 5% (5-100%). 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 Birriwa Bus Route South.

Datasheets for EMM plots are provided in Attachment B while compiled plot data is provided in Attachment C.

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 (DCCEE 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 has been classified as containing two PCTs as well as exotic vegetation (Table 4.3). Details for each PCT are summarised in Table 4.6 and Table 4.7.

Table 4.3 Vegetation mapping within the subject land

Plant community type	Vegetation formation	Vegetation class	Percentage cleared	Direct impacts (ha)	Indirect impacts (ha)	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	1.3	0	1.3
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 – <i>Derived Native Grassland</i>	Grassy Woodlands	Western Slopes Grassy Woodlands	67	67.8	0	67.8
Exotic planted vegetation/pastureland						0.7
Pasture/exotic grassland						144.7
Total						214.5

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. The majority 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 Birriwa Bus Route South and isolated paddock trees.

A list of vegetation zones that will be impacted within the subject land is provided in Table 4.4 and Table 4.5.

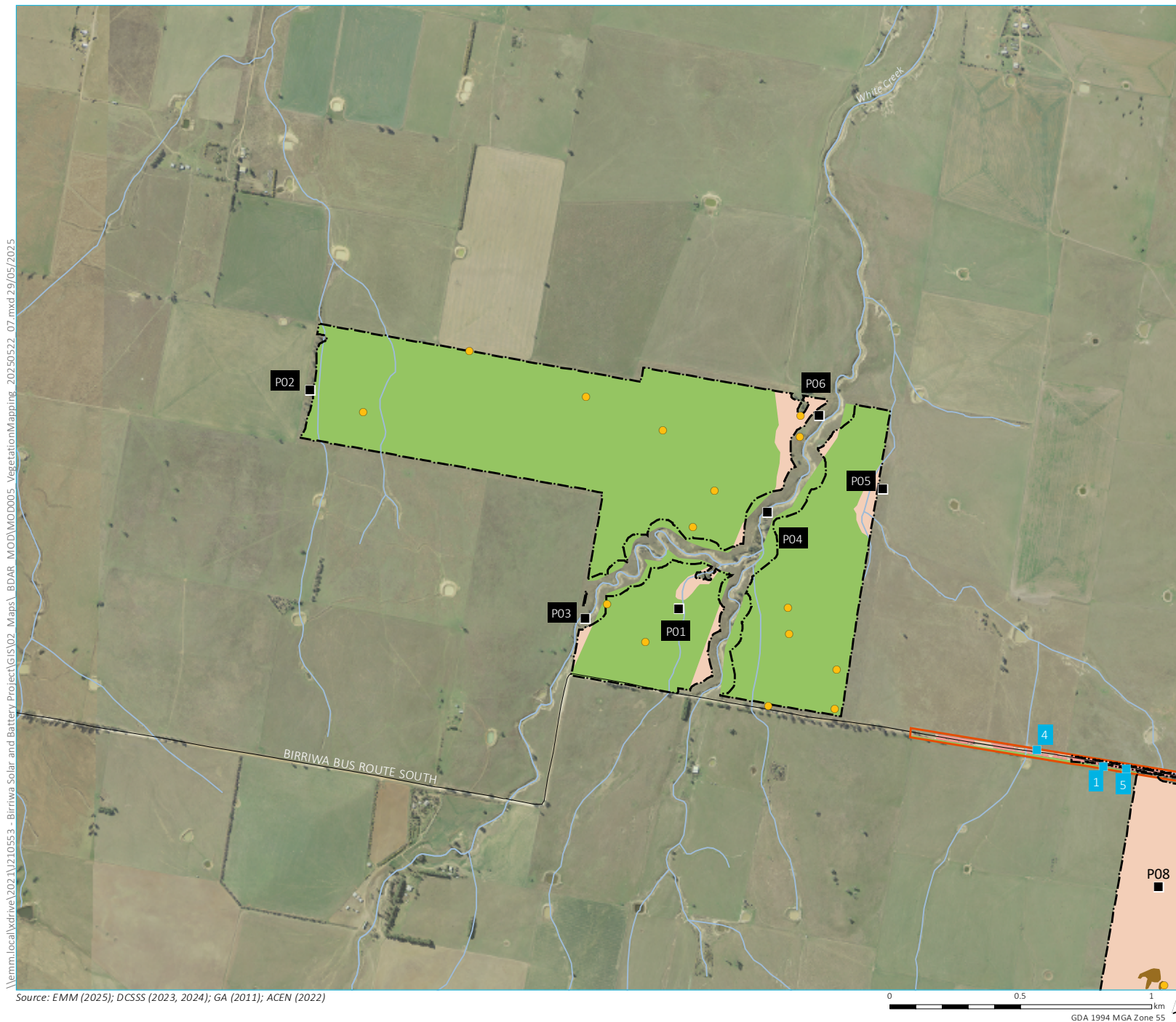
Table 4.4 Vegetation zones identified within the additional lots (EMM)

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	66.2
2	-	-	Exotic vegetation (planted trees and pastureland)	145.3
Total				211.5

Table 4.5 **Vegetation zones identified within the Birriwa Bus Route South (ELA 2025)**

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

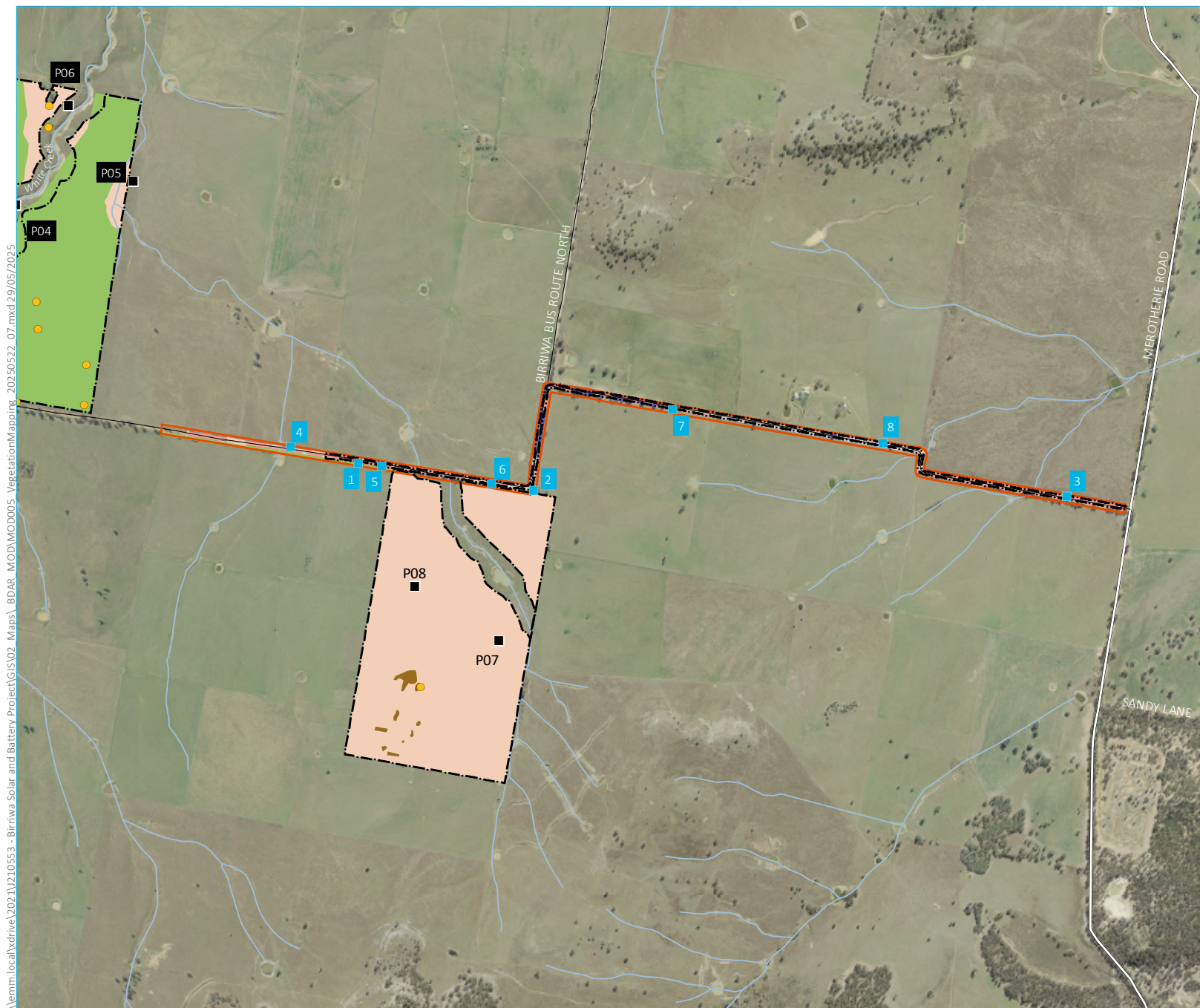
The PCTs and condition zones across the entire subject land are presented in Figure 4.1. A detailed description of PCT 281 within the additional lots is provided in Table 4.6. For detailed descriptions of the PCTs and condition zones within the Birriwa Bus Route South, refer to Attachment A.



- KEY**
- Subject land
 - Birriwa Bus Route South (Assessed by ELA)
 - RDP location
 - Plot location**
 - ELA
 - EMM
 - Existing environment**
 - Major road
 - Minor road
 - Watercourse/drainage line
 - Pasture, Exotic grassland
 - Exotic (Planted Vegetation)
 - Plant community type**
 - 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

Plant community types and plot locations

Birriwa Solar Farm Modification
Biodiversity Development Assessment Report
Figure 4.1



KEY

- Subject land
- Birriwa Bus Route South (Assessed by ELA)
- RDP location
- Plot location
 - ELA
 - EMM
- Existing environment
 - Major road
 - Minor road
 - Watercourse/drainage line
 - Pasture, Exotic grassland
 - Exotic (Planted Vegetation)
- Plant community type
 - 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

Plant community types and plot locations

Birriwa Solar Farm Modification
Biodiversity Development Assessment Report
Figure 4.1

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 DNG is provided in Table 4.6.

For descriptions of the PCTs within the Birriwa Bus Route South, namely PCT 281 Woodland, PCT 277 Woodland, PCT 281 DNG and PCT 277 DNG refer to Section 3.5 of Attachment A.

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

Attribute	Description
PCT ID	281
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	Derived Native Grassland
Extent within subject land	66.2 ha
Survey effort	Plot 1 Plot 2 Plot 3 Plot 4 Plot 5 Plot 6 Plot 7 Plot 8
Vegetation integrity score	18
Description	<p>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 <i>Angophora floribunda</i> (Rough-barked Apple) and Blakely's Red Gum (<i>Eucalyptus blakelyi</i>) and were designated as poor condition. All wooded areas mapped as PCT281-poor are to be retained.</p> <p>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.</p> <p>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 (<i>Eragrostis brownii</i>), Purple Wiregrass (<i>Aristida ramosa</i>), Common Rush (<i>Juncus usitatus</i>), Rat's Tail Grass (<i>Sporobolus creber</i>), Red Grass (<i>Bothriochloa macra</i>), Slender Bamboo Grass (<i>Austrostipa verticillata</i>), Swamp Dock (<i>Rumex brownii</i>) and Yellow Burr Daisy (<i>Calotis lappulacea</i>).</p>

Attribute	Description
	<p>Exotic species occurring within the groundcover include St. Johns Wort (<i>Hypericum perforatum</i>), Paspalum (<i>Paspalum dilatatum</i>), African Lovegrass (<i>Eragrostis curvula</i>), Khaki Weed (<i>Alternanthera pungens</i>) Bathurst Burr (<i>Xanthium spinosum</i>) and Saffron Thistle (<i>Carthamus lanatus</i>) which are all High Threat Weeds (HTWs). Other common exotics include Flaxleaf Fleabane (<i>Conyza bonariensis</i>), Pale Pigeon Grass (<i>Setaria pumila</i>), Purpletop (<i>Verbena bonariensis</i>) and Scotch Thistle (<i>Onopordium acanthium</i>).</p>
Diagnostic tools and justification used to assign PCT 281	<p>Based upon the data contained in BioNet Vegetation Classification database (DPE 2024), PCT 281 is considered to be the best fit based on:</p> <ul style="list-style-type: none"> • 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: <ul style="list-style-type: none"> – Rough-barked Apple – Blakely's Red Gum – Slender Bamboo Grass – Purple Wiregrass – Yellow Burr-daisy – Kangaroo Grass (<i>Themeda triandra</i>) – Brown's Lovegrass – Common Rush – Red Grass – Rock Fern (<i>Cheilanthes sieberi</i>) – Twining glycine (<i>Glycine clandestina</i>) – <i>Oxalis perennans</i> – Fuzzweed (<i>Vittadinia cuneata</i>)
TEC Status	<p>BC Act status:</p> <p>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:</p> <ul style="list-style-type: none"> • 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. <p>All zones for PCT 281 within the subject land meet the criteria for inclusion as the BC Act listed community.</p> <p>EPBC Act status:</p> <p>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 <i>Eucalyptus albens</i> (White Box), <i>Eucalyptus melliodora</i> (Yellow Box) and/or <i>Eucalyptus blakelyi</i> (Blakely's Red Gum), and in some areas the grey box species <i>E. microcarpa</i> and/or <i>E. moluccana</i> 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:</p> <ul style="list-style-type: none"> • have a predominantly native understorey (i.e. more than 50% of the perennial ground layer must comprise native species)



Attribute	Description
	<ul style="list-style-type: none"> • 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. <p>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).</p>
Estimate of percent cleared value of PCT across its distribution	67%
Patch size	99
Hollow-bearing trees	Not present
Photo: vegetation zone 1 – PCT 281_DNG, Plot 6 (directly impacted)	
Photo: PCT 281_poor, Plot 2 (to be retained)	

Table 4.7 **Exotic vegetation**

Attribute	Description
PCT ID	Not applicable
Common name	Exotic vegetation
Vegetation class	Not applicable
Extent within subject land	145.3 hectares (ha), comprising: <ul style="list-style-type: none"> • Exotic pastureland: 144.7 ha • Exotic planted: 0.7 ha
Survey effort	<p>Detailed vegetation mapping was undertaken as described in Section 4.2.1.</p> <p>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.</p> <p>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.</p>
Description and condition	<p>Exotic vegetation included cropping, exotic grassland, and exotic planted trees.</p> <p>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.</p> <p>Exotic trees include small stands near to farmsteads, such as Pepper Tree (<i>Schinus molle</i> var. <i>areira</i>). These areas were mapped as exotic, providing any other vegetation were also exotic (i.e. cropping or exotic grassland).</p> <p>Exotic grassland was mapped where exotic grasses and forbs are abundant and native species coverage and/or diversity was low. Exotic species include Pale Pigeon Grass (<i>Setaria pumila</i>), Barnyard Grass (<i>Echinochloa crus-galli</i>), Flaxleaf Fleabane and Saffron Thistle. Typically, these areas had been ploughed, sown with exotic pasture species, and improved with fertiliser. Native species, where present, included grazing tolerant species, and was almost entirely limited to Rat's Tail Grass (<i>Sporobolus creber</i>).</p>
Justification of evidence used to identify the PCT	Not applicable
Status	Not listed
Estimate of percent cleared value of PCT	Not applicable

Attribute	Description
Photo	

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 credit calculator 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 6.7). Given this, the vegetation integrity scores for the vegetation zones within the additional lots and the Birriwa Bus Route South have been calculated independently.

A summary of the vegetation integrity score for the vegetation zones to be impacted within the additional lots and the Birriwa Bus Route South is provided in Table 4.8 and Table 4.9 respectively.

Table 4.8 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	66.2	18

Table 4.9 Summary of vegetation zones within Birriwa Bus Route South (ELA 2025)

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	65.3
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	34.9
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 4.10.

Table 4.10 Threatened ecological communities recorded in the subject land

Threatened Ecological Community	EPBC Act	BC Act	Associated PCTs and vegetation zones	Additional lots - direct impact (ha)	Birriwa Bus Route South - 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	66.2	0.18	66.38
			PCT 281: Woodland	0.0	1.38	1.38
Total area (ha)				66.2	2.85	69.05

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 Birriwa Bus Route South 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 Birriwa Bus Route South and this portion of the subject land was assessed independently, some species have been predicted to occur within Birriwa Bus Route South and not the additional lots. These species have been identified within Table 5.1.

Table 5.1 Assessment of ecosystem credit species within the subject land

Scientific name	Common name	Associated PCTs	Justification for exclusion
<i>Anthochaera phrygia</i>	Regent Honeyeater	281, 277	Not excluded
<i>Aphelocephala leucopsis</i> ¹	Southern Whiteface	277	Not excluded
<i>Artamus cyanopterus</i>	Dusky Woodswallow	281	Not excluded
<i>Callocephalon fimbriatum</i>	Gang-gang Cockatoo	281, 277	Not excluded
<i>Chalinolobus picatus</i>	Little Pied Bat	281	Not excluded
<i>Chthonicola sagittata</i>	Speckled Warbler	281, 277	Not excluded

Scientific name	Common name	Associated PCTs	Justification for exclusion
<i>Circus assimilis</i>	Spotted Harrier	281, 277	Not excluded
<i>Climacteris picumnus victoriae</i>	Brown Treecreeper (eastern subspecies)	281, 277	Not excluded
<i>Daphoenositta chrysoptera</i>	Varied Sittella	281, 277	Not excluded
<i>Dasyurus maculatus</i>	Spotted-tailed Quoll	281, 277	Not excluded
<i>Falco subniger</i>	Black Falcon	281, 277	Not excluded
<i>Falsistrellus tasmaniensis</i> ¹	Eastern False Pipistrelle	277	Not excluded
<i>Glossopsitta pusilla</i>	Little Lorikeet	281, 277	Not excluded
<i>Grantiella picta</i>	Painted Honeyeater	281, 277	Not excluded
<i>Haliaeetus leucogaster</i>	White-bellied Sea-Eagle	281, 277	Not excluded
<i>Hieraaetus morphnoides</i>	Little Eagle	281, 277	Not excluded
<i>Hirundapus caudacutus</i>	White-throated Needletail	281	Not excluded
<i>Lathamus discolor</i>	Swift Parrot	281, 277	Not excluded
<i>Lophoictinia isura</i>	Square-tailed Kite	281, 277	Not excluded
<i>Melanodryas cucullata cucullata</i>	South-eastern Hooded Robin	281, 277	Not excluded
<i>Melithreptus gularis gularis</i>	Black-chinned Honeyeater (eastern subspecies)	281, 277	Not excluded
<i>Miniopterus orianae oceanensis</i>	Large Bent-winged Bat	281, 277	Not excluded
<i>Neophema pulchella</i>	Turquoise Parrot	281, 277	Not excluded
<i>Petroica boodang</i>	Scarlet Robin	281, 277	Not excluded
<i>Petroica phoenicea</i>	Flame Robin	281, 277	Not excluded
<i>Polytelis swainsonii</i>	Superb Parrot	281, 277	Not excluded
<i>Pomatostomus temporalis temporalis</i>	Grey-crowned Babbler (eastern subspecies)	281, 277	Not excluded
<i>Pteropus poliocephalus</i>	Grey-headed Flying-fox	281, 277	Not excluded
<i>Saccolaimus flaviventris</i>	Yellow-bellied Sheath-tail-bat	281, 277	Not excluded
<i>Stagonopleura guttata</i>	Diamond Firetail	281, 277	Not excluded
<i>Varanus rosenbergi</i>	Rosenberg's Goanna	281	Not excluded

1. Species only predicted by the BAMC for Birriwa Bus Route South.

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 Birriwa Bus Route South and this portion of the subject land was assessed independently, some species have been predicted to occur within Birriwa Bus Route South 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	Habitat/geographic constraints	Constraint present in subject land?	Vagrant species?	Candidate species (yes/no) and rationale
Flora					
<i>Acacia ausfeldii</i>	Ausfeld's Wattle	-	-	N/A	Yes. Potential habitat occurs within the subject land. Associated species include <i>Eucalyptus albens</i> , <i>E. blakelyi</i> and <i>Callitris spp.</i> , with an understorey dominated by <i>Cassinia spp.</i> and grass.
<i>Ammobium craspedioides</i> ¹	Yass Daisy	South of Cowra.	-	N/A	No. The subject land is not located South of Cowra.
<i>Cullen parvum</i> ¹	Small scurf-pea	-	-	N/A	Yes. Associated with Box Gum Woodland.
<i>Dichanthium setosum</i>	Bluegrass	-	-	N/A	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.
<i>Euphrasia arguta</i>	-	-	-	N/A	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	Habitat/geographic constraints	Constraint present in subject land?	Vagrant species?	Candidate species (yes/no) and rationale
<i>Pomaderris cotoneaster</i>	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	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. Therefore, there is no habitat for this species in the DNG. The exotic pastureland was similarly ruled out. The smaller, better condition wooded areas of PCT 281_poor may provide suitable habitat for this species and will be retained.
<i>Prasophyllum petilum</i>	Tarengo Leek Orchid	-	-	N/A	Yes. Subject land contains potential habitat of grassy ground layer containing areas of Kangaroo Grass under Box-Gum Woodland.
<i>Prasophyllum sp. Wybong</i>	-	-	-	N/A	Yes. Subject land contains suitable habitat of open eucalypt woodland and grassland.
<i>Swainsona recta</i> ¹	Small Purple-pea	-	-	N/A	Yes. Found in grasslands and grassy woodlands in association with <i>Eucalyptus blakelyi</i> and <i>E. melliodora</i> .
<i>Swainsona sericea</i>	Silky Swainson-pea	-	-	N/A	Yes. Species is associated with Box Gum Woodland, which occurs within the subject land.

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	Habitat/geographic constraints	Constraint present in subject land?	Vagrant species?	Candidate species (yes/no) and rationale
Fauna					
<i>Anthochaera phrygia</i>	Regent Honeyeater (Breeding)	As per Important Habitat Map.	No	N/A	No. The subject land is not within mapped important habitat.
<i>Aprasia parapulchella</i>	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.
<i>Burhinus grallarius</i>	Bush Stone-curlew	Fallen/standing dead timber including logs.	Yes	No	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.
<i>Callocephalon fimbriatum</i>	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	No. No suitable breeding hollows were located within the subject land. Wooded areas of PCT 281 are to be retained.
<i>Cercartetus nanus</i> 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).
<i>Chalinolobus dwyeri</i>	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	Yes. Roosting/breeding: Microhabitats are absent in the subject land (Section 5.2.3 (2)(a)(i) of the BAM), but possible within 2 km (Barney's Reef). Foraging: Foraging habitat occurs within Birriwa Bus Route South. Microhabitats in the additional lots are degraded (Section 5.2.3 (2)(a)(ii) of the BAM): DNG does not provide 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	Habitat/geographic constraints	Constraint present in subject land?	Vagrant species?	Candidate species (yes/no) and rationale
					<p>Barney's Reef rock formation occurs less than 2 km from the most southern extent of the subject land, associated with the ridgeline to the south. There will be no direct disturbance to these potential breeding and roosting areas.</p> <p>In accordance with the BAMC, NSW BioNet Threatened Biodiversity Data Collection (TBDC) and '<i>Species credit' threatened bats and their habitat: NSW survey guide for the Biodiversity Assessment Method</i> (OEH 2018), a 2 km buffer has been applied to the identified ridgeline to determine native vegetation that would represent potential foraging/hunting habitat for the species. It is considered unlikely that the species would hunt in the open exotic pastureland, exotic trees or the DNG vegetation zone of PCT 281 within the subject land which are intersected by the 2 km buffer from the ridgeline.</p> <p>The exotic pastureland and DNG vegetation zone of PCT 281 have been excluded as they are considered degraded in accordance with Section 5.2.3 (2) (a) (i) of the BAM (DPIE 2020), and Section 2.3 of '<i>Species credit' threatened bats and their habitat: NSW survey guide for the Biodiversity Assessment Method</i> (OEH 2018), as follows:</p> <p>The TBDC describes the following for the species habitat and ecology:</p> <p>Roosts in caves (near their entrances), crevices in cliffs, old mine workings and in the disused, bottle-shaped mud nests of the Fairy Martin (<i>Petrochelidon ariel</i>), frequenting low to mid-elevation dry open forest and woodland close to these features. Females have been recorded raising young in maternity roosts (c. 20–40 females) from November through to January in roof domes in sandstone caves and overhangs. They remain loyal to the same cave over many years.</p> <p>Found in well-timbered areas containing gullies.</p> <p>The relatively short, broad wing combined with the low weight per unit area of wing indicates manoeuvrable flight. This species probably forages for small, flying insects below the forest canopy (OEH 2025a).</p> <p>The habitat and micro habitats on which the species depend are sufficiently degraded such that the species is unlikely to use the exotic</p>

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	Habitat/geographic constraints	Constraint present in subject land?	Vagrant species?	Candidate species (yes/no) and rationale
					<p>pasture areas nor DNG vegetation zone of PCT 281 within the subject land.</p> <p>The small areas of woodland which do occur within the subject land are outside of the 2 km buffer and therefore have not been included as a species polygon.</p> <p>There is no potential breeding habitat within the subject land, or within 100 m of the subject land, therefore there will be no impact to breeding habitat for the species. Derelict buildings do occur within the subject land which may provide sub-optimal roosting habitat for the species.</p>
<i>Delma impar</i> ¹	Striped Legless Lizard	South of the Mid-Western Highway.			<p>No.</p> <p>The subject land is not located south of the Mid-Western Highway.</p>
<i>Haliaeetus leucogaster</i>	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	<p>Yes.</p> <p>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.</p>
<i>Hieraaetus morphnoides</i>	Little Eagle (Breeding)	Nest trees – live (occasionally dead) large old trees within vegetation.	Yes	No	<p>Yes.</p> <p>Potential nest trees occur within the subject land, however, targeted surveys were undertaken during the breeding season and no large stick nests were located.</p>
<i>Keyacris scurra</i> ¹	Key's Matchstick Grasshopper	N/A	N/A	No	<p>Yes.</p> <p>Potential to occur in higher condition vegetation zones.</p>
<i>Lathamus discolor</i>	Swift Parrot (Breeding)	As per Important Habitat Map.	No	No	<p>No.</p> <p>The subject land is not within mapped important habitat.</p>

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	Habitat/geographic constraints	Constraint present in subject land?	Vagrant species?	Candidate species (yes/no) and rationale
<i>Litoria booroolongensis</i>	Booroolong Frog	N/A	N/A	No	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.
<i>Lophoictinia isura</i>	Square-tailed Kite (Breeding)	Nest trees.	Yes	No	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.
<i>Miniopterus orianae oceanensis</i>	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. 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.

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	Habitat/geographic constraints	Constraint present in subject land?	Vagrant species?	Candidate species (yes/no) and rationale
<i>Myotis macropus</i>	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	<p>No.</p> <p>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.</p> <p>There are no hollow-bearing trees within the subject land, and therefore, despite the species being likely to use the farm dams, no species polygon can be created (in accordance with the BAM threatened bats survey guide).</p> <p>This species has not been assessed further.</p>
<i>Ninox connivens</i>	Barking Owl (Breeding)	Living or dead trees with hollows greater than 20 cm diameter and greater than 4 m above the ground.	No	No	<p>No.</p> <p>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.</p>
<i>Ninox strenua</i>	Powerful Owl (Breeding)	Living or dead trees with hollow greater than 20 cm diameter.	No	No	<p>No.</p> <p>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.</p>
<i>Petaurus norfolcensis</i>	Squirrel Glider	N/A	N/A	No	<p>No.</p> <p>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.</p>

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	Habitat/geographic constraints	Constraint present in subject land?	Vagrant species?	Candidate species (yes/no) and rationale
<i>Petaurus norfolcensis</i> - 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.
<i>Petrogale penicillata</i>	Brush-tailed Rock-wallaby	Land within 1 km of rocky escarpments, gorges, steep slopes, boulder piles, rock outcrops or cliff lines.	No	No	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.
<i>Phascogale tapoatafa</i>	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	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.
<i>Phascolarctos cinereus</i>	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	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	Habitat/geographic constraints	Constraint present in subject land?	Vagrant species?	Candidate species (yes/no) and rationale
<i>Polytelis swainsonii</i>	Superb Parrot (Breeding)	Living or dead <i>E. blakelyi</i> , <i>E. melliodora</i> , <i>E. albens</i> , <i>E. camaldulensis</i> , <i>E. microcarpa</i> , <i>E. polyanthemos</i> , <i>E. mannifera</i> , <i>E. intertexta</i> 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	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.
<i>Pteropus poliocephalus</i>	Grey-headed Flying-fox (Breeding)	Breeding camps	No	No	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.
<i>Synemon plana</i> ¹	Golden Sun Moth	South of the Mid-Western Highway. Wallaby grass (<i>Rytidosperma</i> sp), Speargrass (<i>Austrostipa</i> sp) or Chilean needlegrass (<i>Nassella neesiana</i>)			No. The subject land is not located south of the Mid-Western Highway.
<i>Tyto novaehollandiae</i>	Masked Owl (Breeding)	Hollow bearing trees Living or dead trees with hollows greater than 20 cm diameter.	-	-	No. Habitat constraints. The subject land does not contain living or dead trees with hollows greater than 20 cm diameter. However, owl surveys and nocturnal stag watches were conducted within the study area as a precaution.

1. Species only predicted for the Birriwa Bus Route South 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 Birriwa Bus Route South and this portion of the subject land was assessed independently. As such, some species have been identified as requiring further assessment within Birriwa Bus Route South and not the additional lots. A list of species requiring further assessment for the additional lots and Birriwa Bus Route South 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
<i>Acacia ausfeldii</i>	Ausfeld's Wattle	-	Vulnerable	Flora
<i>Chalinolobus dwyeri</i>	Large-eared Pied Bat	Endangered	Endangered	Fauna
<i>Dichanthium setosum</i>	Bluegrass	Vulnerable	Vulnerable	Flora
<i>Euphrasia arguta</i>	-	Critically endangered	Critically endangered	Flora
<i>Haliaeetus leucogaster</i>	White-bellied Sea-eagle	-	Vulnerable	Fauna
<i>Hieraaetus morphnoides</i>	Little Eagle	-	Vulnerable	Fauna
<i>Lophoictinia isura</i>	Square-tailed Kite	-	Vulnerable	Fauna
<i>Prasophyllum petilum</i>	Tarengo Leek Orchid	Endangered	Endangered	Flora
<i>Prasophyllum sp. Wybong</i>	-	Critically endangered	-	Flora
<i>Swainsona sericea</i>	Silky Swainson-pea	-	Vulnerable	Flora

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
<i>Acacia ausfeldii</i>	Ausfeld's Wattle	-	Vulnerable	Flora
<i>Burhinus grallarius</i>	Bush Stone-curlew	-	Endangered	Fauna
<i>Callocephalon fimbriatum</i>	Gang-gang Cockatoo	Endangered	Vulnerable	Fauna
<i>Cercartetus nanus</i>	Eastern Pygmy-possum	-	Vulnerable	Fauna
<i>Chalinolobus dwyeri</i>	Large-eared Pied Bat	Endangered	Endangered	Fauna
<i>Cullen parvum</i>	Small Scurf-pea	-	Endangered	Flora
<i>Dichanthium setosum</i>	Bluegrass	Vulnerable	Vulnerable	Flora
<i>Euphrasia arguta</i>	Euphrasia arguta	Critically endangered	Critically endangered	Flora
<i>Haliaeetus leucogaster</i>	White-bellied Sea-Eagle	-	Vulnerable	Fauna
<i>Hieraaetus morphnoides</i>	Little Eagle	-	Vulnerable	Fauna

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

5.3.3 Targeted survey methods

As discussed above, the additional lots and the Birriwa Bus Route South were assessed independently, and some species have been identified as requiring further assessment within Birriwa Bus Route South and not the additional lots. As such, the species targeted during surveys and the targeted survey methods conducted differ between the portions of the subject land.

The targeted survey methods conducted within the additional lots is detailed in the following sections. For details on the targeted survey methods conducted within the Birriwa Bus Route South, refer to section 4.5 of Attachment A.

i Targeted flora surveys

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 5.3.4). 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
<i>Acacia ausfeldii</i>	Ausfeld’s Wattle	August-October	10-11 October 2023 3 September 2024
<i>Dichanthium setosum</i>	Bluegrass	November-May	23-25 January 2024 20-22 May 2024
<i>Euphrasia arguta</i>	–	November-March	23-25 January 2024
<i>Prasophyllum petilum</i>	Tarengo Leek Orchid	September-December	10-11 October 2023 3 September 2024
<i>Prasophyllum</i> sp. <i>Wybong</i>	–	September-October	10-11 October 2023 3 September 2024
<i>Swainsona sericea</i>	Silky Swainson-pea	September-November	10-11 October 2023 3 September 2024

ii Targeted fauna surveys

Targeted surveys in the additional lots were conducted for potential breeding habitat for birds of prey by identifying any large stick nests. Although woodland areas outside of the additional lots are to be retained, isolated paddock trees within the additional lots may be removed to facilitate the project.

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 5.6 and Table 5.7 . 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.

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 5.6.

Table 5.6 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	<ul style="list-style-type: none"> • 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. 	<p>DEC (2004) has not resolved bird survey requirements and does not provide guidance on survey effort. DSEWPaC (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.</p> <p>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.</p>
Targeted nest searches 10 and 11 October 2024 22 and 23 January 2024 3 September 2024	<ul style="list-style-type: none"> • 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. 	<p>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.</p> <p>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.</p>

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 5.7. The three hollow bearing trees that were stag watched during the nocturnal bird surveys are shown on Figure 5.1.

Table 5.7 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	<p>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.</p> <p>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.</p> <p>DEC (2004) suggests stag watching potential roost hollows (for 30 minutes prior to sunset and 60 minutes after sunset).</p>	<p>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.</p> <p>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.</p>

5.3.4 Targeted survey results

Whilst the additional lots and Birriwa Bus Route South have been assessed independently, the results of targeted surveys conducted across the entire subject land have been compiled 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 Birriwa Bus Route South (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 Birriwa Bus Route South 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 5.8 (reproduced from ELA 2025).

Table 5.8 Microbat species recorded within the Birriwa Bus Route South (ELA 2025)

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

iii Candidate species presence, extent and habitat quality

Table 5.9 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).

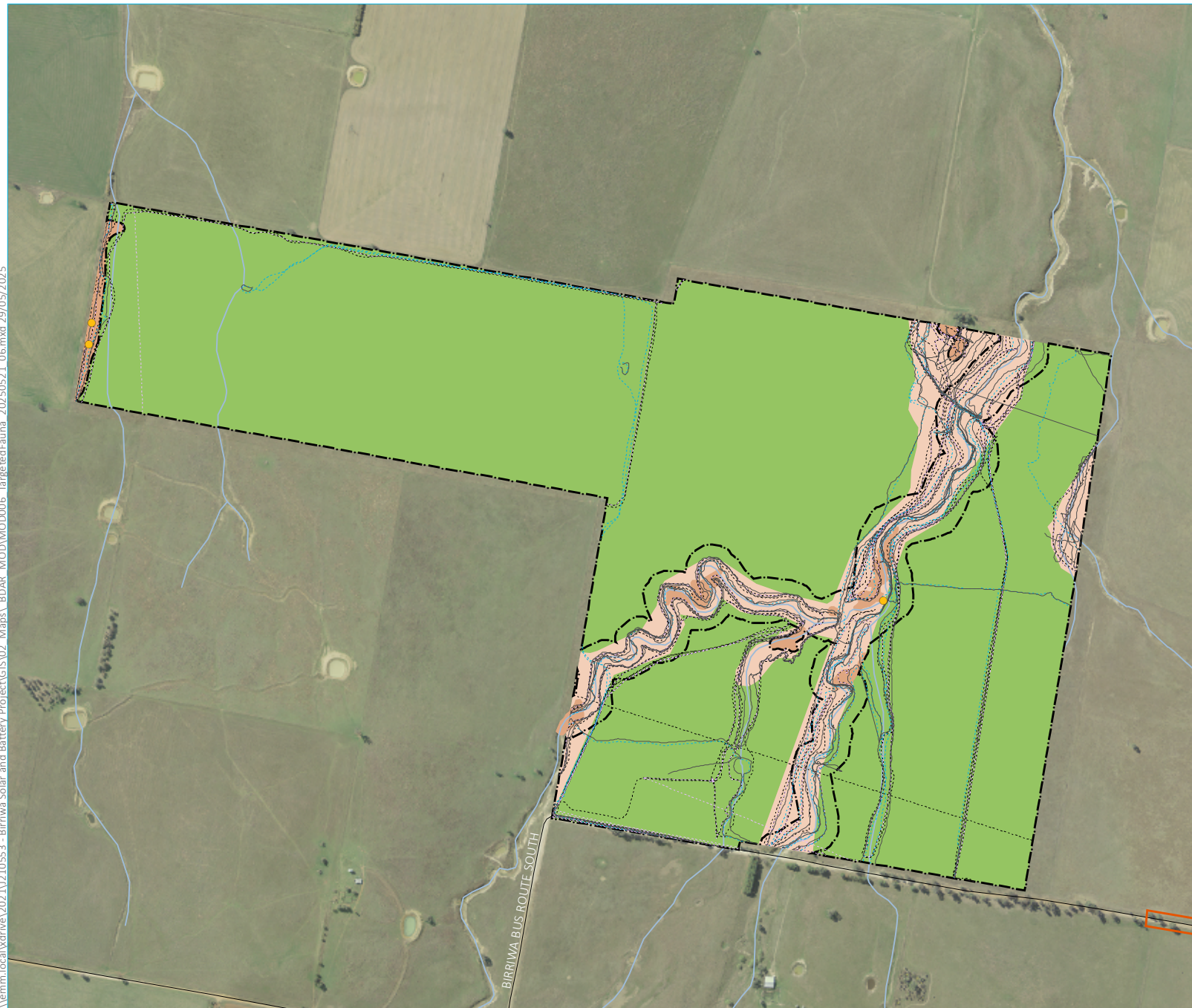
Table 5.9 Candidate species presence, extent and habitat quality

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
<i>Acacia ausfeldii</i>	Ausfeld's Wattle	Not recorded	-	-	-	-
<i>Burhinus grallarius</i>	Bush Stone-curlew	Not recorded	-	-	-	-
<i>Callocephalon fimbriatum</i>	Gang-gang Cockatoo	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
<i>Cercartetus nanus</i>	Eastern Pygmy-possum	Not recorded	-	-	-	-
<i>Chalinolobus dwyeri</i>	Large-eared Pied Bat	Breeding habitat not recorded	-	-	-	-
<i>Cullen parvum</i>	Small Scurf-pea	Not recorded	-	-	-	-
<i>Dichanthium setosum</i>	Bluegrass	Not recorded	-	-	-	-
<i>Euphrasia arguta</i>	-	Not recorded	-	-	-	-
<i>Haliaeetus leucogaster</i>	White-bellied Sea-eagle	Not recorded	-	-	-	-
<i>Hieraetus morphnoides</i>	Little Eagle	Not recorded	-	-	-	-
<i>Keyacris scurra</i>	Key's Matchstick Grasshopper	Not recorded	-	-	-	-
<i>Lophoictinia isura</i>	Square-tailed Kite	Not recorded	-	-	-	-
<i>Myotis macropus</i>	Southern Myotis	Potentially recorded	-	0.96	281_Woodland	58.1
			-	0.23	277_Woodland	42.3
			-	0.06	281_DNG	59.1
			-	0.47	277_DNG	35.8
			-	28.12	281_DNG	18
<i>Ninox connivens</i>	Barking Owl	Not recorded	-	-	-	-
<i>Ninox strenua</i>	Powerful Owl	Not recorded	-	-	-	-
<i>Petaurus norfolcensis</i>	Squirrel Glider	Not recorded	-	-	-	-
<i>Phascogale tapoatafa</i>	Brush-tailed Phascogale	Not recorded	-	-	-	-
<i>Phascolarctos cinereus</i>	Koala	Not recorded	-	-	-	-
<i>Polytelis swainsonii</i>	Superb Parrot	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
<i>Pomaderris cotoneaster</i>	Cotoneaster Pomaderris	Not recorded	-	-	-	-
<i>Prasophyllum petilum</i>	Tarengo Leek Orchid	Not recorded	-	-	-	-
<i>Prasophyllum</i> sp. <i>Wybong</i>	-	Not recorded	-	-	-	-
<i>Swainsona recta</i>	Small Purple-pea	Not recorded	-	-	-	-
<i>Swainsona sericea</i>	Silky Swainson-pea	Not recorded	-	-	-	-
<i>Tyto novaehollandiae</i>	Masked Owl	Recorded	-	0.58	281_Woodland	58.1
			-	0.22	277_Woodland	42.3
			-	0.14	281_DNG	59.1
			-	0.05	277_DNG	35.8

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KEY

- Subject land
- Birriwa Bus Route South (Assessed by ELA)
- Hollow- bearing tree (and stag watch location)
- Track
- Targeted flora survey
 - October 2023
 - January 2024
 - May 2024
 - September 2024
- Existing environment
 - Minor road
 - Watercourse/drainage line
 - Pasture, exotic grassland
- Plant community type
 - 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
 - Low
 - Derived native grassland (DNG)

Note: Birriwa Bus Route South was surveyed by ELA

Targeted survey method and results (EMM) Page 1 of 2

Birriwa Solar Farm Modification
Biodiversity Development Assessment Report
Figure 5.1



- KEY**
- Subject land
 - Birriwa Bus Route South (Assessed by ELA)
 - Track
 - Targeted flora survey**
 - October 2023
 - January 2024
 - May 2024
 - September 2024
 - Existing environment**
 - Minor road
 - Watercourse/drainage line
 - Pasture, exotic grassland
 - Exotic (planted vegetation)
 - Plant community type**
 - 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)
- Note:** Birriwa Bus Route South was surveyed by ELA

Targeted survey method and results (EMM)
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Birriwa Solar Farm Modification
Biodiversity Development Assessment Report
Figure 5.1



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

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Part B

Impact assessment

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, indirect and prescribed impacts

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

- direct impacts:
 - loss of native vegetation (derived native grassland only)
 - loss and degradation of native fauna habitats
- indirect impacts:
 - erosion and sedimentation
 - weed introduction and spread
 - feral animal invasion into retained habitats
 - potential inadvertent disturbance of retained habitats
 - removal of habitat resources for threatened fauna
 - increased noise, vibration and dust levels resulting in disturbance of fauna species, and consequent abandonment of habitat, or changes in behaviour (including breeding behaviour)
 - lighting for night works, resulting in disturbance to fauna species and changes in occupancy or behaviour.

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.

6.2 Prescribed impacts

An assessment of prescribed impacts is provided in Table 6.1.

Table 6.1 Prescribed impact assessment

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	<input type="checkbox"/> Yes/ <input checked="" type="checkbox"/> No	Cliffs and rocky areas occur approximately 1.3 km south, outside of the subject land.	No disturbance to habitat for cave dwelling species.	<ul style="list-style-type: none"> • Large-eared Pied Bat • Large Bent-winged Bat • Eastern Cave Bat • Brush-tailed Rock Wallaby
Human-made structures	<input checked="" type="checkbox"/> Yes/ <input type="checkbox"/> No	Small building	Demolition of roosting site for microbats.	No species are considered likely to be dependent on this feature. Microbats may roost in it from time to time.
Non-native vegetation	<input checked="" type="checkbox"/> Yes/ <input type="checkbox"/> No	Mature planted Peppercorn shrubs/trees. Areas of pasture/exotic grassland.	Nil. Unlikely to provide any habitat.	None identified
Habitat connectivity	<input checked="" type="checkbox"/> Yes/ <input type="checkbox"/> No	Riparian corridor along creek that flows through the study area and links to the 1,500 m assessment area. The vegetation within Birriwa Bus Route South provides connectivity through along the road corridor.	Disturbance of spring feeding creek likely to threaten riparian corridor health. Removal of vegetated corridor preventing movement between patches of habitat for less mobile fauna species.	None identified
Waterbodies, water quality and hydrological processes	<input type="checkbox"/> Yes/ <input checked="" type="checkbox"/> No	Several drainage lines intersect with the subject land; however, these are all ephemeral in nature and do not support riparian vegetation.	Riparian areas to be avoided.	None identified
Wind farm development	<input type="checkbox"/> Yes/ <input checked="" type="checkbox"/> No	N/A	No wind farm proposed on site.	N/A
Vehicle strikes	<input checked="" type="checkbox"/> Yes/ <input type="checkbox"/> No	N/A	No new roads required for proposed development, though increased traffic during construction activities will occur.	N/A

6.3 Avoidance, minimisation and management

6.3.1 Avoidance and minimisation strategy

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 PCTs 277 and 281 have been retained where possible, limiting impacts to threatened fauna species within the locality.

Key avoidance measures that have been implemented by ACEN comprise:

- placement of the additional lots entirely within areas of native and exotic grassland
- avoidance of 3.45 ha of PCTs 277 and 281 within the Birriwa Bus Route South, which conform to the BC Act 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
- avoidance of 3.45 ha of PCTs 277 and 281 within the Birriwa Bus Route South, which provides potential habitat for threatened fauna species within the locality, inclusive of foraging habitat for Masked Owl and Southern Myotis
- avoidance of threatened species habitat, including hollow-bearing trees
- public road crossings have been located within the subject land within areas of minimal vegetation, thereby avoiding the need to remove vegetation for these crossings
- refinements to the modification design to avoid impacts to watercourses. Two third order streams within the study area have been excluded from the subject land, thereby avoiding impacts to any associated 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).

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. The modification initially encompassed approximately 88.9 ha of PCT 281, including wooded areas. However, the final design has minimised impacts to the TEC by avoiding 3.45 ha of PCTs 277 and 281 along Birriwa Bus Route South. Accordingly, the reduction in impact on Box Gum Woodland and derived native grassland also reduces the impact on native flora and fauna habitat. Table 6.2 summarises the avoidance and minimisation measures to minimise the potential for development-related impacts on biodiversity.

Table 6.2 Suggested impact avoidance and minimisation strategy

Impact	Action	Intended outcome	Timing	Responsibility
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.	Design	The Applicant
	Following construction, include species of PCT 281 into landscaping.	Increase the floristic and structural diversity present in the subject land to be consistent with PCT 281.	Post-construction	Site manager Project ecologist Bush regeneration team leader
Reduction in or disturbance of potential habitat for threatened fauna	Project designed to avoid canopied areas of Box Gum Woodland	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.	Mitigate injury to potential fauna species inhabiting man-made structures.	Pre-construction	Site manager Project ecologist
	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.	Mitigate indirect impacts to fauna inhabiting retained and/or adjacent habitat.	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. Lights associated with operation will be positioned to avoid light spill into surrounding habitat.	Minimise indirect impacts to fauna inhabiting retained and/or adjacent habitat.	Construction Post-construction	Site manager Project ecologist
Reduction in potential habitat for threatened flora	Project designed to avoid canopied areas of Box Gum Woodland	Minimise impact on potential threatened flora habitat resulting from the project.	Design	The Applicant
Removal of logs and debris from the subject land	Retain hollow logs and debris to be used 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
Loss of riparian habitat and connectivity within the locality	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

Impact	Action	Intended outcome	Timing	Responsibility
Indirect impacts on native vegetation to be retained including Box Gum Woodland to be retained	All workers to be made aware of ecologically sensitive areas and the need to avoid impacts. This includes adjacent native vegetation. Temporary fencing or signage is to be placed at the edges of areas of vegetation to be retained.	Avoid unintentional impacts to Box Gum Woodland and other native vegetation.	Pre-construction	The Applicant Site manager
	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	
Erosion and sedimentation	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
Weed introduction and spread	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.	Pre-construction	The Applicant Site manager
	Weed hygiene protocols are in place prior to entering the subject land. This includes wash-down procedures to all plant and machinery.		Construction	
	St. Johns Wort (<i>Hypericum perforatum</i>) are to be managed as per the <i>Biosecurity Act 2015</i> 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.			

Impact	Action	Intended outcome	Timing	Responsibility
	A Biodiversity Management Plan (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.			
Dust disturbance	Monitor dust levels and implement suppression strategies where required such as wetting down dirt roads or reducing vehicles speeds.	Reduce dust settlement on native vegetation and habitat for native species.	Construction	The Applicant Site manager
Vehicle strike on fauna	Development of a Construction Traffic Management Plan (CTMP) including construction speed limits, reductions to driving at night, and wildlife awareness training to minimise risk of vehicle strike during the construction phase when there is expected to be an increase in traffic movements.	Mitigate risk of prescribed impact of vehicle strike on threatened species and other native fauna during construction.	Construction	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.

6.3.2 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 6.3).

Table 6.3 Adaptive management strategy

Uncertain biodiversity impact	Project Component	Response	Trigger for management
Indirect impacts on retained Box Gum Woodland	Solar and BESS development	Protective fencing (e.g. parawebbing) will be placed around retained areas of PCT 281_poor for protection during construction, where required. The condition of the fencing will be monitored to ensure vegetation is not impacted. The condition of the Box Gum Woodland will be assessed prior and following construction to determine if any impacts have occurred.	Protective fencing is breached (where installed). The health of the Box Gum Woodland declines when compared to baseline assessment

Uncertain biodiversity impact	Project Component	Response	Trigger for management
Impacts on potential roosting habitat in buildings for threatened microbats	Solar and BESS development	<p>A buffer zone will be enforced around any derelict buildings suspected to have the potential to host threatened microbats.</p> <p>A pre-clearance inspection will be conducted prior to the demolition of any potential roosting buildings to determine the presence of threatened microbats.</p>	Roosting habitat is disturbed, and population of local threatened microbat species is impacted, leading to potential decline.

6.4 Serious and Irreversible Impacts

An impact is to be regarded as serious and irreversible (SAIL) 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.

Candidate SAIL entities are listed in Table 6.4, along with the relevant principles for the listing of the SAIL entity, based on information from the Threatened Biodiversity Data Collection (TBDC).

Table 6.4 Candidate SAIL entities for the modification

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

6.4.1 Threatened ecological communities

i White Box – Yellow Box – Blakely’s Red Gum Grassy Woodland and Derived Native Grassland Critically Endangered Ecological Community

As discussed in Section 1.5.1, the additional lots and Birriwa Bus Route South were assessed independently. The assessment of vegetation within the additional lots identified one PCT and vegetation zone to be impacted by the project, being PCT 281 in a DNG condition. The assessment of vegetation with Birriwa Bus Route South identified two PCTs, being PCT 277 and PCT 281, each containing two vegetation zones, DNG and woodland.

Given the additional lots and Birriwa Bus Route South have been assessed independently based on the vegetation assessment conducted within each portion of the subject land, the two SAI assessments that have been prepared for the *White Box – Yellow Box – Blakely’s Red Gum Grassy Woodland and Derived Native Grassland Critically Endangered Ecological Community* have been retained as separate assessments and are provided below.

The SAI assessment prepared by EMM for the additional lots is provided in Table 6.5 and Table 6.6. Table 6.5 provides details of the current status of *White Box – Yellow Box – Blakely’s Red Gum Grassy Woodland and Derived Native Grassland Critically Endangered Ecological Community* (referred to below as Box Gum Woodland CEEC) and Table 6.6 provides details as required under the SAI assessment criteria.

The SAI assessment prepared by ELA for the Birriwa Bus Route South has been reproduced in Table 6.7.

Table 6.5 **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 threatened ecological community (TEC) in NSW	<p>White Box – Yellow Box – Blakely’s Red Gum Grassy Woodland and Derived Native Grassland has undergone a very large reduction in geographic distribution.</p> <p>The best estimate of the extent of occurrence (EOO) is 702,800 km², based on a minimum convex polygon enclosing likely occurrences of the community. The best estimate of the area of occupancy (AOO) is 151,100 km².</p>	<ul style="list-style-type: none"> • 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	<p>Approximately greater than 90% reduction in pre-1750 distribution.</p> <p>According to the NSW TSSC (2020):</p> <ul style="list-style-type: none"> • 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. 	<ul style="list-style-type: none"> • 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.	<p>The Threatened Biodiversity Profile description (BCS 2025b) lists the following threats affecting the ecological function of the TEC:</p> <ul style="list-style-type: none"> • 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 groundlayer in box-gum woodland remnants where trees have been partially or fully removed • altered fire regimes <p>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.</p>	<ul style="list-style-type: none"> • 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	<p>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:</p> <ul style="list-style-type: none"> • A geographically or ecologically distinct area in which a single threatening event can rapidly affect all occurrences of an ecosystem type. <p>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.</p> <p>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:</p> <ul style="list-style-type: none"> • the leasehold Western Division of New South Wales • the freehold Central Division and Eastern Division of New South Wales. <p>An alternative interpretation of threat-defined locations based on biogeographical regions (bioregions) would produce an estimate of six threat-defined locations.</p>	<ul style="list-style-type: none"> • 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.

