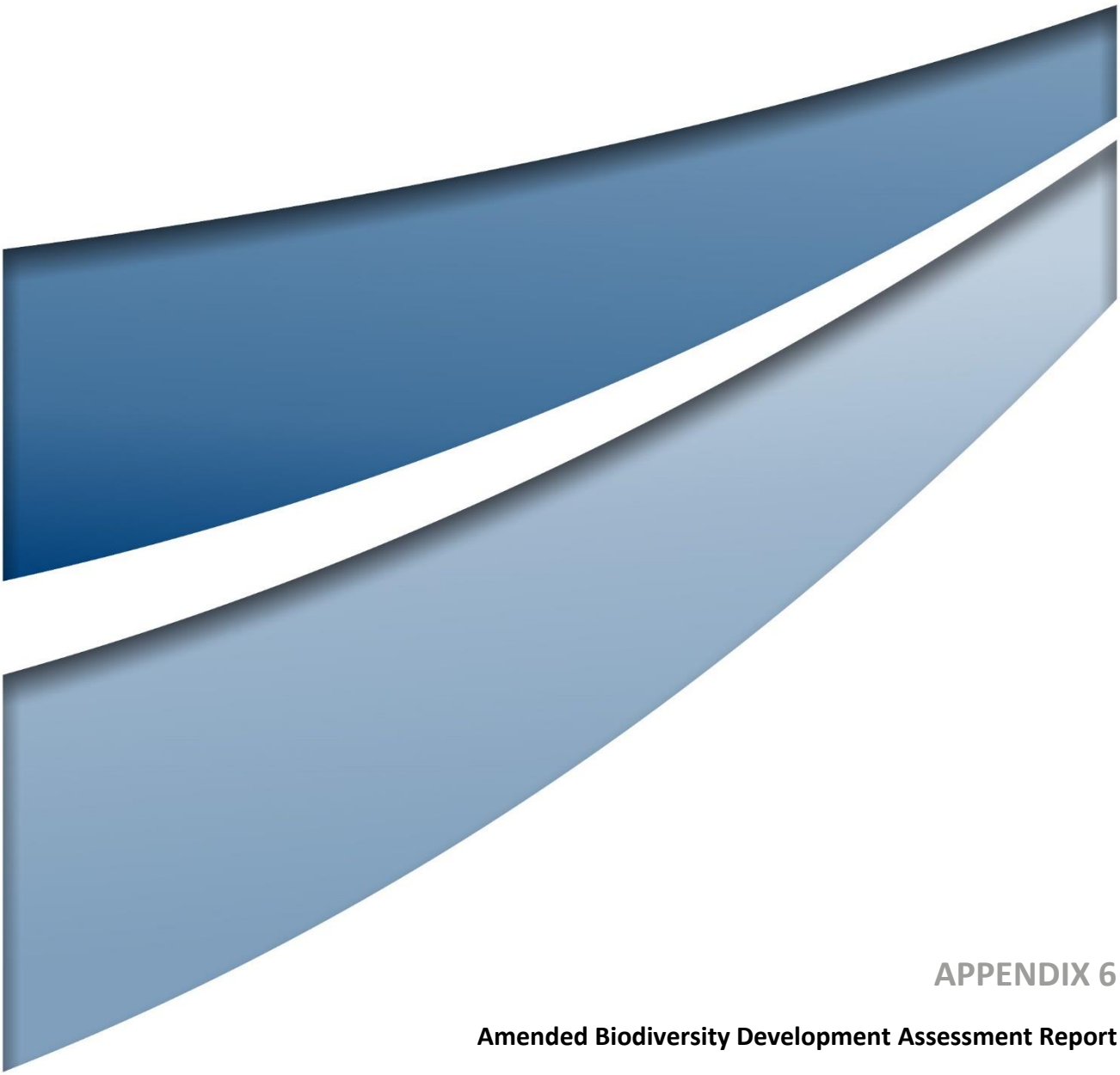
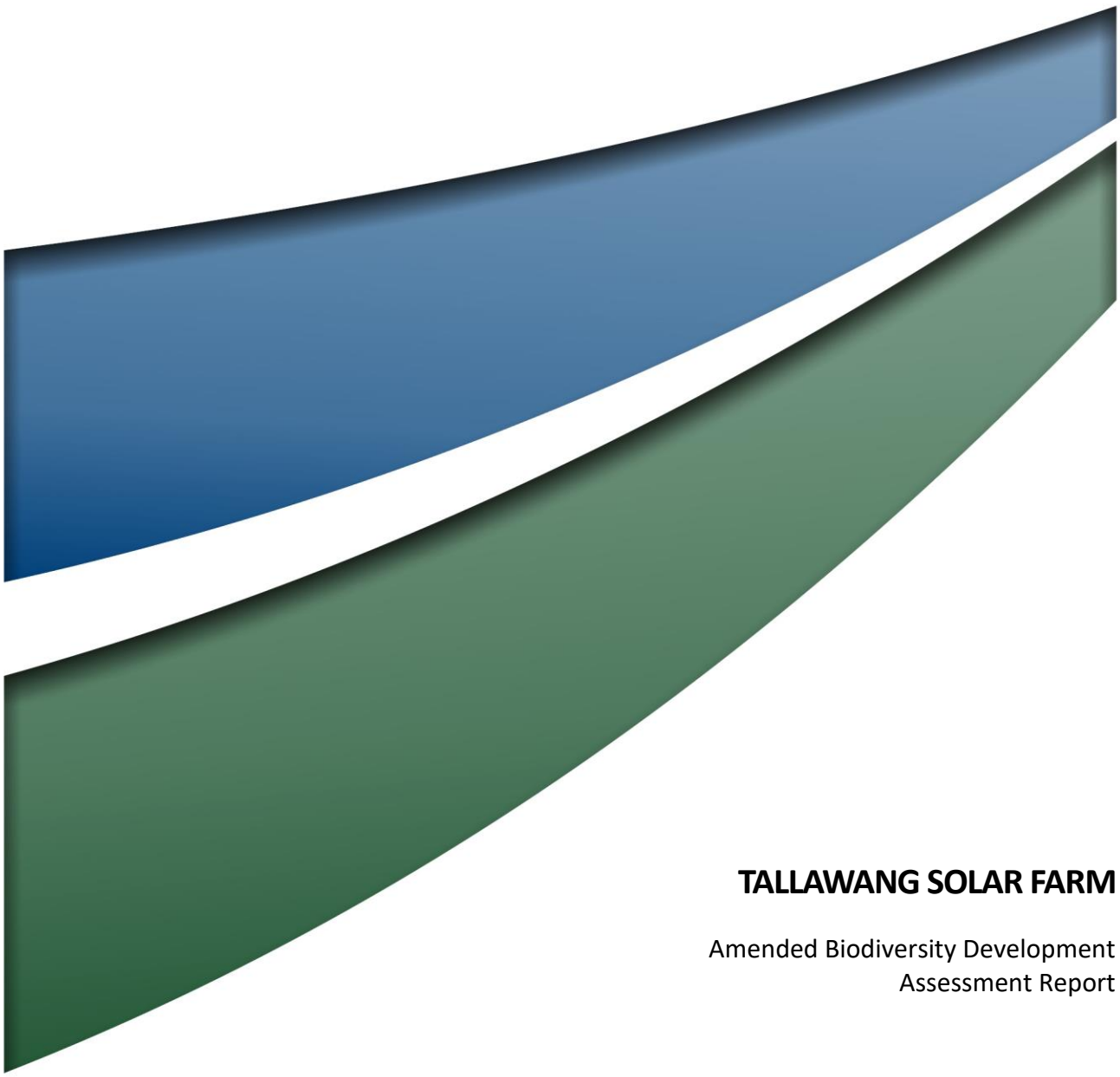


APPENDIX 6

Amended Biodiversity Development Assessment Report

umwelt
Environmental & Social Consultants



TALLAWANG SOLAR FARM

Amended Biodiversity Development Assessment Report

FINAL

May 2024

TALLAWANG SOLAR FARM

Amended Biodiversity Development Assessment Report

FINAL

Prepared by

Umwelt (Australia) Pty Limited

on behalf of

RES Australia

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Project Manager:	Marion O'Neil
Technical Director:	Adam Cavallaro
Technical Manager:	James Garnham
Report No.	21139/R25
Date:	May 2024

Environmental & Social Consultants

75 York Street, Teralba, NSW 2284

This report was prepared using Umwelt's ISO 9001 certified Quality Management System.

Acknowledgement of Country

Umwelt would like to acknowledge the traditional custodians of the country on which we work and pay respect to their cultural heritage, beliefs, and continuing relationship with the land. We pay our respect to the Elders – past, present, and future.

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Document Status

Rev No.	Reviewer		Approved for Issue	
	Name	Date	Name	Date
V1	Adam Cavallaro	12/04/2024	Malinda Facey	14/04/2025
V2	Adam Cavallaro	13/05/2024	Malinda Facey	15/05/2024

BAM Certification

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

Name:	**James Garnham**
Signature:	
Date:	17/05/2024
BAM Assessor Accreditation No:	BAAS19021

Conflict of Interest

The undersigned 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 the client.

Name:	**James Garnham**
Signature:	
Date:	17/05/2024
BAM Assessor Accreditation No:	BAAS19021

Executive Summary

In 2022, the Environmental Impact Statement (EIS) including a Biodiversity Development Assessment Report (BDAR) for the Tallawang Solar Farm (Umwelt, 2022a) was submitted to the former Department of Planning and Environment (DPE) (currently the NSW Department of Planning, Housing and Infrastructure (DPHI)) and publicly exhibited. Following analysis of the EIS submissions, RES undertook a thorough review of the Project's design and layout, which resulted in the redesign of some features of the Project, including some readjustments to the Project Area and Development Footprint (the Amended Project). The Amended Project area is approximately 1,300 hectares (ha) and the Amended Development Footprint is approximately 1,015.67 ha.

To update the Amended Project, Umwelt has now prepared an Amended Biodiversity Development Assessment Report (BDAR) in accordance with the Biodiversity Assessment Method (BAM). The Project will involve the construction, operation and decommissioning of a 500 megawatt (MW) solar farm with a Battery Energy Storage System (BESS) and associated infrastructure and works.

Surveys identified the following Plant Community Types (PCTs) and vegetation that will be impacted by the Amended Project:

- Category 1 – Exempt Land (1,002.11 ha).
- PCT81 Western Grey Box – cypress pine shrub grass shrub tall woodland in the Brigalow Belt South Bioregion moderate condition (1.95 ha).
- PCT281 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 moderate condition (3.58 ha).
- PCT318 Mugga Ironbark –Tumbledown Red Gum – Red Box – Black Cypress Pine open forest on shallow stony soils on hills in the NSW South Western Slopes Bioregion moderate condition (0.93 ha).
- PCT81 Western Grey Box – cypress pine shrub grass shrub tall woodland in the Brigalow Belt South Bioregion derived native grassland condition (1.04 ha).

Where possible the original avoidance strategy has been retained by strategically locating the Amended Development Footprint on Category 1 – exempt Land. Overall, Project placement and design has resulted in the avoidance of direct impacts on approximately 107 ha of remnant woodland and derived native grassland which equates to 93.44% of remnant woodland and derived native grassland being retained within the Amended Project Area.

Following the application of avoidance and mitigation measures, and the completion of seasonal biodiversity surveys, the BAM assessment identified that the following biodiversity credits (total of 346) are required to offset the impacts of the Amended Project:

Entity	Credits Required
PCT 81 Western Grey Box – cypress pine shrub grass shrub tall woodland in the Brigalow Belt South Bioregion	87
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	155
PCT 318 Mugga Ironbark – Tumbledown Red Gum – Red Box - Black Cypress Pine open forest on shallow stony soils on hills in the NSW South Western Slopes Bioregion	20
Southern myotis (*Myotis macropus*)	65
Dichanthium setosum (Bluegrass)	19

Project Team

Name	BAM Accreditation Number	Contribution to the project	Experience
Adam Cavallaro	BAAS18056	Biodiversity Assessment Project Director Review of Amended BDAR, review of BAM calculator	Adam has over 19 years' experience in the environmental industry completing biodiversity impact assessments under NSW and Commonwealth legislation. He is an accredited assessor under the BAM and is experienced in ecological restoration planning, threatened species and vegetation integrity plot surveys.
James Garnham	BAAS19021	Biodiversity Assessment Project Manager. Preparation of Amended BDAR. BAM plot surveys / plant community mapping / threatened flora and fauna surveys community mapping	James has over 8 years' experience in the environmental industry completing biodiversity impact assessments under the NSW and Commonwealth legislation. He is an accredited assessor under the BAM and is experienced in threatened species and vegetation surveys.
Shaun Corry	BAAS17041	Previous Biodiversity Assessment Project Director Review of the 2022 BDAR, review of BAM Calculator. Threatened flora and fauna surveys	Shaun has over 15 years' experience in the environmental industry and in project management and direction. He has extensive ecological field survey experience across NSW and has a strong background in preparing ecological assessments and biodiversity offset strategies for projects assessed under the NSW BAM, NSW Biodiversity Offsets Policy for Major Projects, BioBanking and BioCertification Schemes.
Belinda Howe	BAAS21019	Previous Biodiversity Assessment Project Manager Preparation of the 2022 BDAR. BAM Plot Surveys/ Threatened flora and fauna surveys	Belinda has extensive experience in a diverse range of terrestrial and aquatic flora and fauna survey techniques including bird surveys, amphibian and reptile surveys, spotlighting, call playback and wetland assessments. Belinda also has expertise in other forms of environmental assessment including Biodiversity Assessment Methodology (BAM) in NSW and corresponding report writing.
Bill Wallach	BAAS17068	Threatened flora and fauna surveys	Bill has worked on a number of major project vegetation assessments and has considerable experience in threatened species assessment, particularly for threatened flora species and ecological communities listed under the EPBC Act and BC Act.
Phillipa Fagan	BAAS18117	BAM plot surveys / plant community mapping / threatened flora and fauna surveys	Philippa has over 8 years' of ecological consulting experience. Philippa has worked on many biodiversity assessment projects and has previous experience in the preparation of the BDARs including undertaking field requirements, conducting BAM calculations, and reporting.

Name	BAM Accreditation Number	Contribution to the project	Experience
Patricia Robinson	BAAS18123	Threatened flora surveys / BAM Plot Surveys	Trish has over 13 years of ecological consulting experience with a strong background in botanical field surveys, vegetation community identification, mapping and classification, ecological monitoring and surveys targeting threatened species, populations and ecological communities.
Joel Callaghan		BAM plot surveys / plant community mapping / threatened flora and fauna surveys	Joel has over 5 years of ecological consulting experience with a strong background in botanical field surveys, vegetation community identification, mapping and classification, ecological monitoring and surveys targeting threatened species, populations and ecological communities.
Zachariah Cotter		Threatened flora surveys	Zach has a total of 8 years working in the environmental industry as an Ecologist and Senior Spatial Ecologist. He is well experienced in undertaking threatened species assessments and has conducted numerous threatened species surveys across NSW.
Mathew Mullaney		Threatened flora surveys	Matthew is a graduate ecologist with over 5 year's ecological experience. He is experienced in conducting plot-based surveys to classify vegetation and has undertaken numerous threatened flora surveys for a variety of shrubs, forbs and orchids.
Lily Mickaill	-	BAM plot surveys / plant community mapping / threatened flora and fauna surveys	Lily has experience conducting BAM plots, weed identification and management, targeted flora and fauna surveys using a range of methods including transects, spotlighting, active searching, call playback and camera traps.
Rebecca Abbott	-	GIS Mapping	Rebecca has over 25 years' experience and has extensive spatial/drafting experience, responsible for delivery of a wide range of GIS, drafting, and graphics work for Umwelt's projects including BDARs and large long-term environmental impact assessments.

Glossary

Term	Definition
BAM	Biodiversity Assessment Methodology
BC Act	NSW Biodiversity Conservation Act 2016
BCD	Biodiversity Conservation Division sometimes referred to as BCS
BCS	Biodiversity Conservation and Science sometimes referred to as BCD
BDAR	Biodiversity Development Assessment Report
CEEC	Critically Endangered Ecological Community
DAWE	Former Commonwealth Department of Agriculture, Water and Environment
Commonwealth DCCEEW	Commonwealth Department of Climate Change, Energy, Environment and Water
NSW DCCEEW	NSW Department of Climate Change, Energy, Environment and Water
DNG	Derived Native Grasslands
DPE	Department of Planning and Environment (formerly DPIE)
DPHI	Department of Planning, Housing and Infrastructure (formerly DPHI)
DPIE	NSW Department of Planning, Industry and Environment
Ecosystem credit	A measurement of the value of EECs, CEECs and threatened species habitat for species that can be reliably predicted to occur within PCT. Ecosystem credits measure the loss in biodiversity values at a development site and the gain in biodiversity values at an offset site.
EEC	Endangered Ecological Community
EP	Endangered Population
EP&A Act	NSW Environmental Planning and Assessment Act 1979
EPBC Act	Commonwealth Environment Protection and Biodiversity Conservation Act 1999
GIS	Geographical Information System
IBRA	Interim Biogeographic Regionalisation for Australia (Version 7)
LGA	Local Government Area
MGA	Map Grid of Australia
NSW	New South Wales
OEH	NSW Office of Environment and Heritage (now BCD)
PCT	Plant Community Type
PMST	Protected Matters Search Tool
Amended Project area	The total area in which the Amended Project would be developed. The Amended Project Area covers approximately 1,300 ha and includes the solar farm site and BESS development area and a small section of the Castlereagh Highway and its associated road reserve.
Proponent	RES Australia Pty Ltd (RES)
SAII	Serious and Irreversible Impact
SEARs	DPE Secretary's Environmental Assessment Requirements
SEPP	State Environmental Planning Policy
Species credit	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.

Term	Definition
Strahler Stream Order	Classification system that gives a waterway an 'order' according to the number of tributaries associated with it.
Subject Land	The proposed area within the broader Amended Project Area that will be disturbed by the Amended Project is referred to throughout this report as the Subject Land in accordance with the BAM
TBDC	Threatened Biodiversity Data Collection
TEC	Threatened Ecological Community
VIS	Vegetation Information System

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1.0 Introduction

Umwelt was engaged by the RES Australia Pty Ltd (RES) to prepare an Amended Biodiversity Development Assessment Report (BDAR) for the proposed Tallawang Solar Farm located in the mid-west region of New South Wales (NSW). The Amended BDAR is required to support a change to the project as identified and assessed in the Environmental Impact Statement (EIS) to improve the design and to respond to government agency feedback received during the EIS submission phase. This is in response to the EIS submissions received from agencies, community members and interest groups. Further details are provided in the section below.

1.1 Background to the Project

RES Australia Pty Ltd (RES) is proposing to develop the Tallawang Solar Farm (the Project) to generate solar energy to supply the people of New South Wales (NSW) with renewable energy. The Project is located in the Central West region of NSW, approximately 8 km northwest of Gulgong in the Mid-Western Regional Local Government Area (LGA) of NSW (refer to **Figure 1.1**).

The Project is a direct response to the NSW Government's commitment to transition to renewable electricity generation. The Project is located within the Central West Orana Renewable Energy Zone (CWO-REZ), established under the NSW Government's Electricity Strategy (2019) and Electricity Infrastructure Roadmap (2020). The Project would contribute to achieving State and Federal commitments for establishing reliable, affordable and sustainable electricity generation within NSW.

The Project is proposed to include up to 500 megawatts (MW) of solar electricity generation with a Battery Energy Storage System (BESS) and associated infrastructure and works. The Project is proposing to connect to the grid via the proposed CWO-REZ Transmission Project currently being developed by the NSW Government to support the growth of the CWO-REZ.

Approval for the Project is being sought under the State Significant Development (SSD) provisions (Division 4.7) of Part 4 of the *Environmental Planning and Assessment Act* 1979 (EP&A Act) as the Project is declared to be SSD under *State Environmental Planning Policy (Planning Systems) 2021* (Planning Systems SEPP).

The Environmental Impact Statement (EIS) including a Biodiversity Development Assessment Report (BDAR) for the Tallawang Solar Farm (Umwelt, 2022a) was submitted to the former Department of Planning and Environment (DPE) (currently the NSW Department of Planning, Housing and Infrastructure (DPHI)) and publicly exhibited from 28 October to 24 November 2022. A submission was received from Biodiversity, Conservation and Science Directorate (BCS) dated 17 November 2022 in relation to the BDAR, which has been addressed in **Appendix I** of this Amended BDAR.

Following analysis of the EIS submissions, RES undertook a thorough review of the Project's design and layout. As a result, RES is proposing to amend the Project as presented in the EIS in response to concerns raised in the EIS submissions and based on further consultation with agencies, landholders and key stakeholders. The proposed amendments include the introduction of a 400-person Temporary Workers Accommodation (TWA) facility, removal of the proposed overhead electricity transmission line, BESS capacity increase and an updated treatment design for the proposed intersection upgrade at the new site access on the Castlereagh Highway (the Amended Project). Some minor layout refinements and readjustment of the Project Area boundary and development footprint are also proposed as part of the amended Project. As part of the biodiversity avoidance strategy, the Amended Project design has included a movement corridor for fauna species previously included within the development footprint due to the fence alignment.

The conceptual layout for the Amended Project is shown in **Figure 1.2**.

This resulted in new areas that were not assessed or fully covered in the exhibited BDAR as they fell outside the Tallawang Solar Farm Project Area at time of survey and assessment. This Amended BDAR assesses the impacts of these changes and identifies any revised management and mitigation measures to be implemented as part of the Amended Project. This report should be read in conjunction with the previous investigations documented in the BDAR (Umwelt 2022a) and EIS (Umwelt 2022b).

The Amended Project Area as illustrated on **Figure 1.1** encompasses four freehold properties, some parcels of Crown Land ('paper roads') and a section of the Castlereagh Highway and road reserve, covering an area of approximately 1,300 ha. These properties are primarily utilised for cropping and grazing activities.

For the purposes of this assessment, the areas within the Amended Project Area subject to direct impacts are referred to as the Subject Land and makes up approximately 1,016 ha of the Amended Project Area.

The Subject Land is defined as the area inclusive of:

- Development footprint of the solar farm site and BESS development area including a 400-person Temporary Workers Accommodation (TWA) facility.
- Development footprint of the intersection upgrade on the Castlereagh Highway.

1.2 Overview of the Amended Project

The Tallawang Solar Farm project remains generally as described in Section 3 of the EIS (Umwelt, 2022b). However, some key design amendments have been made to the Project in response to public and agency submissions received during the exhibition period and based on further consultation with agencies, affected landholders and stakeholders more broadly. These include:

- Inclusion of a 400-person TWA facility within the Amended Project Area.
- Updated treatment for the proposed intersection upgrade at the newly proposed site access on the Castlereagh Highway.
- Removal of the 13 km overhead electricity transmission line traversing through the Barneys Reef Wind Farm as this is now included in EnergyCo's CWO-REZ Transmission Project.

- Increased BESS capacity from 200 MW/400 MW-h to 500 MW/1000 MW-h.
- Minor layout refinements, including:
    - removal of the northern substation option
    - installation of additional solar panels within already disturbed areas
    - realignment of the security fence line to improve fauna connectivity.
- Minor readjustment of the Project Area boundary and development footprint.

The Amended Project's conceptual layout is provided in **Figure 1.2**. A comparison between the Project as presented in the EIS and the amended Project is provided in **Table 1.1**.

Table 1.1 Comparison between the Project as presented in the EIS and the Amended Project

Project Element	EIS Project	Amended Project
Project area	Approximately 1,370 ha.	Approximately 1,300 ha.
Development footprint	Approximately 866 ha.	Approximately 1,016 ha.
Schedule of lands	The Project comprises (wholly or partly) 35 cadastral lots.	The Project comprises (wholly or partly) 19 feehold cadastral lots.
Project access	Project access will be via the Castlereagh Highway at a newly proposed access point from a local gravel road directly south of the Project Area.	No change.
Intersection upgrade	A short Channelised Right turn (CHR) and an Auxiliary Left turn (AUL) treatment on the Castlereagh Highway.	A standard (full sized) CHR & AUL treatments on the Castlereagh Highway.
Targeted capacity (solar)	500 MW (AC).	No change.
Targeted capacity (BESS)	200 MW / 400 MW-h (DC).	500 MW / 1000 MW-h.
Grid connection	A new 330 kV electricity transmission line is proposed to connect the Project to the proposed CWO-REZ Transmission Line via the NSW Government's proposed switching station to be located on the adjacent Barneys Reef Wind Farm project.	The Project's grid connection will be via the proposed CWO Transmission Project being developed by the Energy Corporation of NSW (EnergyCo) and the new 330 kV electricity transmission line is no longer proposed as part of this SSD application.
BESS design	DC-coupled battery storage units will be distributed throughout the Project Area, adjacent to the inverters.	No change.
Substation	One onsite 330 kV substation and switchyard proposed at two possible locations i.e. a northern and central location.	One onsite 330 kV substation proposed at a central location, as shown on **Table 1.2.**

Project Element	EIS Project	Amended Project
Photovoltaic modules	Approximately 1,136,400 bifacial solar PV solar panels in 2P configuration, arranged in a series of rows utilising east-west single-axis tracking with row spacing of up to 12 m and maximum height of 5 m at full tilt.	No change.
Temporary ancillary infrastructure	Temporary ancillary facilities required during construction would typically include: • Site compound including storage area, offices and meeting room, ablution facilities, canteen and car parking. • Laydown areas involving areas suitable for storing plant and equipment, and deliveries including solar panels and cable drums, and areas to support waste management activities (e.g. cardboard and timber).	No change.
Transport Route	Project transport will be via road from the Port of Newcastle, via the Golden Highway and then the Castlereagh Highway to the Project Area.	No change.
Workforce numbers	• **Construction** – Approximately 270 direct full time equivalent (FTE) and 430 indirect FTE jobs (Ethos Urban, 2022). At the Project's peak construction (for up to 6 months) this is expected to increase to about 580 direct FTE jobs (Ethos Urban, 2022). • **Operation** – Up to 7 direct FTE and 20 indirect FTE jobs.	• **Construction** – Approximately 380 FTE jobs, with up to 420 workers on site during peak construction. • **Operation** – no change.
Construction period	Up to 34 months.	Up to 36 months.
Construction timing	Commence Q2 2024.	Commence Q4 2026.
Workers Accommodation	Dispersed across nearby towns and villages within the Mid-Western and Warrumbungle LGA's.	Provision of an onsite TWA facility.
Project life	35 years.	No change.

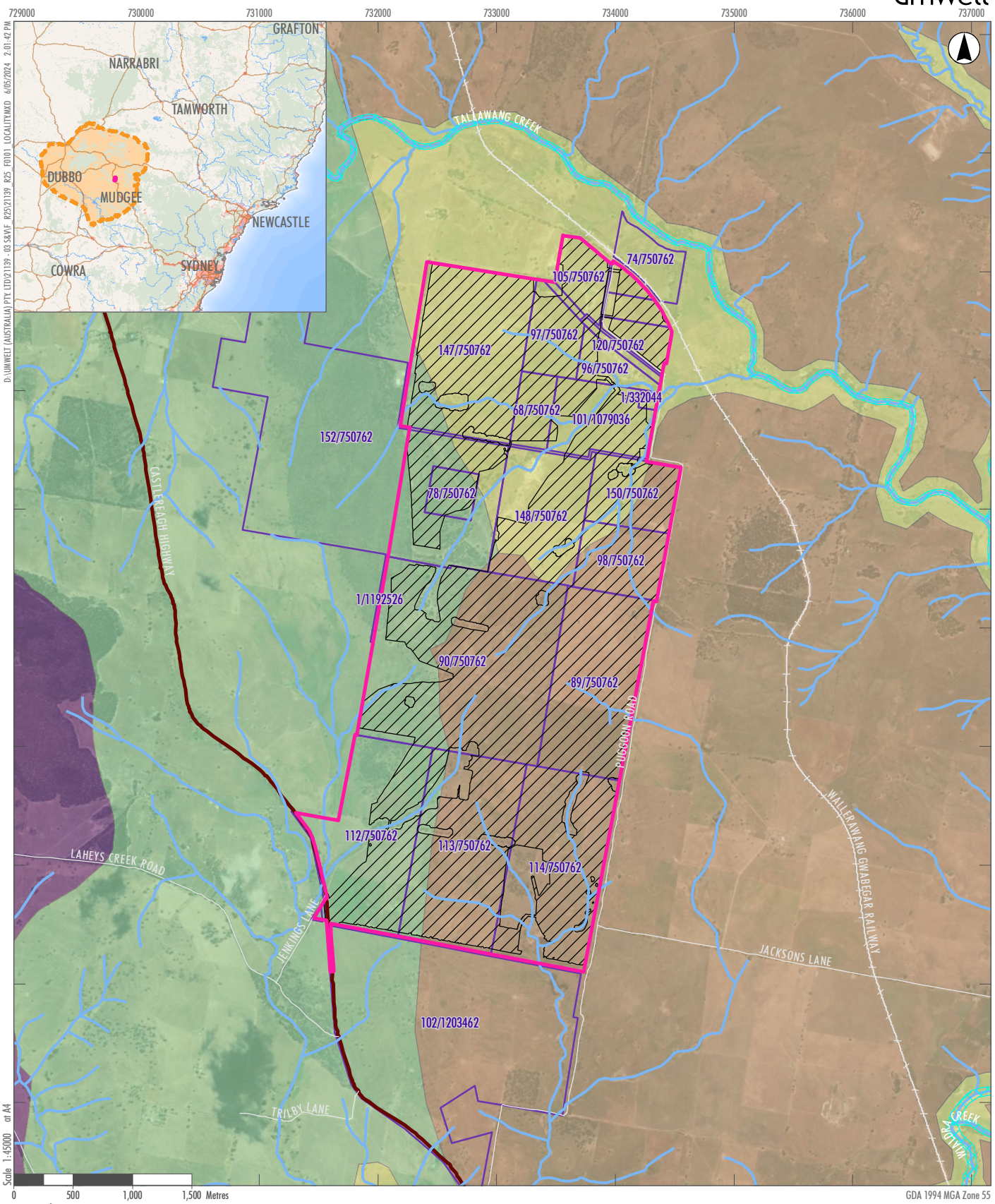
1.3 Location

The location of the Development Footprint for the solar farm, BESS and proposed intersection upgrade on the Castlereagh Highway (hereafter referred to as the Subject Land) and other relevant landscape features that pertain to this assessment and required by Appendix K of the BAM are shown on **Figure 1.2** and **Figure 1.3**. Refer to **Table 1.2** for a summary of the Subject Land's location in the landscape.

Given the size of the Subject Land, the scale of the figures does not strictly comply with the scale required by the BAM however the underlying dataset will be made available to the DPHI with the submission of the Amended BDAR.

Table 1.2 Subject Land Location in the Landscape

Subject Land Location in the Landscape	
IBRA Bioregion	NSW Southwestern Slopes
IBRA Subregion	Inland Slopes
Mitchell Landscape	Gulgong Ranges, Cope Hills Granite, Talbragar – Upper Macquarie Terrace Sands and Gravels
LGA	Mid-Western
Assessment Type	Major Project – Site-based
Subject Land Size	1,015.67 h



Legend

- Project Area Boundary
- Subject Land
- Indicative Central-West Orana Renewable Energy Zone
- Cadastre Boundary
- Biodiverse riparian land
- Local Road
- State Road'
- Creeks/Rivers

Mitchell Landscape

- Cope Hills Granite
- Goonoo Slopes
- Gulgong Ranges
- Talbragar - Upper Macquarie Terrace Sands and Gravels

FIGURE 1.1

Locality Plan

Image Source: ESRI Basemap Data source: NSW DFSI (2022), RES (2024)

1.4 The Subject Land

Regionally, the Subject Land (as shown in **Figure 1.2**) occurs in an area with a strong history of agricultural activity (grazing and cropping). The Subject Land contains areas currently utilised for agricultural activities and also supports patches of remnant vegetation.

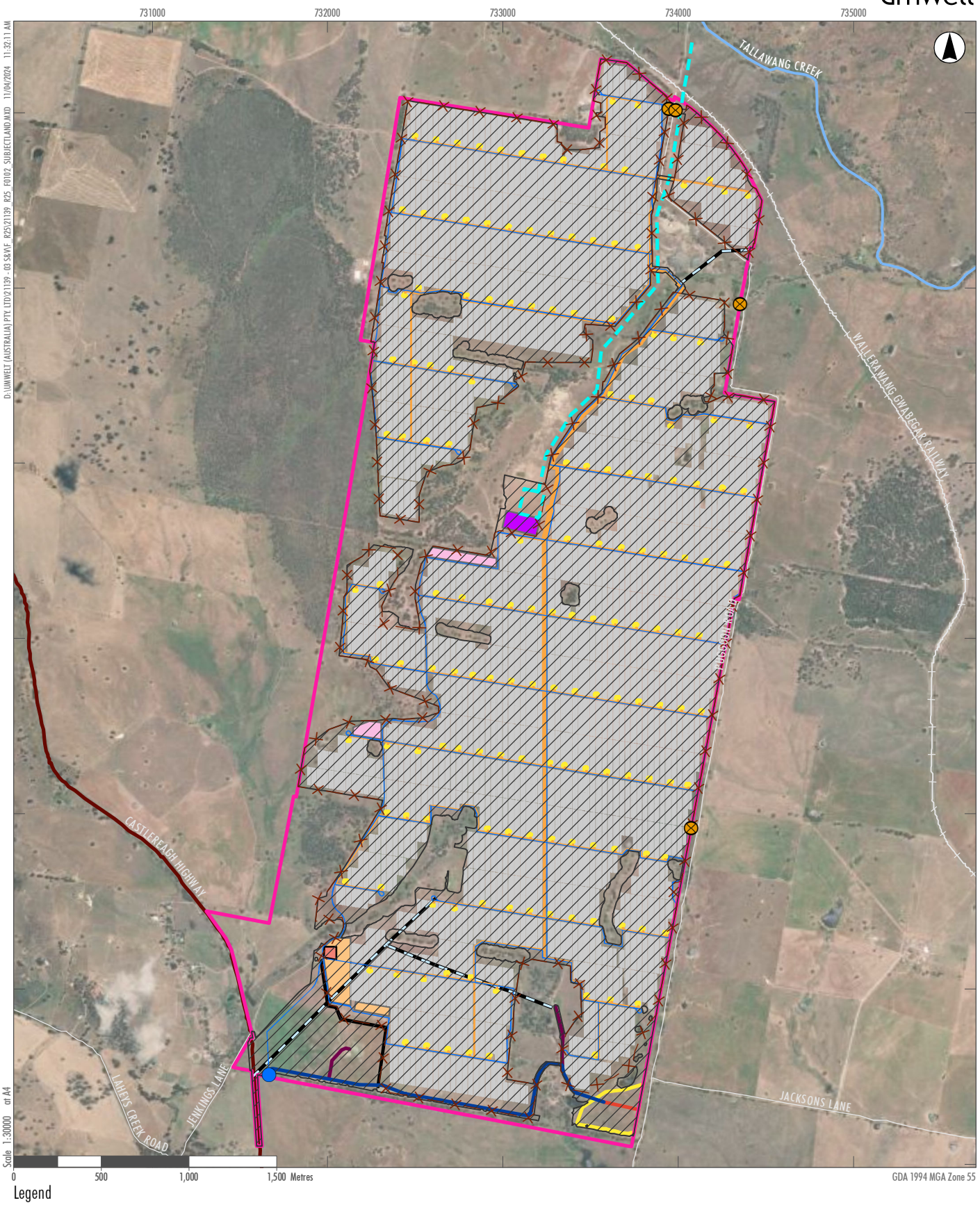
The Proponent has carefully designed the Amended Project in such a way that the Subject Land assessed in this Amended BDAR avoids large patches of remnant vegetation, dams, and drainage lines. The Subject Land predominantly consists of the cleared, open paddocks and is highly modified due to historic and current agricultural practices (cropping and grazing). It is therefore already largely devoid of native vegetation, with minimal clearing to occur. The Subject Land will be subject to a range of impacts as outlined in **Section 5.0**.

The Subject Land includes all areas that will be directly impacted by the Amended Project including all Solar farm and BESS, intersection upgrade on the Castlereagh Highway, Asset Protection Zones (APZs), access components such as access tracks, security fencing and any disturbances associated with the construction of these components.

The Subject Land contains 1,002.11 hectares of land mapped as Category 1 – exempt land (refer to **Figure** 1.4). Category 1 – exempt land is classified under the *Local Land Services Act 2013* as that which was (legally or otherwise) entirely cleared of native vegetation, including groundcover and grasses, as of 1 January 1990 or legally cleared as off August 2017. Category 1 – exempt land also applies to land which is currently subject to cropping practices and is completely devoid of any native vegetation. Category 1 land is exempt from assessment under the BAM.

As part of the initial BDAR, Umwelt completed a land categorisation process in consultation with the BCS. Consultation included discussion on the methodology used to delineate between Category 1 – exempt land grassland and potential CEEC grasslands and a site visit to inspect the proposed solar farm site and discuss the assessment process. the methodology used to produce this mapping is provided in **Appendix G**.
In 2023, the draft Native Vegetation Regulatory (NVR) map was published for Central West Local Land Services regions.

The methodology for assessing Category 1 – exempt land undertaken for the initial BDAR has since been reviewed and has been determined that land within the Subject Land mapped as Category 1 – exempt land is generally in line with the current draft NVR map.



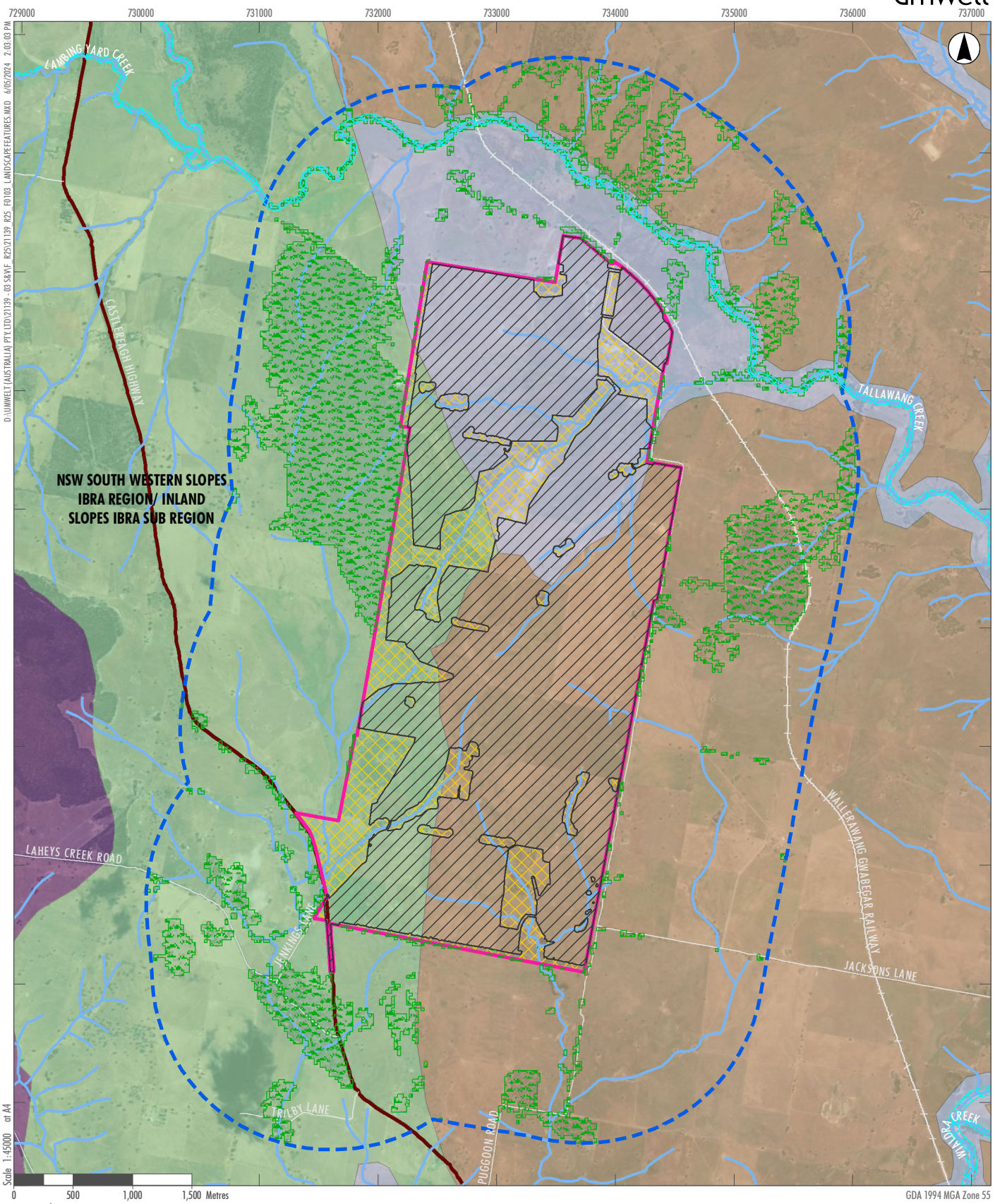
Legend

- Project Area Boundary
- Subject Land
- Proposed Single Axis Tracker
- Temporary Workers Accommodation (TWA)
- BESS and DC-DC Coupled PCS with Hardstanding
- Proposed MV Reticulation
- Proposed Access
- Construction Compound
- Temporary Laydown
- Proposed O&M Facility
- Proposed Substation
- Grid Connection Infrastructure
- Primary Project Access
- Secondary Access
- Temporary Workers Accommodation (TWA) Access
- Security Fence
- Proposed Landowner Access Track
- Temporary Workers Accommodation (TWA) Access
- Proposed Post Construction Landowner Access Track
- Proposed Landscaping Area
- Local Road
- State Road'
- Creeks/Rivers
- 22kV Distribution Line (to be rerouted where necessary)

FIGURE 1.2

Subject Land

Image Source: ESRI Basemap Data source: NSW DFSI (2022), RES (2024)



Legend

- Project Area Boundary
- Subject Land
- Retained / Impact Avoidance Areas
- 1500m Buffer (4411.4 ha)
- Native Vegetation Extent (Total Area = 672.44 ha / 15.24% of Assessment Area)
- Biodiverse riparian land
- Local Road
- State Road'
- Creeks/Rivers

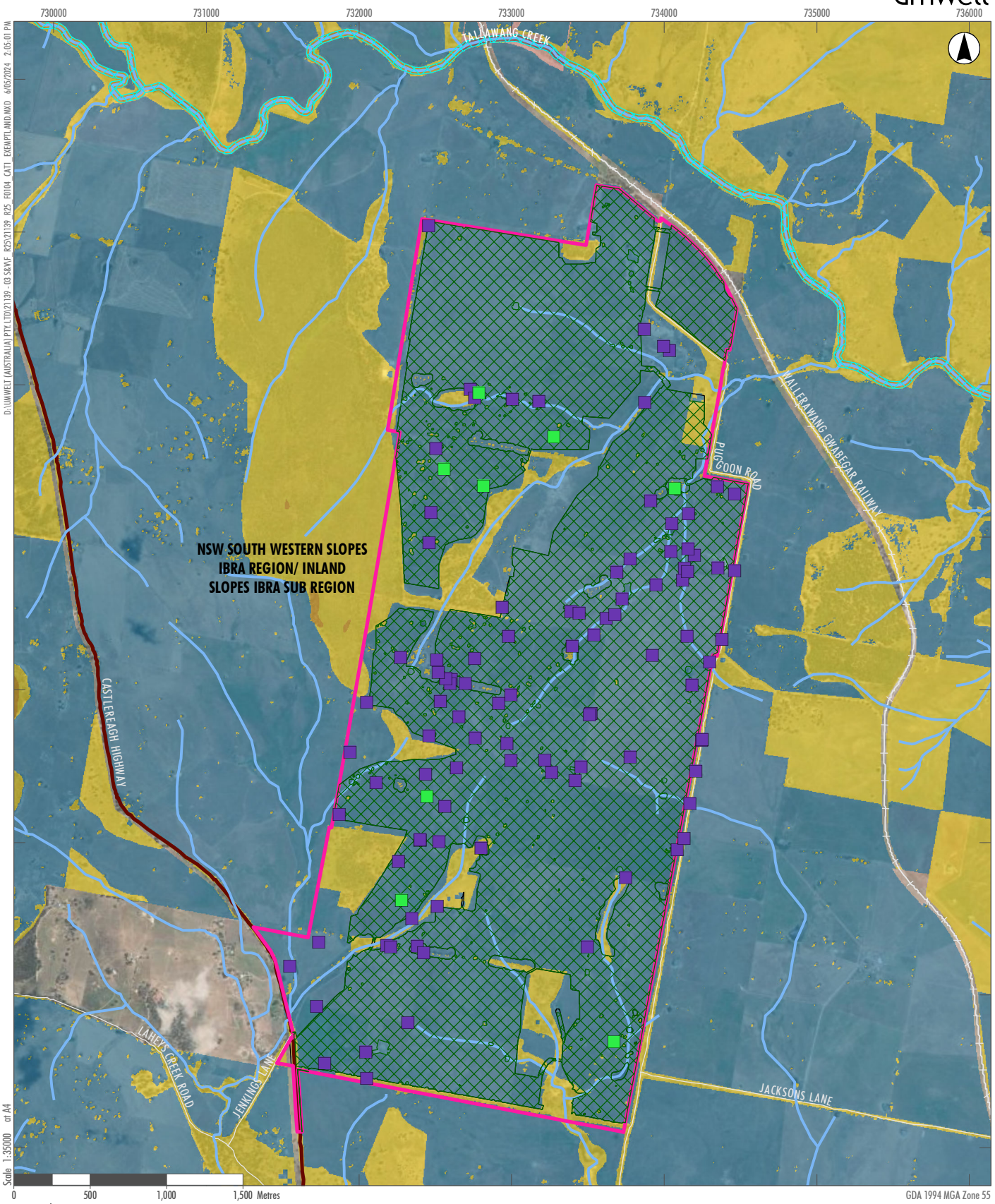
Mitchell Landscape

- Cope Hills Granite
- Goonoo Slopes
- Gulgong Ranges
- Talbragar - Upper Macquarie Terrace Sands and Gravels

FIGURE 1.3

Landscape Features

Image Source: ESRI Basemap Data source: NSW DFSI (2022), RES (2024)



Legend

- Project Area Boundary
- Subject Land
- Biodiverse riparian land
- Category 1 - Exempt Land

Draft native vegetation regulatory map

- Category 1-exempt land (draft)
- Category 2-regulated land (draft)
- Category 2-vulnerable regulated land (in-force)
- Category 2-sensitive regulated land (in-force)
- Category 2-sensitive and vulnerable regulated lands areas of overlap (in-force)

Category 1 - Exempt Land Data Collection

- Category 1 - Exempt Land Condition Rapid Assessment
- Vegetation Integrity Plot

- Local Road
- State Road'
- Creeks/Rivers

FIGURE 1.4

Category 1 - Exempt Land

Image Source: ESRI Basemap Data source: NSW DFSI (2022), RES (2024)

1.4.1 Local Ecological Context

The land uses immediately surrounding the Amended Project Area predominantly include agricultural activities (livestock grazing and cropping), other rural land use activities, and areas of privately and publicly owned remnant vegetation. The vegetation present in the Subject Land and surrounds comprises predominately cleared paddocks and select patches of native woodland and forest.

Remnant vegetation primarily occurs on steep, rocky slopes which are unsuitable for cropping though are, typically, modified or degraded from grazing activities. Despite the degraded and isolated nature of the remnant vegetation across the landscape, a number of threatened ecological communities (TECs) listed under the *Biodiversity Conservation Act 2016* (BC Act) are known to occur including:

- 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 CEEC.
- Inland Grey Box Woodland in the Riverina, NSW South Western Slopes, Cobar Peneplain, Nandewar and Brigalow Belt South Bioregions Endangered Ecological Community EEC.
- Fuzzy Box Woodland on alluvial Soils of the South Western Slopes, Darling Riverine Plains and Brigalow Belt South Bioregions EEC.

1.5 Key Resources, Policies and Documents

The following key resources, policies and documents were used during the preparation of this Amended BDAR:

- Biodiversity Assessment Method 2020 (DPIE 2020a)
- Biodiversity Assessment Method Operational Manual – Stage 1 (NSW DPIE 2020b)
- Biodiversity Assessment method Operational Manual – Stage 2 (NSW DPIE 2019)
- Biodiversity Assessment Method (BAM) Calculator User Guide (NSW OEH 2017)
- Biodiversity Assessment Method Calculator
- BioNet Atlas of NSW Wildlife database and mapping tool (DPE 2022a), last accessed September 2023
- Threatened Biodiversity Data Collection (TBDC) (DPE 2022b), last accessed March 2022
- Vegetation Information System (VIS) Classification Database (DPIE 2021c), last accessed March 2022
- Surveying threatened plants and their habitats: NSW survey guide for the Biodiversity Assessment method (DPIE 2020c)
- Flora Species with Specific Survey Requirements List Version 1
- 'Species Credits' threatened bats and their habitats (NSW OEH 2018)
- NSW Survey Guide for Threatened Frogs (NSW DPIE 2020d)

- Threatened Biodiversity Survey and Assessment: Guidelines for Developments and Activities (Working Draft) (DEC 2004)
- Surveying Threatened Plants and Their Habitats (DPIE 2020b)
- Commonwealth Department of Agriculture, Water and the Environment (DAWE) Protected Matters Search Tool (DAWE 2022), last accessed March 2022
- Other information sources relied upon are referenced in the text and are listed in the References Section of this Report.

1.6 Assessment Requirements

The initial BDAR was prepared in accordance with the requirements of the Planning Secretary's Environmental Assessment Requirements (SEARs) (SSD-23700028) and SEARs Agency advice received from BCS. The Amended BDAR has been prepared in a consistent manner and has also sought to address the BCS submission on the initial BDAR (refer to **Appendix I**).

1.7 Report Preparation and Submission

The initial BDAR was prepared by Belinda Howe (Ecologist) (BAM Accreditation BAAS21019) with review and technical direction from Shaun Corry (Principal Ecologist) (BAM Accreditation Number BAAS17041). Field surveys were undertaken by Belinda Howe, Shaun Corry. The initial BDAR was finalised on 11 July 2022 and the BAM Calculator was submitted to the authority within two weeks of the report submission.

This Amended BDAR was prepared by James Garnham (Principal Ecologist (BAM Accreditation BAAS 19021) with review and technical direction from Adam Cavallaro (Principal Ecologist) (BAM Accreditation BAAS 18056).

Details of contributors to the amended BDAR are listed on page vi of this report.

2.0 Methods

The methods executed in this Amended BDAR were undertaken in accordance with the Biodiversity Assessment Method 2020 (BAM) and the Biodiversity Assessment Method Operational Manual (Stage 1). Further details on the methodologies used to complete this assessment are outlined in **Appendix A** as directed by **Table 2.1** below.

Table 2.1 Methods

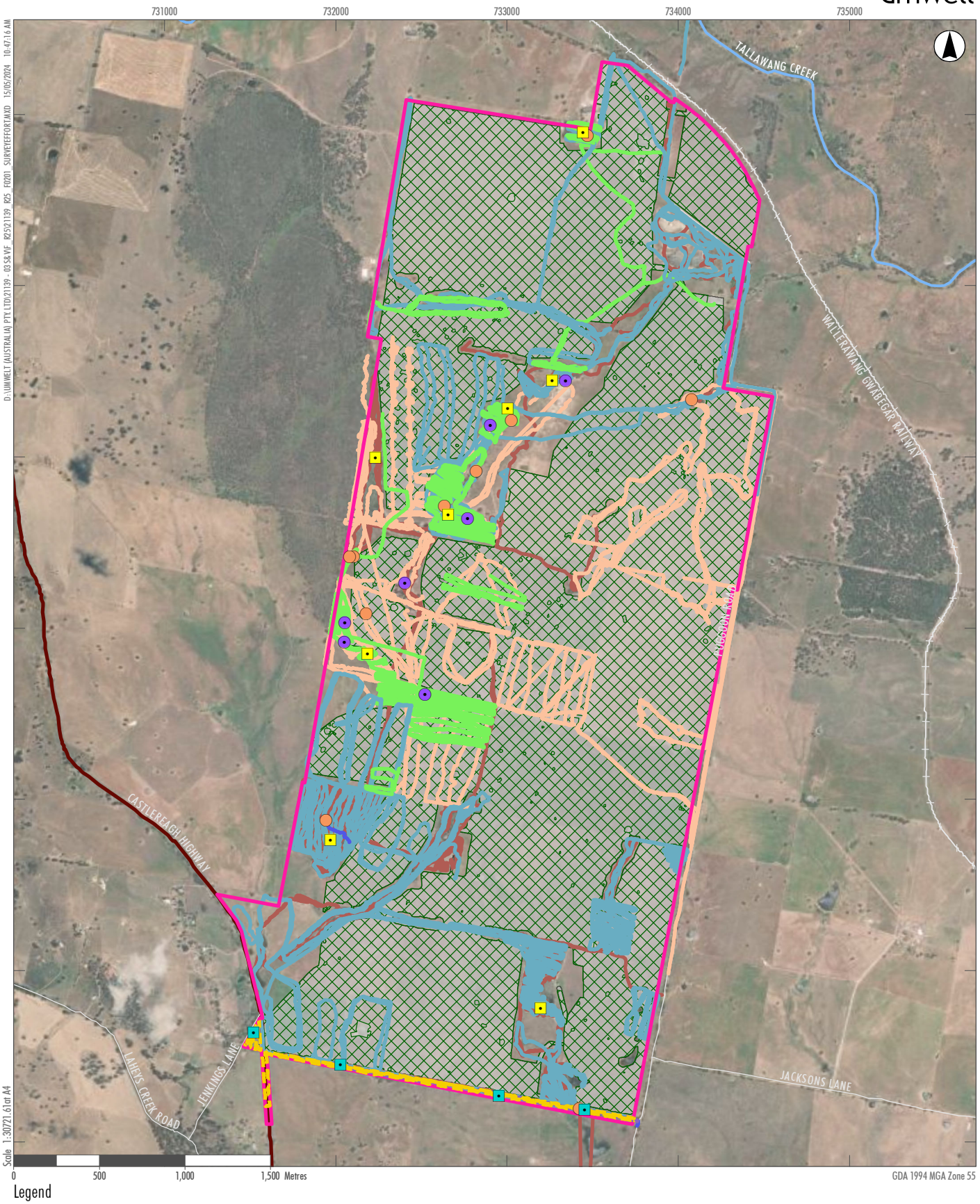
Methods Undertaken	Relevant Appendix A Section
Landscape Value	
Landscape Features and Site Context	Section A1.1
Native Vegetation Assessment	
Literature and Database Review	Section A1.2.1
Floristic and Vegetation Integrity Surveys	Section A1.2.2
Meandering Transects	Section A1.2.3
Digital Aerial Photo Interpretation	Section A1.2.4
Plant Identification and Nomenclature Standards	Section A1.2.5
Vegetation Mapping	Section A1.2.6
Threatened Ecological Community Delineation	Section A1.2.7
Plant Community Type Allocation	Section A1.2.8
Threatened Species	
Literature and Database Review	Section A1.3.1
Ecosystem-Credit Species Assessment	Section A1.3.2
Species-Credit Species Assessment	Section A1.3.3
SEPP (Biodiversity and Conservation) 2021	Section A1.3.4
Weather Conditions	
Weather Conditions and Limitations	Section A1.4

A total of 36 BAM plots were undertaken within the Amended Project Area. These consisted of 23 BAM plots within plant community types (PCTs) and 13 BAM plots within areas mapped as Category 1 – exempt land. Floristic and vegetation integrity data was collected in accordance with minimum requirements under the BAM (DPIE 2020a), as shown in **Table 2.2**. Additional plots were collected for some PCTs and vegetation zones above the minimum requirements of the BAM, due to changes in the Subject Land boundary.