Table 6.6 **Impact assessment of Box Gum Woodland CEEC for the additional lots**

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 additional lots would impact on 66.2 ha of the TEC in a DNG form.	-	-
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 additional lots would impact on 0.0000094% 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 additional lots would result in the removal of 66.2 ha of the TEC in DNG form, which is 0.0000094% 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 6.2 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 the size of isolated areas of TEC (ha)	The project will result in the removal of 2.85 ha of the TEC which is 0.000004% of its current extent. The vegetation within the BBRS Study Area is highly disturbed and modified. Much of the surrounding landscape as per SVTM identifies the areas as PCT 0.	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 in excess of 100 m. This TEC is very fragmented in the locality by vast areas of cropping and exotic grassland.	-	-
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	According to Corlett (2009), typical maximum dispersal distances for different dispersal mechanisms are as follows:	Corlett 2009 Booth 2017	-

Criteria	Data/ information	Data sources	Details of data deficiency, assumptions, reasons for low confidence in information
flora species associated with the TEC (km)	<ul style="list-style-type: none"> • 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 <p>Eucalyptus spp. (including <i>Eucalyptus blakelyi</i> 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).</p> <p>Native flora species associated with Box Gum Woodland CEEC (as identified in NSW TSSC 2020) include:</p> <ul style="list-style-type: none"> • <i>Acacia dealbata</i> • <i>Acacia filicifolia</i> • <i>Acacia implexa</i> • <i>Acacia mearnsii</i> • <i>Acaena agnipila</i> • <i>Acaena ovina</i> • <i>Ajuga australis</i> • <i>Angophora floribunda</i> • <i>Anthosachne scabra</i> • <i>Aristida behriana</i> • <i>Aristida jerichoensis</i> • <i>Aristida latifolia</i> • <i>Aristida ramoda</i> • <i>Asperula conferta</i> • <i>Austrostipa aristiglumis</i> 		

Criteria	Data/ information	Data sources	Details of data deficiency, assumptions, reasons for low confidence in information
	<ul style="list-style-type: none"> • <i>Austrostipa blackii</i> • <i>Austrostipa densiflora</i> • <i>Austrostipa nodosa</i> • <i>Austrostipa scabra</i> • <i>Bothriochlora macra</i> • <i>Brachychiton populneus</i> • <i>Brunoniella australis</i> • <i>Bulbine spinosa</i> • <i>Bursaria spinosa</i> • <i>Callitris glaucophylla</i> • <i>Cheilanthes sieberi</i> • <i>Chloris ventricosa</i> • <i>Chrysocephalum apiculatum</i> • <i>Chrysocephalum semipapposum</i> • <i>Convolvulus</i> spp. • <i>Cymbonotus lawsonianus</i> • <i>Cymbopogon refractus</i> • <i>Cynoglossum suaveolens</i> • <i>Desmodium varians</i> • <i>Dianella longifolia</i> • <i>Dichanthium sericeum</i> • <i>Dichondra</i> spp. • <i>Dichopogon fimbriatus</i> • <i>Einadia nutans</i> • <i>Eremophila debilis</i> • <i>Eucalyptus albens</i> • <i>Eucalyptus blakelyi</i> • <i>Eucalyptus bridgesiana</i> • <i>Eucalyptus macrorhyncha</i> • <i>Eucalyptus melliodora</i> • <i>Eucalyptus moluccana</i> 		

Criteria	Data/ information	Data sources	Details of data deficiency, assumptions, reasons for low confidence in information
	<ul style="list-style-type: none"> • <i>Eucalyptus polyanthemos</i> • <i>Eucalyptus rubida</i> • <i>Euchiton involucratum</i> • <i>Euchiton sphaericus</i> • <i>Euphorbia drummondii</i> • <i>Exocarpos cupressiformis</i> • <i>Galium spp.</i> • <i>Geranium retrorsum</i> • <i>Geranium solanderi</i> • <i>Glycine spp.</i> • <i>Gonocarpus elatus</i> • <i>Gonocarpus tetragynus</i> • <i>Goodenia bellidifolia</i> • <i>Goodenia hederacea</i> • <i>Goodenia pinnatifida</i> • <i>Hydrocotyle laxiflora</i> • <i>Hypericum gramineum</i> • <i>Jacksonia scoparia</i> • <i>Jasminum suavissimum</i> • <i>Leptorhynchos squamatus</i> • <i>Lissanthe strigosa</i> • <i>Lomandra filiformis</i> • <i>Lomandra multiflora</i> • <i>Melichrus urceolatus</i> • <i>Microlaena stipoides</i> • <i>Microseris lanceolata</i> • <i>Microtis unifolia</i> • <i>Notelaea microcarpa</i> • <i>Olearia elliptica</i> • <i>Opercularia aspera</i> • <i>Oxalis perennans</i> 		

Criteria	Data/ information	Data sources	Details of data deficiency, assumptions, reasons for low confidence in information
	<ul style="list-style-type: none"> • <i>Panicum effusum</i> • <i>Plantago debilis</i> • <i>Plantago gaudichaudii</i> • <i>Plantago varia</i> • <i>Poa labillardieri</i> • <i>Poa sieberiana</i> • <i>Poranthera microphylla</i> • <i>Ranunculus lappaceus</i> • <i>Rostellularia adscendens</i> • <i>Rubus parvifolius</i> • <i>Rumex brownii</i> • <i>Rytidosperma auriculatum</i> • <i>Rytidosperma pilosum</i> • <i>Rytidosperma racemosum</i> • <i>Rytidosperma setaceum</i> • <i>Schoenus apogon</i> • <i>Scleranthus biflorus</i> • <i>Sida corrugata</i> • <i>Solengyne gunnii</i> • <i>Sorghum leiocladum</i> • <i>Sporobolus creber</i> • <i>Stackhousia monogyna</i> • <i>Stackhousia viminea</i> • <i>Stellaria pungens</i> • <i>Swainsona galegifolia</i> • <i>Templetonia stenophylla</i> • <i>Themeda triandra</i> • <i>Tricoryne elatior</i> • <i>Velleia paradoxa</i> • <i>Veronica plebeia</i> • <i>Wahlenbergia communis</i> 		

Criteria	Data/ information	Data sources	Details of data deficiency, assumptions, reasons for low confidence in information														
	<ul style="list-style-type: none">• <i>Wahlenbergia luteola</i>• <i>Wahlenbergia planiflora</i>• <i>Wurmbea dioica</i>• <i>Xerochrysum viscosum</i> <p>The additional lots contains characteristic grass species of the TEC in the genera <i>Aristida</i> and <i>Austrostipa</i> and are likely to be animal-dispersed and capable of dispersing between 1 and 10 km. The grasses in the genera <i>Bothriochloa</i> 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 and 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. <i>Themeda triandra</i> 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.</p> <p>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.</p>																
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.																
Vegetation integrity analysis	Vegetation integrity for the TEC within the additional lots is presented in the summary table below: <table><tr><th>Vegetation zone</th><th>Direct impacts (ha)</th><th>Indirect impacts (ha)</th><th>VI score</th><th>Composition score</th><th>Structure score</th><th>Function score</th></tr><tr><td>281_DNG</td><td>6.2</td><td>0</td><td>18</td><td>36.9</td><td>55.2</td><td>2.9</td></tr></table>	Vegetation zone	Direct impacts (ha)	Indirect impacts (ha)	VI score	Composition score	Structure score	Function score	281_DNG	6.2	0	18	36.9	55.2	2.9	-	-
Vegetation zone	Direct impacts (ha)	Indirect impacts (ha)	VI score	Composition score	Structure score	Function score											
281_DNG	6.2	0	18	36.9	55.2	2.9											

Table 6.7 **Impact assessment of Box Gum Woodland CEEC in Birriwa Bus Route South (ELA 2025)**

Impact Assessment Provisions	Assessment
1. The action and measures taken to avoid the direct and indirect impact on the potential entity for an SAI	<p>Direct impacts could remove up to 2.85 ha of the TEC.</p> <p>The proposed subject land has been modified and evaluated numerous times to avoid Box Gum Woodland in its woodland form. All trees within the study area for Birriwa Bus Route South were geo-referenced by a surveyor to ensure the road design avoids removing trees where possible.</p> <p>The current design and layout affects less native vegetation and less TEC than the original concept plan for the road design. Engagement with Mid-Western Regional Council has informed design considerations that avoid impacts on some hollow bearing trees (HBTs) along the Birriwa Bus Route South.</p>
2a. Evidence of reduction in geographic distribution (Principle 1, clause 6.7(2)(a) BC Regulation) as the current total geographic extent of the TEC in NSW AND the estimated reduction in geographic extent of the TEC since 1970 (not including impacts of the proposal)	<p>The best estimate of the extent of occurrence (EOO) is 702,800 km² based on a polygon containing the likely community (NSW TSSC 2020). The best estimate of the area of occupancy (AOO) is 151,100 km². However, not all areas occupied by the community are covered by maps and there may be an underestimate of the true extent. For example, many areas mapped as PCT 0 (cleared) on the SVTM are DNG associated with Box Gum Woodland.</p> <p>It is estimated that the TEC has declined by 90% since pre 1750 distribution. The TSSC (2006) estimate that less than 5% of the original distribution remain. There is no estimate of vegetation extent as of 1970, therefore the decline between 1970 and 2024 cannot be estimated.</p>
<p>2b. Extent of reduction in ecological function for the TEC using evidence that describes the degree of environmental degradation or disruption to biotic processes (Principle 2, clause 6.7(2)(b) BC Regulation) indicated by:</p> <ul style="list-style-type: none"> i) change in community structure ii) change in species composition iii) disruption of ecological processes iv) invasion and establishment of exotic species v) degradation of habitat, and vi) fragmentation of habitat. 	<p>Threats to the TEC include habitat loss, degradation and fragmentation from agriculture, forestry, mining and residential development. Additional threats include overgrazing, cropping, weed invasion, feral pests, removal of ground layer and altered fire regimes (OEH 2025). These factors can degrade the ecological function of the TEC leading to condition states that vary depending upon the severity and mechanism of disturbance. Whether the resulting impacts represent a permanent or temporary loss depends on the extent of disturbance and the effectiveness of measures implemented to reverse the decline. Currently the extent of reduction in ecological function is unknown.</p> <p>The project will not impact ecological function outside of the proposed impact area. Measures will be implemented during pre-construction and construction phases to control potential impacts, such as the spread of invasive weed species ensuring the adjacent vegetation remains unaffected. Furthermore, the project will not lead to additional impacts on the quality or integrity of Box Gum Woodland outside of the proposed impact area.</p> <p>The project is not expected to cause direct or indirect fragmentation or isolation of Box Gum Woodland due to the already patchy distribution of this TEC within the landscape. Additionally, the vegetation proposed for removal does not serve as a critical linkage between habitats or vegetation areas. Consequently, the project will not disrupt connectivity or contribute to habitat isolation. These considerations demonstrate that the development has been designed to minimise impacts on the TEC both within and surrounding the study area for Birriwa Bus Route South.</p>

Impact Assessment Provisions	Assessment
<p>2c. Evidence of restricted geographic distribution (Principle 3, clause 6.7 (2) (c) BC Regulation), based on the TECs geographic range in NSW according to the:</p> <ul style="list-style-type: none"> i) extent of occurrence ii) area of occupancy, and iii) number of threat-defined locations. 	<p>Box Gum Woodland is not listed as being affected by Principle 3. The geographical distribution of the TEC is not restricted (NSW TSSC 2020) ranging over 700,00 km² from the Queensland border in the north, to the Victorian border in the south. In NSW it occurs in the North Coast, New England Tableland, Nandewar, Brigalow Belt South, Sydney Basin, South Eastern Highlands, NSW South Western Slopes, South East Corner and Riverina Bioregions (OEH 2025).</p> <ul style="list-style-type: none"> i) EOO is estimated 702,800 km² ii) AOO is estimated 151,000 km² iii) The BAM (2020) defines threat locations in terms of threatened species but does not mention TECs. According to the IUCN Red List of Ecosystem Categories and Criteria (IUCN 2017), a defined threat location is: a geographically or ecological distinct area in which a single threatening event can rapidly affect all occurrences of an ecosystem type. Land clearing for agriculture and development, conversion from native pastures to intensified cropping are likely to be the biggest factors defining the locations for threats to the TEC. This includes all leasehold and freehold land in the South Western Slopes Bioregion.
<p>2d. Evidence that the TEC is unlikely to respond to management (Principle 4, clause 6.7 (2) (d) BC Regulation).</p>	<p>The TEC is currently along roadsides with minimal management. Should the road upgrade associated with the project not occur, the TEC is unlikely to respond to management due to the restriction of road edges, continuous road maintenance and private property bordering each side.</p>
<p>3. Where the TBDC indicated that data is 'unknown' or 'data deficient' for a TEC for a criterion listed in subsection 9.1.1(2), the assessor must record this in the BDAR or BCAR.</p>	<p>No thresholds have been identified.</p>
<p>4a. The impact on the geographic extent of the TEC (Principles 1 and 2) by estimating the total area of the TEC to be impacted by the proposal:</p> <ul style="list-style-type: none"> i) in hectares, and ii) as a percentage of the current geographic extent of the TEC in NSW. 	<p>Birriwa Bus Route South will impact on 2.85 ha of the TEC. The best estimate of occurrence is 702,800km² (70,280,000 ha; NSW TSSC 2020) so therefore Birriwa Bus Route South will impact on 0.000004% of its current extent.</p>

Impact Assessment Provisions	Assessment																																			
<p>4b. The extent that the proposed impacts are likely to contribute to further environmental degradation or the disruption of biotic processes (Principle 2) of the TEC by:</p> <p>i) estimating the size of any remaining, but now isolated, areas of the TEC; including areas of the TEC within 500 m of the Development Footprint or equivalent area for other types of proposals</p> <p>describing the impacts on connectivity and fragmentation of the remaining areas of TEC measured by:</p> <ul style="list-style-type: none">– distance between isolated areas of the TEC, presented as the average distance if the remnant is retained AND the average distance if the remnant is removed as proposed, and– estimated maximum dispersal distance for native flora species characteristic of the TEC, and– other information relevant to describing the impact on connectivity and fragmentation, such as the area to perimeter ratio for remaining areas of the TEC as a result of the development <p>describing the condition of the TEC according to the vegetation integrity score for the relevant vegetation zone(s) (Section 4.3). The assessor must also include the relevant composition, structure and function condition scores for each vegetation zone.</p>	<p>Birriwa Bus Route South will result in the removal of 2.85 ha of the TEC which is 0.000004% of its current extent. The vegetation within the study area for Birriwa Bus Route South is highly disturbed and modified. Much of the surrounding landscape as per the SVTM identifies the areas as PCT 0.</p> <p>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.</p> <p>The dispersal ability of characteristic Eucalyptus spp. associated with the TEC is estimated to be 1 km although most seeds are distributed within 200 m from nearby trees (Booth 2017). Grasses can disperse by wind exceeding 1 km particularly within fragmented landscapes (Heydel et al. 2014).</p> <p>The project is unlikely to significantly increase the edge to area ratio of the remaining TEC given that these areas are already exposed to edge effects including weed encroachment.</p> <p>Vegetation integrity analysis for the TEC is presented below.</p>																																			
Vegetation integrity analysis	<p>Vegetation integrity for the TEC within the Birriwa Bus Route South is presented in the summary table below:</p> <table><tr><th>Vegetation zone</th><th>Direct impacts (ha)</th><th>Indirect impacts (ha)</th><th>VI score</th><th>Composition score</th><th>Structure score</th><th>Function score</th></tr><tr><td>277_DNG</td><td>0.72</td><td>0</td><td>35.8</td><td>45.3</td><td>57.5</td><td>17.5</td></tr><tr><td>277_Woodland</td><td>0.57</td><td>0</td><td>41.1</td><td>66.3</td><td>41</td><td>25.5</td></tr><tr><td>281_DNG</td><td>0.18</td><td>0</td><td>34.9</td><td>89.3</td><td>8.2</td><td>58.2</td></tr><tr><td>281_Woodland</td><td>1.38</td><td>0</td><td>65.3</td><td>83.2</td><td>61</td><td>54.8</td></tr></table>	Vegetation zone	Direct impacts (ha)	Indirect impacts (ha)	VI score	Composition score	Structure score	Function score	277_DNG	0.72	0	35.8	45.3	57.5	17.5	277_Woodland	0.57	0	41.1	66.3	41	25.5	281_DNG	0.18	0	34.9	89.3	8.2	58.2	281_Woodland	1.38	0	65.3	83.2	61	54.8
Vegetation zone	Direct impacts (ha)	Indirect impacts (ha)	VI score	Composition score	Structure score	Function score																														
277_DNG	0.72	0	35.8	45.3	57.5	17.5																														
277_Woodland	0.57	0	41.1	66.3	41	25.5																														
281_DNG	0.18	0	34.9	89.3	8.2	58.2																														
281_Woodland	1.38	0	65.3	83.2	61	54.8																														

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.

Table 6.8 provides a summary of the vegetation zones that do not trigger the above thresholds.

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 vegetation, and in the case of this assessment, those particularly associated with past grazing and cropping activities (Table 6.8).

Table 6.8 Summary of impacts not requiring offsets – non-native vegetation

Vegetation zone	PCT	Name	Area	Vegetation integrity score	Future vegetation integrity score	Change in vegetation integrity score	Credits required
2	N/A	Exotic Pastureland and exotic planted	145.3	NA	NA	NA	0

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

Impacts to native vegetation requiring offsets include:

- direct impacts to 1.29 ha of PCT 277 – Blakely’s Red Gum - Yellow Box grassy tall woodland of the NSW South Western Slopes Bioregion, consisting of:
 - 0.72 ha of DNG
 - 0.57 ha of woodland
- direct impacts to 67.76 ha 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, consisting of:
 - 66.38 ha of DNG

- 1.38 ha of woodland.

A summary of the ecosystem credits required for the additional lots, including changes in vegetation integrity score, are provided in Table 6.9. A total of 746 ecosystem credits are required to offset the additional lots. A credit report is provided in Attachment F.

Table 6.9 Summary of ecosystem credits required for the additional lots (EMM)

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	66.2	18	0.0	-18	746

A summary of the ecosystem credits required for the Birriwa Bus Route South, including changes in vegetation integrity score, are provided in Table 6.10. A total of 85 ecosystem credits are required to offset the Birriwa Bus Route South. A credit report is provided in Attachment F.

Table 6.10 Summary of ecosystem credits required for the Birriwa Bus Route South (ELA 2025)

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	65.3	0.0	-65.3	56
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	12
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	34.9	0.0	-34.9	4
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	13
Total			2.85				85

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

Impacts to threatened species habitat requiring offsets include:

- direct impacts on 29.97 ha of habitat for the Southern Myotis
- direct impacts on 1.0 ha of habitat for the Masked Owl.

A summary of the species credits required for the vegetation zone within the additional lots occupied by threatened species, including changes in vegetation integrity score, are provided in Table 6.11. A total of 254 species credits are required to offset the additional lots. Figure 6.2 displays the species polygon for Southern Myotis. Credit reports for the additional lots and Birriwa Bus Route South are provided in Attachment F.

Table 6.11 Summary of species credits required for the additional lots

Species	Vegetation zone name	Area (ha)/ individual (HL)	Habitat condition	Future habitat condition	Loss of habitat condition	Candidate SAI	Species credits
Southern Myotis (<i>Myotis macropus</i>)	281_DNG	28.12	18	0.0	18	False	254

A summary of the species credits required for all vegetation zones within Birriwa Bus Route South occupied by threatened species, including changes in vegetation integrity score, are provided in Table 6.12. A total of 77 species credits are required to offset the impacts of the Birriwa Bus Route South. Figure 6.2 displays the species polygon for Southern Myotis and Figure 6.3 displays the species polygon for Masked Owl. Credit reports for the additional lots and Birriwa Bus Route South are provided in Attachment F.

Table 6.12 Summary of species credits required for Birriwa Bus Route South

Species	Vegetation zone name	Area (ha)/ individual (HL)	Habitat condition	Future habitat condition	Loss of habitat condition	Candidate SAI	Species credits
Southern Myotis (<i>Myotis macropus</i>)	277_DNG	0.46	35.8	0.0	--35.8	False	8
	277_Woodland	0.23	41.1	0.0	-41.1	False	5
	281_DNG	0.06	74.2	0.0	-74.2	False	2
	281_Woodland	0.96	65.1	0.0	-65.1	False	33
Subtotal							47
Masked Owl (<i>Tyto novaehollandiae</i>)	277_DNG	0.05	35.8	0.0	-35.8	False	1
	277_Woodland	0.22	41.1	0.0	-41.1	False	5
	281_DNG	0.14	74.2	0.0	-74.2	False	5
	281_Woodland	0.58	65.1	0.0	65.1	False	19
Subtotal							30

6.7 Biodiversity offset strategy

The project will offset the residual impacts on biodiversity via conservation mechanisms established under the NSW Biodiversity Offset Scheme (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 Birriwa Bus Route South (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 project will require the retirement of a total of 831 ecosystem credits and 331 species credits. The credit requirements per stage are provided in Table 6.13 for ecosystem credit species and Table 6.14 for species credit species. The credit reports for each stage are provided within Attachment F.

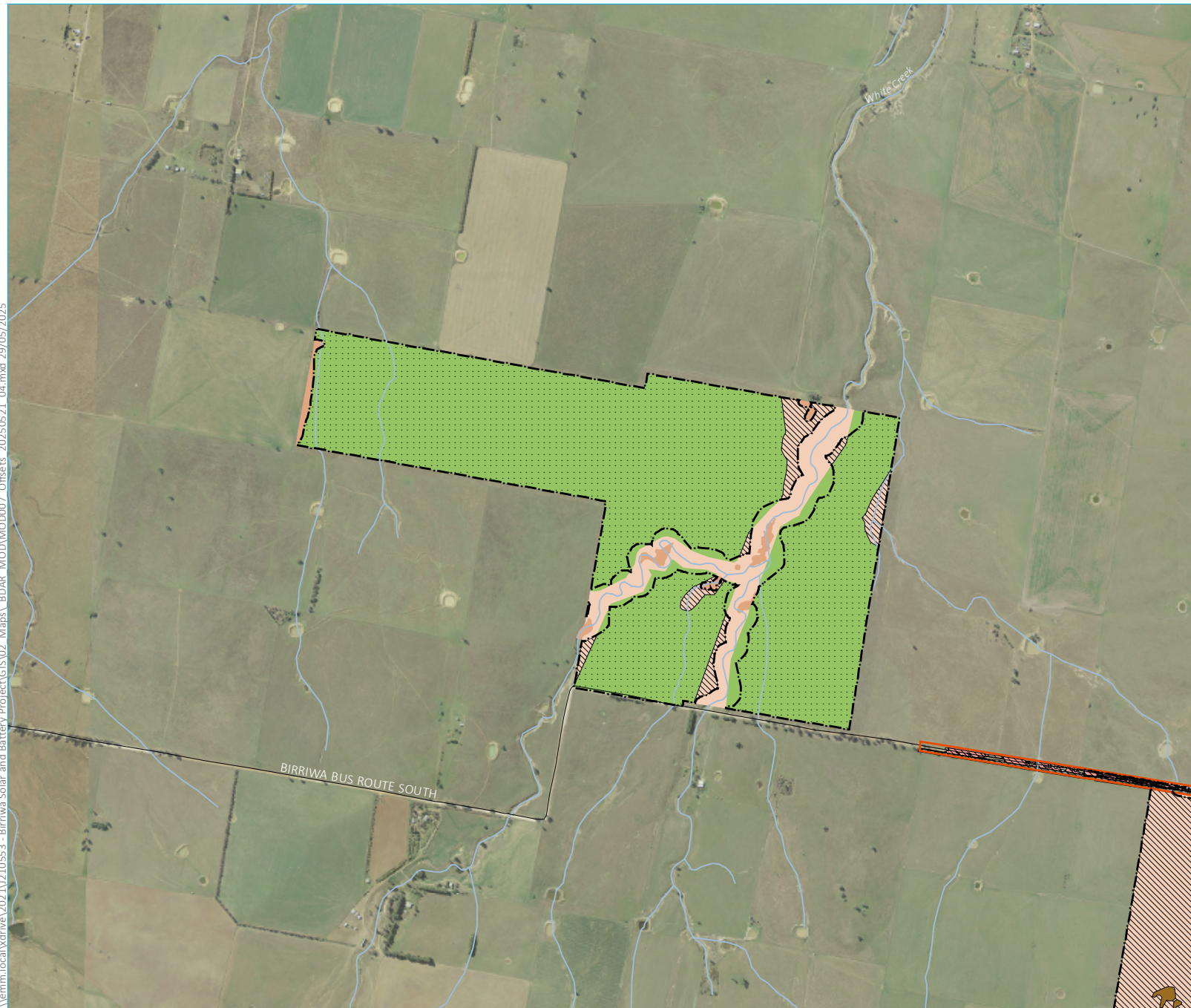
Table 6.13 Summary of stage offset delivery – ecosystem credits

Species	Vegetation zone name	Change in VI score	Biodiversity Risk Weighting	Area (ha)	Credits
Stage 1					
281	281_Woodland	-65.3		1.38	56
277	277_Woodland	-41.1		0.57	12
281	281_DNG	-34.9		0.18	4
277	277_DNG	-35.8		0.72	13
Subtotal				2.85	85
Stage 2					
281	281_DNG	-18		66.2	746
Subtotal					746

Table 6.14 **Summary of staged offset delivery – species credits**

Species	Vegetation zone name	Change in VI score	Biodiversity Risk Weighting	Area (ha)	Credits
Stage 1					
Southern Myotis (<i>Myotis macropus</i>)	277_DNG	--35.8	2	0.46	8
	277_Woodland	-41.1	2	0.23	5
	281_DNG	-74.2	2	0.06	2
	281_Woodland	-65.1	2	0.96	33
Masked Owl (<i>Tyto novaehollandiae</i>)	277_DNG	-35.8	2	0.05	1
	277_Woodland	-41.1	2	0.22	5
	281_DNG	-74.2	2	0.14	5
	281_Woodland	65.1	2	0.58	19
Stage 2					
Southern Myotis (<i>Myotis macropus</i>)	281_DNG	-18	2	28.1	254

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KEY

Birriwa Bus Route South (Assessed by ELA)

Subject land

Impacts not requiring offsets

Impacts requiring offsets

Existing environment

Minor road

Watercourse/drainage line

Pasture, exotic grassland

Exotic (planted vegetation)

Plant community type

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

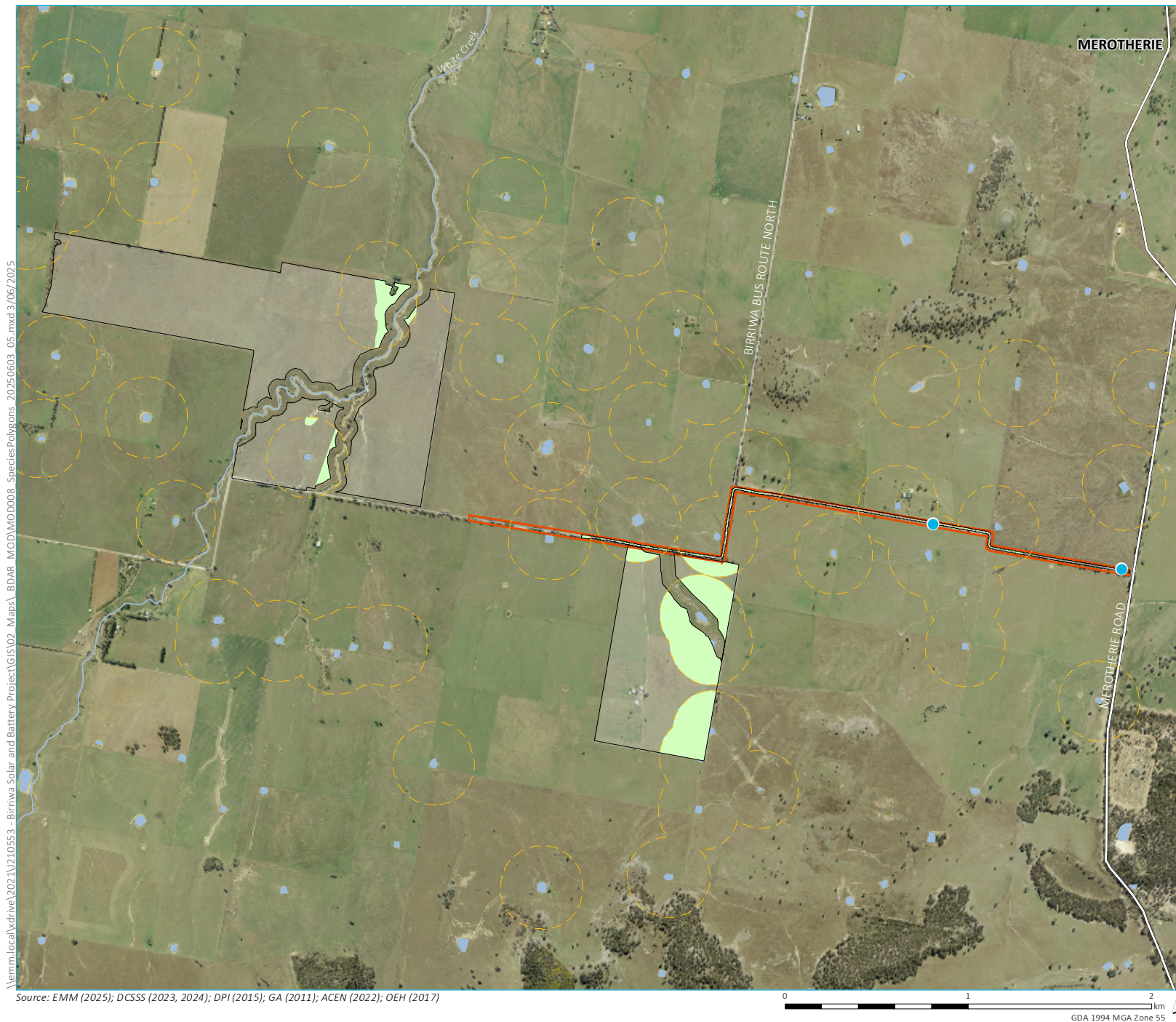
Derived native grassland (DNG)

Woodland

Low

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

Birriwa Solar Farm Modification
Biodiversity Development Assessment Report
Figure 6.1



- KEY**
- Birriwa Bus Route South (Assessed by ELA)
 - Subject land
 - Dam Buffer (200m)
 - Southern Myotis (anabat recording)
 - Southern Myotis species polygon
 - Existing environment
 - Major road
 - Minor road
 - Named watercourse
 - Dam

Species polygon - Southern Myotis

Birriwa Solar Farm Modification
Biodiversity Development Assessment Report
Figure 6.2

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- KEY
- Birriwa Bus Route South (Assessed by ELA)
 - Subject land
 - Masked Owl species polygon
 - 800 m buffer
 - Masked Owl (call playback)
 - Hollow bearing tree
 - Existing environment
 - Minor road
 - Named watercourse

Species polygon - Masked Owl

Birriwa Solar Farm Modification
Biodiversity Development Assessment Report
Figure 6.3

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 Likelihood of occurrence assessment

The Protected Matters Search Tool (PMST) (DCCEEW 2025) (Attachment D) 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	<ul style="list-style-type: none">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	<ul style="list-style-type: none">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	<ul style="list-style-type: none">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	<ul style="list-style-type: none">The species is known to occur in the bioregion and the subject land supports optimal habitat features for the species.	Yes
Known	<ul style="list-style-type: none">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 Protected Matters Search Tool (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). 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 277 and PCT 281 (in relation to associated BAM plots) within the subject land conform 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)

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 ELA: All plots	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 ELA: All plots	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 ELA: All plots	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 ELA: All plots	Patch size is greater than 2 ha	Not listed under the EPBC Act
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 ELA: All plots	No regeneration of canopy is present.	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 7.3.

Table 7.3 Likelihood of occurrence

Scientific Name	Common Name	EPBC Status	Source	Likelihood of occurrence – additional lots
Plants				
<i>Androcalva procumbens</i>	-	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.
<i>Bertya mollissima</i>	-	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.
<i>Dichanthium setosum</i>	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.
<i>Euphrasia arguta</i>	-	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.
<i>Homoranthus darwinoides</i>	Fairy Bells	V	PMST	Low. No associated species or suitable habitat (gravelly soils) occur within the additional lots.
<i>Lepidium aschersonii</i>	Spiny Peppergrass	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
<i>Lepidium monoplocoides</i>	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.
<i>Ozothamnus tessellatus</i>	-	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.
<i>Prasophyllum petilum</i>	Tarengo Leek Orchid	E	BAMC PMST	Low. 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.
<i>Prasophyllum</i> sp. Wybong	-	CE	BAMC PMST	Low. 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.
<i>Swainsona murrayana</i>	Slender Darling-pea	V	PMST	Low. Suitable habitat occurs within the additional lots (grassy woodlands), however no associated species (<i>Maireana</i> sp.) were present and the additional lots do not occur on clay-based soils which is where the species has been collected (BCS 2025b).
<i>Swainsona recta</i>	Small Purple Pea	E	PMST	Low. 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 <i>Swainsona</i> species. No previous records within the locality.
<i>Thesium australe</i>	Austral Toadflax	V	PMST	Low 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.
<i>Tylophora linearis</i>	-	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
<i>Zieria ingramii</i>	Keith's Zieria	E	PMST	<p>Low.</p> <p>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 <i>Eucalyptus dwyeri</i> 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.</p>
Birds				
<i>Anthochaera phrygia</i>	Regent Honeyeater	CE	BAMC PMST	<p>Low.</p> <p>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. All wooded vegetation of PCT 281, which provides potential foraging habitat for the species is outside the additional lots.</p>
<i>Aphelocephala leucopsis</i>	Southern Whiteface	V	PMST	<p>Low.</p> <p>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.</p>
<i>Botaurus poiciloptilus</i>	Australasian Bittern	E	PMST	<p>Low.</p> <p>There is no suitable wetland habitat within the additional lots. No previous records within the locality.</p>
<i>Callocephalon fimbriatum</i>	Gang-gang Cockatoo	E	BAMC PMST	<p>Low.</p> <p>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.</p>
<i>Calyptorhynchus lathami lathami</i>	South-eastern Glossy Black-cockatoo	V	PMST	<p>Low.</p> <p>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.</p>
<i>Climacteris picumnus victoriae</i>	Brown Treecreeper (eastern subspecies)	V	BAMC PMST	<p>Low.</p> <p>Suitable foraging habitat occurs in the wooded areas outside 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.</p>

Scientific Name	Common Name	EPBC Status	Source	Likelihood of occurrence – additional lots
<i>Falco hypoleucos</i>	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.
<i>Grantiella picta</i>	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. Nonetheless these areas are to be retained providing sub-optimal foraging habitat for this species. A number of records (68) occur approximately 10 km east of the additional lots.
<i>Haliaeetus leucogaster</i>	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.
<i>Lathamus discolor</i>	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).
<i>Leipoa ocellata</i>	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.
<i>Lophochroa leadbeateri leadbeateri</i>	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.
<i>Melanodryas cucullata cucullata</i>	South-eastern Hooded Robin	E	BAMC PMST	Low. Suitable foraging habitat may occur within the wooded areas of PCT 281, though these areas 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.
<i>Neophema chrysostoma</i>	Blue-winged Parrot	V	PMST	Low. Suitable foraging habitat may occur within the wooded areas outside of the additional lots. No suitable hollows occur within the additional lots. No previous records within the locality.

Scientific Name	Common Name	EPBC Status	Source	Likelihood of occurrence – additional lots
<i>Pedionomus torquatus</i>	Plains-wanderer	CE	PMST	Negligible. 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.
<i>Polytelis swainsonii</i>	Superb Parrot	V	BAMC PMST	Low. Suitable foraging habitat may occur within the wooded areas of PCT 281 outside of the additional lots. No suitable hollows occur within the additional lots. No previous records within the locality.
<i>Pycnoptilus floccosus</i>	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.
<i>Stagonopleura guttata</i>	Diamond Firetail	V	BAMC PMST	Low. Suitable foraging and breeding habitat may occur outside of the additional lots in the wooded areas of PCT 281. 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				
<i>Galaxias rostratus</i>	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.
<i>Maccullochella macquariensis</i>	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.
<i>Maccullochella peelii</i>	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.
<i>Macquaria australasica</i>	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				
<i>Crinia sloanei</i>	Sloane's Froglet	E	PMST	<p>Low.</p> <p>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.</p>
<i>Litoria booroolongensis</i>	Booroolong Frog	E	BAMC	<p>Low.</p> <p>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.</p>
Mammals				
<i>Chalinolobus dwyeri</i>	Large-eared Pied Bat	V	BAMC PMST	<p>Low.</p> <p>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).</p> <p>The study area for the additional lots does not provide suitable 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 Birriwa Bus Route South, outside of the additional lots. Further assessment of this species within Birriwa Bus Route South is provided in Section 11 of Attachment A.</p> <p>No roosting habitat for this species occurs within the additional lots.</p>
<i>Dasyurus maculatus</i>	Spotted-tail Quoll	E	BAMC PMST	<p>Low.</p> <p>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).</p>
<i>Nyctophilus corbeni</i>	Corben's Long-eared Bat	V	PMST	<p>Low.</p> <p>The additional lots does not contain hollows for breeding. Wooded areas outside of the additional lots occur as smaller patches and are unlikely to be used 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).</p>
<i>Phascolarctos cinereus</i>	Koala (NSW, QLD and ACT)	V	BAMC PMST	<p>Low.</p> <p>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).</p>

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

The PMST conducted for Birriwa Bus Route South predicted that nine flora species and 27 fauna species listed under the EPBC Act could occur within Birriwa Bus Route South. Of the species predicted, the following were assessed as likely to occur within Birriwa Bus Route South:

- 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 7.4 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 7.4 Likelihood of occurrence for migratory species

Scientific name	EPBC Status	Source	Potential presence
Australian Painted Snipe (<i>Rostratula australis</i>)	E, Ma	PMST	Negligible There is no wetland or estuarine habitat within the subject land. No previous records within the locality.
Common Sandpiper (<i>Actitis hypoleucos</i>)	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 (<i>Calidris ferruginea</i>)	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 (<i>Apus pacificus</i>)	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 (<i>Gallinago hardwickii</i>)	Ma, Mi	PMST	Negligible. There is no wetland or estuarine habitat within the subject land. No previous records within the locality.
Pectoral Sandpiper (<i>Calidris melanotos</i>)	Ma, Mi	PMST	Negligible. There is no wetland or estuarine habitat within the subject land. No previous records within the locality.
Rufous Fantail (<i>Rhipidura rufifrons</i>)	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 (<i>Myiagra cyanoleuca</i>)	Ma, Mi, B	PMST	Negligible. No heavily vegetated forest or gullies within the subject land. No previous records within locality.
Sharp-tailed Sandpiper (<i>Calidris acuminata</i>)	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 (<i>Hirundapus caudacutus</i>)	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 (<i>Motacilla flava</i>)	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 Birriwa Bus Route South predicted eight species listed as migratory under the EPBC Act could occur within Birriwa Bus Route South based on database searches undertaken. Of the migratory species predicted, the following were assessed as likely to occur within Birriwa Bus Route South:

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

7.1.2 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. No species were considered likely to occur within the additional lots, while seven species were considered likely to occur within the Birriwa Bus Route South.

For the species considered likely to occur within Birriwa Bus Route South, significant impact assessments are provided in Section 11 of Attachment A. A summary of these assessments has been reproduced in Table 7.5.

Table 7.5 Summary of significant impact assessments for Birriwa Bus Route South (ELA 2025)

Scientific name	Nature and consequence	Duration of impact	Quantum of impact	Significant impact?
Regent Honeyeater (<i>Anthochaera phrygia</i>)	Indirect	Permanent	1.95	Unlikely
Fork-tailed Swift (<i>Apus pacificus</i>)	Indirect / Direct	Permanent	2.85	Unlikely
Large-eared Pied Bat (<i>Chalinolobus dwyeri</i>)	Indirect / Direct	Permanent	2.85	Unlikely
Brown Treecreeper (<i>Climacteris picumnus</i>)	Direct	Permanent	1.95	Unlikely

Scientific name	Nature and consequence	Duration of impact	Quantum of impact	Significant impact?
White-throated Needletail (<i>Hirundapus caudacutus</i>)	Direct	Permanent	2.85	Unlikely
Corben's Long-eared Bat (<i>Nyctophilus corbeni</i>)	Direct / indirect	Permanent	1.95	Unlikely
Diamond Firetail (<i>Stagnopleura guttata</i>)	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 7.3) 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 Birriwa Bus Route South (refer to section 11.2 of Attachment A). 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 mitigation actions recommended within this BDAR have been developed in parallel with the approved project design. This process has ensured the avoidance and minimisation of biodiversity constraints as far as practicable. Residual impacts include the loss of:

- 0.72 ha of PCT 277 DNG
- 0.57 ha of PCT 277 woodland
- 66.38 ha of PCT 281 DNG
- 1.38 ha of PCT 281 woodland
- 29.83 ha of Southern Myotis habitat
- 0.99 ha of Masked Owl habitat.

Mitigation and management measures have been proposed to address predicted impacts on biodiversity. These include pre-clearance, construction, and operational phase measures to avoid impacts at all stages of the modification.

The offset requirements determined for the modification are summarised in Table 8.1 and all credit reports have been included within Attachment F.

Table 8.1 **Summary of credit requirements**

Entity	Area (ha)/count	Number of credits
PCT 277 DNG	0.72	13
PCT 277 woodland	0.57	12
PCT 281 DNG	66.38	750
PCT 281 woodland	1.38	56
Southern Myotis	29.83	301
Masked Owl	0.99	30
Total credits	-	1,162

This BDAR has informed an assessment of one SAI TEC which occurs within the subject land:

- 69.05 ha of White Box – Yellow Box – Blakely’s Red Gum Grassy Woodland and Derived Native Grassland CEEC in a DNG form.

ACEN will compensate for these residual impacts through the implementation of a biodiversity offset strategy.

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.

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Attachment A

Birriwa Bus Route South BDAR


A stylized topographic map with green contour lines is positioned on the left side of the page, extending from the top to the bottom. The map features several concentric circles and irregular wavy lines representing elevation changes.

Birriwa Bus Route South Biodiversity Development Assessment Report

Prepared by Eco Logical Australia Pty Ltd on behalf of

ACEN Australia Pty Ltd

DOCUMENT CONTROL

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Template 2.8.1

Executive Summary

ACEN Australia Pty Ltd (ACEN) has approval to develop the Birriwa Solar and Battery Project (the Project), a large scale solar photovoltaic (PV) electricity generation facility including battery storage and associated infrastructure, including the construction of a temporary accommodation facility. ACEN is now seeking approval to modify development consent SSD-29508870 to include the following changes (the Modification):

- Inclusion of additional lots
- An alternative secondary access route
- Increased capacity of the approved temporary accommodation facility
- Increased Battery Energy Storage System (BESS) capacity and duration
- Upgrade of part of the existing Birriwa Bus Route South (BBRS) local road.

As a modification to a State Significant Development under the NSW *Environmental Planning and Assessment Act 1979* (EP&A Act), the proposal requires a Biodiversity Development Assessment Report (BDAR) in accordance with the NSW *Biodiversity Conservation Act 2016* (BC Act) to assess the Project's impacts upon biodiversity.

This BDAR, prepared by Eco Logical Australia Pty Ltd (ELA), assesses the potential biodiversity impacts associated with the BBRS road upgrade component of the proposed Modification. A separate BDAR addressing the remaining components of the Modification is being prepared by EMM Consulting Pty Ltd (EMM).

E1: Development Description

The BBRS road upgrade component involves realignment, widening and resurfacing of the BBRS local road to support vehicle access during the construction and operation of the approved Project (SSD 29508870). The BBRS Study Area covers approximately 8 ha of road corridor and roadside vegetation, extending from Merotherie Road to the proposed Temporary Workers Accommodation Facility and Access.

E2: Measures to Avoid and Minimise

The Development Footprint has undergone multiple design refinements to avoid and minimise impacts to native vegetation and sensitive areas.

Key refinements include:

- Consultation with Mid-Western Regional Council (MWRC) to ensure compliance with Austroads rural road design standards whilst minimising impacts to roadside woodland.
- Alignment adjustments and width reductions to avoid pockets of vegetation and habitat trees resulting in the avoidance of 3.45 ha of Critically Endangered Ecological Community (CEEC) *White Box-Yellow Box – Blakely's Red Gum and Derived Native Grassland*; Box Gum Woodland listed under the BC Act.

E3: Native Vegetation and Threatened Species

Biodiversity impacts were assessed through field survey and mapping consistent with the NSW Biodiversity Assessment Method (BAM) 2020 (DPIE 2020a). The refined Development Footprint impacts approximately 2.85 ha of native vegetation.

Two Plant Community Types (PCTs) occur within the Development Footprint:

- 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 and Brigalow Belt South Bioregion*.

Both PCTs are associated with the Threatened Ecological Community (TEC) *White Box - Yellow Box – Blakely's Red Gum Grassy Woodland and Derived Native Grassland* (Box Gum Woodland) listed under the NSW *Biodiversity Conservation Act 2016* (BC Act), but do not meet the condition threshold under the Commonwealth *Environmental Protection Biodiversity Conservation Act 1999* (EPBC Act).

Two threatened fauna species were recorded within the Development Footprint:

- *Myotis macropus* (Southern Myotis)
- *Tyto novaehollandiae* (Masked Owl)

Species polygons have been prepared and biodiversity credits calculated for these species. An assessment of the impacts under the EPBC Act determined that no Matters of National Environmental Significance (MNES) are present with the BBRs Study Area, therefore referral to the Commonwealth Minister for the Environment is not required for the road upgrade component.

E4: Impacts and Offset Requirements

There will be a direct loss of 2.85 ha of native vegetation including foraging habitat for threatened species. This requires offsetting under the NSW Biodiversity Offset Scheme (BOS).

Direct impacts to PCTs that require offsets are shown in Table E1 and species credits required are shown in Table E2.

Table E1: Ecosystem credits for Birriwa Bus Route South

Vegetation Zone	PCT	Condition/ Zone	Area (ha)	VI Score	TEC Association	Ecosystem Credits
1	281	Woodland	1.38	65.3	Box Gum Woodland	56
2	277	Woodland	0.57	41.1	Box Gum Woodland	12
3	281	Derive Native Grassland	0.18	34.9	Box Gum Woodland	4
4	277	Derive Native Grassland	0.72	35.8	Box Gum Woodland	13
Total			2.85			85

Table E2: Species credits for Birriwa Bus Route South

Scientific Name	Common Name	Loss of habitat (ha)	Credits Required
<i>Myotis macropus</i>	Southern Myotis	1.72	45
<i>Tyto novaehollandiae</i>	Masked Owl	0.99	27
		Total	72

Impacts to Box Gum Woodland – a CEEC at risk of Serious and Irreversible Impacts (SAIL) – have been considered. Despite avoidance efforts, residual impacts remain.

E5: Mitigation Measures

The potential impacts to biodiversity within the BBRS Study Area have been avoided and minimised as much as practicable, through design refinements.

Further mitigation measures will be employed to manage the extent and severity of impacts during construction and operation of the Approved Project and include provisions of biodiversity offsets, management measures, monitoring and adaptive management measures. These are outlined in the Environment Impact Assessment for the Birriwa Solar and Battery Project.

Mitigation measures specific to the BBRS Road upgrade are:

- Avoiding woodland by ensuring Development Footprint is within areas of low-quality DNG that are highly disturbed through roadside maintenance activities.
- Pre-clearing surveys prior to the removal of hollow bearing trees to mitigate injury to potential fauna inhabiting hollows.
- Hollow logs and debris will be retained to be used post construction. This will improve fauna habitat within the Study Area.
- Avoiding the removal of canopy trees where possible and limiting it to the understory. This targeted approach minimises disturbance to the canopy layer, preserving the woodland's ecological integrity.
- Exclusion fencing (no-go zones) will be used to avoid indirect impacts to retained trees. This includes temporary fencing, bunting tape or similar.
- Sediment controls will be installed in areas where works will occur in proximity to waterways to avoid increased sedimentation and erosion.
- Weed hygiene protocols will be implemented to avoid spreading.
- Preparation of a Biodiversity Management Plan for the Project detailing vegetation clearing protocols, erosion and sedimentation controls, weed management, habitat retention and enhancement and post-construction monitoring.

The Development Footprint may be further refined through detailed design. Final residual impacts will be confirmed, and biodiversity credits retired in accordance with the Project.

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Abbreviations

Abbreviation	Description
AC	Alternating Current
ACEN	ACEN Australia Pty Ltd / the proponent
AOBV	Areas of Outstanding Biodiversity Value
AOO	Area of Occupancy
ASL	Above Sea Level
BAM	Biodiversity Assessment Method 2020
BAMC	Biodiversity Assessment Method Credit Calculator
BBRS	Birriwa Bus Route South
BC Act	<i>NSW Biodiversity Conservation Act 2016</i>
BC Regulations	Biodiversity Conservation Regulations
BCS	Biodiversity Conservation and Science Directorate
BDAR	Biodiversity Development Assessment Report
BGW	Box Gum Woodland
BOS	Biodiversity Offset Scheme
CEEC	Critically Endangered Ecological Community
CPHR	Conservation Programs, Heritage and Regulation
CWO-REZ	The Central West Orana Renewable Energy Zone
DBH	Diameter at breast height
DC	Direct Current
DCCEEW	Department of Climate Change, Energy, the Environment and Water (Commonwealth and NSW)
DNG	Derived Native Grassland
DP	Deposited Plan
DPE	Department of Planning and Environment
DPIE	NSW Department of Planning, Industry and Environment
ECB	Eastern Cave Bat
EEC	Endangered Ecological Community
EIS	Environmental Impact Statement
ELA	Eco Logical Australia Pty Ltd
EMS	Environmental Management Strategy
EnergyCo	Energy Corporation of NSW
EOO	Extent of Occurrence
EP&A Act	<i>NSW Environmental Planning and Assessment Act 1979</i>
EPBC Act	<i>Commonwealth Environment Protection and Biodiversity Conservation Act 1999</i>

Abbreviation	Description
FM Act	NSW <i>Fisheries Management Act 1994</i>
GBGW	Grey Box Grassy Woodlands and Derived Native Grasslands of South-eastern Australia
Ha	Hectare
HBT	Hollow Bearing Tree
IBRA	Interim Biogeographic Regionalisation for Australia
IGB	Inland Grey Box Woodland in the Riverina, NSW South Western Slopes, Cobar Peneplain, Nandewar and Brigalow Belt South Bioregions
IPC	Independent Planning Commission
KFH	Key Fish Habitat
LEP	Local Environment Plan
LEPB	Large-eared Pied Bat
LGA	Local Government Area
MNES	Matters of National Environmental Significance
MWRC	Mid-Western Regional Council
NEM	National Electricity Market
NPWS	National Parks and Wildlife Services
NRAR	Natural Resources Access Regulator
NSW	New South Wales
PCT	Plant Community Type
PCU	Power Conversion Units
PMST	Protected Matters Search Tool
RDP	Rapid Data Point
SAII	Serious and Irreversible Impact
SAT	Spot Assessment Technique
SCADA	Supervisory Control and Data Acquisition
SEARs	Secretary's Environmental Assessment Requirements
SEED	Sharing and Enabling Environmental Data
SEPP	State Environmental Planning Policy
SSD	State Significant Development
SVTM	State Vegetation Type Mapping
TBDC	Threatened Biodiversity Data Collection
TEC	Threatened Ecological Community
TSSC	Threatened Species Scientific Committee
VI	Vegetation Integrity
WM Act	NSW <i>Water Management Act 2000</i>

Certification under section 6.15 of the *Biodiversity Conservation Act 2016*

I certify that this report has been prepared based on the requirements of, and information provided under, the Biodiversity Assessment Method (BAM) 2020 and clause 6.15 of the *Biodiversity Conservation Act 2016*.

Accredited Assessor: Cheryl O'Dwyer BAAS18153

Signature: 

Date: 20/05/2025

Declarations

I declare that I have considered the circumstances and there is no actual, perceived, or potential conflict of interest. This declaration has been made in the interests of full disclosure to the decision-maker. Full disclosure has also been provided to ACEN Australia Pty Ltd.

Accredited Assessor: Cheryl O'Dwyer BAAS18153

Signature: 

Date: 20/05/2025

Details and experience of authors and contributors

Table E 3: Details and experience of authors and contributors

Name	Assessor Accreditation	ELA Role	Tasks performed	Relevant qualifications
Dr Cheryl O'Dwyer	BAAS18153	Principal Ecologist, lead assessor	Threatened flora surveys, VI assessment, technical direction, and review. Preparation of BDAR. BAMC data entry and analysis.	PhD (Botany/Zoology) M. Science B. Science
Lachlan Metzler	-	Ecologist	Threatened flora surveys, VI assessment, arboreal mammal surveys. Bird surveys. Field planning. Report Preparation	B. Science
Janene Devereux	BAAS19045	Senior Ecologist	Reporting	B. Environmental Science and Management
Tahnee Coull	-	Ecologist	Threatened flora surveys, VI assessment, arboreal mammal surveys and bird surveys	B. Science (Environmental Science)
Greg Natesan	-	Environmental Consultant	Spotlighting, Owl and Koala surveys	B. Science (Environmental Science) B. Geospatial Science
Kacey Tada	-	Graduate Ecologist	VI Plots, bird surveys	B. Science (Hons) M. Environment
Shirley Chia	-	Graduate Ecologist	VI Plots, bird surveys	S. Science (Ecology Hons)
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Kalya Abbey		Principal Consultant	Document review	B. Science (Ag)

Stage 1 Biodiversity Assessment

1. Introduction

1.1. Project overview

ACEN Australia Pty Ltd (ACEN) has approval to develop the Birriwa Solar and Battery Project (the Project), a large scale solar photovoltaic (PV) electricity generation facility with battery storage and associated infrastructure, including a temporary accommodation facility.

ACEN is now seeking approval to modify development consent SSD-29508870 to include the following changes (the Modification):

- Inclusion of additional lots
- An alternative secondary access route
- Increased capacity of the approved temporary accommodation facility
- Increased Battery Energy Storage System (BESS) capacity and duration.
- Upgrade of part of the existing Birriwa Bus Route South (BBRS) local road.

As a modification to a State Significant Development under the NSW *Environmental Planning and Assessment Act 1979* (EP&A Act), the proposal requires a Biodiversity Development Assessment Report (BDAR) in accordance with the NSW *Biodiversity Conservation Act 2016* (BC Act) to assess the Project's impacts upon biodiversity.

This BDAR, prepared by Eco Logical Australia Pty Ltd (ELA), assesses the potential biodiversity impacts associated with the BBRS road upgrade component of the proposed Modification. A separate BDAR addressing the remaining components of the Modification is being prepared by EMM Consulting Pty Ltd (EMM).

The BBRS Road upgrade involves realignment, widening and resurfacing of the BBRS local road to facilitate vehicle access during the construction and operation of the approved Project (SSD 29508870).

An initial BBRS road upgrade Study Area of 16.42 ha was provided by ACEN which included a buffer around the road reserve extending into private land either side. The Study Area was refined to 8 ha to assess only the road reserve (fence-line to fence-line) for the purpose of this BDAR. This area, hereafter referred to as the BBRS Study Area, extends from the intersection of Merotherie Road along BBRS to just beyond the entrance of the proposed Temporary Workers Accommodation Facility.

The BBRS Study Area is located approximately 19 km north of Gulgong and 25 km southeast of Dunedoo, within the Mid-Western Regional Council (MWRC) Local Government Area (LGA). Both the approved Project and proposed Modification (Figure 1-1) are located within the Central-West Orana (CWO) Renewable Energy Zone (REZ).

This assessment was prepared under the NSW Biodiversity Assessment Method 2020 (BAM), BAM Calculator (BAM-C) reference 00056898/BAAS18153/25/00057139 (Revision 0).

The location of BBRS Study Area is shown in the BAM Location Map (Figure 1-2) and Site Map (Figure 1-3). The Development Footprint located within the BBRS Study Area is approximately 4.33 ha, comprising 2.85 ha of roadside vegetation and 1.47 ha of existing road surface.