The survey effort for the biodiversity assessment is shown on **Figure 2.1**.

Table 2.2 Adequacy of Floristic and Vegetation Integrity Survey

Veg. Zone	Plant Community Type (PCT) *Condition Class*	Area in the Subject Land (ha)	Number of Floristic and Vegetation Integrity Plots		Rapid Vegetation Assessments Completed (Amended Project Area)
			Required	Completed	
1	81 Western Grey Box - cypress pine shrub grass shrub tall woodland in the Brigalow Belt South Bioregion *Moderate Condition*	1.95	2	8	6
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 *Moderate Condition*	3.58	2	5	17
3	318 Mugga Ironbark - Tumbledown Red Gum - Red Box - Black Cypress Pine open forest on shallow stony soils on hills in the NSW South Western Slopes Bioregion *Moderate Condition*	0.93	1	7	3
4	81 Western Grey Box - cypress pine shrub grass shrub tall woodland in the Brigalow Belt South Bioregion *Derived Native Grassland* (DNG)	1.04	1	3	6
-	Category 1 – Exempt Land	1,002.11	-	13	7
-	Exotic roadside	0.39	-	-	2
-	Dam/Road/Structure	5.67	-	-	-
TOTAL		**1,015.67**	**6**	**36**	**41**



Legend

- Project Area Boundary
- Subject Land
- Category 1 - Exempt Land
- Remote Camera Locations (Aug 2021)
- Remote Camera Locations (Sep - Oct 2023)
- Call Playback
- Koala SAT Survey
- Survey Tracklog (Spring 2020)
- Survey Tracklog (Summer 2021)
- Survey Tracklog (Spring 2021)
- Survey Tracklog (Summer 2022)
- Spotlighting Tracks (Winter 2021)
- Survey Tracklog (Spring 2023)
- Spotlighting Tracklog (Spring 2023)
- Local Road
- State Road'
- Creeks/Rivers

FIGURE 2.1

Survey Effort

Image Source: ESRI Basemap Data source: NSW DFSI (2022), RES (2024)

3.0 Results

3.1 Landscape Value

3.1.1 Landscape Features

In accordance with the requirements of the BAM, landscape features within a 1,500 m buffer have been mapped surrounding the Subject Land. This 1,500 m buffer area predominantly contains agricultural land, with a mixture of forested areas from regrowth to intact, and a mosaic of main roads and dirt tracks. These landscape features are outlined in relation to the Subject Land in **Table 3.1** below.

Table 3.1 Landscape Features in the Subject Land

Landscape Features	
IBRA Bioregion	NSW Southwestern Slopes.
IBRA Subregion	Inland Slopes.
Mitchell Landscape	Gulgong Ranges, Cope Hills Granite, Talbragar – Upper Macquarie Terrace Sands and Gravels.
Rivers, Streams, Estuaries	Small, degraded first order ephemeral streams exist within the Subject Land.
Wetlands (within, adjacent to and downstream)	None.
Native Vegetation Extent	The native vegetation extent has been derived from the State vegetation type map (SVTM), field validation and survey within the Subject Land. Approximately 892.91 ha in the 1,500 m buffer area (19.76%) – predominantly comprised of woodland areas and derived native grassland in various conditions. The remaining 3,624.18 ha consists of exotic vegetation and disturbed areas.
Areas of Geological Significance and Soil Hazard Features	None identified.
Areas of Outstanding Biodiversity Value	None.
Exotic/Disturbed Areas	Cleared tracks exist within the Subject Land. There are large areas of the Subject Land dominated by exotic vegetation which have not been assigned to a PCT. There are also areas of Category 1 – exempt land that have been excluded from assessment, as per Section 1.5 of the BAM.
Connectivity Features	The Subject Land is not an important link for any fauna movement and has not been identified in connectivity mapping. Not identified within a Priority Investment Area. Not identified as an important flyway for migratory species.

3.2 Native Vegetation within the Subject Land

3.2.1 Plant Community Types and Vegetation Zones

Surveys of the Subject Land identified three PCTs, in two condition types (refer to **Figure 3.1**):

- PCT 81 Western Grey Box – cypress pine shrub grass shrub tall woodland in the Brigalow Belt South Bioregion moderate condition (1.95 h)
- 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 moderate condition (3.58 hectares)
- PCT 318 Mugga Ironbark -Tumbledown Red Gum - Red Box - Black Cypress Pine open forest on shallow stony soils on hills in the NSW South Western Slopes Bioregion moderate condition (0.93 h)
- PCT 81 Western Grey Box - cypress pine shrub grass shrub tall woodland in the Brigalow Belt South Bioregion derived native grassland (1.04 hectares)

Descriptions of the vegetation zones are outlined below, and a flora species list is included in **Appendix B**.

3.2.1.1 Zone 1 – PCT 81 – Western Grey Box - cypress pine shrub grass shrub tall woodland in the Brigalow Belt South Bioregion moderate condition

PCT Name	**PCT 81 Western Grey Box - cypress pine shrub grass shrub tall woodland in the Brigalow Belt South Bioregion**	
Condition	**Moderate Condition**	
PCT Formation	Grassy Woodlands	
PCT Class	Floodplain Transition Woodlands	
PCT Per cent cleared	78	
Area (ha)	1.95	
Patch Size Class (ha)	101	
General Description	This vegetation zone occurs largely as scattered patches throughout the centre of the Subject Land (refer to **Figure 3.1**). The identification of this vegetation zone was based on information collected during onsite surveys and considering topography and landscape position.	

PCT Name	PCT 81 Western Grey Box - cypress pine shrub grass shrub tall woodland in the Brigalow Belt South Bioregion
Canopy Description	A fairly open canopy dominated by western grey box (*Eucalyptus microcarpa*) (also known as inland grey box), with occasional rough- barked apple (*Angophora floribunda*) and yellow box (*Eucalyptus melliodora*). Some patches of this vegetation community are co- dominated by fuzzy box (*Eucalyptus conica*) and western grey box.
Mid-storey Description	Very little mid storey is present, except for saplings of the dominant Eucalypt species.
Ground Cover Description	This vegetation zone is characterised by a predominantly native ground layer comprising a mixture of grasses and herbs. Dominant native grasses consist of western rats-tail grass (*Sporobolus creber*), three-awn grass (*Aristida vagans*) and wallaby grass (*Rytidosperma tenuis*). Less dominant native grasses and herbs include windmill grass (*Chloris truncata*), wiry panic (*Entolasia stricta*), blueberry lily (*Dianella longifolia*) and *Einadia hastata.* These native species are accompanied by exotic species including catsear (*Hypochaeris radicata*), fleabanae (*Conyza bonariensis*) and *Paronychia brasiliana.*
PCT Allocation	PCT options for this vegetation zone were identified using BioNet VIS and filtering for western grey box (*E. microcarpa*), black cypress pine (*C. endlicheri*) and *Calotis lappulacea,* as well as the inland slopes subregion. Four PCTs contain all four of these characteristics, which are PCT 77, PCT 80, PCT 81 and PCT 82. PCT 77 was immediately discounted because its formation is an Arid Shrubland, with an Acacia sub-formation. While the floristic match for PCT 80 appeared suitable initially, the location in the landscape states that it is found on alluvial or stagnant alluvial plains in the predominantly winter rainfall belt of southern-central NSW. Mainly restricted to the eastern section of the Riverina Bioregion and the western section of the NSW South Western Slopes Bioregions (DPIE 2021c). This description is not suitable for the vegetation community on site. PCT 82 is very similar to PCT 80, and is therefore also a sound floristic match. However PCT 82 contains a large list of shrubs as diagnostic species, 19 in total, none of which occur in this community on site. PCT 81 was chosen because this PCT, unlike the others, also contains rough- barked apple (*A. florbunda*), which is on site, with the western grey box and black cypress pine. Additionally, while PCT 81 also has a long list of shrubs, most of which are not present on site, it does list Sifton bush (*Cassinia sifton*) and a variety of wattles (*Acacia spp.*), both of which are present on site. It also contains six of the diagnostic groundcover species, which is relatively high given the homogenous and low diversity- nature of the ground layer on site. This is also the mapping unit displayed on the regional mapping for the area. It was therefore considered likely that PCT 81 was the most suitable, given the species assemblage and the position in the landscape.
BC Act Status	Inland Grey Box Woodland in the Riverina, NSW South Western Slopes, Cobar Peneplain, Nandewar and Brigalow Belt South Bioregions EEC.
EPBC Act Status	Grey Box (*Eucalyptus microcarpa*) Grassy Woodlands and Derived Native Grasslands of South-eastern Australia EEC.

3.2.1.2 Zone 2 – 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 moderate condition

PCT Name	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	Moderate Condition	
PCT Formation	Grassy Woodlands	
PCT Class	Western Slopes Grassy Woodlands	
PCT Per cent cleared	67	
Area (ha)	0.93	
Patch Size Class (ha)	101	
General Description	This vegetation zone occurs largely within the north of the Subject Land (refer to **Figure 3.1**). The identification of this vegetation zone was based on information collected during surveys and considering topography and landscape position.	
Canopy Description	An open canopy dominated by rough- barked apple (*Angophora* floribunda) and blakely's red gum (*Eucalyptus blakelyi*) with occasional yellow box (*Eucalyptus melliodora*).	
Mid-storey Description	Very little midstorey is present, except for saplings of the dominant Eucalypt species.	
Ground Cover Description	This vegetation zone is characterised by a predominantly native ground layer comprising a mixture of grasses and herbs. Dominant native grasses consist of western rats-tail grass (*Sporobolus creber*), three-awn grass (*Aristida vagans*) and wallaby grass (*Rytidosperma tenuis*). Less dominant native grasses and herbs include windmill grass (*Chloris truncata*), wiry panic (*Entolasia stricta*), blueberry lily (*Dianella longifolia*) and *Einadia hastata*. These native species are accompanied by exotic species including catsear (*Hypochaeris radicata*), fleabanae (*Conyza bonariensis*) and *Paronychia brasiliana*.	
PCT Allocation	PCT options for this vegetation zone were identified using BioNet VIS and filtering for rough-barked apple (*A. floribunda*), Blakely's red gum (*E. blakelyi*), and yellow box (*E. melliodora*) as well as the inland slopes subregion. Five PCTs contain all four of these characteristics, which are PCT 78, 81, 85, 281 and 381.	

PCT Name	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 78 was immediately discounted because its formation is a Forested Wetland. Similarly PCT 85 was not considered suitable as it is a river oak (*Casuarina cunninghamiana*) dominated community, and this species is not present on site. PCT 81 could also be immediately discounted as it is a better match for the vegetation in Zone 1. While the floristic match for PCT 381 appeared suitable initially, closer analysis of the floristic match showed that it had only seven species in common with the vegetation on site (discounting the midstorey), which is not very high. PCT 281 is very similar to PCT 381, and is therefore also a sound floristic match. However PCT 281 had a much higher floristic match with the vegetation on site, with 14 species. This is also the mapping unit displayed on the regional mapping for the area. It was therefore considered likely that PCT 281 was the most suitable, given the species assemblage and the position in the landscape.
BC Act Status	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 CEEC.
EPBC Act Status	White Box – Yellow Box – Blakely's Red Gum Grassy Woodland and Derived Native Grassland CEEC.

3.2.1.3 Zone 3 – PCT 318 – Mugga Ironbark -Tumbledown Red Gum - Red Box - Black Cypress Pine open forest on shallow stony soils on hills in the NSW South Western Slopes Bioregion moderate condition

PCT Name	318 Mugga Ironbark -Tumbledown Red Gum - Red Box - Black Cypress Pine open forest on shallow stony soils on hills in the NSW South Western Slopes Bioregion	
Condition	Moderate Condition	
PCT Formation	Semi-arid Woodlands (Shrubby sub-formation)	
PCT Class	Inland Rocky Hill Woodlands	
PCT Per cent cleared	60	
Area (ha)	0.93	
Patch Size Class (ha)	101	

PCT Name	318 Mugga Ironbark -Tumbledown Red Gum - Red Box - Black Cypress Pine open forest on shallow stony soils on hills in the NSW South Western Slopes Bioregion
General Description	This vegetation zone occurs largely on the western boundary of the Subject Land (refer to **Figure 3.1**). The identification of this vegetation zone was based on information collected during surveys and considering topography and landscape position.
Canopy Description	An open canopy dominated by tumbledown red gum (*Eucalyptus dealbata*), with mugga ironbark (*Eucalyptus sideroxylon*) and black cypress pine (*Callitris endlicheri*).
Mid-storey Description	The midstorey within this PCT in the Subject Land is largely absent, with occasional Sifton bush (*Cassinia Sifton*).
Ground Cover Description	This vegetation zone is characterised by a moderately dense native groundcover, mostly consisting of grasses. Dominant grass species include speargrass (*Austrostipa scabra*), western rat- tail grass (*Sporobolus creber*), threeawn speargrass (*Aristida vagans*) and common couch (*Cynodon dactylon*). Forbs were also present, with common native species being *Calotis lappulacea, Wahlenbergia spp.* and kidney weed (*Dichondra repens*). Exotic species were common in this PCT on site, though not dominant. Regularly encountered species include fleabane (*Conyza bonariensis*) and catsear (*Hypochaeris radicata*).
PCT Allocation	PCT options for this vegetation zone were identified using BioNet VIS and filtering for tumbledown red gum (*E. dealbata*), mugga ironbark (*E. sideroxylon*) and the inland slopes subregion. Four PCTs were considered suitable from the list generated, because they feature tumbledown red gum in the community name, which was considered relevant given the dominance of this species. The PCTs considered were PCT 318, PCT 332, PCT 461 and PCT 1279. PCT 332 and PCT 1279 was immediately discounted because of the presence of inland scribbly gum (*Eucalyptus rossii*). This species is not present on site and from experience, is usually a dominant tree when it occurs. These PCTs also typically occur on steep hillsides and slopes, which are not present on site. PCT 461 has a good floristic match for the vegetation on site, with tumbledown red gum (*E. dealbata*), mugga ironbark (*E. sideroxylon*) and black cypress pine (*C. endlicheri*) all being diagnostic species. However, the position in the landscape does not appear to reflect the topography on site, with PCT 461 typically occurring on hillslopes, hillcrests and gullies in rises, low hills and hills (DPIE 2021c). PCT 318 was therefore chosen as the best match, given that tumbledown red gum (*E. dealbata*), mugga ironbark (*E. sideroxylon*) and black cypress pine (*C. endlicheri*) are the first three species listed as diagnostic species, implying that they are the most dominant. This reflects the vegetation on site. While the midstorey cannot be used as a floristic match, due to its absence as a result of disturbance, the groundcover species show floristic similarity with that on site, with eight species being present. This is not a high number; however the vegetation is highly degraded, and this PCT represents the best match in a disturbed setting. Finally, it is the only PCT of the four interrogated that is present on foot slopes, which is a much better description of its place on site, rather than on slopes, crests and hillsides.
BC Act Status	Not consistent with any listed TEC under the BC Act.
EPBC Act Status	Not consistent with any listed TEC under the EPBC Act.

3.2.1.4 Zone 4 – PCT 81 – Western Grey Box - cypress pine shrub grass shrub tall woodland in the Brigalow Belt South Bioregion derived native grassland

PCT Name	PCT 81 Western Grey Box – cypress pine shrub grass shrub tall woodland in the Brigalow Belt South Bioregion	
Condition	**Derived native grassland**	
PCT Formation	Grassy Woodlands	
PCT Class	Floodplain Transition Woodlands	
PCT Per cent cleared	78	
Area (ha)	1.93	
Patch Size Class (ha)	101	
General Description	This vegetation zone occurs largely as discrete patches in the south of the Subject Land (refer to **Figure 3.1**). The identification of this vegetation zone was based on information collected during onsite surveys and considering topography and landscape position.	
Canopy Description	Canopy is absent within this vegetation zone. Scattered western grey box (*Eucalyptus microcarpa*) (also known as inland grey box), and occasional rough- barked apple (*Angophora floribunda*) and yellow box (*Eucalyptus melliodora*) are present in proximity to the vegetation zone.	
Mid-storey Description	Very little mid storey is present, except for saplings of the dominant Eucalypt species (outside the vegetation zone).	
Ground Cover Description	This vegetation zone is characterised by a mixed native and exotic ground layer comprising a dominated by grasses but with some herbs. Dominant native grasses consist of kangaroo grass (*Themeda triandra*), western rats-tail grass (*Sporobolus creber*), shorthair plumegrass (*Dichelachne micrantha*), Brown's lovegrass (*Eragrostis brownii* and hairy panic (*Panicum effusum*). Less dominant native grasses and herbs include purple wiregrass (*Aristida ramosa*), red grass (*Bothriochloa macra*), mountain burr-daisy (*Calotis cuneata*) and *Einadia hastata.* These native species are accompanied by exotic species including soft brome (*Bromus hordeaceus*), catsear (*Hypochaeris radicata*), fleabanae (*Conyza bonariensis*), St. Johns wort (*Hypericum perforatum*), petty spurge (*Euphorbia peplus*) and purpletop (*Verbena bonariensis*).	
PCT Allocation	This grassland community was assigned to PCT 81 in a derived native grassland form as it occurs near to patches that were allocated to PCT 81. Evidence of this community returning to the grassland patches is evident in the regeneration of sapling Eucalypts that occur on the edges between the woodland and native grassland patches.	
BC Act Status	Not consistent with any listed TEC under the BC Act.	
EPBC Act Status	Not consistent with any listed TEC under the EPBC Act.	

3.2.2 Threatened Ecological Communities

Two TECs listed under the BC Act and two TECs listed under the EPBC Act were identified within the Subject Land. **Table 3.2** and **Table 3.3** below identify the TECs, the corresponding PCTs, and area of impact for each TEC. The following subsections detail the decision-making process for each TEC.

Table 3.2 Summary of TECs listed under the NSW BC Act

Threatened Ecological Community listed under the NSW BC Act	Vegetation Zone	Area (ha)
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 CEEC	Zone 2 – PCT 281 moderate condition	3.58
Inland Grey Box Woodland in the Riverina, NSW South Western Slopes, Cobar Peneplain, Nandewar and Brigalow Belt South Bioregions Endangered Ecological Community EEC	Zone 1 – PCT 81 *moderate condition*	1.95

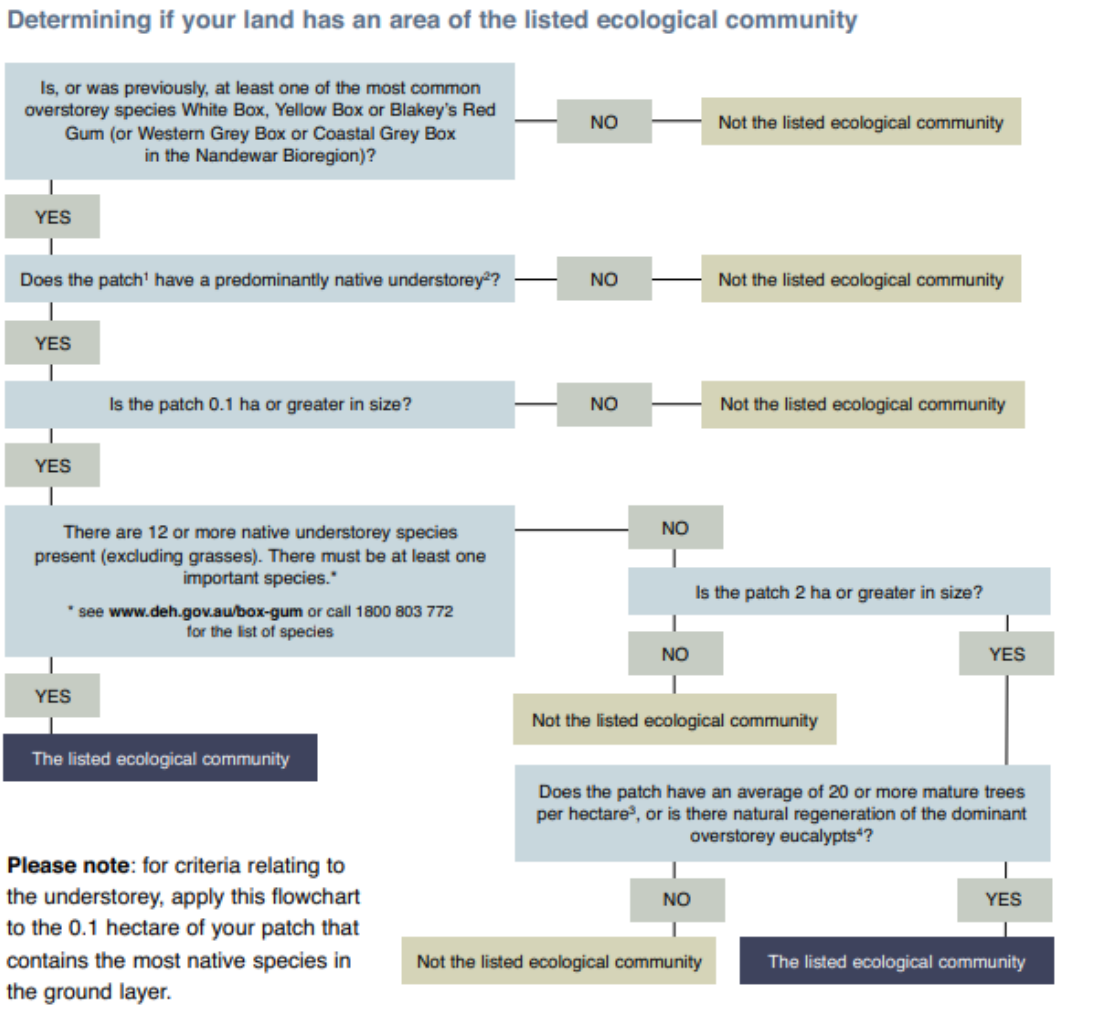
Table 3.3 Summary of TECs listed under the Commonwealth EPBC Act

Threatened Ecological Community listed under the EPBC Act	Vegetation Zone	Area (ha)
White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland CEEC	Zone 2 – PCT 281 moderate condition	3.58
Grey Box (*Eucalyptus microcarpa*) Grassy Woodlands and Derived Native Grasslands of South-eastern Australia EEC	Zone 1 – PCT 81 moderate condition	1.95

3.2.2.1 White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland CEEC

In determining whether the vegetation within the Subject Land conforms to the White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and DNG CEEC (Box-Gum Woodland CEEC), the flowchart (DEH 2004) stepping out the requirements of this community must be consulted. **Photo 3.1** identifies these requirements, and the determination to include the DNG areas in this CEEC is documented below in **Table 3.4** .

Photo 3.1 Flowchart depicting conformity to Box-Gum Woodland CEEC (DEH 2004)



[1] Patch – a patch is a continuous area containing the ecological community (areas of other ecological communities such as woodlands dominated by other species are not included in a patch). In determining patch size it is important to know what is, and is not, included within any individual patch. The patch is the larger of:

- an area that contains five or more trees in which no tree is greater than 75 m from another tree, or
- the area over which the understorey is predominantly native.

Patches must be assessed at a scale of 0.1 ha (1000m^2) or greater.

[2] A predominantly native ground layer is one where at least 50 per cent of the perennial vegetation cover in the ground layer is made up of native species. The best time of the year to determine this is late autumn when the annual species have died back and have not yet started to regrow. (At other times of the year, you can determine whether something is perennial or not is if it is difficult to pull out of the soil. Annual species pull out very easily.)

[3] Mature trees are trees with a circumference of at least 125 cm at 130 cm above the ground.

[4] Natural regeneration of the dominant overstorey eucalypts when there are mature trees plus regenerating trees of at least 15 cm circumference at 130 cm above the ground.

Table 3.4 Summary of Box Gum Woodland Identification Process under the Commonwealth EPBC Act

Requirement	Vegetation on Site
Is, or was previously, at least one of the most common overstorey species White Box, Yellow Box or Blakely's Red Gum?	Yes – Blakely's Red Gum is the dominant tree species in this community on site, with occasional yellow box also present.
Does the patch have a predominantly native understorey?	Yes, the patch contains predominantly native species in the understorey, though diversity is low, with very few weeds present.
Is the patch 0.1 ha or greater in size?	Yes.
There are 12 or more native understorey species present (excluding grasses). There must be at least one important species.	All plots in this community contained fewer than 12 native understorey species, when grasses were excluded. There were important species present however, with *Calotis cuneifolia* being present in almost all plots.
Is the patch 2 ha or greater in size.	Yes.
Does the patch have 20 or more mature trees per hectare or is there natural regeneration of the dominant overstorey Eucalypts?	The patch does not have 20 or more mature trees per hectare.
Conclusion.	The patch conforms to the CEEC.

3.2.2.2 Grey Box (*Eucalyptus microcarpa*) Grassy Woodlands and Derived Native Grasslands of South-eastern Australia EEC

In determining whether the vegetation on site conforms to the Grey Box (*Eucalyptus microcarpa*) Grassy Woodlands and Derived Native Grasslands of South-eastern Australia EEC (Grey Box Grassy Woodland EEC), the Threatened Species Scientific Committee (TSSC) Listing Advice must be consulted (TSSC 2010). Using the key diagnostic characteristics in the listing advice it was determined that the remnant woodland components (Vegetation Zone 1) aligned with Grey Box Grassy Woodland EEC. This was due to the following criteria being met:

- The Subject Land occurring on the lower slopes and plains of central NSW.
- The vegetation structure of the community taking the form of a woodland.
- The canopy being dominated by *Eucalyptus microcarpa* (greater than 50% cover).
- A shrub layer present with less than 30% cover.
- The ground layer comprising native grasses and forbs.

There are large areas of grassland surrounding the patches of remnant Grey Box Grassy Woodland EEC. This grassland has been determined to be Category 1 – Exempt Land under NSW legislation. Category 1 – Exempt Land is not recognised under the EPBC Act, consequently these grassland areas were assessed through rapid assessment and floristic plots. It was determined that the grassland areas of the Subject Land do not meet the criteria for Grey Box Grassy Woodland DNG EEC.

To meet the key diagnostic criteria the grassland areas must achieve a total perennial native vegetation cover of at least 50% in the ground layer at any time of the year. The grassland areas were surveyed throughout spring, summer and winter. Of the total ground cover over 50% of the cover comprised exotic species cover. It was determined that the grassland areas of the Subject land do not conform to Grey Box Grassy Woodland DNG EEC.

3.2.3 Vegetation Integrity Score

Table 3.5 below details the vegetation integrity scores for the vegetation zones in the Subject Land. The vegetation integrity data for each of the vegetation zones is provided in **Appendix C**.

Table 3.5 Vegetation Zone Vegetation Integrity Scores

Veg Zone	PCT Name	Presence of Hollow-bearing Trees	Composition	Structure	Function	Current Vegetation Integrity Score
1	81 Western Grey Box - cypress pine shrub grass shrub tall woodland in the Brigalow Belt South Bioregion *Moderate Condition*	No	91.1	71.7	60.4	73.3
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 *Moderate Condition*	Yes	64.7	88.6	70.3	73.9
3	318 Mugga Ironbark -Tumbledown Red Gum - Red Box - Black Cypress Pine open forest on shallow stony soils on hills in the NSW South Western Slopes Bioregion *Moderate Condition*	Yes	43.1	51.9	41.4	45.2
4	81 Western Grey Box - cypress pine shrub grass shrub tall woodland in the Brigalow Belt South Bioregion *DNG*	No	63.8	64.1	20.1	43.5

3.3 Threatened Species within the Subject Land

3.3.1 Ecosystem-credit Species

A list of the ecosystem-credit species predicted to occur by the BAM Calculator and/or the literature review and whether they are considered likely to occur in the vegetation zones within the Subject Land is provided in **Appendix D**. Justification is provided for any species from the BAM-C automatically populated list excluded from assessment. Geographic limitations, vagrant species, habitat constraints, degradation or lack of suitable microhabitats are the permitted reasons for excluding species credit species.

3.3.2 Species-credit Species

A list of the species-credit species predicted to occur by the BAM Calculator and/or the literature review and whether they are considered likely to occur in the vegetation zones within the Subject Land is provided in **Appendix D**. No species-credit species were detected during any surveys within the Subject Land. Two species-credit species were detected outside of the Subject Land. These were *Diuris tricolor* and *Swainsona sericea*. As mentioned above these areas have been avoided in infrastructure design.

Since the initial BDAR submission in 2022, the BAM-Calculator has undergone a number of updates which has resulted in a new candidate species requiring assessment, being the southern myotis (*Myotis macropus*). The southern myotis (*Myotis macropus*), could not be ruled out to be present with the Subject Land based on habitat constraints. There are a number of waterbodies (>3 m in width) present across the Subject Land or within 200 m of the boundary. As there were no formal surveys carried out for this species, the species is assumed to be present. The species polygon details are provided in **Table 3.6** and the species polygon is mapped in **Figure 3.3**.

Table 3.6 Southern Myotis Species Polygon Details

Information Required	Species Polygon Details
Biodiversity Risk Weighting	2.
SAII Entity	No.
Habitat constraints / microhabitats present on the Subject Land / vegetation zone	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.
Extent of suitable habitat present	PCT 281 Condition Zone 2 – moderate Condition = 1.88 ha.
TBDC species specific recommendations	The TBDC notes to refer to the ‘‘Species credit’ threatened bats and their habitats - NSW survey guide for the Biodiversity Assessment Method’ for information on targeted survey requirements and mapping species polygons. The ‘‘Species credit’ threatened bats and their habitats – NSW survey guide for the Biodiversity Assessment Method’ notes that aerial imagery is to be used to map waterbodies with pools / stretches 3 m or wider on or within 200 m of the subject land. Species polygon boundaries should align with PCTs on the subject land to which the species is associated (listed in the TBDC) that are within 200 m of waterbodies mapped.
Habitat condition (vegetation integrity score for each vegetation zone in the polygon)	PCT 281 Condition Zone 2 – moderate Condition = 1.88.

The threatened flora species Bluegrass (*Dichanthium setosum*) has been surveyed across the majority of the Amended Project Area as part of summer surveys carried out in 2021 and 2022. There was no Bluegrass found within the Original Project Area. A small area associated with the proposed intersection upgrades (identified after the survey period) on the Castlereagh Highway was not covered as part of these surveys. Although this species has not been recorded across any part of the Amended Project, a conservative approach has been undertaken resulting in the assumed presences of this species within 0.9 ha of PCT 81 DNG within roadside vegetation.

For the purposes of this BDAR, species-credit species habitat occurring within the areas identified in **Figure 3.3** have been included in the species polygon.

Assumed presence is permissible under Section 5.3 of the BAM. The proponent will work with landowners post submission and prior to the commencement of construction to undertake the required surveys and amend the final credit liability for the Amended Project in light of survey outcomes.

The species polygon details are provided in **Table 3.7** and the species polygon is mapped in **Figure 3.3**.

Table 3.7 Bluegrass Species Polygon Details

Information Required	Species Polygon Details
Biodiversity Risk Weighting	2
SAII Entity	No
Habitat constraints / microhabitats present on the Subject Land / vegetation zone	N/A
Extent of suitable habitat present	PCT 81 Condition Zone 4 – DNG Condition = 0.9 ha
TBDC species specific recommendations	Use seed-head to identify. Survey Nov - May, 3 to 4 weeks after effective rainfall
Habitat condition (vegetation integrity score for each vegetation zone in the polygon)	PCT 81 Condition Zone 4 – DNG Condition = 43.5

3.3.3 SEPP (Biodiversity and Conservation) 2021

State Environmental Planning Policy (SEPP) (Biodiversity and Conservation) 2021 (the SEPP) must be considered when assessing impacts to the koala (*Phascolarctos cinereus*) in development applications to be considered by local councils. While the project is being assessed as a State Significant Development, and the provisions of koala habitat protection in the SEPP do not apply, the intent of the SEPP has been considered in the identification of potential koala habitat and breeding habitat for assessment under State and Commonwealth legislation.

The Subject Land is situated within Zone RU1 Primary Production, because of this Chapter 3 Koala Habitat Protection 2020 of the SEPP is applicable. Koala Habitat Protection 2020 describes:

- Potential habitat as areas of native vegetation where trees of the types listed in Schedule 2 constitute at least 15% of the total number of trees in the upper or lower strata of the tree component.
- Core koala habitat as area of land with a resident population of koalas, evidenced by attributes such as breeding females, being females with young, and recent sightings of and historical records of a population.

This assessment of koala habitat has used the koala feed tree schedule itemised in both Schedule 1 and Schedule 3 of SEPP (Biodiversity and Conservation) 2021 as the latter provides a comprehensive list of preferred feed trees based on recent studies (OEH 2018a).

Ten of the tree species listed in Schedule 3 of the SEPP have been recorded within the Subject Land. These tree species represent 15% or greater of the total number of trees within any PCT in the Subject Land and, as such, all PCTs across the Subject Land represent potential koala habitat. **Table 3.7** lists the koala feed trees present within the Subject Land.

Table 3.7 Koala Feed Tree Present within Subject Land

Scientific Name	Common Name
Angophora floribunda	Rough-barked Apple
Callitris glaucophylla	White Cypress Pine
Eucalyptus albens	White Box
Eucalyptus blakelyi	Blakely's Red Gum
Eucalyptus conica	Fuzzy Box
Eucalyptus dealbata	Tumbledown Red Gum
Eucalyptus melliodora	Yellow Box
Eucalyptus microcarpa	Western Grey Box
Eucalyptus polyanthemos	Red Box
Eucalyptus sideroxylon	Mugga Ironbark

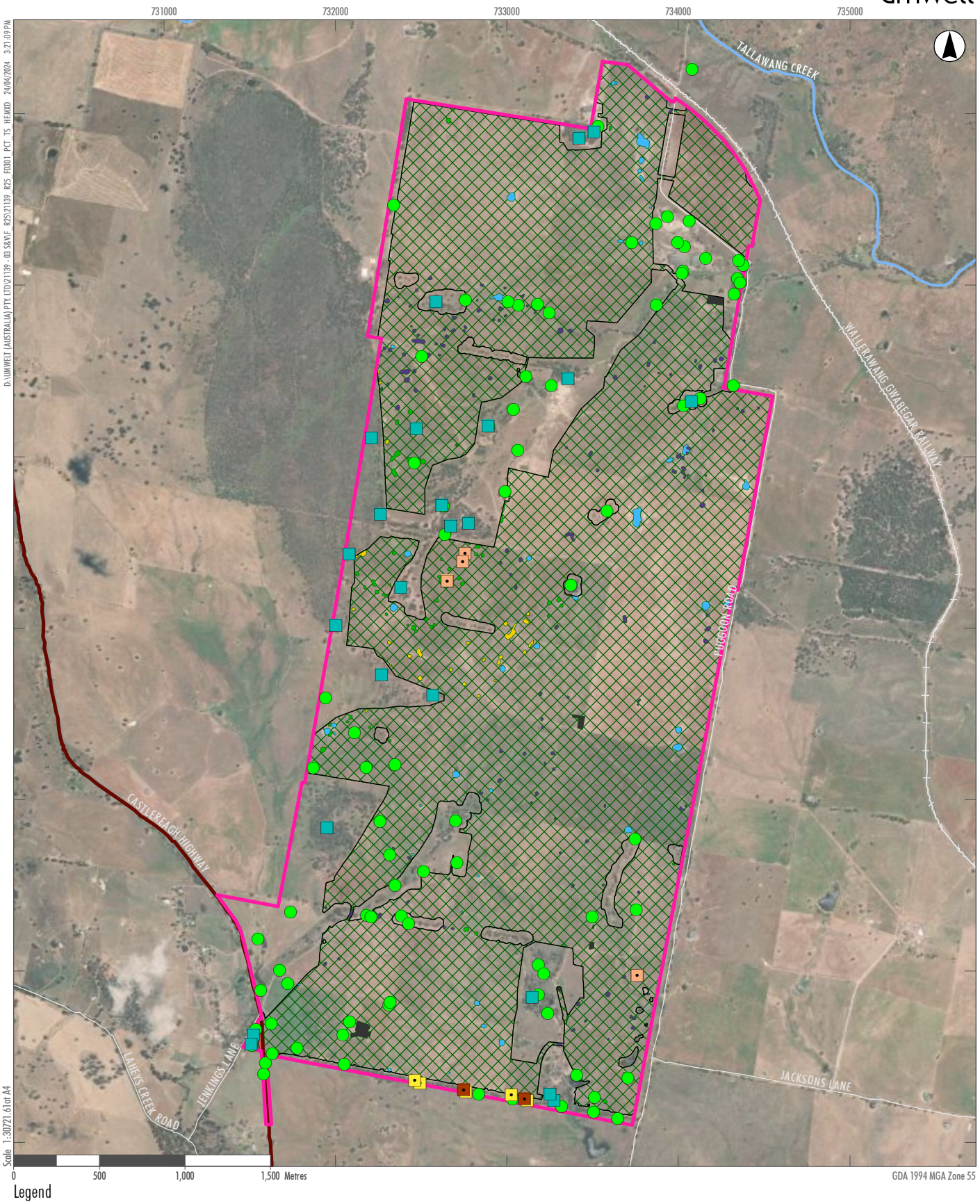
Despite the Subject Land representing potential habitat for the koala, the koala was not recorded in the Subject Land despite extensive ecological survey. This included nocturnal spotlighting searches, call playback, koala Spot Assessment Technique (SAT) surveys and remote camera surveys in areas of suitable habitat. Survey details are provided in Appendix A and survey locations are shown in **Figure 2.1**. In addition, a review of the BioNet Atlas of NSW Wildlife reveals no records of this species within 5 km of the Subject Land, with three records within 20 km of the Subject Land. These records range from 2002 to 2017.

As a result, the Subject Land does not represent core koala habitat as the koala was not recorded in the Subject Land and koalas have not been recorded nearby (within 5 km) within the last 18 years. No further provisions of koala habitat protection in SEPP (Biodiversity and Conservation) 2021 apply. Notwithstanding this, the koala is a dual ecosystem and species credit species under the BAM and has been further considered in **Appendix D**.

3.4 Aquatic Habitats

Several degraded, un-named, ephemeral, first and second order tributaries occur within the Subject Land. These were typically devoid of riparian vegetation as a result of historical agricultural and grazing practices. These areas are considered unlikely to provide any habitat for threatened species, due to their highly degraded nature and history of disturbance.

Tallawang Creek runs north of the Amended Project Area. The Amended Project Area does not support aquatic habitat identified as threatened Freshwater Fish Communities, Key Fish Habitat or Species Habitat as listed and mapped by Department of Primary Industries (DPI).



Legend

- Project Area Boundary
- Subject Land
- Flora Plot Location
- Large HBTs
- Extra-large HBTs
- Large and Extra-large HBTs
- Rapid Assessment Point

PCT and Condition

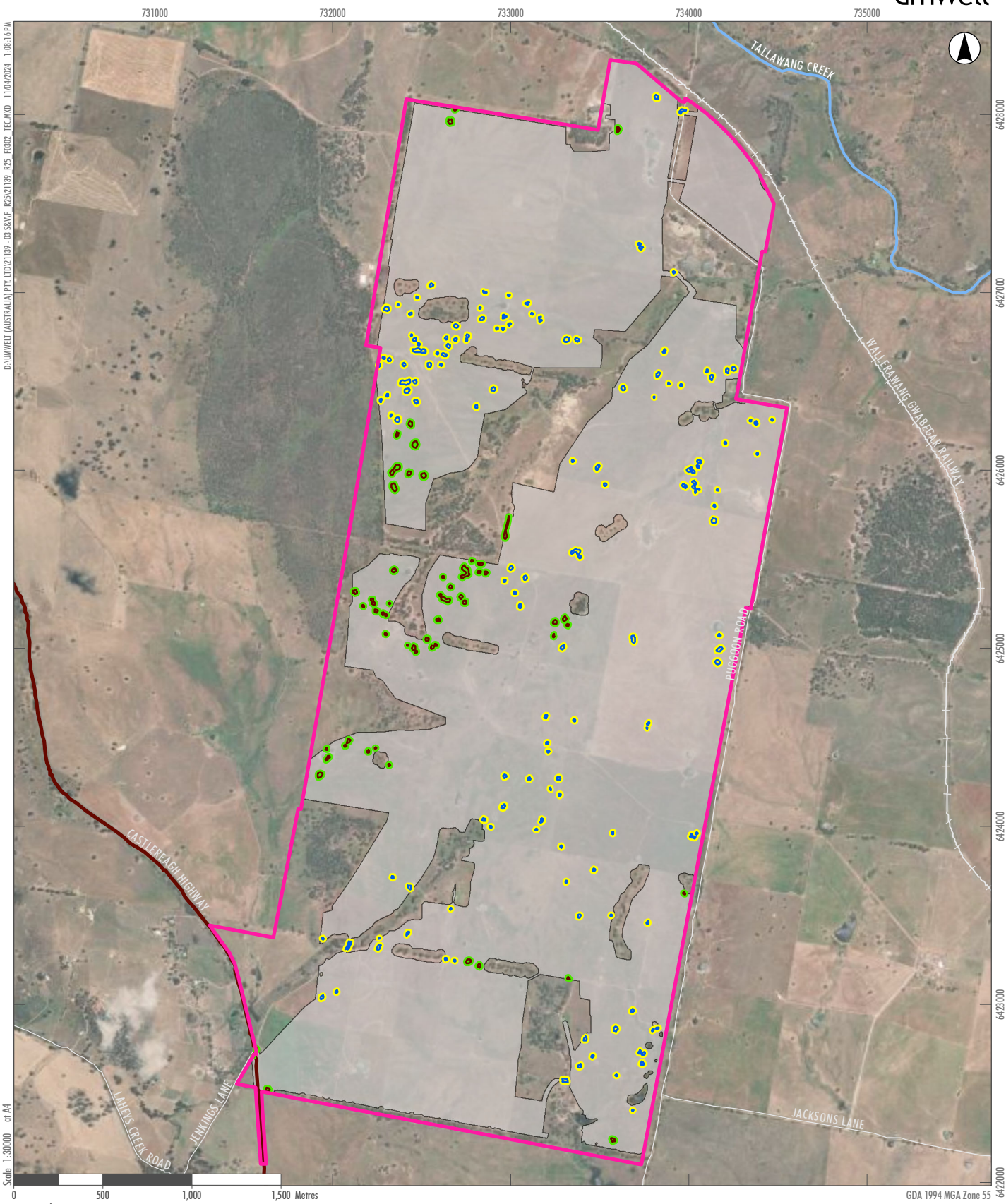
- 281 - Rough-Barked Apple - red gum - Yellow Box woodland Moderate Condition
- 318 - Mugga Ironbark -Tumbledown Red Gum - Red Box - Black Cypress Pine open forest Moderate Condition
- 81 - Western Grey Box - cypress pine shrub grass shrub tall woodland Derived Native Grassland Condition
- 81 - Western Grey Box - cypress pine shrub grass shrub tall woodland Moderate Condition
- Category 1 - Exempt Land
- Dam
- Exotic roadside
- Road
- Structure

- Local Road
- State Road'
- Creeks/Rivers

FIGURE 3.1

Plant Community Types, Threatened Species and Habitat Features in the Subject Land

Image Source: ESRI Basemap Data source: NSW DFSI (2022), RES (2024)



Legend

- Project Area Boundary
- Subject Land
- Local Road
- State Road'
- Creeks/Rivers

State Listed TEC

- Inland Grey Box Woodland
- White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland

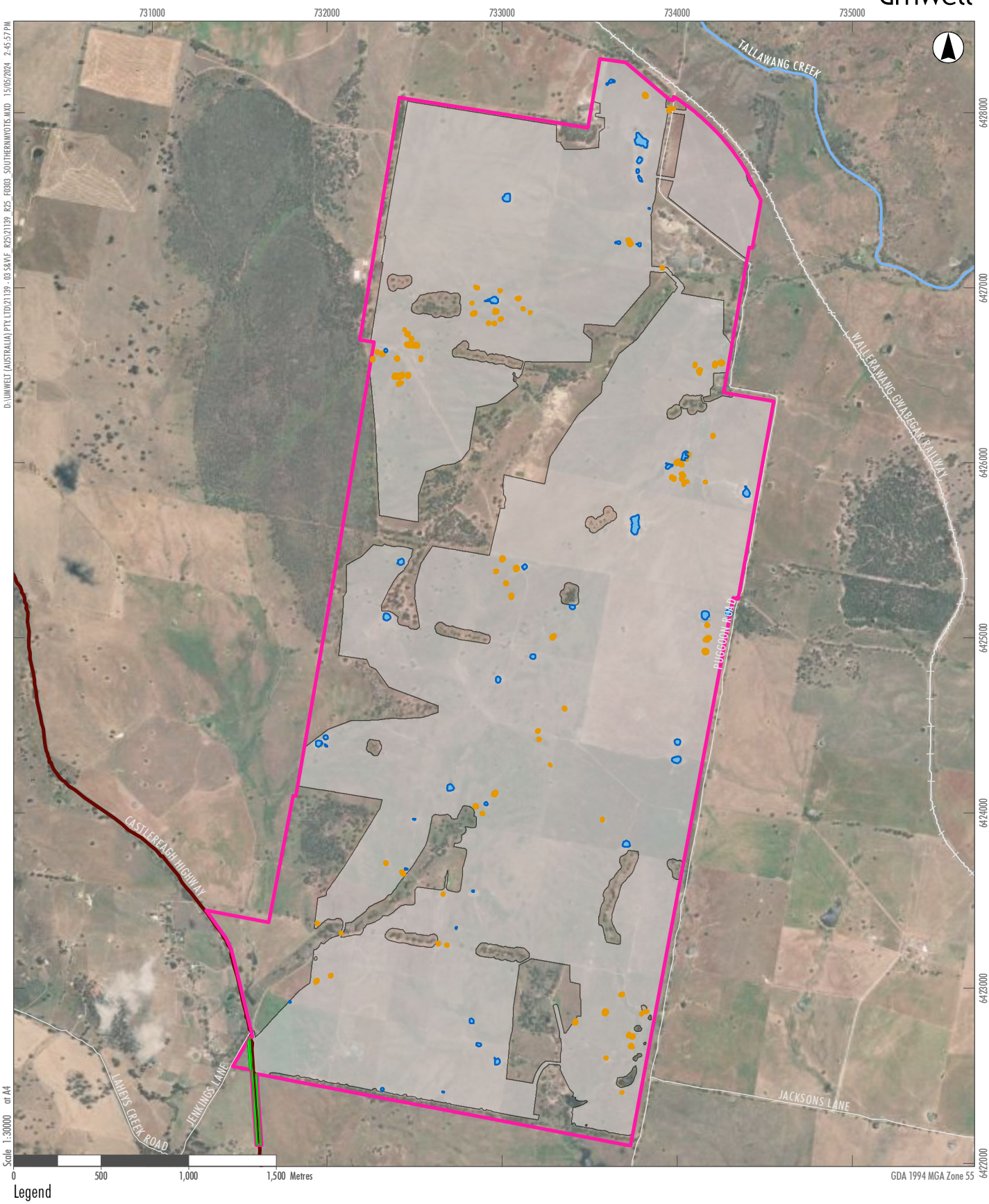
Federally Listed TEC

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

FIGURE 3.2

Threatened Ecological Communities

Image Source: ESRI Basemap Data source: NSW DFSI (2022), RES (2024)



Legend

- Project Area Boundary
- Subject Land
- Myotis Species Polygon
- *Dichanthium setosum* Species Polygon
- Dam
- Local Road
- State Road'
- Creeks/Rivers

FIGURE 3.3

Species Credit Species Polygons

Image Source: ESRI Basemap Data source: NSW DFSI (2022), RES (2024)

4.0 Avoidance and Minimisation of Impacts

4.1 Avoidance of Impacts

4.1.1 Avoidance of Native Vegetation and Habitat

A key part of site selection for RES involved identifying land where biodiversity impacts could be avoided and / or managed, as far as practicable. For Tallawang Solar Farm the selection criteria were:

- farmland with a land use history of heavy grazing and cropping activities
- location close to a proposed grid connection point.

After the site was selected RES went through multiple design phases to avoid as much remnant vegetation as practicable. This has resulted in remnant vegetation on the western boundary, which provides connectivity with a much larger area of remnant vegetation off site, being retained by the Proponent. Similarly, most creeks and major drainage lines in the Project Area providing biodiversity value have been avoided with a setback buffer of up to 40 m as part of the design. While these waterways and drainage lines may be in a degraded condition, the Proponent's design recognised that they may continue to provide some form of habitat corridor. See **Figure 4.1** for the alternative project footprints considered**.**

The biodiversity assessment commenced early in the design process which has allowed the Proponent to utilise ecological survey works to inform the progression of the conceptual layout of the Project. To avoid impacts on native vegetation the current design has focused on locating as much of the solar farm, associated infrastructure and temporary construction areas within exotic and / or previously cleared grassland areas (some of which is derived native grassland) with low biodiversity value. This method has resulted in the majority of the associated impacts being within these lower value areas.

Since the initial BDAR submission the Project Area has changed with the removal of the transmission line to the north and the introduction of the TWA facility, intersection upgrade on the Castlereagh Highway and an increase in the Development Footprint for the Solar Farm and BESS. Where possible the original avoidance strategy has been retained by minimising impacts to degraded drainages lines. The buffer from some of the drainage lines have been reduced to 20 m from the edge of the canopy in these areas to provide flexibility for detailed design of the project post approval.

The TWA facility and TWA access road will see an increase in removal of primarily Category 1 – exempt lands. During the design process, significant refinement of the access road has occurred to ensure any impacts to native vegetation from the TWA facility and access road are minimised. The original design considered the formalisation of the road reserve to the south of the Amended Project Area by constructing a paved road to service the TWA facility. The extensive works required in this area to formalise the road would have resulted in the removal of up to 5.5 ha of the State and Commonwealth listed EEC Inland Grey Box Woodland, and 0.5 ha of State and Commonwealth Listed CEEC White Box – Yellow Box – Blakely's Red Gum Grassy Woodland and Derived Native Grassland. To minimise these impacts, the road was shifted to within the Subject Land into areas nominated as Category 1 – exempt land adjacent to the road reserve and located at least 5 m from the canopy drip line to further minimise any indirect impacts to this vegetation.

In its entirety, the Subject Land is extremely degraded and consists largely of Category 1 – exempt land, and areas of derived native grassland. The solar arrays, BESS, TWA, access road, substation and associated infrastructure has been placed predominately in Category 1 – exempt land or other degraded areas, with only marginal stands of isolated remnant vegetation to be cleared. As previously mentioned, the only vegetation, which is connected to intact remnant vegetation off site, is to be retained.

In terms of the loss of habitat, the grassland areas where the solar array and BESS development will be, typically only provide foraging habitat for more mobile threatened species of bird and bat. This aerial foraging habitat will still be present upon installation of the solar farm, and therefore, the general removal of threatened species habitat is also being minimised, due to the nature of the project.

Two threatened forb species were detected during threatened species surveys. One individual of *Diuris tricolor* was detected in the southern remnant of the Amended Project Area and two individuals *Swainsona sericea* were detected adjacent to the creek line in the south west of the Amended Project Area.
All threatened species locations have been avoided in the final infrastructure layout.

Overall, within the Amended Project Area, Project placement and design has resulted in the avoidance of direct impacts on approximately 107 ha of remnant woodland and derived native grassland which equates to 93.44% of remnant woodland and derived native grassland being retained within the Amended Project Area, this is an increase from the 100 ha in the original proposal.

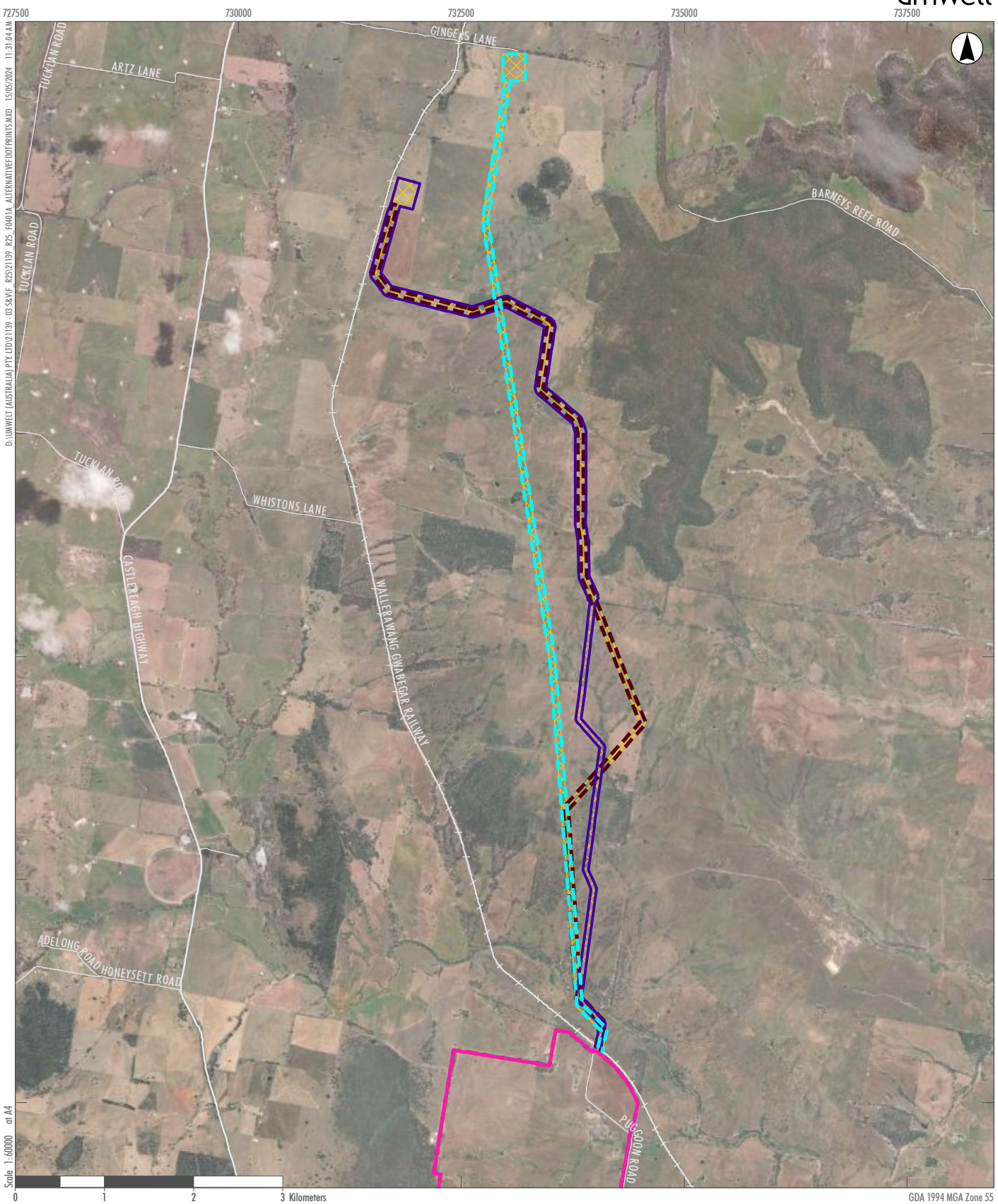
4.1.2 Avoidance of Prescribed Impacts

The following impacts are considered 'prescribed impacts' as per Section 6.1 of the *Biodiversity Conservation Regulation 2017*:

- impacts on the habitat of threatened species or ecological communities associated with karst, caves, crevices, cliffs and other geological features of significance, rocks, human-made structures or non-native vegetation
- impacts on the connectivity of different areas of habitat of threatened species that facilitates the movement of those species across their range
- impacts on movement of threatened species that maintains their life cycle
- impacts of development on water quality, water bodies and hydrological processes that sustain threatened species and threatened ecological communities
- impacts of vehicle strikes on threatened species or on animals that are part of a TEC.

As outlined in **Section 4.1.1** above, RES sought to avoid and minimise the potential impacts on the biodiversity values of the Subject Land primarily through general avoidance of remnant vegetation and careful placement of the solar farm and associated infrastructure. The Subject Land has been strategically located on land that has been extensively cleared associated with historical agricultural land uses, resulting in a small area of disturbance to native vegetation or fauna habitats.

Further detail on the assessment of prescribed impacts is outlined in **Section 5.2**.



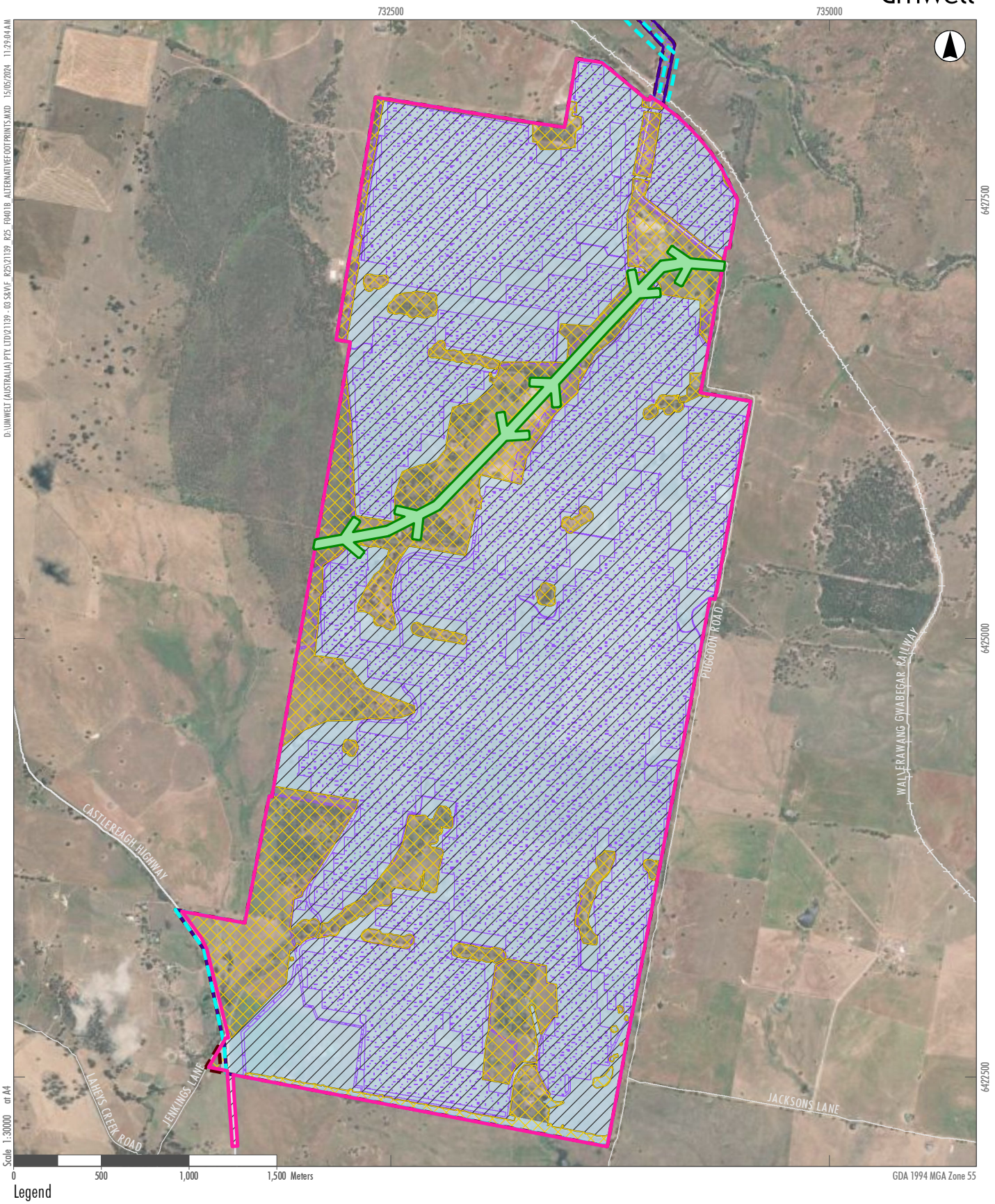
Legend

- Project Area Boundary
- Retained / Impact Avoidance Areas
- Alternate Variation of the Project Area
- Alternate Variation of the Project Area
- Alternate Variation of the Project Area
- Road

FIGURE 4.1A

Alternative Footprints Considered

Image Source: ESRI Basemap Data source: NSW DFSI (2022), RES (2024)



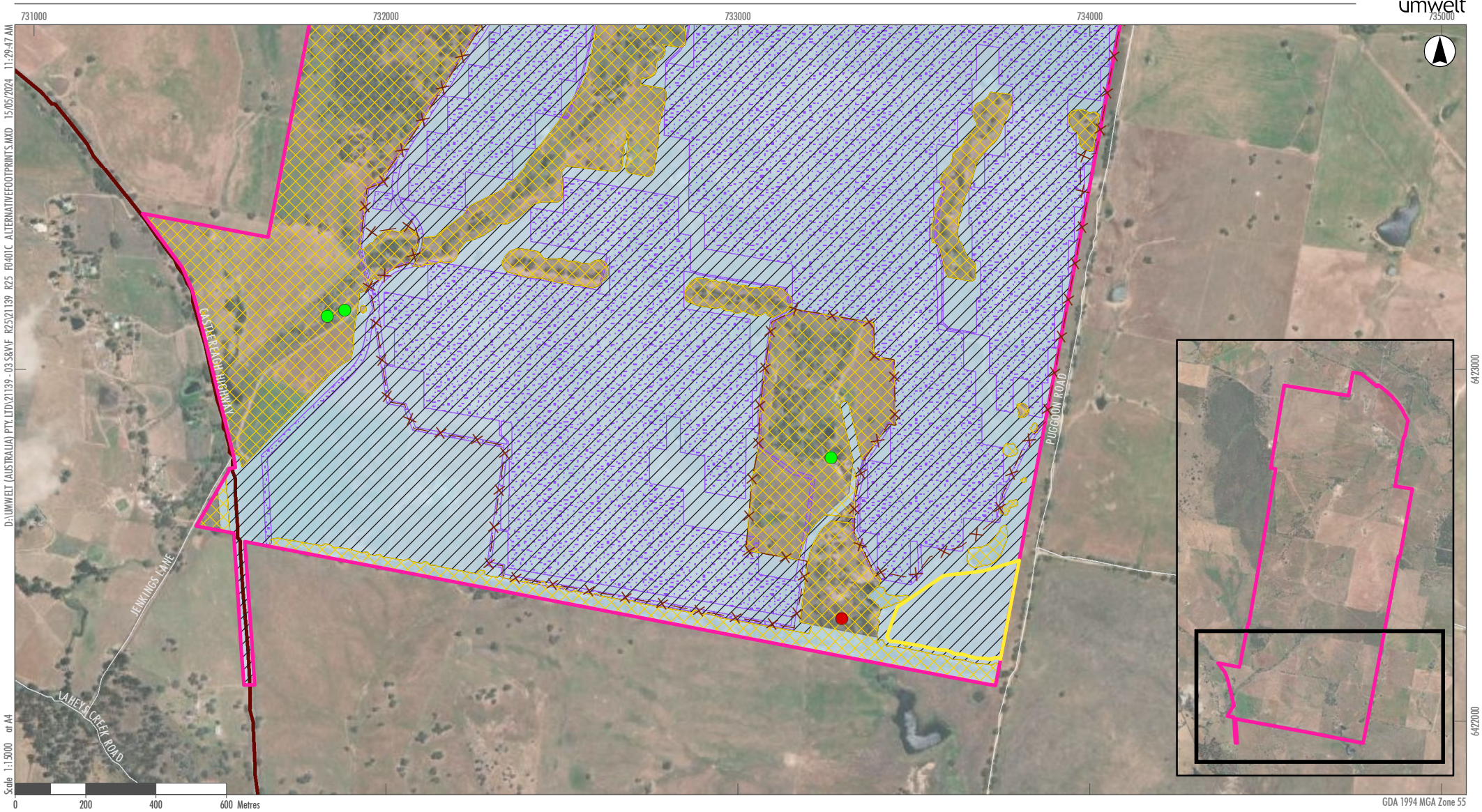
Legend

- Project Area Boundary
- Movement Corridor
- Original Subject Land (August 2022)
- Initial Amended Subject Land (February 2024)
- Amanded Subject Land (April 2024)
- Retained / Impact Avoidance Areas
- Alternate Variation of the Project Area
- Alternate Variation of the Project Area
- Alternate Variation of the Project Area
- Road

FIGURE 4.1B

Alternative Footprints Considered

Image Source: ESRI Basemap Data source: NSW DFSI (2022), RES (2024)



Legend

- Project Area Boundary
- Original Subject Land (August 2022)
- Initial Amended Subject Land (February 2024)
- Amanded Subject Land (April 2024)
- Retained / Impact Avoidance Areas
- Temporary Workers Accommodation (TWA)
- Security Fence

Avoided Threatened Species

- *Diuris tricolor*
- *Swainsona sericea*

- State Road'
- Local Road
- Railway
- Creeks/Rivers

FIGURE 4.1C

Alternative Footprints Considered

Image Source: ESRI Basemap Data source: NSW DFSI (2022), RES (2024)

4.2 Minimisation and Management of Impacts

The following specific control measures are considered to be integral to the mitigation of impacts on the biodiversity features of the Subject Land and are recommended:

- Salvage of biodiversity features, including habitat resources (e.g., hollow logs, tree hollows, fallen timber and rocks / boulders).
- A pre-clearing procedure will be implemented to minimise the potential for impacts on native fauna species (focusing on threatened species) as a result of the clearing of hollow-bearing trees / habitat features. The pre-clearing procedure is designed to minimise impacts to hollow-dependent and ground-dwelling fauna (respectively).
- Weed management.
- Fencing and access control.
- Bushfire management.
- Erosion and sedimentation control.
- Workforce education and training.

Each of these minimisation measures should be included in a Construction Environmental Management Plan. General guidance for their implementation is provided in the following subsections.

4.2.1 Pre-clearance and Tree-felling

Pre-clearance surveys and tree-felling supervision recommendations will be implemented to minimise the potential for impacts on native fauna species (including threatened species) as a result of the clearing of hollow-bearing trees.

4.2.1.1 Pre-clearance Surveys

Pre-clearance surveys are to be undertaken prior to tree felling works, be undertaken by suitably qualified and experienced persons / personnel and include:

- The demarcation of areas approved for clearing to reduce risk of accidental clearing.
- Habitat resources and habitat trees should be identified and marked (note: habitat trees are those containing hollows, cracks or fissures and spouts, active nests, dreys or other signs of fauna usage. Other habitat features to be identified include fallen timber/hollow logs, burrows, and boulder piles).
- The potential presence of threatened flora and fauna species, endangered populations and tecs should be identified.
- The identification of threatened species or habitat features that are suitable for translocation or salvage.
- Disturbance activities should be targeted to specific times of the year to minimise impacts to threatened species usage of habitat features for breeding and roosting, where practicable.

4.2.1.2 Tree-felling Supervision

Tree felling will be completed as close to the completion of pre-clearance surveys as practicable to limit the potential for new issues to arise (such as new active nests being built). Tree felling supervision will be undertaken by an appropriately qualified and experienced person after pre-clearance surveys have identified potential habitat features. The tree-felling process will include the following:

Prior to Felling Habitat Trees

- Completion of actions recommended from the pre-clearing surveys, including (but not limited to) salvage of identified habitat features, additional surveys to determine threatened fauna usage of the area (if required), any actions required to discourage fauna occupation.
- Removal of non-habitat trees/vegetation as close to the habitat tree felling date as possible in order to create disturbance to discourage fauna usage of the habitat trees.
- Tap or soft shake of habitat trees (with heavy machinery) as appropriate to encourage fauna to abandon trees.

On the Day of Felling Habitat Trees

- All habitat trees will be subject to a visual inspection to survey for fauna by an appropriately qualified and experienced person on the day of felling. Any identified fauna that can be safely removed prior to the felling of the tree will be removed and relocated to a suitable location.
- Habitat trees previously identified as containing fauna, or the potential for fauna, where hollows cannot be safely checked prior to felling, will be shaken and any fauna observed to be exiting the tree in response to the shaking will be given opportunity to vacate or assisted in suitable relocation.
- Providing no fauna are identified, the habitat trees will be lowered as gently as possible with heavy machinery.
- The felled tree shall be re-inspected at ground level by an appropriately qualified and experienced person and any live fauna identified will be captured and relocated prior to the movement of the habitat tree.
- Felled trees are to be rolled where appropriate so that the number of hollows blocked against the ground is minimised.
- Habitat features identified for translocation or salvage operations should be extracted and stored appropriately.
- If arboreal fauna are identified in a habitat tree on the day of felling, the supervising person is to advise the most appropriate method to minimise potential harm. This may include leaving the tree overnight, further shaking to encourage the animal to vacate the tree, gradual removal of branches to discourage ongoing use, soft-felling of the tree with the animal in the tree, or measures to capture and relocate the animal to secure habitats.
- Uninjured animals should be released on the day of capture into nearby suitable secure habitat and should not be held for extended periods of time.

Injured animals will be taken to the nearest veterinary clinic or wildlife carer as soon as possible for assessment and treatment.

4.2.2 Security fence and exclusion surveys

A security fence will be constructed surrounding the solar farm. Whilst alternative fencing options have been considered, the current industry standard design will be utilised which includes a 2.2 m high security fence (depending on final design) with barbed wire strands around the top of the security fence to prevent unauthorised access to the solar farm and BESS development area.

The change to the fence alignment around the drainage line has considered biodiversity values to facilitate fauna movement by connecting native vegetation in the west to patchy islands of native vegetation in the east. The change to the fence will see an additional 6 km (approximately) of fenceline created that will result in substantial increases in materials, resources and costs to undertake the works, to ensure an unimpeded movement corridor was retained across the Project Area.

It is considered that this will permanently exclude most fauna but unlikely to be of a significant barrier to avian species, or small mammal, reptiles or frogs.

To avoid native fauna (non-avian) becoming trapped within the solar farm, the solar farm security fence will be constructed in a sequential manner to allow an escape route up until the closure of the final gap. In the unlikely event native ground dwelling fauna is accidentally trapped within the fenced area the animal(s) will be trapped and removed by a qualified professional.

Breaches to the fence will be identified from routine inspections. In the very unlikely situation that the security fence is breached and the potential for fauna intrusion into the solar farm and BESS development area is identified, a qualified professional will be engaged to complete exclusion searches following any breaches.

4.2.3 Weed Management

Weed species could be inadvertently brought into the Subject Land or surrounding habitats with imported materials, on vehicles and mobile plant, or could invade naturally through removal of native vegetation and the creation of a suitable growth medium. The presence of weed species has the potential to decrease the value of vegetation for native species, particularly threatened species.

Weed management controls will include:

- The survey and treatment of invasive weed species prior to the disturbance of topsoil within the Subject Land to prevent exacerbation of the outbreak and / or the spread of the subject species to previously unaffected areas within the Subject Land.
- Ongoing environmental inspections and ad hoc (as required) treatment of outbreaks of invasive weed species within the Subject Land during the construction and operation of the project.
- All machinery and equipment will be cleaned thoroughly prior to entering the Subject Land. Cleaning must include the removal of all mud and plant matter (inside and out), followed by washing with high pressure water.

4.2.4 Fencing and Access Control During Construction

During construction, temporary exclusion fencing or other form of suitable marking measure, will be used to demarcate vegetation in locations where necessary to avoid accidental damage to areas of vegetation outside of the Subject Land.

Access control is an important feature in protecting and demarcating areas outside the Subject Land from vehicle access, human access, and accidental disturbance. Measures include:

- appropriate temporary fencing (or other form of suitable marking measures) and signposting of areas to prevent the uncontrolled entry of people, accidental disturbance and to minimise vehicular and human traffic
- clear and visible signage is to be appropriately located to inform the workforce and others of the restricted access or otherwise of areas outside the Subject Land
- worker education and awareness of exclusion areas, including as delivered through site induction information
- the use of GPS enabled machinery (where available) to help prevent accidental disturbance of exclusion areas.

4.2.5 Erosion and sediment control

A Stormwater Management Plan including an Erosion Sediment Control Plan will be prepared to appropriately limit post development flows and manage downstream water quality as part of the site establishment and clearing works.

Measures to be implemented include:

- minimising the area of disturbance (as far as practicable)
- diverting run-off water around disturbed areas
- installation and ongoing maintenance of temporary erosion and sediment controls (e.g., sediment fencing) throughout the duration of the construction of the Project
- design, implementation, and ongoing maintenance of permanent operational phase controls (e.g. catch drains) during the operational phase of the Project
- stabilisation (i.e., landscaping and revegetation) of all disturbed areas not required for the operation of the Project, to reduce the potential for future erosion.

The Erosion and Sediment Control Plan will be drafted with regard to the Managing Urban Stormwater: Soils and Construction (Volume 1) (the 'Blue Book') standard or to the standard of any equivalent replacement to this standard available at the commencement of construction.

4.2.6 Workforce Education and Training

The development of education packages and training can help to mitigate anthropogenic impacts on biodiversity resulting from the construction and operation of the Project. The ability of non-ecological personnel to identify key threatened species or key ecological threats can help to mitigate impacts on threatened species. The following mitigation actions will be implemented for the Project to develop a greater understanding and awareness of biodiversity issues in non-ecological trained personnel:

- Inductions for the workforce will be undertaken to make them aware of the key ecological issues present in the Subject Land to aid in their understanding of their role and responsibilities in the protection and/or minimisation of impacts to all native biodiversity.
- Inductions will identify the location of sensitive flora and fauna, including any defined exclusion / no-go areas, and the policies being implemented to protect the biodiversity values of such areas.
- Responsibilities with respect to weed management and biosecurity.

4.2.7 Summary of Measures, Timing and Responsibility

Management including the timing, action, outcome and responsibility of these measures.

Table 4.1 Recommended Avoidance and Minimisation Measures Before, During and After, Construction

Measure	Timing	Responsibility	Proposed Techniques	Outcome
Before Construction				
Preliminary ecological site inspection	Pre-project design	N/A	N/A	• Preliminary assessment of areas of avoidance to inform project design.
Location and design of works in existing disturbed areas.	Project design	N/A	N/A	• Focus impacts on areas of low biodiversity value.
Workforce education and training	Pre-construction and during construction and operation	Site Manager	• Environmental induction	• Environmental awareness for construction crews.
During Construction				
Implement Construction Environmental Management Plan	Prior to clearance and during clearance activities	Site Manager	Develop plan to adequately manage environmental impacts during construction	Minimal impacts to environmental values. Define environmental performance criteria for the construction of the Project.

Measure	Timing	Responsibility	Proposed Techniques	Outcome
Demarcation of approved clearance boundaries	Prior to clearance and during clearance activities	Site Manager	Clearly identify areas not proposed for clearance	Minimisation of unnecessary impacts to surrounding vegetation and habitats Avoidance of accidental over-clearing.
Pre clearance and tree felling supervision	Prior to clearance and during clearance activities	Project ecologist and site manager	Pre- clearance and tree felling in accordance with **Section 4.2**	Minimal impacts to local fauna and their habitats.
Erosion and Sediment	Prior to clearance and during clearance activities During operations	Project ecologist and site manager	Develop an Erosion and Sediment Control Plan to manage ESC impacts during construction and operations Implementation of outlined techniques during design and construction Implement outlined techniques during operations	Minimisation of sediment movement, site stability, minimisation of erosion within Subject Land. Avoidance of accidental release of sediment to waterways.
After Construction				
Fauna Exclusion	During the establishment of the security fence	Project ecologist and site manager	Exclude native fauna species from site. Methods will be documented in the CEMP	Avoid indirect impacts associated with entrapment.
Weed management	Construction and operation	Site Manager	Chemical and physical removal of invasive weed species in accordance with the *Noxious and Environmental Weeds Handbook* (DPI 2014). Regular inspection to identify potential weed infestations. Treatment implemented prior to initial disturbance as 'as required' beyond this point	Minimisation of environmental and noxious weeds within the site. Minimisation of weed spread from and into the wider locality.
Fencing and access control	Construction and operation	Site Manager	Security fences will be constructed around the three sections of the Solar Farm restricting access	Provides for access control to avoid unwanted human interference and disturbance to non-operational areas.
Erosion and sedimentation control	Construction and operation	Site Manager	Adequate controls during works for erosion and sediment control	Avoid sediment entering local creeks.

5.0 Assessment of Impacts

5.1 Impacts on Native Vegetation and Habitat

5.1.1 Direct Impacts

The direct impacts on native vegetation associated with the original project (including the transmission line) were 30.93 ha with 30 ha of State and Commonwealth listed TECs being impacted. The revised project design and removal of the transmission line of the Amended Project, will result in reduced impacts on biodiversity values which will include the loss of native vegetation and fauna habitat as a result of clearance works for the solar farm and BESS. The Subject Land generally contains a low abundance of important habitat features such as fallen logs and hollow-bearing trees, due to the majority being historically cleared and actively used for ongoing agricultural activities.

Table 5.1 below outlines the direct impacts on native vegetation, which totals approximately 7.5 ha. Avoidance and mitigation measures associated with minimising these direct impacts are discussed in **Section 4.0** above.

Table 5.1 Direct Impacts on Biodiversity Values

Plant Community Type	Area within the Subject Land (ha)
81 Western Grey Box – cypress pine shrub grass shrub tall woodland in the Brigalow Belt South Bioregion *moderate condition*	1.95
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 *moderate condition*	3.58
318 Mugga Ironbark -Tumbledown Red Gum – Red Box – Black Cypress Pine open forest on shallow stony soils on hills in the NSW South Western Slopes Bioregion *moderate condition*	0.93
81 Western Grey Box – cypress pine shrub grass shrub tall woodland in the Brigalow Belt South Bioregion DNG	1.04
Category 1 – Exempt Land	1,002.11

5.1.2 Indirect Impacts

The Amended Project is not expected to result in any substantial indirect impacts on the biodiversity values of the adjacent land. Some minor indirect impacts associated with loss of connectivity, noise, dust and weeds may occur at different stages of the Project and are discussed below in **Table 5.2**.

Table 5.2 Indirect Impacts

Impact	Description	Threatened Entity Impacted	Project Impact Intensity	Frequency / Duration	Project phase / timing of impact	Likelihood and consequences
Water	Changes to hydrology are considered unlikely and the project design will include inherent measures that maintain pre-development flows from the Subject Land (quantity and quality) into the ephemeral drainage systems in the Subject Land, which are being avoided. Some waterway crossings will be required during the construction phase. All waterway crossings will be designed and constructed in compliance with the Department of Primary Industries, Office of Water, Guidelines for riparian corridors on waterfront land and Guidelines for watercourse crossings on waterfront land. With implementation of management and mitigation measures outlined in the Water Resources Impact Assessment (Umwelt, 2023), surface water quality impacts resulting from the construction and decommissioning of the Amended Project are expected to be negligible. It is therefore not expected to be of any level of significance in relation to any locally occurring threatened species, populations or communities.	Ecosystem credit species retained for assessment in **Appendix D** and species credit threatened fauna species assessed as present in **Appendix D**.	Low	Infrequent / long term	Construction and operation	Likely to occur. Consequences include loss of existing ephemeral watercourses within the Subject Land.
Noise	Construction noise may disrupt the roosting and foraging behaviour of fauna species and reduce the occupancy of areas of suitable habitat within the Subject Land. Regarding potential impacts on biodiversity, there will be no substantial change to noise impacts given that the solar farm, when operational, will not generate additional noise beyond noise generally present in a rural environment Any additional impacts resulting	Ecosystem credit species retained for assessment in **Appendix D** and species credit threatened fauna species assessed as present in **Appendix D**.	Low	Frequent / short term	Construction	Construction noise will occur and likely limited to day time operations. The consequences may include short term reduction in suitability of retained and adjoining habitats

Impact	Description	Threatened Entity Impacted	Project Impact Intensity	Frequency / Duration	Project phase / timing of impact	Likelihood and consequences
	from noise emissions are not expected to be of any level of significance in relation to threatened species, populations and communities.					during construction works for sensitive fauna species. The likelihood of long term impacts is unlikely with on-going construction works to cense at the completion of construction and the low noise levels expected during the operational phase of the project.
Light	Light emissions resulting from security lighting at the solar farm may result in adverse impacts on adjacent habitats and, particularly nocturnal birds and bats. Behavioural changes in animals can occur in response to the physical presence of a development and include changes in foraging locations and mating behaviour (Gleeson and Gleeson 2012). Research into the impacts of altered lighting indicates that it can trigger behavioural and physiological responses including changes in foraging behaviour, disruptions of seasonal day length trigger cues for critical behaviour, disorientation and temporary blindness and interference with predator prey relationships (OEH 2016b). Appropriate lighting controls to minimise impacts will be implemented as part of the operation of the solar farm including minimisation of lighting emissions following Australian Standards.	Ecosystem credit species retained for assessment in **Appendix D** and species credit threatened fauna species assessed as present in **Appendix D**.	Low	Frequent / ongoing	Operation	Limited impacts may occur, consequences likely to include minor alteration to fauna behaviours including avoidance of light and opportunistic utilisation of light spill areas.

Impact	Description	Threatened Entity Impacted	Project Impact Intensity	Frequency / Duration	Project phase / timing of impact	Likelihood and consequences
	All lighting will be shrouded and aimed towards the ground. The proposed impact from lighting is unlikely to have a significant impact to threatened species or populations across the broader landscape.					
Weed management	Weed species could be inadvertently brought into the Subject Land with imported materials, on vehicles or mobile plant, or could invade naturally through removal of native vegetation. The presence of weed species within the Subject Land have the potential to decrease the value of proximate extant vegetation. Mitigation measures outlined in **Section 4.2** will be implemented to minimise the potential for weed encroachment into areas surrounding the Subject Land.	Ecosystem credit species retained for assessment in **Appendix D** and species credit threatened fauna species assessed as present in **Appendix D**.	Low	Frequent / long term	Construction and operation	Medium likelihood of weed spread is to occur, with the implementation of mitigation measures in **Section 4.2** that would include hygiene wash down of all equipment prior to entering the Subject Land. In addition, the likelihood would be reduced with all retained patches of native vegetation to be fenced off during construction and sign posted to ensure no entry reducing the chance of weed spread. The current low conditions of the site suggest that weed spread has and will continue to occur Consequences include introductions of new weeds and reduced

Impact	Description	Threatened Entity Impacted	Project Impact Intensity	Frequency / Duration	Project phase / timing of impact	Likelihood and consequences
						grazing and suppression of existing weeds.
Pest animal species	Populations of feral fauna species such as foxes, rabbits and cats can increase and quickly populate new areas as a result of disturbance. Clearing, thinning of vegetation and the creation of tracks have the ability to assist the establishment and spread of feral fauna species. Given the already degraded nature of the Subject Land, it is unlikely that pest fauna species populations would increase significantly due to the Project. However, the security fence may increase feral predator access the adjoining remnant vegetation (Harris I.M., Mills H.R. and Bencini R. 2010). Mitigation measures outlined in **Section 4.2** will minimise the potential for feral animal spread and impacts into surrounding areas around the Subject Land.	Ecosystem credit species retained for assessment in **Appendix D** and species credit threatened fauna species assessed as present in **Appendix** D.	Low	Frequent / long term	Construction and operation	Likely already occurring due to historical habitat modification. Low potential for increased impacts, potential consequences include reduced habitat suitability and predation of threatened fauna species.
Air quality impacts	Air quality impacts have the potential to adversely impact native species during ground disturbance works. Potential impacts include dust covering vegetation thereby potentially reducing vegetation health and growth. The design of the proposal will include inherent measures to minimise the potential for adverse dust impacts.	Ecosystem credit species retained for assessment in **Appendix D** and species credit threatened fauna species assessed as present in **Appendix D**.	Low	Infrequent / short term	Construction	Low potential to occur if appropriate dust suppression is undertaken. Consequences include physical injury to airways of fauna species and short term reduced photosynthetic capacity for impacted flora.

Impact	Description	Threatened Entity Impacted	Project Impact Intensity	Frequency / Duration	Project phase / timing of impact	Likelihood and consequences
Security fence	The construction of the security fence has the potential to cause indirect impact to biodiversity. The following indirect impacts have been identified and discussed: **Connectivity** The Amended Project is not directly impacting the large remnant areas present in the Amended Project Area. These areas have been avoided and will continue to contribute to the habitat values in the landscape primarily for highly mobile avifauna species. The fence location has been designed to follow the Subject Land boundary to minimise impacts to connectivity across the wider Amended Project Area. The fence location will result in the Solar Farm being divided into three separate areas that will facilitate movement from east to west through the degraded remnant drainage line. The fence design will also allow for access to vegetation and water bodies in the south eastern drainage line. The remaining changes to connectivity may have a negligible impact on fauna movement across the landscape as all other retained vegetation that will be enclosed within the Solar Farm will still be accessible for highly mobile species. The fence may also have a negligible impact on fragmentation of remnant areas. Large remnants occur on either side of the solar farm/ BESS, surrounded by degraded grasslands. They are connected through remnant vegetation along Tallawang Creek and the small remnant patches	Ecosystem credit species retained for assessment in **Appendix D** and species credit threatened fauna species assessed as present in **Appendix D**.	Moderate	Frequent / Long term	Construction and operation.	Likely to occur. Consequences include reduction in habitat connectivity.

Impact	Description	Threatened Entity Impacted	Project Impact Intensity	Frequency / Duration	Project phase / timing of impact	Likelihood and consequences
	within the solar farm/BESS, While the majority of native fauna species would prefer to use woodland to navigate through their landscape, some species are able to use a matrix of vegetation types to disperse. Species that rely on a corridor of woody vegetation to traverse their landscape may become species sensitive to changes in genetic assemblage (Gascon *et al* 1999; Giubbina *et al* 2016). These woodland reliant species may experience changes to connectivity. **Changes in fauna movements** The security fence is likely to act as a barrier to movement which will change the way fauna species move through the landscape in this area. The security fence is planned to be placed around the solar farm/ BESS and will be placed 500 m east of the Castlereagh Highway and 60 m to the railway line. As such, it may direct more fauna to the highway or railway line. To limit these impacts the re-designed fences is to follow the Subject Land boundary to minimise impacts to movement across the wider Amended Project Area. The fence location will result in the Solar Farm being divided into three separate areas that will facilitate movement from east to west through the degraded remnant drainage line which at is narrowest is 150 m. The fence design will also allow for access to vegetation and water bodies in the south eastern drainage line. It is hard to quantify the potential impacts in relation to changes in fauna movement patterns however there is the potential that the					

Impact	Description	Threatened Entity Impacted	Project Impact Intensity	Frequency / Duration	Project phase / timing of impact	Likelihood and consequences
	establishment of the fence could increase the occurrence of road/rail kill. **Entrapment** As discussed in **Section 4.2** the security fence has the potential to entrap fauna within the areas of the solar farm where the risk is not appropriately managed during construction or during maintenance activities. Mitigation measures outlined in **Section 4.2** will minimise the potential for native fauna to become trapped inside the security fence. **Increased feral predator predation** As discussed above, this project has the potential to increase feral predator abundance. As established in the literature (Harris I.M., Mills H.R. and Bencini R. 2010) structures in the landscape, that can influence how native fauna transverse the landscape, can lead to increased predation by feral predators on native fauna, the security fence may act as a structure to 'funnel' native fauna to areas where they are easily predated by feral fauna. Alternatively feral predators, such as the cat (*Felis catus*) and fox (*Vulpes vulpes*), may use the fence as a tool to predate on native fauna more successfully.					

Regarding potential impacts on biodiversity, there will be little substantial change to water, noise, weed species, pest animal, lighting, or air quality related impacts, given that the land is already highly disturbed and is adjacent to existing land uses that are highly modified for agricultural use, as well as main roads. While the solar farm itself is long term, construction is a temporary activity. Any additional impact resulting from the Project, is not expected to be of any level of significance in relation to threatened species, populations, and communities, given that the Subject Land will occur in an already disturbed area surrounded by tracks, roads and the cleared areas currently used for agricultural purposes.

5.2 Prescribed Impacts

Prescribed impacts are described in **Section 4.1.2** and an assessment of potential prescribed impacts is provided in **Table 5.3**. No threatened entities are considered likely to be dependent upon or may use habitat features associated with any of the prescribed impacts.

Table 5.3 Prescribed Impacts

Prescribed Impact	Potential for Impact	Justification
Impacts on the habitat of threatened species or ecological communities associated with karst, caves, crevices, cliffs and other geological features of significance, rocks, human-made structures or non-native vegetation	No	Karst, caves, crevices, cliffs and other geological features of significance, rocks or human-made structures that have potential to provide habitat for threatened fauna species are not located within, or in proximity to, the Subject Land. The 833.86 ha area of Category 1 – Exempt land is proposed to be impacted, though the area is not considered to be habitat for any threatened species or ecological communities.
Impacts on the connectivity of different areas of habitat of threatened species that facilitates the movement of those species across their range	No	Important connectivity and movement habitat is unlikely to be impacted by the proposed development. The Subject Land in its current disturbed state does not provide any high- quality habitat or substantial movement habitat for terrestrial, arboreal or aquatic threatened species. The Subject Land's location in the landscape is not conducive for fauna movement given the poor quality of much of the vegetation, and because it is largely surrounded by cleared agricultural land devoid of tracts of native vegetation.
Impacts on movement of threatened species that maintains their life cycle	No	The habitat present in the Subject Land is of low quality due to its highly disturbed state and is unlikely to be important to the movement of threatened species. It may support the occasional movement of more mobile species such as large forest owls and microbats.
Impacts of development on water quality, water bodies and hydrological processes that sustain threatened species and threatened ecological communities	No	Changes to hydrology are considered unlikely and the project design will maintain pre-development flows from the development area (quantity and quality) into the ephemeral drainage systems, given that they are being avoided as part of the design. It is therefore not expected to be of any level of significance in relation to threatened species, populations, and communities.

Prescribed Impact	Potential for Impact	Justification
Impacts of wind turbine strikes on protected animals	No	The impacts of wind turbines are not applicable to this proposed development.
Impacts of vehicle strikes on threatened species or on animals that are part of a TEC.	No	While the frequency of vehicular activity into the Subject Land may be increased, particularly during construction, it is not considered likely that this would result in vehicle strikes on threatened species or animals part of a TEC. Once the solar farm has been constructed, vehicle movements will be minimal, aside from routine maintenance activities. Native fauna are not likely to be in high abundance in these cleared, degraded areas. Vehicle strike will be to a minimum within the Subject Land after the establishment of the security fence and controls adopted during construction to prevent entrapment (as far as practicable).
Uncertain prescribed impacts - unable to be reliably predicted during the assessment process or are infrequent in nature. Associated with caves, cliffs, mine subsidence and wind turbine / increased vehicle strikes	No	No uncertain prescribed impacts will occur.

5.3 Serious and Irreversible Impacts

The determination of a SAII on biodiversity values is to be made by the decision maker in accordance with the principles set out in the BC Regulation 2017. Under Clause 6.7 (2) of the BC Regulation 2017, an impact is to be regarded as serious and irreversible if it is likely to contribute significantly to the risk of a threatened species or ecological community becoming extinct because of one of the following four principles:

- Principle 1: The impact will cause a further decline of the species or ecological community that is currently observed, estimated, inferred or reasonably suspected to be in a rapid rate of decline, or
- Principle 2: the impact it will further reduce the population size of the species or ecological community that is currently observed, estimated, inferred or reasonably suspected to have a very small population size, or
- Principle 3: it is an impact 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, or
- 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. SAII on biodiversity values of proposed development or activity means SAII on biodiversity values as determined under section 6.5 of the BC Act, that would remain after the measures proposed to be taken to avoid or minimise the impact on biodiversity values of the proposed development.

If decision maker is of the opinion that proposed SSD is likely to have SAII on biodiversity values, the Minister is required to:

- take those impacts into consideration, and
- determine whether there are any additional and appropriate measures that will minimise those impacts if consent or approval is to be granted.

Six species-credit species predicted by the BAM calculator for the Amended Project are also listed as serious and irreversible impact (SAII) entities in the Guidance to Assist a Decision-Maker to Determine a Serious and Irreversible Impact (OEH 2017). These are:

- regent honeyeater (*Anthochaera phrygia*) important habitat
- large-eared pied bat (*Chalinolobus dwyeri*) breeding habitat
- swift parrot (*Lathamus discolor*) important habitat
- *Euphrasia arguta*
- large bent-winged bat (*Miniopterus orianae oceanensisi*) breeding habitat
- *Prasophyllum* sp. *Wybong*.

Whilst these species are identified by the calculator, further consideration of their potential presence on site is required and **Table 5.4** details the assessment process for the identified SAII species.

Table 5.4 Serious and Irreversible Impacts Assessment

Species	SAII	Habitat Constraint	Likelihood of Occurrence	Further Assessment Required?
Anthochaera phrygia regent honeyeater	Yes, mapped important areas	Yes, mapped important areas	Moderate – species not recorded within the Subject Land or the surrounds despite onsite surveys. Nearest record approximately 10 km northwest of Subject Land. Further, the Subject Land does not contain any land mapped as important habitat for this species.	The Subject Land does not occur in the area mapped as "important habitat" and the species has not been recorded in the Subject Land. The Project is not expected to result in a serious and irreversible impact on this species.
Chalinolobus dwyeri large-eared pied bat	Yes, breeding habitat. Within 100 m of cliffs containing maternity roost/s	Yes, within 2 km of cliffs; rocky areas containing caves, overhangs, escarpments, outcrops, or crevices, or within two kilometres of old mines or tunnels.	Low – this species has been recorded less than 10 km north of the Amended Project Area. However, no foraging or roosting habitat has been observed within 2 km of the Subject Land.	No potential foraging or breeding habitat has been observed within 2 km surrounding the Subject Land. Required features for this species include habitat within two kilometres of rocky areas containing caves, overhangs, escarpments, outcrops, or crevices, or within two kilometres of old mines or tunnels (DPIE 2021a). The Project is not expected to result in a serious and irreversible impact on this species.
Lathamus discolor swift parrot	Yes, mapped important areas	Yes, mapped important areas.	Low – species not recorded within the Subject Land or the surrounds despite onsite surveys. Nearest record approximately 20 km northwest of Subject Land. Further, the Subject Land does not contain any land mapped as important habitat for this species.	The Subject Land does not occur in the area mapped as "important habitat" and the species has not been recorded in the Subject Land. The Project is not expected to result in a serious and irreversible impact on this species.

Species	SAII	Habitat Constraint	Likelihood of Occurrence	Further Assessment Required?
Euphrasia arguta	Yes	No	Low - not recorded within the Subject Land. Closest known record approximately 50 km east of Subject Land.	This species was not recorded within the Subject Land despite extensive targeted surveys. The degraded nature of the Subject Land, and the ongoing historical disturbance make the Subject Land very unsuitable for this species. The Project is not expected to result in a serious and irreversible impact on this species.
Miniopterus orianae oceanensis large bent-winged bat	Yes, breeding habitat; Cave, tunnel, mine, culvert or other structure known or suspected to be used for breeding including species records.	Yes, breeding habitat; Cave, tunnel, mine, culvert or other structure known or suspected to be used for breeding including species records.	Moderate - not recorded within the Subject Land. Closest known record approximately 5 km east of Subject Land. Further, the Subject Land does not contain any recognised breeding habitat for the species.	While the Subject Land may contain foraging habitat for this species, areas supporting breeding habitat are present. Required features for this species include caves, tunnels, mines, culverts, or other structures known or suspected to be used for breeding (DPIE 2021a). The Project is not expected to result in a serious and irreversible impact on this species.
Prasophyllum sp. Wybong	Yes	No	Low - not recorded within the Subject Land. Closest known record approximately 100 km east of the study area.	This species was not recorded within the Subject Land despite extensive targeted surveys. The degraded nature of the Subject Land, and the ongoing historical disturbance make the Subject Land very unsuitable for this species. The Project is not expected to result in a serious and irreversible impact on this species.
White Box – Yellow Box – Blakely's Red Gum Grassy Woodland	Yes	No	Known to occur within the Subject Land and surrounds.	Further assessment required. See **Section 5.3.1**.

5.3.1 Box-Gum Woodland CEEC SAII Assessment

An impact is to be regarded as serious and irreversible if it is likely to contribute significantly to the risk of a threatened species or ecological community becoming extinct if:

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

An assessment in accordance with Section 9.1.1 of the BAM is provided in **Table 5.5** and **Table 5.6** below.

Table 5.5 SAII Assessment – Current Geographic Distribution

Criteria	Assessment
evidence of reduction in geographic distribution (Principle 1, clause 6.7(2)(a) BC Regulation) presented by an estimate of the:	
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)	The community has undergone a very large historical reduction in geographic distribution and has experienced disruption of biotic processes of relative severity >90% over more than 90% of its distribution since 1750 (NSW TSSC 2020). This ecological community has been heavily cleared across most of its range. The remaining extent of the ecological community is highly fragmented, occurring in small, isolated patches within a cleared environment, or within a landscape of other disturbed woodlands. The available data shows that over 90% of the original extent of this ecological community has been cleared (Table 5). Of the remaining area, a large proportion of it has been modified and occurs as trees over a predominantly exotic understorey. The Committee judged that less than 5% of the original extent of the ecological community remains of sufficient condition and size to be included in the listed ecological community, having undergone a decline of 95% or more (NSW TSSC 2020). The current estimate of this CEEC in NSW is 250,729 ha, with approximately 93% having been cleared since 1750 (NSW TSSC 2020). There is no single map of fine thematic scale that encompasses either the present or pre-1750 extent across the entire distribution of the community (NSW TSSC 2020). Umwelt has analysed regional vegetation mapping products (State Vegetation Type Maps VIS 4467, 4468, VIS 4894 and VIS 4778) spanning the Central-West Orana REZ to understand the extent of PCTs that could potentially conform with the Box Gum Woodland CEEC. This analysis presents some insight into the degree to which future projects throughout this REZ are going to interact with the CEEC. For this analysis, Umwelt has used those PCTs identified within the NSW Bionet Vegetation Classification as having the potential to align with the Box Gum Woodland CEEC. Additionally, Umwelt also included PCTs are likely have the potential to align with the Box Gum Woodland CEEC based on their title, and or our experience of analysing the TEC on other Projects. Of the total Central-West Orana REZ (2,094,353 ha), 31,740 ha (1.5%) does not include PCT mapping using the four aforementioned regional vegetation mapping products. The analysis suggests that some 645,767 ha (30.8%) of land within the Central-West Orana REZ may support vegetation with the potential to align with the Box Gum Woodland CEEC. The remaining 1,416,846 ha (67.7 %) is considered unlikely to align with the Box Gum Woodland CEEC based on the regional mapping. Furthermore, the Listing Advice for the EPBC Act listed version of the Box Gum Woodland CEEC estimates its national extent to be approximately 416,000 ha (TSSC 2006). Of the likely occurring Box Gum Woodland CEEC predicted to occur within the Central-West Orana REZ, the Project will impact in the order of 0.004% of the regional extent of the CEEC. A total of 3.58 ha of the Box Gum Woodland CEEC was identified within the Subject Land and persists as moderate to good condition woodland.

Criteria	Assessment
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:	
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	In general, the diversity of understorey flora species has decreased across the range of the ecological community, primarily as a result of grazing and pasture improvement. Clearing the understorey for cropping and cultivated pasture eliminates the native species, including any soil stored seed, preventing the re-establishment of a native understorey without assistance. As a result of this, very few patches with a predominantly native understorey remain. Understorey species diversity has also been lost, and continues to be lost, through the effects of the severe fragmentation. If population sizes are too small, the local extinction of species from a patch can occur at random. Small areas are also more susceptible to weed invasion. In addition, many of the remaining areas in best condition occur on linear reserves such as travelling stock routes and road reserves. While these linear remnants are important for conservation, they are particularly prone to invasion by weeds (NSW TSSC 2020).
evidence of restricted geographic distribution (Principle 3, clause 6.7(2)(c) BC Regulation):	
based on the TEC's geographic range in NSW according to the: i. extent of occurrence ii. area of occupancy, and iii. number of threat-defined locations	Commonwealth Threatened Species Scientific Committee (TSSC) (2023) has stated: The extent of occurrence of this ecological community is very large, notwithstanding that it has undergone a severe decline in area of occupancy due to both clearing and degradation. It is difficult to ascertain the current area of the ecological community as defined. There is no doubt that this ecological community is subject to ongoing threats across its range. These include further clearing, deterioration of remnant condition and degradation of the landscape in which remnants occur. Of particular concern is the threat posed to some of the highest quality remnants, on Travelling Stock Routes and Reserves, through the increasing trend of converting intermittent grazing regimes to more intensive or set stocking regimes. While this ecological community is subject to demonstrable, ongoing threats, there are insufficient data to determine the current degree of these threats across the dispersed remnants of this ecological community. There are also insufficient data to accurately determine its current area (NSW TSSC 2020). However, it is known to occur within NSW in the Brigalow Belt South, Nandewar, New England Tableland, Sydney Basin, NSW North Coast, South Eastern Highlands, South East Corner, NSW South Western Slopes and Riverina Bioregions. The TEC is also known to occur in the South Eastern Queensland Bioregion in Queensland and the Victorian Midlands Bioregion in Victoria.
evidence that the TEC is unlikely to respond to management (Principle 4, clause 6.7(2)(d) BC Regulation).	The Threatened Biodiversity Data Collection (TBDC) for this TEC is data deficient in terms of response to management, however the management actions are listed, and there is nothing to suggest that the TEC would not respond to these actions if they were undertaken. These are: • Undertaking control of feral fauna. • Managing stock to reduce grazing pressure.

Criteria	Assessment
	• Do not harvest firewood from remnants. • Leave fallen timber on the ground. • Erect on site markers to alert maintenance staff to the high-quality remnant. • Encourage regeneration by fencing remnants, controlling grazing and undertaking supplementary planting where necessary. • Undertake weed control. • Protect all sites from further clearing and disturbance. • Ensure remnants remain connected or linked (or re-establish links). • Mark remnants onto maps and use to plan activities.
Where the TBDC indicates 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.	The TBDC for this TEC is data deficient in terms of response to management.

Table 5.6 SAII Assessment – Impact Assessment

In relation to the impacts from the proposal on the species at risk of an SAII, the assessor must include data and information on:	
the impact on the geographic extent of the TEC (Principles 1 and 3) by estimating the total area of the TEC to be impacted by the proposal:	
i. in hectares, and ii. as a percentage of the current geographic extent of the TEC in NSW. Data and information should include direct impacts (i.e. from clearing) and indirect impacts where partial loss of the TEC is likely as a result of the proposal. The assessor should consider for example, changes to fire regime (frequency, severity), hydrology, pollutants, species interactions (increased competition, changes to pollinators or dispersal), fragmentation, increased edge effects and disease, pathogens and parasites, which are likely to contribute to the loss of flora and/or fauna species characteristic of the TEC.	Current estimated extent in NSW is 250,729 ha. The total area of Box Gum Woodland within the Subject Land is 3.58 ha. This is equivalent to the removal of <0.01 % of the estimated current extent in NSW.

<table>
<tr><th colspan="2">In relation to the impacts from the proposal on the species at risk of an SAII, the assessor must include data and information on:</th></tr>
<tr><td>The extent that the proposed impacts are likely to contribute to further environmental degradation or the disruption of biotic processes (Principle 2) of the TEC by:
i. estimating the size of any remaining, but now isolated, areas of the TEC; including areas of the TEC within 500 m of the development footprint or equivalent area for other types of proposals
ii. describing the impacts on connectivity and fragmentation of the remaining areas of TEC measured by:
• 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
• ther 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
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.</td><td>Less than 10% of the original distribution of the CEEC is likely to have avoided structural changes (TSSC 2020). As such, the CEEC now occurs in a heavily fragmented and isolated form.
Using State regional mapping it is estimated that there is 434.65 ha of Box Gum Woodland in the 1,500 m surrounding the Subject Land. The Box Gum Woodland to be removed by the project is 3.58 ha. The remaining areas of Box Gum Woodland surrounding the Subject Land exist in an already fragmented state due to the long history of agricultural land use.
It is unlikely that the Project will remove entire patches of Box Gum Woodland, but rather will impact on part of already fragmented patches. It is recognised that this will lead to an increased fragmentation of remaining vegetation. This could increase the distances between patches of woodland and open woodland, remnant trees in derived native grassland.
The vegetation zone that supports box gum woodland CEEC in the Subject Land is Vegetation Zone 2 (PCT281_moderate), which comprises the woodland component of the community.
The VI score of this Vegetation Zone indicates the vegetation in this zone is in moderate condition. The vegetation was observed to have an intact canopy. There was little to no mid-storey except for the occasion shrub below a canopy tree. The ground layer was often sparse of forb species due to sheep and cattle grazing. Weedy grasses that can withstand the regular grazing pressure from cattle and sheep persist within this vegetation zone.
<table>
<tr><th>Vegetation Zone</th><th>V.I Score</th><th>Composition</th><th>Structure</th><th>Function</th></tr>
<tr><td>VZ3-Moderate</td><td>69.3</td><td>55.6</td><td>90</td><td>66.6</td></tr>
</table>
</td></tr>
<tr><td>The assessor may also provide new information that demonstrates that the principle identifying that the TEC is at risk of an SAII is not accurate.</td><td>Not applicable.</td></tr>
</table>

5.4 Impacts to Matters of National Environmental Significance

A referral was submitted to the Department on 3 March 2022. On 27 April 2022, The Commonwealth DCCEEW (formerly DAWE) confirmed the Tallawang Solar Farm (the Proposed Action) constitutes a controlled action under Section 75 of the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act). The controlling provisions under the EPBC Act for the Proposed Action are:

- Listed threatened species and communities (sections 18 and 18A).

The Commonwealth DCCEEW has issued its assessment requirements which have been incorporated into the SEARs for the Project (refer to **Section 1.6**). Specifically, the Commonwealth DCCEEW considered the Project is likely to have a significant impact on:

- White Box – Yellow Box – Blakely's Red Gum Grassy Woodland and derived native grassland – Critically Endangered
- Koala (combined populations of QLD, NSW and the ACT) (*Phascolarctos cinereus*) – Endangered
- Spotted-tail Quoll (south-east mainland population) (*Dasyurus maculatus maculatus*) – Endangered
- Regent Honeyeater (*Anthocaera phrygia*) – Critically Endangered
- Large-eared Pied Bat (*Chalinobilus dwyeri*) – Vulnerable
- Corben's Long-eared Bat (*Nyctophilus corbeni*) – Vulnerable
- Grey Box Grassy Woodland and Derived Native Grassland of south-east Australia – Endangered Ecological Community (EEC).

The impacts of the Project on the threatened species identified as being significantly impacted by the Project is discussed in **Appendix H**. Since submission of the Referral documentation small variations in the areas of impact to the EPBC Act listed entities has occurred these changes in areas are identified in **Appendix H**.