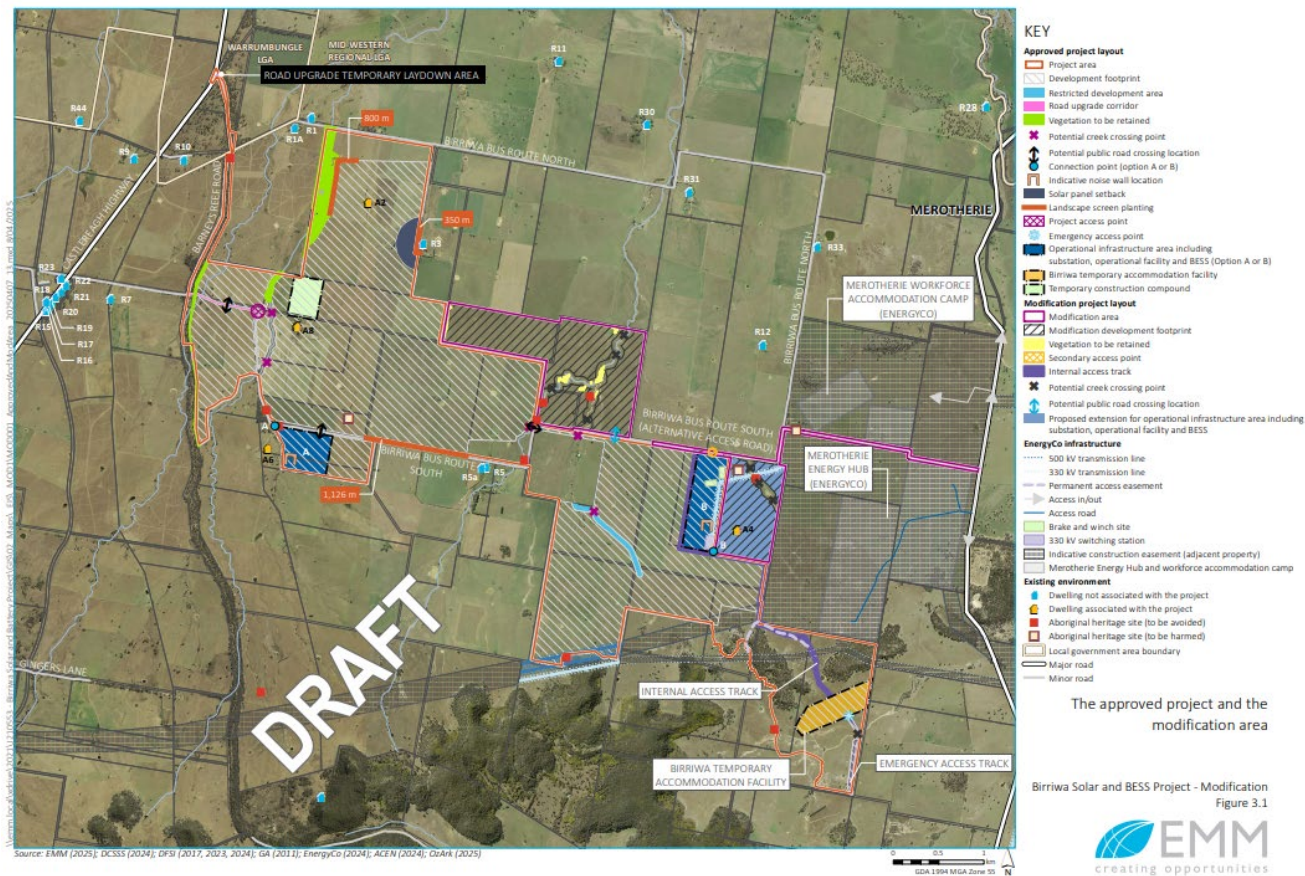


Figure 1-1: Layout of Project and proposed Modification (supplied by EMM)

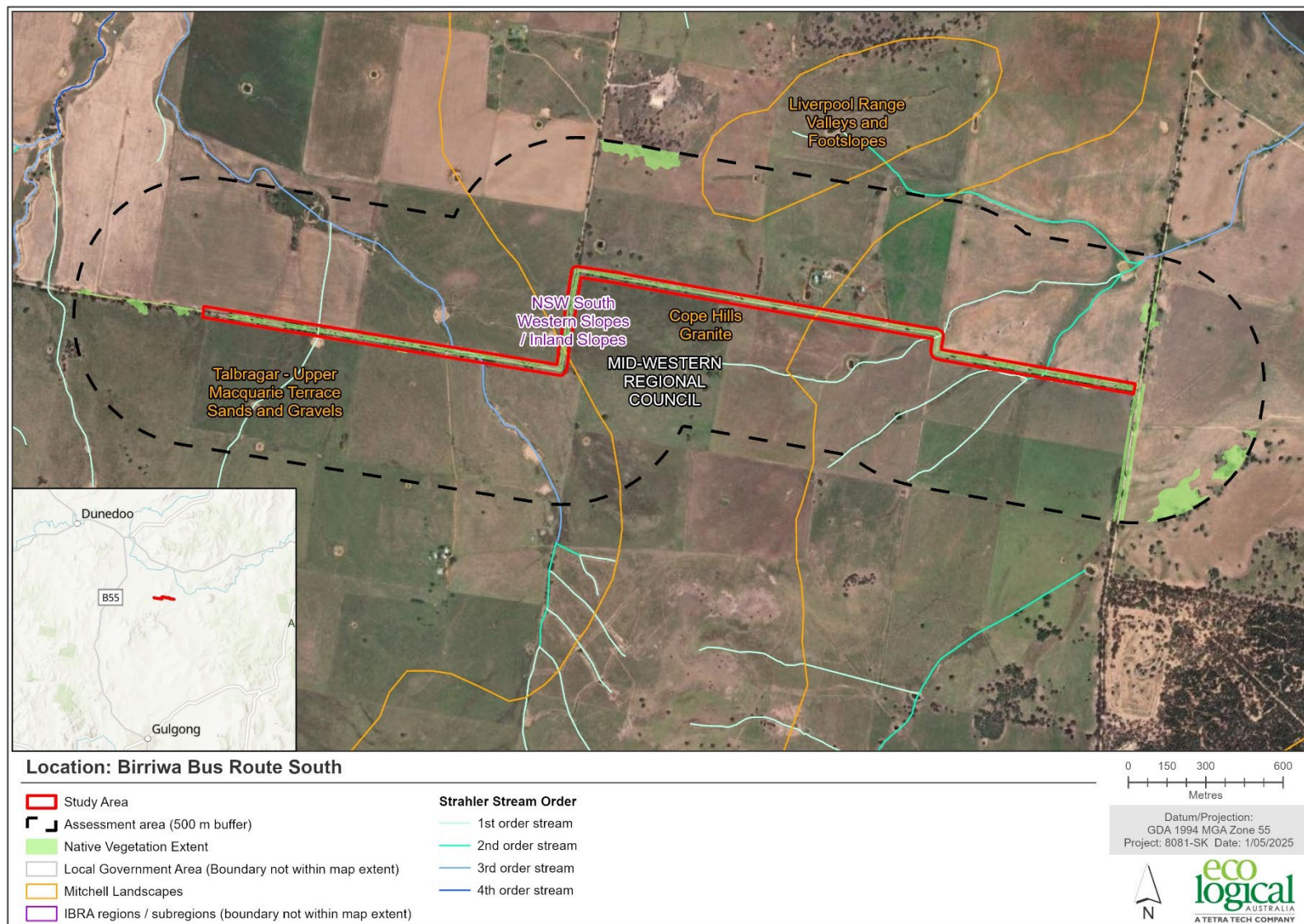


Figure 1-2: Location and layout of Birriwa Bus Route South upgrade



Figure 1-3: Site map

The following terms are used throughout this BDAR to describe the impacts of the proposal in accordance with the NSW BAM (2020):

- **Project** – Refers to the approved Birriwa Solar and Battery Project.
- **BBRS Study Area** - The area of local road and roadside vegetation (approximately 8 ha) assessed under BAM (2020). The area has been subject to detailed biodiversity surveys to inform the refinement of the Development Footprint.
- **Development Footprint** - The area within the BBRS Study Area that will be subject to direct impact from the proposed Modification to upgrade the BBRS local road.
- **Assessment buffer** – A 500 m buffer zone surrounding the linear Development Footprint, used in the assessment of native vegetation extent and landscape context in accordance with BAM (2020).

Definitions of commonly used terms are provided in Appendix 1.

1.1.1. Location

The Project is located approximately 26 km north of Gulgong and 19 km southeast of Dunedoo, within the Mid-Western Regional Council (MWRC) Local Government Area (LGA).

The BBRS Study Area covers comprises approximately 8 ha of predominantly modified roadside vegetation along BBRS, a local road under the jurisdiction of MWRC. The area is characterised by generally flat terrain with slight undulations, and elevations ranging from 450 to 550 m above sea level (asl). Patches of remnant woody vegetation (open woodland) occur along the road corridor and represent the only remaining native vegetation within the broader surrounding landscape.

The Development Footprint has been refined based on the outcomes of environmental assessments and consultation with relevant agencies, including MWRC. The Development Footprint represents the indicative maximum extent of ground disturbance associated with the realignment and widening of BBRS to facilitate safe vehicle access during construction and operation of the approved Project.

Further refinement of the Development Footprint may occur during detailed design and ongoing consultation to minimise potential environmental impacts wherever practicable.

1.1.2. Other documentation

Other reports prepared for the Project and relevant to biodiversity are:

- ELA (2024) Aquatic Impact Assessment Report V5 Prepared for ACEN Australia Pty Ltd
- EMM (2022) Birriwa Solar and Battery Project Biodiversity Development Assessment Report Prepared for ACEN Australia Pty Ltd
- EMM (2023) Birriwa Solar and Battery Project Biodiversity Development Assessment Report Updated. Prepared for ACEN Australia Pty Ltd Volume 1 & 2.
- EMM (2022) Birriwa Solar and Battery Project Environmental Impact Statement prepared for ACEN Australia Pty Ltd 2022.

1.2. Biodiversity Offset Scheme trigger

The BBRS upgrade is part of the Modification application to State Significant Development SSD – 29508870 under the NSW *Environmental Planning and Assessment Act 1979* (EP&A Act) and a BDAR is required in accordance with the BC Act to assess the Project's impacts upon biodiversity.

1.3. Excluded Impacts

There is approximately 1.47 ha of existing cleared road surface within the Development Footprint that do not require assessment under the BAM 2020.

1.4. Matters of National Environmental Significance

No Matters of National Environmental Significance (MNES) were recorded within the BBRS Study Area. The roadside vegetation is highly modified and degraded and does not conform to any Threatened Ecological Communities (TEC) listed under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act).

Surveys for MNES were undertaken in accordance with the NSW BAM (2020) and included the following:

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

Assessment of the significance of impacts for these species have been undertaken (Section 11; Appendix 9).

1.5. Information sources

The following data sources were reviewed as part of this report:

- BioNet Vegetation Classification Database
- BioNet (Wildlife Atlas) and Protected Matters Search for threatened species/populations that may have been previously recorded within 10 km and are listed under the BC Act, and/or the EPBC Act (Department of Agriculture, Water and the Environment; DAWE 2024)
- BioNet Threatened Biodiversity Data Collection (TBDC)
- Species Profiles and Threats Database (DCCEEW 2024b)
- Register of Declared Areas of Outstanding Biodiversity Value (AOBV; DEH 2024a)
- Strahler Stream Orders – Hydroline spatial data
- Interim Biogeographic Regionalisation of Australia (IBRA) Version 7
- NSW Department of Primary Industries freshwater threatened species distribution maps
- Key Fish Habitat Maps
- NSW Government Biodiversity Assessment Method (2020) and online Calculator
- NSW Biodiversity Values Map (Department of Environment and Heritage; DEH 2024b)
- NSW Sharing and Enabling Environmental Data (SEED)

- NSW Spatial Services
- NSW (Mitchell) Landscapes.
- Watkins, Cameron, Yoo and Colquhoun 1999. Gulgong 1:100,000 Geological Sheet 8833, 1st edition. Geological Survey of New South Wales, Orange, Sydney/Australian Geological Survey Organisation, Canberra.

2. Method

2.1. Site context methods

As a linear assessment, a 500 m Assessment buffer was applied to the BBRs Study Area in accordance with the BAM (2020). This report includes two base maps; the Location Map (Figure 1-2) and the Site Map (Figure 1-3).

2.1.1. Landscape features

The Mid-Western Regional Council (MWRC) Local Government Area (LGA) encompasses approximately 875,200 ha of which 13% is designated as National Parks, Public Reserves, rivers and estuaries. State Forests account for an additional 2% while the remaining area is primarily freehold land.

The land within and surrounding the BBRs Study Area is predominantly used for agricultural purposes, including grazing and cropping. Native vegetation is largely confined to roadsides, with scattered large paddock trees within neighbouring properties. Very little native vegetation persists in the broader landscape (Table 2-1). Vegetation along BBRs primarily consists of remnant and modified grassy woodlands, which have been influenced by edge effects from existing road construction and usage.

Table 2-1: Native Vegetation Extent

Assessment Area (ha)	489.7 ha
Total Area of native vegetation cover (ha)	14.27 ha
Percentage of native vegetation	3%
Class (0-10%, >10-30%, 30-70%, >70%)	0-10%

There are no mapped areas of Important Habitat (DEH 2024b) within the Assessment buffer, though Important Habitat for Regent Honeyeater is located approximately 26 km south and west of the BBRs Study Area. Habitat features within the BBRs Study Area include vegetation, hollow bearing trees, fallen and standing dead timber, stick nests and leaf litter.

Unnamed tributaries intersect with the BBRs Study Area in four locations (Figure 1-3). These unnamed tributaries include two first order streams, one second order stream and one third order stream in the central-west portion of the BBRs Study Area. There are no farm dams within the BBRs Study Area, however there are seven located within 200 m. A separate aquatic assessment has been completed for the Study Area (ELA 2024) and is included in Appendix 2.

2.1.2. IBRA Bioregions and IBRA Subregions

Both the approved Project and proposed Modification are located within the NSW South Western Slopes IBRA Bioregion and within the Inland Slopes Subregion.

2.1.3. Geomorphology / Topography

The BBRS Study Area features flats and gently undulating hills, with elevations ranging from 450 to 550 m asl. Local relief typically varies from 50 to 90 m with drainage lines situated 300 to 1,000 m apart (Murphy & Lawrie 1998). There are no notable geological features such as karsts, caves, crevices, or cliffs within the BBRS Study Area. However, cliff lines are present within 5 km of the BBRS Study Area specifically within Barney's Reef.

2.1.4. NSW (Mitchell) Landscapes

Land within BBRS Study Area encompasses two NSW (Mitchell) Landscapes (DCCEE 2016):

1. Cope Hills Granite (85% cleared):

- **Description:** This landscape features undulating and rolling hills composed of Carboniferous granite and granodiorite. The general elevation ranges from 500 to 740m, with local relief of approximately 150 m. The soils are gritty gradational red earth and red texture-contrast soils (Department of Environment and Climate Change NSW 2002).
- **Vegetation:** Characteristic forest species include *Eucalyptus melliodora* (Yellow Box), *Eucalyptus blakelyi* (Blakely's Red Gum), *Eucalyptus macrorhyncha* (Red Stringybark), *Eucalyptus bridgesiana* (Apple Box), *Eucalyptus dalrympleana* (Mountain Gum) and *Callitris endlicheri* (Black Cypress Pine).

2. Talbragar – Upper Macquarie Terrace Sands and Gravels (93% cleared):

- **Description:** This landscape consists of sandy Quaternary alluvial sediments found on the floodplains and terraces of the Talbragar River. It has a general elevation range of 350 to 500m, and local relief of 30 to 40m. The soils are red-brown and red-yellow earthy sands with some yellow texture-contrast soils along the valley margins (Department of Environment and Climate Change NSW 2002).
- **Vegetation:** Vegetation includes *Eucalyptus camaldulensis* (River Red Gum) along channels, *Eucalyptus melliodora* and *Angophora floribunda* (Rough-barked Apple) and *Callitris glaucophylla* (White Cypress Pine) on the plains.

Landscape features considered for this assessment are summarised in Table 2-2 below.

Table 2-2: Landscape features

Landscape Features	Development Footprint	Assessment Buffer	Data Source
IBRA Region	South Western Slopes	South Western Slopes	Interim Biogeographic Regionalisation for Australia Version 7

Landscape Features	Development Footprint	Assessment Buffer	Data Source
IBRA Subregion	Inland Slopes	Inland Slopes	Interim Biogeographic Regionalisation for Australia Version 7
NSW Mitchell Landscapes	Cope Hills Granite and Talbragar – Upper Macquarie Terrace Sands and Gravels	Cope Hills Granite and Talbragar – Upper Macquarie Terrace Sands and Gravels – Liverpool Range Valley and Foothills	NSW (Mitchell) Landscapes – version 3.1 (DCCEEW 2016)
Area of impacted vegetation (ha)	2.85	2.85	Calculated using aerial imagery and ArcGIS software
Total area of Native Vegetation Extent (ha)	2.85	14.26	Calculated using aerial imagery and ArcGIS software
Percentage Native Vegetation Extent#	99%	3%	Calculated using aerial imagery and ArcGIS software
Rivers and Streams	<ul style="list-style-type: none"> • 2 x 1st order streams • 1 x 2nd order stream • 1 x 3rd order stream 	<ul style="list-style-type: none"> • 4 x 1st order streams • 1 x 2nd order stream • 1 x 3rd order stream 	Hydroline spatial data

2.1.5. Patch size

Patch size was calculated using available vegetation mapping for all patches of intact native vegetation on and adjoining the Study Area. Patch size was assigned to one of four classes (<5 ha, 5-24 ha, 25-100 ha or ≥100 ha). A patch size of 5 ha was determined for the BBRS Study Area.

3. Native Vegetation, Threatened Ecological Communities (TECs) and Vegetation Integrity

3.1. Existing Information

A review of the Central Tablelands NSW State Vegetation Type Mapping (SVTM, DCCEEW 2020) was undertaken to inform the field survey. Two Plant Community types (PCTs) were identified within the Study Area with a third located within the broader landscape:

- 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*
- PCT 1881 – *Western Hunter Flats Rough-barked Apple Forest*

Most of the Study Area on the SVTM was mapped as PCT 0 (not classified) (Figure 3-1).

3.2. Mapping native vegetation extent

ELA completed vegetation surveys within the BBRS Study Area across multiple days during November 2023 and April 2024. Plate 3-1 and Plate 3-2 show examples of typical vegetation within the Study Area.

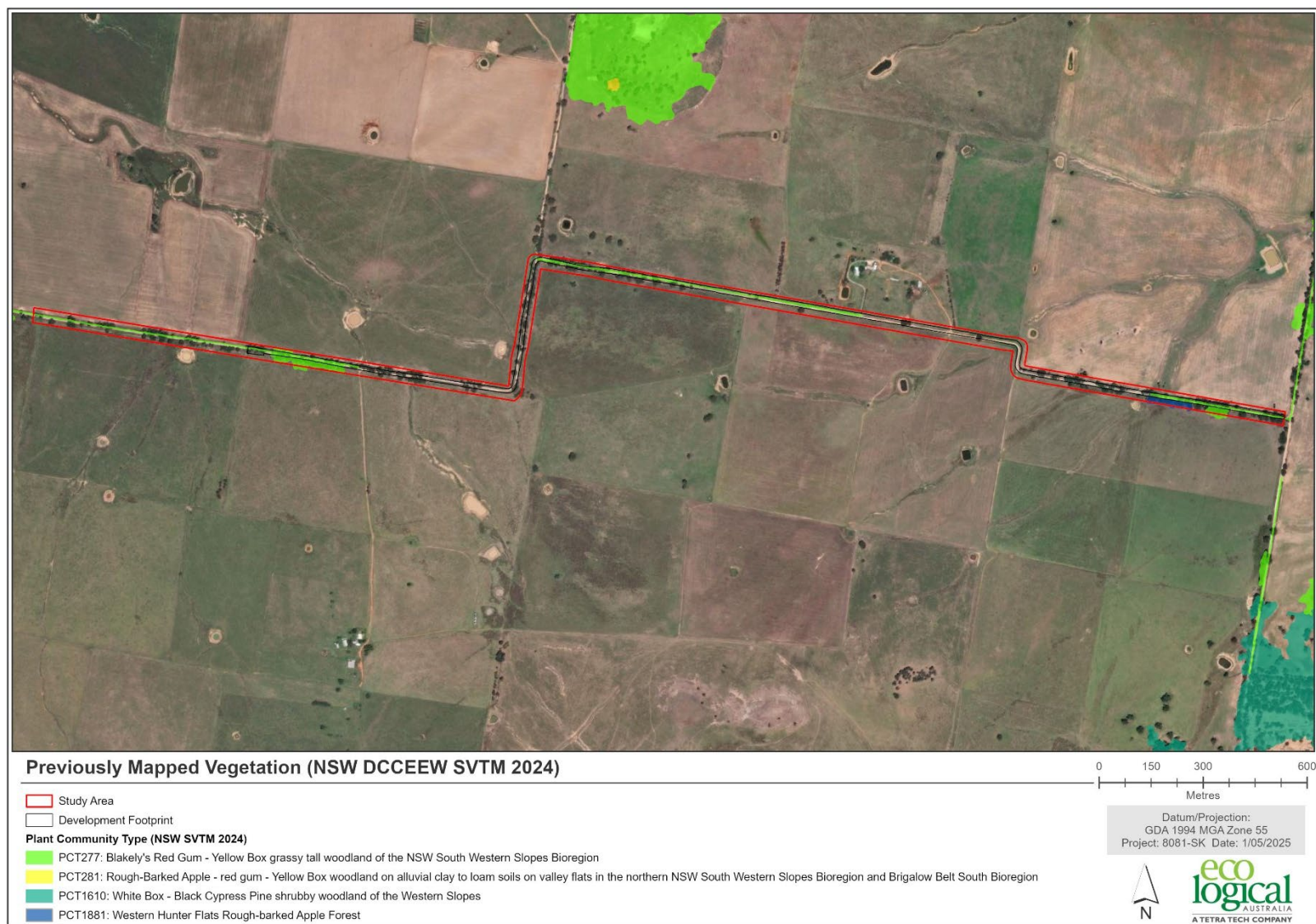


Figure 3-1: State Vegetation Type Mapping



Plate 3-1: Typical woodland vegetation within the Development Footprint



Plate 3-2: Typical grassland vegetation within the Development Footprint

3.3. Plot based vegetation survey

Eight vegetation integrity (VI) plots were completed, consisting of full floristics, cover and abundance (20 m x 20 m plot) and functional attributes (20 m x 50 m plots) collected in accordance with BAM (2020). The timing of vegetation surveys is shown in Table 3-1.

Table 3-1: Vegetation survey effort

Task	Ecologists	Dates
Vegetation validation	Dr Cheryl O'Dwyer, Lachlan Metzler	27 November 2023
VI assessment	Lachlan Metzler, Clara Friswell	3 & 4 April 2024

Areas that did not contain native vegetation such as the formed roadway (1.47 ha) have been excluded from the assessment.

3.4. Native vegetation cover

Vegetation in the Study Area consists of scattered trees (*Angophora floribunda* (Rough-Barked Apple), *Eucalyptus melliodora* (Yellow Box), *E. blakelyi* (Blakely's Red Gum) and *E. microcarpa* (Grey Box)). The surrounding landscape, largely devoid of trees, has been heavily impacted by intensive agricultural activities on adjoining private land. The ground layer shows significant disturbance attributed to road maintenance activities such as grading, culvert formation and erosion. These disturbances have heavily impacted the area, introducing weeds and exotic pasture species, which dominate much of the vegetation. Notable invasive species include *Paspalum dilatatum* (Paspalum), *Avena fatua* (Wild Oats), and *Bromus diandrus* (Great Brome) with patches of *Hypericum perforatum* (St John's Wort) and *Heliotropium amplexicaule* (Blue Heliotrope). Despite these disturbances, native grasses persist, including *Themeda triandra* (Kangaroo Grass) and *Austrostipa bigeniculata* (Speargrass) which were recorded alongside *Aristida ramosa* (Three-awn grass) and *Sporobolus crebra* (Slender Rat's Tail Grass). Other native species recorded include *Calotis lappulacea* (Yellow Burr Daisy), *Grona varians* (Variable Glycine), *Bulbine bulbosa* (Bulbine Lily) and *Dianella revoluta* (Blue Flax Lily). Shrubs are scarce.

3.5. Plant Community Types and PCT Justification

Assigning PCTs was challenging due to the limited presence of remnant vegetation. Remaining canopy trees and remnant vegetation within the surrounding landscape were used to assign two PCTs:

- 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 and Brigalow Belt South Bioregion.*

Descriptions of each PCT and justification for PCT selection are provided in Table 3-2 and Table 3-3. PCT mapping is shown in Figure 3-2 to Figure 3-4. PCTs were stratified to vegetation zones based on condition. Further detail on vegetation condition zones is also provided in the tables below and shown in Figure 3-5 to Figure 3-7.

Table 3-2: Vegetation description of PCT 277 Red Gum - Yellow Box grassy tall woodland of the NSW South Western Slopes Bioregion

Feature		Description
PCT Name		Blakely's Red Gum - Yellow Box grassy tall woodland of the NSW South Western Slopes Bioregion
Vegetation Formation		Grassy Woodland
Vegetation Class		Western Slopes Grassy Woodlands
Percent cleared value (%)		94
Extent within Development Footprint (ha)		1.29 ha
Threatened Community Association	Ecological (TEC)	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		<p>The best fit PCT was identified using the BioNet Filter Tool within BioNet Vegetation Classification Database. The following parameters were added to the tool:</p> <ul style="list-style-type: none"> • IBRA and subregion (NSW South Western Slopes and Inland Slopes). • Vegetation Formation - Grassy Woodland • Vegetation Class – Western Slopes Grassy Woodlands • Upper stratum - <i>Eucalyptus melliodora</i> was selected as the key tree species. <p>The process returned 16 PCTs. These PCTs were further refined by adding ground cover from plot data. <i>Themeda triandra</i> (Kangaroo Grass) and <i>Austrostipa bigeniculata</i> were added to the PCT Filter Tool. This process returned 2 PCTs. Lithology and landscape positioning (colluvial sediments on footslopes), was also used to select best fit PCT.</p> <p>Other PCTs considered were: PCT 266</p> <p>PCT 266 was discarded due to the dominance of <i>Eucalyptus albens</i> associated with this PCT which was not recorded within the zone.</p> <p>PCT 277 was selected as the best fit due to the presence of <i>Eucalyptus melliodora</i> on colluvial soils with a predominately grassy ground layer.</p>
Vegetation Description		<p>This PCT within the Study Area was scattered patches of remnant canopy of <i>E. blakelyi</i> and <i>E. melliodora</i>. 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 <i>Paspalum dilatatum</i> (Paspalum), <i>Avena fatua</i> (Wild Oats), and <i>Bromus diandrus</i> (Great Brome). Despite these impacts patches of remnants of native grasses persisted throughout this zone. <i>Themeda triandra</i> and <i>Austrostipa bigeniculata</i> were recorded in scattered patches alongside <i>Aristida ramosa</i>, <i>Sporobolus crebra</i> and <i>Calotis lappulacea</i>.</p> <p>Two vegetation zones were identified, differentiated based on the presence or absence of canopy cover:</p> <ul style="list-style-type: none"> • PCT 277-Woodland. This zone featured a canopy dominated by <i>E. melliodora</i> with <i>E. blakelyi</i> as a co-dominate species and occasional occurrences of <i>Angophora floribunda</i>. The ground layer contained native grasses including <i>Themeda triandra</i>, <i>Aristida ramosa</i> and <i>Sporobolus creber</i>. Agricultural weeds were abundant including <i>Lolium perenne</i> (Rye Grass), <i>Chloris gayana</i> (Rhodes Grass) and <i>Bromus diandrus</i>.

Feature	Description
	<ul style="list-style-type: none"> 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



PCT 277 - DNG



PCT 277 - Woodland

Table 3-3: 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

Feature	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 Woodland
Vegetation Class	Western Slopes Grassy Woodlands
Percent cleared value (%)	70
Extent within Development Footprint (ha)	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	<p>The best fit PCT was identified using the BioNet Filter Tool within BioNet Vegetation Classification Database. The following parameters were added to the tool:</p> <ul style="list-style-type: none"> IBRA and subregion (NSW South Western Slopes and Inland Slopes). Vegetation Formation - Grassy Woodland Vegetation Class – Western Slopes Grassy Woodlands Upper stratum - <i>Angophora floribunda</i> and <i>Eucalyptus blakelyi</i> were selected as the key tree species.

Feature	Description
	<p>The process returned 6 PCTs. Lithology and landscape positioning (alluvial sediments on footslopes), was also used to select best fit PCT.</p> <ul style="list-style-type: none"> • PCT 274 was discarded due to the absence of <i>Eucalyptus albens</i> which is a significant feature of this PCT. • PCT 3388 was discarded due to the absence of <i>Eucalyptus albens</i> which is a significant feature of this PCT. • PCT 3397 was discarded due to the absence of <i>Eucalyptus melliodora</i> which is 'almost always' included in this PCT. • PCT 3406 was discarded due to the absence of <i>Eucalyptus albens</i> which is a dominant canopy species in this PCT. • PCT3396 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 <i>A. floribunda</i> with the presence of <i>E. blakelyi</i> occurring along lower slopes on alluvial soils. Plot data identified a variety of ground species that are typical of this PCT.
Vegetation Description	<p>The following vegetation zones were identified differentiated based on presence or absence of canopy and shrubs:</p> <ul style="list-style-type: none"> • PCT 281-DNG. At the time of assessment this vegetation zone was predominantly native, characterised by a mix of native grasses including <i>Sporobolus creber</i>, <i>Eragrostis brownii</i> and <i>Eragrostis leptostachya</i>. Tree cover was minimal with less than 1%. There was an incursion of weeds consisting of predominately <i>Setaria parviflora</i> and <i>Eragrostis cilianensis</i> with <i>P. dilatatum</i>, <i>S. pumila</i>, <i>Conyza bonariensis</i>, but included native grasses such as <i>E. leptostachya</i>, <i>S. crebra</i>, <i>T. triandra</i> and <i>Chloris truncata</i>. • PCT 281-Woodland. This vegetation zone was identified along the roadsides The canopy layer was dominated by a diverse mix of species, including <i>A. floribunda</i>, <i>E. melliodora</i>, and <i>E. blakelyi</i>. The shrub layer was sparse, primarily consisting of <i>C. sifton</i> with small patches of <i>Atriplex semibaccata</i>. 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.



PCT 281 - Woodland



PCT 281 - DNG



Figure 3-2: PCTs within the Development Footprint (Page 1)

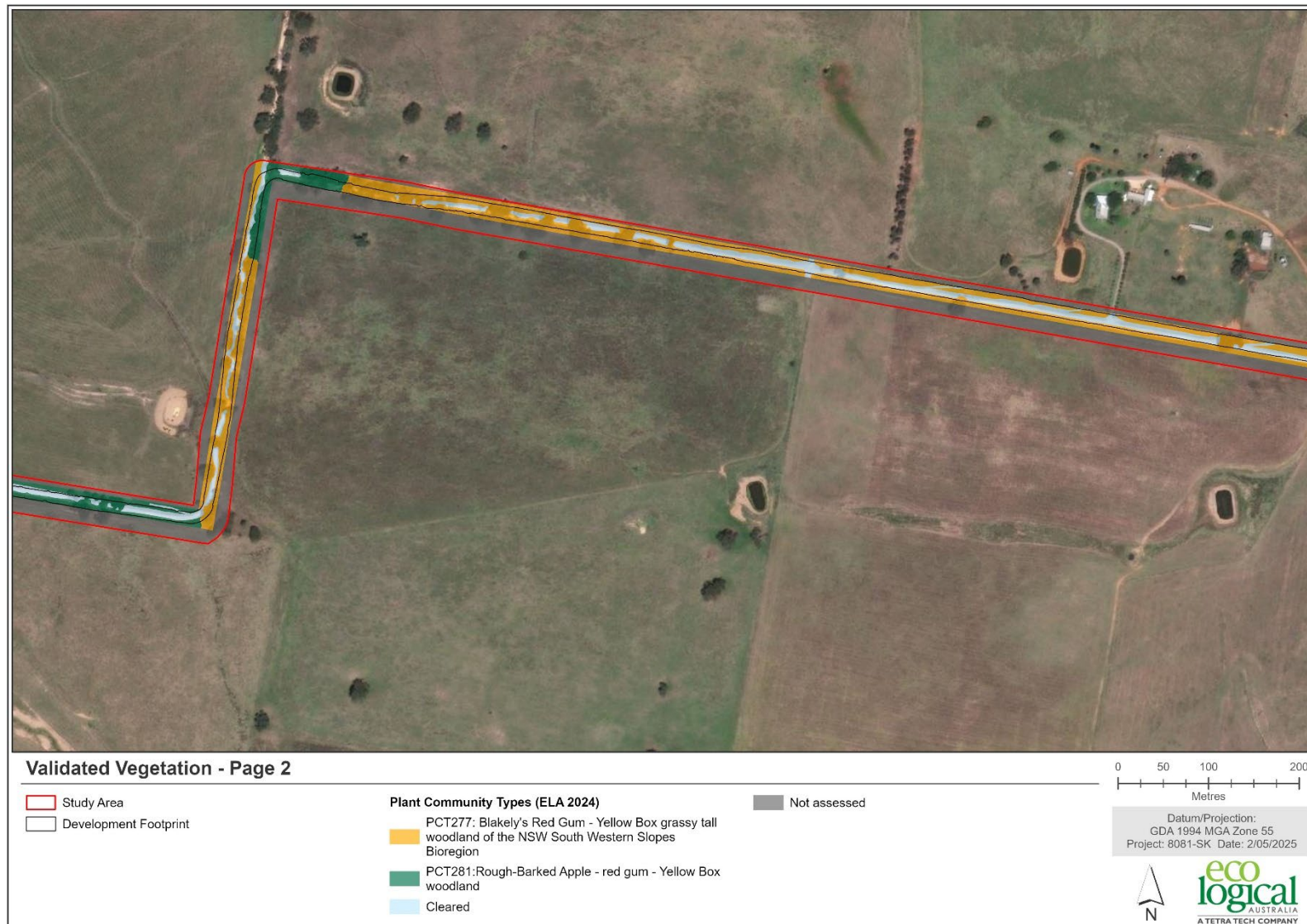


Figure 3-3: PCTs within the Development Footprint (Page 2)

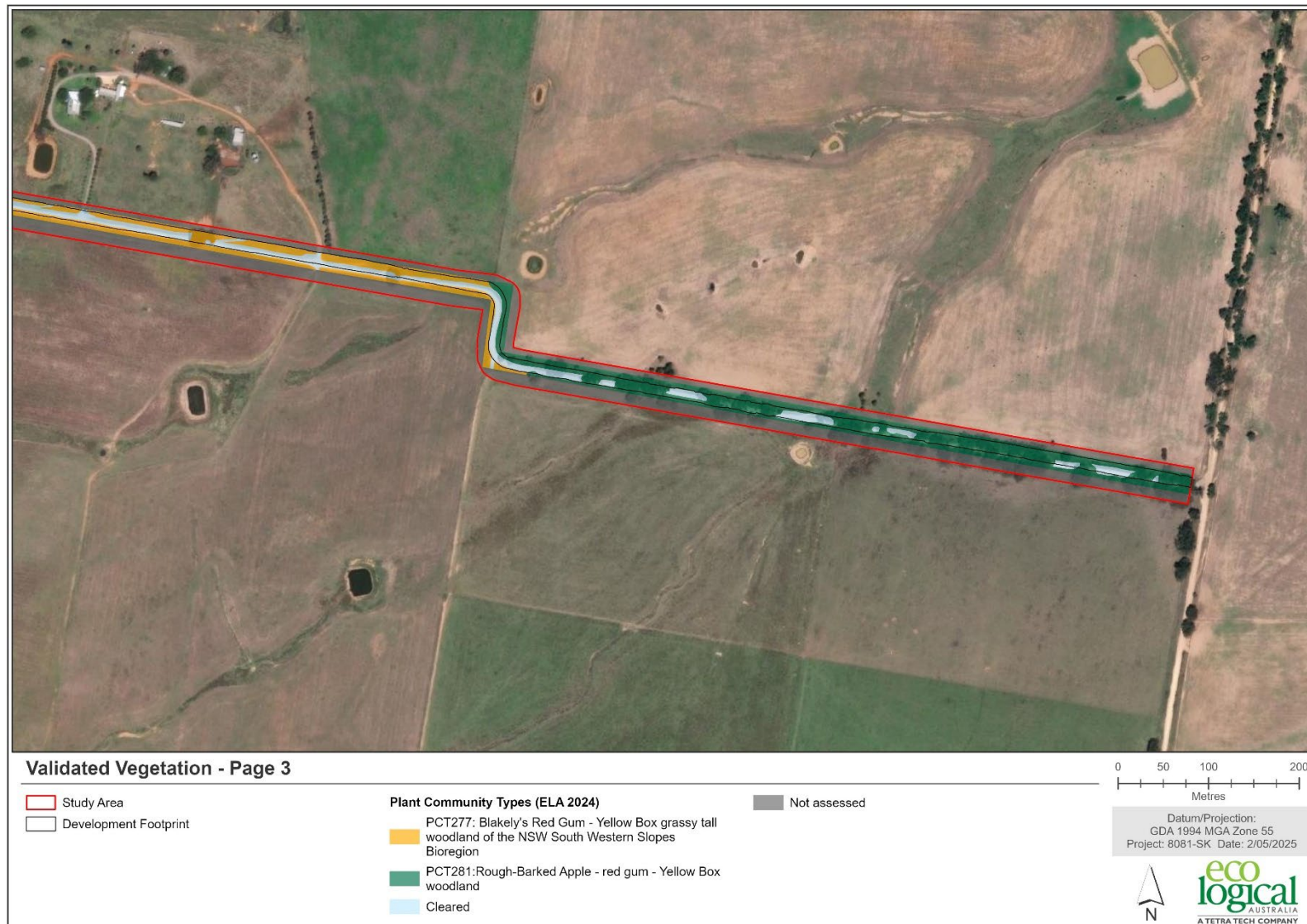


Figure 3-4: PCTs within the Development Footprint (Page 3)



Figure 3-5:Vegetation zones within the Development Footprint (Page 1)

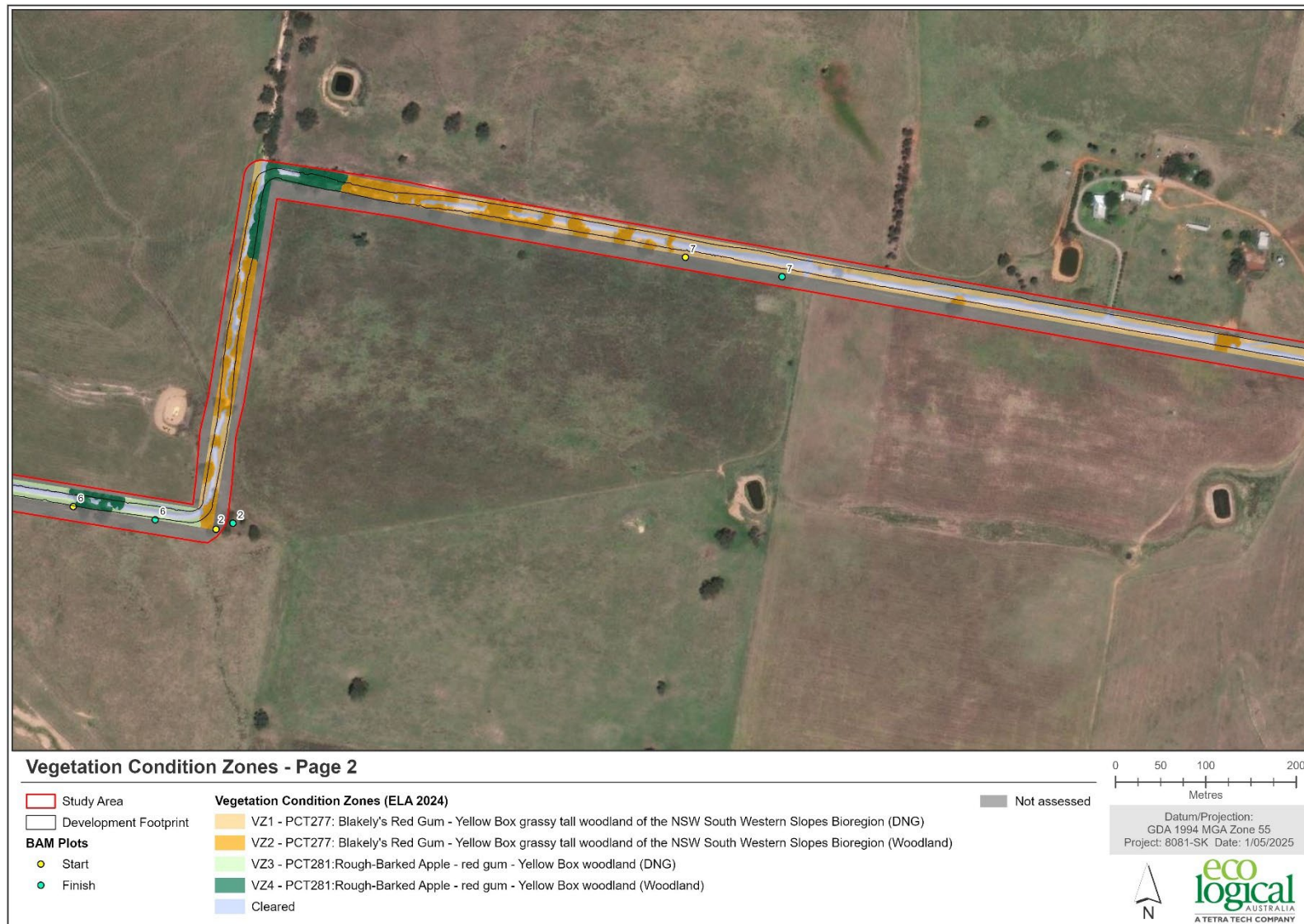


Figure 3-6: Vegetation zones within the Development Footprint (Page 2)

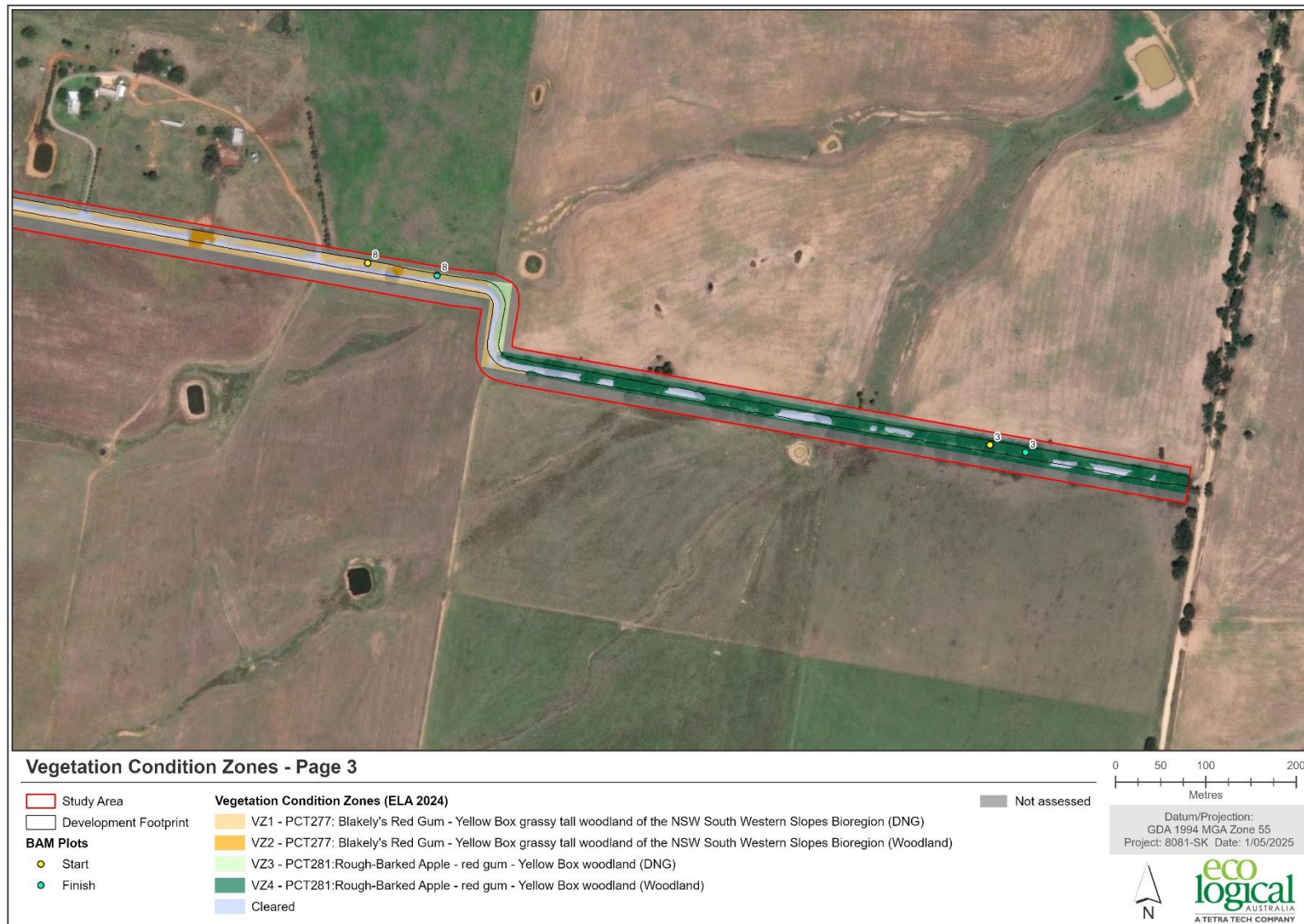


Figure 3-7: Vegetation zones within the Development Footprint (Page 3)

3.6. Threatened Ecological Communities

Both PCT 277 and PCT 281 are associated with the Threatened Ecological Community (TEC) *White Box - Yellow Box – Blakely’s Red Gum Grassy Woodland and Derived Native Grassland*. This TEC is listed as Critically Endangered under both the BC Act and the EPBC Act. The TEC is referred to as ‘Box Gum Woodland’.

3.6.1. BC Act listed - *White Box - Yellow Box – Blakely’s Red Gum Grassy Woodland and Derived Native Grassland in the NSW North Coast, New England Tableland, Nandewar, Brigalow Belt South, Sydney Basin, South Eastern Highlands, NSW South Western Slopes, South East Corner and Riverina Bioregions*

Under the BC Act, the vegetation must meet the following criteria:

- Occurs at elevations between 170 and 1,200 meters above sea level
- Found on moderate to highly fertile soils, with topography ranging from flat plains to undulating hills
- Consists of an assemblage of species, including the presence or prior occurrence of Grassy Woodlands dominated by species such as *Eucalyptus albens* (White Box), *Eucalyptus melliodora* (Yellow Box), and *Eucalyptus blakelyi* (Blakely’s Red Gum) in varying combinations, generally with a grassy understory (TSSC 2020).

The Final Determination (TSSC 2020) also includes modified areas where canopy species are present even if the ground layer is dominated by exotic species, and areas of DNG where the canopy is absent. Importantly, all occurrences of the TEC, regardless of condition, are covered by the Determination.

Each vegetation zone within the BBRS Study Area was assessed against the Identification Guidelines for Endangered Ecological Communities: White Box-Yellow Box-Blakely’s Red Gum Woodland (NSW National Parks and Wildlife Service (NPWS 2002).

Both PCT 277 and PCT 281 exhibit characteristic species and ground layers typical of Box Gum Woodland despite existing disturbances. Therefore, these zones, despite their current condition, are included as part of the listed community. The areas (ha) of each vegetation zone within the BBRS Study Area and Development Footprint are shown in Table 3-4 and on Figure 3-8 to Figure 3-10.

Table 3-4: Area of BC Act listed Box Gum Woodland within the BBRS Study Area and Development Footprint

PCT and Vegetation Zone	BBRS Study Area (ha)	Development Footprint (ha)
PCT 277-DNG	1.51	0.72
PCT 277-Woodland	1.00	0.57
PCT 281-DNG	0.58	0.18
PCT 281-Woodland	3.21	1.38
TOTAL	6.3	2.85

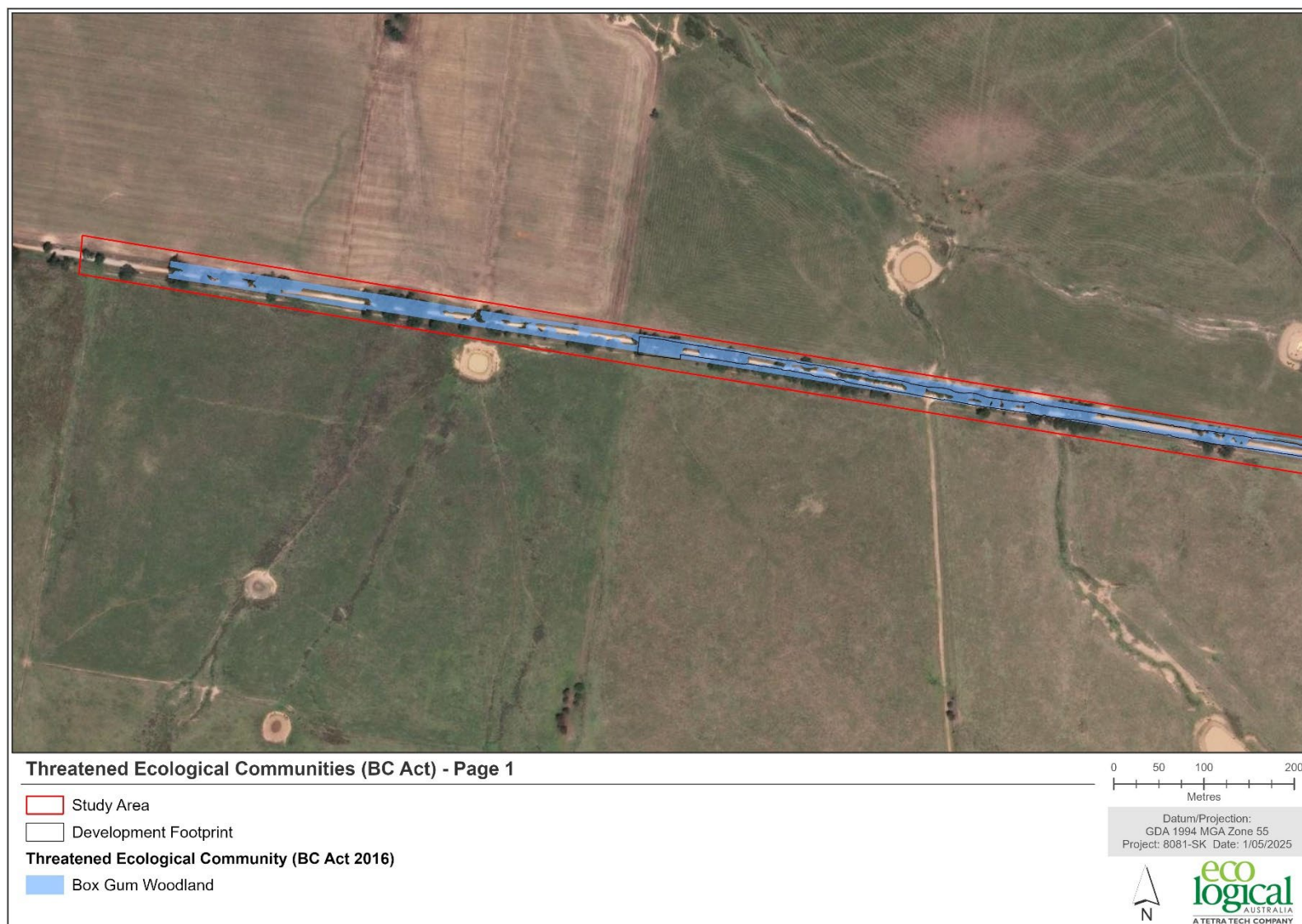


Figure 3-8: Box Gum Woodland CEEC (BC Act) (Page 1)



Figure 3-9: Box Gum Woodland CEEC (BC Act) (Page 2)

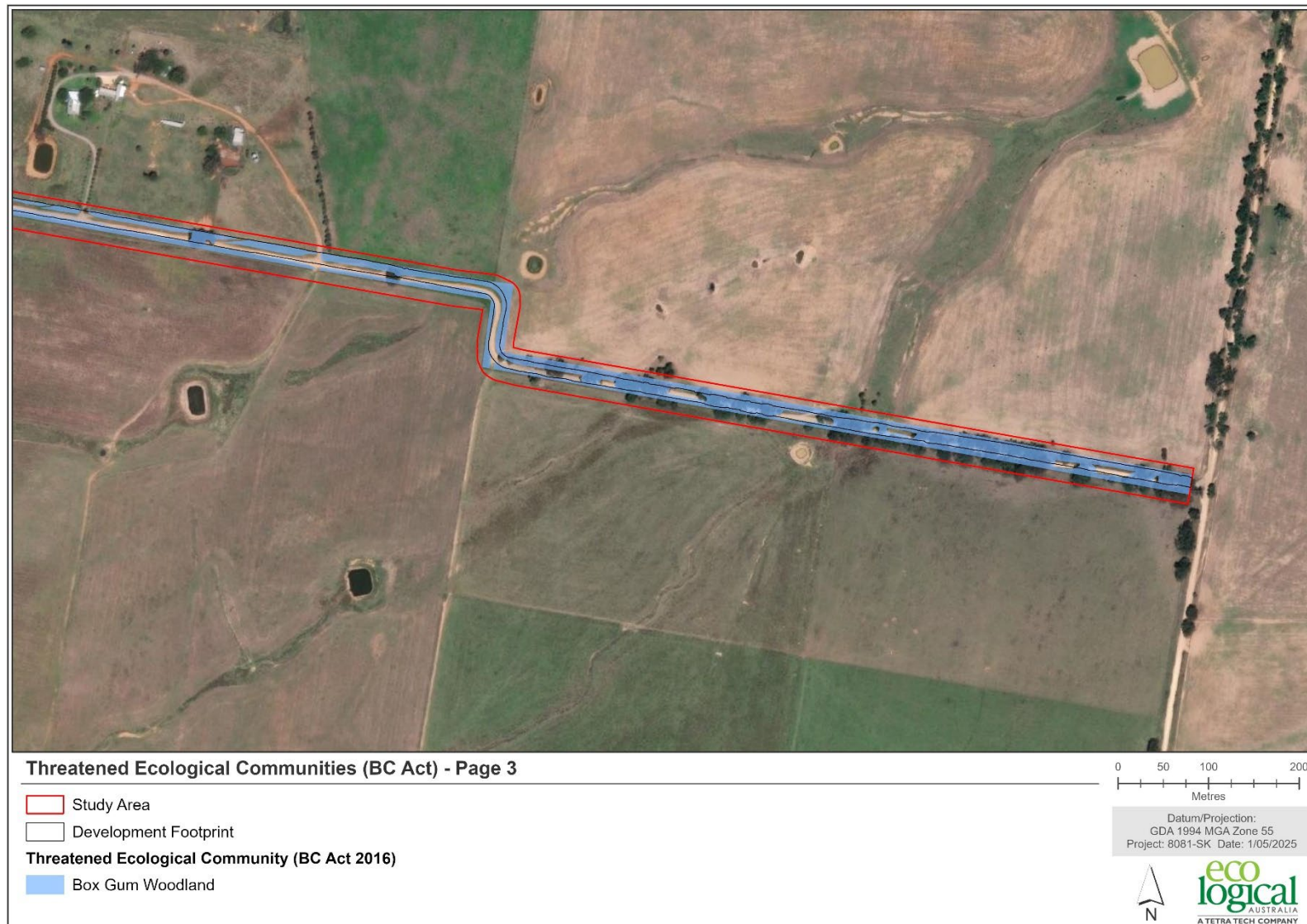


Figure 3-10: Box Gum Woodland CEEC (BC Act) (Page 3)

3.6.2. EPBC Act listed *White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland*

PCT 277 and PCT 281 have the potential to be associated with the Critically Endangered Box Gum Woodland TEC listed under the EPBC Act. This ecological community is characterized by specific ecological attributes including:

- Rainfall range: Occurs in areas receiving between 400 mm and 1200 mm of annual rainfall
- Soil and Altitude: Found on moderate to highly fertile soils, at elevations between 170 m to 1200 m above sea level
- Vegetation Composition: Typically dominated by one or more of *Eucalyptus albens* (White Box), *Eucalyptus melliodora*, and *Eucalyptus blakelyi* with a grassy ground-layer containing 12 or more native forbs (including one key species) or evidence of natural canopy regeneration.

Each vegetation zone within the BBRs Study Area was assessed using the flowchart “*Determining if your land has an area of the listed ecological community*” from White Box – Yellow Box – Blakely’s Red Gum Grass Woodlands and Derived Native Grasslands (Department of the Environment and Heritage, 2006).

Neither PCT 277 and PCT 281 qualifies as the listed community under the EPBC Act due to insufficient native diversity within the ground layer and lack of canopy regeneration. The patch size was also smaller than the required minimum of 2 ha for inclusion in the listed community. Therefore, these PCTs do not qualify as part of the EPBC Act listed Box Gum Woodland TEC.

3.7. Vegetation Integrity assessment

3.7.1. Vegetation Integrity plots

Eight VI plots were surveyed throughout the BBRs Study Area to confirm PCT selection and TECs. VI plots were undertaken to assess the composition, structure, and function components of each vegetation zone within the BBRs Study Area in accordance with the BAM 2020.

Location of VI plots were randomly selected from aerial imagery to avoid ecotones and provide a representative sample for each PCT based on total area and vegetation condition class as required by BAM 2020 (Table 3-5). These were micro-sited within the field to ensure that the location of plots was a true representation of the PCT condition. Detailed field data is provided in Appendix 3 and Appendix 4. Photographs of each plot are also presented in Appendix 4.

Given the small size of patches within each vegetation condition, data within all plots were interrogated to ensure that they were representative of the zone. When reviewing the data it was identified that Plot 6 crossed two into two vegetation zones. Given that this plot was in excess of requirements this plot was not used in the BAM-C.

Table 3-5: VI plots completed across the Development Footprint

PCT	PCT Name	Condition	Area within Development Footprint (ha)	Required VI Plots	Plots Surveyed
277	Blakelys Red Gum - Yellow Box grassy tall woodland of the NSW South Western Slopes Bioregion	DNG	0.72	1	Plot 7, Plot 8
		Woodland	0.57	1	Plot 2

PCT	PCT Name	Condition	Area within Development Footprint (ha)	Required VI Plots	Plots Surveyed
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	1	Plot 4
		Woodland	1.38	2	Plot 1, Plot 3, Plot 5,

3.7.2. Vegetation Integrity Scores

Plot data was uploaded into the BAMC to generate an overall VI Score (Table 3-6).

Table 3-6: Vegetation Integrity Scores

VZ ID	Vegetation Zone	Area within Development Footprint (ha)	Composition Score	Structure Score	Function Score	Hollow bearing trees present?	VI Score
1	281-Woodland	1.38	83.2	61	54.8	No	65.3
2	277-Woodland	0.57	66.3	41	25.5	No	41.1
3	281-DNG	0.18	89.3	8.2	58.2	No	34.9
4	277-DNG	0.72	45.3	57.5	17.5	No	35.8
TOTAL		2.85					

4. Habitat Suitability for threatened species

4.1. Existing information

An assessment of potential fauna habitat was conducted throughout the BBRs Study Area concurrently with vegetation surveys and PCT mapping and reference to desktop information (see Figure 4-1 for threatened species previously recorded within 10 km of the BBRs Study Area). The BBRs Study Area primarily consists of low-quality roadside remnant vegetation consisting of scattered trees with hollows and is surrounded by managed and cropped land with nearby farm dams.

Desktop assessments included reviews of previous studies that had been undertaken in the general location. ELA (2024) completed targeted surveys for threatened species within the broader landscape, along Merotherie Road and within private lands located approximately 5 km southeast of the BBRs Study Area from 2021 through to 2024. These areas consisted of cleared farmland used for cropping and grazing, isolated paddock trees with hollows, scattered rocks and small patches of remnant vegetation.