5.5 Aquatic Impacts

Aquatic habitats within the Subject Land consist of several un-named, ephemeral drainage lines that are degraded as a result of historical and current agricultural practices. The potential impacts on water quality are anticipated to be limited, given the nature and scale of the construction works, the low quality of aquatic habits, and the design adopted by the Proponent to support a separation between the development area and these features.

Standard environmental management measures will be implemented and are expected to sufficiently manage any impacts. Water and erosion management controls will be employed to minimise erosion and discharge of sediment and other pollutants during construction.

6.0 Biodiversity Credit Impact Summary

6.1 Impacts Not Requiring Assessment

Under Section 10.1 of the BAM, impacts to areas of land without native vegetation do not require further assessment, other than for prescribed impacts. The Subject Land contains 1,002.11 ha of Category 1 – exempt land. These areas do not require assessment under the BAM and do not require offsetting. These areas are shown in **Figure 1.3**.

Figure 6.1 shows the disturbed areas within the Subject Land that do not require assessment in accordance with Section 10.1 of the BAM.

6.2 Impacts Requiring Offsets

Impacts on native vegetation not requiring offsets under the BAM include native vegetation that has a vegetation integrity score of less than 20 (where it is not associated with ecosystem-credit species habitat or a TEC), less than 17 (where it is associated with ecosystem-credit habitat or a VEC) or less than 15 (where it is representative of an EEC or CEEC).

All PCTs have a vegetation integrity score of higher than 17 (refer to **Table 3.2**). Therefore, offsetting under the BAM is required. **Table 6.1** and **Figure 6.1** summarises this outcome.

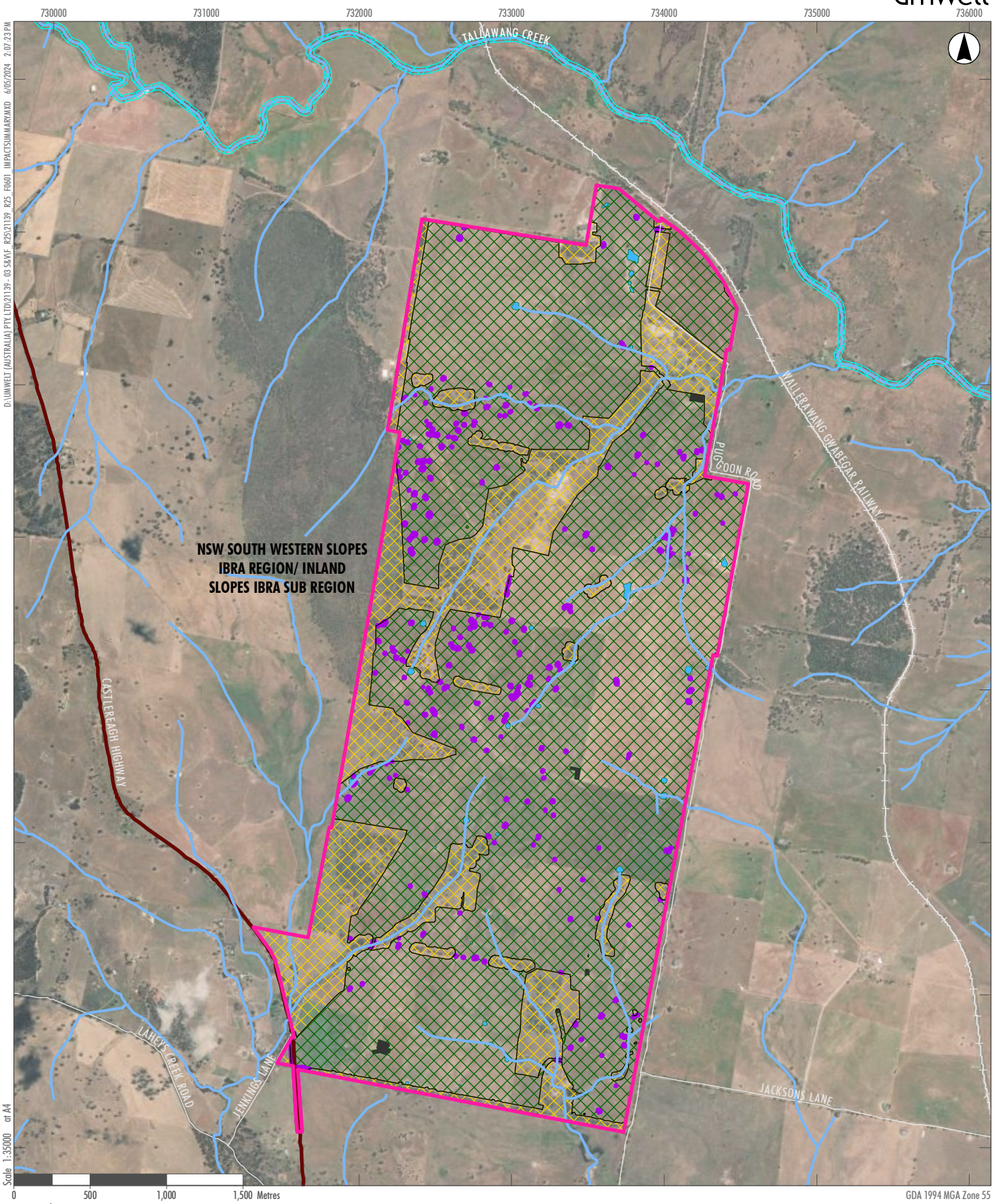
Table 6.1 Impacts Requiring Offset

Vegetation Zone	PCT / Species-credit species	TEC	Impact area (ha)	Current VI score	Future VI score	Change in VI score	Biodiversity risk weighting	Credits required
1	81 Western Grey Box – cypress pine shrub grass shrub tall woodland in the Brigalow Belt South Bioregion *Moderate Condition*	Yes	1.95	66.5	0	-66.5	2	65
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 *Moderate Condition*	Yes	3.58	69.3	0	-69.3	2.5	155

Vegetation Zone	PCT / Species-credit species	TEC	Impact area (ha)	Current VI score	Future VI score	Change in VI score	Biodiversity risk weighting	Credits required
3	318 Mugga Ironbark - Tumbledown Red Gum - Red Box - Black Cypress Pine open forest on shallow stony soils on hills in the NSW South Western Slopes Bioregion *Moderate Condition*	No	0.93	50.3	0	-50.3	1.75	20
5	81 Western Grey Box – cypress pine shrub grass shrub tall woodland in the Brigalow Belt South Bioregion DNG	No	1.04	41.7	0	-41.7	2	22
n/a	Southern myotis (*Myotis macropus*)	n/a	1.9	-	-	-	2	65

6.3 Impacts Not Requiring Offset

There are no vegetation zones that have a VI score below the threshold for offsetting and therefore there are no impacts of native vegetation that do not require offsetting.



Legend

- Project Area Boundary
- Subject Land
- Impact Avoidance Areas
- Impacts Requiring Offsets
- Biodiverse riparian land

PCT and Condition

- 281 - Rough-Barked Apple - red gum - Yellow Box woodland Moderate Condition
- 318 - Mugga Ironbark -Tumbledown Red Gum - Red Box - Black Cypress Pine open forest Moderate Condition
- 81 - Western Grey Box - cypress pine shrub grass shrub tall woodland Derived Native Grassland Condition
- 81 - Western Grey Box - cypress pine shrub grass shrub tall woodland Moderate Condition
- Category 1 - Exempt Land
- Dam
- Exotic roadside
- Road
- Structure

- Local Road
- State Road'
- Creeks/Rivers

FIGURE 6.1

Impact Summary

Image Source: ESRI Basemap Data source: NSW DFSI (2022), RES (2024)

7.0 Biodiversity Credit Report

A full Biodiversity Credit Report is included in **Appendix E**.

A summary of the key outcomes is provided in **Table 7.1**.

Table 7.1 Credits Required to Offset the Proposed Development

Biodiversity Values	Credits Required
Ecosystem Credits	
81 Western Grey Box - cypress pine shrub grass shrub tall woodland in the Brigalow Belt South Bioregion *Moderate Condition*	65
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 *Moderate Condition*	155
318 Mugga Ironbark – Tumbledown Red Gum – Red Box – Black Cypress Pine open forest on shallow stony soils on hills in the NSW South Western Slopes Bioregion *Moderate Condition*	20
81 Western Grey Box – cypress pine shrub grass shrub tall woodland in the Brigalow Belt South Bioregion DNG	22
Ecosystem Credits Total	**262**
Species Credits	
Southern myotis (*Myotis macropus*)	65
Bluegrass (*Dichanthium setosum*)	19
Species Credits Total	**84**

The Proponent is still considering the proposed methods for the retirement of credits and offsetting. The desired approach remains land-based offsets secured through a Stewardship Agreement building on the letter report prepared by Umwelt which provides a preliminary offset strategy based on a desktop assessment of biodiversity values impacted by the Project, and properties available in the local area which may provide a suitable area for offset (Umwelt 2022c). Whilst work is currently being completed to ascertain the viability of this approach for this project, no formal offset sites are proposed at this stage. Other options available under the BAM (and Bilateral Agreement) are also being considered and may form part of the overall offsetting package.

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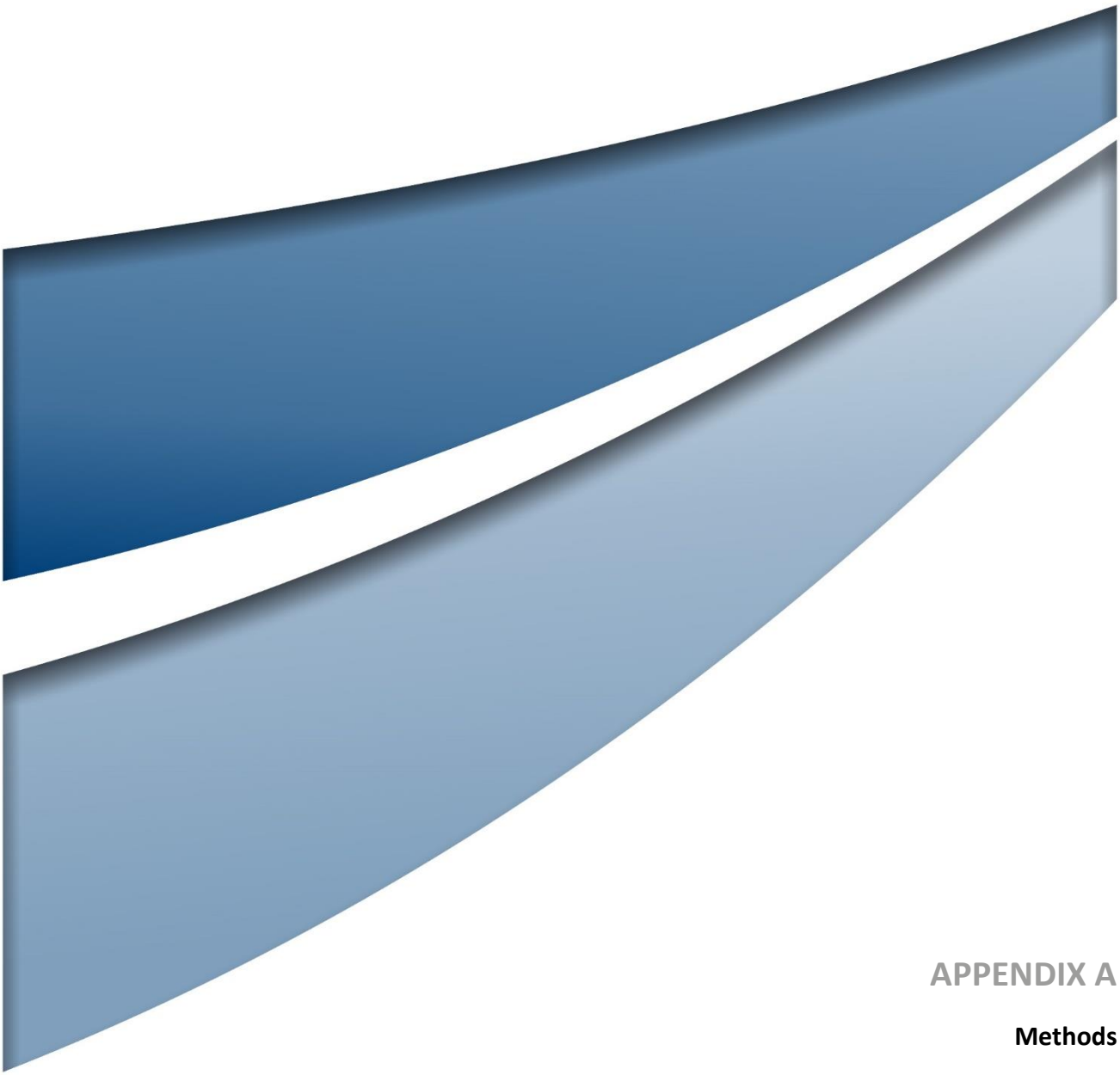
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APPENDIX A

Methods

A1 Methods

A1.1 Landscape Features and Site Context

Landscape features such as IBRA bioregions, IBRA subregions and NSW Mitchell Landscape regions, native vegetation extent within a 1500m buffer area, cleared areas, rivers, streams, wetlands and connectivity features were identified within the Subject Land where appropriate in accordance with Section 3.1 of the BAM (DPIE 2020a).

Determining the 'Site Context' of the Subject Land is calculated by assessing the native vegetation cover and patch size within the Subject Land in accordance with Section 3.2 of the BAM (DPIE 2020a).

A1.2 Native Vegetation Assessment

A1.2.1 Literature and Database Review

A review of previous documents and reports relevant to the proposed project was undertaken. The information obtained was used to inform survey design and was also used to assist in the assessment of potentially occurring threatened and migratory species, endangered populations (EPs) and TECs.

Relevant documents included:

- VIS Classification Database (DPIE 2021c), last accessed August 2021
- DAWE Protected Matters Search Tool for known/predicted EPBC Act-listed TECs, last accessed August 2021.

A1.2.2 Mapping Native Vegetation Extent

The native vegetation extent within the Project Area was determined during site surveys, through Geographic Information Systems (GIS) mapping and aerial photograph interpretation using recent aerial imagery. Native vegetation and PCT mapping was undertaken using best-practice techniques to delineate vegetation communities across the Development Footprint. Vegetation mapping involved the following key steps:

- Review of aerial imagery to assess vegetation distribution patterns as dictated by change in canopy texture, tone, and colour, as well as topography.
- Review of the modelled distribution of vegetation communities within broader scale regional based
- vegetation mapping.
- Preparation of a draft PCT map based on interpretation of digital aerial imagery.
- Field-based ground-truthing of the draft PCT mapping.
- Confirmation of vegetation community floristic delineations based on plot data.

Vegetation communities were delineated through the identification of patterns of plant species assemblages in each of the identified strata. Slight variations in species composition are typical across the extent of a community and are often associated with microhabitats or ecotones with other communities.

The extent of native ground-cover vegetation within offsite areas where a canopy of native trees was absent, was estimated based on the visual interpretation of aerial imagery including areas of cultivation and fence boundaries. Native vegetation extent mapping offsite is broad-scale and completed for the purposes of estimation of native vegetation cover under the BAM (DPE, 2020a).

Table A.1 summarises the extent of native vegetation cove within the Amended Project Area.

Table A.1 Native Vegetation Cover in the Assessment Circle

Native Vegetation Cover	
1500 m Buffer Assessment Area (ha)	4,411
Total Area of Native Vegetation Cover (ha)	672.4
Percentage of Native Vegetation Cover (%)	15.2
Class (0-10, >10-30, >30-70 or >70%)	>10-30%

A1.2.3 Floristic and Vegetation Integrity Survey

Floristic and vegetation integrity surveys were undertaken in February 2021, June 2021, August 2021, January 2022 and September 2023. A total of 36 BAM plots were conducted within the Subject Land during the surveys undertaken for this assessment (refer to **Figure 2.1**), although only a total of 23 plots were required to calculate the credit requirement of the Subject Land. Floristic and vegetation integrity data was collected in accordance with the minimum requirements under the BAM (DPIE 2020a).

At each floristic and vegetation integrity plot, data was recorded according to Section 5 of the BAM (OEH 2017a). This involved setting out 20 x 50 m, 20 x 20 m and 1 x 1 m plots. The location of each 20 x 50 m plot was recorded using a hand-held GPS with accuracy of ± 5 m. The Map Grid of Australia (MGA) coordinate system was used.

At each plot/transect, roughly 45 to 60 minutes was spent searching for all vascular flora species present within the 20 x 20 m plot. Searches of each 20 x 20 m plot were generally undertaken through parallel transects from one side of the plot to another. Most effort was spent on examining the groundcover, which usually supported well over half of the species present, however the composition of any shrub, mid-storey, canopy and emergent layers were also thoroughly examined.

Semi-quantitative rapid assessments were undertaken at thirteen locations (refer to **Figure 2.1**). At each location the dominant species in each stratum were recorded to assist in vegetation mapping and PCT allocation.

A1.2.4 Targeted Threatened Flora Surveys

Targeted threatened species surveys were completed in accordance with the *Surveying threatened plants and their habitats NSW survey guide for the Biodiversity Assessment Method* (DPIE 2020b) and any relevant species requirements listed in the Threatened Biodiversity Data Collection (DPE 2024c). Umwelt Ecologists undertook these works during October 2020, February, June and August 2021, and September 2023. The condition of the Subject Land is considered open vegetation therefore wider separation distances between transects were used in accordance with Table 1 of the Guidelines. The Flora surveys were conducted as parallel transects at distances of ten to twenty metres apart where possible, whereby the observer was continually scanning left and right to search for threatened flora species. f

No more than five species were surveyed for at one time within a given PCT. Details of the field survey methods used and species targeted are listed in **Table A.2**.

Table A.2 Species credit species survey methodology and timing

Survey Group	Target Species	Species Survey Period	Survey Dates	Survey Method	Plant Community Type Associations /Areas Surveyed		
					81	281	318
Group 1	*Diuris tricolor*	September – October	27, 28, 29 & 30 September 2021, 26 September 2023 and 19, 20, 21, 22 & 23 October 2020	Parallel traverse	✓	^	^
	Leucochrysum albicans subsp. tricolor	September – April	27, 28, 29 & 30 September 2021, 26 September 2023 and 19, 20, 21, 22 & 23 October 2020	Parallel traverse	^	^	✓
	Prasophyllum sp. Wybong	September – October	27, 28, 29 & 30 September 2021, 26 September 2023 and 19, 20, 21, 22 & 23 October 2020	Parallel traverse	✓	✓	^
	Swainsona sericea	September – November	27, 28, 29 & 30 September 2021, 26 September 2023 and 19, 20, 21, 22 & 23 October 2020	Parallel traverse	^	✓	^
	Acacia ausfeldii	August – October	27, 28, 29 & 30 September 2021, 26 September 2023 and 19, 20, 21, 22 & 23 October 2020	Parallel traverse	^	✓	^
	Pomaderris cotoneaster	October – November	19, 20, 21, 22 & 23 October 2020	Parallel traverse	^	✓	^
Group 2	*Euphrasia arguta*	November – March	17, 18, 19 & 20 January 2022	Parallel traverse	^	✓	^
	Dichanthium setosum	November – May	17, 18, 19 & 20 January 2022	Parallel traverse	✓	✓	^

A1.2.5 Meandering Transects

Meandering transects were also walked across the area in between the collection of floristic plots, or for the deployment or collection of remote cameras. Opportunistic sampling of vegetation was undertaken along these transects, particularly searches for threatened and otherwise significant species, endangered populations and TECs. Records along transects supplemented floristic sampling carried out in plots, however, the data collected are in the form of presence records, rather than semi-quantitative cover abundance scores.

Meandering transects provided information on spatial patterns of vegetation that informed vegetation community mapping of the Subject Land.

A1.2.6 Digital Aerial Photograph Interpretation

Digital imagery (aerial photographs) of the Subject Land was viewed prior to and after vegetation survey to identify spatial patterns in vegetation, land use and landscape features. These informed field survey design and implementation, ecological assessment and vegetation community mapping of the Subject Land. Mapping was undertaken using the Manifold System 8.0 GIS, QGIS and ESRI ArcMap 10.6.

A1.2.7 Plant Identification and Nomenclature Standards

All vascular plants recorded or collected within plots and on meandering transects were identified using keys and nomenclature in Harden (1992, 1993, 2000 and 2002). Where known, changes to nomenclature and classification have been incorporated into the results. Updated taxonomy has been derived from PlantNET (Botanic Gardens Trust 2020).

For herbaceous and graminoid species, such as those belonging to the families Asteraceae, Cyperaceae and Poaceae, the allocation of specimens to sub-specific levels was affected by the availability of adequate flowering or fruiting material. The specimens collected during the survey that were lacking adequate flowering or fruiting material were not of potential significance or importance and so were identified to genus level only.

Common names follow Harden (1992, 1993, 2000 and 2002) where available, and draw on other sources such as local names where these references do not provide a common name.

A1.2.8 Vegetation Mapping

Vegetation mapping was undertaken using best-practice techniques to delineate vegetation communities across the Subject Land. Vegetation mapping involved the following key steps:

- preliminary review of digital aerial imagery to explore vegetation distribution patterns as dictated by change in canopy texture, tone and colour, as well as topography
- predicting the distribution of particular vegetation communities based on understanding the distribution of PCTs (DPIE 2021c) and previous mapping undertaken in the area (Bell 2007).
- ground-truthing of the vegetation map based on survey effort

- revision of vegetation community floristic delineations based on plot data, and
- revision of the vegetation map based on ground-truthing.

Vegetation communities were delineated through the identification of repeating patterns of plant species assemblages in each of the identified strata.

A1.2.9 Threatened Ecological Community Delineation Techniques

Where applicable, vegetation communities identified in the Subject Land were compared to TECs listed under the Commonwealth EPBC Act and NSW BC Act and an assessment of similarity with the NSW Scientific Committee Final Determinations and the Commonwealth Threatened Species Scientific Committee Listing and Conservation Advice. The following approach was used:

- full-floristic plot assessments and meandering surveys to determine floristic composition and structure of each ecological community
- comparison with published species lists, including lists of 'important species' as identified on the listing advice provided by the NSW Scientific Committee and/or Commonwealth Threatened Species Scientific Committee
- comparison with habitat descriptions and distributions for listed TECs
- assessment using guidelines and recovery plans published by the Commonwealth Department of Environment and Energy (DoEE) and the NSW OEH
- comparison with other assessments of TECs in the region.

A1.2.10 Plant Community Type (PCT) Allocation

Each of the vegetation communities described within the Subject Land were aligned with an equivalent PCT as detailed in the VIS Classification Database (DPIE 2021c). For each vegetation community described in the Subject Land, the dominant and characteristic species were entered into the online plant community identification tab and an initial list of PCTs was generated. The profiles for each of the possible PCTs were then interrogated and the most appropriate match assigned based on floristic, structure, soil, landform and distribution details.

Further detail regarding this allocation for individual PCT is outlined in **Section 3.2.1.**

A1.3 Threatened Species

A1.3.1 Literature and Database Review

A review of previous documents and reports relevant to the proposed project was undertaken. This included relevant ecological database searches. The information obtained was used to inform survey design where required and was also used to assist in the assessment of potentially occurring ecosystem-credit and species-credit species. Relevant documents and resources included:

- BioNet Atlas of NSW Wildlife database and mapping tool (DPIE 2021a), last accessed March 2024.
- Threatened Biodiversity Data Collection (DPIE 2021b) for known/predicted threatened species in the Inland Slopes IBRA subregion, last accessed March 2024.
- PlantNET (Botanic Gardens Trust) database search for threatened plants within a 10 km radius from the Subject Land, last accessed March 2024.
- DAWE Protected Matters Search Tool (DAWE 2021) for known/predicted EPBC Act-listed species, last accessed March 2022.

A preliminary assessment using the TBDC was undertaken which provided a list of species-credit species that might require survey and the suitable survey periods for each species. The results of these database searches, literature review and TBDC review were used to design the appropriate survey requirements for species-credit species.

A1.3.2 Ecosystem-credit Species

Ecosystem-credit species are those threatened species that can be predicted by vegetation surrogates and landscape features. Ecosystem-credit species are not required to be specifically targeted during field surveys, however an assessment of the suitability of habitat in the Subject Land is undertaken to determine the species presence or otherwise in the vegetation zones identified.

Appendix D outlines the ecosystem credit species predicted by the BAM calculator or identified in the literature review.

A1.3.3 Species-credit Species

Targeted and opportunistic surveys for species-credit species were undertaken across the Subject Land during flora surveys. **Table A.3** below outlines the dates, methods and species targeted during the surveys.

Appendix D outlines the species-credit species predicted by the BAM calculator or identified in the literature review, and the targeted survey effort undertaken in accordance with BAM survey requirements.

Appendix D also notes where species-credit species were not considered to require further survey in accordance with Section 5 of the BAM (DPIE 2020a).

Species-credit surveys considered the following survey guidelines:

- *Threatened Biodiversity Survey and Assessment: Guidelines for Developments and Activities* – Working Draft (DEC 2004)
- Surveying Threatened Plants and Their Habitats (DPIE 2020b)
- *Draft Survey Guidelines for Australia's Threatened Orchids* (DoEE 2013)
- *'Species credit threatened bats and their habitats'* (OEH 2018b)
- *Hygiene protocol for the control of disease in frogs* (DECC 2008)
- *NSW Survey Guideline for Threatened Frogs* (DPIE 2020c).

A1.3.4 SEPP (Biodiversity and Conservation) 2021

State Environmental Planning Policy (SEPP) (Biodiversity and Conservation) 2021 must be considered when assessing impacts to the koala (*Phascolarctos cinereus*) in development applications to be considered by local councils. While the project is being assessed as a State Significant Development, and the provisions of koala habitat protection in the SEPP do not apply, the intent of the SEPP have been considered in the identification of potential koala habitat and breeding habitat for assessment under state and Commonwealth legislation.

The Subject Land is situated within Zone RU1 Primary Production, because of this Chapter 3 Koala Habitat Protection 2020 applies. Koala Habitat Protection 2020 describes:

- Potential habitat as areas of native vegetation where trees of the types listed in Schedule 2 constitute at least 15% of the total number of trees in the upper or lower strata of the tree component.
- Core koala habitat as area of land with a resident population of koalas, evidenced by attributes such as breeding females, being females with young, and recent sightings of and historical records of a population.

This assessment of koala habitat has used the koala feed tree schedule itemised in both Schedule 1 and Schedule 3 of SEPP (Biodiversity and Conservation) 2021 as the later provides a comprehensive list of preferred feed trees based on recent studies (OEH 2018a).

Table A.3 Species credit species survey methodology and timing

Survey Date	Method	Species Targeted
19/10/2020 – 23/10/2020	Searches performed in suitable rocky habitat. Searches for large stick nests Searches for suitable hollows. Searches for suitable bat – breeding structures. Searches for breeding camps.	*Aprasia parapulchella* (Pink-tailed Worm Lizard) *Haliaeetus lecogaster* (white- bellied sea- eagle) *Hieraaetus morphnoides* (little eagle) *Lophoictinia isura* (square- tailed kite) *Lophochroa leadbeateri* (pink cockatoo) *Miniopterus orianae oceanensis* (large bentwing-bat) *Polytelis swainsonii* (superb parrot) *Pteropus poliocephalus* (grey-headed flying-fox) *Litoria booroolongensis* (Booroolong Frog)
19/10/2020 – 23/10/2020	Targeted floristic searches.	*Acacia ausfeldii* (Ausfeld's wattle) *Diuris tricolor* (pine donkey orchid) *Leucochrysum albicans var. tricolor* (hoary sunray) *Homoranthus darwinioides* *Prostanthera discolor* *Prasophyllum petilum* *Prasophyllum sp.* Wybong *Pultenaea glabra* *Swainsona recta* (small purple- pea) *Swainsona sericea* (*sikly swainson- pea*) *Thesium australe* *Tylophora linearis* *Zieria ingramii* *Dichanthium setosum* (Queensland bluegrass) *Commersonia procumbens* *Euphrasia arguta* *Pomaderris cotoneaster*
15/02/2021 – 19/02/2021	BAM Floristic Plots.	
15/02/2021 – 19/02/2021	Spotlighting targeted in remnant woodland and forest. Spot Assessment Technique (SAT). Call playback. Searches for suitable bat-breeding structures.	*Burhinus grallarius* (Bush- stone curlew) *Phascolarctos cinereus* (Koala) *Miniopterus orianae oceanensis* (large bentwing-bat)

Survey Date	Method	Species Targeted
15/02/2021 – 19/02/2021	Targeted floristic searches.	*Dichanthium setosum* (Queensland bluegrass) *Euphrasia arguta* *Leucochrysum albicans* (hoary sunray) *Thesium australe* *Tylophora linearis* *Zieria ingramii*
7/06/2021 – 9/06/2021	BAM Floristic Plots.	
7/06/2021 – 9/06/2021	Call playback and spotlighting (one night only). Spot Assessment Technique (SAT). Searches for large hollows.	*Ninox connivens* (Barking owl) *Ninox strenua* (Powerful owl) *Tyto novaehollandiae* (Masked owl) *Litoria booroolongensis* (Booroolong Frog) *Phascolarctos cinereus* (Koala)
5/08/2021 – 8/08/2021	BAM Floristic Plots.	
5/08/2021 – 8/08/2021	Searches for suitable hollows Call playback and spotlighting. Searches for suitable bat-breeding structures.	*Calyptorhynchus lathami* (glossy- black cockatoo) *Ninox connivens* (Barking owl) *Ninox strenua* (Powerful owl) *Tyto novaehollandiae* (Masked owl) *Crinia sloanei* (Sloane's froglet) *Litoria booroolongensis* (Booroolong Frog) *Phascolarctos cinereus* (koala) *Miniopterus orianae oceanensis* (large bentwing-bat)
5/08/2021 – 20/08/2021	Remote-sensor cameras.	*Petaurus norfolcensis* (Squirrel glider) *Phascogale tapoatafa* (Brush-tailed phascogale)
27/09/2021 – 30/09/2021	Targeted floristic searches.	*Acacia ausfeldii* (Ausfeld's wattle) *Diuris tricolor* (pine donkey orchid) *Leucochrysum albicans var. tricolor* (hoary sunray) *Homoranthus darwinioides* *Prostanthera discolor* *Prasophyllum petilum* *Prasophyllum sp.* Wybong *Pultenaea glabra* *Swainsona recta* (small purple- pea) *Swainsona sericea* (*sikly swainson- pea*) *Thesium australe* *Tylophora linearis* *Zieria ingramii* *Dichanthium setosum* (Queensland bluegrass) *Commersonia procumbens* *Euphrasia arguta*

Survey Date	Method	Species Targeted
17/01/2022 – 20/01/2022	Targeted floristic searches.	*Dichanthium setosum* (Queensland bluegrass) *Euphrasia arguta* *Leucochrysum albicans* (hoary sunray) *Thesium australe* *Tylophora linearis* *Zieria ingramii*
25/09/2023 – 26/09/2023	Searches for large stick nests. Searches for suitable hollows. Searches for suitable bat-breeding structures. Searches for breeding camps.	*Haliaeetus lecogaster* (white- bellied sea- eagle) *Hieraaetus morphnoides* (little eagle) *Lophoictinia isura* (square- tailed kite) *Lophochroa leadbeateri* (pink cockatoo) *Miniopterus orianae oceanensis* (large bentwing-bat) *Polytelis swainsonii* (superb parrot) *Pteropus poliocephalus* (Grey- headed flying- fox)
25/09/2023 – 26/09/2023	Targeted floristic searches.	*Acacia ausfeldii* (Ausfeld's wattle) *Diuris tricolor* (pine donkey orchid) *Leucochrysum albicans var. tricolor* (hoary sunray) *Prasophyllum petilum* *Prasophyllum sp.* Wybong *Swainsona sericea* (sikly swainson- pea) *Pomaderris cotoneaster*
25/09/2023 – 9/10/2023	Remote sensor cameras.	*Petaurus norfolcensis* (Squirrel glider)
25/09/2023 – 26/09/2023	Call playback and spotlighting.	*Burhinus grallarius* (Bush – stone curlew) *Phascolarctos cinereus* (Koala)
25/09/2023 – 26/09/2023	BAM Floristic Plots.	

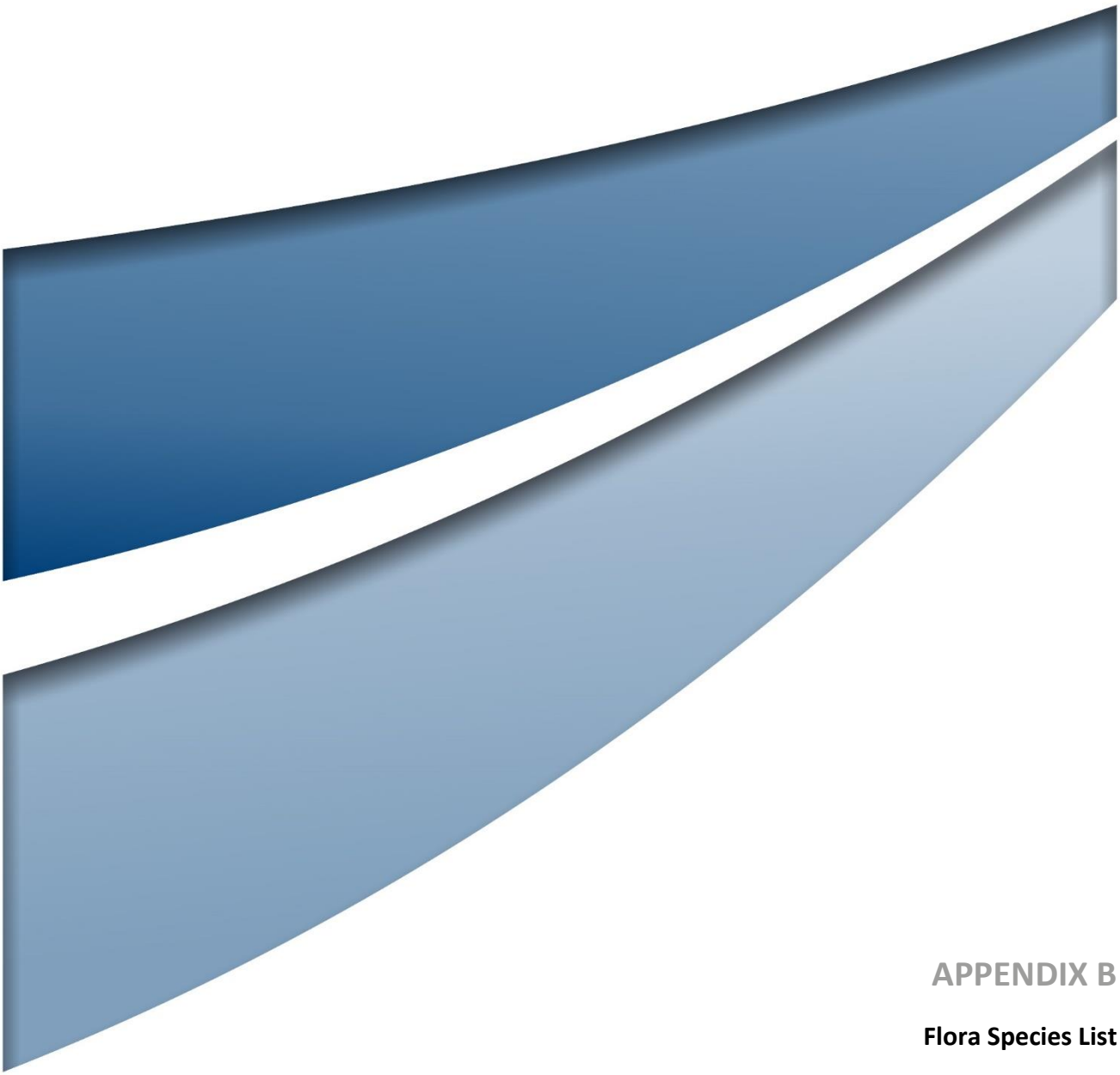
A1.4 Weather Conditions and Limitations

Table A.2 below outlines the weather conditions for the surveys. Data is derived from the Gulgong weather station (062013) from the Bureau of Meteorology (BOM) (2024).

Table A.2 Weather Conditions for Surveys

Date	Daily Data			Monthly Data		
	Min-Max Temp. (°C)	Rainfall (mm)	Relative Humidity (%)	Min-Max Temp (°C) (mean)	Rainfall (mm) (total)	Relative Humidity (%) (mean)
19/10/2021	10.1-24.0	7.2	93	10.0 – 25.0	74.2	93
20/10/2021	10.5-24.7	0	78			
21/10/2021	12.3-25.9	0	83			
22/10/2021	11.2-28.7	0	81			
23/10/2021	12.9-28.6	0	67			
15/02/2021	11.6-25.5	34.4	64	15.1 – 28.3	106.0	75
16/02/2021	15.5-27.6	0	71			
17/02/2021	15.7-26.3	0	64			
18/02/2021	14.3-26.4	0	72			
19/02/2021	14.8-26.1	0	80			
7/06/2021	-0.2-18.8	0.8	99	4.6 – 15.7	93.4	91
8/06/2021	3.2-14.7	0	80			
9/06/2021	4.0-6.7	3.4	93			
2/08/2021	3.4-20.2	0	92	3.6 – 17.4	27.3	78
3/08/2021	1.1-14.4	5.4	76			
4/08/2021	5.6-9.3	1.4	96			
5/08/2021	6.1-14.7	0.6	91			
27/09/2021	6.9-21.0	0	61	4.9 – 20.5	45.2	68
28/09/2021	7.5-22.3	0	70			
29/09/2021	13.2-17.5	1.0	77			
30/09/2021	9.0-22.7	23.0	75			
17/01/2021	17.1-32.4	4.4	83	17.4 – 29.4	21.7	73
18/01/2021	21.3-24.6	0	78			
19/01/2021	18.7-20.7	8.2	80			
20/01/2021	14.8-24.2	2.2	54			

Date	Daily Data			Monthly Data		
	Min-Max Temp. (°C)	Rainfall (mm)	Relative Humidity (%)	Min-Max Temp (°C) (mean)	Rainfall (mm) (total)	Relative Humidity (%) (mean)
25/09/2023	5.2-26.0	0	95	6.8 – 25.5	14.0	84
26/09/2023	6.9-27.5	0	96			



APPENDIX B

Flora Species List

Appendix B Flora Species List

The following list was developed from the floristic plot surveys. It includes all species of vascular plants observed during these surveys. It is acknowledged that the list is not comprehensive, as not all species are readily detected at any one time of the year. Many species flower only during restricted periods of the year, and some flower only once in several years. In the absence of flowering material, many of these species cannot be identified, or even detected.

Names of classes and families follow a modified Cronquist (1981) System.

Any species that could not be identified to the lowest taxonomic level are denoted in the following manner:

sp.	specimens that are identified to genus level only.

The following abbreviations or symbols are used in the list:

A	denotes abundance rating according to BAM
C	cover measure according to BAM
asterisk (*)	denotes species non-native species
HT	denotes High Threat Weed species under the BAM
subsp.	subspecies and
var.	variety.

All vascular plants recorded or collected were identified using keys and nomenclature in Harden (1992, 1993, 2000 and 2002). Where known, changes to nomenclature and classification have been incorporated into the results, as derived from PlantNET (Botanic Gardens Trust 2020), the on-line plant name database maintained by the National Herbarium of New South Wales.

Common names used follow Harden (1992, 1993, 2000 and 2002) where available, and draw on other sources such as local names where these references do not provide a common name.

Family	Scientific Name	Common Name	Growth Form	VZ1_PCT81_moderate															
				P21139_006		P21139_009		P21139_011		P21139_016		P21139_019		P21139_020		P21139_030		P_21139_203	
				PC	Ab	PC	Ab	PC	Ab	PC	Ab	PC	Ab	PC	Ab	PC	Ab	PC	Ab
Amaranthaceae	*Alternanthera denticulata*	Lesser Joyweed	FG																
Amaranthaceae	*Alternanthera nana*	Hairy Joyweed	FG	0.1	6			0.1	30			0.1	10	0.2	100				
Amaranthaceae	*Alternanthera spp.*	Joyweed	FG																
Amaranthaceae	*Gomphrena celosioides*	Gomphrena Weed	EX											0.1	1				
Anthericaceae	*Tricoryne elatior*	Yellow Autumn-lily	FG																
Apiaceae	*Cyclospermum leptophyllum*	Slender Celery	EX																
Apiaceae	*Daucus carota*	Wild Carrot	EX																
Apiaceae	*Daucus spp.*		FG											0.2	100				
Apiaceae	*Hydrocotyle laxiflora*	Stinking Pennywort	FG																
Apocynaceae	*Gomphocarpus fruticosus*	Narrow-leaved Cotton Bush	EX																
Asparagaceae	*Dichopogon fimbriatus*		FG																
Asphodelaceae	*Dianella longifolia*	Blueberry Lily	FG							0.1	3	0.2	10	0.1	1				
Asteraceae	*Aster spp.*		EX																
Asteraceae	*Bidens pilosa*	Cobbler's Pegs	HT																
Asteraceae	*Bidens subalternans*	Greater Beggar's Ticks	HT											0.1	4				
Asteraceae	*Brachyscome spathulata*		FG																
Asteraceae	*Calocephalus citreus*	Lemon Beauty-heads	FG																
Asteraceae	*Calotis cuneata*	Mountain Burr-Daisy	FG																
Asteraceae	*Calotis cuneifolia*	Purple Burr-Daisy	FG		50	0.2	20			0.5	100	3	100			0.1	20		
Asteraceae	*Calotis lappulacea*	Yellow Burr-daisy	FG	0.1	4	0.2	50					0.5	100	0.5	100				
Asteraceae	*Carthamus lanatus*	Saffron Thistle	HT					10	200										
Asteraceae	*Cassinia arcuata*		SG							0.2	50	0.1	3			0.1	3		
Asteraceae	*Cassinia sifton*		SG																
Asteraceae	*Cassinia spp.*		SG																
Asteraceae	*Centaurea calcitrapa*	Star Thistle	EX																
Asteraceae	*Cirsium vulgare*	Spear Thistle	EX											0.1	1			1	50
Asteraceae	*Conyza bonariensis*	Flaxleaf Fleabane	EX	0.1	5	0.5	50	0.1	10	0.1	5	0.3	20	0.5	50				
Asteraceae	*Conyza spp.*		EX																
Asteraceae	*Conyza sumatrensis*	Tall fleabane	EX																
Asteraceae	*Cotula australis*	Common Cotula	FG																
Asteraceae	*Cymbonotus lawsonianus*	Bear's Ear	FG																
Asteraceae	*Cymbonotus preissianus*	Austral Bear's Ear	FG																
Asteraceae	*Euchiton involucratus*	Star Cudweed	FG																
Asteraceae	*Euchiton sphaericus*	Star Cudweed	FG																

Family	Scientific Name	Common Name	Growth Form	VZ1_PCT81_moderate															
				P21139_006		P21139_009		P21139_011		P21139_016		P21139_019		P21139_020		P21139_030		P_21139_203	
				PC	Ab	PC	Ab	PC	Ab	PC	Ab	PC	Ab	PC	Ab	PC	Ab	PC	Ab
Asteraceae	*Gamochaeta americana*	Purple Cudweed	EX					0.1	30										
Asteraceae	*Gamochaeta spp.*		EX							0.1	2								
Asteraceae	*Hypochaeris radicata*	Catsear	EX	0.1	10	0.1	10	0.1	20	0.1	5							0.1	20
Asteraceae	*Lactuca serriola*	Prickly Lettuce	EX																
Asteraceae	*Olearia viscosa*		SG																
Asteraceae	*Pseudognaphalium luteoalbum*	Jersey Cudweed	FG									0.1	1						
Asteraceae	*Silybum marianum*	Variegated Thistle	EX																
Asteraceae	*Solenogyne bellioides*	Solengyne	FG																
Asteraceae	*Soliva sessilis*	Bindyi	EX																
Asteraceae	*Sonchus oleraceus*	Common Sowthistle	EX															0.1	5
Asteraceae	*Taraxacum officinale*	Dandelion	EX																
Asteraceae	*Vernonia cinerea*	little ironweed	FG																
Asteraceae	*Vittadinia cuneata*		FG													0.1	20		
Asteraceae	*Vittadinia spp.*	Fuzzweed	FG																
Asteraceae	*Xanthium spinosum*	Bathurst Burr	HT																
Asteraceae	*Xerochrysum viscosum*	Sticky Everlasting	FG																
Boraginaceae	*Echium plantagineum*	Patterson's Curse	EX															0.1	5
Brassicaceae	*Hirschfeldia incana*	Buchan Weed	EX																
Brassicaceae	*Lepidium africanum*	Common Peppercress	EX	0.1	10	0.1	2	0.1	50			0.3	100	0.3	100				
Brassicaceae	*Lepidium bonariense*	Argentine Peppercress	EX															0.1	5
Cactaceae	*Opuntia humifusa*	Creeping Pear	HT																
Cactaceae	*Opuntia stricta*	Common Prickly Pear	EX																
Campanulaceae	*Pratia concolor*	Poison Pratia	FG																
Campanulaceae	*Wahlenbergia communis*	Tufted Bluebell	FG																
Campanulaceae	*Wahlenbergia gracilis*	Sprawling Bluebell	FG																
Campanulaceae	*Wahlenbergia spp.*	Bluebell	FG							0.1	20								
Caryophyllaceae	*Paronychia brasiliana*	Chilean Whitlow Wort, Brazilian Whitlow	EX							0.1	10	0.3	100						
Caryophyllaceae	*Petrorhagia nanteuilii*	Proliferous Pink	EX																
Caryophyllaceae	*Stellaria media*	Common Chickweed	EX																
Casuarinaceae	*Allocasuarina torulosa*	Forest Oak	TG			3	1												
Chenopodiaceae	*Atriplex spp.*		SG																
Chenopodiaceae	*Chenopodium pumilio*	Small Crumbweed	FG					0.2	50										
Chenopodiaceae	*Einadia hastata*	Berry Saltbush	FG							0.5	100			0.5	100				
Chenopodiaceae	*Einadia nutans*	Climbing Saltbush	FG													0.1	10	0.1	20

Family	Scientific Name	Common Name	Growth Form	VZ1_PCT81_moderate															
				P21139_006		P21139_009		P21139_011		P21139_016		P21139_019		P21139_020		P21139_030		P_21139_203	
				PC	Ab	PC	Ab	PC	Ab	PC	Ab	PC	Ab	PC	Ab	PC	Ab	PC	Ab
Chenopodiaceae	*Einadia nutans subsp. nutans*	Climbing Saltbush	FG							0.1	10	2	100	5	100				
Chenopodiaceae	*Einadia trigonos*	Fishweed	FG	0.1	10	0.1	20					1	50						
Clusiaceae	*Hypericum gramineum*	Small St John's Wort	FG					0.1	20							0.1	20		
Clusiaceae	*Hypericum perforatum*	St. Johns Wort	HT																
Convolvulaceae	*Convolvulus erubescens*	Pink Bindweed	OG																
Convolvulaceae	*Dichondra repens*	Kidney Weed	FG			1	500							0.1	2				
Crassulaceae	*Crassula spp.*	Stonecrop	FG																
Cupressaceae	*Callitris endlicheri*	Black Cypress Pine	TG																
Cupressaceae	*Callitris glaucophylla*	White Cypress Pine	TG							2	2								
Cyperaceae	*Carex appressa*	Tall Sedge	GG																
Cyperaceae	*Carex inversa*	Knob Sedge	GG	0.1	20					1	100	2	50	3	100				
Cyperaceae	*Cyperus bifax*	Downs Nutgrass	GG																
Cyperaceae	*Cyperus brevifolius*		EX																
Cyperaceae	*Cyperus eragrostis*	Umbrella Sedge	HT																
Cyperaceae	*Cyperus gracilis*	Slender Flat-sedge	GG																
Cyperaceae	*Fimbristylis dichotoma*	Common Fringe-sedge	GG			0.1	10									0.1	10		
Cyperaceae	*Gahnia aspera*	Rough Saw-sedge	GG									0.3	10	0.2	2				
Cyperaceae	*Lepidosperma laterale*	Variable Sword-sedge	GG									0.1	1						
Cyperaceae	*Schoenus spp.*		GG																
Dilleniaceae	*Hibbertia obtusifolia*	Hoary Guinea Flower	SG																
Dilleniaceae	*Hibbertia spp.*		SG																
Ericaceae	*Astroloma humifusum*	Native Cranberry	SG																
Ericaceae	*Leucopogon ericoides*	Pink Beard-heath	SG																
Ericaceae	*Leucopogon spp.*		SG																
Ericaceae	*Lissanthe strigosa*	Peach Heath	SG			0.1	1			0.1	2								
Euphorbiaceae	*Euphorbia drummondii*	Caustic Weed	FG	0.1	1	0.1	10												
Euphorbiaceae	*Euphorbia peplus*	Petty Spurge	EX																
Euphorbiaceae	*Euphorbia spp.*		FG																
Fabaceae (Faboideae)	*Daviesia acicularis*		SG																
Fabaceae (Faboideae)	*Daviesia spp.*		SG																
Fabaceae (Faboideae)	*Desmodium varians*		OG											0.1	1				
Fabaceae (Faboideae)	*Glycine clandestina*	Twining glycine	OG			0.1	1												

Family	Scientific Name	Common Name	Growth Form	VZ1_PCT81_moderate															
				P21139_006		P21139_009		P21139_011		P21139_016		P21139_019		P21139_020		P21139_030		P_21139_203	
				PC	Ab	PC	Ab	PC	Ab	PC	Ab	PC	Ab	PC	Ab	PC	Ab	PC	Ab
Fabaceae (Faboideae)	*Glycine tabacina*	Variable Glycine	OG															0.1	10
Fabaceae (Faboideae)	*Hardenbergia violacea*	False Sarsaparilla	OG																
Fabaceae (Faboideae)	*Medicago arabica*	Spotted Burr Medic	EX																
Fabaceae (Faboideae)	*Medicago spp.*		EX																
Fabaceae (Faboideae)	*Pultenaea microphylla*		SG							0.4	100								
Fabaceae (Faboideae)	*Pultenaea retusa*		SG													0.1	1		
Fabaceae (Faboideae)	*Trifolium repens*	White Clover	EX					0.1	100			0.1	2						
Fabaceae (Faboideae)	*Trifolium spp.*		EX															0.1	20
Fabaceae (Faboideae)	*Trifolium stellatum*		EX																
Fabaceae (Mimosoideae)	*Acacia hakeoides*	Hakea Wattle	SG	0.1	1														
Fabaceae (Mimosoideae)	*Acacia spectabilis*	Mudgee Wattle	SG																
Fabaceae (Mimosoideae)	*Acacia spp.*	Wattle	SG							0.1	2								
Gentianaceae	*Centaurium erythraea*	Common Centaury	EX																
Gentianaceae	*Centaurium tenuiflorum*	Branched Centaury, Slender centaury	EX																
Geraniaceae	*Erodium spp.*	Crowfoot	FG																
Geraniaceae	*Geranium homeanum*		FG																
Goodeniaceae	*Goodenia heterophylla*		FG																
Goodeniaceae	*Goodenia paniculata*		FG																
Goodeniaceae	*Goodenia spp.*		FG																
Haloragaceae	*Gonocarpus tetragynus*	Poverty Raspwort	FG																
Haloragaceae	*Haloragis heterophylla*	Variable Raspwort	FG			0.1	10									0.1	50		
Haloragaceae	*Haloragis serra*		FG																
Juncaceae	*Juncus spp.*		GG					0.1	15										
Juncaceae	*Juncus subsecundus*	Finger Rush	GG	0.5	30	0.5	50			0.1	10	0.3	50						
Juncaceae	*Juncus usitatus*		GG													0.1	10	1	500
Lamiaceae	*Mentha spp.*		FG															0.1	5

Family	Scientific Name	Common Name	Growth Form	VZ1_PCT81_moderate															
				P21139_006		P21139_009		P21139_011		P21139_016		P21139_019		P21139_020		P21139_030		P_21139_203	
				PC	Ab	PC	Ab	PC	Ab	PC	Ab	PC	Ab	PC	Ab	PC	Ab	PC	Ab
Lamiaceae	*Prunella vulgaris*	Self-heal	EX																
Lauraceae	*Cassytha spp.*		OG																
Lomandraceae	*Lomandra confertifolia*	Matrush	GG											0.1	1				
Lomandraceae	*Lomandra filiformis*	Wattle Matt-rush	GG							0.1	2							60	1000
Lomandraceae	*Lomandra filiformis subsp. filiformis*		GG											0.1	5				
Lomandraceae	*Lomandra glauca*	Pale Mat-rush	GG																
Lomandraceae	*Lomandra leucocephala subsp. leucocephala*	Woolly Mat-rush	GG															0.2	100
Lomandraceae	*Lomandra multiflora*	Many-flowered Mat-rush	GG									1	10	0.1	1	0.1	10		
Lomandraceae	*Lomandra spp.*	Mat-rush	GG																
Malvaceae	*Brachychiton populneus*	Kurrajong	TG																
Malvaceae	*Malva parviflora*	Small-flowered Mallow	EX																
Malvaceae	*Modiola caroliniana*	Red-flowered Mallow	EX									0.1	1	0.1	5				
Malvaceae	*Sida corrugata*	Corrugated Sida	FG															0.1	20
Malvaceae	*Sida rhombifolia*	Paddy's Lucerne	EX															0.1	5
Myrtaceae	*Angophora floribunda*	Rough-barked Apple	TG			5	1												
Myrtaceae	*Baeckea spp.*		SG																
Myrtaceae	*Eucalyptus blakelyi*	Blakely's Red Gum	TG									0.5	1						
Myrtaceae	*Eucalyptus conica*	Fuzzy Box	TG									15	8	5	5				
Myrtaceae	*Eucalyptus dealbata*	Tumbledown Red Gum	TG																
Myrtaceae	*Eucalyptus melliodora*	Yellow Box	TG																
Myrtaceae	*Eucalyptus microcarpa*	Western Grey Box	TG	25	3	30	2			25	6	5	1	15	7	20	15	30	7
Myrtaceae	*Eucalyptus polyanthemos*	Red Box	TG																
Myrtaceae	*Eucalyptus sideroxylon*	Mugga Ironbark	TG	15	1											3	1		
Myrtaceae	*Melaleuca spp.*		SG																
Nyctaginaceae	*Boerhavia dominii*	Tarvine	FG																
Oxalidaceae	*Oxalis perennans*		FG	0.1	3	0.1	40					0.1	10	0.2	100				
Phormiaceae	*Stypandra glauca*	Nodding Blue Lily	FG																
Phyllanthaceae	*Poranthera microphylla*	Small Poranthera	FG																
Plantaginaceae	*Plantago debilis*	Shade Plantain	FG															0.2	50
Plantaginaceae	*Plantago lanceolata*	Lamb's Tongues	EX																
Plantaginaceae	*Veronica plebeia*	Trailing Speedwell	FG																
Poaceae	*Aristida leichhardtiana*		GG							0.3	100	0.1	3						
Poaceae	*Aristida ramosa*	Purple Wiregrass	GG															10	1000
Poaceae	*Aristida spp.*		GG											0.2	10				

Family	Scientific Name	Common Name	Growth Form	VZ1_PCT81_moderate															
				P21139_006		P21139_009		P21139_011		P21139_016		P21139_019		P21139_020		P21139_030		P_21139_203	
				PC	Ab	PC	Ab	PC	Ab	PC	Ab	PC	Ab	PC	Ab	PC	Ab	PC	Ab
Poaceae	*Aristida vagans*	Threeawn Speargrass	GG			0.1	10			35	1000	0.3	20			15	200		
Poaceae	*Austrostipa bigeniculata*	Yanganbil	GG																
Poaceae	*Austrostipa densiflora*	Foxtail Speargrass	GG											3	50				
Poaceae	*Austrostipa scabra*	Speargrass	GG	35	1000			0.1	10	0.2	20	5	100	3	50				
Poaceae	*Austrostipa spp.*		GG																
Poaceae	*Austrostipa verticillata*	Slender Bamboo Grass	GG															5	500
Poaceae	*Avena barbata*	Bearded Oats	EX																
Poaceae	*Bothriochloa decipiens*	Pitted Bluegrass	GG																
Poaceae	*Bothriochloa macra*	Red Grass	GG																
Poaceae	*Bouteloua dactyloides*	Buffalo Grass	EX																
Poaceae	*Briza minor*	Shivery Grass	EX																
Poaceae	*Bromus cartharticus*	Praire Grass	EX															0.5	100
Poaceae	*Bromus catharticus*	Praire Grass	EX									0.2	10	2	50				
Poaceae	*Bromus hordeaceus*	Soft Brome	EX																
Poaceae	*Capillipedium spicigerum*	Scented-top Grass	GG																
Poaceae	*Chloris gayana*	Rhodes Grass	HT																
Poaceae	*Chloris truncata*	Windmill Grass	GG					0.2	20	0.2	20	10	1000	5	500				
Poaceae	*Chloris ventricosa*	Tall Chloris	GG																
Poaceae	*Cynodon dactylon*	Common Couch	GG					5	200										
Poaceae	*Dichanthium sericeum*	Queensland Bluegrass	GG																
Poaceae	*Dichelachne micrantha*	Shorthair Plumegrass	GG																
Poaceae	*Dichelachne spp.*		GG							0.2	20								
Poaceae	*Digitaria brownii*	Cotton Panic Grass	GG																
Poaceae	*Digitaria diffusa*	Open Summer-grass	GG									0.1	2						
Poaceae	*Digitaria divaricatissima*	Umbrella Grass	GG									0.1	5						
Poaceae	*Digitaria spp.*		GG					0.2	20	0.3	50								
Poaceae	*Echinochloa spp.*		GG																
Poaceae	*Echinopogon ovatus*	Forest Hedgehog Grass	GG																
Poaceae	*Echinopogon spp.*		GG			2	50												
Poaceae	*Eleusine tristachya*	Goose Grass	EX	0.5	50			0.1	20					0.2	50				
Poaceae	*Elymus scaber*	Wheatgrass, Common Wheatgrass	GG																
Poaceae	*Enneapogon gracilis*	Slender Nineawn	GG													0.1	20		
Poaceae	*Entolasia stricta*	Wiry Panic	GG	0.1	20					2	1000					0.1	5		
Poaceae	*Eragrostis brownii*	Brown's Lovegrass	GG							0.2	100			3	500	0.5	200		

Family	Scientific Name	Common Name	Growth Form	VZ1_PCT81_moderate															
				P21139_006		P21139_009		P21139_011		P21139_016		P21139_019		P21139_020		P21139_030		P_21139_203	
				PC	Ab	PC	Ab	PC	Ab	PC	Ab	PC	Ab	PC	Ab	PC	Ab	PC	Ab
Poaceae	*Eragrostis cilianensis*	Stinkgrass	EX			20	1000							0.1	3				
Poaceae	*Eragrostis curvula*	African Lovegrass	HT	0.1	10			50	1000			10	1000	0.1	3				
Poaceae	*Eragrostis leptostachya*	Paddock Lovegrass	GG									1	100			0.5	200		
Poaceae	*Eragrostis pilosa*	Soft Lovegrass	EX																
Poaceae	*Eragrostis spp.*		GG							1	100			10	1000				
Poaceae	*Eriochloa pseudoacrotricha*	Early Spring Grass	GG									0.1	10	0.2	50				
Poaceae	*Eulalia aurea*	Silky Browntop	GG																
Poaceae	*Hyparrhenia hirta*	Coolatai Grass	HT																
Poaceae	*Lachnagrostis filiformis*		GG																
Poaceae	*Lolium perenne*	Perennial Ryegrass	EX															0.1	10
Poaceae	*Microlaena stipoides*	Weeping Grass	GG			0.1	20			0.3	50	20	1000	15	1000	0.1	5		
Poaceae	*Panicum effusum*	Hairy Panic	GG	0.5	50			1	100	0.2	20	0.2	20			0.1	20		
Poaceae	*Panicum spp.*	Panicum	GG																
Poaceae	*Paspalidium distans*		GG									5	500	5	500				
Poaceae	*Paspalidium spp.*		GG																
Poaceae	*Paspalum dilatatum*	Paspalum	HT											0.1	1				
Poaceae	*Paspalum spp.*		GG	0.1	10														
Poaceae	*Poa sieberiana*	Snowgrass	GG																
Poaceae	*Rytidosperma caespitosum*	Ringed Wallaby Grass	GG													0.1	10		
Poaceae	*Rytidosperma setaceum*	Small-flowered Wallaby-grass	GG	5	200	25	1000											0.5	200
Poaceae	*Rytidosperma spp.*		GG																
Poaceae	*Rytidosperma tenuius*		GG							5	1000	20	1000	10	100				
Poaceae	*Setaria gracilis*		EX																
Poaceae	*Setaria parviflora*		EX	0.5	50			10	200					0.1	3				
Poaceae	*Setaria pumila*	Pale Pigeon Grass	EX																
Poaceae	*Sorghum leiocladum*	wild sorghum	GG													0.1	10		
Poaceae	*Sporobolus africanus*	Parramatta Grass	EX															1	100
Poaceae	*Sporobolus caroli*	Fairy Grass	GG																
Poaceae	*Sporobolus creber*	Slender Rat's Tail Grass	GG	0.1	10	2	50	10	200	0.3	50	0.5	50	2	100				
Poaceae	*Themeda triandra*		GG															10	1000
Poaceae	*Triticum sp.*	Triticum sp.	EX																
Polygonaceae	*Acetosella vulgaris*	Sheep Sorrel	HT									5	1000	0.3	100	0.1	50		
Polygonaceae	*Polygonum aviculare*	Wireweed	EX					0.3	100										
Polygonaceae	*Rumex acetosella*	Sheep Sorrel	HT	0.1	15			0.1	20										

Family	Scientific Name	Common Name	Growth Form	VZ1_PCT81_moderate															
				P21139_006		P21139_009		P21139_011		P21139_016		P21139_019		P21139_020		P21139_030		P_21139_203	
				PC	Ab	PC	Ab	PC	Ab	PC	Ab	PC	Ab	PC	Ab	PC	Ab	PC	Ab
Polygonaceae	*Rumex brownii*	Swamp Dock	FG											0.1	1			0.1	20
Portulacaceae	*Portulaca oleracea*	Pigweed	FG	0.1	2									0.1	1				
Primulaceae	*Anagallis arvensis*	Scarlet Pimpernel	EX																
Pteridaceae	*Cheilanthes distans*	Bristly Cloak Fern	EG																
Pteridaceae	*Cheilanthes sieberi*	Rock Fern	EG			1	50			0.1	5	0.1	2						
Rosaceae	*Acaena novae-zelandiae*	Bidgee-widgee	FG																
Rosaceae	*Rosa rubiginosa*	Sweet Briar	HT																
Rosaceae	*Rubus fruticosus*	Blackberry complex	HT																
Rubiaceae	*Asperula conferta*	Common Woodruff	FG	0.1	1	0.1	40												
Rubiaceae	*Opercularia diphylla*	Stinkweed	FG									0.3	50						
Rubiaceae	*Pomax umbellata*	Pomax	FG			0.1	20			0.1	3								
Rubiaceae	*Richardia brasiliensis*	Mexican Clover	EX																
Rubiaceae	*Richardia stellaris*		EX																
Sapindaceae	*Dodonaea viscosa*	Sticky Hop-bush	SG																
Scrophulariaceae	*Eremophila debilis*	Amulla	SG																
Scrophulariaceae	*Verbascum thapsus*	Great Mullein	EX																
Scrophulariaceae	*Verbascum virgatum*	Twiggy Mullein	EX											0.1	1				
Solanaceae	*Lycium ferocissimum*	African Boxthorn	HT																
Solanaceae	*Solanum cinereum*	Narrawa Burr	SG					0.1	20										
Solanaceae	*Solanum nigrum*	Black-berry Nightshade	EX	0.1	3	0.1	1	0.1	10	0.1	3	0.1	2	0.2	10				
Solanaceae	*Solanum pseudocapsicum*	Madeira Winter Cherry	EX					0.2	50										
Solanaceae	*Solanum spp.*		FG																
Stackhousiaceae	*Stackhousia spp.*		FG																
Urticaceae	*Urtica incisa*	Stinging Nettle	FG															0.1	2
Verbenaceae	*Verbena bonariensis*	Purpletop	EX									0.2	20	0.1	2			0.1	5
Verbenaceae	*Verbena rigida*	Veined Verbena	EX																
Violaceae	*Hybanthus monopetalus*	Slender Violet-bush	FG																

Family	Scientific Name	Common Name	Growth Form	VZ2_PCT281_moderate									
				P21139_013		P21139_017		P21139_022		P21139_028		P21139_031	
				PC	Ab	PC	Ab	PC	Ab	PC	Ab	PC	Ab
Amaranthaceae	*Alternanthera denticulata*	Lesser Joyweed	FG										
Amaranthaceae	*Alternanthera nana*	Hairy Joyweed	FG	1	100	0.1	1						
Amaranthaceae	*Alternanthera spp.*	Joyweed	FG										
Amaranthaceae	*Gomphrena celosioides*	Gomphrena Weed	EX										
Anthericaceae	*Tricoryne elatior*	Yellow Autumn-lily	FG										
Apiaceae	*Cyclospermum leptophyllum*	Slender Celery	EX										
Apiaceae	*Daucus carota*	Wild Carrot	EX										
Apiaceae	*Daucus spp.*		FG										
Apiaceae	*Hydrocotyle laxiflora*	Stinking Pennywort	FG	2	100	0.2	50	2	50				
Apocynaceae	*Gomphocarpus fruticosus*	Narrow-leaved Cotton Bush	EX										
Asparagaceae	*Dichopogon fimbriatus*		FG										
Asphodelaceae	*Dianella longifolia*	Blueberry Lily	FG			0.1	4						
Asteraceae	*Aster spp.*		EX										
Asteraceae	*Bidens pilosa*	Cobbler's Pegs	HT										
Asteraceae	*Bidens subalternans*	Greater Beggar's Ticks	HT										
Asteraceae	*Brachyscome spathulata*		FG										
Asteraceae	*Calocephalus citreus*	Lemon Beauty-heads	FG										
Asteraceae	*Calotis cuneata*	Mountain Burr-Daisy	FG										
Asteraceae	*Calotis cuneifolia*	Purple Burr-Daisy	FG	0.1	5	2	100						
Asteraceae	*Calotis lappulacea*	Yellow Burr-daisy	FG	0.1	1	0.2	20					6	250
Asteraceae	*Carthamus lanatus*	Saffron Thistle	HT										
Asteraceae	*Cassinia arcuata*		SG			0.2	10	0.1	5				
Asteraceae	*Cassinia sifton*		SG										
Asteraceae	*Cassinia spp.*		SG										
Asteraceae	*Centaurea calcitrapa*	Star Thistle	EX										
Asteraceae	*Cirsium vulgare*	Spear Thistle	EX	0.2	5	0.2	10						
Asteraceae	*Conyza bonariensis*	Flaxleaf Fleabane	EX	1	100	0.2	10	0.2	200				
Asteraceae	*Conyza spp.*		EX										
Asteraceae	*Conyza sumatrensis*	Tall fleabane	EX										
Asteraceae	*Cotula australis*	Common Cotula	FG										
Asteraceae	*Cymbonotus lawsonianus*	Bear's Ear	FG										
Asteraceae	*Cymbonotus preissianus*	Austral Bear's Ear	FG					0.2	100				
Asteraceae	*Euchiton involucratus*	Star Cudweed	FG			0.1	1000						
Asteraceae	*Euchiton sphaericus*	Star Cudweed	FG										
Asteraceae	*Gamochaeta americana*	Purple Cudweed	EX									0.5	500
Asteraceae	*Gamochaeta spp.*		EX										
Asteraceae	*Hypochaeris radicata*	Catsear	EX			0.1	5			1	500		
Asteraceae	*Lactuca serriola*	Prickly Lettuce	EX										

Family	Scientific Name	Common Name	Growth Form	VZ2_PCT281_moderate									
				P21139_013		P21139_017		P21139_022		P21139_028		P21139_031	
				PC	Ab	PC	Ab	PC	Ab	PC	Ab	PC	Ab
Asteraceae	*Olearia viscosa*		SG										
Asteraceae	*Pseudognaphalium luteoalbum*	Jersey Cudweed	FG			0.1	2						
Asteraceae	*Silybum marianum*	Variegated Thistle	EX										
Asteraceae	*Solenogyne bellioides*	Solengyne	FG	0.1	5	0.1	20						
Asteraceae	*Soliva sessilis*	Bindyi	EX									0.3	200
Asteraceae	*Sonchus oleraceus*	Common Sowthistle	EX										
Asteraceae	*Taraxacum officinale*	Dandelion	EX	0.1	2							0.4	200
Asteraceae	*Vernonia cinerea*	little ironweed	FG										
Asteraceae	*Vittadinia cuneata*		FG			0.1	1000	2	500				
Asteraceae	*Vittadinia spp.*	Fuzzweed	FG										
Asteraceae	*Xanthium spinosum*	Bathurst Burr	HT										
Asteraceae	*Xerochrysum viscosum*	Sticky Everlasting	FG										
Boraginaceae	*Echium plantagineum*	Patterson's Curse	EX										
Brassicaceae	*Hirschfeldia incana*	Buchan Weed	EX										
Brassicaceae	*Lepidium africanum*	Common Peppercress	EX	0.2	100							0.2	2000
Brassicaceae	*Lepidium bonariense*	Argentine Peppercress	EX										
Cactaceae	*Opuntia humifusa*	Creeping Pear	HT										
Cactaceae	*Opuntia stricta*	Common Prickly Pear	EX										
Campanulaceae	*Pratia concolor*	Poison Pratia	FG										
Campanulaceae	*Wahlenbergia communis*	Tufted Bluebell	FG										
Campanulaceae	*Wahlenbergia gracilis*	Sprawling Bluebell	FG										
Campanulaceae	*Wahlenbergia spp.*	Bluebell	FG			0.1	5						
Caryophyllaceae	*Paronychia brasiliana*	Chilean Whitlow Wort, Brazilian Whitlow	EX	5	1000	0.2	50			0.1	20		
Caryophyllaceae	*Petrorhagia nanteuilii*	Proliferous Pink	EX										
Caryophyllaceae	*Stellaria media*	Common Chickweed	EX									1	1000
Casuarinaceae	*Allocasuarina torulosa*	Forest Oak	TG										
Chenopodiaceae	*Atriplex spp.*		SG			0.1	1						
Chenopodiaceae	*Chenopodium pumilio*	Small Crumbweed	FG										
Chenopodiaceae	*Einadia hastata*	Berry Saltbush	FG										
Chenopodiaceae	*Einadia nutans*	Climbing Saltbush	FG					0.1	10				
Chenopodiaceae	*Einadia nutans subsp. nutans*	Climbing Saltbush	FG			0.2	50						
Chenopodiaceae	*Einadia trigonos*	Fishweed	FG	2	100								
Clusiaceae	*Hypericum gramineum*	Small St John's Wort	FG					0.1	50	0.1	20		
Clusiaceae	*Hypericum perforatum*	St. Johns Wort	HT										
Convolvulaceae	*Convolvulus erubescens*	Pink Bindweed	OG										
Convolvulaceae	*Dichondra repens*	Kidney Weed	FG	0.5	100	0.2	50						
Crassulaceae	*Crassula spp.*	Stonecrop	FG									0.2	500
Cupressaceae	*Callitris endlicheri*	Black Cypress Pine	TG										

Family	Scientific Name	Common Name	Growth Form	VZ2_PCT281_moderate									
				P21139_013		P21139_017		P21139_022		P21139_028		P21139_031	
				PC	Ab	PC	Ab	PC	Ab	PC	Ab	PC	Ab
Cupressaceae	*Callitris glaucophylla*	White Cypress Pine	TG										
Cyperaceae	*Carex appressa*	Tall Sedge	GG										
Cyperaceae	*Carex inversa*	Knob Sedge	GG			0.2	50						
Cyperaceae	*Cyperus bifax*	Downs Nutgrass	GG										
Cyperaceae	*Cyperus brevifolius*		EX										
Cyperaceae	*Cyperus eragrostis*	Umbrella Sedge	HT										
Cyperaceae	*Cyperus gracilis*	Slender Flat-sedge	GG										
Cyperaceae	*Fimbristylis dichotoma*	Common Fringe-sedge	GG							0.1	2		
Cyperaceae	*Gahnia aspera*	Rough Saw-sedge	GG										
Cyperaceae	*Lepidosperma laterale*	Variable Sword-sedge	GG										
Cyperaceae	*Schoenus spp.*		GG										
Dilleniaceae	*Hibbertia obtusifolia*	Hoary Guinea Flower	SG										
Dilleniaceae	*Hibbertia spp.*		SG			0.1	1						
Ericaceae	*Astroloma humifusum*	Native Cranberry	SG										
Ericaceae	*Leucopogon ericoides*	Pink Beard-heath	SG							0.1	1		
Ericaceae	*Leucopogon spp.*		SG										
Ericaceae	*Lissanthe strigosa*	Peach Heath	SG			1	10						
Euphorbiaceae	*Euphorbia drummondii*	Caustic Weed	FG										
Euphorbiaceae	*Euphorbia peplus*	Petty Spurge	EX										
Euphorbiaceae	*Euphorbia spp.*		FG			0.1	1						
Fabaceae (Faboideae)	*Daviesia acicularis*		SG										
Fabaceae (Faboideae)	*Daviesia spp.*		SG			0.1	2						
Fabaceae (Faboideae)	*Desmodium varians*		OG										
Fabaceae (Faboideae)	*Glycine clandestina*	Twining glycine	OG										
Fabaceae (Faboideae)	*Glycine tabacina*	Variable Glycine	OG	0.1	5	0.2	100						
Fabaceae (Faboideae)	*Hardenbergia violacea*	False Sarsaparilla	OG										
Fabaceae (Faboideae)	*Medicago arabica*	Spotted Burr Medic	EX							0.1	50		
Fabaceae (Faboideae)	*Medicago spp.*		EX										
Fabaceae (Faboideae)	*Pultenaea microphylla*		SG										
Fabaceae (Faboideae)	*Pultenaea retusa*		SG										
Fabaceae (Faboideae)	*Trifolium repens*	White Clover	EX	0.2	20	0.1	3					0.3	300
Fabaceae (Faboideae)	*Trifolium spp.*		EX										
Fabaceae (Faboideae)	*Trifolium stellatum*		EX										
Fabaceae (Mimosoideae)	*Acacia hakeoides*	Hakea Wattle	SG										
Fabaceae (Mimosoideae)	*Acacia spectabilis*	Mudgee Wattle	SG										
Fabaceae (Mimosoideae)	*Acacia spp.*	Wattle	SG										
Gentianaceae	*Centaurium erythraea*	Common Centaury	EX										
Gentianaceae	*Centaurium tenuiflorum*	Branched Centaury, Slender centaury	EX										

Family	Scientific Name	Common Name	Growth Form	VZ2_PCT281_moderate									
				P21139_013		P21139_017		P21139_022		P21139_028		P21139_031	
				PC	Ab	PC	Ab	PC	Ab	PC	Ab	PC	Ab
Geraniaceae	*Erodium spp.*	Crowfoot	FG									0.4	40
Geraniaceae	*Geranium homeanum*		FG					0.1	10				
Goodeniaceae	*Goodenia heterophylla*		FG										
Goodeniaceae	*Goodenia paniculata*		FG										
Goodeniaceae	*Goodenia spp.*		FG					0.1	20				
Haloragaceae	*Gonocarpus tetragynus*	Poverty Raspwort	FG										
Haloragaceae	*Haloragis heterophylla*	Variable Raspwort	FG			0.2	50			0.2	200		
Haloragaceae	*Haloragis serra*		FG										
Juncaceae	*Juncus spp.*		GG										
Juncaceae	*Juncus subsecundus*	Finger Rush	GG										
Juncaceae	*Juncus usitatus*		GG			0.1	5			5	50		
Lamiaceae	*Mentha spp.*		FG										
Lamiaceae	*Prunella vulgaris*	Self-heal	EX									0.2	200
Lauraceae	*Cassytha spp.*		OG										
Lomandraceae	*Lomandra confertifolia*	Matrush	GG										
Lomandraceae	*Lomandra filiformis*	Wattle Matt-rush	GG			0.1	20						
Lomandraceae	*Lomandra filiformis subsp. filiformis*		GG										
Lomandraceae	*Lomandra glauca*	Pale Mat-rush	GG										
Lomandraceae	*Lomandra leucocephala subsp. leucocephala*	Woolly Mat-rush	GG										
Lomandraceae	*Lomandra multiflora*	Many-flowered Mat-rush	GG							0.1	5		
Lomandraceae	*Lomandra spp.*	Mat-rush	GG					0.2	100				
Malvaceae	*Brachychiton populneus*	Kurrajong	TG			0.1	1	0.1	1				
Malvaceae	*Malva parviflora*	Small-flowered Mallow	EX										
Malvaceae	*Modiola caroliniana*	Red-flowered Mallow	EX	0.1	3	0.1	1						
Malvaceae	*Sida corrugata*	Corrugated Sida	FG										
Malvaceae	*Sida rhombifolia*	Paddy's Lucerne	EX										
Myrtaceae	*Angophora floribunda*	Rough-barked Apple	TG	20	9			20	2	25	14		
Myrtaceae	*Baeckea spp.*		SG			0.1	1000						
Myrtaceae	*Eucalyptus blakelyi*	Blakely's Red Gum	TG	5	1	25	8	10	3	5	1		
Myrtaceae	*Eucalyptus conica*	Fuzzy Box	TG										
Myrtaceae	*Eucalyptus dealbata*	Tumbledown Red Gum	TG										
Myrtaceae	*Eucalyptus melliodora*	Yellow Box	TG					5	1				
Myrtaceae	*Eucalyptus microcarpa*	Western Grey Box	TG										
Myrtaceae	*Eucalyptus polyanthemos*	Red Box	TG										
Myrtaceae	*Eucalyptus sideroxylon*	Mugga Ironbark	TG										
Myrtaceae	*Melaleuca spp.*		SG			0.1	1000						
Nyctaginaceae	*Boerhavia dominii*	Tarvine	FG										
Oxalidaceae	*Oxalis perennans*		FG			0.1	3						

Family	Scientific Name	Common Name	Growth Form	VZ2_PCT281_moderate									
				P21139_013		P21139_017		P21139_022		P21139_028		P21139_031	
				PC	Ab	PC	Ab	PC	Ab	PC	Ab	PC	Ab
Phormiaceae	*Stypandra glauca*	Nodding Blue Lily	FG										
Phyllanthaceae	*Poranthera microphylla*	Small Poranthera	FG										
Plantaginaceae	*Plantago debilis*	Shade Plantain	FG										
Plantaginaceae	*Plantago lanceolata*	Lamb's Tongues	EX									0.3	300
Plantaginaceae	*Veronica plebeia*	Trailing Speedwell	FG										
Poaceae	*Aristida leichhardtiana*		GG										
Poaceae	*Aristida ramosa*	Purple Wiregrass	GG			2	100	50	3000				
Poaceae	*Aristida spp.*		GG										
Poaceae	*Aristida vagans*	Threeawn Speargrass	GG			1	100			0.2	100		
Poaceae	*Austrostipa bigeniculata*	Yanganbil	GG										
Poaceae	*Austrostipa densiflora*	Foxtail Speargrass	GG										
Poaceae	*Austrostipa scabra*	Speargrass	GG	0.1	3	0.3	50	5	500			0.3	30
Poaceae	*Austrostipa spp.*		GG										
Poaceae	*Austrostipa verticillata*	Slender Bamboo Grass	GG	0.1	1								
Poaceae	*Avena barbata*	Bearded Oats	EX										
Poaceae	*Bothriochloa decipiens*	Pitted Bluegrass	GG	0.5	100								
Poaceae	*Bothriochloa macra*	Red Grass	GG					0.1	20			5	3000
Poaceae	*Bouteloua dactyloides*	Buffalo Grass	EX										
Poaceae	*Briza minor*	Shivery Grass	EX									0.2	200
Poaceae	*Bromus cartharticus*	Praire Grass	EX										
Poaceae	*Bromus catharticus*	Praire Grass	EX	0.2	10			0.1	10			15	2000
Poaceae	*Bromus hordeaceus*	Soft Brome	EX										
Poaceae	*Capillipedium spicigerum*	Scented-top Grass	GG							0.1	5		
Poaceae	*Chloris gayana*	Rhodes Grass	HT										
Poaceae	*Chloris truncata*	Windmill Grass	GG	0.1	3	1	100						
Poaceae	*Chloris ventricosa*	Tall Chloris	GG										
Poaceae	*Cynodon dactylon*	Common Couch	GG										
Poaceae	*Dichanthium sericeum*	Queensland Bluegrass	GG										
Poaceae	*Dichelachne micrantha*	Shorthair Plumegrass	GG										
Poaceae	*Dichelachne spp.*		GG										
Poaceae	*Digitaria brownii*	Cotton Panic Grass	GG	0.3	50								
Poaceae	*Digitaria diffusa*	Open Summer-grass	GG										
Poaceae	*Digitaria divaricatissima*	Umbrella Grass	GG	1	100	0.3	100						
Poaceae	*Digitaria spp.*		GG			0.2	50						
Poaceae	*Echinochloa spp.*		GG										
Poaceae	*Echinopogon ovatus*	Forest Hedgehog Grass	GG										
Poaceae	*Echinopogon spp.*		GG										
Poaceae	*Eleusine tristachya*	Goose Grass	EX	0.1	10							0.3	30

Family	Scientific Name	Common Name	Growth Form	VZ2_PCT281_moderate									
				P21139_013		P21139_017		P21139_022		P21139_028		P21139_031	
				PC	Ab	PC	Ab	PC	Ab	PC	Ab	PC	Ab
Poaceae	*Elymus scaber*	Wheatgrass, Common Wheatgrass	GG	0.1	3								
Poaceae	*Enneapogon gracilis*	Slender Nineawn	GG										
Poaceae	*Entolasia stricta*	Wiry Panic	GG										
Poaceae	*Eragrostis brownii*	Brown's Lovegrass	GG	2	100	0.5	100	0.1	50			10	150
Poaceae	*Eragrostis cilianensis*	Stinkgrass	EX										
Poaceae	*Eragrostis curvula*	African Lovegrass	HT							2	500	3	2000
Poaceae	*Eragrostis leptostachya*	Paddock Lovegrass	GG							0.1	20	2	4000
Poaceae	*Eragrostis pilosa*	Soft Lovegrass	EX										
Poaceae	*Eragrostis spp.*		GG			2	100						
Poaceae	*Eriochloa pseudoacrotricha*	Early Spring Grass	GG			0.5	100						
Poaceae	*Eulalia aurea*	Silky Browntop	GG			2	100						
Poaceae	*Hyparrhenia hirta*	Coolatai Grass	HT										
Poaceae	*Lachnagrostis filiformis*		GG										
Poaceae	*Lolium perenne*	Perennial Ryegrass	EX	0.1	2					1	500	20	2000
Poaceae	*Microlaena stipoides*	Weeping Grass	GG	60	1000	1	100	0.1	10				
Poaceae	*Panicum effusum*	Hairy Panic	GG					0.2	100				
Poaceae	*Panicum spp.*	Panicum	GG			0.2	20					0.4	400
Poaceae	*Paspalidium distans*		GG										
Poaceae	*Paspalidium spp.*		GG	0.5	50								
Poaceae	*Paspalum dilatatum*	Paspalum	HT	0.1	1	0.5	50						
Poaceae	*Paspalum spp.*		GG										
Poaceae	*Poa sieberiana*	Snowgrass	GG										
Poaceae	*Rytidosperma caespitosum*	Ringed Wallaby Grass	GG										
Poaceae	*Rytidosperma setaceum*	Small-flowered Wallaby-grass	GG			20	1000						
Poaceae	*Rytidosperma spp.*		GG	0.2	20								
Poaceae	*Rytidosperma tenuius*		GG			3	1000						
Poaceae	*Setaria gracilis*		EX										
Poaceae	*Setaria parviflora*		EX	1	100	0.3	50						
Poaceae	*Setaria pumila*	Pale Pigeon Grass	EX							10	1000		
Poaceae	*Sorghum leiocladum*	wild sorghum	GG			5	100			5	1000		
Poaceae	*Sporobolus africanus*	Parramatta Grass	EX										
Poaceae	*Sporobolus caroli*	Fairy Grass	GG										
Poaceae	*Sporobolus creber*	Slender Rat's Tail Grass	GG	10	1000	0.3	20			15	1500	20	5000
Poaceae	*Themeda triandra*		GG			1	50	25	500				
Poaceae	*Triticum sp.*	Triticum sp.	EX									1	1000
Polygonaceae	*Acetosella vulgaris*	Sheep Sorrel	HT	0.1	10	0.2	50			15	3000	7	2000
Polygonaceae	*Polygonum aviculare*	Wireweed	EX										
Polygonaceae	*Rumex acetosella*	Sheep Sorrel	HT										

Family	Scientific Name	Common Name	Growth Form	VZ2_PCT281_moderate									
				P21139_013		P21139_017		P21139_022		P21139_028		P21139_031	
				PC	Ab	PC	Ab	PC	Ab	PC	Ab	PC	Ab
Polygonaceae	*Rumex brownii*	Swamp Dock	FG			0.1	1						
Portulacaceae	*Portulaca oleracea*	Pigweed	FG										
Primulaceae	*Anagallis arvensis*	Scarlet Pimpernel	EX										
Pteridaceae	*Cheilanthes distans*	Bristly Cloak Fern	EG					0.1	50				
Pteridaceae	*Cheilanthes sieberi*	Rock Fern	EG			0.1	3					0.4	400
Rosaceae	*Acaena novae-zelandiae*	Bidgee-widgee	FG			0.1	1000						
Rosaceae	*Rosa rubiginosa*	Sweet Briar	HT										
Rosaceae	*Rubus fruticosus*	Blackberry complex	HT										
Rubiaceae	*Asperula conferta*	Common Woodruff	FG			0.1	1000					1	1000
Rubiaceae	*Opercularia diphylla*	Stinkweed	FG										
Rubiaceae	*Pomax umbellata*	Pomax	FG										
Rubiaceae	*Richardia brasiliensis*	Mexican Clover	EX										
Rubiaceae	*Richardia stellaris*		EX			0.1	2						
Sapindaceae	*Dodonaea viscosa*	Sticky Hop-bush	SG										
Scrophulariaceae	*Eremophila debilis*	Amulla	SG					0.1	20				
Scrophulariaceae	*Verbascum thapsus*	Great Mullein	EX										
Scrophulariaceae	*Verbascum virgatum*	Twiggy Mullein	EX										
Solanaceae	*Lycium ferocissimum*	African Boxthorn	HT					0.1	1				
Solanaceae	*Solanum cinereum*	Narrawa Burr	SG	0.1	4								
Solanaceae	*Solanum nigrum*	Black-berry Nightshade	EX	1	100	0.1	3						
Solanaceae	*Solanum pseudocapsicum*	Madeira Winter Cherry	EX										
Solanaceae	*Solanum spp.*		FG										
Stackhousiaceae	*Stackhousia spp.*		FG										
Urticaceae	*Urtica incisa*	Stinging Nettle	FG										
Verbenaceae	*Verbena bonariensis*	Purpletop	EX	0.1	1							0.1	20
Verbenaceae	*Verbena rigida*	Veined Verbena	EX										
Violaceae	*Hybanthus monopetalus*	Slender Violet-bush	FG										
Zygophyllaceae	*Tribulus terrestris*	Cat-head	EX										

Table 1.1 Flora list for VZ3_PCT318_moderate and VZ4_PCT81_DNG

Family	Scientific Name	Common Name	Growth Form	VZ3_PCT318_moderate														VZ4_PCT81_DNG					
				P21139_001		P21139_003		P21139_004		P21139_005		P21139_007		P21139_008		P21139_025		P21139_032		P_21139_200		P_21139_204	
				PC	Ab	PC	Ab	PC	Ab	PC	Ab	PC	Ab	PC	Ab	PC	Ab	PC	Ab	PC	Ab	PC	Ab
Amaranthaceae	*Alternanthera denticulata*	Lesser Joyweed	FG																				
Amaranthaceae	*Alternanthera nana*	Hairy Joyweed	FG	0.5	200			0.1	2														
Amaranthaceae	*Alternanthera spp.*	Joyweed	FG							1	100												
Amaranthaceae	*Gomphrena celosioides*	Gomphrena Weed	EX																				
Anthericaceae	*Tricoryne elatior*	Yellow Autumn-lily	FG			0.1	25					0.1	20										
Apiaceae	*Cyclospermum leptophyllum*	Slender Celery	EX							0.1	150												
Apiaceae	*Daucus carota*	Wild Carrot	EX																				
Apiaceae	*Daucus spp.*		FG																				
Apiaceae	*Hydrocotyle laxiflora*	Stinking Pennywort	FG																				
Apocynaceae	*Gomphocarpus fruticosus*	Narrow-leaved Cotton Bush	EX																	0.1	5		
Asparagaceae	*Dichopogon fimbriatus*		FG																				
Asphodelaceae	*Dianella longifolia*	Blueberry Lily	FG													0.1	1						
Asteraceae	*Aster spp.*		EX																	5	200		
Asteraceae	*Bidens pilosa*	Cobbler's Pegs	HT									0.1	5										
Asteraceae	*Bidens subalternans*	Greater Beggar's Ticks	HT																				
Asteraceae	*Brachyscome spathulata*		FG													0.2	100						
Asteraceae	*Calocephalus citreus*	Lemon Beauty-heads	FG																				
Asteraceae	*Calotis cuneata*	Mountain Burr-Daisy	FG															0.3	30				
Asteraceae	*Calotis cuneifolia*	Purple Burr-Daisy	FG			0.1	10	0.1	20	0.1	20	3	100	0.1	30	2	200						
Asteraceae	*Calotis lappulacea*	Yellow Burr-daisy	FG	0.1	5	3	100	0.2	25					0.2	20			5	250				
Asteraceae	*Carthamus lanatus*	Saffron Thistle	HT																				
Asteraceae	*Cassinia arcuata*		SG													10	50	0.1	1				
Asteraceae	*Cassinia sifton*		SG			0.1	5	0.2	20	0.1	5	0.1	10										
Asteraceae	*Cassinia spp.*		SG																	0.1	10	0.1	5
Asteraceae	*Centaurea calcitrapa*	Star Thistle	EX																				
Asteraceae	*Cirsium vulgare*	Spear Thistle	EX					0.1	2	0.1	5									0.1	5	0.1	10
Asteraceae	*Conyza bonariensis*	Flaxleaf Fleabane	EX			0.1	30	1	50	1	300	0.1	200					0.5	50				
Asteraceae	*Conyza spp.*		EX																				
Asteraceae	*Conyza sumatrensis*	Tall fleabane	EX									0.1	30										
Asteraceae	*Cotula australis*	Common Cotula	FG	0.1	5																		
Asteraceae	*Cymbonotus lawsonianus*	Bear's Ear	FG																				
Asteraceae	*Cymbonotus preissianus*	Austral Bear's Ear	FG																				
Asteraceae	*Euchiton involucratus*	Star Cudweed	FG																				
Asteraceae	*Euchiton sphaericus*	Star Cudweed	FG	0.1	20	0.1	50			0.1	30	0.1	50	0.1	10								

Family	Scientific Name	Common Name	Growth Form	VZ3_PCT318_moderate														VZ4_PCT81_DNG					
				P21139_001		P21139_003		P21139_004		P21139_005		P21139_007		P21139_008		P21139_025		P21139_032		P_21139_200		P_21139_204	
				PC	Ab	PC	Ab	PC	Ab	PC	Ab	PC	Ab	PC	Ab	PC	Ab	PC	Ab	PC	Ab	PC	Ab
Asteraceae	*Gamochaeta americana*	Purple Cudweed	EX																				
Asteraceae	*Gamochaeta spp.*		EX																				
Asteraceae	*Hypochaeris radicata*	Catsear	EX	0.1	15			0.1	3	0.1	10	0.1	15	0.1	20			0.3	29	0.1	40	0.2	50
Asteraceae	*Lactuca serriola*	Prickly Lettuce	EX							0.1	5												
Asteraceae	*Olearia viscosa*		SG													0.1	2						
Asteraceae	*Pseudognaphalium luteoalbum*	Jersey Cudweed	FG																				
Asteraceae	*Silybum marianum*	Variegated Thistle	EX																				
Asteraceae	*Solenogyne bellioides*	Solengyne	FG																				
Asteraceae	*Soliva sessilis*	Bindyi	EX																				
Asteraceae	*Sonchus oleraceus*	Common Sowthistle	EX																				
Asteraceae	*Taraxacum officinale*	Dandelion	EX																				
Asteraceae	*Vernonia cinerea*	little ironweed	FG																				
Asteraceae	*Vittadinia cuneata*		FG													0.1	20						
Asteraceae	*Vittadinia spp.*	Fuzzweed	FG																				
Asteraceae	*Xanthium spinosum*	Bathurst Burr	HT	0.1	10																		
Asteraceae	*Xerochrysum viscosum*	Sticky Everlasting	FG							0.1	1	0.1	5										
Boraginaceae	*Echium plantagineum*	Patterson's Curse	EX																				
Brassicaceae	*Hirschfeldia incana*	Buchan Weed	EX																				
Brassicaceae	*Lepidium africanum*	Common Peppercress	EX	10	200	0.1	50	0.1	3	0.1	50												
Brassicaceae	*Lepidium bonariense*	Argentine Peppercress	EX																				
Cactaceae	*Opuntia humifusa*	Creeping Pear	HT																				
Cactaceae	*Opuntia stricta*	Common Prickly Pear	EX					0.1	3														
Campanulaceae	*Pratia concolor*	Poison Pratia	FG																				
Campanulaceae	*Wahlenbergia communis*	Tufted Bluebell	FG	0.1	5	0.1	10	0.3	100			0.1	100										
Campanulaceae	*Wahlenbergia gracilis*	Sprawling Bluebell	FG			0.1	50			0.1	20			0.1	100								
Campanulaceae	*Wahlenbergia spp.*	Bluebell	FG																				
Caryophyllaceae	*Paronychia brasiliana*	Chilean Whitlow Wort, Brazilian Whitlow	EX																				
Caryophyllaceae	*Petrorhagia nanteuilii*	Proliferous Pink	EX			0.1	10											0.3	30				
Caryophyllaceae	*Stellaria media*	Common Chickweed	EX																				
Casuarinaceae	*Allocasuarina torulosa*	Forest Oak	TG																				
Chenopodiaceae	*Atriplex spp.*		SG																				
Chenopodiaceae	*Chenopodium pumilio*	Small Crumbweed	FG	0.4	300			0.1	50	0.1	50												
Chenopodiaceae	*Einadia hastata*	Berry Saltbush	FG																				
Chenopodiaceae	*Einadia nutans*	Climbing Saltbush	FG			0.1	30	0.1	30	0.3	30	0.1	50										

Family	Scientific Name	Common Name	Growth Form	VZ3_PCT318_moderate														VZ4_PCT81_DNG					
				P21139_001		P21139_003		P21139_004		P21139_005		P21139_007		P21139_008		P21139_025		P21139_032		P_21139_200		P_21139_204	
				PC	Ab	PC	Ab	PC	Ab	PC	Ab	PC	Ab	PC	Ab	PC	Ab	PC	Ab	PC	Ab	PC	Ab
Chenopodiaceae	*Einadia nutans subsp. nutans*	Climbing Saltbush	FG																				
Chenopodiaceae	*Einadia trigonos*	Fishweed	FG					0.1	2	0.1	20	0.1	20										
Clusiaceae	*Hypericum gramineum*	Small St John's Wort	FG							0.1	30							0.1	10				
Clusiaceae	*Hypericum perforatum*	St. Johns Wort	HT															3	30	5	300	5	500
Convolvulaceae	*Convolvulus erubescens*	Pink Bindweed	OG																				
Convolvulaceae	*Dichondra repens*	Kidney Weed	FG																	0.1	20		
Crassulaceae	*Crassula spp.*	Stonecrop	FG																				
Cupressaceae	*Callitris endlicheri*	Black Cypress Pine	TG			2	1									10	10						
Cupressaceae	*Callitris glaucophylla*	White Cypress Pine	TG							8	7	5	1										
Cyperaceae	*Carex appressa*	Tall Sedge	GG																				
Cyperaceae	*Carex inversa*	Knob Sedge	GG	0.5	200					0.1	30												
Cyperaceae	*Cyperus bifax*	Downs Nutgrass	GG																				
Cyperaceae	*Cyperus brevifolius*		EX																				
Cyperaceae	*Cyperus eragrostis*	Umbrella Sedge	HT	0.1	20													3	300				
Cyperaceae	*Cyperus gracilis*	Slender Flat-sedge	GG															0.2	20				
Cyperaceae	*Fimbristylis dichotoma*	Common Fringe-sedge	GG			0.1	20			0.1	100			0.1	50								
Cyperaceae	*Gahnia aspera*	Rough Saw-sedge	GG																				
Cyperaceae	*Lepidosperma laterale*	Variable Sword-sedge	GG							0.1	10												
Cyperaceae	*Schoenus spp.*		GG									0.1	100	0.3	300								
Dilleniaceae	*Hibbertia obtusifolia*	Hoary Guinea Flower	SG																				
Dilleniaceae	*Hibbertia spp.*		SG																				
Ericaceae	*Astroloma humifusum*	Native Cranberry	SG									0.1	30										
Ericaceae	*Leucopogon ericoides*	Pink Beard-heath	SG													0.1	5						
Ericaceae	*Leucopogon spp.*		SG									0.1	1										
Ericaceae	*Lissanthe strigosa*	Peach Heath	SG																				
Euphorbiaceae	*Euphorbia drummondii*	Caustic Weed	FG																				
Euphorbiaceae	*Euphorbia peplus*	Petty Spurge	EX															0.3	30				
Euphorbiaceae	*Euphorbia spp.*		FG																				
Fabaceae (Faboideae)	*Daviesia acicularis*		SG													1	10						
Fabaceae (Faboideae)	*Daviesia spp.*		SG																				
Fabaceae (Faboideae)	*Desmodium varians*		OG																				
Fabaceae (Faboideae)	*Glycine clandestina*	Twining glycine	OG																				
Fabaceae (Faboideae)	*Glycine tabacina*	Variable Glycine	OG			0.1	200											0.2	20				
Fabaceae (Faboideae)	*Hardenbergia violacea*	False Sarsaparilla	OG							0.1	20												
Fabaceae (Faboideae)	*Medicago arabica*	Spotted Burr Medic	EX																				

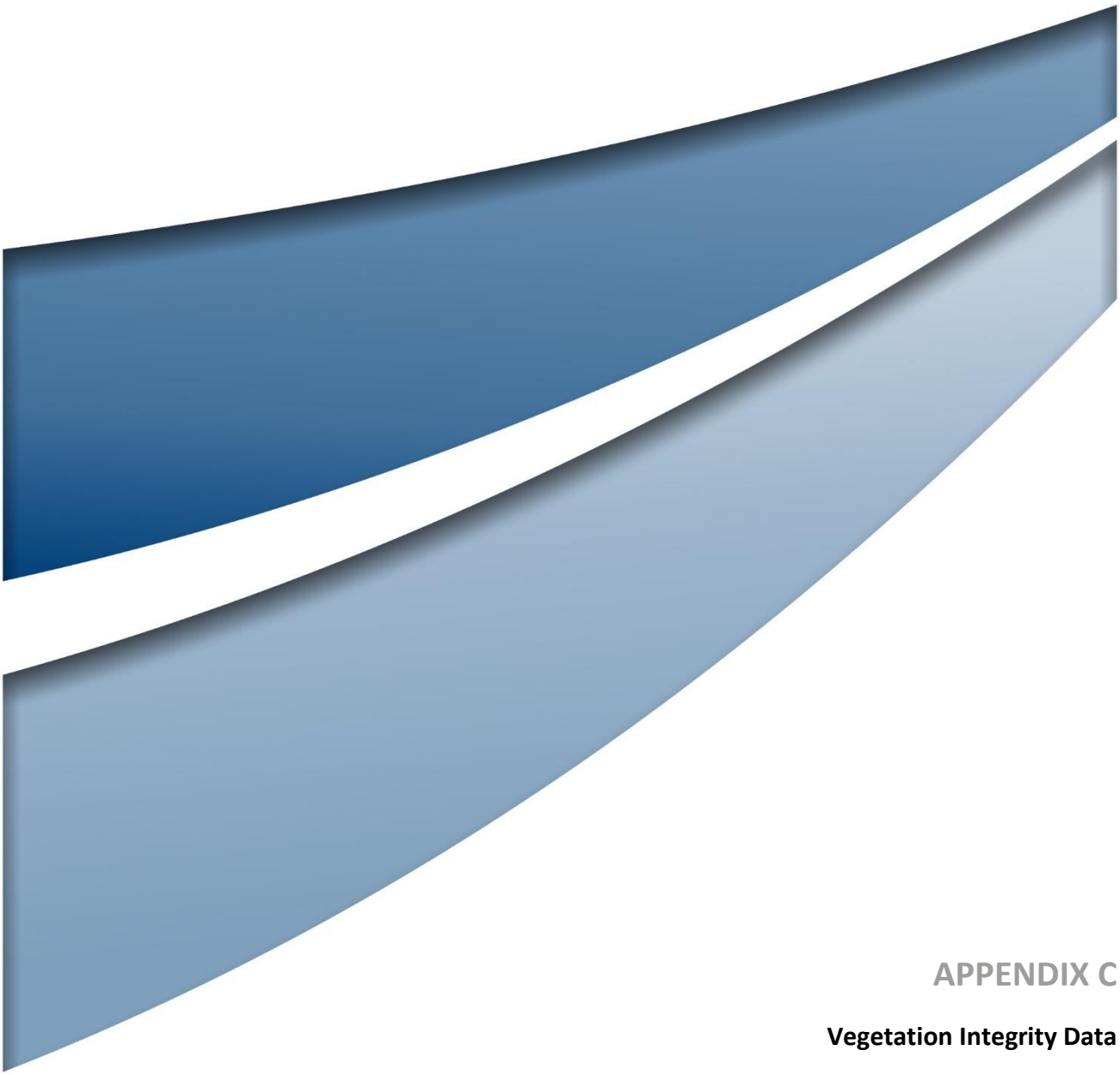
Family	Scientific Name	Common Name	Growth Form	VZ3_PCT318_moderate														VZ4_PCT81_DNG					
				P21139_001		P21139_003		P21139_004		P21139_005		P21139_007		P21139_008		P21139_025		P21139_032		P_21139_200		P_21139_204	
				PC	Ab	PC	Ab	PC	Ab	PC	Ab	PC	Ab	PC	Ab	PC	Ab	PC	Ab	PC	Ab	PC	Ab
Fabaceae (Faboideae)	*Medicago spp.*		EX																				
Fabaceae (Faboideae)	*Pultenaea microphylla*		SG																				
Fabaceae (Faboideae)	*Pultenaea retusa*		SG																				
Fabaceae (Faboideae)	*Trifolium repens*	White Clover	EX	0.1	50																		
Fabaceae (Faboideae)	*Trifolium spp.*		EX																				
Fabaceae (Faboideae)	*Trifolium stellatum*		EX																				
Fabaceae (Mimosoideae)	*Acacia hakeoides*	Hakea Wattle	SG			0.1	1					0.2	1										
Fabaceae (Mimosoideae)	*Acacia spectabilis*	Mudgee Wattle	SG			0.1	3							15	20								
Fabaceae (Mimosoideae)	*Acacia spp.*	Wattle	SG					0.2	2							0.1	1						
Gentianaceae	*Centaurium erythraea*	Common Centaury	EX																				
Gentianaceae	*Centaurium tenuiflorum*	Branched Centaury, Slender centaury	EX							0.1	10												
Geraniaceae	*Erodium spp.*	Crowfoot	FG																				
Geraniaceae	*Geranium homeanum*		FG																	0.1	20		
Goodeniaceae	*Goodenia heterophylla*		FG			0.1	50	0.1	6	0.3	530												
Goodeniaceae	*Goodenia paniculata*		FG																				
Goodeniaceae	*Goodenia spp.*		FG																				
Haloragaceae	*Gonocarpus tetragynus*	Poverty Raspwort	FG			20	800	2	50	1	100	1	100	20	300								
Haloragaceae	*Haloragis heterophylla*	Variable Raspwort	FG																				
Haloragaceae	*Haloragis serra*		FG													2	200						
Juncaceae	*Juncus spp.*		GG																				
Juncaceae	*Juncus subsecundus*	Finger Rush	GG	0.1	20							0.1	50										
Juncaceae	*Juncus usitatus*		GG							0.1	30												
Lamiaceae	*Mentha spp.*		FG																				
Lamiaceae	*Prunella vulgaris*	Self-heal	EX																				
Lauraceae	*Cassytha spp.*		OG											0.1	5								
Lomandraceae	*Lomandra confertifolia*	Matrush	GG																				
Lomandraceae	*Lomandra filiformis*	Wattle Matt-rush	GG													0.1	10					0.1	100
Lomandraceae	*Lomandra filiformis subsp. filiformis*		GG																				
Lomandraceae	*Lomandra glauca*	Pale Mat-rush	GG			0.1	50			0.1	5												
Lomandraceae	*Lomandra leucocephala subsp. leucocephala*	Woolly Mat-rush	GG																				
Lomandraceae	*Lomandra multiflora*	Many-flowered Mat-rush	GG													0.1	1			0.1	10		
Lomandraceae	*Lomandra spp.*	Mat-rush	GG																				
Malvaceae	*Brachychiton populneus*	Kurrajong	TG																				
Malvaceae	*Malva parviflora*	Small-flowered Mallow	EX	4	50																		

Family	Scientific Name	Common Name	Growth Form	VZ3_PCT318_moderate														VZ4_PCT81_DNG					
				P21139_001		P21139_003		P21139_004		P21139_005		P21139_007		P21139_008		P21139_025		P21139_032		P_21139_200		P_21139_204	
				PC	Ab	PC	Ab	PC	Ab	PC	Ab	PC	Ab	PC	Ab	PC	Ab	PC	Ab	PC	Ab	PC	Ab
Malvaceae	*Modiola caroliniana*	Red-flowered Mallow	EX	0.1	10																		
Malvaceae	*Sida corrugata*	Corrugated Sida	FG																				
Malvaceae	*Sida rhombifolia*	Paddy's Lucerne	EX																				
Myrtaceae	*Angophora floribunda*	Rough-barked Apple	TG															0.1	1	0.1	4	0.1	20
Myrtaceae	*Baeckea spp.*		SG							0.2	10	0.2	30	5	50								
Myrtaceae	*Eucalyptus blakelyi*	Blakely's Red Gum	TG	40	9	15	4	5	5					5	4			0.4	6	5	40		
Myrtaceae	*Eucalyptus conica*	Fuzzy Box	TG																				
Myrtaceae	*Eucalyptus dealbata*	Tumbledown Red Gum	TG													15	10						
Myrtaceae	*Eucalyptus melliodora*	Yellow Box	TG																				
Myrtaceae	*Eucalyptus microcarpa*	Western Grey Box	TG															0.2	5			1	40
Myrtaceae	*Eucalyptus polyanthemos*	Red Box	TG													1	1						
Myrtaceae	*Eucalyptus sideroxylon*	Mugga Ironbark	TG							20	3	15	3			10	2						
Myrtaceae	*Melaleuca spp.*		SG											25	30								
Nyctaginaceae	*Boerhavia dominii*	Tarvine	FG																				
Oxalidaceae	*Oxalis perennans*		FG	0.1	50	0.1	50	0.1	30					0.1	100			0.5	100				
Phormiaceae	*Stypandra glauca*	Nodding Blue Lily	FG			0.1	40			0.1	20	0.1	10	0.1	15	0.2	10						
Phyllanthaceae	*Poranthera microphylla*	Small Poranthera	FG			0.1	50																
Plantaginaceae	*Plantago debilis*	Shade Plantain	FG																			0.1	20
Plantaginaceae	*Plantago lanceolata*	Lamb's Tongues	EX																	0.1	10		
Plantaginaceae	*Veronica plebeia*	Trailing Speedwell	FG							0.1	20	0.1	50			0.1	10						
Poaceae	*Aristida leichhardtiana*		GG																				
Poaceae	*Aristida ramosa*	Purple Wiregrass	GG									15	500	10	300			0.4	400				
Poaceae	*Aristida spp.*		GG																				
Poaceae	*Aristida vagans*	Threeawn Speargrass	GG			0.1	20			1	100					35	1000						
Poaceae	*Austrostipa bigeniculata*	Yanganbil	GG													1	50						
Poaceae	*Austrostipa densiflora*	Foxtail Speargrass	GG					20	400														
Poaceae	*Austrostipa scabra*	Speargrass	GG			15	200					5	200			20	500						
Poaceae	*Austrostipa spp.*		GG																	20	1000		
Poaceae	*Austrostipa verticillata*	Slender Bamboo Grass	GG																				
Poaceae	*Avena barbata*	Bearded Oats	EX																				
Poaceae	*Bothriochloa decipiens*	Pitted Bluegrass	GG																				
Poaceae	*Bothriochloa macra*	Red Grass	GG			0.1	5											0.5	50				
Poaceae	*Bouteloua dactyloides*	Buffalo Grass	EX	10	200																		
Poaceae	*Briza minor*	Shivery Grass	EX																				
Poaceae	*Bromus cartharticus*	Praire Grass	EX																				