During these surveys, seven species were recorded:

- *Falco subniger* (Black Falcon)
- *Tyto novaehollandiae* (Masked Owl)

- *Pomatostomus temporalis temporalis* (Grey-crowned Babbler)
- *Hirundapus caudacutus* (White-throated Needletail)
- *Chalinolobus dwyeri* (Large-eared Pied Bat)
- *Minopterus orianae oceanensis* (Large Bent-winged Bat)
- *Saccolaimus flaciventris* (Yellow-bellied Sheath-tailed Bat)
- *Vespadelus traughtoni* (Eastern Cave Bat).

The NSW BioNet Atlas data base of threatened flora and fauna was also reviewed to identify threatened species which may have previously been recorded in the broader landscape. Two species have been recorded:

- *Hieraaetus morphnoides* (Little Eagle) – observed along Barney’s Reef Road
- *Phascolarctos cinereus* (Koala) – observed in 2024 on Blue’s Spring Road with scats recorded in the western section of BBRS near the Community Transfer Waste Station (EMM 2023).

4.2. Ecosystem credit species

Ecosystem credit species are threatened species whose occurrence can generally be predicted using vegetation surrogates and/or landscape features, or that have a low probability of detection using targeted surveys. The Threatened Biodiversity Data Collection (TBDC) identifies the threatened species assessed for ecosystem credits. A targeted survey is not required to identify or confirm the presence of ecosystem credit species.

Ecosystem credit species predicted to occur within the Study Area are generated by the BAMC following the input of VI data and the PCTs identified within Section 3.4. No predicted species have been removed from the assessment. Ecosystem credit species predicted to occur at the Development Footprint, their associated habitat constraints, geographic limitations and sensitivity to gain class is included in Appendix 5.

4.3. Species credit species

Species credit species that require further assessment on the Development Footprint (i.e. candidate species), their associated habitat constraints, geographic limitations and sensitivity to gain class are included in Table 4-1.

Species with habitat constraints may be avoided following in-depth assessment of the potential for habitat within the Development Footprint. Subsections 5.2.1 to 5.2.6 of the BAM were used to identify the habitat suitability for threatened species within the BBRS Study Area. Species credit species removed from further assessment based on their habitat constraints are detailed within Section 4.2.2.

Table 4-1: Candidate 'species credit' species

Candidate species	BC Act	EPBC Act	Sensitivity to gain class	Habitat/Geographical Constraints	Habitat within the Study Area	PCTs	Targeted surveys required?
<i>Anthochaera phrygia</i> Regent Honeyeater	CE	CE	High	Important Habitat Map	The Study Area is not mapped on the Important Habitat Map; and therefore, surveys are not required.	281	No
<i>Aprasia parapulchella</i> Pink-tailed Legless Lizard	V	V	High	Rocky areas, or within 50 m of rocky areas (TSDC 2023). There are no listed geographical constraints for this species (Office of Environment and Heritage 2023).	Suitably sized rocks for this species are approximately: 300 mm wide and 50 mm deep (Wong et al. 2011). 100–150 mm wide, 120–220 mm long, 50–150 mm deep (Jones 1999). There were no rocks along Birriwa Bus Route South. No suitable habitat exists	277, 281	No
<i>Burhinus grallarius</i> Bush Stone-curlew	E	NL	High	Fallen/standing dead timber including logs. There are no listed geographical constraints for this species (Office of Environment and Heritage 2023).	Yes, fallen/standing dead timber including logs are present throughout remnant woodland patches within the Study Area.	277, 281	Yes
<i>Callocephalon fimbriatum</i> Gang-gang Cockatoo (Breeding)	V	E	High	Eucalypt tree species with hollows at least 3 m above the ground and with hollow diameter of 7 cm or larger. There are no listed geographical constraints for this species (Office of Environment and Heritage 2023).	Several hollow bearing trees are present throughout the biodiversity Study Area which conform to this species' requirements.	277, 281	Yes
<i>Cercartetus nanus</i> Eastern Pygmy-possum	V	NL	High	No habitat or geographical constraints.	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 (TSDC 2023).	277	Yes

Candidate species	BC Act	EPBC Act	Sensitivity to gain class	Habitat/Geographical Constraints	Habitat within the Study Area	PCTs	Targeted surveys required?
<i>Chalinolobus dwyeri</i> Large-eared Pied Bat	E	E	Very High	Within 2 km of rocky areas containing caves, overhangs, escarpments, outcrops, or crevices, or within 2 km of old mines or tunnels. Potential breeding habitat is PCTs associated with the species within 100 m of rocky areas containing caves, or overhangs or crevices, cliffs or escarpments, or old mines, tunnels, culverts, derelict concrete buildings (Department of Planning and Environment, 2023d). There are no listed geographical constraints for this species (Office of Environment and Heritage 2023).	This species is a species credit species for breeding and foraging habitat (TBDC 2023). Any impact to breeding habitat is a Serious and Irreversible Impact (SAII). There is no breeding habitat present within the biodiversity BBRs Study Area; however, foraging habitat is present.	277, 281	Yes
<i>Delmar impar</i> Striped Legless Lizard	V	V	Moderate	South of the Mid-Western Highway	In NSW South-western Slopes, considered to likely occur south of the Mid-Western Highway. Study Area north of the Mid-Western Highway; therefore surveys not required due to geographical constraints.	277	No
<i>Haliaeetus leucogaster</i> White-bellied Sea-Eagle	V	NL	High	Living or dead mature trees within suitable vegetation within 1 km of rivers, lakes, large dams or creeks, wetlands and coastlines (TSDC 2023). There are no listed geographical constraints for this species (Office of Environment and Heritage 2023).	Several stick nests were recorded throughout the biodiversity Study Area. Further survey is required to determine if White-bellied Sea-Eagle are utilising these nests.	277, 281	Yes
<i>Hieraetus morphnoides</i> Little Eagle	V	NL	Moderate	Nest trees – live (occasionally dead) large old trees within vegetation (TSDC 2023). There are no listed geographical constraints for this species (Office of Environment and Heritage 2023).	Several stick nests were recorded throughout the biodiversity Study Area. Further survey is required to determine if Little Eagle are utilising these nests.	277, 281	Yes
<i>Keyarcis scurra</i> Key's Matchstick Grasshopper	E	E	High	There are no habitat constraints.		277	Yes

Candidate species	BC Act	EPBC Act	Sensitivity to gain class	Habitat/Geographical Constraints	Habitat within the Study Area	PCTs	Targeted surveys required?
<i>Lathamus discolor</i> Swift Parrot	E	CE	Moderate	Important Habitat Map	The Study Area is not mapped on the Important Habitat Map; and therefore, surveys are not required.	277, 281	No
<i>Litoria booroolongensis</i> Booroolong Frog	E	E	High		There is no permanent or near permanent river environment with rocky structures (bedrock or cobble) within the Study Area; and therefore surveys are not required.	277, 281	No
<i>Lophoictinia isura</i> Square-tailed Kite	V	NL	Moderate	Nest trees (TSDC 2023). There are no listed geographical constraints for this species (Office of Environment and Heritage 2023).	Several stick nests were recorded throughout the biodiversity Study Area. Further survey is required to determine if Square-tailed Kites are utilising these nests.	277, 281	Yes
<i>Miniopterus orianae oceanis</i> Large Bent-winged Bat	V	NL	Very High	Cave, tunnel, mine, culvert or other structure known or suspected to be used for breeding. Potential breeding habitat is caves, tunnels, mines or other structures known or suspected to be used by <i>M. schreibersii oceanensis</i> including species records in BioNet with microhabitat code 'IC – in cave'; observation type code 'E nest roost'; with numbers of individuals >500; or from the scientific literature. There are no listed geographical constraints for this species (Office of Environment and Heritage 2023).	This species is a species credit species for breeding habitat only (TBDC 2023). This is no breeding habitat for this species present within the biodiversity Study Area.	281	No
<i>Myotis macropus</i> Southern Myotis	V	NL	High	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.	Suitable habitat is located within the 200 m of the Study Area		Yes
<i>Ninox connivens</i> Barking Owl	V	NL	High	Living or dead trees with hollows greater than 20 cm diameter and greater than 4 m above the	Several hollow bearing trees are present throughout the biodiversity Study Area	277, 281	Yes

Candidate species	BC Act	EPBC Act	Sensitivity to gain class	Habitat/Geographical Constraints	Habitat within the Study Area	PCTs	Targeted surveys required?
				ground (TSDC 2023). There are no listed geographical constraints for this species (Office of Environment and Heritage 2023).	which conform to this species' requirements. This species was recorded south of the Stubbo Solar Project (ELA 2020) and offsets have been calculated for SSD 10452. A review will be undertaken to determine if additional offsets will be required.		
<i>Ninox strenua</i> Powerful Owl	V	NL	High	Living or dead trees with hollow greater than 20 cm diameter (TSDC 2023). There are no listed geographical constraints for this species (Office of Environment and Heritage 2023).	Several hollow bearing trees are present throughout the biodiversity Study Area which conform to this species' requirements.	281	Yes
<i>Petaurus norfolcensis</i> Squirrel Glider	V	NL	High	No habitat or geographical constraints.	This species inhabits mature or oldgrowth Box, Box Ironbark and River Red Gum forest west of the Great Dividing Range (TSDC 2023).	277, 281	Yes
<i>Petaurus norfolcensis - endangered population</i> Squirrel Glider Wagga Wagga LGA	E	NL	High	Located within the Wagga Wagga LGA	Removed due to geographical constraints		No
<i>Petrogale penicillata</i> Brush-tailed Rock-wallaby	E	V	Very High	Land within 1 km of rocky escarpments, gorges, steep slopes, boulder piles, rock outcrops or cliffhills (TSDC 2023). There are no listed geographical constraints for this species (Office of Environment and Heritage 2023).	The biodiversity Study Area does not contain areas within 1 km of cliffhills and rocky areas. This species browse on vegetation in and adjacent to rocky areas (TSDC 2023). 1 km buffer did not intersect with Birriwa Bus Route South.	277, 281	No
<i>Phascogale tapoatafa</i>	V	NL	High	No habitat or geographical constraints.	Yes Found in dry sclerophyll forest with sparse ground cover	277, 281	Yes

Candidate species	BC Act	EPBC Act	Sensitivity to gain class	Habitat/Geographical Constraints	Habitat within the Study Area	PCTs	Targeted surveys required?
Brush-tailed Phascogale							
<i>Phascolarctos cinereus</i> Koala	E	E	High	Presence of Koala use trees (TSDC 2023). There are no listed geographical constraints for this species (Office of Environment and Heritage 2023).	Feed trees, as per Schedule 3 of the State Environment Planning Policy (Biodiversity and Conservation) 2021 are present throughout the biodiversity Study Area.	277, 281	Yes
<i>Polytelis swainsonii</i> Superb Parrot (Breeding)	V	V	High	Living or dead <i>E. blakelyi</i> , <i>E. melliadora</i> , <i>E. albens</i> , <i>E. camaldulensis</i> , <i>E. microcarpa</i> , <i>E. polyanthemos</i> , <i>E. mannifera</i> , <i>E. intertexta</i> with hollows greater than five cm diameter; greater than 4 m above ground or trees with a diameter at breast height (DBH) of greater than 30 cm (TSDC 2023). There are no listed geographical constraints for this species (Office of Environment and Heritage 2023).	Several hollow bearing trees are present throughout the biodiversity Study Area which conform to this species' requirements.	277, 281	Yes
<i>Pteropus poliocephalus</i> Grey-headed Flying-fox	V	V	High	Breeding Camps	An assessment of habitat confirmed that no breeding camps are present within the biodiversity Study Area. The closest camp is located at Mudgee 43 km south of the Study Area (DCCEEW 2024a).	277, 281	No
<i>Synemon plana</i> Golden Sun Moth	V	V	Moderate	South of the Mid-Western Highway. Requires wallaby grasses, speargrasses with open spaces	In NSW South-western Slopes, considered to likely occur south of the Mid-Western Highway. Study Area north of the Mid-Western Highway; therefor surveys not required.	277	No
<i>Tyto novaehollandiae</i> Masked Owl	V	NL	High	Living or dead trees with hollows greater than 20 centimetre diameter. There are no listed geographical constraints for this species (Office of Environment and Heritage, 2023).	Several hollow bearing trees are present throughout the biodiversity Study Area which conform to this species' requirements.	277, 281	Yes

FLORA

Candidate species	BC Act	EPBC Act	Sensitivity to gain class	Habitat/Geographical Constraints	Habitat within the Study Area	PCTs	Targeted surveys required?
<i>Acacia ausfeldii</i> Ausfeld's Wattle	V	NL	High	Footslopes and low rises on Sandstone	Found in woodlands with a <i>Cassinia</i> dominated understory	277, 281	Yes
<i>Ammobium craspedioides</i> Yass Daisy	V	V	High	Restricted to areas south of Cowra	Found in Box-Gum Woodlands. Geographically restricted.	-	No
<i>Cullen parvum</i> # Small Scurf-pea	E	NL	Moderate		Found in Box Gum Woodland.	277	Yes
<i>Dichanthium setosum</i> Bluegrass	V	V	High	No habitat or geographical constrains.	Yes. Potential habitat within the Study Area. Associated with heavy black soils and red-brown loams with clay subsoil. Often found in disturbed areas.	281	Yes
<i>Euphrasia arguta</i> Euphrasia arguta	CE	CE	High	No habitat or geographical constrains.	Yes. Suitable habitat present	277, 281	Yes
<i>Pomaderris cotoneaster</i> Cotoneaster Pomaderris	CE	CE	High	In northern part of inland slopes east of Castlereagh Hwy.	Found in a range of habitats predominately in forested areas. Habitat includes deep friable soils, rocky slopes and steep gullies in sandstone cliffs.	277, 281	Yes
<i>Prasophyllum petilum</i> * Tarengo Leek Orchid	CE	E	High		Found in Box Gum Woodlands with grassy understory often with <i>Themeda triandra</i>	277, 281	Yes
<i>Prasophyllum sp. Wybong</i> * Prasophyllum sp. Wybong	NL	CE	Very high	No habitat or geographical constrains.	Open Eucalypt woodland and grasslands	277, 281	Yes
<i>Swainsona recta</i> Small Purple-pea	E	E	High	No habitat or geographical constrains.	Found in grasslands and grassy woodlands in association with <i>Eucalyptus blakelyi</i> and <i>E. melliodora</i> .	277	Yes

Candidate species	BC Act	EPBC Act	Sensitivity to gain class	Habitat/Geographical Constraints	Habitat within the Study Area	PCTs	Targeted surveys required?
<i>Swainsona sericea</i> Silky Swainson-pea	V	NL	Moderate	Footslopes and low rises on sandstone	Found in natural temperate grasslands and woodlands.	277, 281	Yes

4.3.1. Geographic limitations

The BAM-C provides geographic limitations for a number of species. The location of the Development Footprint results in the exclusions for a number of species, which are detailed Table 4-2 below. These species have been excluded from any further assessment.

Table 4-2: Exclusions based on Geographic Constraints

Species name	Common name	Geographic limitation	Justification
<i>Ammobium craspedioides</i>	Yass Daisy	South of Cowra	The Development Footprint is not south of Cowra
<i>Delma impar</i>	Striped Legless Lizard	South of the Mid-Western Highway	The Development Footprint is not south of the Mid-Western Highway
<i>Petaurus norfolcensis</i> - <i>endangered population</i>	Squirrel Glider in the Wagga Wagga Local Government Area	Wagga Wagga LGA	The Development Footprint is not within the Wagga Wagga LGA
<i>Synemon plana</i>	Golden Sun Moth	South of Mid-Western Highway	The Development Footprint is not south of the Mid-Western Highway

4.3.2. Assess the habitat constraints and vagrant species on the Subject Land

A habitat assessment including on-ground surveys was undertaken across the BBRS Study Area to determine the types of threatened species habitats that may be present and require assessment. The habitat assessment included the following:

- Hollow bearing tree survey
- Stick nest survey
- Large Woody Debris
- Floristic data within each vegetation zone.

The following sections describe the habitat features identified during the habitat assessment and outlines the methods and results for each information source.

4.3.3. Hollow bearing tree survey

The entirety of the BBRS Study Area was traversed during a hollow bearing tree and stick nest survey in January 2024. At each potential hollow bearing tree, the following information was captured:

- Tree species (or stag)
- Diameter at breast height (DBH)
- Number of hollows from size classes (<5 cm, 5-10 cm, 10-15 cm, 15-20 cm, 20-30 cm, >30 cm)
- Suitability for threatened species.

Across the Development Footprint 53 hollow-bearing trees were identified. The majority of hollows were less than 20 cm diameter, however 12 hollows greater than 20 cm were observed. The locations of all hollow-bearing trees are provided in Figure 4-2.

4.3.4. Stick nests

During the habitat assessment, eight stick nests were identified within the BBRS Study Area. The stick nests ranged in size from 30 cm to 60 cm diameter. No nesting birds were observed utilising the stick

nests during the habitat assessment or during diurnal avifauna surveys in Spring and Summer 2023/2024, nor was there any breeding behaviour recorded during these surveys. The location of all stick nests is provided in Figure 4-2. An example of a stick nest detected within the Development Footprint is provided below in Plate 4-1.



Plate 4-1: Stick nest along Birriwa Bus Route South

4.3.5. Aquatic habitat

There are two first order streams, one second order stream and one third order stream present within the Development Footprint. All streams are ephemeral in nature. There are no farm dams present within the BBRs Study Area, however there are numerous within the surrounding paddocks, and 7 within 200 m of the BBRs Study Area. All farm dams are within grassland areas, surrounded by a mixture of native and exotic vegetation. Habitat within these areas is generally degraded.

4.4. Candidate species requiring further assessment

Under Section 5.2.2 of the BAM, the assessor may consider that a threatened species is unlikely to occur on the subject land or in a vegetation zone if:

- a. the assessor determines that none of the habitat constraints for the species are present in a vegetation zone. No further assessment is required for that species in that vegetation zone. The assessor must record their reasoning for this determination in the BAR, or
- b. the assessor determines that none of the habitat constraints for the species are present on the entire subject land. No further assessment is required for that species. The assessor must record their reasoning for this determination in the BAR, or

- c. the species is a vagrant in the IBRA subregion. No further assessment is required. The assessor must record their reasoning for this determination in the BAR.

Following the assessments within the BBRS Study Area, habitat constraints for the following species are absent and these species have been removed from the BAM-C (Table 4-3).

Table 4-3: Exclusions based on Habitat Constraints

Species name	Common name	Habitat constraint	Justification
<i>Aprasia parapulchella</i>	Pink-tailed Legless Lizard	Rocky areas, or within 50 m of rocky areas (TBDC 2024). There are no listed geographical constraints for this species (Office of Environment and Heritage, 2024).	Suitably sized rocks for this species are approximately: 300 mm wide and 50 mm deep (Wong et al. 2011). 100–150 mm wide, 120–220 mm long, 50–150 mm deep (Jones 1999). There were no suitable rocks within the BBRS Study Area.
<i>Petrogale penicillata</i>	Brush-tailed Rock-wallaby	Land within one kilometre of rocky escarpments, gorges, steep slopes, boulder piles, rock outcrops or cliff lines (TBDC). There are no listed geographical constraints for this species (Office of Environment and Heritage, 2024).	The BBRS Study Area does not contain areas within one kilometre of cliff lines and rocky areas. This species browses on vegetation in and adjacent to rocky areas (Office of Environment and Heritage 2024). This species was removed as there was no suitable habitat.
<i>Pteropus poliocephalus</i>	Grey-headed Flying-fox (Breeding)	Breeding camps	Breeding camps were not recorded during surveys across the BBRS Study Area.
<i>Lathamus discolor</i>	Swift Parrot (Breeding)	Other; As per Important Habitat Map	The BBRS Study Area is not mapped on the Important Habitat Map; and therefore, surveys are not required.
<i>Anthochaera phrygia</i>	Regent Honeyeater (Breeding)	Other; As per Important Habitat Map	The BBRS Study Area is not mapped on the Important Habitat Map; and therefore, surveys are not required.
<i>Miniopterus orianae oceanensis</i>	Large Bent-winged Bat	Cave, tunnel, mine, culvert or other structure known or suspected to be used for breeding. Potential breeding habitat is caves, tunnels, mines or other structures known or suspected to be used by <i>M. schreibersii oceanensis</i> including species records in BioNet with microhabitat code 'IC – in cave'; observation type code 'E nest roost'; with numbers of individuals >500; or from the scientific literature. There are no listed geographical constraints for this species (Office of Environment and Heritage, 2024).	This species is a species credit species for breeding habitat only (TBDC 2024). This is no breeding habitat for this species present within the BBRS Study Area.
<i>Litoria booroolongensis</i>	Booroolong Frog	According to DPIE (2020b) The species requires permanent, or near permanent river environment with rocky structures (bedrock or cobble). Suitable breeding habitat consists of rocky structures in shallow water along the	There is no permanent or near permanent river environment with rocky structures (bedrock or cobble) within the BBRS Study Area;

Species name	Common name	Habitat constraint	Justification
		riparian zone, and non-breeding habitat is any habitat within the riparian zone (generally within 50 metres of the high-water mark).	and therefore, surveys are not required.

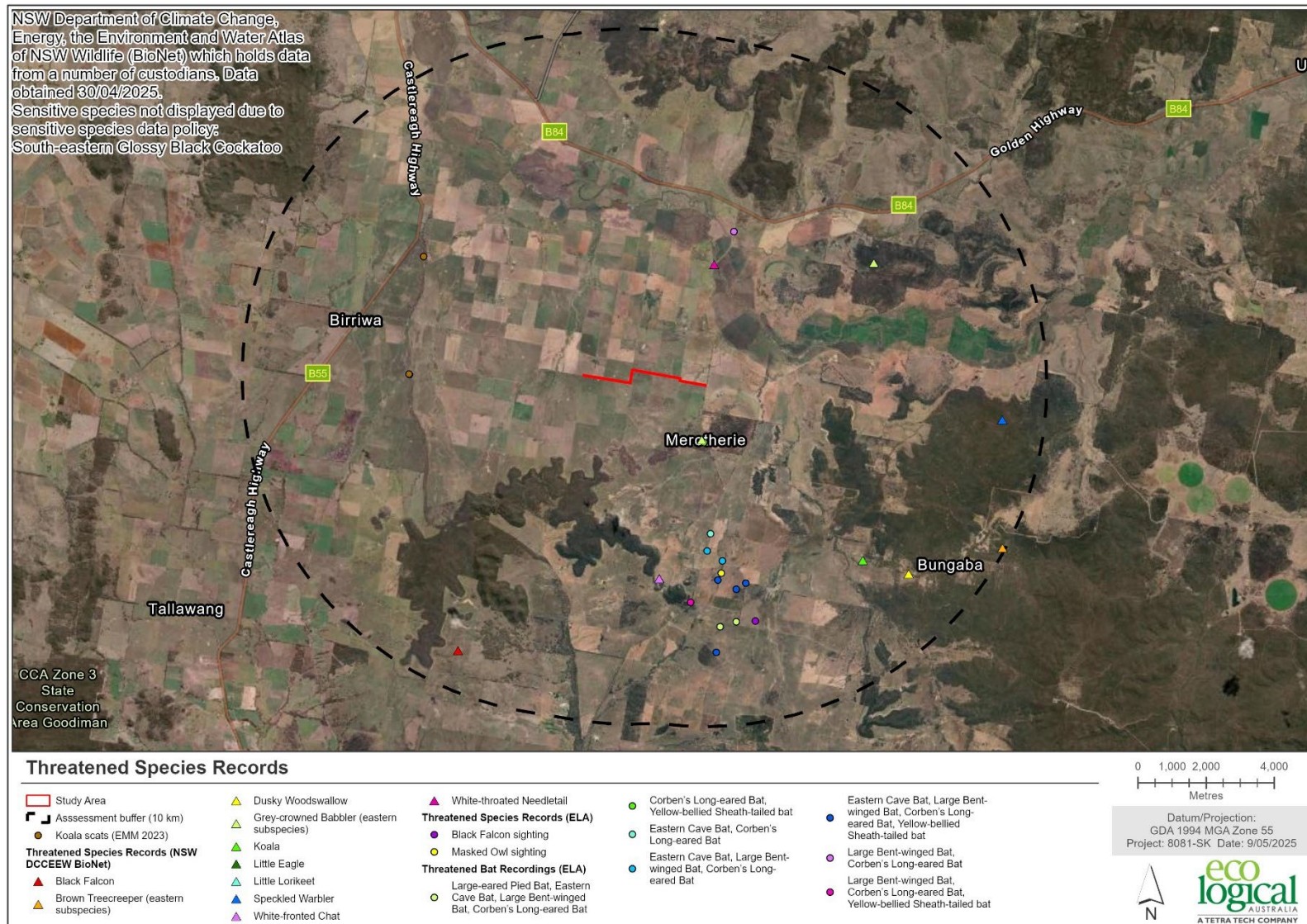


Figure 4-1: BioNet atlas records of threatened flora and fauna



Figure 4-2: Fauna habitat features

4.5. Threatened Species Survey - Targeted Surveys

Based on the assessment of Sections 4.3 and 4.4 above, a threatened species survey plan and survey was undertaken to establish the presence of candidate species.

Targeted surveys were conducted in accordance with established flora and 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)
- *Surveying threatened plants and their habitats.* NSW survey guide for the Biodiversity Assessment Method (DPIE 2020c)
- *Survey guidelines for Australia's threatened orchids.* Guidelines for detecting orchids listed as 'threatened' under the EPBC Act 1999 (CoA 2013)
- *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.

4.5.1. Flora Surveys

Flora surveys were conducted in accordance with the Threatened Flora Survey Guideline (DPIE 2020c), 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 BAM-C, 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 4-2), *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 4-4 and shown in Figure 4-3.

Table 4-4: Candidate flora species requiring targeted survey

Species	Common name	Survey Timing requirements TBDC	Dates surveyed	Presence?
Flora				
<i>Acacia ausfeldii</i>	Ausfeld's Wattle	Aug - Oct	27-29 November 2023	No
<i>Cullen parvum</i>	Small Scurf-pea	Dec - Jan	11 December 2024	No

Species	Common name	Survey Timing requirements TBDC	Dates surveyed	Presence?
<i>Dichanthium setosum</i>	Bluegrass	Nov - May	27-29 November 2023 19 March 2024	No
<i>Euphrasia arguta</i>	Euphrasia arguta	Nov - Mar	27-29 November 2023 19 March 2024	No
<i>Pomaderris cotoneaster</i>	Cotoneaster Pomaderris	Oct - Nov	27-29 November 2023	No
<i>Prasophyllum petilum</i>	Tarengo Leek Orchid	Sept - Dec	27-29 November 2023 25 September 2024	No
<i>Prasophyllum sp. Wybong</i>	Prasophyllum sp. Wybong	Sept - Oct	27-29 November 2023 25 September 2024	No
<i>Swainsona recta</i>	Small Purple-pea	Sept - Nov	27-29 November 2023 25 September 2024	No
<i>Swainsona sericea</i>	Silky Swainson-pea	Sept - Nov	27-29 November 2023 25 September 2024	No



Plate 4-2 *Prasophyllum petilum* at local reference site (Photo credit R. Croake (23 Sep 2024))

4.5.2. 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 – 11 am) or afternoon (2 – 5 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 through 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 (Plate 4-2). 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 4-5 and shown in Figure 4-4.

Table 4-5: Candidate diurnal birds requiring targeted surveys

Species	Common name	Survey Timing TBDC	Date surveyed	Presence?
<i>Burhinus grallarius</i>	Bush Stone-curlew	All year	27-29 November 2023 25 September 2024	No
<i>Callocephalon fimbriatum</i>	Gang-gang Cockatoo	Oct - Jan	27-29 November 2023 25 September 2024	No
<i>Haliaeetus leucogaster</i>	White-bellied Sea-Eagle	July - Dec	27-29 November 2023 25 September 2024	No
<i>Hieraaetus morphnoides</i>	Little Eagle	Aug - Oct	25 September 2024	No
<i>Lophoictinia isura</i>	Square-tailed Kite	Sept - Dec	27-29 November 2023 25 September 2024	No
<i>Polytelis swainsonii</i>	Superb Parrot	Sept - Nov	27-29 November 2023 25 September 2024	No



Plate 4-2: Stick nests and hollows recorded within the BBRS Study Area

4.5.3. Nocturnal Bird Surveys

Surveys for threatened forest owls and the Bush Stone-curlew (Table 4-6) were conducted using spotlighting combined with call-play back techniques at four locations (Figure 4-4). 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 min 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 4-6: Candidate nocturnal birds requiring targeted survey

Species	Common name	Survey Timing TBDC	Date surveyed	Presence?
<i>Burhinus grallarius</i>	Bush Stone-curlew	All year	11-13 June 2024 17-20 June 2024	No
<i>Ninox connivens</i>	Barking Owl	All year	11-13 June 2024 17-20 June 2024	No
<i>Ninox strenua</i>	Powerful Owl	All year	11-13 June 2024 17-20 June 2024	No
<i>Tyto novaehollandiae</i>	Masked Owl	All year	11-13 June 2024 17-20 June 2024	Yes

4.5.4. 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 4-7 and shown in Figure 4-4.

Twenty-two remote cameras, deployed on 18 March 2024 were positioned approximately 1-2 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 (Plate 4-3, Table 4-8 and Figure 4-5).

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 2 cameras for every hectare of suitable habitat thereafter. Field plans were submitted to the Biodiversity Offset Scheme (BOS) helpdesk on the 30 March 2024. The total area of suitable habitat and the number of cameras required is shown in Table 4-8. Replies for the BOS helpdesk confirmed that the survey efforts for each section were adequate (Appendix 6). 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 4-7: Candidate mammal species requiring targeted survey

Species	Common name	Survey Timing TBDC	Date surveyed	Presence?
<i>Cercartetus nanus</i>	Eastern Pygmy-possum	Oct- Mar	18 March-1 April 2024	No
<i>Petaurus norfolcensis</i>	Squirrel Glider	All Year	18 March-19 April 2024 11-13 June 2024 17-20 June 2024	No
<i>Phascogale tapoatafa</i>	Brush-tailed Phascogale	Dec - June	18 March-19 April 2024 11-13 June 2024 17-20 June 2024	No

Table 4-8: Number of cameras deployed across the BBRS Study Area based on suitable patch size

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



Plate 4-3: Example of a baited remote cameras in situ.

4.5.4.1. Koala Surveys

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 - 4 April 2024 (Figure 4-6). The dogs were led through the BBRS Study Area with particular focus around Koala feed trees.

4.5.5. Bats

Bat surveys during January 2024, (Table 4-9) were conducted at four locations with one ultrasonic Anabat Detector deployed within the BBRS Study Area and 3 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 min 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 7).

Table 4-9: Candidate bat species requiring targeted survey

Species	Common name	Survey Timing	Date surveyed		Presence?
<i>Chalinolobus dwyeri</i>	Large-eared Pied Bat	Nov - Jan	17-22 January 2024	4 Anabat detectors	No
<i>Myotis macropus</i>	Southern Myotis	Oct - Mar	17-21 January 2024	4 Anabat detectors	Potential
			21-27 March 2024	4 Anabat detectors	Potential

4.5.6. Keys Matchstick Grasshopper

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 6) 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 Birriwa Bus Route South (Figure 4-7). A grasshopper net was used to disturb the vegetation. The net was checked for grasshoppers after 50 sweeps.

4.6. Weather conditions

Weather conditions during survey periods are provided below in Table 4-10.

Table 4-10: 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
28-Nov-23	17.8	28.7	0
29-Nov-23	16.8	28	0

Date	Minimum temperature (°C)	Maximum temperature (°C)	Rainfall (mm)
17-Jan-24	16.9	28.5	0
18-Jan-24	20	28.8	0
19-Jan-24	11.6	32.6	0
20-Jan-24	16	35.7	29
21-Jan-24	15	39	13.7
22-Jan-24	16.8	34	0
19-Mar-24	16.5	33.7	0
20-Mar-24	18.7	23.4	0
21-Mar-24	13	24.3	0
22-Mar-24	11.9	n/a	6.1
23-Mar-24	n/a	27.6	2
24-Mar-24	13.9	27.4	0
25-Mar-24	10.3	29.1	0
26-Mar-24	9.4	31.7	0
27-Mar-24	12.8	29.4	0
2-Apr-24	15.9	24.2	0
3-Apr-24	9.7	25.3	0
4-Apr-24	9.4	20	0
11-Jun-24	1.1	18	0
12-Jun-24	4.5	15.6	0
13-Jun-24	-2.5	15	0
17-Jun-24	0	14.2	0
18-Jun-24	-0.9	14	0
19-Jun-24	-1.5	14.4	0
20-Jun-24	0.8	16.5	0
25-Sep-24	15.7	27.3	1.3
11-Dec-24	15.5	30.8	0



Figure 4-3: Threatened flora survey effort



Figure 4-4: Diurnal and nocturnal bird survey effort



Figure 4-5: Mammal survey effort



Figure 4-6: Koala survey effort



Figure 4-7: Keys Matchstick Grasshopper survey effort

4.7. Results of Targeted Surveys

A Masked Owl was observed during an evening of spotlighting and call playback surveys. Images were sent to experienced owl ecologist David Coombes for confirmation. Whilst the quality of the image made it difficult to distinguish the individual from the more common Barn Owl (Plate 4-5), it was recorded as a Masked Owl as they are known to be present and were recently recorded by ELA ecologists within the surrounding area. Masked Owls are a candidate species requiring offset credits. The species polygon for this species is outlined in Section 4.10.

Tyto alba (Barn Owl), *Ninox boobook* (Southern Boobook) and *Podargus strigoides* (Tawny Frogmouth) were recorded in the BBRs Study Area. Images collected from cameras did not detect any nocturnal mammal species. No hairs were collected from hair tubes.



Plate 4-5: Potential Masked owl (inconclusive identification) recorded on Birriwa Bus Route South

Results from the Anabat detectors positively identified the presence of three threatened bats with the potential for an additional two species. These findings are described in Table 4-11 below and shown on Figure 4-8.

Table 4-11: Microbat species recorded or potentially recorded within the Study Area

Species	Common Name	BC Act listing*	EPBC Act listing*	Habitat and polygon
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Positively Identified

Species	Common Name		BC Act listing*	EPBC Act listing*	Habitat and polygon
<i>Chalinolobus dwyeri</i>	Large-eared Bat	Pied	E	E	This species is a full credit species because it cannot be reliably predicted to occur on a site based on vegetation or landscape features. Species polygons are all associated PCTs within 2 km from caves and cliff lines. The BBRS Study Area is not within 2 km from cliff lines, therefore a species polygon is not required.
<i>Miniopterus orianae oceanensis</i>	Large winged Bat	Bent-	V	NL	This species is a species/ecosystem credit species. Species polygons are 100 m from suitable caves. The BBRS Study Area is not within 100 m from cliff lines, therefore a species polygon is not required.
<i>Saccolaimus flaviventris</i>	Yellow-bellied Sheath-tailed bat		V	NL	Ecosystem species. Therefore, no additional offsets required.
Potentially identified					
<i>Myotis macropus</i>	Southern Myotis		V	NL	Species credit species. Species polygons are all associated PCTs within the Development Footprint that occur within 200 m of high-bank around waterbodies, which includes farm dams.
<i>Vespadelus troughtoni</i>	Eastern Cave Bat		V	NL	Species credit species. Species polygon is all associated PCTs within the Development Footprint that are within 2 km from caves and cliff lines. The BBRS Study Area is not within 2 km from cliff lines, therefore a species polygon is not required.

* V= Vulnerable, E=Endangered, CE=Critically Endangered NL = Not Listed



Figure 4-8: Threatened species identified during survey

4.8. Expert reports

Expert reports are not used in this BDAR.

4.9. Limitations

Evening diurnal bird surveys were conducted at dusk prior to spotlighting for forest owls and nocturnal mammals. In addition to the ten days dedicated to targeting birds, birds were opportunistically recorded whilst traversing the site contributing to the species list. Surveys were postponed if weather conditions were deemed unsuitable for observing or hearing the targeted species.

Many insectivorous bat species produce calls that overlap in call profile parameters. Depending on the quality and type of call recorded (search phase, feeding buzz, social calls), these calls cannot always be distinctly separated. Weather and climatic conditions also affect the detectability and quality of the recorded calls. Calls were only positively identified to species when their defining characteristics were clearly present ensuring no confusion with species that have overlapping and / or similar calls. Calls that could not be confidently identified to species level due to intermediate characteristics were categorised as a species or genus complex.

4.10. Species polygons

Species polygons have been determined for the following species:

- Southern Myotis (*Myotis macropus*)
- Masked Owl (*Tyto novaehollandiae*).

4.10.1. Species polygon Southern Myotis

The echolocation calls of Southern Myotis often overlap with those of *Nyctophilus* spp. complicating species identification and leading to their classification as a complex of calls. As definitive calls from Southern Myotis were not recorded within the BBRS Study Area, the precautionary principle was applied, assuming the presence of the species.

To create the species polygon, all potential call locations were mapped and the nearest water body was identified. A 200 m buffer was applied from the top of bank of this water body (Figure 4-9). All PCTs where the species was potentially present within the modification Development Footprint was mapped as the species polygon (Table 4-12).

Table 4-12: Southern myotis - species polygon areas

PCT	Condition	Area (ha)
277	DNG	0.47
	Woodland	0.23
281	DNG	0.06
	Woodland	0.96
Total		1.72

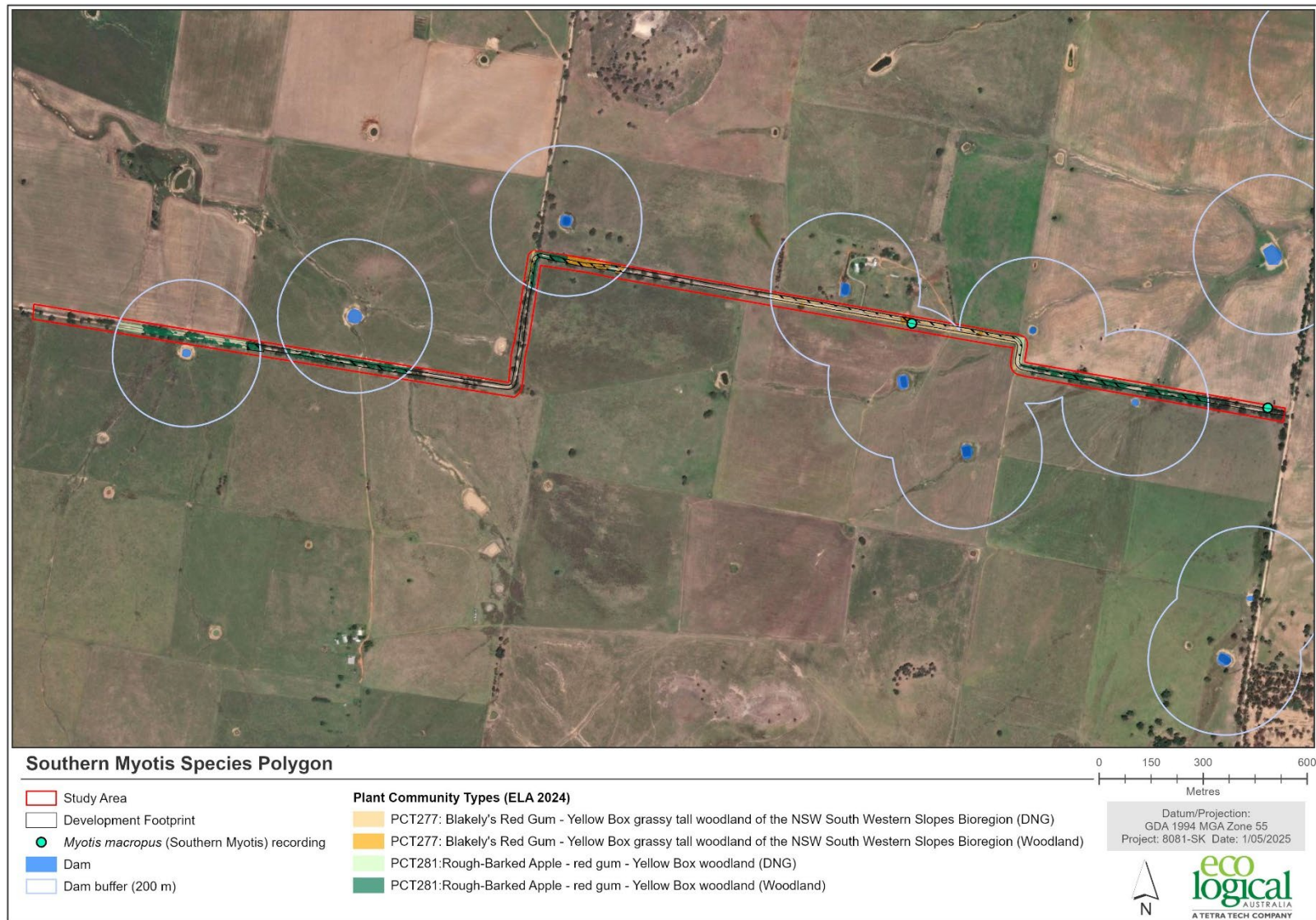


Figure 4-9: Southern myotis species polygon

4.10.2. Species polygon – Masked Owl

A species polygon was created by buffering the observation location by 800 m and overlaying this buffer with the location of suitable hollow bearing trees which are necessary to nesting and roosting within the Development Footprint (Figure 4-10). The areas included in the species polygon are presented in Table 4-8 and are shown in Figure 4-10.

Table 4-13: Masked owl - species polygon areas

PCT	Condition	Area (ha)
277	DNG	0.05
	Woodland	0.22
281	DNG	0.14
	Woodland	0.58
Total		0.99

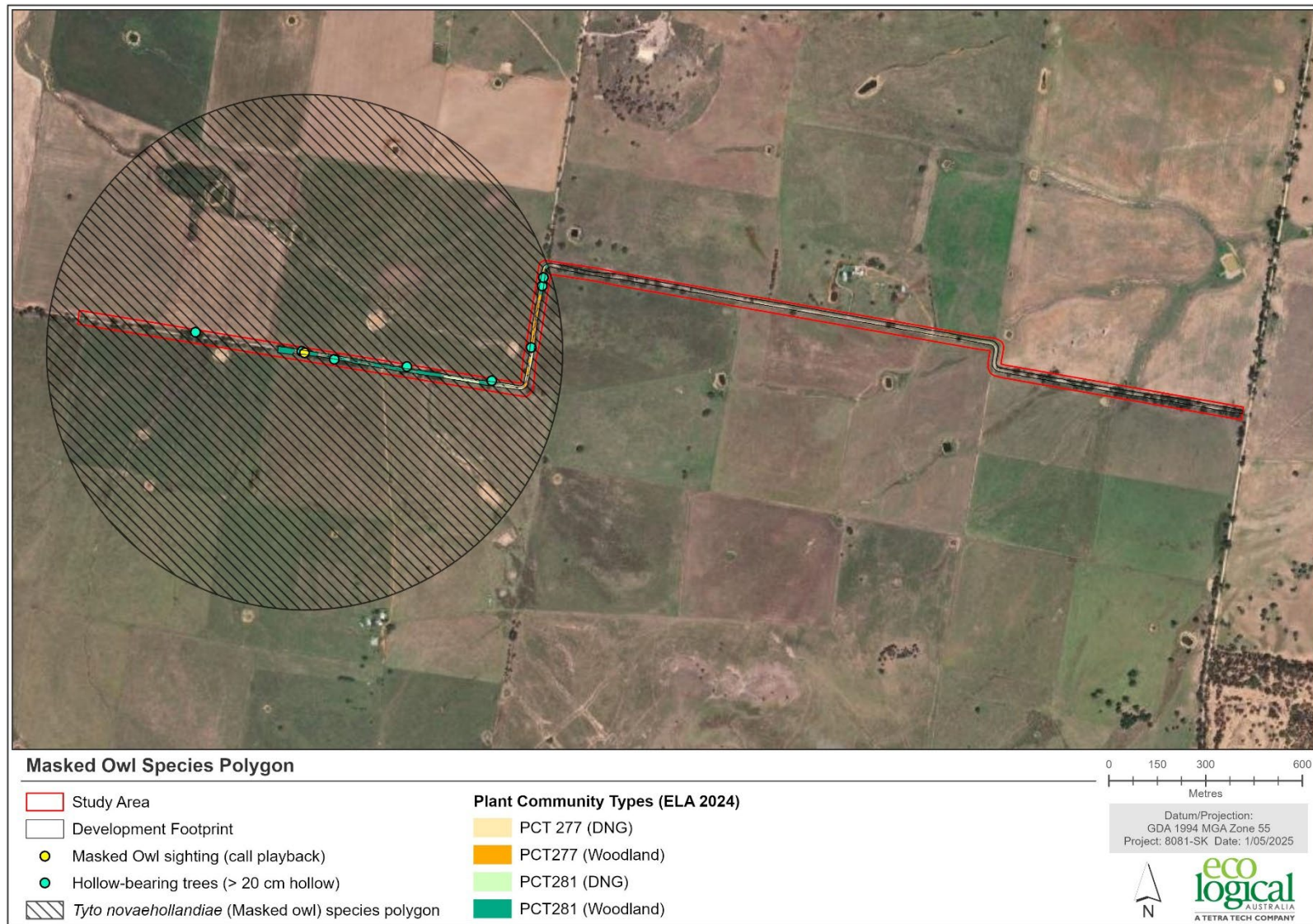


Figure 4-10: Masked Owl species polygon

5. Identifying Prescribed Impacts

Prescribed additional biodiversity impacts (prescribed impacts) must be assessed as part of the BOS, as per Clause 6.1 of the *Biodiversity Conservation Regulations 2018*. Such prescribed impacts (including direct and indirect impacts) are impacts upon the habitat of threatened entities, on areas connecting threatened species habitat, that affect water quality and hydrological process, and on threatened species from turbine strikes or vehicle strikes. Prescribed impacts have been identified within the Development Footprint (Table 5-1).

Table 5-1: Prescribed impacts

Feature	Present	Description of feature and location	Threatened entities that use feature
Karst, caves, crevices, cliffs, rocks or other geological features	No	The Study Area does not contain karst, caves, crevices, cliffs, rocks or other geological features. The nearest features of this nature are located approximately 3km to the south of the Development Footprint.	<ul style="list-style-type: none"> • Large-eared Pied Bat • Large Bent-winged Bat • Eastern Cave Bat <p>Species polygons have been not been created for any cave dwelling species as the Development Footprint is greater than 2km from any cave or cliffline features used by these species.</p>
Human made structures	No	There are no human made structures within the Development Footprint.	NA
Non-native vegetation	No	All vegetation within the Development Footprint was attributed to a native PCT.	NA
Habitat Connectivity	Yes	The locality of the BBRS Study Area is considered highly fragmented with remnant vegetation surrounded by agricultural land, however the Development Footprint provides connectivity along the road corridor.	<p>Arboreal mammals are particularly sensitive to connectivity loss, however no threatened arboreal mammals were recorded within the Development Footprint. Birds and bats are highly mobile and are unlikely to be impacted by fragmentation. Masked owls have large home-ranges (>1000 ha).</p>
Water bodies, water quality and hydrological processes	Yes	There are two first order streams, one second order stream and one third order stream present within the Development Footprint. All are ephemeral. There are no farm dams present within the Development Footprint, however there are 7 located within 200m of the BBRS Study Area. All farm dams occur within grassland areas on private property. All farm dams are surrounded by a mixture of native and exotic vegetation. Habitat within these areas is generally degraded.	Variety of small woodland birds. Southern Myotis and Eastern Bent-winged Bat.

Feature	Present	Description of feature and location	Threatened entities that use feature
Vehicle Strikes	Yes	The proposed development will increase the amount of traffic within the Development Footprint, especially during construction.	Masked Owl

Stage 2 Impact Assessment (Biodiversity Values and Prescribed Impacts)

This section identifies the potential impacts of the project on biodiversity values and the measures taken to avoid and minimise impacts. The production of this BDAR has been carried out in parallel with and has informed the evolution of the project design. This has ensured avoidance of environmental constraints, including impacts to high condition Box-Gum Woodland and Grey Box Grassy Woodlands.

6. Avoiding and Minimising Direct Impacts

Vegetation within Crown Land in the BBRs Study Area has been assessed (Table 6-1). The Development Footprint has been modified and altered to avoid the removal of as many trees as possible. ELA ecologists marked all HBTs within the BBRs Study Area. These were geo-referenced by a surveyor. Consultation has been continuing with MWRC to ensure the road is compliant with Council regulations whilst minimising the impact of native vegetation. As a result, 2.85 ha of native vegetation will be impacted: a 45% reduction in impacts to native vegetation.

Table 6-1: Areas within the BBRs Study Area

Zone	Area within the BBRs Study Area (ha)	Area within the Development Footprint (ha)
PCT 277_DNG	1.51	0.72
PCT 277_Woodland	1.00	0.57
PCT 281_DNG	0.58	0.18
PCT 281_Woodland	3.21	1.35
Native Vegetation	6.3	2.85
Cleared	1.76	1.47
TOTAL	8.06	4.33

Key avoidance measures include:

- Avoiding impacts to 3.45 ha of native vegetation within the BBRs Study Area by refining the Development Footprint in consultation with MWRC.
- A reduction in impacts to 3.45 ha of Box Gum Woodland.

6.1. Project design

The entire Study Area was surveyed in accordance with the principles outlined in Section 7.1.1 of the Biodiversity Assessment Method (BAM). Knowledge of biodiversity values informed decisions about the micro-siting the road design, ensuring compliance with avoidance and minimization principles. The initial Stage 1 assessment provided foundational data on biodiversity values, which guided early planning and allowed iterative adjustments to the Development Footprint as field surveys progressed.

Vegetation in areas outside of the Development Footprint will be retained within the Crown land road reserve, maintaining connectivity and facilitating movement of native fauna across the broader landscape. Mitigation measures during construction will be installed, such as no-go zones, sedimentation and erosion barriers and weed control measures to avoid impacts to the surrounding vegetation.

The Development Footprint was refined to avoid:

- 3.45 ha of Critically Endangered Ecological Community (CEEC) Box Gum Woodland.

The decision-making process considered all relevant factors outlined in BAM Section 7.1.1, including:

- Prioritizing areas with low biodiversity value or low vegetation integrity scores for development
- Avoiding areas of mapped important habitat for threatened species
- Locating the proposal outside buffer zones around breeding habitat features, such as nest trees and caves.

Furthermore, alternative locations, routes, and designs were thoroughly assessed to avoid or minimize impacts on biodiversity values. This iterative process ensured that the BBRS road upgrade was strategically located to achieve a balance between development objectives and environmental considerations, prioritizing the conservation of biodiversity values while meeting project requirements.

The Development Footprint has been refined based on the outcomes of environmental assessments and consultation with relevant agencies, including MWRC. It represents the indicative maximum extent of ground disturbance associated with the realignment and widening of BBRS to facilitate safe vehicle access during construction and operation of the Project.

Further refinement of the Development Footprint may occur during detailed design and ongoing consultation to minimise potential environmental impacts wherever practicable.

7. Avoid and Minimise Prescribed Impacts

7.1. Karst, caves, crevices, cliffs, rocks and other geological features of significance

The BBRS Study Area does not contain any areas of geological significance such as karsts, caves, crevices or cliffs. These features are present within the broader landscape, exceeding 2 km and will not be either directly or indirectly impacted by the proposed development.

7.2. Human-made structures and non-native vegetation

The BBRS Study Area does not contain any human made structures and all vegetation within the Development Footprint has been attributed to a native PCT, therefore no non-native vegetation was recorded.

7.3. Habitat connectivity

The BBRS Study Area is located within a highly fragmented landscape, where remnant vegetation occurs as scattered patches within a matrix of predominantly agricultural land. The Development Footprint follows a local road corridor containing linear strips of native vegetation interspersed with gaps lacking canopy cover. While the vegetation within the Development Footprint may facilitate movement for some mobile species capable of traversing canopy gaps greater than 200 metres, connectivity for more arboreal and gap-sensitive species is likely to be limited. Given the lack of habitat within the surrounding landscape habitat connectivity within the Development Footprint is considered to be high ecological value and any incremental loss of connectivity contributes cumulatively to broader landscape-scale fragmentation.

7.4. Water bodies, water quality and hydrological processes

Two first-order streams, one second-order stream, and one third-order stream intersect the Development Footprint. While no farm dams are located within the BBRS Study Area, seven farm dams are present in adjacent paddocks within 200 metres. Due to the linear and constrained nature of the road corridor, it was not feasible to avoid intersecting drainage lines during alignment of the road upgrade. Mitigation measures to manage potential impacts from erosion and sedimentation will be implemented which are described in detail as part of the Birriwa Solar and Battery Project EIS. A summary of proposed mitigation measures are provided in Section 8.3.2

7.5. Vehicle strikes

During the construction phase, there may be a noticeable increase in light and heavy vehicle traffic along Birriwa Bus Route South. This may impact Masked Owl which are at risk of vehicle strike. Although koalas have been recorded in the broader landscape, extensive surveys within the BBRS Study Area found no evidence of their presence. However, macropods and wombats are known to be affected by existing vehicle traffic in the area, making road safety and wildlife mitigation measures a priority.

To minimize the risk of vehicle-wildlife collisions and protect local fauna during both the construction and operational phases, the following mitigation strategies will be implemented:

- **Wildlife Awareness Training:** All employees and contractors working on-site will receive training on wildlife awareness and safe driving practices. This training will emphasize vigilance, especially during dawn and dusk when many animals are most active.
- **Reduced Nighttime Driving:** Nighttime driving will be minimized, particularly during construction, as many animals are more active and vulnerable to vehicle strikes during these hours.
- **Wildlife Strike Monitoring:** A wildlife strike monitoring program will be established, where all vehicle-wildlife collisions will be recorded. This data will be used to identify high-risk areas or times of day for wildlife movements, allowing for targeted mitigation measures to be implemented as needed.

By integrating these strategies, the road upgrade aims to significantly reduce the impacts of increased traffic on local wildlife, ensuring a safer coexistence between project operations and the surrounding ecosystem.

7.6. Summary of measures to avoid and minimise impacts

The following measures will be implemented to avoid and minimise impacts:

- Protect riparian zones with sedimentation controls.
- Enforce low-speed limits.
- Wildlife strike monitoring.
- Wildlife awareness training.
- Reduced nighttime driving.
- Develop and implement a Biodiversity Management Plan (BMP) to address management of weeds, habitat corridors, riparian areas, water quality and monitoring.

7.7. Cumulative impacts

The CWO-REZ spans approximately 20,000 km², located around Dubbo and Dunedoo, and has become a hub for renewable energy generation, storage, and transmission. This designation has catalysed the development of numerous renewable energy projects in the REZ with multiple projects approved and many in various stages of planning. Road upgrades are an inevitable part of these activities.

Cumulative impacts from these developments, pose significant risks to ecosystems and biodiversity. Widening and realigning roads to facilitate the safe movement of construction vehicles and passenger cars, reduces habitat, alters habitat quality by changing local hydrology, microclimates and soil conditions. This is particularly pertinent in fragmented agricultural landscapes where much of the remnant vegetation persists along roadsides.

To mitigate these impacts, a regional and collaborative approach is essential. Pooling resources from multiple projects can help fund biodiversity conservation efforts, such as habitat restoration and connectivity enhancement. Preserving woodland patches and establishing corridors for wildlife movement are critical strategies.

By integrating these strategies and considering the cumulative effects of regional development in planning processes, the CWO-REZ can align renewable energy development with biodiversity conservation. This approach ensures the region's renewable energy goals are met without compromising the health of local ecosystems.

8. Assessment of Impacts

8.1. Direct impacts

8.1.1. Residual direct impacts

The BBRS road upgrade design has been refined and micro-sited to avoid and minimise impacts to native vegetation. The Development Footprint has been adjusted to minimise the clearing of Box Gum Woodland by selecting a route that reduces the amount of native vegetation clearing and refining the conceptual road upgrade designs.

Table 8-1 and Table 8-2 summarises the residual direct impacts to PCTs and threatened species within the Development Footprint of the BBRS road upgrade. These residual impacts will be mitigated through pre-clearance surveys, retaining large woody debris and implementing weed hygiene measures.