Family	Scientific Name	Common Name	Growth Form	VZ3_PCT318_moderate														VZ4_PCT81_DNG					
				P21139_001		P21139_003		P21139_004		P21139_005		P21139_007		P21139_008		P21139_025		P21139_032		P_21139_200		P_21139_204	
				PC	Ab	PC	Ab	PC	Ab	PC	Ab	PC	Ab	PC	Ab	PC	Ab	PC	Ab	PC	Ab	PC	Ab
Poaceae	*Bromus catharticus*	Praire Grass	EX	0.2	30																		
Poaceae	*Bromus hordeaceus*	Soft Brome	EX															5	500				
Poaceae	*Capillipedium spicigerum*	Scented-top Grass	GG																				
Poaceae	*Chloris gayana*	Rhodes Grass	HT					0.1	10													0.5	1000
Poaceae	*Chloris truncata*	Windmill Grass	GG			5		20	400	2	100												
Poaceae	*Chloris ventricosa*	Tall Chloris	GG	0.2	50																		
Poaceae	*Cynodon dactylon*	Common Couch	GG	15	800							0.2	50	15	300								
Poaceae	*Dichanthium sericeum*	Queensland Bluegrass	GG																				
Poaceae	*Dichelachne micrantha*	Shorthair Plumegrass	GG															5	5000				
Poaceae	*Dichelachne spp.*		GG																				
Poaceae	*Digitaria brownii*	Cotton Panic Grass	GG			1	20									1	50						
Poaceae	*Digitaria diffusa*	Open Summer-grass	GG	0.1	20																		
Poaceae	*Digitaria divaricatissima*	Umbrella Grass	GG																				
Poaceae	*Digitaria spp.*		GG																				
Poaceae	*Echinochloa spp.*		GG	0.1	50																		
Poaceae	*Echinopogon ovatus*	Forest Hedgehog Grass	GG									10	200	3	50								
Poaceae	*Echinopogon spp.*		GG																				
Poaceae	*Eleusine tristachya*	Goose Grass	EX	2	100	1	200	5	100														
Poaceae	*Elymus scaber*	Wheatgrass, Common Wheatgrass	GG													20	1000	0.2	20				
Poaceae	*Enneapogon gracilis*	Slender Nineawn	GG																				
Poaceae	*Entolasia stricta*	Wiry Panic	GG			10	500			5	300	0.1	20	3									
Poaceae	*Eragrostis brownii*	Brown's Lovegrass	GG													5	100	5	3000				
Poaceae	*Eragrostis cilianensis*	Stinkgrass	EX	3	50			1	100	0.5	50	0.5	100	3	100								
Poaceae	*Eragrostis curvula*	African Lovegrass	HT	30	1000	15	300	10	1000	50	1000	35	1000	5	100					1	50		
Poaceae	*Eragrostis leptostachya*	Paddock Lovegrass	GG																				
Poaceae	*Eragrostis pilosa*	Soft Lovegrass	EX																				
Poaceae	*Eragrostis spp.*		GG																				
Poaceae	*Eriochloa pseudoacrotricha*	Early Spring Grass	GG																				
Poaceae	*Eulalia aurea*	Silky Browntop	GG																				
Poaceae	*Hyparrhenia hirta*	Coolatai Grass	HT																	5	500		
Poaceae	*Lachnagrostis filiformis*		GG																				
Poaceae	*Lolium perenne*	Perennial Ryegrass	EX																				
Poaceae	*Microlaena stipoides*	Weeping Grass	GG			1	100			0.1	20	5	300	3	50								
Poaceae	*Panicum effusum*	Hairy Panic	GG					0.1	2	5	300	10	500					5	500			0.5	1000

Family	Scientific Name	Common Name	Growth Form	VZ3_PCT318_moderate														VZ4_PCT81_DNG					
				P21139_001		P21139_003		P21139_004		P21139_005		P21139_007		P21139_008		P21139_025		P21139_032		P_21139_200		P_21139_204	
				PC	Ab	PC	Ab	PC	Ab	PC	Ab	PC	Ab	PC	Ab	PC	Ab	PC	Ab	PC	Ab	PC	Ab
Poaceae	*Panicum spp.*	Panicum	GG																				
Poaceae	*Paspalidium distans*		GG																				
Poaceae	*Paspalidium spp.*		GG																				
Poaceae	*Paspalum dilatatum*	Paspalum	HT	2	100																		
Poaceae	*Paspalum spp.*		GG																				
Poaceae	*Poa sieberiana*	Snowgrass	GG																			0.3	1000
Poaceae	*Rytidosperma caespitosum*	Ringed Wallaby Grass	GG																				
Poaceae	*Rytidosperma setaceum*	Small-flowered Wallaby-grass	GG			5	300	8	400	1	100			0.5	100								
Poaceae	*Rytidosperma spp.*		GG																				
Poaceae	*Rytidosperma tenuius*		GG																				
Poaceae	*Setaria gracilis*		EX																				
Poaceae	*Setaria parviflora*		EX	0.2	100	1	50					0.1	10	2	50								
Poaceae	*Setaria pumila*	Pale Pigeon Grass	EX																	1	100		
Poaceae	*Sorghum leiocladum*	wild sorghum	GG																				
Poaceae	*Sporobolus africanus*	Parramatta Grass	EX																				
Poaceae	*Sporobolus caroli*	Fairy Grass	GG																				
Poaceae	*Sporobolus creber*	Slender Rat's Tail Grass	GG	3	200	10	400	0.5	100	0.2	50							15	5000				
Poaceae	*Themeda triandra*		GG															30	3000	30	1000	80	1000
Poaceae	*Triticum sp.*	Triticum sp.	EX																				
Polygonaceae	*Acetosella vulgaris*	Sheep Sorrel	HT																				
Polygonaceae	*Polygonum aviculare*	Wireweed	EX	1	300													0.1	20				
Polygonaceae	*Rumex acetosella*	Sheep Sorrel	HT	0.1	30	0.2	300	0.1	4	1	500	0.3	300										
Polygonaceae	*Rumex brownii*	Swamp Dock	FG	0.1	20																		
Portulacaceae	*Portulaca oleracea*	Pigweed	FG	10	300			0.1	15														
Primulaceae	*Anagallis arvensis*	Scarlet Pimpernel	EX																				
Pteridaceae	*Cheilanthes distans*	Bristly Cloak Fern	EG													0.1	50						
Pteridaceae	*Cheilanthes sieberi*	Rock Fern	EG			0.2	300	0.2	50	0.1	30	0.1	100							0.1	30		
Rosaceae	*Acaena novae-zelandiae*	Bidgee-widgee	FG																				
Rosaceae	*Rosa rubiginosa*	Sweet Briar	HT																				
Rosaceae	*Rubus fruticosus*	Blackberry complex	HT																	20	200		
Rubiaceae	*Asperula conferta*	Common Woodruff	FG																				
Rubiaceae	*Opercularia diphylla*	Stinkweed	FG									0.1	5										
Rubiaceae	*Pomax umbellata*	Pomax	FG			0.1	50	0.1	13	1	200	0.2	100	3	200	0.1	10						
Rubiaceae	*Richardia brasiliensis*	Mexican Clover	EX																				
Rubiaceae	*Richardia stellaris*		EX																				

Family	Scientific Name	Common Name	Growth Form	VZ3_PCT318_moderate														VZ4_PCT81_DNG					
				P21139_001		P21139_003		P21139_004		P21139_005		P21139_007		P21139_008		P21139_025		P21139_032		P_21139_200		P_21139_204	
				PC	Ab	PC	Ab	PC	Ab	PC	Ab	PC	Ab	PC	Ab	PC	Ab	PC	Ab	PC	Ab	PC	Ab
Sapindaceae	*Dodonaea viscosa*	Sticky Hop-bush	SG													0.1	5						
Scrophulariaceae	*Eremophila debilis*	Amulla	SG																				
Scrophulariaceae	*Verbascum thapsus*	Great Mullein	EX																				
Scrophulariaceae	*Verbascum virgatum*	Twiggy Mullein	EX																				
Solanaceae	*Lycium ferocissimum*	African Boxthorn	HT																				
Solanaceae	*Solanum cinereum*	Narrawa Burr	SG			0.1	5	0.4	6	0.1	10	0.1	10	0.1	10								
Solanaceae	*Solanum nigrum*	Black-berry Nightshade	EX	0.1	10	0.1	10	0.1	3	0.1	10	0.1	100										
Solanaceae	*Solanum pseudocapsicum*	Madeira Winter Cherry	EX																				
Solanaceae	*Solanum spp.*		FG																				
Stackhousiaceae	*Stackhousia spp.*		FG																				
Urticaceae	*Urtica incisa*	Stinging Nettle	FG																				
Verbenaceae	*Verbena bonariensis*	Purpletop	EX	0.1	10	0.1	10	0.1	2	0.1	10							10		0.5	100	1	1000
Verbenaceae	*Verbena rigida*	Veined Verbena	EX																				
Violaceae	*Hybanthus monopetalus*	Slender Violet-bush	FG									0.1	1										
Zygophyllaceae	*Tribulus terrestris*	Cat-head	EX																				



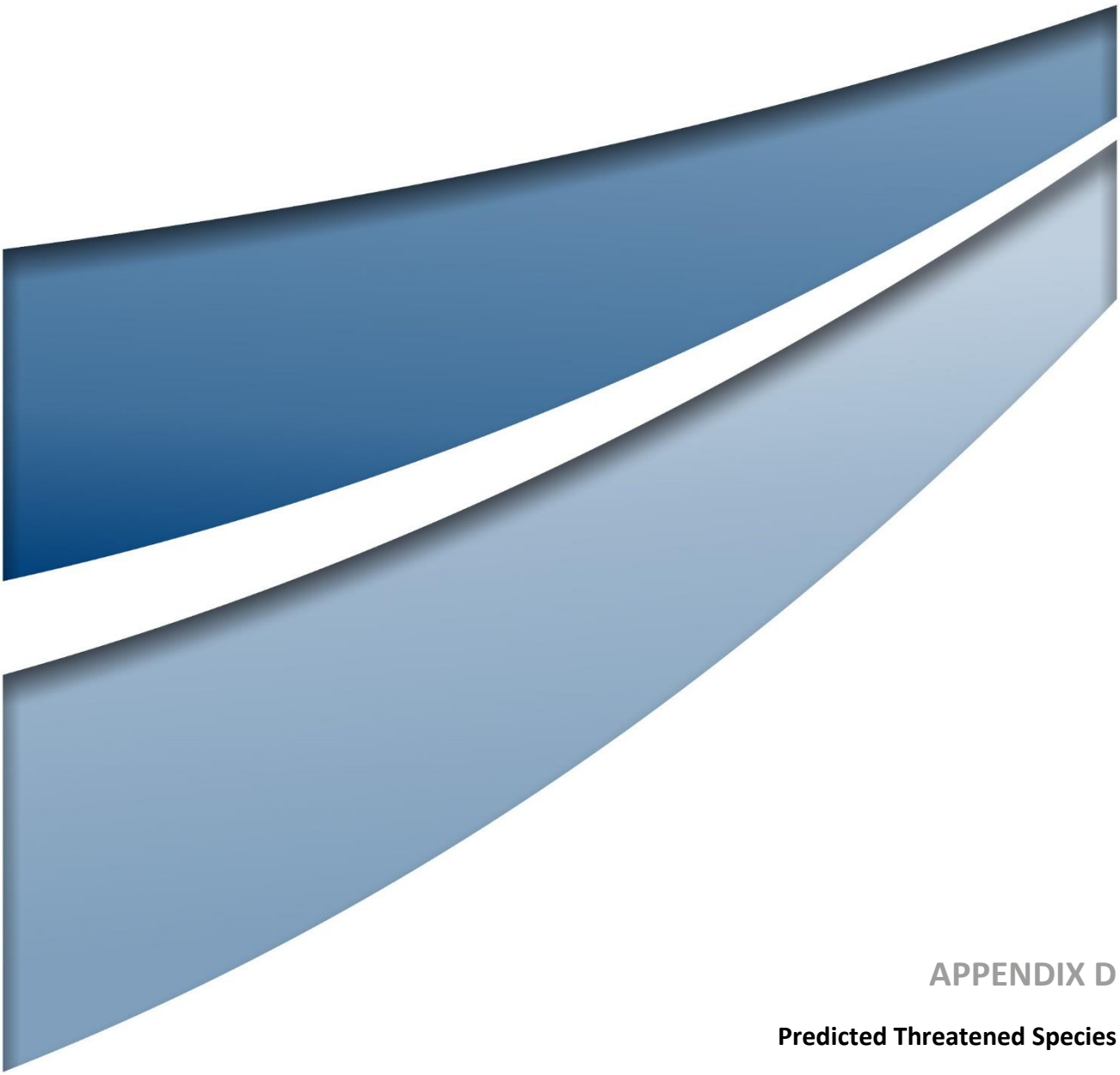
APPENDIX C

Vegetation Integrity Data

APPENDIX C VEGETATION INTEGRITY DATA

	COMPOSITION						STRUCTURE						FUNCTION										
	Tr	Sh	Gr	Fb	Fn	Ot	Tr	Sh	Gr	Fb	Fn	Ot	Regen	Stem Classes (cm)					No. Large Trees	No. Hollow Trees	Litter (%)	Fallen Logs (m)	High Threat Weeds
													>5	5-10	10-20	20-30	30-50	50-80					
P21139_006 VZ_1	0	0	5	5	1	0	0	0	36.4	0.5	0.1	0	1	0	1	0	1	1	5	2	3.8	15	40
P21139_009 VZ_1	2	3	12	14	1	1	28	0.4	14.8	4.5	0.1	0.1	1	0	1	0	1	1	4	2	16.4	12	51
P21139_011 VZ_1	2	6	9	13	1	0	20	0.8	45.5	5.2	0.1	0	0	0	0	0	0	0	0	0	26	0	35.4
P21139_016 VZ_1	0	0	2	5	0	0	0	0	50.1	1.1	0	0	1	1	1	1	1	1	3	0	92	29.5	53.2
P21139_019 VZ_1	1	1	9	7	1	0	10	0.1	76	0.9	0.2	0	1	1	1	1	1	0	0	1	14.4	13	10
P21139_020 VZ_1	2	4	16	6	1	0	27	0.8	46.4	1.4	0.1	0	1	1	1	1	1	0	0	3	36	11	0
P21139_030 VZ_1	0	0	2	3	1	0	0	0	20.1	1.2	0.1	0	0	0	1	1	1	1	3	0	29	11.5	1
P21139_203 VZ_1	0	1	7	3	1	2	0	0.1	94.6	0.3	0.1	0.3	0	0	1	1	1	0	0	1	44	71	0
P21139_013 VZ_2	3	1	7	9	1	1	38	0.1	29.8	2	1	0.1	1	1	1	1	1	1	7	0	19.4	14.5	0
P21139_017 VZ_2	2	1	12	7	0	1	25	0.1	74.9	5.8	0	0.1	0	1	1	1	1	1	5	2	57	17	0.2
P21139_022 VZ_2	1	0	3	4	0	0	35	0	2.5	0.4	0	0	1	0	1	1	1	1	5	0	50	0.5	1

	COMPOSITION						STRUCTURE						FUNCTION										
	Tr	Sh	Gr	Fb	Fn	Ot	Tr	Sh	Gr	Fb	Fn	Ot	Regen	Stem Classes (cm)					No. Large Trees	No. Hollow Trees	Litter (%)	Fallen Logs (m)	High Threat Weeds
													>5	5-10	10-20	20-30	30-50	50-80					
P21139_028 VZ_2	0	0	4	0	0	0	0	0	52	0	0	0	0	0	1	1	1	1	2	1	24	12	5.1
P21139_031 VZ_2	0	0	1	4	1	0	0	0	30	0.4	0.1	0	0	0	0	0	0	0	0	0	5	0	31
P21139_001 VZ_3	2	1	3	2	1	0	5.1	0.1	50.1	0.2	0.1	0	0	0	1	1	1	1	1	0	7.4	23	31
P21139_003 VZ_3	1	0	7	6	0	1	30	0	86.7	0.7	0	0.1	1	0	1	1	1	0	0	0	16	11	0
P21139_004 VZ_3	2	1	4	1	0	0	1.1	0.1	80.9	0.1	0	0	1	0	1	1	1	0	0	0	2	42	5.5
P21139_005 VZ_3	1	0	7	9	0	0	40	0	19	11.5	0	0	0	0	1	1	1	1	2	0	19	51	32.3
P21139_007 VZ_3	2	4	11	13	1	1	17	0.4	47.4	24.1	0.2	0.1	0	0	1	1	1	1	1	0	46	97	15.2
P21139_008 VZ_3	1	3	5	12	1	0	5	0.8	48.6	3.4	0.2	0	0	1	1	0	0	0	0	0	24	4	10.2
P21139_025 VZ_3	1	1	10	11	1	0	30	0.2	12.1	1.4	0.1	0	1	1	1	1	1	0	0	1	11	23.5	12.3
P21139_032 VZ_4	2	1	7	2	0	0	30	0.1	20.6	0.3	0	0	1	0	0	0	0	0	0	0	2	0	17
P21139_200 VZ_4	0	0	7	4	1	0	0	0	56.4	0.4	0.1	0	1	0	0	0	0	0	0	0	22	0	5
P21139_204 VZ_4	1	0	13	15	1	1	20	0	45.7	10.3	2	0.1	0	0	0	0	0	0	0	0	13	0	0.7



APPENDIX D

Predicted Threatened Species

Appendix D Predicted Threatened Species

Predicted Ecosystem-credit Species

Species	BC Act	EPBC Act	Sensitivity to Gain	Habitat Constraint	Vegetation Zone Prediction
Regent honeyeater *Anthochaera phrygia* (foraging)	CE	CE	High	-	81 281 318
Dusky woodswallow *Artamus cyanopterus* (foraging)	V	-	Moderate	-	81 281 318
Gang-gang Cockatoo *Callocephalon fimbriatum*	V	E	Moderate	-	281 318
Glossy black- cockatoo *Calyptorhynchus lathami* (foraging)	V	V	High	Presence of *Allocasuarina* and *Casuarina* species	81
Little pied bat *Chalinolobus picatus*	V	-	High	-	81 281
Speckled warbler *Chthonicola sagittata*	V	-	High	-	81 281 318
Spotted harrier *Circus assimilis*	V	-	Moderate	-	281
Brown treecreeper (eastern subspecies) *Climacteris picumnus victoriae*	V	V	High	-	81 281 318

Species	BC Act	EPBC Act	Sensitivity to Gain	Habitat Constraint	Vegetation Zone Prediction
Varied sittella ***Daphoenositta chrysoptera***	V	-	Moderate	-	81 281 318
Spotted tailed quoll ***Dasyurus maculatus***	V	E	High	-	81 281 318
Black falcon ***Falco subniger***	V	-	Moderate	-	281
Little lorikeet ***Glossopsitta pusilla***	V	-	High	-	81 281 318
Painted honeyeater ***Grantiella picta***	V	V	Moderate	Mistletoes at five per hectare	81 281 318
White-bellied sea-eagle ***Haliaeetus leucogaster*** **(foraging)**	V	-	High	Waterbodies; within 1km of rivers, lakes, large dams or creeks, wetlands and coastlines	81 281 318
Little eagle (foraging) *Hieraaetus morphnoides*	V	-	Moderate	-	81 281 318
White-throated needletail *Hirundapus caudacutus*	V	V	High	-	81 281 318
Swift parrot ***Lathamus discolor***	E	CE	Moderate	-	81 281 318

Species	BC Act	EPBC Act	Sensitivity to Gain	Habitat Constraint	Vegetation Zone Prediction
Pink cockatoo *Lophochroa leadbeateri* (foraging)	V	-	Moderate	-	81
Square- tailed kite *Lophoictinia isura* (foraging)	E	CE	Moderate	-	81 281 318
Hooded robin *Melanodryas cucullata cucullata*	E	E	Moderate	-	81 281 318
Black-chinned honeyeater (eastern subspecies) *Melithreptus gularis gularis*	V	-	Moderate	-	81 281 318
Large bent-winged bat (foraging) *Miniopterus orianae oceanensis*	V	-	High	-	81 281
Turquoise parrot *Neophema pulchella*	V	-	High	-	81 281 318
Corben's long-eared Bat *Nyctophilus corbeni*	V	V	High	-	81
Gilbert's whistler *Pachycephala inornata*	V	-	Moderate	-	318
Scarlet robin *Petroica boodang*	V	-	Moderate	-	281 318
Flame robin *Petroica phoenicea*	V	-	Moderate	-	281 318

Species	BC Act	EPBC Act	Sensitivity to Gain	Habitat Constraint	Vegetation Zone Prediction
Superb parrot ***Polytelis swainsonii* (foraging)**	V	V	moderate	-	81 281
Grey-crowned babbler (eastern subspecies) *Pomatostomus temporalis temporalis*	V	-	Moderate	-	81 281
Grey-headed flying-fox ***Pteropus poliocephalus***	V	V	High	-	81 281
Yellow-bellied sheathtail-bat *Saccolaimus flaviventris*	V	-	High	-	81 281 318
diamond firetail ***Stagonopleura guttata***	V	V	Moderate	-	81 281 318
Rosenberg's goanna ***Varanus rosenbergi***	V	-	High	South-east of a line that runs between Tarcutta and Galong	281

Predicted Species-credit Species

Species	BC Act	EPBC Act	Sensitivity to Gain	Habitat Constraint	Survey Period	SAII Entity	Survey Method and Justification
Ausfeld's wattle *Acacia ausfeldii*	V	-	High	Footslopes and low rises on sandstone	Aug-Oct	No	**Species not detected**. Threatened species transects undertaken generally in accordance with the Surveying threatened plants and their habitats – NSW survey guide for the BAM across the Subject Land in suitable habitat in October 2020, February 2021, September 2021, and February 2022.
Regent honeyeater *Anthochera Phrygia* **(breeding)**	CE	CE	High	As per mapped areas	NA	Yes	**Survey not required.** No important habitat mapping on the Subject Land.
Pink-tailed worm-lizard *Aprasia parapulchella*	V	V	High	Rocky areas or within 50m of rocky areas	Sept-Nov	No	**Species not detected**. Searches performed in suitable rocky habitat over five days in October 2020. Habitat is considered marginal. No habitat present within solar farm and transmission line impact footprint.

Species	BC Act	EPBC Act	Sensitivity to Gain	Habitat Constraint	Survey Period	SAII Entity	Survey Method and Justification
Bush stone-curlew *Burhinus grallarius*	E	-	High	Fallen/standing dead timber including logs.	All year	No	**Species not detected**. Habitat assessments were conducted in October 2020 and February 2021 to identify potential habitat available for the species across the Subject Land. Opportunistic observations were completed during all surveys during targeted flora transect surveys. Nocturnal spotlighting searches were undertaken in February 2021 over four nights in suitable habitat areas between sunset and midnight using 30-watt hand-held spotlights and head torches. This involved playing the call of the species for five minutes, followed by a listening period of five minutes. Opportunistic observations were completed throughout all Umwelt survey periods and this species was not flushed during flora transects. There are no previous records of the species within 10 km of the Subject Land (DPIE 2021). The species was not flushed during any surveys.
Gang-gang cockatoo (breeding) ***Callocephalon fimbriatum***	E	E	Moderate	Eucalypt tree species with hollows at least 3 m above the ground and with hollow diameter of 7 cm or larger	Oct - Jan	No	**Species not detected**. The vegetation present is not considered suitable for this species as it typically breeds in tall mountain forests. Appropriate habitat within the Subject Site was inspected for evidence of breeding during appropriate survey times. Opportunistic observations were completed during all assessments.

Species	BC Act	EPBC Act	Sensitivity to Gain	Habitat Constraint	Survey Period	SAII Entity	Survey Method and Justification
Glossy black-cockatoo (breeding) *Calyptorhynchus lathami*	V	V	High	Living or dead trees with hollows greater than 15 cm diameter, and higher than 8 m above ground.	–Jan - Sep	No	**Species not detected**. Habitat assessments were undertaken in October 2020 and February 2021 to identify potential habitat available for the species across the Subject Land. Suitable hollows were then stagwatched for diurnal activity in June 2021 and August 2020, with no activity detected. Opportunistic observations were completed during all assessments.
Large-eared pied bat *Chalinolobus dwyeri*	V	V	Very High	Within 2 km of rocky areas containing caves, overhangs, escarpments, outcrops or crevices, or within 2 km of old mines or tunnels.	Sep – Mar	Yes	**No further survey required. Habitat Constraint Not Present.** This species is typically found in areas with extensive cliffs and caves (DPIE 2021a). They can also occur in built structures (culverts) and old buildings. They are also reportedly found in well- timbered areas containing gullies, with breeding habitat associated with caves located 100 m from associated PCTs (DPIE 2021a). Habitat assessments were undertaken to identify potential habitat available for the species across the Subject Land. No suitable breeding or roosting features were detected during the habitat assessment, no foraging habitat (well-timbered areas containing gullies) and no breeding habitat will be impacted by the proposed development. Additionally, a radius of 2km around the site, examined through API where possible, shows no suitable rocky areas, and no known old mines or tunnels of particular importance are known to be present.

Species	BC Act	EPBC Act	Sensitivity to Gain	Habitat Constraint	Survey Period	SAII Entity	Survey Method and Justification
Sloane's froglet *Crinia sloanei*	V	E	Moderate	Semi-permanent/ephemeral wet areas; relatively shallow sections with submergent and emergent vegetation or within 500m of wet area, swamps, waterbodies	Jul-Aug	No	**Species not detected.** Subject Land does not contain suitable habitat for this species. Call playback and spotlighting conducted in June 2021 and August 2021 and species not detected.
Bluegrass *Dichanthium setosum*	V	V	High	-	Nov-May	No	**Species not detected**. Threatened species transects undertaken generally in accordance with the Surveying threatened plants and their habitats - NSW survey guide for the BAM across the Subject Land in suitable habitat in February 2021. **Further survey required.** A small area associated with the proposed intersect upgrades on the Castlereagh Highway was not covered as part of these surveys. Although this species has not been recorded across any part of the Amended Project, a conservative approach has been undertaken resulting in the assumed presences of this species within 0.9 ha of PCT 81 DNG within roadside vegetation. Assumed presence is permissible under Section 5.3 of the BAM. The proponent will work with landowners post submission and prior to the commencement of construction to undertake the required surveys and amend the final credit liability for the Amended Project in light of survey outcomes.

Species	BC Act	EPBC Act	Sensitivity to Gain	Habitat Constraint	Survey Period	SAII Entity	Survey Method and Justification
Pine donkey orchid *Diuris tricolor*	V	-	Moderate	-	Sept-Oct	No	**Species not detected**. Threatened species transects undertaken generally in accordance with the Surveying threatened plants and their habitats - NSW survey guide for the BAM across the Subject Land in suitable habitat in October 2020 and September 2021. This species was detected within the Subject Land, outside of the Subject Land.
Euphrasia arguta	CE	CE	High	-	Nov-Mar	Yes	**Species not detected**. Threatened species transects undertaken generally in accordance with the Surveying threatened plants and their habitats - NSW survey guide for the BAM across the Subject Land in suitable habitat in October 2020 February 2021, September 2021, and February 2022.
White-bellied sea-eagle (breeding) *Haliaeetus leucogaster*	V	-	High	Living or dead mature trees within suitable vegetation within 1km of a rivers, lakes, large dams or creeks, wetlands and coastlines.	Jul - Dec	No	**No further survey required**. This species is a species-credit species for breeding habitat only being nest trees within 1 km of rivers, lakes, large dams or creeks, wetlands and coastlines. Targeted searches for large stick nests were conducted during October 2020 and September 2021 while completing flora transects. Further habitat assessments conducted outside of survey period, with no large stick nests detected anywhere in the Subject Land or immediate vicinity.

Species	BC Act	EPBC Act	Sensitivity to Gain	Habitat Constraint	Survey Period	SAII Entity	Survey Method and Justification
Little eagle (breeding) *Hieraaetus morphnoides*	V	-	Moderate	Nest trees - live (occasionally dead) large old trees within vegetation.	Aug - Oct	No	**Species not detected**. This species is a species-credit species for breeding habitat only. Targeted searches for large stick nests were conducted during all surveys, including October 2020 and September 2021 during the survey period for this entity.
Swift parrot (breeding) *Lathamus discolor*	E	CE	Moderate	Important habitat only (mapped by DPIE)	NA	Yes	**Survey not required.** No important habitat mapping on the Subject Land.
Hoary sunray ***Leucochrysum albicans var. tricolor***	E	-	Moderate	-	Sept-Apr	No	**Species not detected**. Threatened species transects undertaken generally in accordance with the Surveying threatened plants and their habitats - NSW survey guide for the BAM across the Subject Land in suitable habitat in October 2020, February 2021, September 2021, and February 2022.

Species	BC Act	EPBC Act	Sensitivity to Gain	Habitat Constraint	Survey Period	SAII Entity	Survey Method and Justification
Booroolong frog ***Litoria booroolongensis***	E	E	High	-	Oct-Dec	No	**Species not detected**. Subject Land does not contain suitable habitat for this species. The Subject Land is within a highly degraded landscape where the majority of drainage lines lack native vegetation or a rock substrate which is preferred by this species. The drainage lines are predominantly First Order streams and do not represent permanent or semi-permanent river environments as outlined in the NSW Survey Guide for Threatened Frogs (DPIE 2020c). The highly degraded nature of the creeklines coupled with the lack of suitable habitat such as rock crevices in relatively shallow, slow to medium-flowing sections of stream, suggest it is unlikely this species would persist in the landscape. Call playback and spotlighting was conducted in June 2021 and August 2021 and species not detected. It is acknowledged the surveys were undertaken outside the optimal survey period, but considering the highly degraded Subject Land this species is unlikely to occur in the locality.
Pink cockatoo ***Lophochroa leadbeateri*** **(breeding)**	V	-	High	Living or dead trees with hollows greater than 10 cm diameter	Sept-Dec	No	**Species not detected**. Habitat assessments were undertaken in October 2020 to identify potential habitat available for the species across the Subject Land. Suitable hollows were then stagwatched with no activity detected. Opportunistic observations were completed during all assessments.

Species	BC Act	EPBC Act	Sensitivity to Gain	Habitat Constraint	Survey Period	SAII Entity	Survey Method and Justification
Square-tailed kite (breeding) *Lophoictinia isura*	V	-	Moderate	Nest trees.	Sep - Jan	No	**Species not detected**. This species is a species-credit species for breeding habitat only. Targeted searches for large stick nests were conducted during all surveys, including October 2020 and September 2021 during the survey period for this entity.
Large bentwing-bat ***Miniopterus orianae oceanensis*** **(breeding)**	V	-	Very High	Caves, tunnels, mines, culverts or other structures known or suspected to be used for breeding.	Dec-Feb	Yes	**No further survey required. Habitat Constraint Not Present**. This species is a species-credit species for breeding habitat only being caves, tunnels, mines and culverts. Habitat assessments were conducted during all survey periods in October 2020, February, June and August 2021, to identify potential habitat available for the species across the Subject Land. No breeding habitat is anticipated to be impacted by the proposal and therefore, no further survey is required.
Southern Myotis ***Myotis macropus***	V	-	High	Waterbodies with permanent pools/stretches 3m or wider, including rivers, large creeks, billabongs, lagoons, estuaries, dams and other waterbodies, on or within 200m of the site.	Oct-Mar	No	**Species Not Surveyed.** Additional species that has been added since the initial BDAR submission. Due to no survey this species has been assumed to be present. All PCT281 where a waterbodies with permanent pools/stretches 3m or wider, including rivers, large creeks, billabongs, lagoons, estuaries, dams and other waterbodies, on or within 200m of the site.

Species	BC Act	EPBC Act	Sensitivity to Gain	Habitat Constraint	Survey Period	SAII Entity	Survey Method and Justification
Barking owl *Ninox connivens*	V	-	High	Living or dead trees with hollows greater than 20 cm diameter and greater than 4 m above the ground.	–Jan - Aug	No	**Species not detected.** Targeted survey for this species conducted over one night in June 2021 and three nights in August 2021. Call- playback for the species was conducted each night across the Subject Land. Two suitable hollow bearing trees were detected within the Subject Land. Nocturnal spotlighting searches were undertaken over one night in June 2021 and three nights in August 2021 in suitable habitat areas between sunset and midnight using 30 watt hand-held spotlights and head torches. This involved playing the call of the species for five minutes, followed by a listening period of five minutes.
Powerful owl *Ninox strenua*	V	-	High	Living or dead trees with hollows greater than 20 cm diameter and greater than 4 m above the ground.	Jany - Aug	No	**Species not detected.** Targeted survey for this species conducted over one night in June 2021 and three nights in August 2021. Call- playback for the species was conducted each night across the Subject Land. Two suitable hollow bearing trees were detected within the Subject Land. Nocturnal spotlighting searches were undertaken over one night in June 2021 and three nights in August 2021 in suitable habitat areas between sunset and midnight using 30 watt hand-held spotlights and head torches. This involved playing the call of the species for five minutes, followed by a listening period of five minutes.

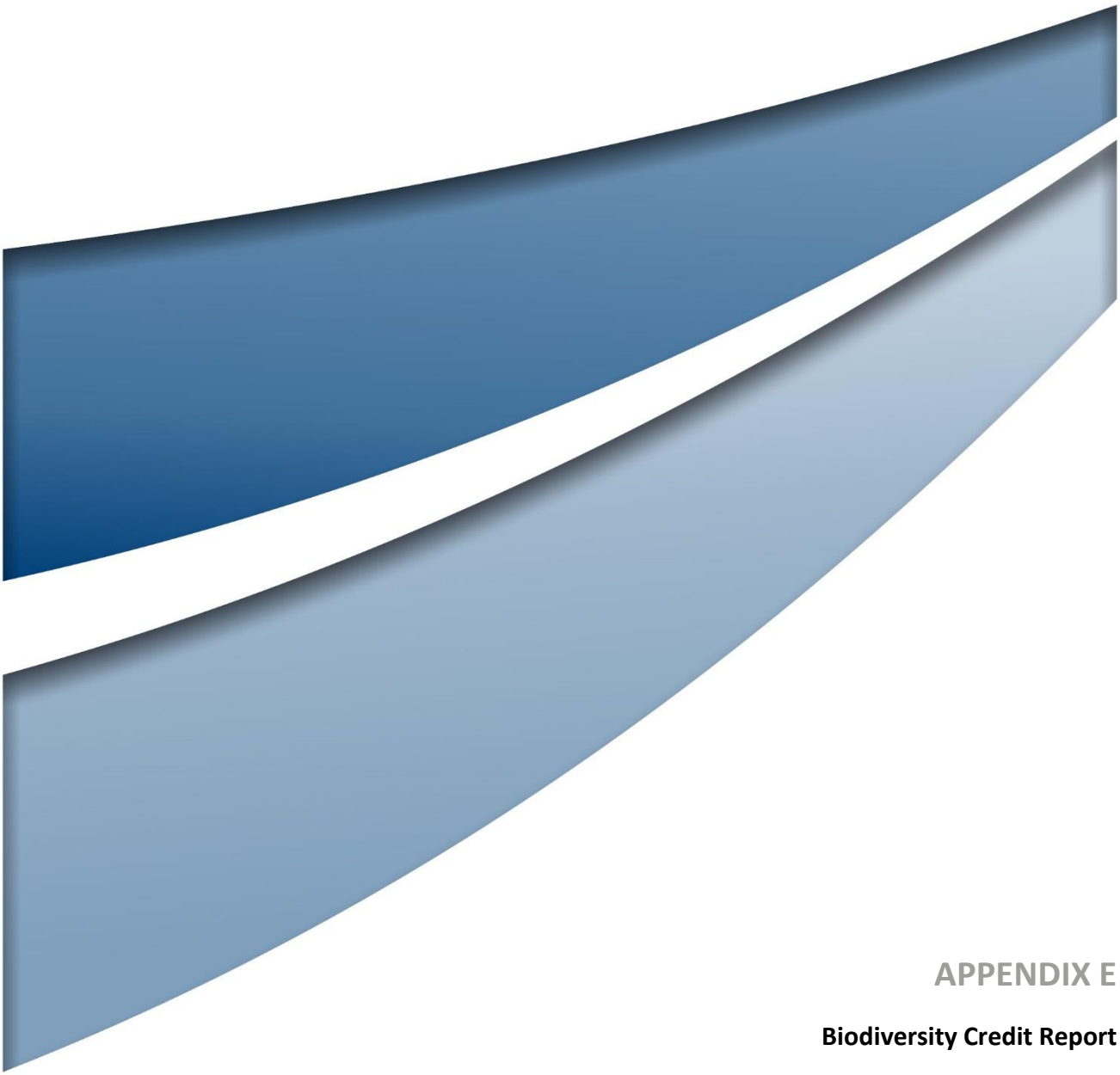
Species	BC Act	EPBC Act	Sensitivity to Gain	Habitat Constraint	Survey Period	SAII Entity	Survey Method and Justification
Squirrel glider ***Petaurus norfolcensis***	V	-	High	-	All year	No	**Species not detected.** Bushnell Trophy Cam HD cameras were installed at 10 locations within the Subject Land for a duration of 73 trap nights. At each site, a remote camera was mounted on a tree trunk and positioned towards a bait station containing peanut butter, honey and oats. Cameras were set to take three photos in quick succession when movement was detected.
Petaurus norfolcensis – endangered population **in Wagga Wagga LGA**	EP	-	High	Wagga Wagga LGA	All year	No	**Excluded due to geographic limitations.** The Subject Land is outside of Wagga Wagga LGA
Petrogale penicillata **Brush-tailed Rock-wallaby**	E	V	High	Land within 1 km of rocky escarpments, gorges, steep slopes, boulder piles, rock outcrops or clifflines	All year	Yes	**Species not detected**. Habitat assessments were undertaken in October 2020 to identify potential habitat available for the species across the Subject Land. No suitable habitat detected in the survey area.

Brush-tailed phascogale ***Phascogale tapoatafa***	V	-	High	Hollow bearing trees	Dec - Jun	No	**Species not Surveyed.** This species was part of the original survey effort for arboreal mammals in which Bushnell Trophy Cam HD cameras were installed at 10 locations within the Subject Land for a duration of 73 trap nights. At each site, a remote camera was mounted on a tree trunk and positioned towards a bait station containing peanut butter, honey and oats. Cameras were set to take three photos in quick succession when movement was detected. It is acknowledged that the survey was outside the currently accepted survey period of December- June for this species. Upon receiving advice (in 2021) from the DPIE accountable threatened species officer for the Brush-tailed Phascogale for a project approximately 30km southwest of the Subject Land. This species was excluded. The advice provided was that the species could be removed as a candidate species based on: - The species is generally associated with coastal vegetation. - The lack of valid records west of the dividing range with the closest records being over 100km away within or east of the divide. - Umwelts experience trapping for the species west of the divide in accordance with current guidelines not has not recorded any of the target species in particular in remnant vegetation such as around Coolah

Species	BC Act	EPBC Act	Sensitivity to Gain	Habitat Constraint	Survey Period	SAII Entity	Survey Method and Justification
							The native vegetation within the Subject Land is scattered degraded patches of canopy trees with limited connectivity to large remnants limiting the potential habitat that would support this species.
Koala (breeding) ***Phascolarctos cinereus***	E	E	High	Areas identified via survey as important habitat	All year	No	**Species not detected.** Nocturnal spotlighting searches and call playback were undertaken in February 2021 and August 2021 over eight nights in suitable habitat areas between sunset and midnight using 30-watt hand-held spotlights and head torches. Call playback involved playing the call of the species for five minutes, followed by a listening period of five minutes. Opportunistic observations were completed throughout all Umwelt survey periods. SATs undertaken in February 2021.
Superb parrot ***Polytelis swainsonii*** **(breeding)**	V	V	High	Living or dead E. blakelyi, E. melliodora, E. albens, E. camaldulensis, E. microcarpa, E. polyanthemos, E. mannifera, E. intertexta with hollows greater than 5cm diameter; greater than 4m above ground or trees with a DBH of greater than 30cm	Sept-Nov	No	**Species not detected**. Habitat assessments were undertaken in October 2020 to identify potential habitat available for the species across the Subject Land. Suitable hollows were then stagwatched with no activity detected. Opportunistic observations were completed during all assessments.

Species	BC Act	EPBC Act	Sensitivity to Gain	Habitat Constraint	Survey Period	SAII Entity	Survey Method and Justification
Pomaderris cotoneaster	E	E	High	-	Oct-Nov	No	**Species not detected.** Threatened species transects undertaken generally in accordance with the Surveying threatened plants and their habitats - NSW survey guide for the BAM across the Subject Land in suitable habitat in October 2020.
Tarengo leek orchid *Prasophyllum petilum*	E	E	High	East of Binalong, south and east of Boorowa	Sept-Dec	No	**Excluded due to geographical constraints.** Subject Land is north west of 'east of Binalong, south and east of Boorowa'.
Prasophyllum sp. Wybong	-	CE	Moderate	-	Sept-Oct	Yes	**Species not detected**. Threatened species transects undertaken generally in accordance with the Surveying threatened plants and their habitats - NSW survey guide for the BAM across the Subject Land in suitable habitat in October 2020.
Grey-headed flying-fox (breeding) *Pteropus poliocephalus*	V	V	High	Breeding camps	Oct - Dec	No	**Species not detected**. Searches for breeding camps over four days in October 2020 and opportunistically during all surveys. Not detected.
Small purple-pea ***Swainsona recta***	E	E	Moderate	-	Sept-Nov	No	**Species not detected**. Threatened species transects undertaken generally in accordance with the Surveying threatened plants and their habitats - NSW survey guide for the BAM across the Subject Land in suitable habitat in October 2020.

Species	BC Act	EPBC Act	Sensitivity to Gain	Habitat Constraint	Survey Period	SAII Entity	Survey Method and Justification
Silky swainson-pea *Swainsona sericea*	V	-	High	-	Sept-Nov	No	**Species not detected**. Threatened species transects undertaken generally in accordance with the Surveying threatened plants and their habitats - NSW survey guide for the BAM across the Subject Land in suitable habitat in October 2020.
Mmasked owl (breeding) *Tyto novaehollandiae*	V	-	High	a living or dead tree with a hollow >20 cm diameter that occurs >4 metres above the ground	Jan - Aug	No	**Species not detected.** Targeted survey for this species conducted over one night in June 2021 and three nights in August 2021. Call- playback for the species was conducted each night across the Subject Land. One suitable hollow bearing tree was detected within the Subject Land. Nocturnal spotlighting searches were undertaken over one night in June 2021 and three nights in August 2021 in suitable habitat areas between sunset and midnight using 30 watt hand-held spotlights and head torches. This involved playing the call of the species for five minutes, followed by a listening period of five minutes.



APPENDIX E

Biodiversity Credit Report

BAM Credit Summary Report

Proposal Details

Assessment Id
00022385/BAAS21019/22/00031701

Proposal Name
Tallawang SF_RTS_V2

BAM data last updated *
14/03/2024

Assessor Name
Bill Wallach

Report Created
16/05/2024

BAM Data version *
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Assessor Number
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BAM Case Status
Finalised

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Assessment Revision
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Assessment Type
Major Projects

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

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

Mugga Ironbark -Tumbledown Red Gum - Red Box - Black Cypress Pine open forest on shallow stony soils on hills in the NSW South Western Slopes Bioregion												
3	318_moderate	Not a TEC	50.3	50.3	0.93	PCT Cleared - 60%	High Sensitivity to Gain			1.75		20
											Subtotal	**20**
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												
2	281_moderate	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	69.3	69.3	3.6	PCT Cleared - 67%	High Sensitivity to Gain	Critically Endangered Ecological Community	Critically Endangered	2.50	True	155
											Subtotal	**155**

Western Grey Box - cypress pine shrub grass shrub tall woodland in the Brigalow Belt South Bioregion												
1	81_moderate	Inland Grey Box Woodland in the Riverina, NSW South Western Slopes, Cobar Peneplain, Nandewar and Brigalow Belt South Bioregions	66.5	66.5	2	PCT Cleared - 78%	High Sensitivity to Gain	Endangered Ecological Community	Endangered	2.00		65
4	81_DNG	Inland Grey Box Woodland in the Riverina, NSW South Western Slopes, Cobar Peneplain, Nandewar and Brigalow Belt South Bioregions	41.7	41.7	1	PCT Cleared - 78%	High Sensitivity to Gain	Endangered Ecological Community	Endangered	2.00		22
											Subtotal	**87**
											Total	**262**

Species credits for threatened species

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

Dichanthium setosum / Bluegrass (Flora)									
81_DNG	41.7	41.7	0.9			Vulnerable	Vulnerable	False	19
								Subtotal	**19**
Myotis macropus / Southern Myotis (Fauna)									
281_moderate	69.3	69.3	1.9	Biodiversity Conservation Act listing status	Species dependent on habitat attributes	Vulnerable	Not Listed	False	65
								Subtotal	**65**

BAM Biodiversity Credit Report (Like for like)

Proposal Details

Assessment Id
00022385/BAAS21019/22/00031701

Proposal Name
Tallawang SF_RTS_V2

BAM data last updated *
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Assessor Name
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Proponent Names

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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
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
81-Western Grey Box - cypress pine shrub grass shrub tall woodland in the Brigalow Belt South Bioregion	Inland Grey Box Woodland in the Riverina, NSW South Western Slopes, Cobar Peneplain, Nandewar and Brigalow Belt South Bioregions	3.0	65	22	87
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	3.6	155	0	155
318-Mugga Ironbark -Tumbledown Red Gum - Red Box - Black Cypress Pine open forest on shallow stony soils on hills in the NSW South Western Slopes Bioregion	Not a TEC	0.9	20	0	20

81-Western Grey Box - cypress pine shrub grass shrub tall woodland in the Brigalow Belt South Bioregion

Like-for-like credit retirement options

Name of offset trading group	Trading group	Zone	HBT	Credits	IBRA region

	Inland Grey Box Woodland in the Riverina, NSW South Western Slopes, Cobar Peneplain, Nandewar and Brigalow Belt South Bioregions This includes PCT's: 76, 80, 81, 82, 101, 110, 237, 248, 3405	-	81_moderate	Yes	65	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.
	Inland Grey Box Woodland in the Riverina, NSW South Western Slopes, Cobar Peneplain, Nandewar and Brigalow Belt South Bioregions This includes PCT's: 76, 80, 81, 82, 101, 110, 237, 248, 3405	-	81_DNG	No	22	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)

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, 528, 538, 544, 563, 567, 571, 589, 590, 597, 599, 618, 619, 622, 633, 654,	-	281_moderate	Yes	155	Inland Slopes, Bogan-Macquarie, Bondo, Capertee Uplands, Capertee Valley, Crookwell, Hill End, Kerrabee, Lower Slopes, Murray Fans, Murrumbateman, Orange, Pilliga, Talbragar Valley and Wollemi. or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.

	702, 703, 704, 705, 710, 711, 796, 797, 799, 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					
318-Mugga Ironbark - Tumbledown Red Gum - Red Box - Black Cypress Pine open forest on shallow stony soils on hills in the NSW South Western Slopes Bioregion	**Like-for-like credit retirement options**					
	Class	Trading group	Zone	HBT	Credits	IBRA region
	Inland Rocky Hill Woodlands This includes PCT's: 177, 178, 318, 319	Inland Rocky Hill Woodlands >=50% and <70%	318_moderate	Yes	20	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)

318-Mugga Ironbark - Tumbledown Red Gum - Red Box - Black Cypress Pine open forest on shallow stony soils on hills in the NSW South Western Slopes Bioregion

Species Credit Summary

Species	Vegetation Zone/s	Area / Count	Credits
Dichanthium setosum / Bluegrass	**81_DNG**	0.9	19.00
Myotis macropus / Southern Myotis	**281_moderate**	1.9	65.00

Credit Retirement Options

Like-for-like credit retirement options

Dichanthium setosum / Bluegrass	Spp	IBRA subregion
	Dichanthium setosum / Bluegrass	Any in NSW
Myotis macropus / Southern Myotis	Spp	IBRA subregion
	Myotis macropus / Southern Myotis	Any in NSW

BAM Biodiversity Credit Report (Variations)

Proposal Details

Assessment Id
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Proposal Name
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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

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
81-Western Grey Box - cypress pine shrub grass shrub tall woodland in the Brigalow Belt South Bioregion	Inland Grey Box Woodland in the Riverina, NSW South Western Slopes, Cobar Peneplain, Nandewar and Brigalow Belt South Bioregions	3.0	65	22	87.00
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	3.6	155	0	155.00
318-Mugga Ironbark -Tumbledown Red Gum - Red Box - Black Cypress Pine open forest on shallow stony soils on hills in the NSW South Western Slopes Bioregion	Not a TEC	0.9	20	0	20.00

81-Western Grey Box - cypress pine shrub grass shrub tall woodland in the Brigalow Belt South Bioregion

Like-for-like credit retirement options

Class	Trading group	Zone	HBT	Credits	IBRA region
Inland Grey Box Woodland in the Riverina, NSW South Western Slopes, Cobar Peneplain, Nandewar and Brigalow Belt South Bioregions This includes PCT's: 76, 80, 81, 82, 101, 110, 237, 248, 3405	-	81_moderate	Yes	65	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.
Inland Grey Box Woodland in the Riverina, NSW South Western Slopes, Cobar Peneplain, Nandewar and Brigalow Belt South Bioregions This includes PCT's: 76, 80, 81, 82, 101, 110, 237, 248, 3405	-	81_DNG	No	22	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.

Variation options

Formation	Trading group	Zone	HBT	Credits	IBRA region

	Grassy Woodlands	Tier 3 or higher threat status	81_moderate	Yes (including artificial)	65	IBRA Region: NSW South Western Slopes, or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.
	Grassy Woodlands	Tier 3 or higher threat status	81_DNG	No	22	IBRA Region: NSW South Western Slopes, or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.

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, 277, 278, 279, 280, 281, 282, 283, 284, 286, 298, 302, 312, 341, 342, 347, 350, 352, 356, 367, 381,	-	281_moderate	Yes	155	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.

	382, 395, 401, 403, 421, 433, 434, 435, 436, 437, 451, 483, 484, 488, 492, 496, 508, 509, 510, 511, 528, 538, 544, 563, 567, 571, 589, 590, 597, 599, 618, 619, 622, 633, 654, 702, 703, 704, 705, 710, 711, 796, 797, 799, 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					
318-Mugga Ironbark - Tumbledown Red Gum - Red Box - Black Cypress Pine open forest on shallow stony soils on hills in the NSW South Western Slopes Bioregion	**Like-for-like credit retirement options**					
	Class	Trading group	Zone	HBT	Credits	IBRA region

	Inland Rocky Hill Woodlands This includes PCT's: 177, 178, 318, 319	Inland Rocky Hill Woodlands >=50% and <70%	318_moderate	Yes	20	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.
	Variation options					
	Formation	Trading group	Zone	HBT	Credits	IBRA region
	Semi-arid Woodlands (Shrubby sub-formation)	Tier 3 or higher threat status	318_moderate	Yes (including artificial)	20	IBRA Region: NSW South Western Slopes, or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.