Table 8-1: Direct impacts to native vegetation

PCT ID	PCT Name	BC Act listing	EPBC Act listing	Direct impact (ha)
PCT 277	Blakely's Red Gum - Yellow Box grassy tall woodland of the NSW South Western Slopes Bioregion	White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland	Does not conform to the EPBC listed CEEC	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	White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland	Does not conform to the EPBC listed CEEC	1.56
Total				2.85

Table 8-2: Direct impacts on threatened species and threatened species habitat

Species	Common Name	Direct impact number of individuals / habitat (ha)	BC Act listing status	EPBC Act listing status
<i>Myotis macropus</i>	Southern Myotis	1.72	V	NL
<i>Tyto novaehollandiae</i>	Masked Owl	0.99	V	NL

8.1.2. Change in vegetation integrity

The changes in vegetation integrity as a result of the BBRS Road upgrade are outlined in Table 8-3. Future vegetation integrity scores for composition, structure and function after development are considered to be zero.

Table 8-3: Changes in vegetation integrity

VZ ID	Vegetation Zone	Area (ha)	Composition Score	Structure Score	Function Score	Future VI Score	VI Score
1	281-Woodland	1.38	83.2	61	54.8	0	65.3
2	277-Woodland	0.57	66.3	41	25.5	0	41.1
3	281-DNG	0.18	89.3	8.2	58.2	0	34.9
4	277-DNG	0.72	45.3	57.5	17.5	0	35.8
TOTAL		2.85					

8.2. Indirect impacts

Indirect impacts of the development are outlined in Table 8-4.

Table 8-4: Indirect impacts

Indirect impact	Impacted entities	Extent	Duration	Project Phase	Likelihood and consequences
Inadvertent impacts on adjacent habitat or vegetation	Remnant vegetation that is outside the Development Footprint.	This could occur if vegetation to be retained is not clearly marked and defined during construction	Potential long-term	During Construction and ongoing	Low if mitigation strategies are implemented. Fencing and no-go zones including signage will be installed.
Reduced viability of adjacent habitat due to edge effects	Remnant vegetation that is outside the Development Footprint.	Vegetation is already impacted by weeds and changes in microclimate due to historical vegetation clearing	Potential long-term	During Construction and ongoing	Low if mitigation strategies are implemented. Weed hygiene and management strategy will be implemented.
Reduced viability of adjacent habitat due to noise, dust or light spill	Remnant vegetation that is outside the Development Footprint.	Noise and dust during construction may interfere with territorial calls, may mask predators approaching. Light spill could impact fauna behaviour.	Potential long-term	During Construction	Low if mitigation strategies are implemented.
Transport of weeds and pathogens from the site to adjacent vegetation	Remnant vegetation and open grassland area that are outside the Development Footprint.	Weeds are present in the landscape due to the historical vegetation clearing and agricultural activities.	Potential long-term	During Construction and ongoing	Low. Weed management strategies will be implemented. Hygiene protocols during development.
Increased risk of starvation or exposure and loss of shade or shelter	Fauna may be impacted by loss of foraging habitat.	The broader landscape is already cleared	Potential long-term	During construction and ongoing	Low. Farmland is abundant in the surrounding landscape.
Loss of breeding habitat	Hollow-dwelling fauna such as arboreal mammals and birds. For example, Masked Owl.	Loss of breeding and roosting habitat for hollow-bearing fauna species	Potential long-term. Hollows take a long time to form. There will be a reduction in HBTs within the Study Area.	During Construction and ongoing	Low. Breeding habitat was not recorded during surveys Remnant vegetation will be retained outside the Development Footprint. HBTs will be retained where

Indirect impact	Impacted entities	Extent	Duration	Project Phase	Likelihood and consequences
					possible or nest boxes will be installed at a ratio of 2:1.
Trampling of threatened flora species	No threatened flora were recorded within the Study Area.	The Development Footprint did not contain any threatened flora.	Unlikely to occur; duration would be negligible.	Unlikely to occur at any point during the Project.	Likelihood is nil and the consequences are negligible because no threatened flora were observed.
Sedimentation and contaminated and/or nutrient rich run-off	Remnant Vegetation / riparian areas within and outside the Development Footprint.	Potential reduction in water quality due to sediments being discharging into drainage lines.	Potential long-term	During Construction and ongoing	Low if mitigation strategies such as sedimentation and erosion controls are implemented.
Increase in predators	Birds, small mammals, amphibians and reptiles	Foxes and cats are already present in the landscape and are unlikely to increase.	Potential long-term	Post development and ongoing	Low. Predators could increase with the development of habitat corridors and greater edge habitat facilitating movement. Implement feral animal controls.
Increase in pest animal populations	Feral mice/ rats may be a food source for raptors and owls	Feral pest animals are already present in the landscape and are unlikely to increase.	Potential long-term	Post development and ongoing	Moderate. Baits used to control pests could inadvertently affect raptors and owls.

8.3. Prescribed impacts

The following prescribed impacts have been identified within the BBRS Study Area. Additional information and migration strategies for each potential prescribed impact has been included in Section 7 above.

8.3.1. Habitat connectivity

8.3.1.1. Nature

The BBRS Study Area is situated in a highly fragmented landscape, where remnant vegetation is scattered within extensive agricultural land. The Development Footprint exists along a road corridor containing some linear patches of connective vegetation interspersed by areas devoid of canopy species. The vegetation within the Development Footprint is likely to provide connectivity to species able to traverse gaps between the canopy of greater than 200 m, however some arboreal species may be limited. The habitat connectivity within the Development Footprint is considered to be high value and any incremental loss of connectivity contributes cumulatively to broader landscape-scale fragmentation.

8.3.1.2. Extent

The removal of roadside vegetation has the potential to reduce fauna movement, particularly in fragmented landscapes where roadside corridors often provide the only remaining habitat connectivity. To minimise this impact, the removal of mature trees along the roadside will be avoided where possible, with most clearing limited to the understory vegetation.

8.3.1.3. Duration

The removal of trees within the landscape is expected to have long-term impacts, particularly through the loss of tree hollows and potential nesting sites. These habitat features take decades to develop and are critical for a range of hollow-dependent fauna species. As such, the biodiversity impacts associated with tree removal will persist well beyond the construction phase of the project.

8.3.1.4. Consequences

The loss of habitat connectivity in an already fragmented landscape can have significant ecological consequences. Isolated fauna populations may experience reduced genetic diversity due to inbreeding, along with increased competition for limited resources, potentially leading to elevated mortality rates. However, the fauna recorded within the BBRS Study Area are generally highly mobile and are unlikely to be significantly affected by the removal of roadside vegetation.

8.3.2. Waterbodies, water quality and hydrogeological

8.3.2.1. Nature

There are two first order streams, one second order stream and one third order stream present within the Development Footprint. There are no farm dams present within the Development Footprint, however there are 7 within the surrounding paddocks within 200 m. Existing road crossings consist of piped culverts with heavily degraded vegetation.

8.3.2.2. Extent

The removal or alteration of riparian vegetation can contribute to increased erosion and sedimentation, leading to reduced water quality. However, the watercourses intersected by the proposed road upgrade

currently lack established riparian vegetation, and as such, the risk of additional impact from vegetation removal is considered low.

8.3.2.3. Duration

Management of water quality and stormwater drainage will require ongoing monitoring to ensure that impacts to waterways are avoided. In the short term, construction activities such as vegetation clearing, earthworks, and drainage modifications may lead to increased erosion, sedimentation, and turbidity in nearby watercourses. In the long term, poorly managed stormwater runoff could result in altered hydrological flows, sustained water quality degradation, and cumulative impacts on aquatic habitats. Continuous monitoring and adaptive management will be essential to mitigate both short- and long-term risks and ensure compliance with relevant water quality guidelines.

8.3.2.4. Consequences

Impacts to water quality resulting from altered drainage patterns, erosion, sedimentation, and stormwater runoff have the potential to affect the biodiversity and ecological integrity of adjacent habitats. These changes can degrade aquatic and terrestrial ecosystems, particularly where sensitive species or downstream environments are present. To mitigate these risks, appropriate erosion and sediment control measures will be implemented during construction and operation. Ongoing monitoring will be required to ensure that these measures are effective and that no adverse impacts occur to nearby waterways.

8.3.3. Vehicle strikes

8.3.3.1. Nature

During the construction and operational phases of the Birriwa Solar and Battery Project, there is expected to be an increase in both light and heavy vehicle traffic along Birriwa Bus Route South. This increased traffic presents a potential risk to wildlife, particularly to the Masked Owl, which is known to be vulnerable to vehicle strike. Although koalas have been recorded in the broader landscape, targeted surveys along the Development Footprint found no evidence of their presence. However, macropods and wombats, which are common in the area, are already known to be impacted by existing road traffic. As such, the implementation of road safety and wildlife mitigation measures will be essential to minimise risks to fauna during all phases of the Project.

8.3.3.2. Extent

An increased risk of vehicle strike may lead to a decline in local fauna populations, particularly species known to be vulnerable to road mortality such as macropods, wombats and owl species.

8.3.3.3. Duration

During the construction phase of the Birriwa Solar and Battery Project, Birriwa Bus Route South will serve as the primary access road to and from the Temporary Workers Accommodation. As a result, the risk of fauna-vehicle collisions is expected to be highest during this period due to increased traffic volumes. Following the completion of construction, traffic levels are anticipated to decrease, and the risk of vehicle strike is expected to return to levels similar to those prior to construction.

8.3.3.4. Consequences

Increased light and heavy vehicle use within the Development Footprint during the construction phase of the Birriwa Solar and Battery Project and Temporary Workers Accommodation may elevate the risk

of vehicle strikes on local fauna, potentially leading to a reduction in population size for vulnerable species. To mitigate this risk, measures such as the enforcement of reduced speed limits, installation of wildlife signage, and implementation of a wildlife strike monitoring program will be adopted to minimise fauna mortality and inform adaptive management responses.

8.4. Mitigating and managing direct and indirect impacts

The potential impacts to biodiversity within the BBRS Study Area have been avoided and minimised as much as practicable, through design refinements.

Further mitigation measures will be employed to manage the extent and severity of impacts during construction and operation of the Approved Project and include provisions of biodiversity offsets, management measures, monitoring and adaptive management measures. These are outlined in the Environment Impact Assessment for the Birriwa Solar and Battery Project.

Mitigation measures specific to the BBRS Road upgrade are:

- Avoiding woodland by ensuring Development Footprint is within areas of low-quality DNG that are highly disturbed through roadside maintenance activities.
- Pre-clearing surveys prior to the removal of hollow bearing trees to mitigate injury to potential fauna inhabiting hollows.
- Hollow logs and debris will be retained to be used post construction. This will improve fauna habitat within the Study Area.
- Avoiding the removal of canopy trees where possible and limiting it to the understory. This targeted approach minimises disturbance to the canopy layer, preserving the woodland's ecological integrity.
- Exclusion fencing (no-go zones) will be used to avoid indirect impacts to retained trees. This includes temporary fencing, bunting tape or similar.
- Sediment controls will be installed in areas where works will occur in proximity to waterways to avoid increased sedimentation and erosion.
- Weed hygiene protocols will be implemented to avoid spreading.
- Preparation of a Biodiversity Management Plan for the Project detailing vegetation clearing protocols, erosion and sedimentation controls, weed management, habitat retention and enhancement and post-construction monitoring.

The Development Footprint may be further refined through detailed design. Final residual impacts will be confirmed, and biodiversity credits retired in accordance with the Project.

Measures proposed to mitigate and manage impacts before, during and after the Project are outlined in Table 8-5.

Table 8-5: Measures proposed to mitigate and manage impacts

Measure	Risk before mitigation	Risk after mitigation	Action	Outcome	Timing	Responsibility
Timing works to avoid critical life cycle events such as breeding or nursing	Moderate	Minor	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.	Impacts to fauna during nesting/nursing avoided	Construction	Site manager
Instigating clearing protocols including pre-clearing surveys, daily surveys and staged clearing, the presence of a trained ecological or licensed wildlife handler during clearing events	Major	Minor	Pre-clearance surveys will be undertaken prior to tree clearing. A qualified ecologist/licenced wildlife handler will supervise tree removal in accordance with best practise methods.	Any fauna utilising habitat within the BBRS Study Areas will be identified and managed to ensure clearing works minimise the likelihood of injuring resident fauna	Prior to construction	Site ecologist
Installing artificial habitats for fauna in adjacent retained vegetation and habitat or human made structures to replace the habitat resources lost and encourage animals to move from the impacted site, e.g. nest boxes	Minor	Minor	There will be a loss of HBTs across the Development Footprint. HBTs will be retained on site as far as practicable. Hollow sections will be retained and used on site where possible.	Reduction in loss of HBTs Fauna have alternate habitat prior to clearing	Prior to construction	Site Manager
Clearing protocols that identify vegetation to be retained, prevent inadvertent damage and reduce soil disturbance; for example, removal of native vegetation by chain-saw, rather than heavy machinery, is preferable in situations where partial clearing is proposed	Moderate	Minor	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). Fencing (or other barriers as required) and signage will be placed around those areas of vegetation to	Vegetation to be retained outside of the Development Footprint boundary will not be disturbed	Construction	Site manager

Measure	Risk before mitigation	Risk after mitigation	Action	Outcome	Timing	Responsibility
			<p>be maintained to prevent any accidental construction damage and provide a permanent barrier between the Development Footprint and retained areas.</p> <p>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.</p> <p>Use of appropriate machinery for vegetation removal adjacent to retained areas.</p>			
Sediment barriers or sedimentation ponds to control the quality of water released from the site into the receiving environment	Minor	Negligible	<p>Appropriate controls will be implemented to manage exposed soil surfaces and stockpiles to prevent sediment discharge into waterways.</p> <p>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.</p> <p>Suitable species will be used as ground cover species in any revegetation areas.</p>	Erosion and sedimentation will be controlled	Construction and decommissioning	Site manager
Noise barriers or daily/seasonal timing of construction and operational activities to reduce impacts of noise	Minor	Negligible	Construction works will only be undertaken during daylight hours.	Noise impacts associated with the development will be managed	Construction / operation /decommissioning	Site manager

Measure	Risk before mitigation	Risk after mitigation	Action	Outcome	Timing	Responsibility
Light shields or daily/seasonal timing of construction and operational activities to reduce impacts of light spill	Minor	Negligible	Construction works will only be undertaken during daylight hours and night lights will not be used. Lights associated with operation will be directional to avoid unnecessarily shining light into adjacent retained vegetation where possible.	Light impacts of construction will be avoided as all works will occur during daylight hours Light spill into adjacent vegetation is reduced	Construction / operation /decommissioning	Site manager
Adaptive dust monitoring programs to control air quality	Minor	Negligible	Dust suppression measures will be implemented to limit dust on site. Revegetation will also be commenced as soon as practicable to minimise areas likely to create dust. Suitable species will be used as ground cover species in any revegetation areas.	Mitigate dust created during construction activities	Construction and decommissioning	Site manager
Programming construction activities to avoid impacts; for example, timing construction activities for when migratory species are absent from the site, or when particular species known to or likely to use the habitat on the site are not breeding or nesting	Moderate	Minor	Active breeding or nesting identified during pre-clearance surveys will be avoided during migration periods	Impacts to fauna during nesting/nursing avoided	Construction	Site manager
Temporary fencing to protect significant environmental features such as riparian zones	Moderate	Minor	All potential waterway crossings will be designed in accordance with <i>Policy and Guidelines for Fish Friendly Waterway Crossing</i> (DPI, n.d.) where appropriate.	Crossing constructed with negligible impacts to aquatic habitats	Detailed design	Site manager
Hygiene protocols to prevent the spread of weeds or pathogens between infected areas and uninfected areas	Minor	Negligible	All machinery will be cleaned prior to entering and exiting the Study Area to minimise the transport of weeds to vegetated areas to be retained.	Weed impacts managed	Construction	Site manager

Measure	Risk before mitigation	Risk after mitigation	Action	Outcome	Timing	Responsibility
			Weeds that are present within the Study Area that are listed under the <i>NSW Biosecurity Act 2015</i> will be managed.			
Staff training and site briefing to communicate environmental features to be protected and measures to be implemented	High	Negligible	<p>All personnel working on the project will undertake an environmental induction as part of their site familiarisation. This will include:</p> <ul style="list-style-type: none"> • 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) <p>key contacts in the case of an environmental emergency.</p>	Staff trained and aware of environmental issues and responsibilities on site	Construction	Site manager
Making provision for the ecological restoration, rehabilitation and/or ongoing maintenance of retained native vegetation habitat on or adjacent to the development site	Major	Negligible	A BMP will identify management of remnant vegetation that will be retained within the BBRS Study Area.	Adjacent habitat protected	Construction	Site manager

8.5. Adaptive management strategy for uncertain impacts

Although numerous surveys have been conducted across the BBRS Study Area over multiple seasons, there remains a potential for unexpected finds—particularly for threatened species with specific habitat requirements or seasonal detectability. Targeted surveys have been undertaken in accordance with the BAM and relevant survey guidelines and advice, using best practice methodologies available at the time of survey. As such, it is considered unlikely that additional threatened species will be identified that were not already recorded during the assessment.

However, in the event of an unexpected find, the NSW Conservation Programs, Heritage and Regulation (CPHR) branch within the Department of Climate Change, Energy, the Environment and Water (DCCEEW) will be notified, and an assessment of significance will be undertaken to determine appropriate management or mitigation actions.

9. Serious and Irreversible Impacts (SAIL)

An impact is to be regarded as serious and irreversible (SAIL) if it is likely to contribute significantly to the risk of a threatened entity becoming extinct based on four principles set out in clause 6.7 of the *Biodiversity Conservation Regulation 2017*:

- 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.
- 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.
- 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.
- 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.

Candidate SAIL entities relevant to the BBRS Road upgrade are listed in Table 9-1 along with the relevant principles for the listing of the SAIL entity, based on information from the TBDC. The SAIL assessment is provided in Section 9.1.

Table 9-1: Candidate SAIL entities for the Project

Threatened species or community	Principle 1	Principle 2	Principle 3	Principle 4
White Box- Yellow Box – Blakely's Red Gum Grassy Woodland and Derived Native Grassland (Box Gum Woodland),	Population reduction of >80% in 10 years or three generations	<50 individuals or <250 individuals where threats are known	-	-
<i>Chalinolobus dwyeri</i> (Large-eared Pied Bat)	-	-	-	Non responding attributes
<i>Vespadelus troughtoni</i> (Eastern Cave Bat) – potential recording	-	-	-	Non responding attributes

Both Large-eared Pied Bat and Eastern Cave Bat were recorded within the BBRS Study Area. While both species are listed as being at risk of SAIL when their breeding habitat is affected, there are no known breeding sites within or adjacent to the Development Footprint. Additionally, there are no impacts occurring within 100 metres of known or potential breeding habitat as a result of the BBRS Road upgrade. On this basis, these species have not been considered further in the impact assessment.

In accordance with Section 9.1.1 of the BAM 2020, additional consideration is required for entities at risk of SAIL. However, it is important to note that a BDAR is not required to make a determination on whether an SAIL will occur; this responsibility lies solely with the relevant decision maker.

9.1. Box Gum Woodland

Impacts to Box Gum Woodland are summarised in Table 9-2 and an assessment of Box Gum Woodland against the assessment criteria outlined in Section 9.1.1 of the BAM (2020) is provided in Table 9-3 below. The location of Box Gum Woodland is shown on Figure 9-1 to Figure 9-3.

Table 9-2: SAI summary

Species / Community	Direct impact, individuals / area (ha)	Threshold
White Box - Yellow Box - Blakely's Red Gum Grassy Woodland	There is 2.85 ha of TEC within the Development Footprint.	No listed threshold

Table 9-3: Evaluation of impact on the TEC

Impact Assessment Provisions	Assessment
1. the action and measures taken to avoid the direct and indirect impact on the potential entity for an SAI	<p>Direct impacts could remove up to 2.85 ha of the TEC.</p> <p>The proposed Development Footprint has been modified and evaluated numerous times to avoid Box Gum Woodland in its woodland form. All trees within the BBRS Study Area were geo-referenced by a surveyor to ensure the road design avoids removing trees where possible.</p> <p>The current design and layout affects less native vegetation and less TEC than the original concept plan for the road design. Current negotiations with Mid-Western Regional Council may further reduce impacts to Box Gum Woodland along the roadside.</p>
2a. evidence of reduction in geographic distribution (Principle 1, clause 6.7(2)(a) BC Regulation) as the current total geographic extent of the TEC in NSW AND the estimated reduction in geographic extent of the TEC since 1970 (not including impacts of the proposal)	<p>The best estimate of the extent of occurrence (EOO) is 702,800 km² based on a polygon containing the likely community (TSSC 2020). The best estimate of the area of occupancy (AOO) is 151,100 km². However, not all areas occupied by the community are covered by maps and there may be an underestimate of the true extent. For example, many areas mapped as PCT 0 (cleared) on the SVTM are DNG associated with Box Gum Woodland.</p> <p>It is estimated that the TEC has declined by 90% since pre 1750 distribution. The TSSC (2006) estimate that less than 5% of the original distribution remain. There is no estimate of vegetation extent as of 1970, therefore the decline between 1970 and 2024 cannot be estimated.</p>
2b. extent of reduction in ecological function for the TEC using evidence that describes the degree of environmental degradation or disruption to biotic processes (Principle 2, clause 6.7(2)(b) BC Regulation) indicated by: <ul style="list-style-type: none"> i. change in community structure ii. change in species composition iii. disruption of ecological processes iv. invasion and establishment of exotic species v. degradation of habitat, and vi. fragmentation of habitat 	<p>Threats to the TEC include habitat loss, degradation and fragmentation from agriculture, forestry, mining and residential development. Additional threats include overgrazing, cropping, weed invasion, feral pests, removal of ground layer and altered fire regimes (OEH 2023). These factors can degrade the ecological function of the TEC leading to condition states that vary depending upon the severity and mechanism of disturbance. Whether the resulting impacts represent a permanent or temporary loss depends on the extent of disturbance and the effectiveness of measures implemented to reverse the decline. Currently the extent of reduction in ecological function is unknown.</p> <p>The proposed development will not impact ecological function outside of the proposed impact area. Measures will be implemented during pre-construction and construction phases to control potential impacts, such as the spread of invasive weed species ensuring the adjacent vegetation remains unaffected. Furthermore, the development will not lead to additional impacts on the quality or integrity of Box Gum Woodland outside of the proposed impact area.</p>

Impact Assessment Provisions	Assessment
	<p>The development is not expected to cause direct or indirect fragmentation or isolation of Box Gum Woodland due to its already patchy distribution of this TEC within the landscape. Additionally, the vegetation proposed for removal does not serve as a critical linkage between habitats or vegetation areas. Consequently, the development will not disrupt connectivity or contribute to habitat isolation. These considerations demonstrate that the development has been designed to minimise impacts on the TEC both within and surrounding the BBRS Study Area.</p>
<p>2c. evidence of restricted geographic distribution (Principle 3, clause 6.7 (2) (c) BC Regulation), based on the TECs geographic range in NSW according to the:</p> <ul style="list-style-type: none"> i. extent of occurrence ii. area of occupancy, and iii. number of threat-defined locations. 	<p>Box Gum Woodland is not listed as being affected by Principle 3. The geographical distribution of the TEC is not restricted (TSSC 2020) ranging over 700,00 km² from the Queensland border in the north, to the Victorian border in the south. In NSW it occurs in the North Coast, New England Tableland, Nandewar, Brigalow Belt South, Sydney Basin, South Eastern Highlands, NSW South Western Slopes, South East Corner and Riverina Bioregions (OEH 2023).</p> <ul style="list-style-type: none"> (i) EOO is estimated 702,800 km² (ii) AOO is estimated 151,000 km² (iii) The BAM (2020) defines threat locations in terms of threatened species but does not mention TECs. According to the IUCN Red List of Ecosystem Categories and Criteria (IUCN 2017), a defined threat location is: <i>a geographically or ecological distinct area in which a single threatening event can rapidly affect all occurrences of an ecosystem type</i>. Land clearing for agriculture and development, conversion from native pastures to intensified cropping are likely to be the biggest factors defining the locations for threats to the TEC. This includes all leasehold and freehold land in the South Western Slopes Bioregion.
2d. evidence that the TEC is unlikely to respond to management (Principle 4, clause 6.7 (2) (d) BC Regulation).	<p>The TEC is currently along roadsides with minimal management. Should the BBRS Road upgrade not occur, the TEC is unlikely to respond to management due to the restriction of road edges, continuous road maintenance and private property bordering each side.</p>
3. Where the TBDC indicated that data is 'unknown' or 'data deficient' for a TEC for a criterion listed in subsection 9.1.1(2), the assessor must record this in the BDAR or BCAR.	<p>No thresholds have been identified.</p>
<p>4a. the impact on the geographic extent of the TEC (Principles 1 and 2) by estimating the total area of the TEC to be impacted by the proposal:</p> <ul style="list-style-type: none"> i. in hectares, and ii. as a percentage of the current geographic extent of the TEC in NSW. 	<p>The Project will impact on 2.85 ha of the TEC. The best estimate of occurrence is 702,800km² (70,280,000 ha; TSSC 2020) so therefore the Project will impact on 0.000004% of its current extent.</p>
<p>4b. the extent that the proposed impacts are likely to contribute to further environmental degradation or the disruption of biotic processes (Principle 2) of the TEC by:</p> <ul style="list-style-type: none"> i. estimating the size of any remaining, but now isolated, areas of the TEC; including 	<p>The Project will result in the removal of 2.85 ha of the TEC which is 0.000004% of its current extent. The vegetation within the BBRS Study Area is highly disturbed and modified. Much of the surrounding landscape as per SVTM identifies the areas as PCT 0.</p> <p>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.</p>

Impact Assessment Provisions	Assessment
<p>areas of the TEC within 500 m of the Development Footprint or equivalent area for other types of proposals</p> <p>ii. describing the impacts on connectivity and fragmentation of the remaining areas of TEC measured by:</p> <ul style="list-style-type: none"> distance between isolated areas of the TEC, presented as the average distance if the remnant is retained AND the average distance if the remnant is removed as proposed, and estimated maximum dispersal distance for native flora species characteristic of the TEC, and other information relevant to describing the impact on connectivity and fragmentation, such as the area to perimeter ratio for remaining areas of the TEC as a result of the development <p>iii. describing the condition of the TEC according to the vegetation integrity score for the relevant vegetation zone(s) (Section 4.3). The assessor must also include the relevant composition, structure and function condition scores for each vegetation zone.</p>	<p>The dispersal ability of characteristic <i>Eucalyptus</i> spp. associated with the TEC is estimated to be 1 km although most seeds are distributed within 200 m from nearby trees (Booth 2017). Grasses can disperse by wind exceeding 1 km particularly within fragmented landscapes (Heydel et al. 2014).</p> <p>The Project is unlikely to significantly increase the edge to area ratio of the remaining TEC given that these areas are already exposed to edge effects including weed encroachment.</p> <p>Vegetation integrity analysis for the TEC is presented in Table 9-4.</p>

Table 9-4: VI of Box Gum Woodland within the Development Footprint

VZ ID	Vegetation Zone	Area (ha)	Composition Score	Structure Score	Function Score	Hollow bearing trees present?	VI Score
1	281-Woodland	1.38	83.2	61	54.8	No	65.3
2	277-Woodland	0.57	66.3	41	25.5	No	41.1
3	281-DNG	0.18	89.3	8.2	58.2	No	34.9
4	277-DNG	0.72	45.3	57.5	17.5	No	35.8
TOTAL		2.85					

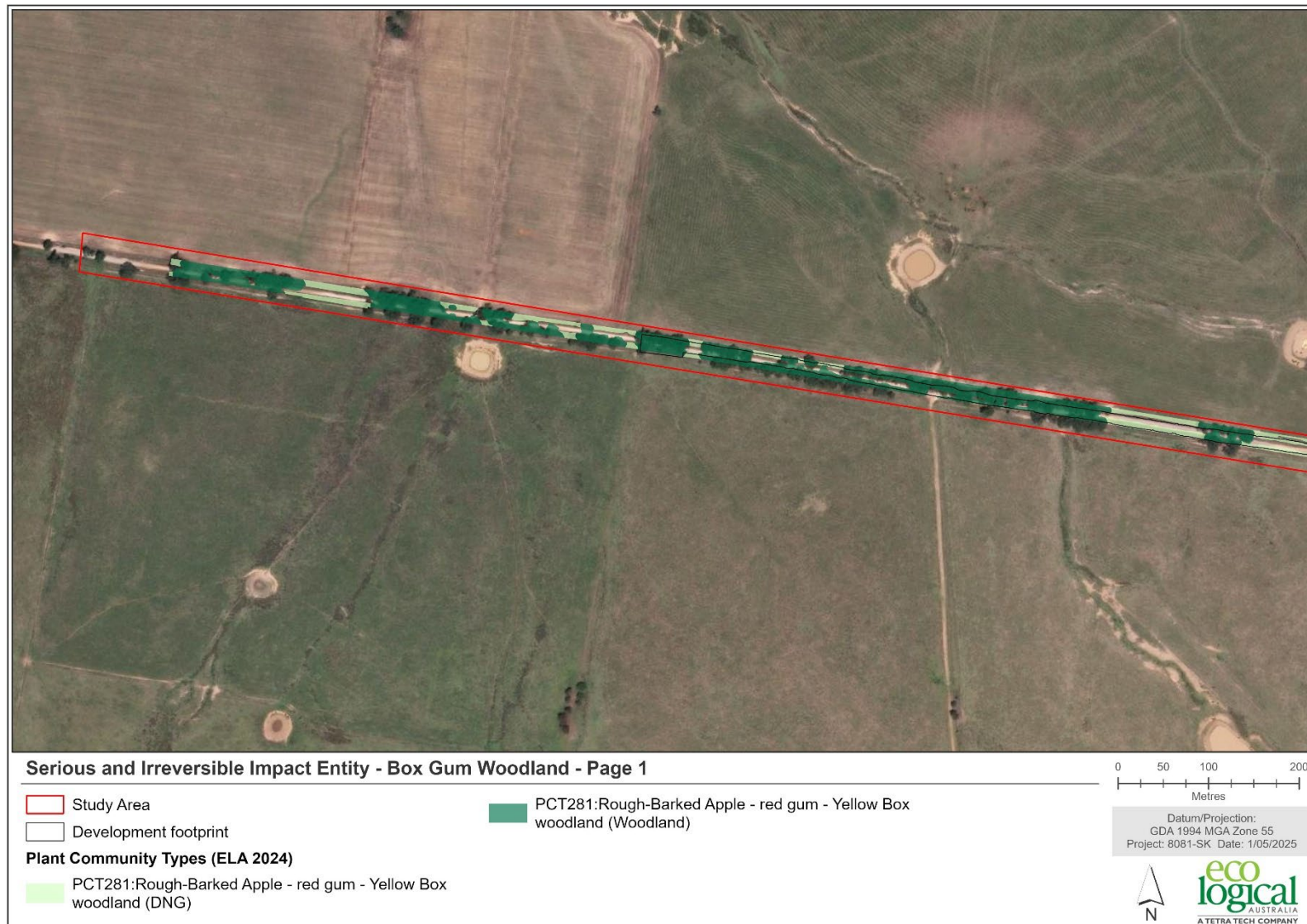


Figure 9-1: SAI entity Box Gum Woodland (Page 1)



Figure 9-2: SII entity Box Gum Woodland (Page 2)

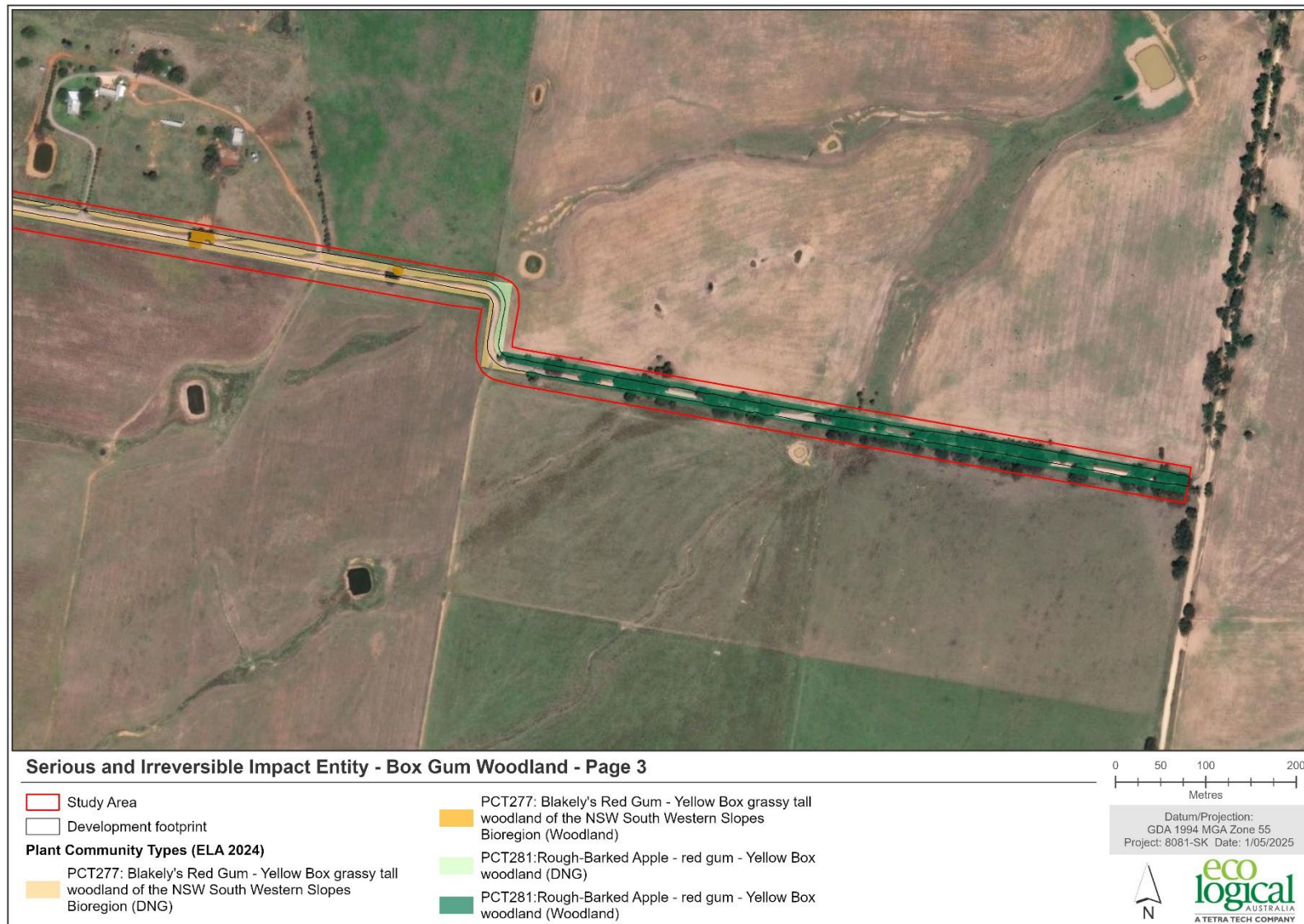


Figure 9-3: SAI entity Box Gum Woodland (Page 3)

10. Impact Summary

10.1. Impacts not requiring offsets

In accordance with Section 9.3 BAM (2020) areas not requiring assessment include:

- Cleared land and exotic species dominated vegetation
- Water courses and dams
- Vegetation below the VI threshold.

Within the BBRS Study Area, cleared land included the existing road surface which was excised out of the mapping. All vegetation zones require offset (Figure 10-1).

10.2. Determine an offset requirement for impacts

Impacts of native vegetation requiring offsets are outlined in Table 10-1.

Table 10-1: Summary of residual impacts requiring ecosystem offsets

Vegetation Zone	PCT	Condition/ Zone	Area (ha)	VI Score	TEC Association	Ecosystem Credits
1	281	Woodland	1.38	65.3	Box Gum Woodland	56
2	277	Woodland	0.57	41.1	Box Gum Woodland	12
3	281	Derive Native Grassland	0.18	34.9	Box Gum Woodland	4
4	277	Derive Native Grassland	0.72	35.8	Box Gum Woodland	13
Total			2.85			85

Impacts to threatened species requiring offsets are outlined in Table 10-2.

Table 10-2: Summary of species credit species requiring offset

Species	Area	VI Score	Future VI Score	Loss of habitat	Candidate SAIL	Biodiversity Risk Weighting	Species Credits Required
Southern Myotis							
281-DNG	0.06	34.9	0	-34.9	No	2	2
281-Woodland	0.96	65.3	0	-65.3	No	2	33
277-DNG	0.47	41.1	0	-41.1	No	2	7
277-Woodland	0.23	35.8	0	-35.8	No	2	5
TOTAL	1.72						47
Masked Owl							
281-DNG	0.14	34.9	0	-34.9	No	2	5
281-Woodland	0.58	65.3	0	-65.3	No	2	19
277-DNG	0.05	41.1	0	-41.1	No	2	1

Species	Area	VI Score	Future VI Score	Loss of habitat	Candidate SAI	Biodiversity Risk Weighting	Species Credits Required
277-Woodland	0.22	35.8	0	-35.8	No	2	5
TOTAL	0.99						30

Credit reports are provided in Appendix 8.



Figure 10-1: Impacts requiring offsets

10.3. Summary of mitigation and management measures

Table 10-3 summarises the mitigation and management measures to be implemented throughout the BBRS road upgrade.

Table 10-3: Summary of mitigation and management measures

Environmental Aspect	Mitigation Measure
General	<p>The BBRS road upgrade will be designed and constructed in a manner as to minimise or mitigate harm to the environment during the construction, operation or decommissioning of the Birriwa Solar Farm and Battery Project, and the Temporary Workers Accommodation and Access, through the implementation of all reasonable and feasible mitigation measures. An Environmental Management Strategy (EMS) will be developed to guide activities associated with construction, operation and decommissioning and rehabilitation of the Birriwa Solar Farm and Battery Project, and the Temporary Workers Accommodation and Access.</p> <p>All site workers will be trained to ensure awareness of the EMS and site-specific training would be provided when specific work activities were taking place near areas of identified biodiversity values that are to be protected. Additional details on mitigation measures for impacts relating to noise, traffic, heritage, waste and visual are provided in the Project approval EIS.</p>
Offset strategy	<p>An offset strategy will be prepared and implemented in accordance with the requirements of the BC Act, which may include Establishment of Biodiversity Stewardship Sites on neighbouring properties.</p>
Biodiversity	<p>A BMP will be prepared in consultation with CPHR, including an unexpected finds procedure. The BMP will include:</p> <ul style="list-style-type: none"> • A Weed Management Plan in accordance with Biosecurity protocols • Pre-clearing protocols, including pre-clearing inspections, establishment of exclusion zones and management of specific habitat features that are to be retained and/or relocated • An Erosion and Sediment Control Plan • Vegetation clearing protocols, including staged habitat removal and specified seasonal limits on clearing activities • Protocols for the salvage and relocation of woody debris, tree hollows and bush rock • Requirements for establishment of temporary fencing and demarcation of no-go zones • Monitoring during construction and post-construction • Adaptive measures if monitoring indicates unexpected adverse impacts – TARPs. <p>Biodiversity mitigation measures will include Project refinement to further minimise the clearing of native vegetation within the Development Footprint and the continuation of assessment of biodiversity impacts on detailed design. Opportunities will be continued to be explored to:</p> <ul style="list-style-type: none"> • Minimise Development Footprint • Protection of HBTs • Minimise impacts to fauna movement corridors
Soils and Water	<p>Appropriate sediment and erosion controls will be implemented as per the BMP. This will include any exposed soil in stockpiles, temporary works, or permanent works such as covering vegetation or permanent capping.</p> <p>Detailed design will assess the need for the use of cut/fill batter protection and effective site surface water management and drainage techniques to prevent the mobilisation of sediments to natural water courses.</p>

Environmental Aspect	Mitigation Measure
SAII – Box Gum Woodland	Measures to avoid impacting Box Gum Woodland will include refinement to further minimise the clearing of this CEEC within the Development Footprint. Opportunities will be continued to be explored to reduce impacts to the CEEC. Additional and appropriate measures if required will be determined in consultation with the CPHR and outlined in the BMP. This may include supporting local agencies to undertake restoration activities or alternative programs to improve and increase Box Gum Woodland in the community.

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; DoE 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; DoE 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	<p>The following species were considered to have potential to occur:</p> <ul style="list-style-type: none"> • <i>Hirundapus caudacutus</i> (White-throated Needletail) - Vulnerable • <i>Nyctophilus corbeni</i> (Corben's Long-eared Bat) -Vulnerable • <i>Climacteris picumnus</i> (Brown Treecreeper) - Vulnerable • <i>Stagonopleura guttata</i> (Diamond Firetail) - Vulnerable • <i>Chalinolobus dwyeri</i> (Large-eared Pied Bat) - Endangered • <i>Anthochaera phrygia</i> (Regent Honeyeater) – Critically Endangered 	Significant impact unlikely
Migratory species	<p>Two migratory species have the potential to occur:</p> <ul style="list-style-type: none"> • <i>Hirundapus caudacutus</i> (White-throated Needletail) • <i>Apus pacificus</i> (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

11.2. Fisheries Management Act 1994 (FM Act)

The FM Act is the principal piece of legislation protecting aquatic habitat in NSW. The act aims to conserve fish stocks, key fish habitat, aquatic vegetation, and threatened species, populations, and communities. Threatened aquatic species, populations and communities are listed under Schedules 4, 4A and 5 of the FM Act, while key threatening processes are listed under Schedule 6. If works involve harm to aquatic habitat, then the proponent is required to demonstrate how the design and works have attempted to avoid, minimise and mitigate direct and indirect harm, plus apply the DPI Fisheries' offset policy to ensure there is no net loss of key fish habitat, as described in Section 3.3.3 of the Policy and Guidelines for Fish Habitat Conservation and Management (Fairfull 2013).

A field assessment of one 3rd order and three 1st/2nd order watercourses on BBRS were assessed, these are not identified as Key Fish Habitat as these are dry with limited riparian cover. The aquatic assessment report is included in Appendix 2.

The assessment concluded that the proposed crossing installations and operation would not impact any threatened species, population or communities listed under the FM Act. Mitigation measures such as erosion and control measures are detailed in the report.

12. Conclusion

ACEN Australia Pty Ltd (ACEN) has approval to develop the Birriwa Solar and Battery Project (the Project), a large-scale solar photovoltaic (PV) electricity generation facility with battery storage and associated infrastructure, including a temporary accommodation facility.

ACEN is now seeking approval to modify development consent SSD-29508870 to include the following changes (the Modification):

- Inclusion of additional lots
- An alternative secondary access route
- Increased capacity of the approved temporary accommodation facility
- Increased Battery Energy Storage System (BESS) capacity and duration
- Upgrade of part of the existing Birriwa Bus Route South (BBRS) local road.

This BDAR assesses the potential biodiversity impacts associated with the BBRS Road upgrade component of the proposed Modification. A separate BDAR addressing the remaining components is being prepared by EMM Consulting Pty Ltd (EMM).

The BBRS Road upgrade involves the realignment, widening, and resurfacing of the BBRS local road to facilitate vehicle access during the construction and operation of the approved Project (SSD-29508870).

The Development Footprint has undergone multiple design refinements to avoid and minimise impacts to native vegetation and sensitive areas.

Key measures include:

- Consultation with MWRC to ensure compliance with Austroads rural road design standards while reducing impacts to roadside woodland.
- Alignment adjustments and width reductions to avoid patches of native vegetation and habitat trees, resulting in the avoidance of 3.45 ha of Critically Endangered Ecological Community (CEEC) *White Box–Yellow Box–Blakely’s Red Gum Grassy Woodland and Derived Native Grassland* (Box Gum Woodland) under the BC Act.

Biodiversity impacts have been assessed through survey, mapping and assessment completed in accordance with the NSW Biodiversity Assessment Method (BAM) 2020 (DPIE 2020a) within an overall Development Footprint of approximately 4.33 ha.

The native vegetation within the Development Footprint comprises two Plant Community Types:

- 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 and Brigalow Belt South Bioregion.*

Both PCTs are associated with the Threatened Ecological Community (TEC) *White Box - Yellow Box – Blakely's Red Gum Grassy Woodland and Derived Native Grassland* (Box Gum Woodland) listed under the NSW *Biodiversity Conservation Act 2016* (BC Act). Neither PCT meets the criteria for listing under the Commonwealth *Environmental Protection Biodiversity Conservation Act 1999* (EPBC Act).

Targeted surveys identified the following candidate species which will be impacted by the BBRS Road upgrade:

- *Myotis macropus* (Southern Myotis)
- *Tyto novaehollandiae* (Masked Owl).

There will be a direct loss of 2.85 ha of native vegetation and associated foraging habitat assessed in this BDAR which requires offsetting under the BOS.

Significant efforts have been made to adjust and refine the Development Footprint to avoid most of the TECs, nevertheless, there will be a direct loss of TECs consisting of:

- Critically Endangered Box Gum Woodland – 2.85 ha.

Design refinements have reduced impacts on biodiversity within the BBRS Study Area. Further mitigation and management actions include:

- Locating the Development Footprint in low-quality, highly disturbed areas of derived native grassland where feasible.
- Avoiding removal of canopy trees in Box Gum Woodland, limiting clearing to the understory where possible.

Preparing a Biodiversity Management Plan addressing clearing protocols, erosion control, weed management, habitat retention, and post-construction monitoring in accordance with the Project approval development consent SSD-29508870.

The Development Footprint may be refined further through detailed design. Final residual impacts will be confirmed, and biodiversity credits retired in accordance with the BOS.

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Appendix 1: Definitions

The following terminology has been used throughout this report for the purposes of describing the impacts of the proposal in the context of a biodiversity assessment in accordance with the NSW Biodiversity Assessment Method 2020. This terminology may or may not align with other technical documents associated with the proposed development.

Terminology	Definition
Area of Occupancy (AOO)	Measures the spatial spread of a taxon to determine the degree to which risks from threatening factors could impact the local population, and is not intended to be an estimate of the amount of occupied or potential habitat.
Biodiversity credit report	The report produced by the Credit Calculator that sets out the number and class of biodiversity credits required to offset the remaining adverse impacts on biodiversity values at a development site, or on land to be biodiversity certified, or that sets out the number and class of biodiversity credits that are created at a biodiversity stewardship site.
BioNet Atlas	The BioNet Atlas (formerly known as the NSW Wildlife Atlas) is the OEH database of flora and fauna records. The Atlas contains records of plants, mammals, birds, reptiles, amphibians, some fungi, some invertebrates (such as insects and snails) and some fish
Broad condition state:	Areas of the same PCT that are in relatively homogenous condition. Broad condition is used for stratifying areas of the same PCT into a vegetation zone for the purpose of determining the vegetation integrity score.
Connectivity	The measure of the degree to which an area(s) of native vegetation is linked with other areas of vegetation.
Credit Calculator	The computer program that provides decision support to assessors and proponents by applying the BAM, and which calculates the number and class of biodiversity credits required to offset the impacts of a development or created at a biodiversity stewardship site.
Development	Has the same meaning as development at section 4 of the EP&A Act, or an activity in Part 5 of the EP&A Act. It also includes development as defined in section 115T of the EP&A Act.
Development Footprint	The area of land that is directly impacted on by a proposed development, including access roads, and areas used to store construction materials.
Development site	An area of land that is subject to a proposed development that is under the EP&A Act.
Ecosystem credits	A measurement of the value of EECs, Critically Endangered Ecological Community (CEEC) and threatened species habitat for species that can be reliably predicted to occur with a PCT. Ecosystem credits measure the loss in biodiversity values at a development site and the gain in biodiversity values at a biodiversity stewardship site.
Extent of occurrence (EOO)	Measures the spatial spread of a taxon to determine the degree to which risks from threatening factors could impact an entire population, and is not intended to be an estimate of the amount of occupied or potential habitat.
High threat exotic plant cover	Plant cover composed of vascular plants not native to Australia that if not controlled will invade and outcompete native plant species.
Hollow bearing tree	A living or dead tree that has at least one hollow. A tree is considered to contain a hollow if: (a) the entrance can be seen; (b) the minimum entrance width is at least 5 cm; (c) the hollow appears to have depth (i.e. you cannot see solid wood beyond the entrance); (d) the hollow is at least 1 m above the ground. Trees must be examined from all angles.

Terminology	Definition
Important wetland	A wetland that is listed in the Directory of Important Wetlands of Australia (DIWA) and SEPP 14 Coastal Wetlands
Linear shaped development	Development that is generally narrow in width and extends across the landscape for a distance greater than 3.5 km in length
Local population	The population that occurs in the Study Area. In cases where multiple populations occur in the Study Area or a population occupies part of the Study Area, impacts on each subpopulation must be assessed separately.
Local wetland	Any wetland that is not identified as an important wetland (refer to definition of Important wetland).
NSW (Mitchell) landscape	Landscapes with relatively homogeneous geomorphology, soils and broad vegetation types, mapped at a scale of 1:250,000.
Multiple fragmentation impact development	Developments such as wind farms and coal seam gas extraction that require multiple extraction points (wells) or turbines and a network of associated development including roads, tracks, gathering systems/flow lines, transmission lines
Operational Manual	The Operational Manual published from time to time by NSW Department of Planning, Industry and Environment (DPIE), which is a guide to assist assessors when using the BAM
Patch size	An area of intact native vegetation that: a) occurs on the development site or biodiversity stewardship site, and b) includes native vegetation that has a gap of less than 100 m from the next area of native vegetation (or ≤ 30 m for non-woody ecosystems). Patch size may extend onto adjoining land that is not part of the development site or stewardship site..
Proponent	A person who intends to apply for consent to carry out development or for approval for an activity.
Reference sites	The relatively unmodified sites that are assessed to obtain local benchmark information when benchmarks in the Vegetation Benchmarks Database are too broad or otherwise incorrect for the PCT and/or local situation. Benchmarks can also be obtained from published sources.
Regeneration	The proportion of over-storey species characteristic of the PCT that are naturally regenerating and have a diameter at breast height < 5 cm within a vegetation zone.
Residual impact	An impact on biodiversity values after all reasonable measures have been taken to avoid, minimise or mitigate the impacts of development. Under the BAM, an offset requirement is determined for the remaining impacts on biodiversity values.
Retirement of credits	The purchase and retirement of biodiversity credits from an already-established biobank site or a biodiversity stewardship site secured by a biodiversity stewardship agreement.
Riparian buffer	Riparian buffers applied to water bodies in accordance with the BAM
Sensitive biodiversity values land map	Development within an area identified on the map requires assessment using the BAM.
Site attributes	The matters assessed to determine vegetation integrity. They include: native plant species richness, native over-storey cover, native mid-storey cover, native ground cover (grasses), native ground cover (shrubs), native ground cover (other), exotic plant cover (as a percentage of total ground and mid-storey cover), number of trees with hollows, proportion of over-storey species occurring as regeneration, and total length of fallen logs.
Site-based development	a development other than a linear shaped development, or a multiple fragmentation impact development

Terminology	Definition
Species credits	The class of biodiversity credits created or required for the impact on threatened species that cannot be reliably predicted to use an area of land based on habitat surrogates. Species that require species credits are listed in the Threatened Biodiversity Data Collection.
Study Area	Is land to which the BAM is applied in Stage 1 to assess the biodiversity values of the land. It includes land that may be a development site, clearing site, proposed for biodiversity certification or land that is proposed for a biodiversity stewardship agreement.
Threatened Biodiversity Data Collection	Part of the BioNet database, published by DPIE and accessible from the BioNet website.
Threatened species	Critically Endangered, Endangered or Vulnerable threatened species as defined by Schedule 1 of the BC Act, or any additional threatened species listed under Part 13 of the EPBC Act as Critically Endangered, Endangered or Vulnerable.
Vegetation Benchmarks Database	A database of benchmarks for vegetation classes and some PCTs. The Vegetation Benchmarks Database is published by OEH and is part of the BioNet Vegetation Classification.
Vegetation zone	A relatively homogenous area of native vegetation on a development site, land to be biodiversity certified or a biodiversity stewardship site that is the same PCT and broad condition state.
Wetland	An area of land that is wet by surface water or ground water, or both, for long enough periods that the plants and animals in it are adapted to, and depend on, moist conditions for at least part of their life cycle. Wetlands may exhibit wet and dry phases and may be wet permanently, cyclically or intermittently with fresh, brackish or saline water
Woody native vegetation	Native vegetation that contains an over-storey and/or mid-storey that predominantly consists of trees and/or shrubs

Appendix 2: Aquatic Assessment

A stylized topographic map with concentric contour lines in a light grey color, positioned on the left side of the page.

Narragamba Solar Project: Aquatic Ecology Impact Assessment

ACEN Australia

DOCUMENT TRACKING

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Template 2.8.1

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Abbreviations

Abbreviation	Description
AAT	Accommodation access track
BBRS	Birriwa Bus Route South
BDAR	Biodiversity Development Assessment Report
DCCEEW	NSW Department of Climate Change, Energy, the Environmental and Water – Water Group
DCP	Mid-Western Regional Development Control Plan 2023
DPI	NSW Department of Primary Industries - Fisheries
ELA	Eco Logical Australia Pty Ltd
EP&A Act	<i>Environmental Planning & Assessment Act 1979</i>
FM Act	<i>Fisheries Management Act 1994</i>
LEP	Mid-Western Regional Local Environmental Plan 2012
SEARs	Planning Secretary's Environmental Assessment Requirements
SSDA	State Significant Development Application
WM Act	<i>Water Management Act 2000</i>

1. Introduction

1.1. Project description

ACEN Australia Pty Ltd (ABN 27 616 856 672) (ACEN) proposes construction and operation of the Narragamba Solar Project (the Project), within the Central-West Orana Renewable Zone (CWO-REZ) of New South Wales (NSW). The Project is located approximately 15 km north of Gulgong and 25 km southeast of Dunedoo, within the Mid-Western Regional Local Government Area (LGA).

The Project includes the construction, operation and decommissioning of an approximate 320 megawatt (AC) large-scale solar project, ancillary electrical and civil engineering works, public road upgrade works and a 500-bed temporary worker accommodation facility. The Project would generate enough electricity to power 160,400 average NSW homes in the national electricity market (NEM) via the future Merotherie Energy Hub proposed by Energy Corporation of NSW (EnergyCo), or via the recently built TransGrid Stubbo switchyard located approximately four kilometres south of the Project.

The Project is located immediately north of the Stubbo Solar and Battery Project (SSD-10452) whose commercial operation of the solar component is expected in the first half of 2025. Narragamba Solar Project would be constructed and operated separately.

The Project includes the following key components:

- approximately 600,000–700,000 photovoltaic modules (solar panels) using a single axis tracking system
- electrical infrastructure including:
 - approximately 55 power conversion units (PCUs) which include inverters for converting direct current (DC) power to alternating current (AC)
 - onsite substation containing main transformers, control and distribution buildings, and associated switchgear
 - overhead and underground electrical reticulation connecting the Project elements
- other permanent onsite ancillary infrastructure including:
 - operation and maintenance facility
 - a temperature-controlled spare parts storage facility
 - supervisory control and data acquisition (SCADA) facilities for remote monitoring and control of the Project
 - a workshop and associated infrastructure
 - access roads
 - carparking
 - security fencing
 - landscaping
- temporary construction ancillary infrastructure including:
 - construction compounds
 - laydown areas

- parking areas
- access tracks and associated infrastructure, including gates and fencing
- concrete batching plant (concrete and stabilising sand mixing)
- earthworks material management areas – potential screening/processing and crushing
- 500 bed temporary worker accommodation facility within the footprint of the temporary worker accommodation facility approved under the Birriwa Solar and Battery Project (SSD-29508870)
- local public road upgrades:
 - upgrade a portion of Merotherie Road from the Merotherie Energy Hub site access south to the solar project access
 - upgrade a portion of Birriwa Bus Route South (BBRS) to facilitate construction and operation of the temporary worker accommodation facility, including a temporary accommodation access track (AAT) and the solar project development footprint along the local public road network.

The Project is expected to employ up to 500 full-time construction workers during peak construction and approximately 10 full-time employees during operation of the solar project. The Project's development footprint would be accessed directly from Merotherie Road via the Golden Highway. The temporary worker accommodation would be constructed and operated via an access track off BBRS, using the upgraded local road network for travel between the development footprint and the accommodation facility.

The operational lifespan of the Project is indicatively 30 years, with potential for upgrades. At the end of its operational life, the Project would be decommissioned, and land rehabilitated in accordance with the conditions of consent and contractually agreed with the host landholders.

This Aquatic Ecology Impact Assessment has been prepared to address the Project Secretary's Environmental Assessment Requirements (Table 1) and reviews the potential impacts of the construction and operation of two, 20 – 30 m wide waterway crossings proposed within the Solar Project development footprint (Figure 1). An additional baseline assessment of waterways of Strahler Order 3 which intersect the proposed road upgrades of Merotherie Road, BBRS, and the access road to the temporary accommodation facility have been undertaken. Each location of potential impact to these waterways is identified as an 'impact area' in Figure 1. Aquatic impacts relevant to the *NSW Fisheries Management Act 1994* (FM Act), *Commonwealth Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act), and measures to mitigate potential impacts to aquatic habitat during construction and operation of the two waterway crossings are included within this report.

This report assesses the impacts of proposed waterway crossings on aquatic ecology. It does not assess the impact of the overall development footprint on all watercourses within the Project. The aquatic impact assessment of these areas will be completed before construction as part of the detailed design phase.

Table 1: SEARs requirements relating to aquatic ecology

Key issue	Description of requirement
-----------	----------------------------

Key issue	Description of requirement
Biodiversity	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

1.2. Site description

The Project development footprint has been largely cleared and historically used for grazing. There remain fragmented and isolated patches of remnant natural and disturbed vegetation mixed through the grazing land (ELA 2024). Overall, the Project development footprint vegetation is considered disturbed due to partial clearing of woodland areas, presence of pasture and weedy species, and grazing and trampling impacts resulting from cattle (ELA 2024).

The Project is situated within the Macquarie River Catchment and contains unnamed 1st, 2nd and 3rd order watercourses, as mapped on the *Water Management (General) Regulation 2018 hydroline spatial data 1.0* (the 'hydroline') map, which drain north-north-east into the Talbragar River. The additional impact areas along BBRS and AAT, cross two unnamed 3rd order watercourses (Figure 1).

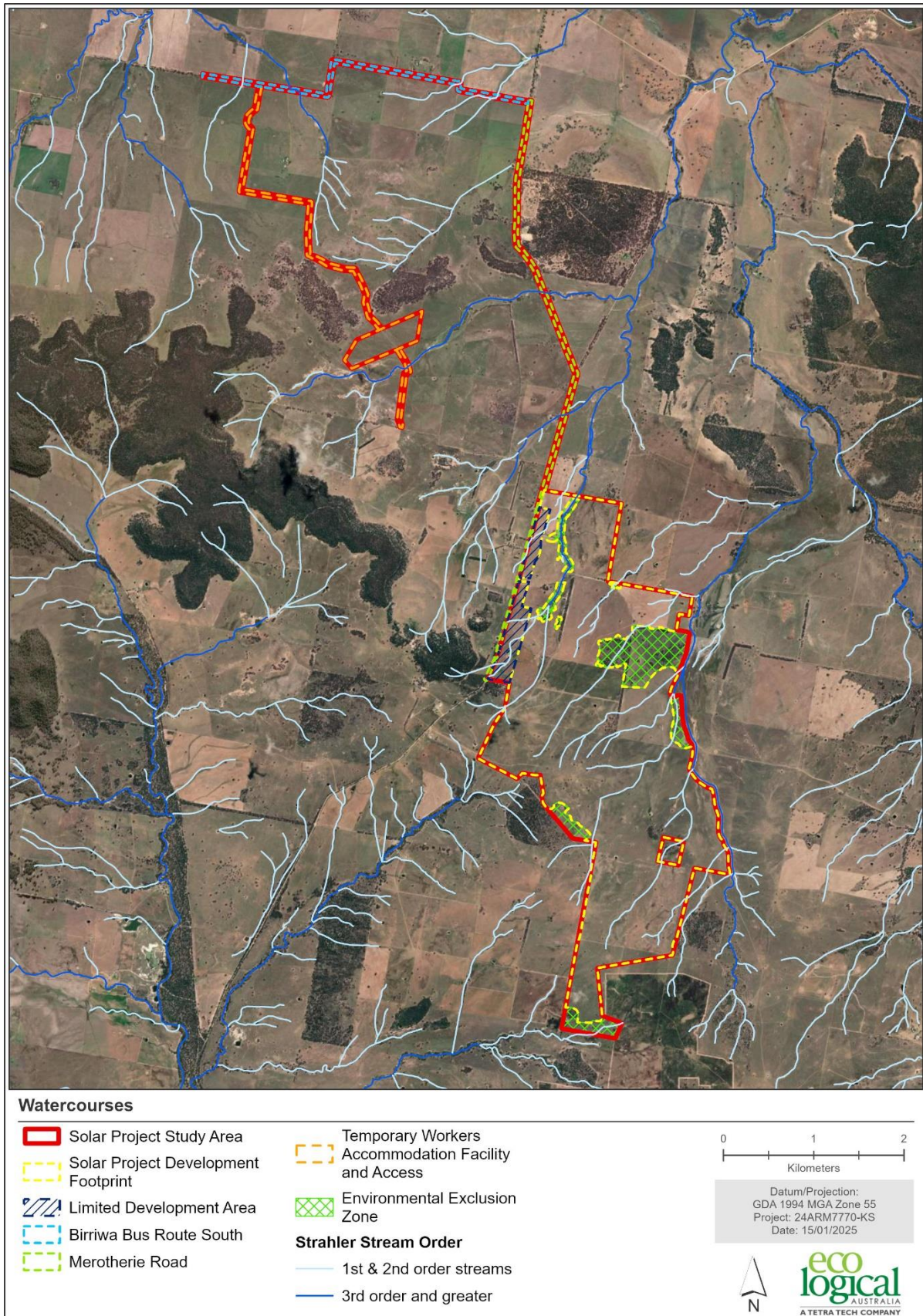


Figure 1: Location of the proposed road upgrades and the Project development footprint

2. Statutory context

2.1. Commonwealth Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act)

Under the EPBC Act, the Commonwealth Environment Minister needs to approve any development that is likely to have a significant impact on Matters of National Environmental Significance (MNES). Should such an impact, as defined in the EPBC Act *Policy Statement 1.1 – Significant Impact Guidelines* (Department of the Environment 2013), be likely, the preparation and submission of a Referral is required. MNES relevant to this study includes threatened ecological communities, flora and fauna species and migratory species that are listed under the Act. The proposed work would not cause a significant impact to aquatic species, and therefore a Referral is not recommended for impacts to aquatic species. For terrestrial MNES relevant to the proposal, refer to the Biodiversity Development Assessment Report (BDAR) (ELA 2024).

2.2. NSW Environmental Planning and Assessment Act 1979 (EP&A Act)

All developments in NSW are assessed in accordance with the provisions of the EP&A Act and the *Environmental Planning and Assessment Regulation 2021*. The EP&A Act provides a system for environmental planning and assessment, including approvals and environmental impact assessment requirements for proposed developments. Implementation of the EP&A Act is the responsibility of the Minister for Planning, statutory authorities and local councils.

This assessment addresses the Project SEARs required under section 4.12(8) of the EP&A Act for SSDAs in relation to biodiversity matters, specifically, the likely impacts on listed aquatic threatened species, populations or ecological communities, scheduled under the *Fisheries Management Act 1994*, and descriptions of the measures to minimise and rehabilitate impacts.

2.3. NSW Biodiversity Conservation Act 2016 (BC Act)

Terrestrial biodiversity values, and flora and fauna listed under the BC Act are addressed in the BDAR (ELA 2024).

2.4. NSW Wetlands Management Policy 2010

The NSW Wetlands Management Policy (DECCW 2010) aims to provide for the protection, ecologically sustainable use and management of NSW wetlands. Wetlands include lakes, lagoons, estuaries, rivers, floodplains, swamps, bogs, billabongs, marshes, coral reefs, and seagrass beds. Wetlands within the Project occur within the riparian corridor.

2.5. NSW Water Management Act 2000 (WM Act)

The WM Act aims to protect and use NSW water in a way that is sustainable and holistic, which will help present generations without harming the ability of future generations to satisfy their needs. The NSW Department of Climate Change, Energy, the Environmental and Water (DCCEEW) – Water Group administers licencing and approvals for controlled activities on ‘waterfront land’, which is defined as

the land 40 m from the highest bank of a river, lake or estuary published on the Department's website (*Water Management (General) Regulation 2018 hydroline spatial data 1.0*), known as the 'hydroline'. DDCEEW – Water Group has published guidelines for controlled activities on waterfront land, referred to hereon in as the 'DCCEEW Guidelines' (DPE 2022). These guidelines assist proponents in designing development to be consistent with the intent of the legislation.

Under Section 4.41(1) of the EP&A Act, controlled activity approval under section 91 of the WM Act is not required for State significant development.

2.6. NSW Fisheries Management Act 1994 (FM Act) and Policy and guidelines for fish habitat conservation and management

The FM Act is the principal piece of legislation protecting aquatic habitat in NSW. The act aims to conserve fish stocks, key fish habitat, aquatic vegetation, and threatened species, populations, and communities. Threatened aquatic species, populations and communities are listed under Schedules 4, 4A and 5 of the FM Act, while key threatening processes are listed under Schedule 6. If works involve harm to aquatic habitat, then the proponent is required to demonstrate how the design and works have attempted to avoid, minimise and mitigate direct and indirect harm, plus apply the DPI Fisheries' offset policy to ensure there is no net loss of key fish habitat, as described in Section 3.3.3 of the *Policy and Guidelines for Fish Habitat Conservation and Management* (Fairfull 2013).

The *Policy and Guidelines for Fish Habitat Conservation and Management* (referred to from here on in as the 'DPI Guidelines') is a supplementary document that outlines the requirements and obligations under the FM Act and the *Fisheries Management (General) Regulation 2010* and were developed to maintain and enhance fish habitat and assist in the protection of threatened species. The Policy provides a definition of key fish habitat and gives guidance for classifying waterways for fish passage, which informs the types of infrastructure suitable (Table 2). It also assigns a sensitivity type to key fish habitat present, so that disturbance and offsetting requirements can be determined (Table 3).

Table 2: Classification of waterways for fish passage and crossing type (Fairfull 2013)

Classification	Characteristics of waterway class and preferred crossing type
CLASS 1 Major key fish habitat	Marine or estuarine waterway or permanently flowing or flooded freshwater waterway (e.g. river or major creek), habitat of a threatened or protected fish species or 'critical habitat'. Bridge, arch structure or tunnel. Bridges are preferred to arch structures.
CLASS 2 Moderate key fish habitat	Non-permanently flowing (intermittent) stream, creek or waterway (generally named) with clearly defined bed and banks with semi-permanent to permanent waters in pool or in connected wetland areas. Freshwater aquatic vegetation is present. TYPE 1 and 2 habitats present. Bridge, arch structure, culvert ^[1] or ford. Bridges are preferred to arch structures, box culverts and fords (in that order).
CLASS 3 Minimal key fish habitat	Named or unnamed waterway with intermittent flow and sporadic refuge, breeding or feeding areas for aquatic fauna (e.g. fish, yabbies). Semi-permanent pools form within the waterway or adjacent wetlands after a rain event. Otherwise, any minor waterway that interconnects with wetlands or other CLASS 1-3 fish habitats. Culvert ^[2] or ford. Box culverts are preferred to fords and pipe culverts (in that order).

Classification	Characteristics of waterway class and preferred crossing type
CLASS 4 Unlikely key fish habitat	Waterway (generally unnamed) with intermittent flow following rain events only, little or no defined drainage channel, little or no flow or freestanding water or pools post rain events (e.g. dry gullies or shallow floodplain depressions with no aquatic flora present). Culvert ^[3] , causeway or ford. Culverts and fords are preferred to causeways (in that order).

Key to crossing type

^[1] High priority given to the 'High Flow Design' procedures presented for the design of these culverts—refer to the "Design Considerations" section of Fairfull and Witheridge 2003.

^[2] Minimum culvert design using the 'Low Flow Design' procedures; however, 'High Flow Design' and 'Medium Flow Design' should be given priority where affordable—refer to the "Design Considerations" section of Fairfull and Witheridge (2003).

^[3] Fish friendly waterway crossing designs possibly unwarranted. Fish passage requirements should be confirmed with NSW DPI.

As noted in Fairfull and Witheridge 2003, there are additional factors that must be taken into consideration by those involved in waterway crossing design and construction, including public safety, social and budgetary constraints. Each crossing is therefore assessed by NSW DPI on a case-by-case basis.

Table 3: Key fish habitat types (Fairfull 2013)

Key fish habitat and associated sensitivity classification scheme for assessing potential impacts of certain activities and developments on key fish habitat types

TYPE 1 – Highly sensitive key fish habitat:

Posidonia australis (strapweed)

Zostera, *Heterozostera*, *Halophila* and *Ruppia* species of seagrass beds >5 m² in area

Coastal saltmarsh >5 m² in area

Coral communities

Coastal lakes and lagoons that have a natural opening and closing regime (i.e. are not permanently open or artificially opened or are subject to one off unauthorised openings)

Marine Park, an aquatic reserve or intertidal protected area

SEPP 14* coastal wetlands, wetlands recognised under international agreements (e.g. Ramsar, JAMBA, CAMBA, ROKAMBA wetlands), wetlands listed in the Directory of Important Wetlands of Australia

Freshwater habitats that contain in-stream gravel beds, rocks greater than 500 mm in two dimensions, snags greater than 300 mm in diameter or 3 metres in length, or native aquatic plants

Any known or expected protected or threatened species habitat or area of declared 'critical habitat' under the FM Act

Mound springs

TYPE 2 – Moderately sensitive key fish habitat:

Zostera, *Heterozostera*, *Halophila* and *Ruppia* species of seagrass beds <5 m² in area

Mangroves

Coastal saltmarsh <5 m² in area

Marine macroalgae such as *Ecklonia* and *Sargassum* species

Estuarine and marine rocky reefs

Coastal lakes and lagoons that are permanently open or subject to artificial opening via agreed management arrangements (e.g. managed in line with an entrance management program)

Key fish habitat and associated sensitivity classification scheme for assessing potential impacts of certain activities and developments on key fish habitat types

Aquatic habitat within 100 m of a marine park, an aquatic reserve or intertidal protected area

Stable intertidal sand/mud flats, coastal and estuarine sandy beaches with large populations of in-fauna

Freshwater habitats and brackish wetlands, lakes and lagoons other than those defined in TYPE 1

Weir pools and dams up to full supply level where the weir or dam is across a natural waterway

TYPE 3 – Minimally sensitive key fish habitat:

Unstable or unvegetated sand or mud substrate, coastal and estuarine sandy beaches with minimal or no in-fauna

Coastal and freshwater habitats not included in TYPES 1 or 2

Ephemeral aquatic habitat not supporting native aquatic or wetland vegetation

*SEPP 14 coastal wetlands are now named Resilience and Hazards SEPP coastal wetlands

2.7. State Environmental Planning Policy (Biodiversity and Conservation) 2021

Chapter 6, 'Water catchments', of the State Environmental Planning Policy (Biodiversity and Conservation) 2021 (Biodiversity and Conservation SEPP) outlines general controls on development in regulated catchments in relation to water quality and quantity, aquatic ecology, flooding, recreation and public access, and total catchment management.

The Project is not situated within a regulated catchment as defined in Part 6.1. Thus, the general controls on development under Division 2 of the Biodiversity and Conservation SEPP do not apply to the proposal.

2.8. Mid-Western Regional Local Environmental Plan (LEP) 2012

The Mid-Western Regional LEP aims to make local environmental planning provisions in accordance with the relevant standard environmental planning instrument under section 3.20 of the EP&A Act. Specific aims for aquatic ecology include:

1.2(2)(b) to encourage the proper management, development and conservation of resources within Mid-Western Regional by protecting, enhancing and conserving –

(ii) soil, water, minerals and other natural resources, and

(iii) native plants and animals

Additional local provision 6.3 *Earthworks* within the Mid-Western Regional LEP relates to aquatic ecology through its objective to ensure that earthworks, in this case, construction of two 20-30 metre-wide waterway crossings, will not have a detrimental impact on environmental functions and processes.

The Project is not mapped as having moderate or high biodiversity sensitivity on the Sensitivity Biodiversity Map. Therefore, additional local provisions relating to biodiversity under section 6.5 of the LEP do not apply to proposed waterway crossings within the Project.

An assessment of the proposal against the relevant provisions is provided in Section 5.5.

2.9. Mid-Western Regional Council Development Control Plan (DCP) 2013

Section 5.4 *Environmental Controls* of the Mid-Western Regional Council DCP contains controls on development relating to riparian and drainage line environments, and threatened species vegetation and management. An assessment of the proposal against these environmental controls is provided in Section 5.6.

3. Methods

3.1. Desktop assessment

A review of the following data, background literature and relevant planning instruments and strategic documents was undertaken:

- *Commonwealth Environment Protection and Biodiversity Conservation Act 1999* – Protected Matters Search Tool (10 km radius)
- *NSW Fisheries Management Act 1994*; *Fisheries NSW Policy and Guidelines for Fish Habitat Conservation and Management* (2013 update) (Fairfull 2013); DPI Fisheries key fish habitat mapping; listed protected and threatened species and populations, including species profiles; ‘Primefact’ publications and expected distribution maps (Riches et al 2016).
- *NSW Water Management Act 2000* and Guidelines for controlled activities on waterfront land (DPE 2022)
- Water Management (General) Regulation 2018 hydroline spatial data 1.0
- NSW Wetlands Management Policy 2010 (DECCW 2010)
- Online Zoological Collections of Australian Museums (OZCAM) and Atlas of Living Australia (ALA) – individual species searches to determine likelihood of occurrence of threatened species
- NSW River styles database (DPE 2023)
- Mid-Western Regional Local Environment Plan 2012 (Mid-Western LEP)
- Mid-Western Regional Council Development Control Plan 2013 (Mid-Western DCP)

3.2. Field survey

On 12 March 2024, two ELA aquatic ecologists (Dr Peter Hancock and Kacey Tada) walked the mapped, unnamed 3rd order watercourse which intersects the two proposed crossing locations (reach 3A in Figure 1). Potential impact areas associated with the proposed road upgrades were also briefly visited. The aim of the field work was to determine the type of key fish habitat (KFH) present and waterway class under the DPI Guidelines by assessing the geomorphic condition of the watercourse, presence of riparian vegetation, types of aquatic habitats present and identifying any threatened aquatic species, populations and communities or their habitat listed under the FM Act and EPBC Act. Particularly, notes were taken on vegetation structure, connectivity and quality, bed and bank stability, and aquatic habitat quality and diversity.

4. Results

4.1. Desktop review

The proposed crossing locations within the Project are situated on a mapped 3rd order watercourse, reach 3A, which flows north into Cockabutta Creek and the Talbragar River, part of the Macquarie River catchment (Figure 2). Additional impact areas associated with the proposed road upgrades include two 3rd order watercourses along Merotherie Road, one 3rd order and three 1st/2nd order watercourses on BBRS, and one 3rd order watercourse along the access track for temporary workers accommodation.

Two of the 3rd order watercourses are mapped by DPI Fisheries as KFH, and two aren't but potentially meet the definition of KFH. KFH occurs in both the creeks that cross Merotherie Road, but not the creeks crossing Birriwa Bus Stop Road, nor the creek crossed by the access track south of the accommodation camp (Figure 2). However, as they are 3rd order waterways, they meet the definition of KFH under the guidelines (Fairfull 2013) so will be considered KFH for the purposes of this assessment.

The DPI Fisheries spatial portal identifies the nearest major waterway, Talbragar River, as having a poor freshwater fish community status. None of the reaches within the Project, have been mapped by DPE for fish community status on the DPI Fisheries Spatial Dataset (DPE 2023). Likewise, none of the waterways in the impact area have been mapped on the NSW River Style map.

The nearest expected threatened fish species is modelled by DPI Fisheries in the Talbragar River, approximately 7 km north of the proposed crossing locations within the Project (Riches et al 2016). The Talbragar River is modelled as within the potential distribution of *Mogurnda adspersa* (Southern Purple-spotted Gudgeon) and *Tandanas tandanas* (Eel-tailed Catfish), which are an Endangered species and an Endangered population under the FM Act, respectively. Potential habitat for Purple-spotted Gudgeon occurs in White Creek, which is west of the current AAT, but is outside our area of assessment. Approximately 110 km downstream, the Talbragar River converges with the Macquarie River. As modelled by DPI Fisheries, this reach of the Macquarie River is within the potential distribution of *Maccullochella macquariensis* (Trout Cod), *Bidyanus bidyanus* (Silver Perch) and *Ambassis agassizii* (Olive Perchlet), the latter of which is part of an Endangered population. Additionally, approximately 40 km east, the Endangered *Craterocephalus amniculus* (Darling River Hardyhead) population has a modelled potential distribution 40 km to the east within the Hunter River Catchment. However, separation by a drainage divide and situation within a different catchment means this Endangered population is unlikely to occur within the Project or potential impact areas.

A MNES search within 10 km of the Project shows two species of fish which may occur or have habitat within the Project. These include:

- *Galaxias rostratus* (Flathead Galaxias)
- *Macquaria australasica* (Macquarie Perch)

An additional two species may occur within 10 km of the Project:

- *Maccullochella macquariensis* (Trout Cod)

- *Maccullochella peelii* (Murray Cod)

A search of ALA records demonstrates that no threatened species, communities or populations with a potential distribution modelled by DPI Fisheries or the MNES Protected Matters Search Tool occur within 10 km of the Project. The nearest record is of an Eel-tailed Catfish, approximately 19 km east-southeast within the Hunter River Catchment. One Murray Cod record occurs approximately 32 km northeast of the Project. Another Murray Cod record exists approximately 32 km to the south-southeast in the Cudgegong River. Occurrences along the Macquarie River between Burrendong Dam and Narromine include Murray Cod, Eel-tailed Catfish and Trout Cod. No occurrences are recorded along the Talbragar River.

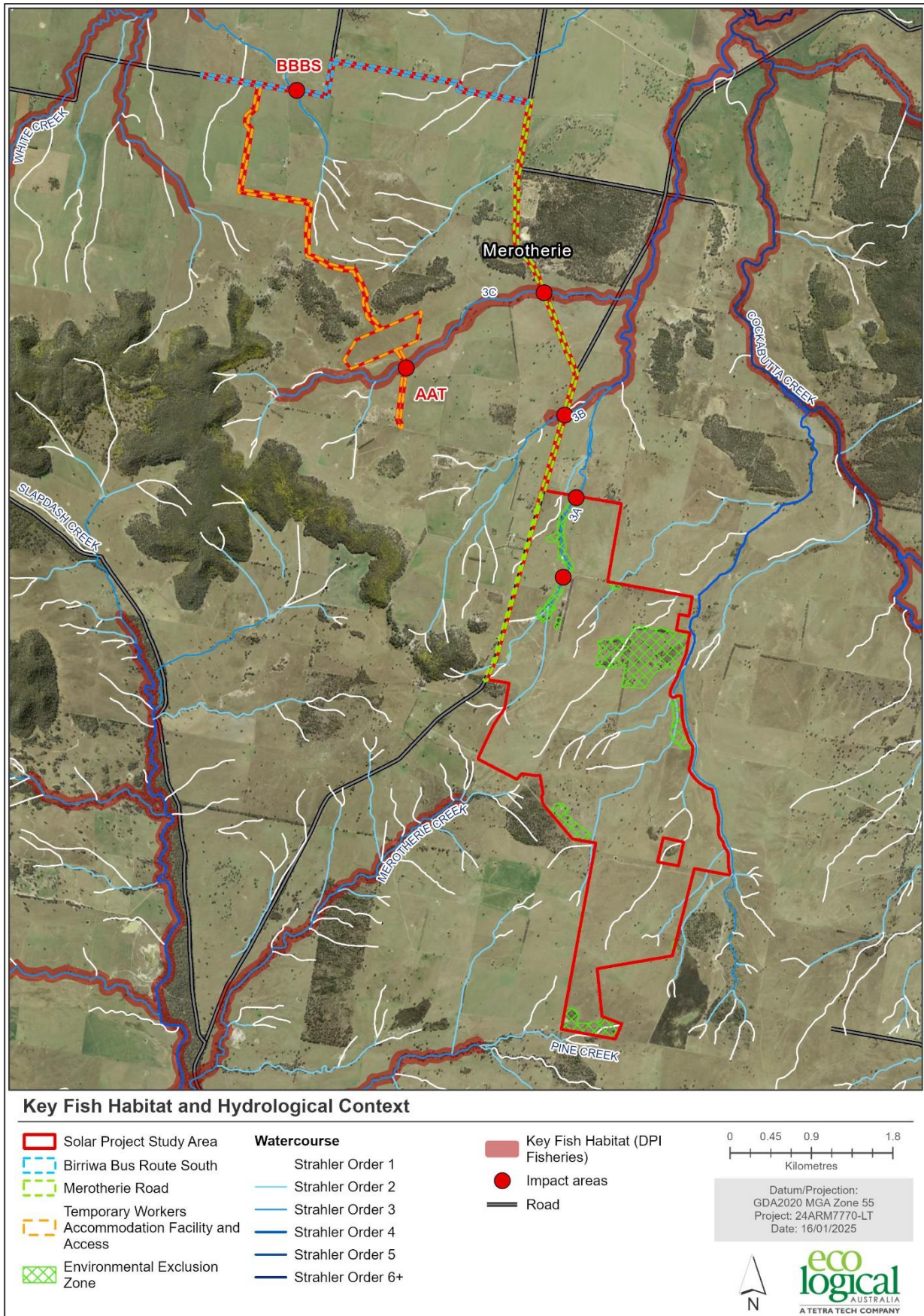


Figure 2: Key fish habitat and hydrological context of the surrounding areas

4.2. Riparian and aquatic condition

Within the Solar project development footprint, along reach 3A at the southern proposed crossing location, the channel was dry and deeply incised, approximately 1.4 – 1.8 m deep. Concrete rubble/bricks/tiles were observed in the channel, likely placed to reduce erosion in periods of flow. No riparian trees existed at this location, but a small patch of *Angophora floribunda* occurred ~100 m downstream along with some *Phragmites australis*. Within the channel there was no standing water, and the bed substrate was predominantly comprised of hard clay and bedrock with some sand. Upstream of the proposed crossing location, the channel was dry, narrow (~2 m wide), and lined with *Juncus* sp. No established riparian zone was observed. There is a small earthen dam 15 x 15 m located 220 m upstream of the proposed crossing location, and a second dam south and west of that. Both dams had submerged aquatic vegetation. See Figure 3 for representative photographs of reach 3A (upstream).

At the northern crossing location within the Solar project development footprint, the channel was dry and vegetated with grass and sedges. The channel presented as several ill-defined shallow drainage lines rather than a singular distinct channel. Upstream, there is an eroded channel approximately 1.2 m deep, vegetated with some sedges. It is likely that reach 3A acts as an ephemeral drainage line during periods of high rainfall, with no permanent aquatic habitat features except for sparse aquatic vegetation such as *Juncus* sp. See Figure 4 for representative photographs of reach 3A (downstream).

The additional creeks crossing at the BBRS and AAT, dry and semi-dry respectively. The creek at the BBRS crossing had some riparian cover with *Eucalyptus* sp. trees lining the creek. Various grasses grew with no permanent aquatic habitat features present (Figure 8). Riparian vegetation was limited to grass cover along the creek at the AAT creek crossing with some erosion evident (Figure 9).

Overall, reach 3A meets the DPI Fisheries definition of Type 3 – *Minimally sensitive key fish habitat* and Class 3 – *Minimal key fish habitat*, defined in Table 2 and Table 3, due to the lack of aquatic habitat features and the presence of a dry, partially defined, discontinuous channel with low riparian and aquatic value (Figure 3; Figure 4). The riparian and aquatic condition of reach 3A is detailed in Table 4 below.

An additional baseline assessment of the riparian and aquatic condition at the potential impact areas beyond the Solar project development footprint, reach 3B, 3C, BBRS and AAT creek crossings, are provided in Table 5. The 3rd order streams, reach 3B, and 3C meet the DPI Fisheries definition of Type 3 – *Minimally sensitive key fish habitat*, and Class 3 – *Minimal key fish habitat* waterways due to their poor riparian and aquatic condition, disconnectivity, and occasional pools of water, as do the creeks at the AAT and BBRS creek crossings.

Representative photographs of each reach assessed beyond the Solar project development footprint are provided in Figure 5 to Figure 9. **Error! Reference source not found..**

Table 4: Riparian and aquatic condition assessed in field at reach 3A within the Solar project development footprint

Riparian indicator	Condition
Spatial integrity	Highly modified. About 5-10% of the native vegetation remains, either as sedges and grasses in the channel, or patches of trees in the riparian zone.
Nativeness	Highly modified. Groundcover dominated by exotic grass species.
Structural integrity	Highly modified. Midstory stratum entirely missing, and canopy cover very sparse.
Age structure	Moderately modified. Reduced cover (75-50%) of dominant strata, and only one age class present
Debris	Highly modified.
Aquatic indicator	Condition
Fish habitat classification (Fisheries Policy)	Class 3 minimally sensitive key fish habitat
Key Fish Habitat Type (Fisheries Policy)	Type 3 minimal key fish habitat
DPI Fisheries 'Freshwater Fish Community' status	Not rated, but further downstream, Talbragar River is classed as 'poor'
Hydroline type	3 rd order ephemeral creek
Channel modification	Some modification with concrete rubble and existing crossing
Bank slope	Varying, 30° to >70°, heavily incised in some locations
Erosion	Substantial gully erosion observed
Connectivity	No connectivity when dry. Numerous low flow barriers to fish passage
Habitat	Negligible at the time of survey.
Native aquatic vegetation abundance	Occasional in patches
Aquatic vegetation richness (native & weed)	Two native aquatic species observed: <i>Juncus</i> sp. and <i>Phragmites australis</i>
Turbidity	N/A. Dry at time of survey
Dominant instream substrate mix	Hard clay and bedrock with some sand
Instream woody debris	Negligible

Table 5: Riparian and aquatic condition assessed for upgrading crossings as part of the Project

Reach label (Figure 2)	Stream order	Condition
3B	3 rd	<p>Poor condition – Type 3 Class 3</p> <p>An existing road crossing had a single piped culvert. Upstream of the road, the channel was dry. Downstream, there was water present in deepened parts of the channel which had steep, bare banks. Some sparse riparian river red gums (<i>Eucalyptus camaldulensis</i>) were observed and there was some small woody debris in the channel, which made poor fish habitat. See Figure 5 for representative photos of reach 3B</p>

Reach label (Figure 2)	Stream order	Condition
3C	3 rd	<p>Poor condition – Type 3 Class 3</p> <p>The existing crossing is a floodway with no pipes, with the bed of the channel sitting 15 cm below to top of the floodway (Figure 6). Upstream of the road had a small standing of water, and the downstream channel was dry and severely eroded. The causeway is currently a barrier to fish passage. The riparian zone consisted of yellow box (<i>Eucalyptus meliodora</i>) and red gum. See Figure 7 for representative photos of reach 3C</p>
BBRS	3 rd	<p>Poor condition – Type 3 Class 4</p> <p>This section of the creek runs beside the northern edge of roadside vegetation for approximately 100 m, before turning south and crossing the road. The creek is narrow and creates a small channel through agricultural land. There is only a slight depression visible downstream of the road. <i>Eucalyptus</i> sp. trees line the road and creek channel with grasses also growing prolifically throughout the creek bed. No aquatic plants are present.</p>
AAT	3 rd	<p>Poor condition – Type 3 Class 3</p> <p>Upstream of the road a distinct creek bed is visible with mostly sand bottom and some gravel. The edges are eroded with only grass lining the riparian zone. The creek edges vary in height up to approximately 1 m above the creek bed. Large, flat bedrock is visible on the side of the crossing. A fence crosses the creek near the crossing. Downstream the creek is less well defined with a narrow depression of creek bed that is a combination of sand, dirt and gravel. One individual <i>Eucalyptus</i> sp. tree grows on the far side riparian zone, with grass being the predominant riparian vegetation. Intermittent pools occurred in the creek bed but no aquatic vegetation was present.</p>



Figure 3: Representative photos of the southern (upstream) proposed crossing location at reach 3A, facing upstream (left) and downstream (right)



Figure 4: Representative photos of the northern (downstream) proposed crossing location at reach 3A, facing upstream (left) and downstream (right)



Figure 5: Representative photos of reach 3B, facing upstream (left) and downstream (right)



Figure 6: Existing road crossing at reach 3C



Figure 7: Representative photos of reach 3C, facing upstream (left) and downstream (right)



Figure 8: Representative photos of creek at BBRS creek crossing upstream (left) and downstream (right).



Figure 9: Representative photos of creek at UT creek crossing upstream (left) and downstream (right) taken from the “Birriwa Solar and Battery Project – BDAR”.

5. Impacts and recommended mitigation measures

This section considers the potential impacts to aquatic ecology from the construction and operation of the road crossings as described in Section 1.

5.1. Construction and operational impact

The impacts and recommended mitigation measures for reducing impacts during construction and operation of the road crossings are listed in Table 6 and Table 7, respectively. All mitigation measures are also listed in Section 0.

Table 6: Assessment of construction impact

Activity	Impact	Mitigation
Road and crossing construction and operation	Reduced water quality and subsequent impact on aquatic ecology due to sedimentation associated with earthworks	<ul style="list-style-type: none"> • Ensure all creek crossings are constructed in accordance with the <i>Policy and Guidelines for Fish Habitat Conservation and Management</i> (Fairfull 2013) and <i>Why do Fish Need to Cross the Road? Fish Passage Requirements for Waterway Crossings</i> (Fairfull and Witheridge 2003). • Before construction, prepare a Construction Environmental Management Plan (CEMP) to address measures to be adopted to minimise impacts resulting from construction works, including type and location of sediment and erosion controls. • Prepare the CEMP in accordance with <i>The Blue Book – Managing Urban Stormwater: Soils and Construction</i> (Landcom 2004) and implemented prior to works, with the aim of achieving an outcome of ‘no visible turbid plumes migrating through the waterway’. • Ensure all works within waterfront land is done in accordance with <i>Guidelines for Controlled Activities on Waterfront Land</i> (DPE 2022) and that any stream or creekline is rehabilitated in consultation with DCCEEW- Water Group. • Inspect erosion controls regularly (daily during workdays) and after rainfall. Fix damaged controls immediately. Remove accumulated sediment or waste material from the sediment controls regularly and dispose of at a licensed waste facility. • Monitor sedimentation down slope of excavated areas. • Leave erosion and sediment controls in place until after the works are completed and the work site is stabilised. • Schedule the works outside of predicted heavy rain periods. • Stop work during and following heavy rainfall to reduce risk of mobilising sediment. • Materials and plant, including stockpiles, are to be stored in designated areas outside of the riparian area and away from other drainage and swales. • Spoil stockpiles should be wetted regularly to reduce opportunities for wind assisted sedimentation. • Stabilise and rehabilitate all disturbed areas including topsoiling, revegetation, weed control and maintenance to adequately restore and improve the integrity of the riparian corridor.

Activity	Impact	Mitigation
	Reduced water quality and subsequent impact on aquatic ecology due to construction machinery, chemicals and waste	<ul style="list-style-type: none"> • Store all chemicals (e.g. fuel, oil) used for construction purposes away from the riparian zone and drainage lines. Chemicals should be stored in designated areas with appropriate bunding/storage systems. • Dedicated refuelling areas are to be established outside of the riparian area and away from other drainage and swales. These areas are to be bunded to ensure any spills do not enter the riparian areas or creek. • Ensure appropriate spill kits are present onsite. • Ensure all equipment is in good working order. • All site workers are to be trained in the use of spill kits and the reporting requirements of such an incident. • Carry associated Safety Data Sheets (SDS) for all chemicals. • Do not use any chemicals that are labelled as 'harmful to marine life' or 'Class 9 Environmentally hazardous' as part of the proposed activities, unless used by a suitably trained and qualified person, and in a way that will not enter the water. • Any concrete/cement slurry used in the construction must not leave the work area until appropriate disposal. Slurry must not enter the waterway.
	Spread of weeds	<ul style="list-style-type: none"> • Wash all equipment, including, erosion and sediment control measures and trailers to prevent spread of exotic species. A visual check for vegetation and seeds on all vehicles, equipment and machinery to be used in the activities must be carried out before work commences. • Remove priority weeds, if any, using best management practices (including appropriate controls to prevent impacts to threatened species) prior to removal of native vegetation. • Bag and remove all weed propagules offsite, preferably the same day and dispose of at designated green waste facility.

Table 7: Assessment of operational impact

Activity	Impact	Mitigation
Road crossing operation	Accumulation of debris on the upstream side of each crossing may act as a barrier to fish passage	<ul style="list-style-type: none"> • Adherence to the DCCEEW guidelines (DPE 2022) and the DPI guidelines (Fairfull 2013) would ensure the crossings have minimal hydrological impacts, allowing fish to pass freely and minimising debris blockages. For 3rd order waterways, the DCCEEW guidelines permit a culvert or bridge. For Class 3 waterways, the DPI guidelines permit a culvert or ford, where box culverts are preferred to fords and pipe culverts (in that order), with 'low flow culvert design' a minimum requirement • Regular inspection of the crossing for accumulation of debris which block fish passage, and removal of such debris if present.
	Concentrated flow through culverts may cause scour on the downstream side of crossings	<ul style="list-style-type: none"> • Implement structural features to dissipate high energy flow. These could include rock baffles or riprap in areas prone to erosion. • Monitor banks and bed for signs of erosion.

5.2. DCCEEW Guidelines for controlled activities on waterfront land

As the Solar project development footprint comprises ‘waterfront land’, the *Controlled activities – guidelines for watercourse crossings on waterfront land* (DPE 2022a) apply. These seek to minimise the impact of watercourse crossings on water flow and quality, stream ecology, and existing riparian vegetation. Bed level crossings and bridges which fully span the watercourse channel provided the best crossings to maintain channel functions, but alternatives are available as long as they comply with the DPE (2022a) guidelines and DPI Fisheries (Fairfull 2013) guidelines.

A culvert or a bridge are the permitted, and preferred, crossing type for the 3rd order watercourse under the *Controlled activities – guidelines for riparian corridors on waterfront land* (DPE 2022b, Table 8). Bridges which fully span the channel are preferred, as they are best at maintaining channel function. However, box culverts may also be considered where they maintain the existing or natural hydraulic, hydrologic, geomorphic and ecological function of the watercourse.

Consistency of the proposed road crossings with the DPE (2022) guidelines would be determined at the detailed design stage when final road crossing designs are submitted.

Table 8: Matrix of permissible crossing types under DPE (2022) guidelines, adapted from Table 2, where ‘Y’ denotes crossing type permitted for a given Strahler stream order.

Stream Order	Road Crossing		
	Any	Culvert	Bridge
1 st	Y		
2 nd	Y		
3 rd		Y	Y
4 th +		Y	Y

5.3. DPI Fisheries policy and guidelines for fish habitat conservation (FM Act)

DPI Fisheries’ Policy and Guidelines for Fish Habitat Conservation and Management (Fairfull 2013) outline requirements for assessing impact of waterfront development to ensure the sustainable management, and ‘no net loss’, of key fish habit (KFH) in NSW (Table 9). The guidelines are used to inform what type of infrastructure is suitable for a waterway and the potential disturbance, offsetting or environmental compensation required, dependent on the sensitivity of KFH present and the waterway classification.

The 3rd order watercourses along BBRS, Merotherie Road, and the AAT, all meet the DPI Fisheries definition of KFH under the guidelines (Fairfull 2013). An assessment of the likelihood of occurrence of threatened species, populations, or communities listed under the FM Act and EPBC Act is provided in Appendix B, though none were considered likely to occur in the waterways assessed. At the time of assessment, all waterways were dry, and there were no large pools upstream that could act as refuge for threatened species, or that would be desirable to threatened species.

The 3rd order watercourse within the Solar project development footprint, and along Merotherie Road and AAT, meet the definition of a Type 3 Class 3 waterway under the DPI guidelines. The creek crossing at the BBRS meets the definition of a Type 3 Class 4 waterway. As a result, permissible crossing types for Class 3 waterways under the guidelines are a culvert or ford, where box culverts are preferred to fords and pipe culverts (in that order), with 'low flow culvert design' a minimum requirement.

The consistency of the proposed road crossings with the DPI guidelines would be determined at the detailed design stage once final road crossing designs are submitted. However, as it stands, the proposal is generally consistent with the DPI guidelines as it is not expected to have an impact on KFH, FM Act listed threatened species, populations or communities, nor create additional barriers to fish passage.

Table 9: Assessment requirements under DPI Fisheries' Policy and Guidelines for Fish Habitat Conservation

Assessment	Response	Comment
Has the proposal attempted to avoid impact to sensitive and valuable habitat, minimise unavoidable impact and mitigate severity of direct or indirect impact, offset with environmental compensation.	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Potential impacts to water quality during the construction phase of the development would be minimised through the implementation of a CEMP. Proposed crossing types would be designed in accordance with the DPI and DCCEEW guidelines.
Will the proposed works directly or indirectly impact threatened species, populations or communities?	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	<p>No direct or indirect impacts to threatened species, populations or communities are expected during the construction or operation of the proposed crossings, as none are expected to occur within or upstream of the Solar project development footprint (See Appendix B for likelihood of occurrence).</p> <p>Potential impacts to water quality or obstructions to fish passage during the construction and operational phases of the development would be minimised through implementation of a CEMP and adherence to the recommendations outlined in Section 5.1.</p>
Will the proposed works harm protected vegetation (seagrass, macroalgae, mangroves or saltmarsh)?	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	N/A – freshwater
Are the proposed works in or near critical habitat for the Grey Nurse Shark (Part 7A of FM Act)?	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	N/A - freshwater
Will the proposed works impact aquaculture leases or commercial fisheries?	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	N/A

Assessment	Response	Comment
<p>Are the works categorised as a key threatening process (as per Schedule 6 of the FM Act) for example:</p> <p>Current shark meshing program in NSW waters</p> <p>Hook and line fishing in areas important for survival of threatened fish species</p> <p>Human-caused climate change</p> <p>Instream structures and other mechanisms that alter the natural flow</p> <p>Introduction of non-indigenous fish and marine vegetation to the coastal waters of NSW</p> <p>Introduction of fish to fresh waters within a river catchment outside their natural range</p> <p>Removal of large woody debris from NSW rivers and streams</p> <p>Degradation of native riparian vegetation along NSW watercourses.</p>	<p><input type="checkbox"/> Yes</p> <p><input checked="" type="checkbox"/> Potential</p> <p><input type="checkbox"/> No</p>	<p>Culverts are considered 'instream structures or other mechanisms that alter natural flows' (DPI 2005). Implementation of fish friendly road crossings (e.g., Fairfull and Witheridge 2003) would reduce the impact of the culvert on the natural flow regime.</p>
<p>Will the works result in a 'net loss' of key fish habitat?</p>	<p><input type="checkbox"/> Yes</p> <p><input checked="" type="checkbox"/> No</p>	<p>The new crossing is expected to have the same footprint as the existing crossing, so there will be no loss of KFH</p>
<p>Do the works require a permit or consultation under Part 7 of the FM Act? Permits relate to:</p> <p>Harming marine vegetation</p> <p>Dredging and/or reclamation of bed or bank</p> <p>Obstruction of fish passage</p> <p>Relocation of threatened species.</p>	<p><input type="checkbox"/> Yes</p> <p><input checked="" type="checkbox"/> No</p>	<p>A permit under Part 7 of the FM Act is not required for SSDA.</p>

5.4. Matters of National Environmental Significance (MNES)

The following MNES (Table 10) were returned from the database search for a 10 km radius around the Project and potential impact areas. No aquatic MNES are expected to be impacted by the proposed works.

Table 10: Potential impacts to matters of National Environmental Significance within 10 km of the Project and potential impact areas

Matter of NES	Count	Comment	Impact Assessment
World Heritage Properties	None	Not near site - terrestrial	No impact
National Heritage Places	None	Not near site - terrestrial	No impact
Wetlands of International Importance (Ramsar Wetlands)	5	Nearest Ramsar wetlands are Hunter Estuary Wetlands, 214 km southeast of the Project.	No impact
Great Barrier Reef Marine Park	None	N/A	No impact
Commonwealth Marine Areas	None	N/A	No impact

Matter of NES	Count	Comment	Impact Assessment
Listed Threatened Ecological Communities	3	Terrestrial species excluded – See BDAR (ELA 2024)	No impact to aquatic species- See BDAR (ELA 2024)
Listed Threatened Species	45	<p>Two EPBC Act listed threatened fish species or their habitat may occur within the Project. These include:</p> <ul style="list-style-type: none"> <i>Galaxias rostratus</i> (Flathead Galaxias) – Critically Endangered <i>Macquaria australasica</i> (Macquarie Perch – Endangered <p>Two EPBC Act listed threatened fish species or their habitat may occur within 10 km of the Project. These include:</p> <ul style="list-style-type: none"> <i>Maccullochella macquariensis</i> (Trout Cod) – Endangered <i>Maccullochella peelii</i> (Murray Cod) – Vulnerable <p>Terrestrial species excluded – See BDAR (ELA 2024)</p>	No impact (Appendix B).
Listed Migratory Species	10	Terrestrial species excluded – see BDAR (ELA 2024).	No impact to aquatic species- See BDAR (ELA 2024)

5.5. Mid-Western Regional LEP

An assessment of the proposal against the LEP Part 6 provisions in relation to aquatic ecology is provided below in Table 11.

Table 11: Mid-Western Regional LEP Additional Local Provisions on development relating to aquatic ecology

Part 6 Provision	Assessment
6.3 Earthworks	<p>(3) Before granting development consent for earthworks, the consent authority must consider the following matters—</p> <p>(a) the likely disruption of, or any detrimental effect on, existing drainage patterns and soil stability in the locality of the development</p> <p>(g) the proximity to, and potential for adverse impacts on, any waterway, drinking water catchment or environmentally sensitive area</p> <p>(h) any appropriate measures proposed to avoid, minimise or mitigate the impacts of the development</p> <p>Earthworks associated with the construction of the two proposed 20 – 30 m wide crossings may disrupt soil, leading to sedimentation. Potential impacts of sedimentation on the watercourse and watercourses downstream would be mitigated through implementation of a CEMP and the recommended mitigation measures detailed in Table 6 and Table 7. The ephemeral and discontinuous nature of the watercourse would also limit the transport of sediment to waterways downstream. In addition, installation of road crossings which adhere to the DCCEW and DPI guidelines would ensure existing drainage patterns are not impacted by the proposed crossings.</p>

5.6. Mid-Western Regional Council DCP

An assessment of the proposal against the DCP Section 5.4 controls on development in relation to aquatic ecology is provided below in Table 12.

Table 12: Mid-Western Regional Council DCP Environmental Controls on development relating to aquatic ecology

5.4 Environmental Controls	Assessment
<p><i>Riparian and drainage line Environments</i></p> <ul style="list-style-type: none"> a. <i>Proponents must identify all drainage lines, streams, creeks and rivers on development plans and identify how the development has been designed to respect and be setback from such waterways and their vegetation.</i> b. <i>Proponents should determine if the development application is classified as integrated development under Section 4.46 of the EP&A Act and if a water use approval, water management work approval or activity approval is required.</i> 	<ul style="list-style-type: none"> a. Under the DCCEE guidelines (DPE 2022), road crossings are permitted within the riparian corridor. Adherence to the DCCEE and DPI guidelines for road crossings would minimise the operational impacts of the two proposed 20 - 30 m wide crossings. b. The proposed development is State significant development, which is exempt from the requirement to obtain controlled activity approval under Section 4.41(1) of the EP&A Act.
<p><i>Threatened Species Vegetation and Management</i></p> <ul style="list-style-type: none"> a. <i>An assessment of any potential impact on native flora and fauna is to accompany a development application. If considered necessary by Council a Flora and Fauna Impact Assessment will be required from a suitably qualified professional. This Assessment will determine whether a Species Impact Statement will be required.</i> b. <i>Development applications should indicate all existing vegetation.</i> c. <i>Buildings and access areas should be sited to avoid removal of trees</i> 	<ul style="list-style-type: none"> a. A BDAR has been prepared for the assessment of potential impacts on native terrestrial flora and fauna (ELA 2024). No aquatic threatened species, populations or communities listed under the FM Act or aquatic matters under the EPBC Act are expected to occur within the Project, or upstream of the Project. b. See BDAR (ELA 2024) c. This is not relevant to the aquatic assessment. No buildings will be situated along waterways.

6. Conclusions and recommendations

This report has reviewed the potential impacts to aquatic ecology from the construction and operation of crossings of a 3rd order creek within the Solar project development footprint, and crossings of 3rd order creeks on Merotherie Rd, BBRS, and the temporary AAT, against published guidelines and legislative requirements. All watercourses were identified as KFH, and all were ephemeral. Where the proposed road upgrades intersect these watercourses, the DCCEEW guidelines permit a culvert or bridge crossing, and the DPI guidelines permit a culvert or ford, where box culverts are preferred to fords and pipe culverts (in that order), with 'low flow culvert design' a minimum requirement. Consistency of the proposed road crossings with the DCCEEW Guidelines and DPI Fisheries guidelines would be determined at the detailed design stage when final road crossing designs are submitted.

In summary, the proposed crossing installations and operation would not have an impact on any threatened species, populations or communities listed under the FM Act or aquatic matters under the EPBC Act. Any terrestrial impacts are assessed within the BDAR (ELA 2024). The proposal is consistent with the provisions of the Mid-Western Regional LEP and development controls in the Mid-Western Regional Council DCP in relation to aquatic ecology.

During construction, the following mitigation measures should be implemented by the Site/Project Manager and all staff/contractors to reduce potential impacts on aquatic ecology (sedimentation, erosion, pollution and weed invasion):

- Prepare a Construction Environmental Management Plan (CEMP) with measures to be adopted to minimise impacts from construction works on the environment, including type and location of sediment and erosion controls.
- Prepare the CEMP in accordance with *The Blue Book – Managing Urban Stormwater: Soils and Construction* (Landcom 2004) and implemented prior to works, with the aim of achieving an outcome of 'no visible turbid plumes migrating through the waterway'.
- Inspect erosion controls regularly (daily during workdays) and after rainfall. Fix damaged controls immediately. Remove accumulated sediment or waste material from the sediment controls regularly and dispose of at a licensed waste facility.
- Monitor sedimentation down slope of excavated areas.
- Leave erosion and sediment controls in place until after the works are completed.
- Schedule the works outside of predicted heavy rain periods.
- Stop work during and following heavy rainfall to reduce risk of mobilising sediment.
- Spoil stockpiles should be wetted regularly to reduce opportunities for wind assisted disbursement.
- Stabilise and rehabilitate all disturbed areas including topsoiling, revegetation, weed control and maintenance to adequately restore and improve the integrity of the riparian corridor.
- Store all chemicals (e.g. fuel, oil) away from the riparian zone and drainage lines. Chemicals should be stored in appropriate bunding/storage systems.
- Dedicated refuelling areas are to be established outside of the riparian area and away from other drainage and swales. These areas are to be bunded to ensure any spills do not enter the riparian areas or creek.
- Ensure appropriate spill kits are present onsite.

- Ensure all equipment is in good working order.
- Carry associated Safety Data Sheets (SDS) for all chemicals.
- Do not use any chemicals that are labelled as 'harmful to marine life' or 'Class 9 Environmentally hazardous' as part of the proposed activities.
- Any concrete/cement slurry used in the construction must not leave the work area. Slurry must not enter the waterway.
- Wash all equipment, including, erosion and sediment control measures and trailers to prevent spread of exotic species. A visual check for vegetation and seeds on all vehicles, equipment and machinery to be used in the activities must be carried out before work commences.
- Remove priority weeds, if any, using best management practices (including appropriate controls to prevent impacts to threatened species) prior to removal of native vegetation.
- Bag and remove all weed propagules offsite, preferably the same day and dispose of at designated green waste facility.

During operation, the following mitigation measures should be implemented to reduce potential impacts on aquatic ecology (blocking fish passage, erosion and scouring):

- Regular inspections of the road crossings for accumulation of debris which may block fish passage, and removal of such debris if present.
- Implement structural features to dissipate high energy flow on the downstream side of crossings to reduce erosion. These could include rock baffles or riprap in areas prone to erosion.
- Monitor banks and bed for signs of erosion.

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Appendix A – DPI Fisheries SEARs

DPI Fisheries
Department of Regional NSW



Our Ref: C23/423

FE23/741

27 July 2023

Jai Reid
The Department of Planning & Environment

Re: **Narragamba Solar Farm (SSD-60575715) SEARs**

DPI Fisheries is responsible for ensuring that fish stocks are conserved and that there is no net loss of key fish habitats upon which they depend. To achieve this, DPI Fisheries ensures that developments comply with the requirements of the *Fisheries Management Act 1994* (namely the aquatic habitat protection and threatened species conservation provisions in Parts 7 and 7A of the Act, respectively), and the associated *Policy and Guidelines for Fish Habitat Conservation and Management (2013)*. In addition, DPI Fisheries is responsible for ensuring the sustainable management of commercial, recreational and Aboriginal cultural fishing, aquaculture, marine parks and aquatic reserves within NSW.

The EA should specifically address impacts on the aquatic ecology and controls to be established for permanent access tracks, temporary access tracks or powerlines in or adjacent to *Key Fish Habitats* (Third order streams or larger (Strahler Stream Order System) and potential impacts on riparian vegetation and threatened species as per below:

AQUATIC ECOLOGICAL ASSESSMENT

An aquatic ecological assessment is required that addresses all direct and indirect impacts of the Narragamba Solar Farm Project on Key Fish Habitat and associated flora and fauna including threatened species, populations, and communities during construction and operation for the life of the asset.

The Aquatic Ecological Assessment should cover the assessment requirements outlined in Chapter 3 of the *Policy and Guidelines for Fish Habitat Conservation and Management (2013)* including:

- Recent aerial photograph (preferably colour), map or GIS of the locality which details the Key Fish Habitat of the development site, all habitats impacted by the development, and waterway classification (CLASS) as defined in Tables 1 and 2 of the *Policy and Guidelines for Fish Habitat Conservation and Management (2013)*.
- Location details of all temporary and permanent infrastructure and construction activities, such as waterway crossings, powerlines, access tracks, etc.
- Mapping of the full aerial extent of Key Fish Habitat types that will be impacted either directly or indirectly by the development and subsequent operation of the Narragamba Solar Farm Project, with impacted habitats clearly identified on recent aerial photographs, maps or GIS.
- Description, quantification, and mapping of all aquatic and riparian vegetation communities potentially impacted by the development. This should include an assessment of the extent and condition of aquatic and riparian vegetation and the presence of significant habitat features (e.g. gravel beds, snags, reed beds, rock bars, etc).

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- Quantification of the extent of aquatic and riparian habitat removal, modification or inundation (whether temporary or permanent) that will result from the proposed development.
- Development of mitigation measures during construction (e.g. Environmental Management Plans) and operation (e.g. Operational Management Plan) including monitoring of proposed mitigation measures and plans to confirm their effectiveness.

WATERWAY CROSSINGS

The construction of permanent or temporary access tracks or underground cables through *Key Fish Habitat* should be in accordance with DPI Fisheries Guideline document: *Policy and Guidelines for Fish Habitat Conservation and Management (Update 2013)*, and the *Policy and Guidelines for Fish Friendly Waterway Crossings (DPI 2003)*. This is to ensure that the works are designed and constructed in accordance with best management practice and with minimal impact on the aquatic environment and fish passage requirements.

LOSS OF RIPARIAN VEGETATION

There is also the likelihood of a loss of riparian vegetation associated with the proposed solar area footprint, alongside Key Fish Habitats. The “*degradation of native riparian vegetation*” has been listed as a Key Threatening Process under the provisions of the *Fisheries Management Act 1994*. DPI Fisheries policy advocates the use of terrestrial buffer zones as per the *Policy and Guidelines for Fish Habitat Conservation and Management (Update 2013)* available on the Department’s website at <http://www.dpi.nsw.gov.au/fishing/habitat/publications/pubs/fish-habitat-conservation> in order to maintain the riparian buffer zone and limit disturbance and susceptibility to bed or bank erosion.

THREATENED SPECIES, POPULATIONS AND ECOLOGICAL COMMUNITIES

An assessment under Part 7A of the *FMA 1994* is required to address whether there are likely to be any significant impacts on listed threatened species, populations or ecological communities. Assessment of the impacts may require initial ‘Seven-Part Test’s. Updated Threatened species distributions can be found at www.dpi.nsw.gov.au/fishing/species-protection/threatened-species-distributions-in-nsw/freshwater-threatened-species-distribution-maps.

D. Ward

David Ward
A/ Senior Fisheries Manager, Murray Darling.

Appendix B – Presence or likelihood of threatened and protected species, populations and communities

If a species has suitable habitat present on site AND is likely to use this habitat AND the species or its habitat would be directly or indirectly impacted, THEN an Assessment of Significance is required. Such species, if any, are highlighted in the table below. This list excludes terrestrial species and those only listed under the BC Act.