Species Credit Summary

Species	Vegetation Zone/s	Area / Count	Credits
Dichanthium setosum / Bluegrass	**81_DNG**	0.9	19.00
Myotis macropus / Southern Myotis	**281_moderate**	1.9	65.00

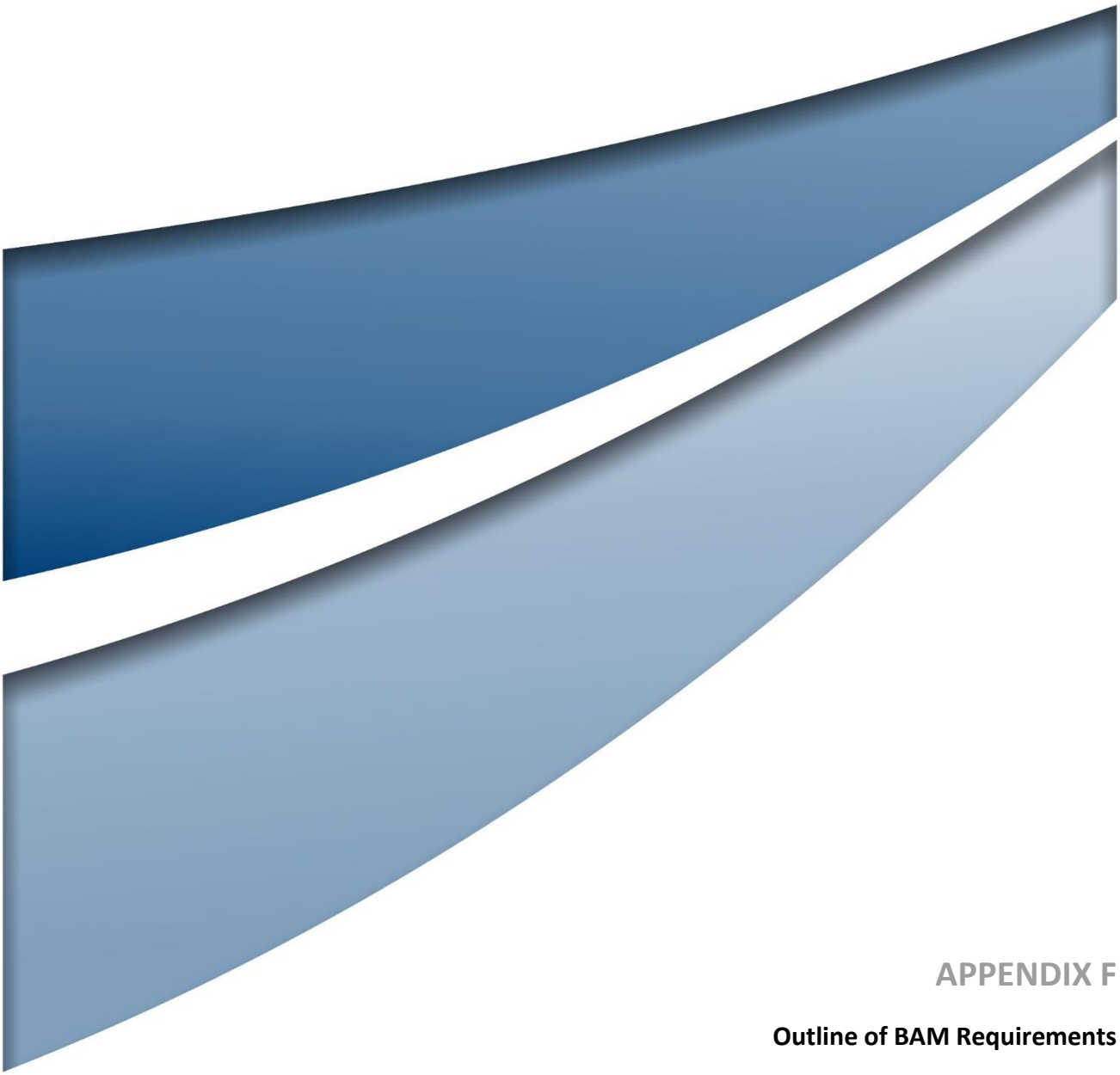
Credit Retirement Options

Like-for-like options

Dichanthium setosum/ Bluegrass	Spp	IBRA region
	Dichanthium setosum/Bluegrass	Any in NSW

Dichanthium setosum/ Bluegrass	**Variation options**		
	Kingdom	Any species with same or higher category of listing under Part 4 of the BC Act shown below	IBRA region
	Flora	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.
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.



APPENDIX F

Outline of BAM Requirements

APPENDIX F BAM REQUIREMENTS

Report Section	BAM Reference	Requirement
Section 1, and Figure 1.1 and 1.2	Chapters 2 and 3	**INFORMATION** Introduction to the biodiversity assessment including: ☒ brief description of the proposal ☒ identification of subject land boundary, including: ☒ operational footprint (if BDAR) ☒ construction footprint indicating clearing associated with temporary/ancillary construction facilities and infrastructure (if BDAR) ☒ land proposed for biodiversity certification (if BCAR) ☒ general description of the subject land ☒ sources of information used in the assessment, including reports and spatial data **MAPS and TABLES (in document)** ☒ Map of the subject land boundary showing the final proposal footprint, including the construction footprint for any clearing associated with temporary/ancillary construction facilities and infrastructure (if BDAR)
Section 1.2, 1.3 and 3.1, Figure 1.3 and Table 3.1 and Appendix A	Sections 3.1. and 3.2, Appendix E	**INFORMATION** Identification of site context components and landscape features, including: ☒ general description of subject land topographic and hydrological setting, geology and soils ☒ percent native vegetation cover in the assessment area (as described in BAM Section 3.2) ☒ IBRA bioregions and subregions (as described in BAM Subsection 3.1.3 ☒ rivers and streams classified according to stream order (as described in BAM Subsection 3.1.3 and Appendix E)

Report Section	BAM Reference	Requirement
		☒ wetlands within, adjacent to and downstream of the site (as described in BAM Subsection 3.1.3 ☒ connectivity of different areas of habitat (as described in BAM Subsection 3.1.3 ☒ karst, caves, crevices, cliffs, rocks and other geological features of significance and for vegetation clearing proposals, soil hazard features (as described in BAM Subsections 3.1.3 and 3.1.3 ☒ areas of outstanding biodiversity value occurring on the subject land and assessment area (as described in BAM Subsection 3.1.3 ☒ any additional landscape features identified in any SEARs for the proposal **MAPS and TABLES (in document)** ☒ Site Map ☒ Property boundary ☒ Boundary of subject land ☒ Cadastre of subject land ☒ Landscape features identified in BAM Subsection 3.1.3 ☒ Location Map ☒ Digital aerial photography at 1:1,000 scale or finer ☒ Assessment area, (i.e. the subject land and either 1500 m buffer area or 500 m buffer for linear development ☒ Landscape features identified in BAM Subsection 3.1.3 ☒ Additional detail (e.g. local government area boundaries) relevant at this scale Landscape features identified in BAM Subsection 3.1.3 and to be shown on the Site Map and/or Location map include: ☒ IBRA bioregions and subregions ☒ rivers, streams and estuaries

Report Section	BAM Reference	Requirement
		☒ wetlands and important wetlands ☒ connectivity of different areas of habitat ☒ karst, caves, crevices, cliffs, rocks and other geological features of significance and if required, soil hazard features ☒ areas of outstanding biodiversity value occurring on the subject land and assessment area ☒ any additional landscape features identified in any SEARs for the proposal ☒ NSW (Mitchell) landscape on which the subject land occurs
Section 3.2, Figure 3.1 and 3.2, Table 3.2 and Appendix A, B and C	Chapter 4, Appendix A and Appendix H	**INFORMATION** ☒ Identify native vegetation extent within the subject land, including cleared areas and evidence to support differences between mapped vegetation extent and aerial imagery (as described in BAM Section 4.1 and Subsection 4.1.1) ☒ Provide justification for all parts of the subject land that do not contain native vegetation (as described in BAM Subsection 4.1.2) ☒ Review of existing information on native vegetation including references to previous vegetation maps of the subject land and assessment area (described in BAM Section 4.1 and Subsection 4.1.1 ☒ Describe the systematic field-based floristic vegetation survey undertaken in accordance with BAM Section 4.2 ☒ Where relevant, describe the use of more appropriate local data, provide reasons that support the use of more appropriate local data and include the written confirmation from the decision-maker that they support the use of more appropriate local data (as described in BAM Subsection 1.4.2 and Appendix A) For each PCT within the subject land, describe: ☒ vegetation class ☒ extent (ha) within subject land

Report Section	BAM Reference	Requirement
		☒ evidence used to identify a PCT including any analyses undertaken, references/sources, existing vegetation maps (BAM Section 4.2) ☒ plant species relied upon for identification of the PCT and relative abundance of each species ☐ if relevant, TEC status including evidence used to determine vegetation is the TEC (BAM Subsection 4.2.2 (1 –2.)) ☒ estimate of percent cleared value of PCT (BAM Subsection 4.2.1) Describe the vegetation integrity assessment of the subject land, including: ☒ identification and mapping of vegetation zones (as described in BAM Subsection 4.3.1) ☒ assessment of patch size (as described in BAM Subsection 4.3.2) ☒ survey effort (i.e. number of vegetation integrity survey plots) as described in BAM Subsection 4.3.4 (1 –2.) ☒ use of relevant benchmark data from BioNet Vegetation Classification (as described in BAM Subsection 4.3.3) **MAPS and TABLES (in document)** ☒ Map of native vegetation extent within the subject land at scale not greater than 1:10,000 including identification of cleared areas (as described in BAM Section 4.1 (1 –3.)) and all parts of the subject land that do not contain native vegetation (BAM Subsection 4.1.2) ☒ Map of PCTs within the subject land (as described in BAM Section 4.2) ☒Map of vegetation zones within the subject land (as described in BAM Subsection 4.3.1) ☒ Map the location of floristic vegetation survey plots and vegetation integrity survey plots relative to PCTs boundaries ☒ Map of TEC distribution on the subject land and table of TEC listing, status and area (ha)

Report Section	BAM Reference	Requirement
		☒ Map of patch size locations for each native vegetation zone and table of patch size areas (as described in BAM Subsection 4.3.2) Table of current vegetation integrity scores for each vegetation zone within the site and including: ☒ composition condition score ☒ structure condition score ☒ function condition score ☒ presence of hollow bearing trees
Section 3.3, Figure 3.2, Appendix 1.3, and Appendix D.	Chapter 5	**INFORMATION** Identify ecosystem credit species likely to occur on the subject land, including: ☒ list of ecosystem credit species derived from the BAM-C (as described in BAM Subsection 5.1.1 and Section 5.2) ☒ justification and supporting evidence for exclusion of any ecosystem credit species based on geographic limitations, habitat constraints or vagrancy (as described in BAM Subsections 5.2.1 and 5.2.2) ☒ justification for addition of any ecosystem credit species to the list Identify species credit species likely to occur on the subject land, including: ☒ list of species credit species derived from the BAM-C (as described in BAM Subsection 5.1.1) ☒ justification and supporting evidence for exclusions based on geographic limitations, habitat constraints or vagrancy (as described in BAM Subsections 5.2.1 and 5.2.2) ☒ justification and supporting evidence for exclusions based on degraded habitat constraints and/or microhabitats on which the species depends (as described in BAM Subsection 5.2.2) ☒ justification for addition of any species credit species to the list

Report Section	BAM Reference	Requirement
		From the list of candidate species credit species, identify: ☒ species assumed present within the subject land (if relevant) (as described in BAM Subsection 5.2.4 (2.a.)) ☒ species present within the subject land on the basis of being identified on an important habitat map for a species (as described in BAM Subsection 5.2.4 (2.d.)) ☒ species for which targeted surveys are to be completed to determine species presence (Subsection 5.2.4 (2.b.)) ☒ species for which an expert report is to be used to determine species presence (Subsection 5.2.4 (2.c.)) Present the outcomes of species credit species assessments from: ☒ threatened species survey (as described in BAM Section 5.2.4) N/A expert reports (if relevant) including justification for presence of the species and information used to make this determination (as described in BAM Section 5.2.4 and 5.3 , Box 3) Where survey has been undertaken include detailed information on: ☒ survey method and effort, (as described in BAM Section 5.3) ☒ justification of survey method and effort (e.g. citation of peer-reviewed literature) if approach differs from the Department's taxa-specific survey guides or where no relevant guideline has been published ☒ timing of survey in relation to requirements in the TBDC or the Department's taxa-specific survey guides. Where survey was undertaken outside these guides include justification for the timing of surveys ☒ survey personnel and relevant experience ☒ describe any limitations to surveys and how these were addressed/overcome

Report Section	BAM Reference	Requirement
		MAPS and TABLES (in document) ☒ Table showing ecosystem credit species in accordance with BAM Section 5.1.1, and identifying: ☒ the ecosystem credit species removed from the list ☒ the sensitivity to gain class of each species ☒ Table detailing species credit species in accordance with BAM section 5.2 and identifying: ☒ the species credit species removed from the list of species because the species is considered vagrant, out of geographic range or the habitat or micro habitat features are not present ☒ the candidate species credit species not recorded on the subject land as determined by targeted survey, expert report or important habitat map ☒ Table detailing species credit species recorded or assumed as present within the subject land, habitat constraints or microhabitats associated with the species, counts of individuals (flora)/extent of suitable habitat (flora and fauna) (as described in BAM Subsection 5.2.6) and biodiversity risk weighting (BAM Section 5.4) ☒ Map indicating the GPS coordinates of all individuals of each species recorded within the subject land and the species polygon for each species (as described in BAM Subsection 5.2.5)
Section 4.1.2 and 5.2	Chapter 6	**INFORMATION** Identify potential prescribed biodiversity impacts on threatened entities, including: ☒ karst, caves, crevices, cliffs, rocks and other geological features of significance (as described in BAM Subsection 6.1.1) ☒ occurrences of human-made structures and non-native vegetation (as described in BAM Subsection 6.1.2)

Report Section	BAM Reference	Requirement
		☒ corridors or other areas of connectivity linking habitat for threatened entities (as described in BAM Subsection 6.1.3) ☒ water bodies or any hydrological processes that sustain threatened entities (as described in BAM Subsection 6.1.4) ☒ protected animals that may use the proposed wind farm development site as a flyway or migration route (as described in BAM Subsection 6.1.5) ☒ where the proposed development may result in vehicle strike on threatened fauna or on animals that are part of a threatened ecological community (as described in BAM Subsection 6.1.6) ☒ Identify a list of threatened entities that may be dependent upon or may use habitat features associated with any of the prescribed impacts ☒ Describe the importance of habitat features to the species including, where relevant, impacts on life-cycle or movement patterns (e.g. Subsection 6.1.3) **MAPS and TABLES (in document)** ☒ Map showing location of any prescribed impact features (i.e. karst, caves, crevices, cliffs, rocks, human-made structures, etc.) ☒ Maps of habitual flight paths for nomadic and migratory species likely to fly over the site and maps of likely habitat for threatened aerial species resident on the site (for wind farm developments only)
Section 4, Figure 4.1a-c and Table 4.1	Chapter 7	**INFORMATION** Demonstration of efforts to avoid and minimise impacts on biodiversity values (including prescribed impacts) associated with the proposal location in accordance with Chapter 7, including an analysis of alternative: ☒ modes or technologies that would avoid or minimise impacts on biodiversity values and justification for selecting the proposed mode or technology

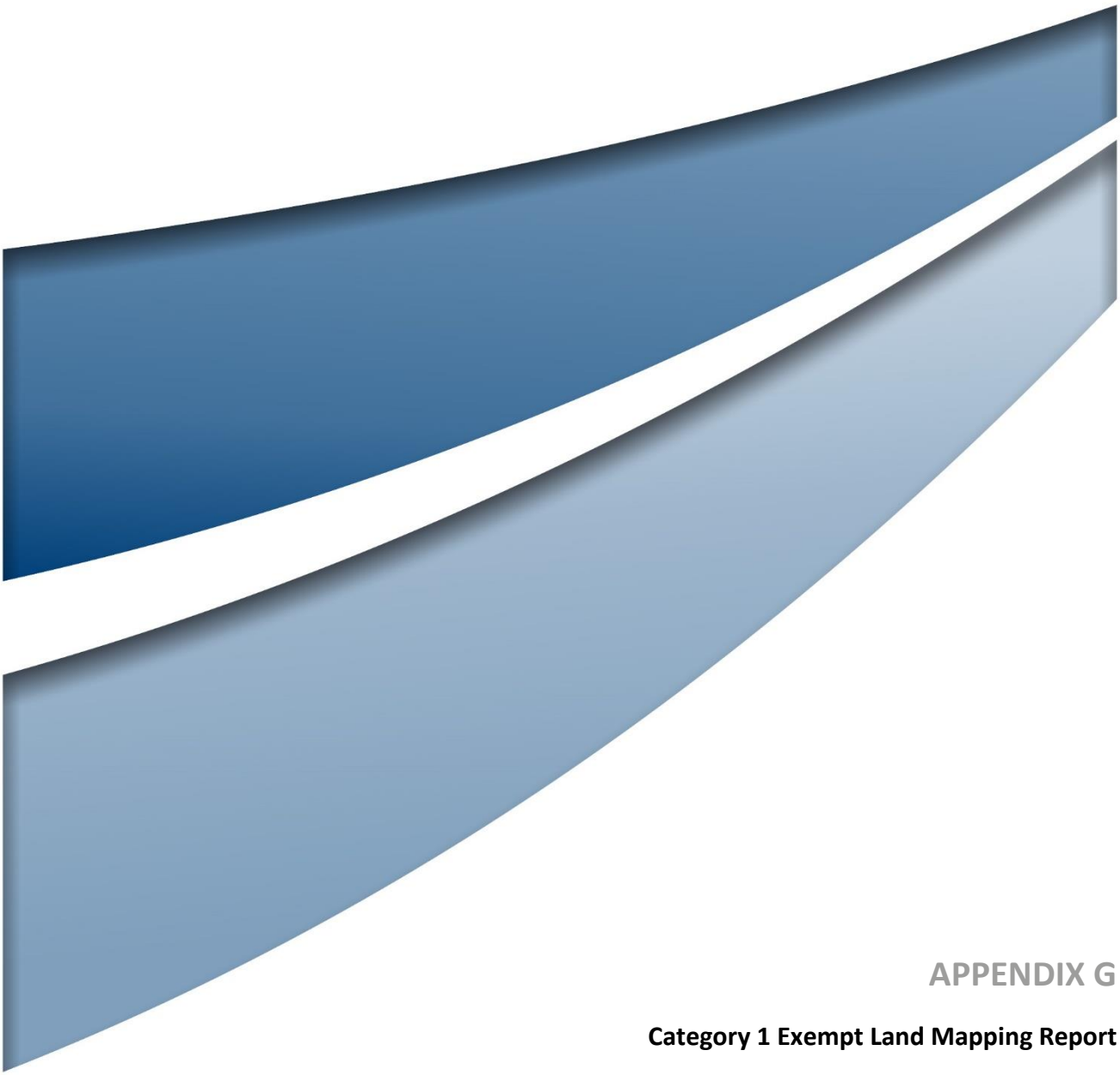
Report Section	BAM Reference	Requirement
		☒ routes that would avoid or minimise impacts on biodiversity values and justification for selecting the proposed route ☒ alternative locations that would avoid or minimise impacts on biodiversity values and justification for selecting the proposed location ☒ alternative sites within a property on which the proposal is located that would avoid or minimise impacts on biodiversity values and justification for selecting the proposed site ☒ Describe efforts to avoid and minimise impacts (including prescribed impacts) to biodiversity values through proposal design (as described in BAM Sections 7.1 and 7.2) ☒ Identification of any other site constraints that the proponent has considered in determining the location and design of the proposal (as described in BAM Section 7.2.1(3.)) **MAPS and TABLES (in document)** ☒ Table of measures to be implemented to avoid and minimise the impacts of the proposal, including action, outcome, timing and responsibility ☒ Map of alternative footprints considered to avoid or minimise impacts on biodiversity values; and of the final proposal footprint, including construction and operation ☒ Maps demonstrating indirect impact zones where applicable
Section 5, Table 5.1 and 5.2, and Table 6.1	Chapter 8, Sections 8.1 and 8.2	**INFORMATION** ☒ Determine the impacts on native vegetation and threatened species habitat, including a description of direct impacts of clearing of native vegetation, threatened ecological communities and threatened species habitat (as described in BAM Section 8.1) Assessment of indirect impacts on vegetation and threatened species and their habitat including (as described in BAM Section 8.2): ☒ description of the nature, extent, frequency, duration and timing of indirect impacts of the proposal ☒ documenting the consequences to vegetation and threatened species and their habitat including evidence-based justifications

Report Section	BAM Reference	Requirement
		☒ reporting any limitations or assumptions, etc. made during the assessment ☒ identification of the threatened entities and their habitat likely to be affected Assessment of prescribed biodiversity impacts (as described in BAM Section 8.3) including: assessment of the nature, extent and duration of impacts on the habitat of threatened species or ecological communities associated with: ☒ karst, caves, crevices, cliffs, rocks and other features of geological significance ☒ human-made structures ☒ non-native vegetation ☒ connectivity of different areas of habitat of threatened species that facilitates the movement of those species across their range ☒ movement of threatened species that maintains their life cycle ☒ water quality, water bodies and hydrological processes that sustain threatened species and threatened ecological communities N/A assessment of the impacts of wind turbine strikes on protected animals ☒ assessment of the impacts of vehicle strikes on threatened species of animals or on animals that are part of a TEC **MAPS and TABLES (in document)** ☒ Table showing change in vegetation integrity score for each vegetation zone as a result of identified impacts
Section 4.2 and Table 4.1	Chapter 8, Sections 8.4 and 8.5	**INFORMATION** Identification of measures to mitigate or manage impacts in accordance with the recommendations in BAM Sections 8.4 and 8.5 including: ☒ techniques, timing, frequency and responsibility ☒ identify measures for which there is risk of failure

Report Section	BAM Reference	Requirement
		☒ evaluate the risk and consequence of any residual impacts ☒ document any adaptive management strategy proposed Identification of measures for mitigating impacts related to: ☒ displacement of resident fauna (as described in BAM Subsection 8.4.1 (2.)) ☒ indirect impacts on native vegetation and habitat (as described in BAM Subsection 8.4.1 (3.)) ☒ mitigating prescribed biodiversity impacts (as described in BAM Subsection 8.4.2) ☒ Details of the adaptive management strategy proposed to monitor and respond to impacts on biodiversity values that are uncertain (BAM Section 8.5) **MAPS and TABLES (in document)** ☒ Table of measures to be implemented to mitigate and manage impacts of the proposal, including action, outcome, timing and responsibility
Section 5.3 and Section 6, and Figure 6.1	Chapter 9	**INFORMATION** Identification and assessment of impacts on TECs and threatened species that are at risk of serious and irreversible impacts (SAII, in accordance with BAM Section 9.1) including: ☒ addressing all criteria in Subsection 9.1.1 for each TEC listed as at risk of an SAII present on the subject land ☒ addressing all criteria in Subsection 9.1.2 for each threatened species at risk of an SAII present on the subject land ☒ documenting assumptions made and/or limitations to information ☒ documenting all sources of data, information, references used or consulted ☒ clearly justifying why any criteria could not be addressed ☒ Identification of impacts requiring offset in accordance with BAM Section 9.2 ☒ Identification of impacts not requiring offset in accordance with BAM Subsection 9.2.1 (3.)

Report Section	BAM Reference	Requirement
		☒ Identification of areas not requiring assessment in accordance with BAM Section 9.3 **MAPS and TABLES (in document)** ☒ Map showing the extent of TECs at risk of an SAII within the subject land ☒ Map showing location of threatened species at risk of an SAII within the subject land Map showing location of: ☒ impacts requiring offset ☒ impacts not requiring offset ☒ areas not requiring assessment
Section 6.2 and Section 7, and Table 6.1 and Table 7.1	Chapter 10	**INFORMATION** Ecosystem credits and species credits that measure the impact of the development on biodiversity values, including: ☒ future vegetation integrity score for each vegetation zone within the subject land (Equation 25 and Equation 26 in BAM Appendix H) ☒ change in vegetation integrity score (BAM Subsection 8.1.1) ☒ number of required ecosystem credits for the direct impacts of the proposal on each vegetation zone within the subject land (BAM Subsection 9) ☒ number of required species credits for each candidate threatened species that is directly impacted on by the proposal (BAM Subsection 10.1.3) **MAPS and TABLES (in document)** ☒ Table of PCTs requiring offset and the number of ecosystem credits required ☒ Table of threatened species requiring offset and the number of species credits required

Report Section	BAM Reference	Requirement
Section 7 and Table 7.1	Chapter 10	**INFORMATION** ☒ Description of credit classes for ecosystem credits and species credits at the development or clearing site or land to be biodiversity certified (BAM Section 10.2) **MAPS and TABLES (in document)** ☒ Table of credit class and matching credit profile



APPENDIX G

Category 1 Exempt Land Mapping Report

umwelt
Environmental & Social Consultants

TALLAWANG SOLAR FARM

Local Land Services Act 2013 Land Category Mapping Methodology

FINAL

May 2024

TALLAWANG SOLAR FARM

Local Land Services Act 2013 Land Category Mapping Methodology

FINAL

Prepared by
Umwelt (Australia) Pty Limited
on behalf of
RES

Project Director: Malinda Facey
Project Manager: Marion O'Neil
Technical Director: Adam Cavallaro
Technical Manager: James Garnham
Report No. 21139/R25 Appendix G
Date: May 2024

This report was prepared using Umwelt's ISO 9001 certified Quality Management System.

Acknowledgement of Country

Umwelt would like to acknowledge the traditional custodians of the country on which we work and pay respect to their cultural heritage, beliefs, and continuing relationship with the land. We pay our respect to the Elders – past, present, and future.

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Rev No.	Reviewer		Approved for Issue	
	Name	Date	Name	Date
V1	Belinda Howe	20/05/2022	Shaun Corry	25/05/2022
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Amended	Adam Cavallaro			

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1.0 Introduction

Section 6.12 of the *Biodiversity Conservation Act 2016* (BC Act) requires a Biodiversity Development Assessment Report (BDAR) for a proposed development or activity that would be authorised by a planning approval, to be prepared in accordance with the Biodiversity Assessment Method (BAM) which is established under Section 6.8 of the BC Act.

Relevantly, section 6.8(3) of the BC Act provides:

(3) The biodiversity assessment method is to exclude the assessment of the impacts of any clearing of native vegetation and loss of habitat on category 1-exempt land (within the meaning of Part 5A of the Local Land Services Act 2013), other than any impacts prescribed by the regulations under section 6.3.

The following definitions from the *Local Land Services Act 2013* (LLS Act) are relevant to the reading of section 6.8(3) of the BC Act:

category 1-exempt land means areas of the State to which this Part applies designated as category 1-exempt land on the native vegetation regulatory map.

category 2-regulated land means areas of the State to which this Part applies designated as category 2-regulated land on the native vegetation regulatory map (including category 2-vulnerable regulated land that is so designated).

60E Purpose of native vegetation regulatory map

The purpose of the native vegetation regulatory map is to designate areas of the State to which this Part applies—

a. where the clearing of native vegetation is not regulated under this Part (**category 1-exempt land**), and

b. where the clearing of native vegetation is regulated under this Part (**category 2-regulated land**), and

c. where the clearing of native vegetation is regulated under this Part but (because of its vulnerability) is subject to additional restrictions and extended to the clearing of dead and non-native plants (**category 2-vulnerable regulated land**).

The Native Vegetation Regulatory Map has not been finalised by the NSW Government and the mapping of Category 1 land has not been released to the public. As such, landholders are responsible for determining the categorisation of their land in accordance with definitions set out within the LLS Act.

This report describes the processes of mapping Category 1 and Category 2 land within the Tallawang Solar Farm Project Area (hereafter referred to as the Project Area) for the purposes of the preparation of Biodiversity Development Assessment Reports to support a State Significant Development (SSD) Application. As set out above, any land assessed as Category 1 land identified through the assessment set out within this report will be subject to exclusion from the BDAR assessment for the Tallawang Solar Farm project (Project) required under section 6.12 of the BC Act.

It is noted that any Category 1-Exempt Land mapped within the Project Area will still be assessed for prescribed impacts under BAM 2020 and will be assessed for impacts to Matters of National Environmental Significance (MNES) under the *Environment Protection and Biodiversity Conservation Act 1999*.

The Project Area means an area inclusive of:

- The solar farm and Battery Energy Storage System (BESS) development area.
- A transmission line corridor for an overhead transmission line connecting the Project to the anticipated grid connection point.

The Project Area boundary is as shown in **Figure 2.1, Figure 2.2,** and **Figure 3.1**.

The Project is located within the Central-West Orana Renewable Energy Zone (CWO REZ). It is anticipated that the Project will connect in to a new high-voltage transmission line proposed to be constructed by the NSW Government to support the progression renewable energy development within the CWO REZ. The final proposed location for the high-voltage transmission line is not publicly available and the transmission line corridor for the Project therefore represents an anticipated connection point based on what information is currently available.

1.1 Definition of Category 1-Exempt Land

Category 1-exempt land is defined in Part 5A, Division 2 of the LLS Act. Subject to certain exceptions, Category 1-exempt land is broadly defined as being:

- Land cleared of native vegetation as at 1 January 1990 or lawfully cleared after 1 January 1990 (but before 25 August 2017).
- Low conservation grasslands.
- Land containing only low conservation groundcover (not being grasslands).
- Native vegetation identified as regrowth in a Property Vegetation Plan under the repealed *Native Vegetation Act 2003.*
- Land bio-certified under the BC Act.

Land meeting the above criteria is not considered to be Category 1-exempt land if certain exceptions apply. These exemptions are discussed further in **Section 2.0** below.

1.1.1 Meaning of 'cleared'

Based on the Land Categorisation Fact Sheet (Local Land Services unknown date), and the Native Vegetation Regulatory Map Method Statement (DPE 2022) 'clearing' (for the purposes of this document) has been interpreted as any areas where there has been a lawful removal of all native vegetation (all strata) prior to the commencement of Part 5A of the LLS Act, being 25 August 2017.

Section 114 of the *Local Land Services Regulation 2014* (LLS Regulation) states:

114 Determining whether native vegetation has been significantly disturbed or modified (s 60J (2))

(1) Native vegetation that comprises grasslands or other non-woody vegetation is taken to have been significantly disturbed or modified (and therefore cleared) only if:

(a) there has been a detectable variation (from information obtained from aerial or satellite imagery) in the structure or composition, or both, of non-woody vegetation, and

(b) that variation is consistent with management of pasture or crops for agricultural purposes, and

(c) that variation has been sustained for at least 12 months on more than one occasion before the commencement of Part 5A of the Act, and

(d) that variation has not been caused only by grazing on the land, and

(e) that variation occurred (from information obtained from aerial or satellite imagery) between 1 January 1990 and the date of commencement of Part 5A of the Act.

(2) During the transitional period referred to in section 60F of the Act, the information that may be used for the purposes of this clause includes information obtained from a source other than from aerial or satellite imagery, but only if the landholder has prepared a record of the information and a map showing the areas to which it applies. The landholder is required to retain the record and map for at least 5 years after any clearing that is carried out in reliance on that information.

In the interpretation of section 114 of the LLS Regulation, the following definitions for 'native vegetation' and 'clearing' from the LLS Act are relevant:

60B Meaning of "native vegetation"

(1) For the purposes of this Part, **native vegetation** means any of the following types of plants native to New South Wales—

(a) trees (including any sapling or shrub or any scrub),

(b) understorey plants,

(c) groundcover (being any type of herbaceous vegetation),

(d) plants occurring in a wetland.

(2) A plant is native to New South Wales if it was established in New South Wales before European settlement. The regulations may authorise conclusive presumptions to be made of the species of plants native to New South Wales by adopting any relevant classification in an official database of plants that is publicly accessible.

(3) For the purposes of this Part, native vegetation extends to a plant that is dead or that is not native to New South Wales if—

(a) the plant is situated on land that is shown on the native vegetation regulatory map as category 2-vulnerable regulated land, and

(b) it would be native vegetation for the purposes of this Part if it were native to New South Wales.

(4) For the purposes of this Part, native vegetation does not extend to marine vegetation (being mangroves, seagrasses, or any other species of plant that at any time in its life cycle must inhabit water other than fresh water). A declaration under section 14.7 of the **Biodiversity Conservation Act 2016** that specified vegetation is or is not marine vegetation also has effect for the purposes of this Part.

60C Meaning of "clearing" native vegetation

For the purposes of this Part, **clearing** native vegetation means any one or more of the following—

(a) cutting down, felling, uprooting, thinning or otherwise removing native vegetation,

(b) killing, destroying, poisoning, ringbarking, or burning native vegetation.

Complete removal of native vegetation has been interpreted for the purposes of the mapping as being areas where complete removal of ground cover has occurred, namely:

- Areas that were cropped/ploughed or significantly disturbed (see clause 114 of the LLS Regulation) for agricultural purposes.
- Areas disturbed by approved activities.

While it is reasonably straight forward to classify land that has had all vegetation removed since 1990 by identifying land where surface disturbance activities have taken place, the legislation provides little clarity on what is meant by 'cleared as at 1 January 1990'. This is particularly important in the present case where there is a long history of disturbance within the Project Area associated with sustained agriculture. This process is complicated in the present conditions by the absence of any publicly available high resolution aerial photography of the Project Area in 1990. The methodology for assessing areas 'cleared' of native vegetation within the Project Area is set out in **Section 2.1**.

1.1.2 Native Vegetation Identified as Regrowth in a Property Vegetation Plan Under the Repealed *Native Vegetation Act 2003*

Although the *Native Vegetation Act 2003* was repealed in 2017, Property Vegetation Plans approved before the repeal of the Act remain valid and the obligations to manage and maintain the associated offset areas continue. There are no valid Property Vegetation Plans relevant to the Project Area.

1.1.3 Low Conservation Value Groundcover

The method of determining whether grassland areas constitute low conservation value grasslands or other cover is described in clause 110 of the LLS Regulation:

110 Determining conservation value of grasslands or other groundcover (s 60H (5))

(1) For the purposes of section 60H (5) of the Act, land contains low conservation value grasslands for the purposes of Division 2 of Part 5A of the Act if the land is determined to contain low conservation value grasslands under the "Interim Grasslands and other Groundcover Assessment Method" published by the Minister for the Environment in the Gazette on 25 August 2017.

(2) For the purposes of clause 109, land contains low conservation value groundcover (not being grasslands) if the land is determined to contain low conservation value groundcover (other than grasslands) under the "Interim Grasslands and other Groundcover Assessment Method" published by the Minister for the Environment in the Gazette on 25 August 2017.

(3) A determination referred to in this clause is not required under the published methods if the Environment Agency Head reasonably believes that an independent field assessment undertaken before the commencement of Part 5A of the Act has determined that the land contains high conservation value grasslands or other groundcover.

In all but a few areas, woodland areas within the Project Area have been removed entirely and the resultant land has a long history of cropping and/or grazing. The presence of exotic grassland and herb species in grassland areas (and the understorey of remnant vegetation which has been grazed) is widespread and vegetation surveys and plot work undertaken in support of the development of the Project, indicate exotic species dominate most cleared areas where these are not actively cropped. This applies in particular to grassland areas which have been mapped as being 'grazing modified pastures' in NSW Land Use 2013 and 2017 mapping (State Government of NSW and Department of Planning, Industry and Environment 2017, State Government of NSW and Department of Planning, Industry and Environment 2020).

Areas of exotic vegetation and areas which are excluded from further assessment under the BAM i.e., Category 1 Land, have been assessed and delineated separately within the BDAR. This is because the two categories are assignable according to different criteria i.e., exotic vegetation is mapped according to the dominance of weed species and the absence of native vegetation cover whereas land categorisation is assigned according to land use information and history.

1.1.4 Land bio-certified under the BC Act.

The land within the Project Area is not subject to bio-certification under the BC Act.

1.2 Category 2-Regulated Land

Category 2 regulated land is defined in Part 5A, Division 2 of the LLS Act. Category 2-regulated land is divided into the following categories, aided based on Based on the Land Categorisation Fact Sheet (Local land Services unknown date), and the Native Vegetation Regulatory Map Method Statement (DPE 2022):

Regulated land, which is any Category 2 land that is not vulnerable or sensitive regulated land, includes:

- Land not cleared as at 1 January 1990 or unlawfully cleared after 1 January 1990.
- Native vegetation grown with the assistance of public funds (but clearing under the Land Management Code is not permitted on such land while the agreement providing the funds is in force).
- Land that was subject to a Private Native Forestry Property Vegetation Plan that is no longer in force.
- Grasslands that are neither low nor high conservation grasslands.
- Travelling stock reserves, apart from travelling stock reserves in the Western Division.
- Land that is (or was previously) subject to a Private Native Forestry Plan or Private Native Forestry Property Vegetation Plan.
- Land that is of a kind prescribed by the LLS Regulation as being Category 2- regulated land (clauses 108 and 113 of the LLS Regulation).

Vulnerable regulated land (clause 108 LLS Regulation), which is land were clearing of native vegetation may not be permitted under the Land Management (Native Vegetation) Code 2018 and includes:

- Steep or highly erodible land.
- Protected riparian areas.
- Land susceptible to erosion, or land that is otherwise environmentally sensitive.

Additional Category 2 regulated land (Sensitive regulated land) (Clause 113 LLS Regulation), which is where clearing is not permitted and includes:

- Land subject to a private land conservation agreement.
- Land set aside under the Land Management Code.
- Land subject to a bio-certification conservation measure.
- Land comprising an offset under a Property Vegetation Plan or set aside under a code under the *Native Vegetation Act 2003.*
- Coastal wetlands and littoral rainforests (*Coastal Management Act 2016*).
- High conservation grasslands.
- Core koala habitat identified in a plan of management (State Environmental Planning Policy No 44 (Koala Protection)).

- Critically endangered plants and critically endangered ecological communities.
- Ramsar wetlands (EPBC Act).
- Land subject to remedial action or conservation measures under the BC Act.
- Land subject to a property, trust, or conservation agreement.
- Land recommended for listing as an Area of Outstanding Biodiversity Value.
- Conservation Areas under the Southern Mallee Land Use Agreement.
- Native vegetation that must be retained under the *Plantation and Reafforestation Act 1999.*
- Land subject to a condition of development consent requiring the land to be set aside for conservation purposes under the *Environmental Planning and Assessment Act 1979* (EP&A Act).
- Rainforest and old-growth forest.

2.0 Methodology

Category 1-exempt land mapping process for the Project was guided by the Secretary's Environmental Assessment Requirements (SEARs) Consolidated Advice (DPIE 2021) issued for Tallawang Solar Farm and has been based on the methodology set out in Native vegetation regulatory map: method statement (2017) (NSW Government, 2017). The methodology for the mapping process adopted for the Project has been described below.

The process for identifying Category 1-exempt land within the Project Area has adopted the following basic process:

- Identify land that had been disturbed and could meet the requirements of Category 1-exempt land on this basis.
- Exclude land that meets the requirements of Category 2-regulated land, vulnerable regulated land, or sensitive regulated land.

2.1 Mapping of Category 1-Exempt Land

Category 1-exempt land areas within the Project Area were identified through the following process which, in part, was documented in the SEARs:

- Land use mapping – used to identify and map existing and historical agricultural land use in NSW (NSW Landuse 2017) (State Government of NSW and Department of Planning, Industry and Environment 2017, State Government of NSW and Department of Planning, Industry and Environment 2020).
- Woody vegetation extent – used to identify and map native vegetation extent – 2008 Woody Extent (State Government of NSW and Department of Planning, Industry and Environment 2011) and 2011 Woody Extent (State Government of NSW and Department of Planning, Industry and Environment 2015).
- State-wide Landcover and Tree Survey (SLATS) woody clearing for NSW – used to identify detectable clearing events since January 1990 (SLATS- Woody Vegetation Change - NSW 2008-2014). Note, no mapping occurs in the Project Area.
- Aerial photography/satellite imagery from 1964, 1980, 1988, and 1992 was reviewed.
- Historic Google Earth satellite imagery between 2005 and 2017.
- Field surveys in 2020, 2021 and 2022 collecting flora data and photographs to show current condition.
- Areas which were identified as having been lawfully cleared/disturbed as set out above were then mapped using geo-rectified imagery.

A full list of the imagery and detailed metadata is set out in **Section 3.0**.

For the purposes of the assessment described in this report, 'Cleared as at 1990' has been interpreted as areas where there is clear evidence of the complete removal of all vegetation or evidence of compositional change in the grassland prior to 1990 and in which shrubs or trees had not regrown prior to 1990.

It should be noted that for the purposes of this assessment an aerial photo from 1992 has been used as the 1990 aerial photo was not available and satellite imagery from 1990 was of insufficient resolution for mapping purposes.

Complete removal of native vegetation has been interpreted for the purposes of the mapping as being areas where complete removal of ground cover has occurred within the Project Area, namely:

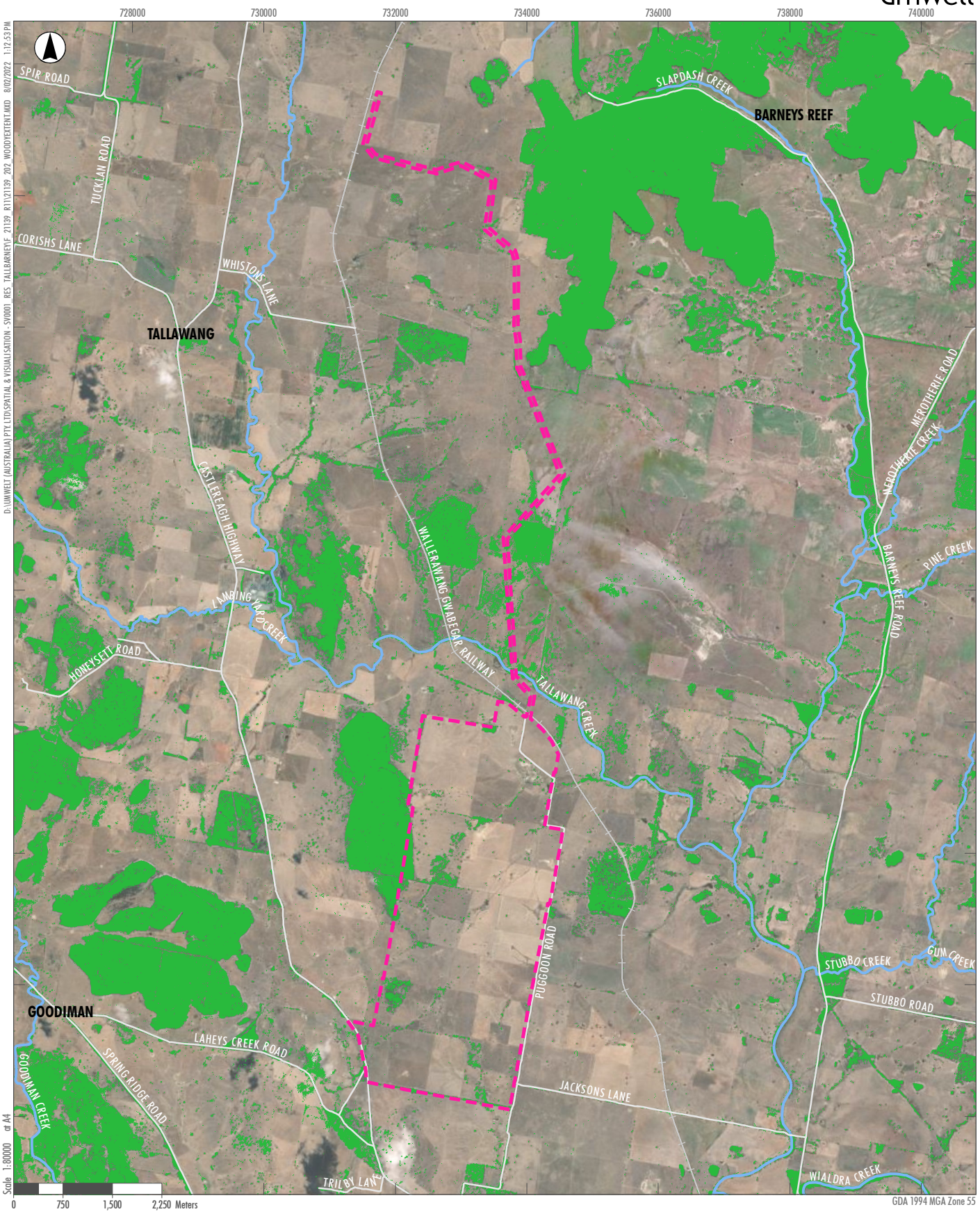
- Areas that were cropped/ploughed or significantly disturbed (see clause 114 of the LLS Regulation) for agricultural purposes.
- Areas disturbed by approved activities.

The presence of remnant paddock trees within the Project Area that have been cleared and cropped does not preclude these areas from being assessed as having been cleared (subject to restriction around the treatment of remnant paddock trees themselves). Only areas that retain trees in relatively close proximity to each other such that they may still be characterised as being a woodland community have been considered as not being cleared where there is evidence of removal of vegetation in and around these trees. Aerial photo interpretation of groundcover texture has been used to inform the assessment of likely disturbance, with a comparison of grassland 'texture' in areas of uncertainty compared to areas where past disturbance is clear to inform the mapping of 'cleared areas.

Change in vegetation composition has been identified through evidence of comparison of sequential aerial photographs of the Project Area which indicate a clear change in the form of the grassland and that change is sustained for at least an additional subsequent image. It is noted that the NSW Land Use 2017 (refer to **Figure 2.2**) mapping of cropping land and 'Grazing modified pastures' is largely accurate and reflective of areas where it can be demonstrated through assessment of available imagery that cropping in the period 1990 to 2017 has occurred. Additionally, a small portion of the project area was mined historically, this has also been accurately mapped. While the NSW Land Use 2017 mapping has been used as a guide in support of the assessment described in this report, with land mapped as 3.2.0, 3.3.0, and 5.8.0 being indicative of land likely to be Category 1 land, the mapping of Category 1 and Category 2 land for the purposes of this assessment has not relied on this mapping. Instead, the assessment has independently verified disturbance (or evidence of disturbance) that would demonstrate complete removal of ground cover satisfying Category 2 disturbance requirements, through onsite assessment.

Figure 2.1 shows the NSW State Government mapping of the 2013 Woody Vegetation Extent and Foliage Projective Cover. This data shows the extent of woody vegetation as of 2013. This data contributed to the mapping of Category 1 – Exempt Land.

Figure 2.2 shows the NSW State Government mapping of the 2017 Land Use Mapping. This data captures how the NSW landscape is being utilised as of 2017. This data contributed to the mapping of Category 1 – Exempt Land.



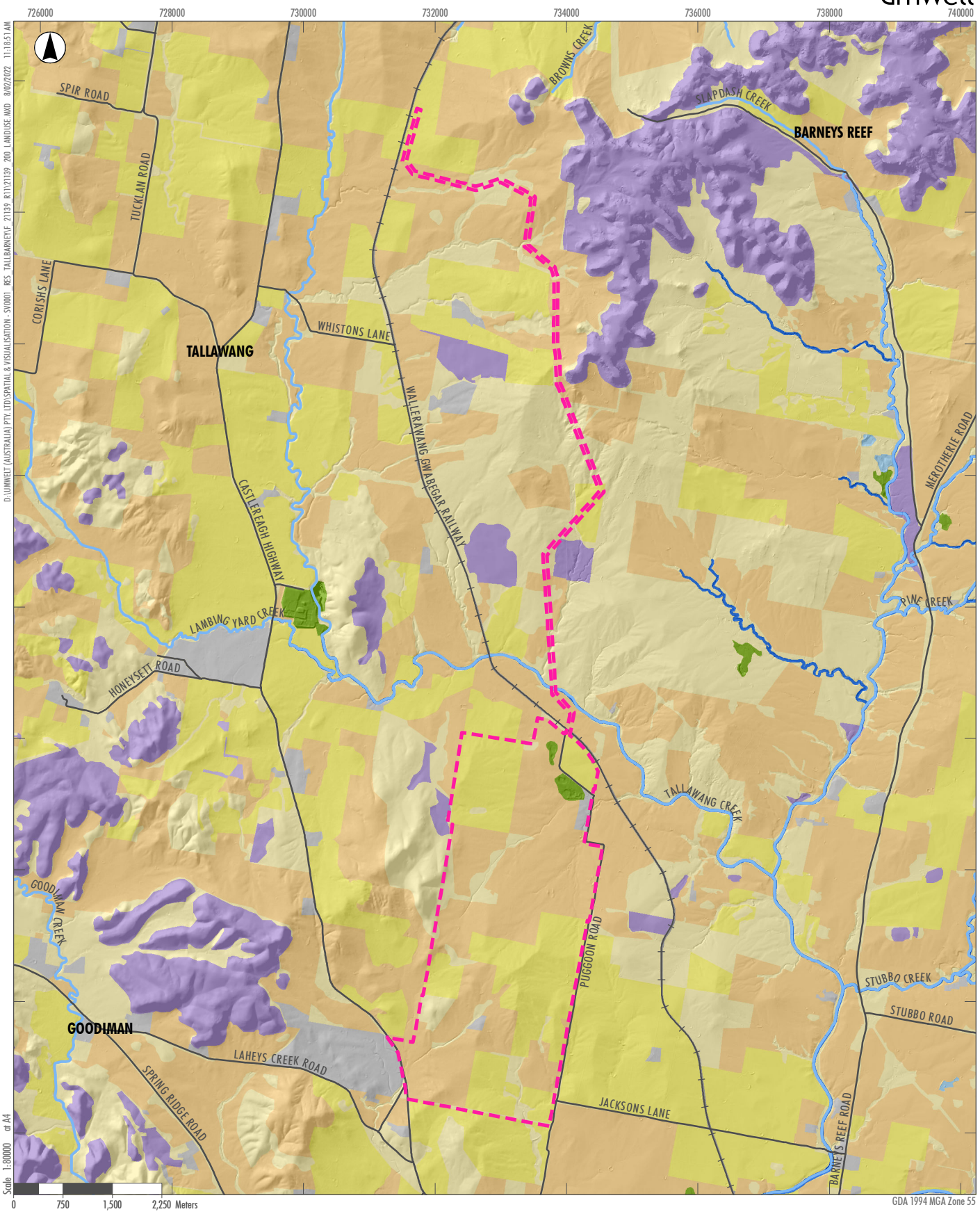
Legend

- Tallawang Solar Farm Project Area
- Woody Extent 2013

FIGURE 2.1

Woody Extent 2013

Image Source: ESR Basemap Data source: RES Australia (2021), NSW DFSI (2020)



Legend

- Tallawang Solar Farm Project Area
- Road
- Railway
- Watercourse

NSW Landuse 2017

- 1.2.0 Managed resource protection
- 1.3.0 Other minimal use
- 2.1.0 Grazing native vegetation
- 3.2.0 Grazing modified pastures
- 3.3.0 Cropping
- 5.4.0 Residential and farm infrastructure
- 5.7.0 Transport and communication
- 5.8.0 Mining
- 6.2.0 Reservoir/dam
- 6.3.0 River

FIGURE 2.2

Land Use 2017

Image Source: ESR Basemap Data source: RES Australia (2021), NSW DFSI (2020)

2.2 Category 2-Regulated Land Exclusion Process

The Category 2-sensitive regulated land and vulnerable regulated land layers from the DPIE SEED data portal have been applied to the Project Area as part of the assessment process in order to exclude Category 2-regulated land from the areas mapped as being Category 1-exempt land.

2.2.1 Excluded Areas

The railway line that cuts through the Project Area is mapped as excluded land.

2.2.2 Sensitive Regulated Land

Category 2-Regulated Land (Sensitive) is defined in **Section 1.2**. All remnant woodland, and some areas of derived native grassland within the Project Area are mapped on the NVR Map as Category 2 Regulated Land and as such have been excluded.

Some remnant woodland has been identified as White Box Yellow Box Blakely's Red Gum Grassy Woodland and Derived Native Grassland which is listed as a Critically Endangered Ecological Community (CEEC) under the BC Act (box gum woodland). This listing contains a derived native grassland component and as such, grasslands across the project area were assessed to determine if they also conform to the TEC and, therefore, should also be considered Category 2 – Regulated Land.

Grasslands across the whole Project Area have experienced an extensive history of cropping, grazing, and pasture improvement activities. Noting that this previous disturbance, alone, does not preclude the presence of the TEC, further analysis has been completed to support classification of this grassland as Category 1-Exempt Land. The analysis presented below has been completed in consideration of the Final Determination (NSW Scientific Committee 2020) to determine whether these grasslands conform to the CEEC. Where the grasslands do not conform to the CEEC they have been considered and mapped as Category 1-Exempt Land.

2.2.2.1 Methodology

Eight vegetation survey points have been used for this analysis. Additionally, rapid vegetation assessments were conducted to capture condition of the grassland (see **Figure 1.4** in main document). The floristic results of the vegetation survey points, coupled with photographs and other observations noted in the survey data have been used to determine if the grasslands within the Project Area conform to box gum woodland DNG CEEC and is presented in **Table 2.1.** This is a summary of the process undertaken to analyse grassland that has the potential to conform to box gum woodland DNG against the CEEC Final Determination (NSW Scientific Committee 2020).

Table 2.1 BC Act listed White Box – Yellow Box – Blakely's Red Gum Grassy Woodland and Derived Native Grassland CEEC Assessment Process

Criterion		Measure or Approach
Assemblage of Species	Ensure native grasses and native herbs, and/or understorey sub-shrubs are present; assess against the 115 species as characterising the assemblage of species for *White Box Yellow Box Blakely's Red Gum Grassy Woodland and Derived Native Grassland* CEEC (NSW Scientific Committee 2020)	At least 20% of flora species in BAM – Vegetation Integrity Plot are characteristic of the CEEC in the Patch Measure proportion of understorey that is native and exotic in the Patch Refer to **Table 3.1** for assessment outcome. Refer to **Table 3.2** for Vegetation Integrity Plot data.
Particular Area	Must occur in one of the following IBRA Regions: Brigalow Belt South Nandewar New England Tableland Sydney Basin NSW North Coast South Eastern Highlands South East Corner NSW South Western Slopes Riverina Bioregion	Assessed across the Project Area Refer to **Table 3.3** for assessment outcome.
Supplementary Descriptors	Hilly to undulating landscapes in areas with soils of moderate fertility derived from a range of lithologies, including alkaline and acid volcanics, granites, sediments, serpentinites and metamorphics	Assessed across the Project Area Refer to **Table 3.3** for assessment outcome.
	Annual rainfall across its range is generally within the range 500 and 800 millimetres per annum, although the community may occur in areas receiving as little as 400 millimetres per annum and as high as 900 millimetres per annum	Assessed across the Project Area Refer to **Table 3.3** for assessment outcome.
	Spans a range in elevation from approximately 170 metres ASL to approximately 1,200 metres ASL, although occurrences on the ranges are typically at lower elevations	Assessed across the Project Area Refer to **Table 3.3** for assessment outcome.
	A canopy characteristically or historically dominated by one or more of white box (*Eucalyptus albens*), yellow box (*E. melliodora*), and Blakely's red gum (*E. blakelyi*); while coastal grey box (*E. moluccana*) may be co-dominant in particular locations	Assess for the grassland, considering average characteristics from all BAM – Vegetation Integrity Plots completed for the grassland, and surrounding remnant woodlands. Refer to **Table 3.3**.
	Canopy projected foliage cover generally less than 30 %, ranging between 15 and 30 m in height	
	Understorey shrubs are typically sparse or absent	

2.2.3 Vulnerable regulated land

There is a creek mapped as Category 2-vulnerable regulated land in the Project Area.

3.0 Category 1 and 2 land Mapping Results

3.1 Category 1-Exempt Land Mapping Results

Figure 3.1 shows the mapping of Category 1 land within the Project Area against 2018 Google imagery (as being representative of 2017 conditions). The mapping of these areas as Category 1 land in March 2022 is considered to be an accurate reflection of LLS Act and Regulation criteria for Category 1 land.