Table 13: Likelihood of threatened aquatic species occurring in the Solar project development footprint

Scientific name	Common name	FM Act	EPBC Act	Habitat associations	ALA records	Likelihood of occurrence and impact
<i>Galaxias rostratus</i>	Flathead Galaxias	CE	CE	Habitat for this species is mid-water in still and gently moving waters of small streams, lakes, lagoons, billabongs and backwaters. It prefers coarse sand or mud substrate and aquatic vegetation.	0	Species or species habitat may occur within the Solar project development footprint, as modelled by DCCEEW (Commonwealth). The nearest suitable habitat for this species is the Talbragar River, ~6 km downstream of the Solar project development footprint. Reach 3A is disconnected from the Talbragar River most of the time due to its ephemeral nature. Therefore, this species is unlikely to occur within the Solar project development footprint along reach 3A, and unlikely to be impacted by the proposed works. Even during periods of flow, there is unlikely to be significant upstream migration from the Talbragar to the Solar project development footprint. Additionally, the nearest ALA record is ~140 km to the south of the Solar project development footprint, in Bathurst. No further assessment of significance required.

Scientific name	Common name	FM Act	EPBC Act	Habitat associations	ALA records	Likelihood of occurrence and impact
<i>Maccullochella macquariensis</i>	Trout Cod	E	E	This species prefers relatively wide, deep, and fast-flowing rivers. They tend occupy areas which have lots of large in-stream woody debris close to riverbanks or mid-stream.	0	Species or species habitat may occur within 10 km of the Solar project development footprint, as modelled by DCCEEW (Commonwealth). The nearest ALA record is ~72 km SW of the Solar project development footprint in Wellington. The nearest ALA record by waterway connection is >110 km downstream in the Macquarie River, near Dubbo. The ephemeral nature of reach 3A is unsuitable habitat for this species. Even in periods of flow, it is unlikely this species would migrate upstream due to the size of the stream and poor habitat quality. Therefore, this species is unlikely to occur within the Solar project development footprint or be impacted by the proposed road crossings. No further assessment of significance required.
<i>Maccullochella peelii</i>	Murray Cod	-	V	This species prefers main channels of rivers or larger tributaries, and seeks refuge from fast flowing water with habitat features such as large woody debris, large rocks and overhanging vegetation.	0	Species or species habitat may occur within 10 km of the Solar project development footprint, as modelled by DCCEEW (Commonwealth). Reach 3A is unsuitable habitat for this species due to the ephemeral nature of the stream, its size, and poor habitat quality. Nearest ALA records are approximately 32 km to the SSW and NE, one of which is potentially from a separate catchment (see Section 4.1). No further assessment of significance required.
<i>Macquaria australasica</i>	Macquarie Perch	E	E	Habitat for this species is bottom or mid-water in slow-flowing rivers with deep holes, typically in the upper reaches of forested catchments with intact riparian vegetation. Macquarie Perch also do well in some upper catchment lakes. In some parts of its range, the species is reduced to taking refuge in small pools which persist in midland-upland areas through the drier summer periods.	0	Species or species habitat may occur within the Solar project development footprint, as modelled by DCCEEW (Commonwealth). The nearest ALA record is ~170 km SE of Project. Reach 3A is unlikely habitat for this species due to the ephemeral nature of the stream, its size, and poor habitat quality. No further assessment of significance required.

Scientific name	Common name	FM Act	EPBC Act	Habitat associations	ALA records	Likelihood of occurrence and impact
<i>Mogurnda adspersa</i>	Southern Purple Spotted Gudgeon	E	-	This species occupies slow-flowing or still waters in rivers, creeks, streams and billabongs. Important habitat features include aquatic vegetation, overhanging vegetation, rocks and snags.	0	Species with potential distribution in Talbragar River, approximately ~6 km downstream of the Project, as mapped by DPI Fisheries. Reach 3A is disconnected from the Talbragar River most of the time due to its ephemeral nature. Therefore, this species is unlikely to occur within the Project along reach 3A, and unlikely to be impacted by the proposed works. Even during periods of flow, there is unlikely to be significant upstream migration from the Talbragar to the Project due to the size of the stream and its poor habitat quality. Additionally, the nearest ALA record is ~45 km south-east of the Project in the Cudgegong River. The nearest record by waterway connection is in the Macquarie River near Dubbo, >110 km downstream. No further assessment of significance required.
<i>Tandanus tandanus</i>	Eel-Tailed Catfish in the Murray-Darling Basin	EP	-	Habitat for this species ranges from clear, slow or still waters to turbid, flowing streams, including rivers, creeks, lakes, billabongs and lagoons.	0	Species with potential distribution in Talbragar River, approximately ~6 km downstream of the Project, as mapped by DPI Fisheries. Reach 3A is disconnected from the Talbragar River most of the time due to its ephemeral nature. Therefore, this species is unlikely to occur within the Project along reach 3A, and unlikely to be impacted by the proposed works. Even during periods of flow, there is unlikely to be significant upstream migration from the Talbragar to the Project due to the size of the stream and its poor habitat quality. Additionally, the nearest ALA record is in a separate catchment, 19 km ESE of Project in the Goulburn River. The nearest record by waterway connection is >150 km downstream in the Macquarie River, near Narromine. No further assessment of significance is required.

Key: ALA = Atlas of Living Australia records within 10 km, CE = Critically Endangered, E = Endangered; EP = Endangered Population, V= Vulnerable

Appendix 3: Vegetation Floristic Plot Data

Exotic	High Threat	Growth Form Group	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	20			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				
*			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		

Appendix 4: Vegetation Integrity Plot Data

Table A 1: VI - Composition

Plot	PCT	Condition	Tree	Shrub	Grass	Forb	Fern	Other
Plot 1	281	Woodland	1	0	7	9	1	2
Plot 2	277	Woodland	1	0	7	6	0	1
Plot 3	281	Woodland	4	0	2	9	0	2
Plot 4	281	DNG	2	1	12	9	1	1
Plot 5	281	Woodland	2	1	15	6	0	3
Plot 6*	281	DNG	2	2	12	8	1	1
Plot 7	277	DNG	0	2	11	4	1	0
Plot 8	277	DNG	1	0	8	2	0	0

*Plot 6 was not included in the BAM-C due to the plot extending between woodland and DNG

Table A 2: VI - Structure

Plot	PCT	Condition	Tree	Shrub	Grass	Forb	Fern	Other
Plot 1	281	Woodland	20.0	0.0	38.4	0.9	0.1	0.2
Plot 2	277	Woodland	30.0	0.0	2.8	3.5	0.0	0.1
Plot 3	281	Woodland	24.5	0.0	1.3	1.4	0.0	0.3
Plot 4	281	DNG	5.5	0.1	3.3	1.0	0.1	0.1
Plot 5	281	Woodland	23.0	0.1	3.4	1.5	0.0	0.3
Plot 6*	281	DNG	15.1	0.2	28.9	1.8	0.1	0.1
Plot 7	277	DNG	0.0	5.1	48.9	0.4	0.1	0.0
Plot 8	277	DNG	4.0	0.0	21.0	0.2	0.0	0.0

*see above

Table A 3: VI - Function

Plot	PCT	Condition	Large Trees	HBTs	Litter	LDW	Stems 5-10	Stems 10-20	Stems 20-30	Stems 30-50	Stems 50-80	Regen?	HTW
Plot 1	281	Woodland	0	0	38	2	1	1	1	1	1	0	15.2
Plot 2	277	Woodland	0	0	34	1	1	0	1	1	0	0	0.3
Plot 3	281	Woodland	1	0	39	0	1	1	1	1	1	0	0.2
Plot 4	281	DNG	0	0	35	26	1	1	1	1	0	1	35.0
Plot 5	281	Woodland	3	0	42	62	1	1	1	1	1	1	11.0
Plot 6	281	DNG	4	1	52	20	1	1	1	1	1	1	2.2
Plot 7	277	DNG	0	0	25	0	1	0	0	0	0	1	0.6
Plot 8	277	DNG	1	0	24	0	0	0	0	0	0	0	17.1

VI Plot Photos



Photograph 1: Plot 1 - Northeast corner



Photograph 1: Plot 1 - Northwest corner



Photograph 3: Plot 1 - Southeast corner



Photograph 4: Plot 1 - Southwest corner



Photograph 5: Plot 2 - Northwest corner



Photograph 6: Plot 2 - Southwest corner



Photograph 7: Plot 2 - Southeast corner



Photograph 8: Plot 3 - Northwest corner



Photograph 9: Plot 3 - Southwest corner



Photograph 10: Plot 3 - Southeast corner



Photograph 11: Plot 3 - Northeast corner



Photograph 2: Plot 4 - Start



Photograph 13: Plot 4 - End



Photograph 14: Plot 5 - Start



Photograph 15: Plot 5 - End



Photograph 16: Plot 6 - Start



Photograph 17: Plot 6 - End



Photograph 18: Plot 7 - Start



Photograph 19: Plot 7 - End



Photograph 20: Plot 8 - Start



Photograph 21: Plot 8 - End

Appendix 5: Ecosystem Credit Species Report

Table A 4: Predicted Ecosystem Credit Species

Species	Common Name	Sensitivity to	BC Act listing	EPBC Act Listing
<i>Anthochaera phrygia</i> (foraging)	Regent Honeyeater	High	CE	CE
<i>Aphelocephala leucopsis</i>	Southern Whiteface	Low	V	V
<i>Artamus cyanopterus</i>	Dusky Woodswallow	Moderate	V	NL
<i>Callocephalon fimbriatum</i>	Gang-gang Cockatoo	Moderate	V	E
<i>Chalinolobus picatus</i>	Little Pied Bat	High	V	NL
<i>Chthonicola sagittata</i>	Speckled Warbler	High	V	NL
<i>Circus assimilis</i>	Spotted Harrier	Moderate	V	
<i>Climacteris picumnus</i>	Brown Treecreeper	High	V	V
<i>Daphoenositta chrysoptera</i>	Varied Sittella	Moderate	V	NL
<i>Dasyurus maculatus</i>	Spotted-tail Quoll	High	V	E
<i>Falco subniger</i>	Black Falcon	Moderate	V	NL
<i>Falsistrellus tasmaniensis</i>	Eastern False Pipistrelle	High	V	NL
<i>Glossopsitta pusilla</i>	Little Lorikeet	High	V	NL
<i>Grantiella picta</i>	Painted Honeyeater	Moderate	V	V
<i>Haliaeetus leucogaster</i>	White-bellied Sea-eagle	High	V	NL
<i>Hieraaetus morphnoides</i> (Foraging)	Little Eagle	Moderate	V	NL
<i>Hirundapus caudacutus</i>	White-throated Needle-tail	High	NL	V
<i>Lathamus discolor</i> (Foraging)	Swift Parrot	Moderate	E	CE
<i>Lophoictinia isura</i> (Foraging)	Square-tailed Kite	Moderate	V	NL
<i>Melanodryas cucullata cucullata</i>	South-eastern Hooded Robin	Moderate	E	E
<i>Melithreptus gularis gularis</i>	Black-chinned Honeyeater	Moderate	V	NL
<i>Miniopterus orianae oceanensis</i> (Foraging)	Large Bent-winged Bat	High	V	NL
<i>Neophema pulchella</i>	Turquoise Parrot	High	V	NL
<i>Petroica boodang</i>	Scarlet Robin	Moderate	V	NL
<i>Petroica phoenicea</i>	Flame Robin	Moderate	V	NL
<i>Polytelis swainsonii</i> (Foraging)	Superb Parrot	Moderate	V	V
<i>Pomatostomus temporalis temporalis</i>	Grey-crowned Babbler	Moderate	V	NL
<i>Pteropus poliocephalus</i> (Foraging)	Grey-headed Flying-Fox	High	V	V
<i>Saccolaimus flaviventris</i>	Yellow-bellied Shear-tail-bat	High	V	NL

Species	Common Name	Sensitivity to	BC Act listing	EPBC Act Listing
<i>Stagonopleura guttata</i>	Diamond Firetail	Moderate	V	V
<i>Varanus rosenbergi</i>	Rosenberg's Goanna	High	V	NL

Appendix 6: BOS Helpdesk Correspondence



Farah Naz 12/Apr/23 3:03 PM

Hi Rebecca,

Thank you for your enquiry.

The BOS subject matter officer has provided the following response to your enquiry:

Thank you for your enquiry regarding survey effort for the Brush-tailed Phascogale (BtP).

We have reviewed the proposed approach and can confirm that the proposal provides sufficient survey effort for the project.

We recommend making contact with the North west regional planning team who will be reviewing the BDAR.

The Biodiversity Conservation and Science directorate is in the process of reviewing all of the IBRA subregions for the Brush-tailed phascogale, however this is an ongoing process.

For any questions please contact the BOS helpdesk.

Kind Regards

The BOS Help Desk Team

DPE-5260 Brush-tailed Phascogale (Phascogale tapoatafa) survey methodology



Farah Naz <jira@boshelpdeskdpensw.atlassian.net>
To: Metzler, Lachlan

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Reply Reply All Forward ...

Wed 17/07/2024 2:24 PM

CAUTION: This email originated from an external sender. Verify the source before opening links or attachments.

Reply above this line.

Farah Naz commented:

Hi [Lachlan Metzler](#),

Thank you for your enquiry. The BOS Subject Matter Officer has provided the following response to your enquiry:

We can confirm that your proposed survey effort is adequate.

Habitat suitability must be assessed in accordance with Section 5.2 of the BAM. It is the Accredited Assessors responsibility to provided justification and supporting evidence for the exclusion of a candidate species based on degraded habitat constraints and/or microhabitats on which the species depends (as described in BAM Subsection 5.2.2). It is not the role of the Accountable Officer or the BOS Help Desk to review adequacy of Accredited Assessors justification.

Kind regards,

The BOS Help Desk Team

[View request](#) - [Turn off this request's notifications](#)

BOS Help Desk Team

Biodiversity and Conservation Division | Department of Climate Change, Energy, the Environment and Water

FN

Farah Naz <jira@boshelptdeskdpensw.atlassian.net>

To

ODwyer, Cheryl

🗨️

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Tue 30/07/2024 3:32 PM

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To refine the species polygon species survey or expert report is required. It is recommended that an expert report is sought. If surveying follow the survey method in the threatened reptiles survey guide. The size of rocks is relevant for targeted survey only, not suitable habitat.

Keys Matchstick Grasshopper

As per the TBDC, the species does not have any habitat constraints.

General Notes

Species is generally reliant on an understorey of tussock grasses, typically Themeda triandra or other disturbance-sensitive species for shelter and possibly food (unconfirmed), but may use similar grasses. Food sources include a range of dicotyledon species. Species known to form part of the diet include *Aira caryophyllaea* (Silver hairgrass), *Scirpus* sp. (sedges), *Wurmbea dioica* (Early Nancy), *B. ulbine bulbosa* (Native Leek), *Calochilus paludosus* (Red Beard Orchid), *Rumex crispus* (Curled Dock), *Acetosella vulgaris/Rumex acetosella* (Sorrel), *Cerastium glomeratum* (Mouse-ear Chickweed), *Ranunculus lappaceus* (Common Buttercup), *Rosa rubiginosa* (Sweet Briar), *Acaena ovina* (Orchid), *Trifolium subterraneum* (Subterranean Clover), *Trifolium arvense* (Haresfoot Clover), *Poranthera microphylla*, *Stackhousia monogyna* (Creamy Candles), *Hibbertia sericea*, *Lavandula stoechas* (Lavender), *Salvia verbenaca* (Vervain), *Verbascum thapsus* (Great Mullein), *Sherardia arvensis* (Field Madder), *Galium tricornatum* (Rough Fruited Bedstraw), *Helichrysum apiculatum* (Common Everlasting), *Ozothamnus retusus* or *O. scaber* (Helichrysum bilobum), *Podolepis jaceoides* (*Podolepis acuminata*) (Showy Copper-wire Daisy) and *Craspedia uniflora*.

Survey Comments

Hatches around January, but is difficult to identify until maturing. Species shelters during cold weather, so limit survey to when infra-red ground temperature is above 15 degrees (minimum), in the warmest part of the day on cloudless or mostly cloudless days. Detectability becomes easier as temperature increases. Species is less likely to be detected under a closed canopy, if surveying in these locations, survey at the edges of the canopy.

Difficult to distinguish from other grasshopper species including nymphal *Acrida conica*, *Psednura* species and other **matchstick grasshoppers** (e.g. *Vandiemena*, *Achurimima* and *Heide*, which may co-occur in some areas). Survey and identification must be undertaken by an appropriately skilled person such as an entomologist or ecologist with a strong knowledge of the species ecology and habitat, and ability to accurately detect and identify the species.

The NatureMapr app or website provide an acceptable free identification service. When using NatureMapr, if the record should remain confidential, tick the box which says 'suppress the location of this sighting from public view'.

Requests to NatureMapr must include photographs that are: 1. Clear, detailed, and georeferenced; 2. from different angles showing scale with the invertebrate in focus; 3. using a macro lens, focusing on the distinguishing features such as the ensiform antennae, slanted face, splayed hind femora and back (thorax/abdomen); 4. Of multiple individuals at different developmental stages, where possible.

If NatureMapr is used for identification, the BAR must include the NatureMapr ID number and web link. Otherwise, identification details including the name and credentials of the person who has identified the species (positively, or as a different species) demonstrating their appropriate skills, knowledge and experience must be documented in the BAR, along with the evidence on which the identification has relied (e.g. photographs, locations, any reports).

Recommended survey methodology

Involves meandering slowly through preferred habitat, observing the preferred flora species and disturbing the vegetation slightly to enhance detectability of the species if present by encouraging movement. Waving vegetation with a dowl or something similar may be of use.

Kind regards

The BOS Help Desk Team

Appendix 7: Anabat Analysis Report

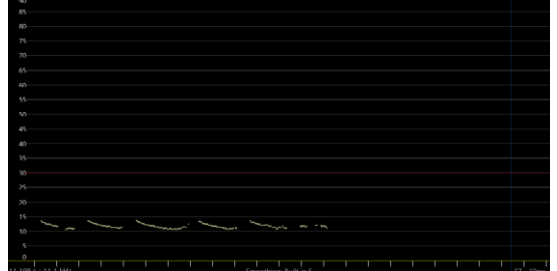
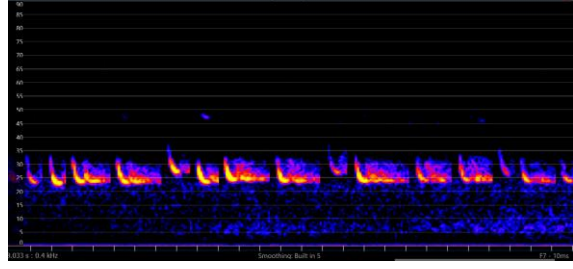


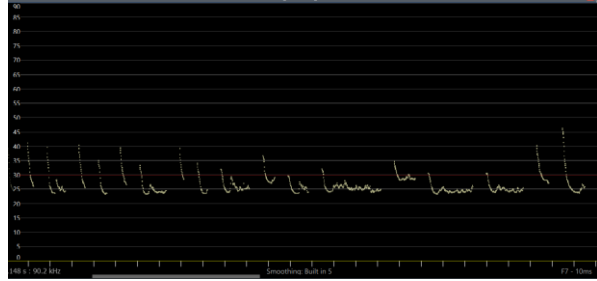
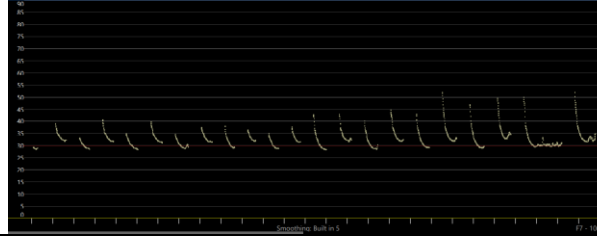
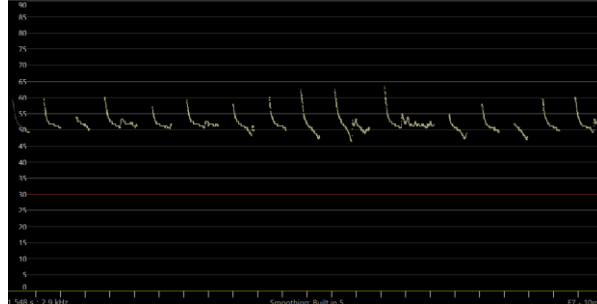
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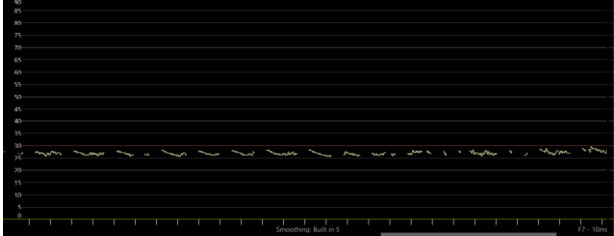
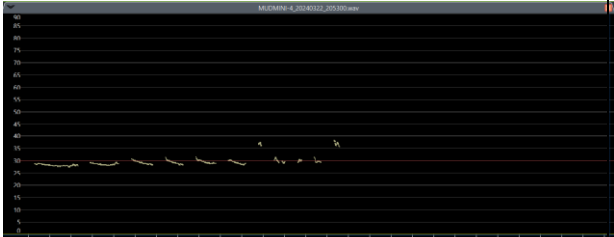
Amy Rowles
 415 Parishs Rd, Hilldale, NSW, 2420
 Mob: 0418451488
 Email: amy@corymbiaecology.com.au
 ABN 61854031078

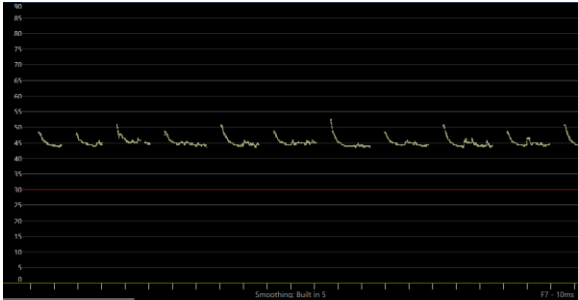
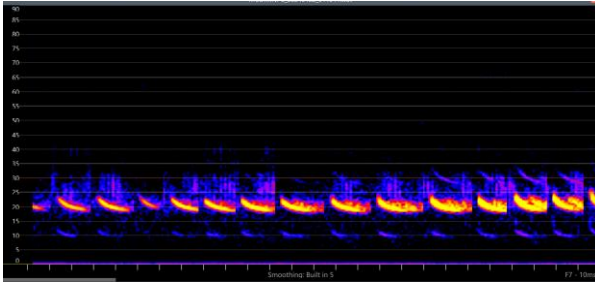
BAT CALL ANALYSIS RESULTS

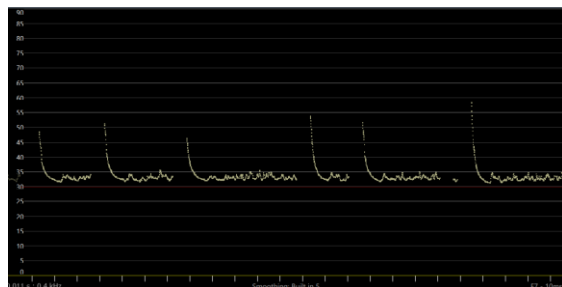
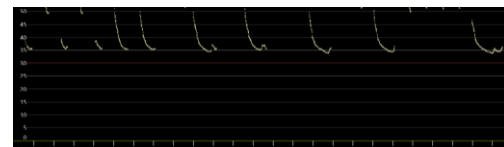
EcoLogical
 Project Name: Berriwa Bus Route

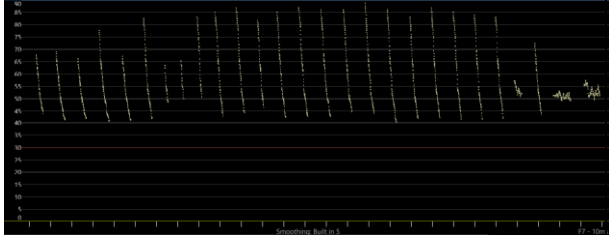
Device	2	4	5	7	8	
Date		21- 27/3/24	21- 27/3/24	21- 23/3/24	17- 22/1/24	Comments
Number of files (noise)	102 (33)	1379 (381)	5819 (1096)	1990 (374)	4565 (1397)	
<i>Austronomus australis</i>		D	D	D	D	Flat to curved pulse characteristic frequency at 10-15khz 
<i>Chalinolobus dwyeri</i>		D (1 pass)			D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

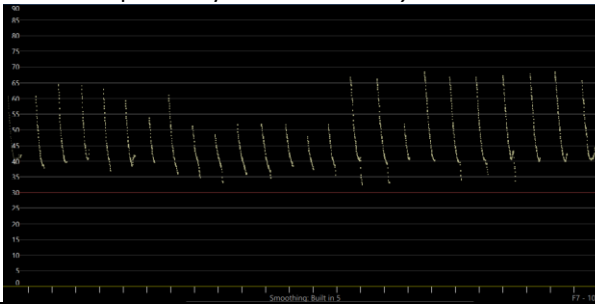
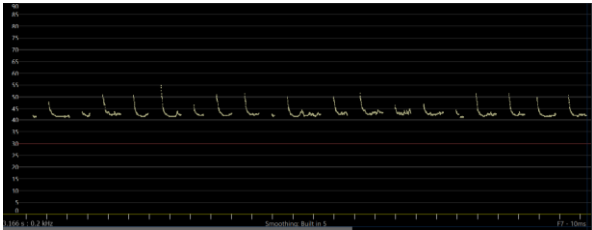
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Date		21- 27/3/24	21- 27/3/24	21- 23/3/24	17- 22/1/24	Comments
Number of files (noise)	102 (33)	1379 (381)	5819 (1096)	1990 (374)	4565 (1397)	
						
<i>Chalinolobus gouldii</i>	D	D	D	D	D	<p>Usually curved, upright pulses with a prominent foot with 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. <i>Scotorepens balstoni</i> and <i>Ozimops</i> sp)</p> 
<i>Chalinolobus morio</i>		D	D	D	D	<p>Curved upright call with a downsweeping tail. Characteristic frequency at 46.5-53khz</p> 
<i>Ozimops planiceps</i>	D	D	D	D	D	<p>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 <i>Chalinolobus gouldii</i> if the</p>

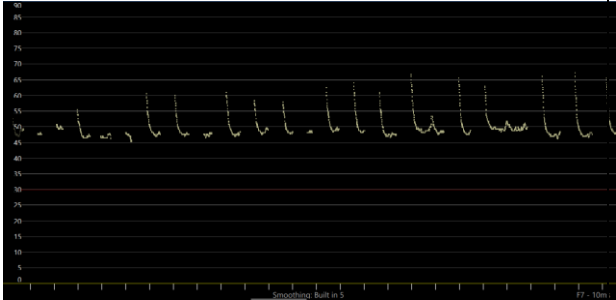
Device	2	4	5	7	8	
Date		21- 27/3/24	21- 27/3/24	21- 23/3/24	17- 22/1/24	Comments
Number of files (noise)	102 (33)	1379 (381)	5819 (1096)	1990 (374)	4565 (1397)	
						<p>pass contains harmonics as <i>C. gouldii</i> does not appear to display harmonics. May be confused with <i>Ozimops petersi</i> and <i>Ozimops ridei</i> at the higher frequencies where there is overlap in call characteristics and overlap in distribution.</p> 
<i>Ozimops ridei</i>		D	D	D	D	<p>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 <i>Ozimops petersi</i> and <i>Ozimops planiceps</i>.</p> 
<i>Miniopterus orianae oceanensis</i>		Po	Pr		Po	<p>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 <i>Vespadelus sp</i> and some passes may not be confidently distinguishable. A more prominent down</p>

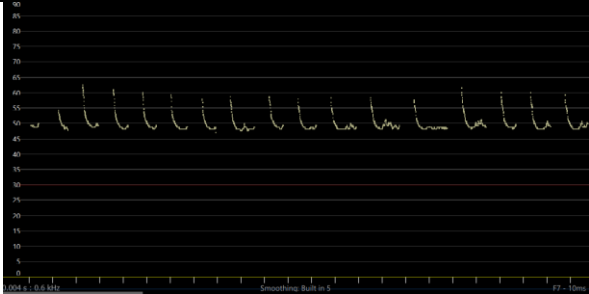
Device	2	4	5	7	8	
Date		21- 27/3/24	21- 27/3/24	21- 23/3/24	17- 22/1/24	Comments
Number of files (noise)	102 (33)	1379 (381)	5819 (1096)	1990 (374)	4565 (1397)	
						<p>sweep tail helps to identify from <i>Vespadelus sp.</i> The higher frequency pulses, particularly in clutter or roost entrances are steeper with a longer initial section, shorter characteristic section, often down sweeping tail. These sequences may be confused with <i>Chalinolobus morio</i> .</p> 
<i>Saccolaimus flaviventris</i>					D – 1 pass	<p>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.</p> 

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)	
<i>Scotorepens balstoni</i>			Po		Pr	<p>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 <i>Chalinolobus gouldii</i> at lower frequencies and other <i>scotorepens</i> species at the higher frequencies. Also can be confused with <i>Falsistrellus tasmaniensis</i> and <i>Scoteanax rueppellii</i>.</p> 
<i>Scotorepens orion</i> / <i>Scoteanax rueppellii</i>			E		E	<p><i>Scotorepens orion</i> - Characteristic frequency 34.5-37.5khz. Curved pulse shape with absent or downsweeping tail.</p> <p><i>Scoteanax rueppellii</i>- 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.</p> 

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)	
<i>Nyctophilus geoffroyi</i> / <i>Nyctophilus gouldi</i> and <i>Nyctophilus corbeni</i>		E	E		E	<p>Near vertical pulse shape. <i>Nyctophilus</i> species currently indistinguishable on call characteristics.</p> 

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)	
<i>Nyctophilus</i> <i>sp / Myotis</i> <i>macropus</i>			E – 13 passes		E – 3 passes	<p><i>Myotis macropus</i> calls are very similar to <i>Nyctophilus</i> species and often cannot be distinguished. Good <i>Myotis</i> passes are often longer and stronger than <i>Nyctophilus</i> with a varying slope between consecutive pulses and often occur at a slightly lower frequency than <i>Nyctophilus</i>. A low number of passes that could be attributed to either <i>Nyctophilus</i> or <i>Myotis</i> were recorded. None of the passes were considered to be highly characteristic of <i>Myotis</i>, therefore the detector locations are unlikely to be significant foraging areas or in close proximity to a roost for <i>Myotis</i>.</p> 
<i>Vespadelus</i> <i>darlingtoni</i>		D		D	D	<p>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 38-40kHz. Passes will overlap with <i>Vespadelus regulus</i> above 40kHz.</p> 

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)	
<i>Vespadelus vulturnus</i>	Pr	D	D	D	D	<p>Characteristic frequency for <i>V. vulturnus</i> 42.5-53khz, where this frequency varies geographically. For <i>V. vulturnus</i>, the characteristic frequency of consecutive pulses often varies within a sequence, whereas consecutive pulses for <i>V. regulus</i> tend to be more consistent. Characteristic frequency for <i>V. regulus</i> 40-55khz, where this frequency and call shape varies geographically. A high number of <i>Vespadelus</i> passes were recorded at 45-47khz most likely <i>V. vulturnus</i>. However some of the lower, more consistent passes may be <i>V. regulus</i>.</p> <p><i>V. vulturnus</i></p> 
<i>Vespadelus regulus</i>	Po	Po	Po	Po	Po	
<i>Vespadelus troughtoni</i> / <i>Vespadelus vulturnus</i> / <i>Chalinolobus morio</i>		E (1 pass)	E (11 passes)	E (3 passes)	E (1 pass)	<p>Although characteristics of passes of <i>Vespadelus troughtoni</i> and <i>V. vulturnus</i> considerably overlap, most of the passes are most likely <i>V. vulturnus</i>, but there are a few passes at a higher frequency that have some possibility of being <i>V. troughtoni</i> or <i>Chalinolobus morio</i> without tails. These passes occurred in very low numbers and therefore it is considered unlikely that highly significant habitat for <i>V. troughtoni</i> occurs in the vicinity.</p>

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 8: BAMC Credit Reports



BAM Biodiversity Credit Report (Like for like)

Proposal Details

Assessment Id	Proposal Name	BAM data last updated *
00056898/BAAS18153/25/00057139	Birriwa Bus Route Upgrade	28/10/2024
Assessor Name	Assessor Number	BAM Data version *
Janene Catherine Devereux	BAAS19045	Current classification (live - default) (80)
Proponent Names	Report Created	BAM Case Status
	20/05/2025	Open
Assessment Revision		Assessment Type
0		Major Projects
Date Finalised	* Disclaimer: BAM data last updated may indicate either complete or partial update of the BAM calculator database. BAM calculator database may not be completely aligned with Bionet.	
To be finalised		

Potential Serious and Irreversible Impacts

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



BAM Biodiversity Credit Report (Like for like)

White Box - Yellow Box - Blakely's Red Gum Grassy Woodland and Derived Native Grassland in the NSW North Coast, New England Tableland, Nandewar, Brigalow Belt South, Sydney Basin, South Eastern Highla	Critically Endangered Ecological Community	277-Blakely's Red Gum - Yellow Box grassy tall woodland of the NSW South Western Slopes Bioregion
Species		
Nil		

Additional Information for Approval

PCT Outside Ibra Added

None added

PCTs With Customized Benchmarks

PCT
No Changes

Predicted Threatened Species Not On Site

Name
No Changes

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

BAM Biodiversity Credit Report (Like for like)

Name of Plant Community Type/ID	Name of threatened ecological community	Area of impact	HBT Cr	No HBT Cr	Total credits to be retired
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	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	1.6	0	60	60
277-Blakely's Red Gum - Yellow Box grassy tall woodland of the NSW South Western Slopes Bioregion	White Box - Yellow Box - Blakely's Red Gum Grassy Woodland and Derived Native Grassland in the NSW North Coast, New England Tableland, Nandewar, Brigalow Belt South, Sydney Basin, South Eastern Highla	1.3	0	25	25

277-Blakely's Red Gum - Yellow Box grassy tall woodland of the NSW South Western Slopes Bioregion	Like-for-like credit retirement options					
	Name of offset trading group	Trading group	Zone	HBT	Credits	IBRA region
	White Box - Yellow Box - Blakely's Red Gum Grassy Woodland and Derived Native Grassland in the NSW North Coast, New England Tableland, Nandewar, Brigalow Belt South, Sydney Basin, South Eastern Highla	-	277_Woodland	No	12	Inland Slopes, Bogan-Macquarie, Bondo, Capertee Uplands, Capertee Valley, Crookwell, Hill End, Kerrabee, Lower Slopes, Murray Fans, Murrumbateman, Orange, Pilliga, Talbragar Valley and Wollemi. or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.

BAM Biodiversity Credit Report (Like for like)

	<p>This includes PCT's:</p> <p>74, 75, 83, 250, 266, 267, 268, 270, 274, 275, 276, 277, 278, 279, 280, 281, 282, 283, 284, 286, 298, 302, 312, 341, 342, 347, 350, 352, 356, 367, 381, 382, 395, 401, 403, 421, 433, 434, 435, 436, 437, 451, 483, 484, 488, 492, 496, 508, 509, 510, 511, 516, 528, 538, 544, 563, 567, 571, 589, 590, 597, 599, 618, 619, 622, 633, 654, 702, 703, 704, 705, 710, 711, 796, 797, 799, 847, 851, 921, 1099, 1303, 1304, 1307, 1324, 1329, 1330, 1332, 1383, 1606, 1608, 1611, 1691, 1693, 1695, 1698, 3314, 3359, 3363, 3373, 3376, 3387, 3388, 3394, 3395, 3396, 3397, 3398, 3399, 3406, 3415, 3533, 4147, 4149, 4150</p>					
	White Box - Yellow Box -		277_DNG	No	13	Inland Slopes, Bogan-Macquarie,

BAM Biodiversity Credit Report (Like for like)

	<p>Blakely's Red Gum Grassy Woodland and Derived Native Grassland in the NSW North Coast, New England Tableland, Nandewar, Brigalow Belt South, Sydney Basin, South Eastern Highla This includes PCT's: 74, 75, 83, 250, 266, 267, 268, 270, 274, 275, 276, 277, 278, 279, 280, 281, 282, 283, 284, 286, 298, 302, 312, 341, 342, 347, 350, 352, 356, 367, 381, 382, 395, 401, 403, 421, 433, 434, 435, 436, 437, 451, 483, 484, 488, 492, 496, 508, 509, 510, 511, 516, 528, 538, 544, 563, 567, 571, 589, 590, 597, 599, 618, 619, 622, 633, 654, 702, 703, 704, 705, 710, 711, 796, 797, 799, 847, 851, 921, 1099, 1303, 1304, 1307, 1324,</p>				<p>Bondo, Capertee Uplands, Capertee Valley, Crookwell, Hill End, Kerrabee, Lower Slopes, Murray Fans, Murrumbateman, Orange, Pilliga, Talbragar Valley and Wollemi. or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.</p>
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BAM Biodiversity Credit Report (Like for like)

	1329, 1330, 1332, 1383, 1606, 1608, 1611, 1691, 1693, 1695, 1698, 3314, 3359, 3363, 3373, 3376, 3387, 3388, 3394, 3395, 3396, 3397, 3398, 3399, 3406, 3415, 3533, 4147, 4149, 4150					
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	Like-for-like credit retirement options					
	Name of offset trading group	Trading group	Zone	HBT	Credits	IBRA region
	White Box - Yellow Box - Blakely's Red Gum Grassy Woodland and Derived Native Grassland in the NSW North Coast, New England Tableland, Nandewar, Brigalow Belt South, Sydney Basin, South Eastern Highla This includes PCT's: 74, 75, 83, 250, 266, 267, 268, 270, 274, 275, 276, 277, 278, 279, 280, 281, 282, 283, 284, 286, 298,	-	281_Woodland	No	56	Inland Slopes, Bogan-Macquarie, Bongo, Capertee Uplands, Capertee Valley, Crookwell, Hill End, Kerrabee, Lower Slopes, Murray Fans, Murrumbateman, Orange, Pilliga, Talbragar Valley and Wollemi. or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.

BAM Biodiversity Credit Report (Like for like)

302, 312, 341, 342, 347, 350, 352, 356, 367, 381, 382, 395, 401, 403, 421, 433, 434, 435, 436, 437, 451, 483, 484, 488, 492, 496, 508, 509, 510, 511, 516, 528, 538, 544, 563, 567, 571, 589, 590, 597, 599, 618, 619, 622, 633, 654, 702, 703, 704, 705, 710, 711, 796, 797, 799, 847, 851, 921, 1099, 1303, 1304, 1307, 1324, 1329, 1330, 1332, 1383, 1606, 1608, 1611, 1691, 1693, 1695, 1698, 3314, 3359, 3363, 3373, 3376, 3387, 3388, 3394, 3395, 3396, 3397, 3398, 3399, 3406, 3415, 3533, 4147, 4149, 4150					
White Box - Yellow Box - Blakely's Red Gum Grassy Woodland and Derived Native Grassland in the NSW North Coast, New	-	281_DNG	No	4	Inland Slopes, Bogan-Macquarie, Bondo, Capertee Uplands, Capertee Valley, Crookwell, Hill End, Kerrabee, Lower Slopes, Murray Fans, Murrumbateman, Orange, Pilliga, Talbragar Valley and Wollemi.

BAM Biodiversity Credit Report (Like for like)

	<p>England Tableland, Nandewar, Brigalow Belt South, Sydney Basin, South Eastern Highla This includes PCT's: 74, 75, 83, 250, 266, 267, 268, 270, 274, 275, 276, 277, 278, 279, 280, 281, 282, 283, 284, 286, 298, 302, 312, 341, 342, 347, 350, 352, 356, 367, 381, 382, 395, 401, 403, 421, 433, 434, 435, 436, 437, 451, 483, 484, 488, 492, 496, 508, 509, 510, 511, 516, 528, 538, 544, 563, 567, 571, 589, 590, 597, 599, 618, 619, 622, 633, 654, 702, 703, 704, 705, 710, 711, 796, 797, 799, 847, 851, 921, 1099, 1303, 1304, 1307, 1324, 1329, 1330, 1332, 1383, 1606, 1608, 1611, 1691, 1693, 1695, 1698, 3314, 3359, 3363, 3373, 3376, 3387, 3388, 3394, 3395,</p>					<p>or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.</p>
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BAM Biodiversity Credit Report (Like for like)

	3396, 3397, 3398, 3399, 3406, 3415, 3533, 4147, 4149, 4150					
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Species Credit Summary

Species	Vegetation Zone/s	Area / Count	Credits
Myotis macropus / Southern Myotis	281_Woodland, 277_Woodland, 281_DNG, 277_DNG	1.7	45.00
Tyto novaehollandiae / Masked Owl	281_Woodland, 277_Woodland, 281_DNG, 277_DNG	1.0	27.00

Credit Retirement Options

Like-for-like credit retirement options

Myotis macropus / Southern Myotis	Spp	IBRA subregion
	Myotis macropus / Southern Myotis	Any in NSW
Tyto novaehollandiae / Masked Owl	Spp	IBRA subregion
	Tyto novaehollandiae / Masked Owl	Any in NSW

BAM Biodiversity Credit Report (Variations)

Proposal Details

Assessment Id

00056898/BAAS18153/25/00057139

Assessor Name

Janene Catherine Devereux

Proponent Name(s)

Assessment Revision

0

Date Finalised

To be finalised

Proposal Name

Birriwa Bus Route Upgrade

Assessor Number

BAAS19045

Report Created

20/05/2025

BAM data last updated *

28/10/2024

BAM Data version *

Current classification (live - default) (80)

BAM Case Status

Open

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.

Potential Serious and Irreversible Impacts

Name of threatened ecological community	Listing status	Name of Plant Community Type/ID
White Box - Yellow Box - Blakely's Red Gum Grassy Woodland and Derived Native Grassland in the NSW North Coast, New England Tableland, Nandewar, Brigalow Belt South, Sydney Basin, South Eastern Highla	Critically Endangered Ecological Community	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
White Box - Yellow Box - Blakely's Red Gum Grassy Woodland and Derived Native Grassland in the NSW North Coast, New England Tableland, Nandewar, Brigalow Belt South, Sydney Basin, South Eastern Highla	Critically Endangered Ecological Community	277-Blakely's Red Gum - Yellow Box grassy tall woodland of the NSW South Western Slopes Bioregion

BAM Biodiversity Credit Report (Variations)

Species

Nil

Additional Information for Approval

PCT Outside Ibra Added

None added

PCTs With Customized Benchmarks

PCT

No Changes

Predicted Threatened Species Not On Site

Name

No Changes

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

Name of Plant Community Type/ID	Name of threatened ecological community	Area of impact	HBT Cr	No HBT Cr	Total credits to be retired
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	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	1.6	0	60	60.00

BAM Biodiversity Credit Report (Variations)

277-Blakely's Red Gum - Yellow Box grassy tall woodland of the NSW South Western Slopes Bioregion	White Box - Yellow Box - Blakely's Red Gum Grassy Woodland and Derived Native Grassland in the NSW North Coast, New England Tableland, Nandewar, Brigalow Belt South, Sydney Basin, South Eastern Highla	1.3	0	25	25.00
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277-Blakely's Red Gum - Yellow Box grassy tall woodland of the NSW South Western Slopes Bioregion	Like-for-like credit retirement options					
	Class	Trading group	Zone	HBT	Credits	IBRA region
	White Box - Yellow Box - Blakely's Red Gum Grassy Woodland and Derived Native Grassland in the NSW North Coast, New England Tableland, Nandewar, Brigalow Belt South, Sydney Basin, South Eastern Highla This includes PCT's: 74, 75, 83, 250, 266, 267, 268, 270, 274, 275, 276, 277, 278, 279, 280, 281, 282, 283, 284, 286, 298, 302, 312, 341, 342, 347, 350, 352, 356, 367, 381, 382, 395, 401, 403, 421, 433, 434, 435, 436, 437, 451, 483, 484, 488, 492, 496, 508, 509, 510, 511, 516, 528, 538, 544, 563, 567, 571, 589, 590, 597, 599, 618, 619, 622, 633,	-	277_Woodl and	No	12	Inland Slopes,Bogan-Macquarie, Bondo, Capertee Uplands, Capertee Valley, Crookwell, Hill End, Kerrabee, Lower Slopes, Murray Fans, Murrumbateman, Orange, Pilliga, Talbragar Valley and Wollemi. or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.

BAM Biodiversity Credit Report (Variations)

	654, 702, 703, 704, 705, 710, 711, 796, 797, 799, 847, 851, 921, 1099, 1303, 1304, 1307, 1324, 1329, 1330, 1332, 1383, 1606, 1608, 1611, 1691, 1693, 1695, 1698, 3314, 3359, 3363, 3373, 3376, 3387, 3388, 3394, 3395, 3396, 3397, 3398, 3399, 3406, 3415, 3533, 4147, 4149, 4150					
White Box - Yellow Box - Blakely's Red Gum Grassy Woodland and Derived Native Grassland in the NSW North Coast, New England Tableland, Nandewar, Brigalow Belt South, Sydney Basin, South Eastern Highla This includes PCT's: 74, 75, 83, 250, 266, 267, 268, 270, 274, 275, 276, 277, 278, 279, 280, 281, 282, 283, 284, 286, 298, 302, 312, 341, 342, 347, 350, 352, 356, 367, 381, 382, 395, 401, 403, 421, 433, 434, 435, 436, 437, 451, 483, 484, 488, 492,	-	277_DNG	No	13	Inland Slopes, Bogan-Macquarie, Bondo, Capertee Uplands, Capertee Valley, Crookwell, Hill End, Kerrabee, Lower Slopes, Murray Fans, Murrumbateman, Orange, Pilliga, Talbragar Valley and Wollemi. or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.	

BAM Biodiversity Credit Report (Variations)

	496, 508, 509, 510, 511, 516, 528, 538, 544, 563, 567, 571, 589, 590, 597, 599, 618, 619, 622, 633, 654, 702, 703, 704, 705, 710, 711, 796, 797, 799, 847, 851, 921, 1099, 1303, 1304, 1307, 1324, 1329, 1330, 1332, 1383, 1606, 1608, 1611, 1691, 1693, 1695, 1698, 3314, 3359, 3363, 3373, 3376, 3387, 3388, 3394, 3395, 3396, 3397, 3398, 3399, 3406, 3415, 3533, 4147, 4149, 4150					
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	Like-for-like credit retirement options					
	Class	Trading group	Zone	HBT	Credits	IBRA region
	White Box - Yellow Box - Blakely's Red Gum Grassy Woodland and Derived Native Grassland in the NSW North Coast, New England Tableland, Nandewar, Brigalow Belt South, Sydney Basin, South Eastern Highla This includes PCT's: 74, 75, 83, 250, 266, 267, 268, 270, 274, 275, 276,	-	281_Woodl and	No	56	Inland Slopes,Bogan-Macquarie, Bondo, Capertee Uplands, Capertee Valley, Crookwell, Hill End, Kerrabee, Lower Slopes, Murray Fans, Murrumbateman, Orange, Pilliga, Talbragar Valley and Wollemi. or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.

BAM Biodiversity Credit Report (Variations)

277, 278, 279, 280, 281, 282, 283, 284, 286, 298, 302, 312, 341, 342, 347, 350, 352, 356, 367, 381, 382, 395, 401, 403, 421, 433, 434, 435, 436, 437, 451, 483, 484, 488, 492, 496, 508, 509, 510, 511, 516, 528, 538, 544, 563, 567, 571, 589, 590, 597, 599, 618, 619, 622, 633, 654, 702, 703, 704, 705, 710, 711, 796, 797, 799, 847, 851, 921, 1099, 1303, 1304, 1307, 1324, 1329, 1330, 1332, 1383, 1606, 1608, 1611, 1691, 1693, 1695, 1698, 3314, 3359, 3363, 3373, 3376, 3387, 3388, 3394, 3395, 3396, 3397, 3398, 3399, 3406, 3415, 3533, 4147, 4149, 4150					
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,	-	281_DNG	No	4	Inland Slopes, Bogan-Macquarie, Bondo, Capertee Uplands, Capertee Valley, Crookwell, Hill End, Kerrabee, Lower Slopes, Murray Fans, Murrumbateman, Orange, Pilliga, Talbragar Valley and Wollemi. or Any IBRA subregion that is within 100

BAM Biodiversity Credit Report (Variations)

	<p>South Eastern Highla</p> <p>This includes PCT's:</p> <p>74, 75, 83, 250, 266, 267, 268, 270, 274, 275, 276, 277, 278, 279, 280, 281, 282, 283, 284, 286, 298, 302, 312, 341, 342, 347, 350, 352, 356, 367, 381, 382, 395, 401, 403, 421, 433, 434, 435, 436, 437, 451, 483, 484, 488, 492, 496, 508, 509, 510, 511, 516, 528, 538, 544, 563, 567, 571, 589, 590, 597, 599, 618, 619, 622, 633, 654, 702, 703, 704, 705, 710, 711, 796, 797, 799, 847, 851, 921, 1099, 1303, 1304, 1307, 1324, 1329, 1330, 1332, 1383, 1606, 1608, 1611, 1691, 1693, 1695, 1698, 3314, 3359, 3363, 3373, 3376, 3387, 3388, 3394, 3395, 3396, 3397, 3398, 3399, 3406, 3415, 3533, 4147, 4149, 4150</p>					kilometers of the outer edge of the impacted site.
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Species Credit Summary

BAM Biodiversity Credit Report (Variations)

Species	Vegetation Zone/s	Area / Count	Credits
Myotis macropus / Southern Myotis	281_Woodland, 277_Woodland, 281_DNG, 277_DNG	1.7	45.00
Tyto novaehollandiae / Masked Owl	281_Woodland, 277_Woodland, 281_DNG, 277_DNG	1.0	27.00

Credit Retirement Options Like-for-like options

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

BAM Biodiversity Credit Report (Variations)

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

BAM Candidate Species Report

Proposal Details

Assessment Id	Proposal Name	BAM data last updated *
00056898/BAAS18153/25/00057139	Birriwa Bus Route Upgrade	28/10/2024
Assessor Name	Report Created	BAM Data version *
Janene Catherine Devereux	20/05/2025	Current classification (live - default) (80)
Assessor Number	Assessment Type	BAM Case Status
BAAS19045	Major Projects	Open
Assessment Revision		Date Finalised
0		To be finalised

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

List of Species Requiring Survey

Name	Presence	Survey Months
<i>Acacia ausfeldii</i> Ausfeld's Wattle	No (surveyed) *Survey months are outside of the months specified in Bionet.	<div> <input type="checkbox"/> Jan <input type="checkbox"/> Feb <input type="checkbox"/> Mar <input type="checkbox"/> Apr <input type="checkbox"/> May <input type="checkbox"/> Jun <input type="checkbox"/> Jul <input checked="" type="checkbox"/> Aug <input type="checkbox"/> Sep <input type="checkbox"/> Oct <input checked="" type="checkbox"/> Nov <input type="checkbox"/> Dec </div> <input checked="" type="checkbox"/> Survey month outside the specified months?
<i>Burhinus grallarius</i> Bush Stone-curlew	No (surveyed)	<div> <input type="checkbox"/> Jan <input type="checkbox"/> Feb <input type="checkbox"/> Mar <input type="checkbox"/> Apr <input type="checkbox"/> May <input checked="" type="checkbox"/> Jun <input type="checkbox"/> Jul <input type="checkbox"/> Aug <input checked="" type="checkbox"/> Sep <input type="checkbox"/> Oct <input checked="" type="checkbox"/> Nov <input type="checkbox"/> Dec </div> <input type="checkbox"/> Survey month outside the specified months?
<i>Callocephalon fimbriatum</i> Gang-gang Cockatoo	No (surveyed)	<div> <input type="checkbox"/> Jan <input type="checkbox"/> Feb <input type="checkbox"/> Mar <input type="checkbox"/> Apr <input type="checkbox"/> May <input type="checkbox"/> Jun <input type="checkbox"/> Jul <input type="checkbox"/> Aug <input type="checkbox"/> Sep <input type="checkbox"/> Oct <input checked="" type="checkbox"/> Nov <input type="checkbox"/> Dec </div> <input type="checkbox"/> Survey month outside the specified months?

BAM Candidate Species Report

<i>Cercartetus nanus</i> Eastern Pygmy-possum	No (surveyed)	<input type="checkbox"/> Jan <input type="checkbox"/> Feb <input checked="" type="checkbox"/> Mar <input type="checkbox"/> Apr <input type="checkbox"/> May <input type="checkbox"/> Jun <input type="checkbox"/> Jul <input type="checkbox"/> Aug <input type="checkbox"/> Sep <input type="checkbox"/> Oct <input type="checkbox"/> Nov <input type="checkbox"/> Dec <input type="checkbox"/> Survey month outside the specified months?
<i>Chalinolobus dwyeri</i> Large-eared Pied Bat	No (surveyed)	<input checked="" type="checkbox"/> Jan <input type="checkbox"/> Feb <input type="checkbox"/> Mar <input type="checkbox"/> Apr <input type="checkbox"/> May <input type="checkbox"/> Jun <input type="checkbox"/> Jul <input type="checkbox"/> Aug <input type="checkbox"/> Sep <input type="checkbox"/> Oct <input type="checkbox"/> Nov <input type="checkbox"/> Dec <input type="checkbox"/> Survey month outside the specified months?
<i>Cullen parvum</i> Small Scurf-pea	No (surveyed)	<input type="checkbox"/> Jan <input type="checkbox"/> Feb <input type="checkbox"/> Mar <input type="checkbox"/> Apr <input type="checkbox"/> May <input type="checkbox"/> Jun <input type="checkbox"/> Jul <input type="checkbox"/> Aug <input type="checkbox"/> Sep <input type="checkbox"/> Oct <input type="checkbox"/> Nov <input checked="" type="checkbox"/> Dec <input type="checkbox"/> Survey month outside the specified months?
<i>Dichanthium setosum</i> Bluegrass	No (surveyed)	<input type="checkbox"/> Jan <input type="checkbox"/> Feb <input checked="" type="checkbox"/> Mar <input type="checkbox"/> Apr <input type="checkbox"/> May <input type="checkbox"/> Jun <input type="checkbox"/> Jul <input type="checkbox"/> Aug <input type="checkbox"/> Sep <input type="checkbox"/> Oct <input checked="" type="checkbox"/> Nov <input type="checkbox"/> Dec <input type="checkbox"/> Survey month outside the specified months?
<i>Euphrasia arguta</i> Euphrasia arguta	No (surveyed)	<input type="checkbox"/> Jan <input type="checkbox"/> Feb <input checked="" type="checkbox"/> Mar <input type="checkbox"/> Apr <input type="checkbox"/> May <input type="checkbox"/> Jun <input type="checkbox"/> Jul <input type="checkbox"/> Aug <input type="checkbox"/> Sep <input type="checkbox"/> Oct <input checked="" type="checkbox"/> Nov <input type="checkbox"/> Dec <input type="checkbox"/> Survey month outside the specified months?
<i>Haliaeetus leucogaster</i> White-bellied Sea-Eagle	No (surveyed)	<input type="checkbox"/> Jan <input type="checkbox"/> Feb <input type="checkbox"/> Mar <input type="checkbox"/> Apr <input type="checkbox"/> May <input type="checkbox"/> Jun <input type="checkbox"/> Jul <input type="checkbox"/> Aug <input checked="" type="checkbox"/> Sep <input type="checkbox"/> Oct <input checked="" type="checkbox"/> Nov <input type="checkbox"/> Dec <input type="checkbox"/> Survey month outside the specified months?

BAM Candidate Species Report

<i>Hieraaetus morphnoides</i> Little Eagle	No (surveyed)	<input type="checkbox"/> Jan <input type="checkbox"/> Feb <input type="checkbox"/> Mar <input type="checkbox"/> Apr <input type="checkbox"/> May <input type="checkbox"/> Jun <input type="checkbox"/> Jul <input type="checkbox"/> Aug <input checked="" type="checkbox"/> Sep <input type="checkbox"/> Oct <input type="checkbox"/> Nov <input type="checkbox"/> Dec <input type="checkbox"/> Survey month outside the specified months?
<i>Keyacris scurra</i> Key's Matchstick Grasshopper	No (surveyed)	<input type="checkbox"/> Jan <input type="checkbox"/> Feb <input type="checkbox"/> Mar <input type="checkbox"/> Apr <input type="checkbox"/> May <input type="checkbox"/> Jun <input type="checkbox"/> Jul <input type="checkbox"/> Aug <input checked="" type="checkbox"/> Sep <input type="checkbox"/> Oct <input type="checkbox"/> Nov <input type="checkbox"/> Dec <input type="checkbox"/> Survey month outside the specified months?
<i>Lophoictinia isura</i> Square-tailed Kite	No (surveyed)	<input type="checkbox"/> Jan <input type="checkbox"/> Feb <input type="checkbox"/> Mar <input type="checkbox"/> Apr <input type="checkbox"/> May <input type="checkbox"/> Jun <input type="checkbox"/> Jul <input type="checkbox"/> Aug <input checked="" type="checkbox"/> Sep <input type="checkbox"/> Oct <input checked="" type="checkbox"/> Nov <input type="checkbox"/> Dec <input type="checkbox"/> Survey month outside the specified months?
<i>Myotis macropus</i> Southern Myotis	Yes (surveyed)	<input checked="" type="checkbox"/> Jan <input type="checkbox"/> Feb <input checked="" type="checkbox"/> Mar <input type="checkbox"/> Apr <input type="checkbox"/> May <input type="checkbox"/> Jun <input type="checkbox"/> Jul <input type="checkbox"/> Aug <input type="checkbox"/> Sep <input type="checkbox"/> Oct <input type="checkbox"/> Nov <input type="checkbox"/> Dec <input type="checkbox"/> Survey month outside the specified months?
<i>Ninox connivens</i> Barking Owl	No (surveyed)	<input type="checkbox"/> Jan <input type="checkbox"/> Feb <input type="checkbox"/> Mar <input type="checkbox"/> Apr <input type="checkbox"/> May <input checked="" type="checkbox"/> Jun <input type="checkbox"/> Jul <input type="checkbox"/> Aug <input type="checkbox"/> Sep <input type="checkbox"/> Oct <input type="checkbox"/> Nov <input type="checkbox"/> Dec <input type="checkbox"/> Survey month outside the specified months?
<i>Ninox strenua</i> Powerful Owl	No (surveyed)	<input type="checkbox"/> Jan <input type="checkbox"/> Feb <input type="checkbox"/> Mar <input type="checkbox"/> Apr <input type="checkbox"/> May <input checked="" type="checkbox"/> Jun <input type="checkbox"/> Jul <input type="checkbox"/> Aug <input type="checkbox"/> Sep <input type="checkbox"/> Oct <input type="checkbox"/> Nov <input type="checkbox"/> Dec <input type="checkbox"/> Survey month outside the specified months?

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<i>Petaurus norfolcensis</i> Squirrel Glider	No (surveyed)	<input type="checkbox"/> Jan <input type="checkbox"/> Feb <input checked="" type="checkbox"/> Mar <input type="checkbox"/> Apr <input type="checkbox"/> May <input checked="" type="checkbox"/> Jun <input type="checkbox"/> Jul <input type="checkbox"/> Aug <input type="checkbox"/> Sep <input type="checkbox"/> Oct <input type="checkbox"/> Nov <input type="checkbox"/> Dec <input type="checkbox"/> Survey month outside the specified months?
<i>Phascogale tapoatafa</i> Brush-tailed Phascogale	No (surveyed)	<input type="checkbox"/> Jan <input type="checkbox"/> Feb <input checked="" type="checkbox"/> Mar <input type="checkbox"/> Apr <input type="checkbox"/> May <input checked="" type="checkbox"/> Jun <input type="checkbox"/> Jul <input type="checkbox"/> Aug <input type="checkbox"/> Sep <input type="checkbox"/> Oct <input type="checkbox"/> Nov <input type="checkbox"/> Dec <input type="checkbox"/> Survey month outside the specified months?
<i>Phascolarctos cinereus</i> Koala	No (surveyed)	<input type="checkbox"/> Jan <input type="checkbox"/> Feb <input type="checkbox"/> Mar <input checked="" type="checkbox"/> Apr <input type="checkbox"/> May <input checked="" type="checkbox"/> Jun <input type="checkbox"/> Jul <input type="checkbox"/> Aug <input type="checkbox"/> Sep <input type="checkbox"/> Oct <input type="checkbox"/> Nov <input type="checkbox"/> Dec <input type="checkbox"/> Survey month outside the specified months?
<i>Polytelis swainsonii</i> Superb Parrot	No (surveyed)	<input type="checkbox"/> Jan <input type="checkbox"/> Feb <input type="checkbox"/> Mar <input type="checkbox"/> Apr <input type="checkbox"/> May <input type="checkbox"/> Jun <input type="checkbox"/> Jul <input type="checkbox"/> Aug <input checked="" type="checkbox"/> Sep <input type="checkbox"/> Oct <input checked="" type="checkbox"/> Nov <input type="checkbox"/> Dec <input type="checkbox"/> Survey month outside the specified months?
<i>Pomaderris cotoneaster</i> Cotoneaster Pomaderris	No (surveyed)	<input type="checkbox"/> Jan <input type="checkbox"/> Feb <input type="checkbox"/> Mar <input type="checkbox"/> Apr <input type="checkbox"/> May <input type="checkbox"/> Jun <input type="checkbox"/> Jul <input type="checkbox"/> Aug <input type="checkbox"/> Sep <input type="checkbox"/> Oct <input checked="" type="checkbox"/> Nov <input type="checkbox"/> Dec <input type="checkbox"/> Survey month outside the specified months?
<i>Prasophyllum petilum</i> Tarengo Leek Orchid	No (surveyed)	<input type="checkbox"/> Jan <input type="checkbox"/> Feb <input type="checkbox"/> Mar <input type="checkbox"/> Apr <input type="checkbox"/> May <input type="checkbox"/> Jun <input type="checkbox"/> Jul <input type="checkbox"/> Aug <input checked="" type="checkbox"/> Sep <input type="checkbox"/> Oct <input checked="" type="checkbox"/> Nov <input type="checkbox"/> Dec <input type="checkbox"/> Survey month outside the specified months?

BAM Candidate Species Report

<i>Prasophyllum sp. Wybong</i> Prasophyllum sp. Wybong	No (surveyed)	<input type="checkbox"/> Jan <input type="checkbox"/> Feb <input type="checkbox"/> Mar <input type="checkbox"/> Apr <input type="checkbox"/> May <input type="checkbox"/> Jun <input type="checkbox"/> Jul <input type="checkbox"/> Aug <input checked="" type="checkbox"/> Sep <input type="checkbox"/> Oct <input type="checkbox"/> Nov <input type="checkbox"/> Dec <input type="checkbox"/> Survey month outside the specified months?
<i>Swainsona recta</i> Small Purple-pea	No (surveyed)	<input type="checkbox"/> Jan <input type="checkbox"/> Feb <input type="checkbox"/> Mar <input type="checkbox"/> Apr <input type="checkbox"/> May <input type="checkbox"/> Jun <input type="checkbox"/> Jul <input type="checkbox"/> Aug <input checked="" type="checkbox"/> Sep <input type="checkbox"/> Oct <input checked="" type="checkbox"/> Nov <input type="checkbox"/> Dec <input type="checkbox"/> Survey month outside the specified months?
<i>Swainsona sericea</i> Silky Swainson-pea	No (surveyed)	<input type="checkbox"/> Jan <input type="checkbox"/> Feb <input type="checkbox"/> Mar <input type="checkbox"/> Apr <input type="checkbox"/> May <input type="checkbox"/> Jun <input type="checkbox"/> Jul <input type="checkbox"/> Aug <input checked="" type="checkbox"/> Sep <input type="checkbox"/> Oct <input checked="" type="checkbox"/> Nov <input type="checkbox"/> Dec <input type="checkbox"/> Survey month outside the specified months?
<i>Tyto novaehollandiae</i> Masked Owl	Yes (surveyed)	<input type="checkbox"/> Jan <input type="checkbox"/> Feb <input type="checkbox"/> Mar <input type="checkbox"/> Apr <input type="checkbox"/> May <input checked="" type="checkbox"/> Jun <input type="checkbox"/> Jul <input type="checkbox"/> Aug <input type="checkbox"/> Sep <input type="checkbox"/> Oct <input type="checkbox"/> Nov <input type="checkbox"/> Dec <input type="checkbox"/> Survey month outside the specified months?

Threatened species Manually Added

None added

Threatened species assessed as not on site

Refer to BAR for detailed justification

Common name	Scientific name	Justification in the BAM-C
Booroolong Frog	Litoria booroolongensis	Habitat degraded
Brush-tailed Rock-wallaby	Petrogale penicillata	Habitat constraints
Golden Sun Moth	Synemon plana	Refer to BAR
Grey-headed Flying-fox	Pteropus poliocephalus	Habitat constraints

BAM Candidate Species Report

Large Bent-winged Bat	<i>Miniopterus orianae oceanensis</i>	Habitat constraints
Pink-tailed Legless Lizard	<i>Aprasia parapulchella</i>	Habitat degraded
Regent Honeyeater	<i>Anthochaera phrygia</i>	Habitat constraints
Squirrel Glider in the Wagga Wagga Local Government Area	<i>Petaurus norfolcensis</i> - endangered population	Refer to BAR
Striped Legless Lizard	<i>Delma impar</i>	Refer to BAR
Swift Parrot	<i>Lathamus discolor</i>	Habitat constraints
Yass Daisy	<i>Ammobium craspedioides</i>	Refer to BAR

Proposal Details

Assessment Id	Proposal Name	BAM data last updated *
00056898/BAAS18153/25/00057139	Birriwa Bus Route Upgrade	28/10/2024
Assessor Name	Report Created	BAM Data version *
Janene Catherine Devereux	20/05/2025	Current classification (live - default) (80)
Assessor Number	BAM Case Status	Date Finalised
BAAS19045	Open	To be finalised
Assessment Revision		Assessment Type
0		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 SAIL	Ecosystem credits
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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	Low Sensitivity to Gain	Critically Endangered Ecological Community	Not Listed	2.00	True	12
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BAM Credit Summary Report

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	Low Sensitivity to Gain	Critically Endangered Ecological Community	Not Listed	2.00	True	13
											Subtotal	25

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	65.3	65.3	1.4	Population size	High Sensitivity to Gain	Critically Endangered Ecological Community	Not Listed	2.50	True	56
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BAM Credit Summary Report

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	34.9	34.9	0.18	Population size	High Sensitivity to Gain	Critically Endangered Ecological Community	Not Listed	2.50	True	4
											Subtotal	60
											Total	85

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 SAIL	Species credits

<i>Myotis macropus / Southern Myotis (Fauna)</i>									
281_Woodland	65.3	65.3	0.96	Biodiversity Conservation Act listing status	Species dependent on habitat attributes	Vulnerable	Not Listed	False	31
277_Woodland	41.1	41.1	0.23	Biodiversity Conservation Act listing status	Species dependent on habitat attributes	Vulnerable	Not Listed	False	5
281_DNG	34.9	34.9	0.06	Biodiversity Conservation Act listing status	Species dependent on habitat attributes	Vulnerable	Not Listed	False	1
277_DNG	35.8	35.8	0.47	Biodiversity Conservation Act listing status	Species dependent on habitat attributes	Vulnerable	Not Listed	False	8
								Subtotal	45
<i>Tyto novaehollandiae / Masked Owl (Fauna)</i>									
281_Woodland	65.3	65.3	0.58	Biodiversity Conservation Act listing status	Species dependent on habitat attributes	Vulnerable	Not Listed	False	19
277_Woodland	41.1	41.1	0.22	Biodiversity Conservation Act listing status	Species dependent on habitat attributes	Vulnerable	Not Listed	False	5

BAM Credit Summary Report

281_DNG	34.9	34.9	0.14	Biodiversity Conservation Act listing status	Species dependent on habitat attributes	Vulnerable	Not Listed	False	2
277_DNG	35.8	35.8	0.05	Biodiversity Conservation Act listing status	Species dependent on habitat attributes	Vulnerable	Not Listed	False	1
								Subtotal	27

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	<p>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.</p> <p>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</p>
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	<p>The National Recovery Plan for Regent Honeyeaters aims to:</p> <ul style="list-style-type: none"> 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. <p>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.</p>
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 cliffclines 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.	<p>The National Recovery Plan for large-eared Pied Bats include:</p> <ul style="list-style-type: none"> • 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, <p>The proposed development is unlikely to interfere substantially with these recovery objectives.</p>
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	<p>Habitat critical to the survival of the Brown Treecreeper includes areas that have:</p> <ul style="list-style-type: none"> • 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. <p>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.</p>
Disrupt the breeding cycle of an important population	<p>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.</p>
Modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline	<p>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.</p>
Result in invasive species that are harmful to a vulnerable species becoming established in the vulnerable species' habitat	<p>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.</p>
Introduce disease that may cause the species to decline, or	<p>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.</p>
Interfere substantially with the recovery of the species.	<p>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.</p>
Conclusion	<p>The proposed development is unlikely to have a significant impact on this species.</p>

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: <ul style="list-style-type: none"> • 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. <p>The proposed development may interfere with the recovery of this species, though it is unlikely to be substantial.</p>
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	<p>Habitat critical to the survival of the Diamond Firetail includes areas of:</p> <ul style="list-style-type: none"> • 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 (<i>Allocasuarina verticillata</i>) within the Mt Lofty Ranges. <p>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.</p>
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 10: Staff CVs



Dr. Cheryl O'Dwyer

Ph.D Botany/Zoology, Master of Science, Bachelor of Science, Major in Botany and Zoology

- A Principal Ecologist with a strong focus on fauna surveys, threatened species monitoring, and ecological restoration.
- Experienced in mammal trapping, insect surveys, and radio telemetry studies.
- Works on biodiversity conservation projects, species recovery plans, and habitat enhancement programs.
- Skilled in community engagement, environmental education, and conservation advocacy.



Lachlan Metzler

Bachelor of Commerce with a Bachelor of Science

- An Ecologist with expertise in threatened species surveys, vegetation mapping, and biodiversity monitoring.
- Holds a Bachelor of Science (Biology) and a Bachelor of Commerce (International Business) from Macquarie University.
- Experience in flora and fauna identification, ecological restoration, and habitat assessments.



Janene Devereux

Bachelor of Science (Marine Science and Sustainable Resource Management)

- A Senior Ecologist with over 14 years of experience in biodiversity assessments, environmental monitoring, and ecological impact assessments.
- Specializes in survey design, flora and fauna surveys, and ecological restoration.
- Extensive experience in renewables, mining, urban development, and local government projects.
- Strong background in team leadership, client communication, and environmental compliance.



Kalya Abbey

Bachelor of Science (Agriculture) and Certificate IV in Project Management

- A Principal Environmental Consultant with 16 years of experience in impact assessment, offsets, post-approvals, monitoring, and operational compliance.
- Expertise in environmental management for renewables, mining, ports, coastal development, and conservation projects.
- Skilled in water and waste management, biodiversity assessments, and regulatory compliance.
- Holds a Bachelor of Science in Agriculture (Land and Water Resource Management) from Charles Sturt University.

Attachment B

Vegetation integrity assessment field datasheets

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)	<i>Sporobolus creber</i> (Slender Rat's Tail Grass)	35	2000	no	N
Grass & grasslike (GG)	<i>Juncus usitatus</i>	5	200	no	N
Grass & grasslike (GG)	<i>Dichanthium sericeum</i> (Queensland Bluegrass)	5	200	no	N
Forb (FG)	<i>Wahlenbergia gracilis</i> (Sprawling Bluebell)	0.1	20	no	N
Grass & grasslike (GG)	<i>Sporobolus caroli</i> (Fairy Grass)	0.1	10	no	N
	<i>Conyza bonariensis</i> (Flaxleaf Fleabane)	1	100	no	E
	<i>Paspalum dilatatum</i> (Paspalum)	5	200		HTE
	<i>Verbena bonariensis</i> (Purpletop)	0.1	10	no	E
Grass & grasslike (GG)	<i>Eragrostis brownii</i> (Brown's Lovegrass)	0.1	20	no	N
	<i>Setaria pumila</i> (Pale Pigeon Grass)	0.1	10	no	E
Grass & grasslike (GG)	<i>Paspalidium distans</i>	0.1	20	no	N
Grass & grasslike (GG)	<i>Rytidosperma caespitosum</i> (Ringed Wallaby Grass)	0.1	20	no	N
	<i>Carthamus lanatus</i> (Saffron Thistle)	0.1	10	no	HTE
Grass & grasslike (GG)	<i>Chloris truncata</i> (Windmill Grass)	0.1	10	no	N
Grass & grasslike (GG)	<i>Aristida ramosa</i> (Purple Wiregrass)	1	50	no	N
Fern (EG)	<i>Cheilanthes sieberi</i> (Rock Fern)	0.1	1	no	N
Grass & grasslike (GG)	<i>Fimbristylis dichotoma</i> (Common Fringe-sedge)	0.1	5	no	N
Forb (FG)	<i>Haloragis aspera</i> (Rough Raspwort)	0.1	10	no	N
Forb (FG)	<i>Lepidium</i> spp. (A Peppercross)	0.2	50	no	N
Grass & grasslike (GG)	<i>Bothriochloa macra</i> (Red Grass)	0.1	20	no	N
	<i>Onopordum acanthium</i> subsp. <i>acanthium</i> (Scotch Thistle)	0.1	1	no	E
	<i>Sonchus asper</i> (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)	<i>Eucalyptus blakelyi</i> (Blakely's Red Gum)	30	5	no	N
Grass & grasslike (GG)	<i>Sporobolus creber</i> (Slender Rat's Tail Grass)	30	2000	no	N
Grass & grasslike (GG)	<i>Aristida vagans</i> (Threawn Speargrass)	10	1000	no	N
Forb (FG)	<i>Calotis lappulacea</i> (Yellow Burr-daisy)	0.2	20	no	N
Forb (FG)	<i>Portulaca oleracea</i> (Pigweed)	0.1	10	no	N
Grass & grasslike (GG)	<i>Juncus usitatus</i>	0.1	5	no	N
Grass & grasslike (GG)	<i>Cyperus gracilis</i> (Slender Flat-sedge)	0.1	20	no	N
Grass & grasslike (GG)	<i>Eragrostis brownii</i> (Brown's Lovegrass)	0.1	20	no	N
Other (OG)	<i>Glycine clandestina</i> (Twining glycine)	1	200	no	N
Forb (FG)	<i>Burchardia umbellata</i> (Milkmaids)	0.1	10	no	N
Forb (FG)	<i>Wahlenbergia gracilis</i> (Sprawling Bluebell)	0.1	10	no	N
Grass & grasslike (GG)	<i>Sporobolus caroli</i> (Fairy Grass)	0.1	10	no	N
Grass & grasslike (GG)	<i>Rytidosperma caespitosum</i> (Ringed Wallaby Grass)	0.1	10	no	N
Grass & grasslike (GG)	<i>Austrostipa verticillata</i> (Slender Bamboo Grass)	0.1	10	no	N
Forb (FG)	<i>Vittadinia cuneata</i> (A Fuzzweed)	0.1	10	no	N
	<i>Hypericum perforatum</i> (St. Johns Wort)	0.1	5	no	HTE
Grass & grasslike (GG)	<i>Fimbristylis dichotoma</i> (Common Fringe-sedge)	0.1	10	no	N
	<i>Digitaria sanguinalis</i> (Crab Grass)	0.1	5	no	E
	<i>Marrubium vulgare</i> (White Horehound)	0.1	1	no	E
	<i>Eragrostis curvula</i> (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)	<i>Angophora floribunda</i> (Rough-barked Apple)	20	10	no	N
	<i>Eragrostis curvula</i> (African Lovegrass)	20	200	no	HTE
Grass & grasslike (GG)	<i>Sporobolus creber</i> (Slender Rat's Tail Grass)	15	200	no	N
Grass & grasslike (GG)	<i>Aristida ramosa</i> (Purple Wiregrass)	5	50	no	N
Forb (FG)	<i>Portulaca oleracea</i> (Pigweed)	0.1	10	no	N
	<i>Paspalum dilatatum</i> (Paspalum)	0.1	2	no	HTE
	<i>Verbena bonariensis</i> (Purpletop)	0.5	5	no	E
Grass & grasslike (GG)	<i>Fimbristylis dichotoma</i> (Common Fringe-sedge)	0.1	10	no	N
Grass & grasslike (GG)	<i>Chloris truncata</i> (Windmill Grass)	0.1	10	no	N
Grass & grasslike (GG)	<i>Rytidosperma caespitosum</i> (Ringed Wallaby Grass)	0.1	20	no	N
Grass & grasslike (GG)	<i>Eragrostis brownii</i> (Brown's Lovegrass)	0.2	50	no	N
	<i>Conyza bonariensis</i> (Flaxleaf Fleabane)	0.1	10	no	E
	<i>Acetosella vulgaris</i> (Sheep Sorrel)	0.1	10	no	HTE
Forb (FG)	<i>Vittadinia cuneata</i> (A Fuzzweed)	0.1	10	no	N
Grass & grasslike (GG)	<i>Juncus usitatus</i>	5	50	no	N
	<i>Alternanthera pungens</i> (Khaki Weed)	0.1	10	no	HTE
Grass & grasslike (GG)	<i>Dichanthium sericeum</i> (Queensland Bluegrass)	0.1	20	no	N
	<i>Hypericum perforatum</i> subsp. <i>veronense</i> (St John's Wort)	0.1	5	no	E
Grass & grasslike (GG)	<i>Cynodon dactylon</i> (Common Couch)	0.1	5	no	N
	<i>Setaria pumila</i> (Pale Pigeon Grass)	0.1	5	no	E
	<i>Lepidium africanum</i> (Common Peppergrass)	0.1	10	no	E
Forb (FG)	<i>Tricoryne elatior</i> (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)	<i>Angophora floribunda</i> (Rough-barked Apple)	10	3	no	N
Grass & grasslike (GG)	<i>Aristida ramosa</i> (Purple Wiregrass)	30	2000	no	N
Grass & grasslike (GG)	<i>Sporobolus creber</i> (Slender Rat's Tail Grass)	10	1000	no	N
Fern (EG)	<i>Cheilanthes sieberi</i> (Rock Fern)	0.1	20	no	N
	<i>Eragrostis curvula</i> (African Lovegrass)	5	200	no	HTE
Grass & grasslike (GG)	<i>Fimbristylis dichotoma</i> (Common Fringe-sedge)	5	200	no	N
Grass & grasslike (GG)	<i>Themeda triandra</i>	0.1	10	no	N
Other (OG)	<i>Glycine tabacina</i> (Variable Glycine)	0.1	20	no	N
Grass & grasslike (GG)	<i>Eragrostis brownii</i> (Brown's Lovegrass)	0.1	20	no	N
Forb (FG)	<i>Calotis lappulacea</i> (Yellow Burr-daisy)	0.1	5	no	N
Grass & grasslike (GG)	<i>Panicum effusum</i> (Hairy Panic)	0.1	10	no	N
	<i>Conyza bonariensis</i> (Flaxleaf Fleabane)	0.1	5	no	E
Grass & grasslike (GG)	<i>Digitaria divaricatissima</i> (Umbrella Grass)	0.1	10	no	N
Grass & grasslike (GG)	<i>Enteropogon acicularis</i> (Curly Windmill Grass)	0.1	5	no	N
Grass & grasslike (GG)	<i>Eragrostis benthamii</i>	0.1	10	no	N
Forb (FG)	<i>Rumex brownii</i> (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)	<i>Sporobolus creber</i> (Slender Rat's Tail Grass)	45	2000	no	N
Grass & grasslike (GG)	<i>Bothriochloa macra</i> (Red Grass)	5	200	no	N
	<i>Setaria pumila</i> (Pale Pigeon Grass)	0.2	50	no	E
Fern (EG)	<i>Cheilanthes sieberi</i> (Rock Fern)	0.1	20	no	N
	<i>Eragrostis curvula</i> (African Lovegrass)	5	200	no	HTE
Grass & grasslike (GG)	<i>Fimbristylis dichotoma</i> (Common Fringe-sedge)	0.1	20	no	N
	<i>Hypericum perforatum</i> (St. Johns Wort)	0.2	50		HTE
Grass & grasslike (GG)	<i>Aristida ramosa</i> (Purple Wiregrass)	1	500	no	N
	<i>Carthamus lanatus</i> (Saffron Thistle)	0.2	100	no	HTE
	<i>Conyza bonariensis</i> (Flaxleaf Fleabane)	0.3	200	no	E
	<i>Paspalum dilatatum</i> (Paspalum)	1	200		HTE
	<i>Verbena bonariensis</i> (Purpletop)	0.1	10	no	E
Grass & grasslike (GG)	<i>Eragrostis benthamii</i>	5	1000	no	N
Grass & grasslike (GG)	<i>Austrostipa scabra</i> (Speargrass)	0.1	20	no	N
Forb (FG)	<i>Craspedia variabilis</i> (Common Billy-buttons)	0.1	5	no	N
	<i>Bromus catharticus</i> (Praire Grass)	0.1	10	no	E
Forb (FG)	<i>Rumex brownii</i> (Swamp Dock)	0.1	2	no	N
Forb (FG)	<i>Euchiton sphaericus</i> (Star Cudweed)	0.1	5	no	N

BAM Site – Field Survey Form

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

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.

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)	<i>Aristida ramosa</i> (Purple Wiregrass)	50	1000	no	N
Grass & grasslike (GG)	<i>Sporobolus creber</i> (Slender Rat's Tail Grass)	15	1000	no	N
	<i>Eragrostis curvula</i> (African Lovegrass)	5	200	no	HTE
Grass & grasslike (GG)	<i>Cynodon dactylon</i> (Common Couch)	5	200		N
Grass & grasslike (GG)	<i>Austrostipa scabra</i> (Speargrass)	0.1	50	no	N
	<i>Conyza bonariensis</i> (Flaxleaf Fleabane)	0.1	20	no	E
	<i>Setaria pumila</i> (Pale Pigeon Grass)	1	500	no	E
Forb (FG)	<i>Rumex brownii</i> (Swamp Dock)	0.1	5	no	N
	<i>Paspalum dilatatum</i> (Paspalum)	5	200	no	HTE
Grass & grasslike (GG)	<i>Bothriochloa macra</i> (Red Grass)	0.1	10	no	N
	<i>Carthamus lanatus</i> (Saffron Thistle)	0.1	10	no	HTE
Grass & grasslike (GG)	<i>Juncus usitatus</i>	0.5	10	no	N
	<i>Xanthium spinosum</i> (Bathurst Burr)	0.1	5	no	HTE
Forb (FG)	<i>Dysphania pumilio</i> (Small Crumbweed)	0.1	5	no	N
	<i>Verbena bonariensis</i> (Purpletop)	0.1	2	no	E
Grass & grasslike (GG)	<i>Digitaria divaricatissima</i> (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)	<i>Sporobolus creber</i> (Slender Rat's Tail Grass)	85	1000		N
Grass & grasslike (GG)	<i>Bothriochloa macra</i> (Red Grass)	25	500		N
	<i>Carthamus lanatus</i> (Saffron Thistle)	0.1	20		HTE
Grass & grasslike (GG)	<i>Eragrostis leptostachya</i> (Paddock Lovegrass)	0.5	100		N
	<i>Alternanthera pungens</i> (Khaki Weed)	0.1	5		HTE
Forb (FG)	<i>Oxalis perennans</i>	0.1	25		N
	<i>Echinochloa crus-galli</i> (Barnyard Grass)	0.1	5		E
	<i>Conyza bonariensis</i> (Flaxleaf Fleabane)	0.1	10		E
Grass & grasslike (GG)	<i>Cynodon dactylon</i> (Common Couch)	0.1	15		N
Forb (FG)	<i>Rumex brownii</i> (Swamp Dock)	0.1	5		N
	<i>Verbena rigida</i> var. <i>rigida</i> (Veined Verbena)	0.1	5		E
	<i>Setaria pumila</i> (Pale Pigeon Grass)	0.1	10		E
	<i>Hypochaeris radicata</i> (Catsear)	0.1	5		E
	<i>Onopordum acanthium</i> subsp. <i>acanthium</i> (Scotch Thistle)	0.1	10		E
Grass & grasslike (GG)	<i>Paspalidium constrictum</i> (Knottybutt Grass)	0.1	20		N
Grass & grasslike (GG)	<i>Juncus usitatus</i>	0.1	30		N
	<i>Sida rhombifolia</i> (Paddy's Lucerne)	0.1	25		E
	<i>Trifolium repens</i> (White Clover)	0.1	100		E
	<i>Soliva sessilis</i> (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)	<i>Sporobolus creber</i> (Slender Rat's Tail Grass)	80	1000		N
Grass & grasslike (GG)	<i>Bothriochloa macra</i> (Red Grass)	0.1	30		N
	<i>Setaria pumila</i> (Pale Pigeon Grass)	0.1	20		E
	<i>Echinochloa crus-galli</i> (Barnyard Grass)	0.1	10		E
Grass & grasslike (GG)	<i>Eragrostis leptostachya</i> (Paddock Lovegrass)	0.1	10		N
	<i>Xanthium spinosum</i> (Bathurst Burr)	0.1	7		HTE
	<i>Modiola caroliniana</i> (Red-flowered Mallow)	0.1	5		E
Forb (FG)	<i>Dysphania pumila</i> (Small Crumbweed)	0.1	5		N
	<i>Schkuhria pinnata</i> var. <i>abrotanoides</i> (Dwarf Marigold)	0.1	5		E
	<i>Verbena bonariensis</i> (Purpletop)	0.1	20		E
	<i>Alternanthera pungens</i> (Khaki Weed)	0.1	10		HTE
	<i>Carthamus lanatus</i> (Saffron Thistle)	0.2	50		HTE
Forb (FG)	<i>Oxalis perennans</i>	0.1	100		N
Grass & grasslike (GG)	<i>Juncus usitatus</i>	10	50		N
	<i>Conyza bonariensis</i> (Flaxleaf Fleabane)	0.1	15		E
Grass & grasslike (GG)	<i>Austrostipa scabra</i> (Speargrass)	0.1	20		N
	<i>Eragrostis cilianensis</i> (Stinkgrass)	0.1	10		E
Grass & grasslike (GG)	<i>Cynodon dactylon</i> (Common Couch)	5	100		N
	<i>Paspalum dilatatum</i> (Paspalum)	0.1	10		HTE
	<i>Onopordum acanthium</i> subsp. <i>acanthium</i> (Scotch Thistle)	0.1	5		E
	<i>Lysimachia arvensis</i> (Scarlet Pimpernel)	0.1	5		E
	<i>Lepidium africanum</i> (Common Peppergrass)	0.1	5		E

Attachment C

Vegetation integrity plot data

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	66.2	99	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	66.2	99	Poor	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	66.2	99	Poor	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	66.2	99	Poor	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	66.2	99	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	66.2	99	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	66.2	99	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	66.2	99	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

Attachment D

Protected Matters Search Results



Australian Government

Department of Climate Change, Energy,
the Environment and Water

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](#)

[Details](#)

[Matters of NES](#)

[Other Matters Protected by the EPBC Act](#)

[Extra Information](#)

[Caveat](#)

[Acknowledgements](#)

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	In buffer area only within area
Coolibah - Black Box Woodlands of the Darling Riverine Plains and the Brigalow Belt South Bioregions	Endangered	Community may occur	In buffer area only within area
Grey Box (Eucalyptus microcarpa) Grassy Woodlands and Derived Native Grasslands of South-eastern Australia	Endangered	Community likely to occur	In feature area within area
Natural grasslands on basalt and fine-textured alluvial plains of northern New South Wales and southern Queensland	Critically Endangered	Community may occur	In buffer area only within area
Weeping Myall Woodlands	Endangered	Community may occur	In buffer area only within area

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 monoplacoides			
Winged Pepper-cress [9190]	Endangered	Species or species habitat may occur within area	In buffer area only
Ozothamnus tessellatus			
[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]	Vulnerable	Species or species habitat likely to occur within area overfly marine area	In feature area
Neophema chrysostoma Blue-winged Parrot [726]		Species or species habitat 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]	Endangered	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]		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.

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Attachment E

Likelihood of occurrence

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 Yarrowonga 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 Daretton. Sightings have been recorded at Milparinka, the Bulloo River and Thurloo Downs. The Fork-tailed Swift is almost exclusively aerial, flying from less than 1 m to at least 300 m above ground and probably much higher. In Australia, they mostly occur over inland plains but sometimes above foothills or in coastal areas. They often occur over cliffs and beaches and also over islands and sometimes well out to sea. They also occur over settled areas, including towns, urban areas and cities. They mostly occur over dry or open habitats, including riparian woodland and tea-tree swamps, low scrub, heathland or saltmarsh. They are also found at treeless grassland and sandplains covered with spinifex, open farmland and inland and coastal sand-dunes. 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 than 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	Calyptrorhynchus lathamii lathamii	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 (<i>Allocasuarina littoralis</i>) and Forest Sheoak (<i>A. torulosa</i>) 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 <i>Eucalyptus</i> 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 <i>Acacia</i> 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 (<i>Eucalyptus camaldulensis</i>) 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 <i>Acacia</i> woodland. Feeds on arthropods gleaned from crevices in rough or decortivating 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 albigfrons	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 unlikely 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 (<i>E. largiflorens</i>) and River Red Gum (<i>E. camaldulensis</i>), 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 sparsely 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 (<i>C. gummifera</i>), Mugga Ironbark and White Box. Commonly used lerp infested trees include Inland Grey Box, Grey Box (<i>E. moluccana</i>) and Blackbutt (<i>E. pilularis</i>).	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	Lophoctinia 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 (<i>Eucalyptus sideroxylon</i>), White Box (<i>E. albens</i>), Inland Grey Box (<i>E. microcarpa</i>), Yellow Box (<i>E. melliodora</i>), Blakely's Red Gum (<i>E. blakelyi</i>) and Forest Red Gum (<i>E. tereticornis</i>). 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). Important 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 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.
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 (<i>Syncarpia glomulifera</i>), Black She-oak (<i>Allocasuarina littoralis</i>), Blackwood (<i>Acacia melanoxylon</i>), Rough-barked Apple (<i>Angaphora floribunda</i>), Cherry Ballart (<i>Exocarpus cupressiformis</i>) 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 solitary 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 than 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	<i>Polytelis swainsonii</i>	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	<i>Pomatostomus temporalis temporalis</i>	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	<i>Pycnoptilus floccosus</i>	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	<i>Rhipidura rufifrons</i>	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 (<i>Eucalyptus microcorys</i>), Mountain Grey Gum (<i>E. cytellocarpa</i>), Narrow-leaved Peppermint (<i>E. radiata</i>), Mountain Ash (<i>E. regnans</i>), Alpine Ash (<i>E. delegatensis</i>), Blackbutt (<i>E. pilularis</i>) or Red Mahogany (<i>E. resinifera</i>); 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	<i>Rostratula australis</i>	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	<i>Stagonopleura guttata</i>	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 (<i>Eucalyptus pauciflora</i>) 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	<i>Tyto novaehollandiae</i>	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	<i>Acacia ausfieldii</i>	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 <i>Eucalyptus albens</i> , <i>E. blakelyi</i> and <i>Callitris spp.</i> , with an understorey dominated by <i>Cassinia spp.</i> 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	<i>Androcalva (Commersonia) procumbens</i>	-	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 <i>Acacia triptera</i> , <i>Callitris endlicheri</i> , <i>Yellow Box</i> , <i>Allocasuarina diminuta</i> , <i>Philotheca salsoifolia</i> , <i>Xanthorrhoea species</i> , <i>Exocarpos cupressiformis</i> , <i>Leptospermum parvifolium</i> and <i>Kunzea parvifolia</i> (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	<i>Bertya mollissima</i>	-	E	E	-	<i>Bertya mollissima</i> 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 Aboriginal 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 <i>Eucalyptus spp.</i> 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 <i>Eucalyptus nobilis</i> (ribbon gum), <i>Kunzea ambigua</i> (Tick Bush), <i>Olearia sp.</i> , <i>Muehlenbeckia sp.</i> 'Mt Norman' and <i>Pelargonium inodorum</i> .			Low	No associated species or suitable habitat (steep hillsides and mountain summits) occur within the subject land. No previous records within the locality.
Flora	<i>Cassinia heleniae</i>	-	E	E	-	Based on confirmed records, <i>Cassinia heleniae</i> 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 <i>C. adunca</i> . 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	<i>Dichanthium setosum</i>	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 <i>Eucalyptus albens</i> , <i>Eucalyptus melanophloia</i> , <i>Eucalyptus melliodora</i> , <i>Eucalyptus viminalis</i> , <i>Myoporum debile</i> , <i>Aristida ramosa</i> , <i>Themeda triandra</i> , <i>Poa sieberiana</i> , <i>Bothriochloa ambigua</i> , <i>Medicago minima</i> , <i>Leptorhynchus squamatus</i> , <i>Lamandra aff. longifolia</i> , <i>Ajuga australis</i> , <i>Calatis hispidula</i> and <i>Austrodranthonia</i> , <i>Dichopogon</i> , <i>Brachyscome</i> , <i>Vittadinia</i> , <i>Wahlenbergia</i> and <i>Psoralea</i> 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	<i>Euphrasia arguta</i>	-	CE	CE	-	<i>Euphrasia arguta</i> 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, <i>Euphrasia arguta</i> 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 <i>Euphrasia arguta</i> 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	<i>Homoranthus darwiniioides</i>	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 gravelly 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 <i>Callitris endlicheri</i> , <i>Eucalyptus crebra</i> , <i>E. fibrosa</i> , <i>C. trachyphloia</i> , <i>E. beyeri subsp. illaquens</i> , <i>E. dwyeri</i> , <i>E. rossii</i> , <i>Leptospermum divaricatum</i> , <i>Melaleuca uncinata</i> , <i>Calytrix tetragona</i> , <i>Allocasuarina spp.</i> and <i>Micromyrtus spp.</i>			Low	No associated species or suitable habitat (gravelly soils) occur within the subject land.
Flora	<i>Lepidium aschersonii</i>	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 <i>Lepidium aschersonii</i> recorded for Australia occurs in NSW. Found on ridges of gilgai clays dominated by Brigalow (<i>Acacia harpophylla</i>), Belah (<i>Casuarina cristata</i>), Buloke (<i>Allocasuarina luehmannii</i>) and Grey Box (<i>Eucalyptus microcarpa</i>). In the south has been recorded growing in Bull Mallee (<i>Eucalyptus behriana</i>). Often the understorey is dominated by introduced plants. The species grows as a component of the ground flora, in grey loamy clays. Vegetation structure varies from open to dense, with sparse grassy understorey and occasional heavy litter.			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	<i>Lepidium monollocoides</i>	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 Cargilligo, Balranald, Wanganella and Deniliquin. Recorded more recently from the Hay Plain, south-eastern Riverina, and from near Pooncarrie. 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 <i>Allocasuarina luehmannii</i> (Bulloak) and/or eucalypts, particularly <i>Eucalyptus largiflorens</i> (Black Box) or <i>Eucalyptus populnea</i> (Poplar Box). The field layer of the surrounding woodland is dominated by tussock grasses. Recorded in a wetland-grassland community comprising <i>Eragrostis australasica</i> , <i>Agrostis avenacea</i> , <i>Austrodranthonia duttoniana</i> , <i>Homopholis prolata</i> , <i>Myriophyllum crispatum</i> , <i>Utricularia dichotoma</i> and <i>Pycnosorus globosus</i> , 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	<i>Ozothamnus tessellatus</i>	-	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 threatened 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	<i>Pimelea curviflora</i> var. <i>curviflora</i>	-	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	<i>Pomaderris cotoneaster</i>	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	<i>Prasophyllum petilum</i>	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 (<i>Poa labillardieri</i>), Black Gum (<i>Eucalyptus aggregata</i>) and tea-trees <i>Leptospermum</i> 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	<i>Prasophyllum</i> sp. <i>Wybong</i>	-	-	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	<i>Swainsona murrayana</i>	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 (<i>Maireana</i> sp.) were present and the site does not occur on clay-based soils which is where the species has been collected.
Flora	<i>Swainsona recta</i>	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 (<i>Eucalyptus blakelyi</i>), Yellow Box (<i>E. melliodora</i>), Candlebark Gum (<i>E. rubida</i>) and Long-leaf Box (<i>E. goniacalyx</i>). Grows in association with understorey dominants that include Kangaroo Grass (<i>Themeda australis</i>), poa tussocks <i>Poa</i> spp. and spear-grasses <i>Austrostipa</i> 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	<i>Swainsona sericea</i>	Silky Swainson-pea	V	-		Found in Natural Temperate Grassland and Snow Gum <i>Eucalyptus pauciflora</i> Woodland on the Monaro. Found in Box-Gum Woodland in the Southern Tablelands and South West Slopes. Sometimes found in association with cypress-pines <i>Callitris</i> 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	<i>Thesium australe</i>	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	<i>Tylophora linearis</i>	-	V	V	-	Grows in dry scrub and open forest. Recorded from low-altitude sedimentary flats in dry woodlands of <i>Eucalyptus fibrosa</i> , <i>Eucalyptus sideroxylon</i> , <i>Eucalyptus albens</i> , <i>Callitris endlicheri</i> , <i>Callitris glaucophylla</i> and <i>Allocasuarina luehmanni</i> . Also grows in association with <i>Acacia hakeoides</i> , <i>Acacia lineata</i> , <i>Melaleuca uncinata</i> , <i>Myoporum</i> species and <i>Casuarina</i> species.			Low	No associated species or suitable habitat (dry scrub and open forest) occur within the subject land.
Flora	<i>Zieria ingramii</i>	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 <i>Eucalyptus</i> - <i>Callitris</i> woodland or open forest with a shrubby to heathy understorey. <i>Eucalyptus dwyeri</i> appears to be a key predictor of <i>Z. ingramii</i> distribution. Mostly from gentle slopes in red-brown and yellow-brown sandy loams, often with a rocky surface. Associated and understorey species include <i>Eucalyptus crebra</i> , <i>E. fibrosa</i> , <i>E. dwyeri</i> , <i>E. beyeriana</i> , <i>E. microcarpa</i> , <i>Callitris endlicheri</i> , <i>Allocasuarina diminuta</i> 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 <i>Eucalyptus dwyeri</i> 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	<i>Chalinolobus dwyeri</i>	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 (<i>Callitris glauca</i>) 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 (<i>Hirundo ariel</i>) 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	<i>Chalinolobus picatus</i>	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	<i>Dasyurus maculatus</i>	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	<i>Miniopterus orianae oceanensis</i>	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	<i>Myotis macropus</i>	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. camaldulensis) 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 to 100 km inland on sandstone country. Known to inhabit a range of habitats including open heathland, open woodland with a heathland understorey 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 Sheath-tail 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: <i>Eucalyptus crebra</i> (narrow-leaved ironbark), <i>Corymbia maculata</i> (syn. <i>E. maculata</i>) (spotted gum), <i>E. dawsonii</i> (slaty gum) and <i>E. moluccana</i> (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 <i>Acacia stenophylla</i> (River Cooba), <i>Acacia salicina</i> (Cooba), <i>Casuarina cristata</i> (Belah), <i>Eremophila bignoniiflora</i> (Eurah), <i>Eucalyptus largiflorens</i> (Black Box), <i>Eucalyptus camaldulensis</i> (River Red Gum) and <i>Eucalyptus populnea subsp. bimbil</i> (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 (<i>Eucalyptus microcarpa</i>) 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 <i>Eucalyptus microcarpa</i> (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 (<i>Acacia pendula</i>) 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 the TEC.

Attachment F

Biodiversity credit report



BAM Biodiversity Credit Report (Like for like)

Proposal Details

Assessment Id	Proposal Name	BAM data last updated *
00046709/BAAS22017/25/00057713	Birriwa MOD - Bus Route South	28/10/2024
Assessor Name	Assessor Number	BAM Data version *
Philippa Fagan	BAAS18117	Current classification (live - default) (80)
Proponent Names	Report Created	BAM Case Status
	04/06/2025	Open
Assessment Revision		Assessment Type
1	BOS Threshold: Area clearing threshold	Major Projects
Date Finalised	* Disclaimer: BAM data last updated may indicate either complete or partial update of the BAM calculator database. BAM calculator database may not be completely aligned with Bionet.	
To be finalised		

Potential Serious and Irreversible Impacts

Name of threatened ecological community	Listing status	Name of Plant Community Type/ID
White Box - Yellow Box - Blakely's Red Gum Grassy Woodland and Derived Native Grassland in the NSW North Coast, New England Tableland, Nandewar, Brigalow Belt South, Sydney Basin, South Eastern Highla	Critically Endangered Ecological Community	277-Blakely's Red Gum - Yellow Box grassy tall woodland of the NSW South Western Slopes Bioregion



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White Box - Yellow Box - Blakely's Red Gum Grassy Woodland and Derived Native Grassland in the NSW North Coast, New England Tableland, Nandewar, Brigalow Belt South, Sydney Basin, South Eastern Highla	Critically Endangered Ecological Community	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
Species		
Nil		

Additional Information for Approval

PCT Outside Ibra Added

None added

PCTs With Customized Benchmarks

PCT
No Changes

Predicted Threatened Species Not On Site

Name
No Changes

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

BAM Biodiversity Credit Report (Like for like)

Name of Plant Community Type/ID	Name of threatened ecological community	Area of impact	HBT Cr	No HBT Cr	Total credits to be retired
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	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	1.6	0	57	57
277-Blakely's Red Gum - Yellow Box grassy tall woodland of the NSW South Western Slopes Bioregion	White Box - Yellow Box - Blakely's Red Gum Grassy Woodland and Derived Native Grassland in the NSW North Coast, New England Tableland, Nandewar, Brigalow Belt South, Sydney Basin, South Eastern Highla	1.3	0	25	25

277-Blakely's Red Gum - Yellow Box grassy tall woodland of the NSW South Western Slopes Bioregion	Like-for-like credit retirement options					
	Name of offset trading group	Trading group	Zone	HBT	Credits	IBRA region
	White Box - Yellow Box - Blakely's Red Gum Grassy Woodland and Derived Native Grassland in the NSW North Coast, New England Tableland, Nandewar, Brigalow Belt South, Sydney Basin, South Eastern Highla	-	277_Woodland	No	12	Inland Slopes, Bogan-Macquarie, Bondo, Capertee Uplands, Capertee Valley, Crookwell, Hill End, Kerrabee, Lower Slopes, Murray Fans, Murrumbateman, Orange, Pilliga, Talbragar Valley and Wollemi. or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.

BAM Biodiversity Credit Report (Like for like)

	<p>This includes PCT's:</p> <p>74, 75, 83, 250, 266, 267, 268, 270, 274, 275, 276, 277, 278, 279, 280, 281, 282, 283, 284, 286, 298, 302, 312, 341, 342, 347, 350, 352, 356, 367, 381, 382, 395, 401, 403, 421, 433, 434, 435, 436, 437, 451, 483, 484, 488, 492, 496, 508, 509, 510, 511, 516, 528, 538, 544, 563, 567, 571, 589, 590, 597, 599, 618, 619, 622, 633, 654, 702, 703, 704, 705, 710, 711, 796, 797, 799, 847, 851, 921, 1099, 1303, 1304, 1307, 1324, 1329, 1330, 1332, 1383, 1606, 1608, 1611, 1691, 1693, 1695, 1698, 3314, 3359, 3363, 3373, 3376, 3387, 3388, 3394, 3395, 3396, 3397, 3398, 3399, 3406, 3415, 3533, 4147, 4149, 4150</p>					
	White Box - Yellow Box -		277_DNG	No	13	Inland Slopes, Bogan-Macquarie,

BAM Biodiversity Credit Report (Like for like)

	<p>Blakely's Red Gum Grassy Woodland and Derived Native Grassland in the NSW North Coast, New England Tableland, Nandewar, Brigalow Belt South, Sydney Basin, South Eastern Highla This includes PCT's: 74, 75, 83, 250, 266, 267, 268, 270, 274, 275, 276, 277, 278, 279, 280, 281, 282, 283, 284, 286, 298, 302, 312, 341, 342, 347, 350, 352, 356, 367, 381, 382, 395, 401, 403, 421, 433, 434, 435, 436, 437, 451, 483, 484, 488, 492, 496, 508, 509, 510, 511, 516, 528, 538, 544, 563, 567, 571, 589, 590, 597, 599, 618, 619, 622, 633, 654, 702, 703, 704, 705, 710, 711, 796, 797, 799, 847, 851, 921, 1099, 1303, 1304, 1307, 1324,</p>				<p>Bondo, Capertee Uplands, Capertee Valley, Crookwell, Hill End, Kerrabee, Lower Slopes, Murray Fans, Murrumbateman, Orange, Pilliga, Talbragar Valley and Wollemi. or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.</p>
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BAM Biodiversity Credit Report (Like for like)

	1329, 1330, 1332, 1383, 1606, 1608, 1611, 1691, 1693, 1695, 1698, 3314, 3359, 3363, 3373, 3376, 3387, 3388, 3394, 3395, 3396, 3397, 3398, 3399, 3406, 3415, 3533, 4147, 4149, 4150					
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	Like-for-like credit retirement options					
	Name of offset trading group	Trading group	Zone	HBT	Credits	IBRA region
	White Box - Yellow Box - Blakely's Red Gum Grassy Woodland and Derived Native Grassland in the NSW North Coast, New England Tableland, Nandewar, Brigalow Belt South, Sydney Basin, South Eastern Highla This includes PCT's: 74, 75, 83, 250, 266, 267, 268, 270, 274, 275, 276, 277, 278, 279, 280, 281, 282, 283, 284, 286, 298,	-	281_Woodland	No	50	Inland Slopes, Bogan-Macquarie, Bondo, Capertee Uplands, Capertee Valley, Crookwell, Hill End, Kerrabee, Lower Slopes, Murray Fans, Murrumbateman, Orange, Pilliga, Talbragar Valley and Wollemi. or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.

BAM Biodiversity Credit Report (Like for like)

302, 312, 341, 342, 347, 350, 352, 356, 367, 381, 382, 395, 401, 403, 421, 433, 434, 435, 436, 437, 451, 483, 484, 488, 492, 496, 508, 509, 510, 511, 516, 528, 538, 544, 563, 567, 571, 589, 590, 597, 599, 618, 619, 622, 633, 654, 702, 703, 704, 705, 710, 711, 796, 797, 799, 847, 851, 921, 1099, 1303, 1304, 1307, 1324, 1329, 1330, 1332, 1383, 1606, 1608, 1611, 1691, 1693, 1695, 1698, 3314, 3359, 3363, 3373, 3376, 3387, 3388, 3394, 3395, 3396, 3397, 3398, 3399, 3406, 3415, 3533, 4147, 4149, 4150					
White Box - Yellow Box - Blakely's Red Gum Grassy Woodland and Derived Native Grassland in the NSW North Coast, New	-	281_DNG	No	7	Inland Slopes, Bogan-Macquarie, Bondo, Capertee Uplands, Capertee Valley, Crookwell, Hill End, Kerrabee, Lower Slopes, Murray Fans, Murrumbateman, Orange, Pilliga, Talbragar Valley and Wollemi.

BAM Biodiversity Credit Report (Like for like)

	<p>England Tableland, Nandewar, Brigalow Belt South, Sydney Basin, South Eastern Highla</p> <p>This includes PCT's: 74, 75, 83, 250, 266, 267, 268, 270, 274, 275, 276, 277, 278, 279, 280, 281, 282, 283, 284, 286, 298, 302, 312, 341, 342, 347, 350, 352, 356, 367, 381, 382, 395, 401, 403, 421, 433, 434, 435, 436, 437, 451, 483, 484, 488, 492, 496, 508, 509, 510, 511, 516, 528, 538, 544, 563, 567, 571, 589, 590, 597, 599, 618, 619, 622, 633, 654, 702, 703, 704, 705, 710, 711, 796, 797, 799, 847, 851, 921, 1099, 1303, 1304, 1307, 1324, 1329, 1330, 1332, 1383, 1606, 1608, 1611, 1691, 1693, 1695, 1698, 3314, 3359, 3363, 3373, 3376, 3387, 3388, 3394, 3395,</p>					<p>or</p> <p>Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.</p>
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BAM Biodiversity Credit Report (Like for like)

	3396, 3397, 3398, 3399, 3406, 3415, 3533, 4147, 4149, 4150					
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Species Credit Summary

Species	Vegetation Zone/s	Area / Count	Credits
Myotis macropus / Southern Myotis	281_Woodland, 277_Woodland, 281_DNG, 277_DNG	1.7	43.00
Tyto novaehollandiae / Masked Owl	281_Woodland, 277_Woodland, 281_DNG, 277_DNG	1.0	27.00

Credit Retirement Options

Like-for-like credit retirement options

Myotis macropus / Southern Myotis	Spp	IBRA subregion
	Myotis macropus / Southern Myotis	Any in NSW
Tyto novaehollandiae / Masked Owl	Spp	IBRA subregion
	Tyto novaehollandiae / Masked Owl	Any in NSW



BAM Biodiversity Credit Report (Like for like)

Proposal Details

Assessment Id	Proposal Name	BAM data last updated *
00046709/BAAS18117/24/00046710	Birriwa MOD - Additional Lots	28/10/2024
Assessor Name	Assessor Number	BAM Data version *
	BAAS22017	Current classification (live - default) (80)
Proponent Names	Report Created	BAM Case Status
	04/06/2025	Open
Assessment Revision		Assessment Type
4		Major Projects
Date Finalised	* Disclaimer: BAM data last updated may indicate either complete or partial update of the BAM calculator database. BAM calculator database may not be completely aligned with Bionet.	
To be finalised		

Potential Serious and Irreversible Impacts

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



BAM Biodiversity Credit Report (Like for like)

Species
Nil

Additional Information for Approval

PCT Outside Ibra Added

None added

PCTs With Customized Benchmarks

PCT
No Changes

Predicted Threatened Species Not On Site

BAM Biodiversity Credit Report (Like for like)

Name
Climacteris picumnus victoriae / Brown Treecreeper (eastern subspecies)
Dasyurus maculatus / Spotted-tailed Quoll
Lathamus discolor / Swift Parrot
Melanodryas cucullata cucullata / South-eastern Hooded Robin
Pomatostomus temporalis temporalis / Grey-crowned Babbler (eastern subspecies)
Pteropus poliocephalus / Grey-headed Flying-fox
Anthochaera phrygia / Regent Honeyeater
Glossopsitta pusilla / Little Lorikeet
Artamus cyanopterus cyanopterus / Dusky Woodswallow

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

Name of Plant Community Type/ID	Name of threatened ecological community	Area of impact	HBT Cr	No HBT Cr	Total credits to be retired
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	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	66.2	0	746	746

BAM Biodiversity Credit Report (Like for like)

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	Like-for-like credit retirement options					
	Name of offset trading group	Trading group	Zone	HBT	Credits	IBRA region
	White Box - Yellow Box - Blakely's Red Gum Grassy Woodland and Derived Native Grassland in the NSW North Coast, New England Tableland, Nandewar, Brigalow Belt South, Sydney Basin, South Eastern Highla This includes PCT's: 74, 75, 83, 250, 266, 267, 268, 270, 274, 275, 276, 277, 278, 279, 280, 281, 282, 283, 284, 286, 298, 302, 312, 341, 342, 347, 350, 352, 356, 367, 381, 382, 395, 401, 403, 421, 433, 434, 435, 436, 437, 451, 483, 484, 488, 492, 496, 508, 509, 510, 511, 516, 528, 538, 544, 563, 567, 571, 589, 590, 597, 599, 618, 619, 622, 633,	-	281_DNG	No	746	Inland Slopes, Bogan-Macquarie, Bondo, Capertee Uplands, Capertee Valley, Crookwell, Hill End, Kerrabee, Lower Slopes, Murray Fans, Murrumbateman, Orange, Pilliga, Talbragar Valley and Wollemi. or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.

BAM Biodiversity Credit Report (Like for like)

	654, 702, 703, 704, 705, 710, 711, 796, 797, 799, 847, 851, 921, 1099, 1303, 1304, 1307, 1324, 1329, 1330, 1332, 1383, 1606, 1608, 1611, 1691, 1693, 1695, 1698, 3314, 3359, 3363, 3373, 3376, 3387, 3388, 3394, 3395, 3396, 3397, 3398, 3399, 3406, 3415, 3533, 4147, 4149, 4150					
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Species Credit Summary

Species	Vegetation Zone/s	Area / Count	Credits
Myotis macropus / Southern Myotis	281_DNG	28.1	254.00

Credit Retirement Options

Like-for-like credit retirement options

Myotis macropus / Southern Myotis	Spp	IBRA subregion
	Myotis macropus / Southern Myotis	Any in NSW

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