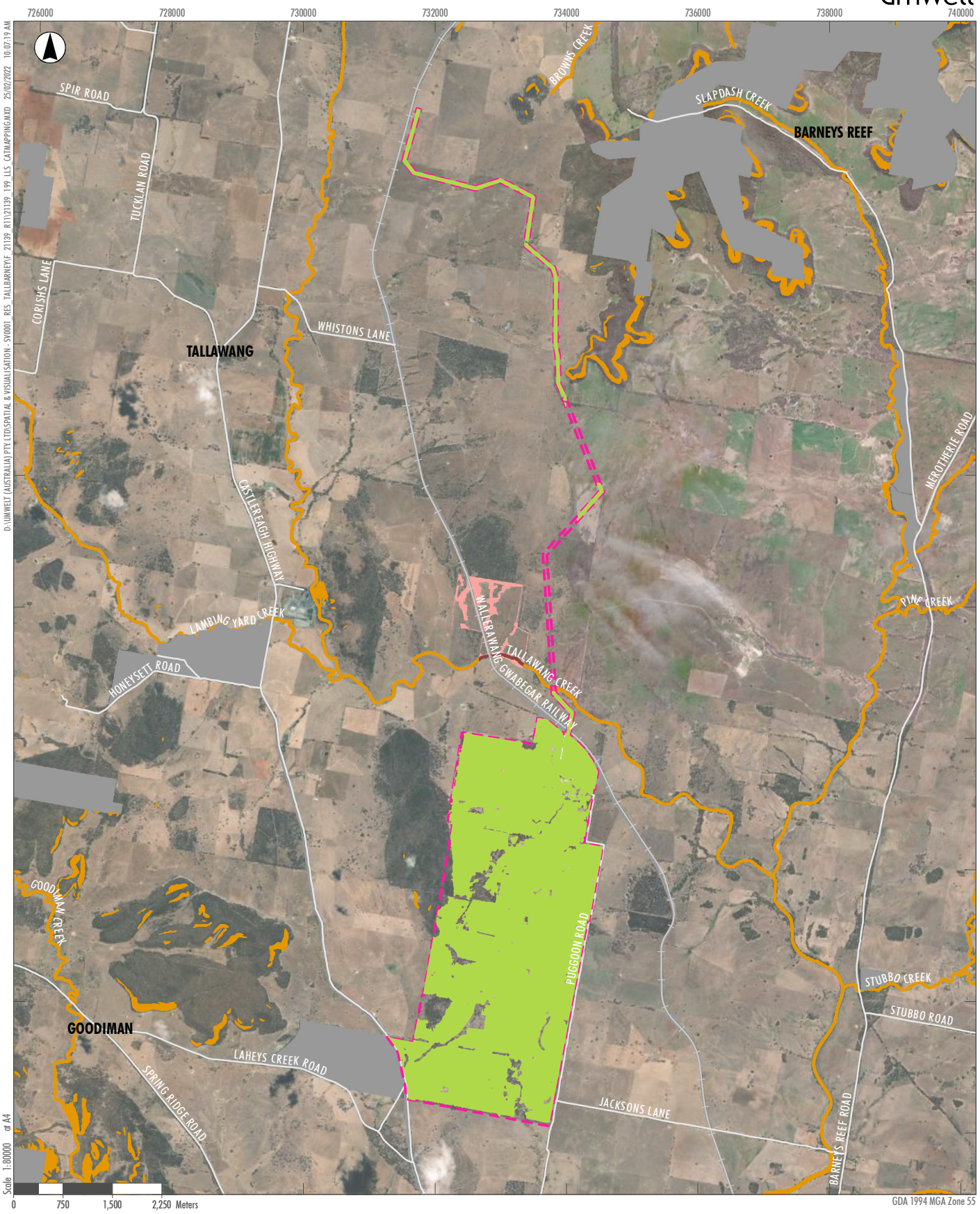
As noted in **Section 1.1.3**, the mapping of grassland and pasture areas as Category 2 Regulated Land should not be considered definitive for future assessment purposes and further groundcover survey may identify that some of the land mapped as being Category 2 land is Low Conservation Value Grassland (Category 1).

3.2 Category 2-Sensitive Land Assessment

The results of analyses described in **Table 2.1** are summarised below. **Table 3.1** summarises the results of the patch scale analysis, **Table 3.2** presents the vegetation integrity data collected at each plot, and **Table 3.3** describes the abiotic criteria necessary for determination. These results have been based on 8 Floristic Integrity Plots collected in the grassland areas. It is noted that data presented here was collected in the areas of best condition of the grassland patch.

Table 3.1 Summary of Species Assemblage

Species Assemblage	Grassland Patch Results
Average proportion of CEEC characteristic species present in BAM – Vegetation Integrity Plots	10.43%
Average proportion of native understorey cover in BAM – Vegetation Integrity Plots	48.6%



Legend

- Tallawang Solar Farm Project Area
- Category 1 - Exempt Land
- Steep or highly erodible land. Protected riparian land or special category land (Category 2 - vunerable regulated land)
- Category 2 - sensitive regulated land
- Category 2 - sensitive regulated land and steep or highly erodible land protected riparian land or special category land (Category 2 - vunerable regulated land)
- Land Excluded from LLS Act

FIGURE 3.1

LLS Act Land Category Mapping

Image Source: ESR Basemap Data source: RES Australia (2021), NSW DFSI (2020)

Table 3.2 Vegetation Integrity Data

	COMPOSITION						STRUCTURE						FUNCTION										
	Tr	Sh	Gr	Fb	Fn	Ot	Tr	Sh	Gr	Fb	Fn	Ot	Regen	Stem Classes (cm)					No. Large Trees	No. Hollow Trees	Litter (%)	Fallen Logs (m)	High Threat Weeds
														>5	5-10	10-20	20-30	30-50	50-80					
Plot_02	0	0	5	5	1	0	0	0	36.4	0.5	0.1	0	0	0	4	0	0	0	0	0	4	0	40
Plot_12	0	0	2	5	0	0	0	0	50.1	1.1	0	0	0	0	1	0	0	0	0	0	1	0	53.2
Plot_14	0	1	4	4	1	0	0	0.1	18.3	1.3	0.2	0	0	0	1.4	0	0	0	0	0	1.4	0	40.3
Plot_23	0	0	3	0	0	0	0	0	58	0	0	0	0	0	4.2	0	0	0	0	0	4.2	0	0.1
Plot_24	0	0	4	0	0	0	0	0	52	0	0	0	0	0	11	0	0	0	0	0	11	0	5.1
Plot_27	0	0	1	4	1	0	0	0	30	0.4	0.1	0	0	0	70	0	0	0	0	0	70	0	31
Plot_29	0	0	3	0	0	0	0	0	40.2	0	0	0	0	0	42	0	0	0	0	0	42	0	30
Plot_31	0	0	5	5	1	0	0	0	36.4	0.5	0.1	0	0	0	4	0	0	0	0	0	4	0	40

Table 3.3 Abiotic Criterion Assessed Across the Project Area

Criteria	Summary of the Project Area	Outcome
IBRA Region	NSW South West Slopes	✓
Landscape	Hilly and undulating country dominated, while valley floors are also involved	✓
Rainfall[1]	Mean annual rainfall of 651.2mm	✓
Elevation	Approximately 400 - 600m ASL	✓
Canopy	Characteristic canopy species are present in the patch and surrounding area	✓

[1] Based on Bureau of Meteorological rainfall data from the Gulgong Post Office weather station (062013)

Rapid Vegetation Assessments

The location of the rapid vegetation assessments are shown in **Figure 1.4** in the main BDAR. The accompanying photographs provided in **Plate 3.1a to 3.1j**) demonstrate the degraded nature of the grassland and the cropping activities that took place during surveys.



Plate 3.1a Example of the condition of analysed grassland within Project Area



Plate 3.1b Example of the condition of analysed grassland within Project Area



Plate 3.1c Example of the condition of analysed grassland within Project Area



Plate 3.1d Example of the condition of analysed grassland within Project Area



Plate 3.1e Example of the condition of analysed grassland within Project Area



Plate 3.1f Example of the condition of analysed grassland within Project Area



Plate 3.1g Example of the condition of analysed grassland within Project Area



Plate 3.1h Example of the condition of analysed grassland within Project Area



Plate 3.1g Example of the condition of analysed grassland within Project Area



Plate 3.1j Example of the condition of analysed grassland within Project Area

3.3 Conclusion

There are no identification thresholds identified in the NSW Threatened Species Scientific Committee – final determination for Box Gum Woodland listed under the BC Act (NSW Threatened Species Scientific Committee 2020). As such an identification threshold was developed for the purposes was distinguishing between Box Gum Woodland DNG CEEC and Category 1 – Exempt Land. The thresholds developed (**Table 2.1**) were conservative and it is believed that the precautionary principal was used while they were developed. For the area to be discounted, and therefore not eligible for Category 1 – Exempt Land Status, it had to have a minimum of 20% of recorded species be characteristic Box Gum Woodland species and at least 50% native vegetation cover.

The result of this analysis against the *White Box Yellow Box Blakely's Red Gum Grassy Woodland and Derived Native Grassland CEEC* listed under the BC Act found that the grassland does not conform to the CEEC. This is because the patch does not contain sufficient box gum woodland characteristic species (~11%) and the patch is dominated by exotic species (exotic species cover of the patch is greater than 50%).

This analysis is supported by the observation noted in the rapid assessments and the NVR mapping outcomes.

Figure 1.4 (in the main document) shows the mapping of Category 1 land within the Project Area against 2018 Google imagery (as being representative of 2017 conditions). A total of 833.9ha of Category 1 Exempt Land has been mapped in the Project Area (865.54ha).

The mapping of these areas as Category 1 land in March 2022 is considered to be an accurate reflection of LLS Act and Regulation criteria for Category 1 land.

As noted in **Section 1.1.3**, the mapping of grassland and pasture areas as Category 2 Regulated Land should not be considered definitive for future assessment purposes and further groundcover survey may identify that some of the land mapped as being Category 2 land is Low Conservation Value Grassland (Category 1).

4.0 Metadata List

Table 4.1 Images/Aerial Photography Reviewed

Images	Date	Source
1964 LPI Georectified Aerial Image	31/05/1991	Portal.spatial.nsw.gov.au Historical Imagery
1980 LPI Georectified Aerial Image	4/11/1980	Portal.spatial.nsw.gov.au Historical Imagery
1988 LPI Georectified Aerial Image	12/01/1988	Portal.spatial.nsw.gov.au Historical Imagery
1992 LPI Georectified Aerial Image	5/06/1992	Portal.spatial.nsw.gov.au Historical Imagery
2002 Google Earth (Maxar Technologies)	19/8/2002	Google Earth 2021
2005 Google Earth (Maxar Technologies)	31/7/2005	Google Earth 2021
2012 Google Earth (Maxar Technologies)	21/11/2012	Google Earth 2021
2013 Google Earth (Maxar Technologies)	11/5/2013	Google Earth 2021
2013 Google Earth Image (CNES/Airbus)	10/10/2013	Google Earth 2021
2013 Google Earth Image (CNES/Airbus)	24/10/2013	Google Earth 2021
2015 Google Earth Image (CNES/Airbus)	4/12/2015	Google Earth 2021
2017 Google Earth Image (CNES/Airbus)	22/7/2017	Google Earth 2021

Table 4.2 Spatial Data Provided

File Name	Date	Description
Tallawang Project Area	12/11/2021	Shapefile showing location of Project Area
21139_PCTmapping_v5_mga55	12/11/2021	Shapefile showing mapped LLS Act Category Mapping for Project Area.

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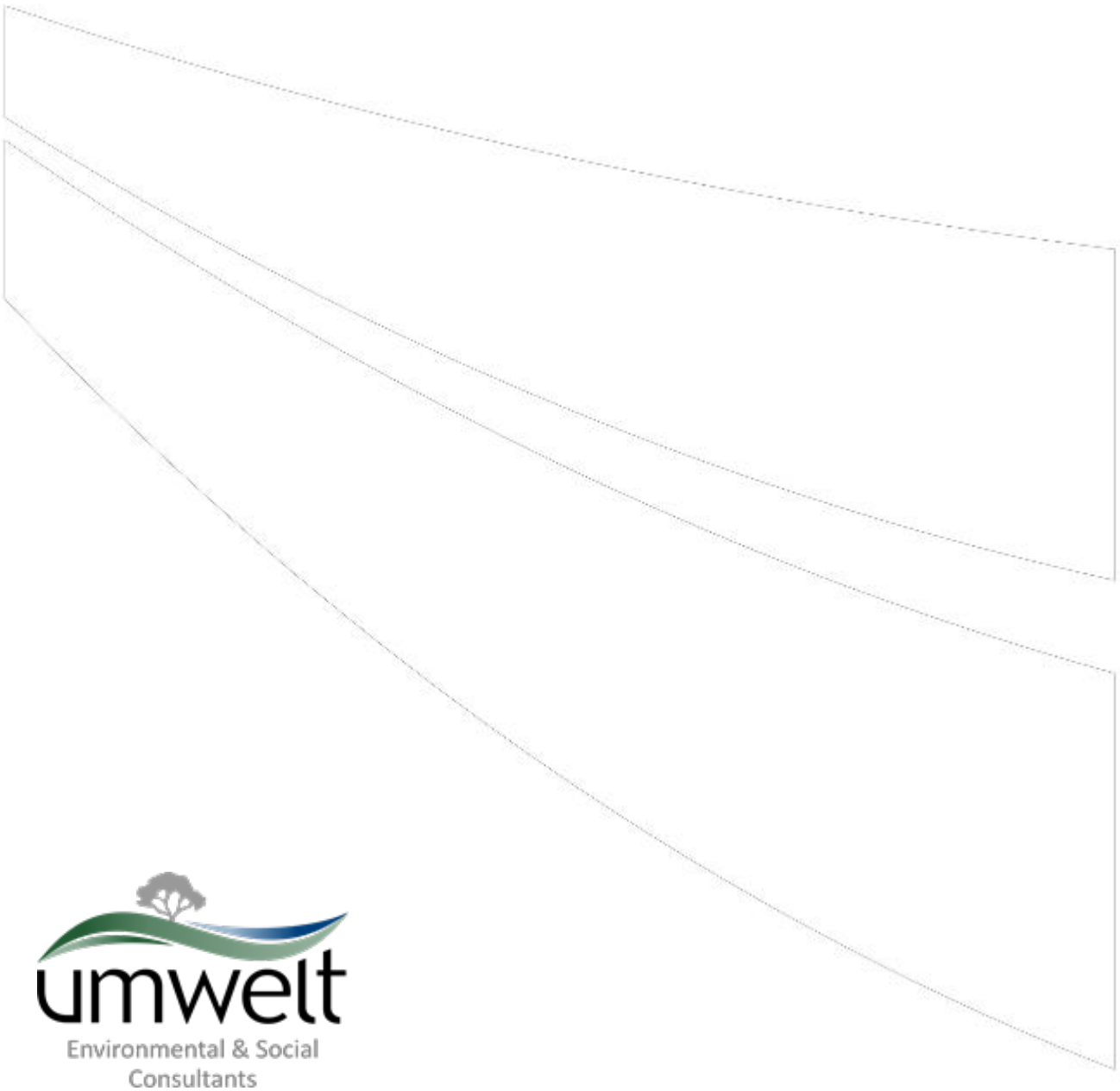
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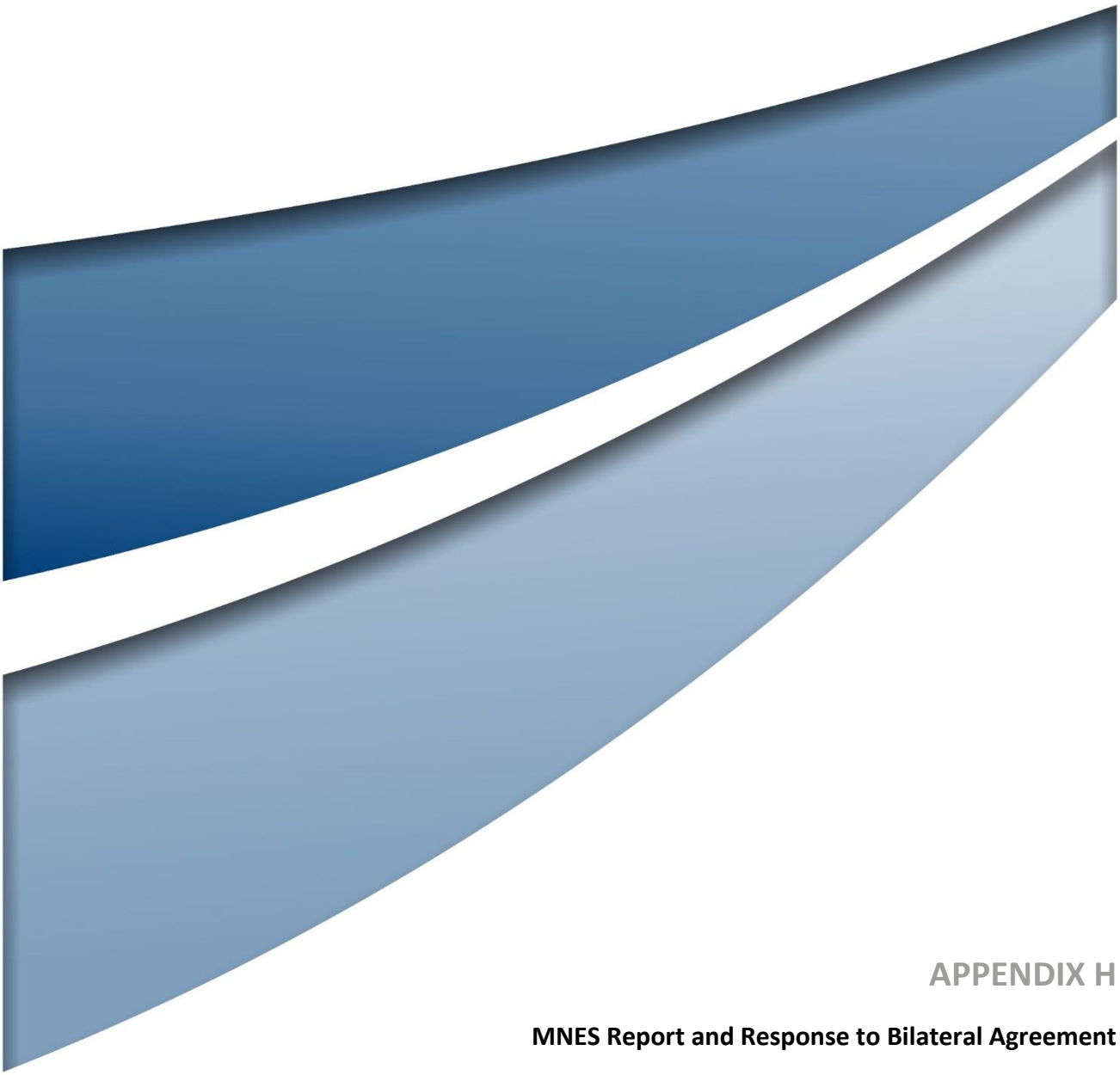
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APPENDIX H

MNES Report and Response to Bilateral Agreement

umwelt
Environmental & Social Consultants

AMENDED ASSESSMENT OF COMMONWEALTH MATTERS

Tallawang Solar Farm

FINAL

May 2024

AMENDED ASSESSMENT OF COMMONWEALTH MATTERS

Tallawang Solar Farm

FINAL

Prepared by
Umwelt (Australia) Pty Limited
on behalf of
RES

Project Director: Malinda Facey
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Report No. 21139/Appendix H
Date: May 2024

Environmental & Social Consultants

This report was prepared using Umwelt's ISO 9001 certified Quality Management System.

Acknowledgement of Country

Umwelt would like to acknowledge the traditional custodians of the country on which we work and pay respect to their cultural heritage, beliefs, and continuing relationship with the land. We pay our respect to the Elders – past, present, and future.

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	Name	Date	Name	Date
1	Shaun Corry	12/5/2022	Shaun Corry	25/5/2022
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1.0 Introduction

On 27 April 2022, the Commonwealth Department of Climate Change, Energy, the Environment and Water (DCCEEW) (formerly Department of Agriculture, Water and Environment (DAWE)) confirmed the Tallawang Solar Farm (the Project) constitutes a controlled action (2022/9171) under Section 75 of the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act). The controlling provisions under the EPBC Act for the Project are:

- Listed threatened species and communities (sections 18 and 18A).

Specifically, DAWE considered the Project is likely to have a significant impact on:

- White Box – Yellow Box – Blakely's Red Gum Grassy Woodland and derived native grassland – Critically Endangered Ecological Community (CEEC)
- Koala (combined populations of QLD, NSW and the ACT) (*Phascolarctos cinereus*) – Endangered
- Spotted-tailed Quoll (south-east mainland population) (*Dasyurus maculatus maculatus*) – Endangered.

Further, in advice issued to the former Department of Planning and Environment (DPE) for the preparation of the Supplementary SEARs (20/6/2022), the Commonwealth DCCEEW identified that there may be a significant impact on the following threatened entities:

- Regent Honeyeater (*Anthochaera phrygia*) – Critically Endangered
- Large-eared Pied Bat (*Chalinolobus dwyeri*) – Vulnerable
- Corben's Long-eared Bat (*Nyctophilus corbeni*) – Vulnerable
- Grey Box Grassy Woodland and Derived Native Grassland of south-east Australia – Endangered Ecological Community (EEC).

The assessment path for the Project is in accordance with the *Amending Agreement No. 1 to the Bilateral Agreement* under Section 45 of the EPBC Act relating to environmental assessment between the Commonwealth and NSW Governments. Commonwealth DCCEEW has issued its assessment requirements which have been incorporated into the SEARs for the Project (refer to Appendix 1 of the EIS) which state:

> ***Biodiversity (threatened species and communities)***
>
> ***Assessment Requirements***
>
> *15. The EIS must identify each EPBC Act listed threatened species and community likely to be impacted by the action. For any species and communities that are likely to be impacted, the proponent must provide a description of the nature, quantum and consequences of the impacts. For species and communities potentially located in the project area or in the vicinity that are not likely to be impacted, provide evidence why they are not likely to be impacted.*
>
> *16. For each of the EPBC Act listed threatened species and communities likely to be impacted by the action the EIS must provide a separate:*

i. description of the habitat (including identification and mapping of suitable breeding habitat, suitable foraging habitat, important populations and habitat critical for survival), with consideration of, and reference to, any relevant Commonwealth guidelines and policy statements including listing advice, conservation advice and recovery plans;

ii. details of the scope, timing and methodology for studies or surveys used and how they are consistent with (or justification for divergence from) published Australian Government guidelines and policy statements;

iii. description of the relevant impacts of the action having regard to the full national extent of the species or community's range; and

iv. description of the specific proposed avoidance and mitigation measures to deal with relevant impacts of the action;

v. identification of significant residual adverse impacts likely to occur after the proposed activities to avoid and mitigate all impacts are taken into account;

vi. a description of any offsets proposed to address residual adverse significant impacts and how these offsets will be established.

vii. details of how the current published NSW Biodiversity Assessment Method (BAM) has been applied in accordance with the objects of the EPBC Act to offset significant residual adverse impacts; and

viii. details of the offset package to compensate for significant residual impacts including details of the credit profiles required to offset the action in accordance with the BAM and/or mapping and descriptions of the extent and condition of the relevant habitat and/or threatened communities occurring on proposed offset sites.

17. Any significant residual impacts not addressed by the BAM may need to be addressed in accordance with the EPBC Act 1999 Environmental Offset Policy.

Other approvals and conditions

18. Information in relation to any other approvals or conditions required must include the information prescribed in Schedule 4 Clause 5 (a) (b) (c) and (d) of the EPBC Regulations. Environmental Record of person proposing to take the action

19. Information in relation to the environmental record of a person proposing to take the action must include details as prescribed in Schedule 4 Clause 6 of the EPBC Regulations.

Information Sources

20. For information given in an EIS, the EIS must state the source of the information, how recent the information is, how the reliability of the information was tested; and what uncertainties (if any) are in the information.

Appendix A

Protected matters relevant to the Tallawang Solar Farm (EPBC 2022/9171) project

Specific Risks

Key risks associated with the proposed action from the Commonwealth perspective include:

- *Potential significant impacts to EPBC listed threatened species and an ecological community resulting from the clearing of native vegetation in the project footprint. The Department of Agriculture,*
- *Water and the Environment believes the proposed action will clear suitable foraging habitat that is critical for the survival of the threatened species mentioned below and reduce the extent of the ecological community present on the proposed action area.*

Threatened species and communities

Based on the information in the referral documentation, the location of the action, species records and likely habitat present in the area, there are likely to be significant impacts to:

- *White Box – Yellow Box – Blakely's Red Gum Grassy Woodland and derived native grassland – Critically Endangered*
- *Koala (combined populations of QLD, NSW and the ACT) (Phascolarctos cinereus) – Endangered*
- *Spotted-tail Quoll (south-east mainland population) (Dasyurus maculatus maculatus) – Endangered*

Additionally, there is some risk that there may be significant impacts on the following matters and further assessment to determine if the communities and species listed below are present in the proposed action area and, if so, the extent to which they may be impacted by the proposed action, is required:

- *Regent Honeyeater (Anthochaera phrygia) – Critically Endangered*
- *Large-eared Pied Bat (Chalinolobus dwyeri) – Vulnerable*
- *Corben's Long-eared Bat (Nyctophilus corbeni) – Vulnerable*
- *Grey Box Grassy Woodland and Derived Native Grassland of south-east Australia – Endangered.*

Further assessment to determine if the communities and species listed above are present in the proposed action area, and if so, the extent to which they may be impacted by the proposed action is required.

This report provides a summary of the key MNES assessment findings including the additional information outlined above and should be read in conjunction with the Amendment Report (Umwelt, 2024a) and specifically the following specialist report:

- The Amended Biodiversity Development Assessment Report (BDAR) prepared by Umwelt (Umwelt 2024b) (this document is Appendix H of the BDAR).

As this assessment will be considered in relation to the Subject Land as documented in the Amended BDAR, any reference to the Referral Area has been replaced to reference the Subject Land.

1.1 Background and Amended Project Overview

RES Australia Pty Ltd (RES) is seeking approval for the State Significant Development (SSD) application of the Tallawang Solar Farm, approximately 8 kilometres (km) northwest of Gulgong within the Mid-Western Regional Local Government Area (LGA) of NSW (refer to **Figure 1.1** of the main BDAR report).

The Project lies within the Central West Orana Renewable Energy Zone (CWO-REZ), established under the *NSW Government's Electricity Strategy* (2019) and *Electricity Infrastructure Roadmap* (2020).

The Project is proposed to include up to 500 megawatts (MW) of solar electricity generation with a Battery Energy Storage System (BESS) and associated infrastructure and works. The Project is proposing to connect to the grid via the proposed CWO-REZ Transmission Project currently being developed by the NSW Government to support the growth of the CWO-REZ.

The Environmental Impact Statement (EIS) including a Biodiversity Development Assessment Report (BDAR) for the Tallawang Solar Farm (Umwelt, 2022) was submitted to the former DPE (currently the NSW Department of Planning, Housing and Infrastructure (DPHI) and publicly exhibited from 28 October to 24 November 2022.

Following analysis of the EIS submissions, RES undertook a thorough review of the Project's design and layout. The Project remains generally as described in Section 3 of the EIS. However, some key design amendments have been made to the Project in response to public and agency submissions received during the exhibition period and based on further consultation with agencies, affected landholders and stakeholders more broadly (hereafter referred to as the Amended Project). These include:

- Inclusion of a 400-person Temporary Workers Accommodation (TWA) facility within the Amended Project Area
- Updated treatment for the proposed intersection upgrade at the newly proposed site access on the Castlereagh Highway
- Removal of the 13 km overhead ETL traversing through the Barneys Reef Wind Farm as this is now included in EnergyCo's CWO-REZ Transmission Project
- Increased BESS capacity from 200 MW/400MW-h to 500 MW/1000MW-h
- Minor layout refinements, including:
    - removal of the northern substation option
    - installation of additional solar panels within already disturbed areas
    - realignment of the security fence line to improve fauna connectivity
- Minor readjustment of the Project Area boundary and development footprint.

The Amended Project's conceptual layout is provided in **Figure 1.2** of the Amended BDAR. A comparison between the Project as presented in the EIS and the amended Project is provided in **Table 1.1** of the Amended BDAR.

The Amended Project Area as illustrated on **Figure 1.1** of the Amended BDAR encompasses four freehold properties, some parcels of Crown Land ('paper roads') and a section of the Castlereagh Highway and road reserve, covering an area of approximately 1,300 ha. These properties are primarily utilised for cropping and grazing activities.

The Subject Land for the Amended Project is defined as the area inclusive of:

- Development footprint of the solar farm site and BESS development area including the 400-person TWA facility.
- Development footprint of the intersection upgrade on the Castlereagh Highway.

2.0 MNES Biodiversity Assessment

2.1 Category 1-Exempt Land

Under NSW legislation, a large portion of the Subject Land has been mapped as Category 1-Exempt Land (see Appendix G of the BDAR). Category 1-Exempt Land represents lawfully cleared land or low condition grassland that is exempt from biodiversity assessment in NSW however it is not recognised under the EPBC Act. As such all grassland areas mapped within the Subject Land were assessed to determine if they supported MNES habitat or conformed to an MNES vegetation community and have been assessed accordingly in this document.

2.1.1 Changes to Submitted Referral Document

Following submission of the EPBC Referral documentation (during February 2022), slight project refinements have resulted in vegetation mapping changes within the Subject Land. **Table 2.1** identifies the changes to the relevant MNES habitat areas. The revised areas include habitat that will be retained as part of the avoidance strategy of the Amended Project. However, this retained area will be fenced within the Amended Development Footprint, consequently restricting fauna movement to primarily terrestrial species; highly mobile species such as birds and bats are unlikely to be restricted.

Table 2.1 Changes to impact area calculations

PCT/MNES	Referred Action Area (ha)	Amended Project Area (ha)
White Box – Yellow Box – Blakely's Red Gum Grassy Woodland and derived native grassland CEEC	25.6	3.58
Grey Box (Eucalyptus microcarpa) Grassy Woodlands EEC	0.38	1.95
Koala	56.3	17.79
Regent Honeyeater	9.7	6.46
Spotted-tailed Quoll	1206.2	1,042.30
Large-eared Pied Bat	9.7	6.46
Corben's Long-eared Bat	9.7	6.46

2.2 Biodiversity Surveys for Listed Threatened Species and Communities

Biodiversity related MNES that may occur in the Subject Land were initially identified through a desktop review of available literature and databases. This includes:

- Commonwealth DCCEEW Protected Matters Search Tool (PMST) Database (2024) within a 10-km radius of the Subject Land to identify threatened species, endangered populations and threatened ecological communities (TECs) previously recorded within the locality.

- A search of the NSW Department of Climate Change, Energy, the Environment and Water (NSW DCCEEW) BioNet Atlas of NSW Wildlife (2024).

The results of the desktop assessments informed the survey design and timing for the ecological studies completed across the Subject Land described below.

Field surveys, performed in accordance with BAM 2020, are considered adequate to have identified the extent of MNES species or habitat occurring in the Subject Land and were conducted in accordance or with consideration of the following survey guidelines, policy statements or recovery plans:

- Threatened Biodiversity Survey and Assessment: Guidelines for Developments and Activities – Working Draft (DEC 2004)
- Surveying Threatened Plants and their Habitats (DPIE 2020b)
- Draft Survey Guidelines for Australia's Threatened Orchids (DoEE 2013)
- Species Credit Threatened Bats and their Habitats – NSW survey guide for the BAM (OEH 2018)
- Survey Guidelines for Australia's Threatened Bats (DEWHA 2010a)
- Survey Guidelines for Australia's Threatened Birds (DEWHA 2010b)
- Survey Guidelines for Australia's Threatened Mammals (DSEWPC 2011)
- Threatened Biodiversity Survey and Assessment: Guidelines for Developments and Activities –Working Draft (DEC 2004).

2.3 MNES Species Assessment Approach

The report produced by the PMST is provided in **Appendix A** and a summary of the results is provided in **Table 2.2** below.

Table 2.2 Summary of EPBC Threatened Entities Identified from the Desktop Review

Group	Number of Threatened and/or Migratory Entities in Locality listed under:	
	EPBC Act threatened	EPBC Act migratory
Ecological communities	2	0
Plants	10	0
Frogs	1	0
Fish	2	0
Reptiles	2	0
Birds	20	10
Mammals	5	0

Of the species identified in the PMST, the Commonwealth DCCEEW considered that the Project as presented in the EIS is likely to have a significant impact on the following biodiversity MNES:

- White Box – Yellow Box – Blakely's Red Gum Grassy Woodland and derived native grassland (box gum woodland DNG) – CEEC
- Koala (combined populations of QLD, NSW and the ACT) (*Phascolarctos cinereus*) – Endangered
- Spotted-tailed Quoll (south-east mainland population) (*Dasyurus maculatus maculatus*) – Endangered.

Further, DAWE identified that there may be a significant impact on the following threatened entities:

- Regent Honeyeater (*Anthochaera phrygia*) – Critically Endangered
- Large-eared Pied Bat (*Chalinolobus dwyeri*) – Vulnerable
- Corben's Long-eared Bat (*Nyctophilus corbeni*) – Vulnerable
- Grey Box Grassy Woodland and Derived Native Grassland of south-east Australia – Endangered Ecological Community (EEC).

All other MNES identified by the PMST were considered in the EPBC Act referral application (February 2022) and, considering there has been minimal changes to the Project since that time, no further assessment of the remaining MNES is included in this document.

2.3.1 White Box – Yellow Box – Blakely's Red Gum Grassy Woodland and derived native grassland CEEC

A total of 3.58 hectares (ha) of White Box – Yellow Box – Blakely's Red Gum Grassy Woodland and derived native grassland (box gum woodland) will be cleared as part of the Amended Project. Surveys performed to identify and map this community were performed in accordance with BAM 2020 and the Commonwealth Threatened Species Scientific Committee Listing and Conservation Advice (Tozer 2019).

A total of 36 floristic plots and 41 rapid vegetation assessments were conducted across and in the vicinity of the Subject Land as part of the biodiversity survey with the survey effort shown on Figure 2.1 of the BDAR.

Vegetation communities identified in the Subject Land were compared to TECs listed under the Commonwealth EPBC Act and an assessment of similarity with the Commonwealth Threatened Species Scientific Committee Listing and Conservation Advice. The following approach was used:

- full-floristic quadrat assessment, rapid assessments and meandering survey to determine floristic composition and structure of each ecological community (including specific 20 x 50m plot sampling for box gum woodland CEEC)
- comparison with published species lists
- comparison with habitat descriptions and distributions for listed TECs
- assessment using guidelines and recovery plans published by DAWE
- assessment against diagnostic and condition criteria, where relevant, and
- comparison with other assessments of TECs in the region.

Detailed assessment of the vegetation communities described and mapped within the Subject Land was undertaken to determine whether the vegetation present met the condition class thresholds identified in Commonwealth Conservation and/or Listing Advice for box gum woodland CEEC (Tozer 2019).

PCT 281 in the Subject Land was identified as conforming to the box gum woodland CEEC. This PCT consists of 3.58 ha within the Subject Land this allocation was due condition class requirements based on patch size, proportion of native canopy cover and groundcover species richness (TSSC 2020a) for mapping as consistent with the CEEC.

The plot / transect surveys undertaken as part of the Amended Project are considered to be consistent with the relevant published survey guidelines and policy statements.

2.3.2 Koala

A total of 17.79 ha of foraging woodland will be cleared as part of the Amended Project. Surveys performed to identify and map koala habitat were performed in accordance with BAM 2020 and the Commonwealth Threatened Species Scientific Committee Listing and Conservation Advice (DAWE 2022).

Nocturnal spotlighting searches and call playback were undertaken in February 2021, August 2021 and September 2023 over nine nights in suitable habitat areas between sunset and midnight using 30-watt head torches. Call playback involved playing the call of the species for five minutes, followed by a listening period of five minutes. Opportunistic observations were completed throughout all Umwelt survey periods and seven Koala Spot Assessment Technique surveys were undertaken in February and June 2021. A total of nine remote cameras were deployed for 15 days in August 2021 and four remote cameras were deployed for 14 days during September and October 2023 (refer to Figure 2.1 of the Amended BDAR for survey locations).

2.3.3 Spotted-tailed Quoll

A total of 1,042.30 ha of low quality dispersal and foraging habitat will be cleared as part of the Amended Project. Surveys performed to identify and map spotted-tailed quoll habitat were performed in accordance with BAM 2020 and the Commonwealth Threatened Species Scientific Committee Listing and Conservation Advice (TSSC 2020b).

The following surveys were conducted across the Subject Land that may have detected the species if it occurred within the Subject Land. Nocturnal spotlighting searches were undertaken in February 2021, August 2021 and September 2023 over nine nights in suitable habitat areas between sunset and midnight using 30-watt head torches. Opportunistic observations were completed throughout all Umwelt survey periods. No den habitat was observed within the Subject Land.

2.3.4 Regent Honeyeater

A total of 6.46 ha of foraging habitat will be cleared as part of the Amended Project. The Subject Land, along with the entire Project Area, does not contain any Important Area Mapping for the regent honeyeater (DPIE 2024). Surveys performed to identify and map potential regent honeyeater habitat were performed in accordance with BAM 2020 and the Commonwealth Threatened Species Scientific Committee Listing and Conservation Advice (TSSC 2020b).

The following surveys were conducted across the Subject Land that may have detected the species if it occurred within the Subject Land. Meanders through woodland areas during October 2020, January 2021, June 2021, August 2021, January 2022 and September 2023. Opportunistic observations were completed throughout all Umwelt survey periods. Potential foraging habitat was observed within the Subject Land.

2.3.5 Large-eared Pied Bat

Surveys performed to identify and map potential large-eared pied bat roosting and foraging habitat were performed in accordance with BAM 2020 and the Commonwealth Threatened Species Scientific Committee Listing and Conservation Advice (TSSC 2020b).

The species is known to foraging only within several kilometres of rocky habitat containing caves, crevices, disused fairy martin nests, etc. The Project Area was surveyed for this habitat. The Subject Land, along with the entire Project Area, does not contain any potential roosting habitat (including maternity roost habitat) for the large-eared pied bat. 6.46 ha of potential foraging habitat occurs on site however without any known roosting habitat in the immediate area it is unlikely that these woodland areas are utilised by the species. Additionally, a radius of 2 km around the site, examined through API where possible, shows no suitable rocky areas, and no known old mines or tunnels of particular importance are known to be present.

2.3.6 Corben's Long-eared Bat

A total of 6.46 ha of potential foraging habitat will be cleared as part of the Amended Project. The Subject Land contains potential roosting and foraging habitat for Corben's long-eared bat. Surveys performed to identify and map potential Corben's long-eared bat roosting and foraging habitat were performed in accordance with BAM 2020 and the Commonwealth Threatened Species Scientific Committee Listing and Conservation Advice (DoE 2013).

6.46 ha of foraging and roosting habitat will be removed within the Subject Land. The habitat that will be removed is already highly fragmented in nature due to the current and historic agricultural use of the land. In addition to this, the species is known to use most roost sites just for a single night such that large distances are travelled at night with consecutive roost sites generally within 4 km (DoE 2013). Goulburn River National Park, Cope State Forest and other reserves are located within 20 km of the Subject Land and support abundant foraging and breeding habitat.

2.3.7 Grey Box Grassy Woodland and Derived Native Grassland of south-east Australia EEC

A total of 1.95 ha of Grey Box Grassy Woodland and Derived Native Grassland (grey box grassy woodland) will be cleared as part of the Amended Project. Surveys performed to identify and map this community were performed in accordance with BAM 2020 and the Commonwealth Threatened Species Scientific Committee Listing and Conservation Advice (Tozer, Simpson & NSW Threatened Species Scientific Committee 2020).

A total of 36 floristic plots and 41 rapid vegetation assessments were conducted across and in the vicinity of the Subject Land as part of the biodiversity survey with the survey effort shown on Figure 2.1 of the Amended BDAR.

Vegetation communities identified in the Subject Land were compared to TECs listed under the Commonwealth EPBC Act and an assessment of similarity with the Commonwealth Threatened Species Scientific Committee Listing and Conservation Advice. The following approach was used:

- full-floristic quadrat assessment, rapid assessments and meandering survey to determine floristic composition and structure of each ecological community
- comparison with published species lists
- comparison with habitat descriptions and distributions for listed TECs
- assessment using guidelines and recovery plans published by DAWE
- assessment against diagnostic and condition criteria, where relevant, and
- comparison with other assessments of TECs in the region.

Detailed assessment of the vegetation communities described and mapped within the Subject Land was undertaken to determine whether the vegetation present met the condition class thresholds identified in Commonwealth Conservation and/or Listing Advice for grey box grassy woodland EEC (NSW Scientific Committee 2011).

PCT 81 in the Subject Land was identified as conforming to the box grassy woodland EEC. This PCT consists 1.95 ha within the Subject Land this allocation was due condition class requirements based on patch size, proportion of native canopy cover and groundcover species richness (NSW Scientific Committee 2011) for mapping as consistent with the EEC.

The plot/transect surveys undertaken are considered to be consistent with the relevant published survey guidelines such as the NSW Biodiversity Assessment Method (DPE 2020).

2.4 Description and Quantification of Habitat for Impacted MNES

Table 2.3 below provides a summary of the extent of direct impact for each potentially impacted MNES in the Commonwealth DCCEEW controlled action decision. It should be noted that the area of impact for the koala and spotted-tailed quoll is greater than the total area of direct impacts. This is because the construction of a security fence that does not involve direct clearing of vegetation, but exclusion of the species to the enclosed vegetation and potential habitat. This has been identified as an indirect impact in Section 5.0 of the Amended BDAR. Further detail and description of the impacted habitat is provided in the sections below. For the full assessment of all MNES that have the potential to occur in the locality of the Subject Land refer to **Appendix B**.

Table 2.3 Summary of Impact Areas for MNES

MNES	Habitat Type	PCTs / vegetation zones	Impacted area (ha)
Known Habitat (MNES recorded on site)			
Box gum woodland CEEC	Woodland	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 *Moderate Condition*	3.58
Grey Box Grassy Woodland CEEC	Woodland	81 Western Grey Box – cypress pine shrub grass shrub tall woodland in the Brigalow Belt South Bioregion *Moderate Condition*	1.95
Potential Habitat (MNES not recorded on site)			
Koala (*Phascolarctos cinereus*)	Foraging	81 Western Grey Box – cypress pine shrub grass shrub tall woodland in the Brigalow Belt South Bioregion *Moderate Condition*	1.95
		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 *Moderate Condition*	3.58
		318 Mugga Ironbark -Tumbledown Red Gum – Red Box – Black Cypress Pine open forest on shallow stony soils on hills in the NSW South Western Slopes Bioregion *Moderate Condition*	0.93
		Additional retained vegetation excluded due to security fence (indirect impact)	11.33
		Total	**17.79**
Spotted-tailed quoll (*Dasyurus maculatus maculatus*)	Foraging	81 Western Grey Box – cypress pine shrub grass shrub tall woodland in the Brigalow Belt South Bioregion *Moderate Condition*	1.95
		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 *Moderate Condition*	3.58
		318 Mugga Ironbark -Tumbledown Red Gum – Red Box – Black Cypress Pine open forest on shallow stony soils on hills in the NSW South Western Slopes Bioregion *DNG*	0.93
		81 Western Grey Box – cypress pine shrub grass shrub tall woodland in the Brigalow Belt South Bioregion *Moderate Condition*	1.04

MNES	Habitat Type	PCTs / vegetation zones	Impacted area (ha)
		Category 1 – exempt land	1,002.11
		Additional retained habitat excluded due to security fence (indirect impact)	32.69
		Total	**1,042.3**
Regent honeyeater (*Anthochaera 13hrygia*)	Foraging	81 Western Grey Box – cypress pine shrub grass shrub tall woodland in the Brigalow Belt South Bioregion *Moderate Condition*	1.95
		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 *Moderate Condition*	3.58
		318 Mugga Ironbark -Tumbledown Red Gum – Red Box – Black Cypress Pine open forest on shallow stony soils on hills in the NSW South Western Slopes Bioregion *Moderate Condition*	0.93
		Total	**6.46**
Large-eared Pied Bat (*Chalinolobus dwyeri*)	Foraging	81 Western Grey Box – cypress pine shrub grass shrub tall woodland in the Brigalow Belt South Bioregion *Moderate Condition*	1.95
		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 *Moderate Condition*	3.58
		318 Mugga Ironbark -Tumbledown Red Gum – Red Box – Black Cypress Pine open forest on shallow stony soils on hills in the NSW South Western Slopes Bioregion *Moderate Condition*	0.93
		Total	**6.46**
Corbens Long-eared Bat (*Nyctophilus corbeni*)	Foraging and Breeding	81 Western Grey Box – cypress pine shrub grass shrub tall woodland in the Brigalow Belt South Bioregion *Moderate Condition*	1.95
		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 *Moderate Condition*	3.58
		318 Mugga Ironbark -Tumbledown Red Gum – Red Box – Black Cypress Pine open forest on shallow stony soils on hills in the NSW South Western Slopes Bioregion *Moderate Condition*	0.93
		Total	**6.46**

2.4.1 Box Gum Woodland CEEC

Box gum woodland is listed as a Critically Endangered Ecological Community (CEEC) under the EPBC Act. This community occurs in and along the western slopes and tablelands of the Great Dividing Range from Southern Queensland (QLD) through New South Wales (NSW) to central Victoria (VIC). It is characterised by a species-rich understorey of native tussock grasses, herbs and scattered shrubs, and the dominance, or prior dominance, of white box (*Eucalyptus albens*), yellow box (*Eucalyptus melliodora*) or Blakely's red gum (*Eucalyptus blakelyi*) trees.

Approximately 3.58 ha of woodland that conforms to the box gum woodland CEEC was identified within the Subject Land and will be directly impacted as a result of the Amended Project. This area consists entirely 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.

Detailed assessment of the vegetation community described and mapped within the Subject Land (refer to Figure 3.2 of Amended BDAR) was undertaken to determine whether the vegetation present met the identification thresholds stated in the Commonwealth Listing Advice (TSSC 2020a).

The national recovery plan (DECCW 2010) promotes the recovery and prevention of CEEC extinction. It identifies five key objectives:

1. Achieving no net loss in extent and condition of the ecological community throughout its geographic distribution
2. Increasing protection of sites with high recovery potential
3. Increasing landscape functionality of the ecological community through management and restoration of degraded sites
4. Increasing transitional areas around remnants and linkages between remnants, and
5. Bringing about enduring changes in participating land manager attitudes and behaviours towards environmental protection and sustainable land management practices to increase extent, integrity and function of Box gum Grassy Woodland.

Design refinements from the original Project have reduced the area of impact to this TEC from 28.06 ha to 3.58 ha. Despite this reduction, the Amended Project will interfere with the recovery of this community through clearing of up to 3.58 ha, particularly through the loss in extent and condition in relation to Objective 1. The removal of 3.58 ha that conforms to the box gum woodland CEEC within the Subject Land would not be critical to the survival of the CEEC, however it does represent removal of CEEC vegetation. These impacts are direct impacts associated with habitat clearing, the impacts are not unknown, unpredictable, or irreversible.

It is estimated that less than 5% of this CEEC throughout its known range remains in good condition with most of this remaining in small, isolated patches (TSSC 2020a). Thiele and Prober (2000) estimated that less than 0.1% of this community remains in a near-intact condition. The NSW Threatened Species Scientific Committee (TSSC 2020a) states that the box gum woodland continues to be degraded at both the patch and landscape scale. This ongoing modification, while not necessarily leading to the total destruction of all elements, threatens it with extinction. The reduction in the integrity across most of its range has been very severe and is unlikely to be re-established. There is circumstantial evidence which suggests that clearing of this CEEC is ongoing and has increased in recent years, particularly in NSW which accounts for three quarters of the distribution of this community. Clearing is likely to continue at least in the short term in NSW under the current regulatory framework (TSSC 2020a).

Design refinements from the original Project have reduced the area of impact to this TEC from 28.06 ha to 3.58 ha. Notwithstanding, without consideration of mitigation or the potential gain through biodiversity offsetting in accordance with the BAM, the Amended Project could have a significant impact on the CEEC. Refer to Sections 6 and 7 of the Amended BDAR for the information surrounding the proposed biodiversity offset plan.

2.4.2 Koala

The species is known to occur in eucalypt woodlands and forests from the north-eastern Queensland, along the eastern coast of NSW, to the south-east corner of South Australia. The species has a fragmented distribution throughout eastern Australia from north-east Queensland to the Eyre Peninsula in South Australia. In NSW it mainly occurs on the central and north coasts with some populations in the west of the Great Dividing Range (DAWE 2022).

The Koala SEPP defines core koala habitat as an area of highly suitable koala habitat where koalas are recorded as being present at the time or in the previous 18 years. Highly suitable koala habitat includes recognised koala feed trees at a density of 15% or more of the canopy. Koala feed trees are identified for regions in NSW in the Koala SEPP and the Koala Habitat Information Base Technical Guide (DPIE 2019). The Subject Land occurs within the Northwest Slopes Koala Management Area where 39 regionally relevant koala feed tree species have been identified. These trees have been ranked in preference of use in the Koala Habitat Information Base (DPIE 2019). Ten of these tree species listed have been recorded within the Subject Land. Identification of whether the PCTs identified in the Subject Land may provide habitat for the Koala has been based on the occurrence of 15% or more of the canopy being regionally significant feed trees (refer to **Table 2.4**).

Table 2.4 Potential koala habitat

Scientific Name	Common Name	Habitat Tree Ranking (DPIE 2019)	Koala Feed Trees Known from Subject Land		
			281	318	81
Angophora floribunda	Rough-barked Apple	Significant use	yes	-	yes
Callitris glaucophylla	White Cypress Pine	Significant use	yes	yes	yes
Eucalyptus albens[#]	White Box	High preferred use	yes	yes	-
Eucalyptus blakelyi	Blakely's Red Gum	High preferred use	yes	-	yes
Eucalyptus conica	Fuzzy Box	High preferred use			yes
Eucalyptus dealbata	Tumbledown Red Gum	High preferred use	-	yes	-
Eucalyptus macrorhyncha	Red Stringybark	Significant use	-	yes	-
Eucalyptus melliodora	Yellow Box	High preferred use	yes	-	-
Eucalyptus microcarpa	Western Grey Box	High preferred use	-	-	yes
Eucalyptus polyanthemos	Red Box	Irregular use	-	-	yes
Eucalyptus sideroxylon	Mugga Ironbark	Irregular use	-	yes	-
Potential koala habitat				Yes Yes	Yes

Schedule 2 feed trees species as listed in NSW State and Environmental Planning Policy (Koala Habitat Protection) 2020 applies to rural lands

The Assessment of Significance for the koala has been prepared with consideration of the *EPBC Act Referral Guidelines for the Vulnerable Koala* (DoE 2014). It is noted that this document is no longer current (as of February 2022) however the conservation advice (DAWE 2022) identifies this document to be used in the referral process, this report will continue to use these referral guidelines. The referral guidelines advise that the assessment of impacts on the koala is undertaken primarily through the assessment of habitat critical to the survival of the koala and actions that interfere substantially with the recovery of the koala. This approach aims to avoid and address habitat loss as well as promote a streamlined assessment and approval process, see **Table 2.5**.

Table 2.5 Koala Habitat Assessment Tool

Koala Habitat Assessment Tool (Table 3 from DoE 2014)			Study Area Assessment	
Attribute	**Score**	**Inland**	**Allocated Score**	**Score Justification**
Koala occurrence	+2 (high)	Evidence of one or more koalas within the last 5 years.	0	No koalas have been recorded in the Subject Land during surveys to date. A review of BioNet (2024) records identifies that there are no records of the koala within 5 km of the Subject Land in the last 10 years. Three records are within 20 km of the Subject Land. These records range from 2002 to 2017. The nearest area of regional koala significance are the Pilliga and Gunnedah.
	+1 (medium)	Evidence of one or more koalas within 2 km of the edge of the impact area within the last 10 years.		
	0 (low)	None of the above.		
Vegetation composition	+2 (high)	Has forest, woodland or shrubland with emerging trees with 2 or more known koala food tree species in the canopy. OR 1 food tree species that alone accounts for >50% of the vegetation in the relevant strata.	+2	As shown in **Table 2.4**, a number of known koala feed trees are known to be associated with the PCTs described in the Subject Land. All of the PCTs support regionally significant high preferred use feed trees. The preferred koala food tree species: *Angophora floribunda*, *Callitris glaucophylla*, *Eucalyptus blakelyi*, *Eucalyptus dealbata* are dominant eucalypt species within the Subject Land.
	+1 (medium)	Has forest, woodland or shrubland with emerging trees with only 1 species of known koala food tree present in the canopy.		
	0 (low)	None of the above.		
Habitat connectivity	+2 (high)	Area is part of a contiguous landscape ≥ 1000 ha.	+1	The Subject Land supports small, disjunct remnant vegetation that is surrounded by cleared grassland. More contiguous intact vegetation occurs approximately 5 km to the north of the Subject Land on Barneys Reef, which was not burnt in the 2019/2020 fires. Large tracts of vegetation extend from the north east tip of the Subject Land, to the east, south east. This includes habitat around Ulan Mine through to national park estate. Parts of Goulburn River National Park were burnt in recent 2019/2020 fires. Meads Creek West (14,128 ha burnt) in Goulburn River and Kerry Ridge fire (183.647 ha burnt) in Wollemi.
	+1 (medium)	Area is part of contiguous landscape < 1000 ha, but ≥ 500 ha.		
	0 (low)	None of the above.		

Koala Habitat Assessment Tool (Table 3 from DoE 2014)			Study Area Assessment	
Key existing threats	+2 (low)	Little or no evidence of koala mortality from vehicle strike or dog attack at present in areas that score 1 or 2 for koala occurrence.	+1	Score 0 for koala occurrence but likely to have some degree of threat from dogs or vehicles.
	+1 (medium)	Evidence of infrequent or irregular koala mortality from vehicle strike or dog attack at present in areas that score 1 or 2 for koala occurrence, OR areas which score 0 for koala occurrence are likely to have some degree of dog or vehicle threat present.		
	0 (high)	Evidence of frequent or regular koala mortality from vehicle strike or dog attack in the study area at present, OR areas which score 0 for koala occurrence and have a significant dog or vehicle threat present.		
Recovery value	+2 (high)	Habitat is likely to be important for achieving the interim recovery objectives for the relevant context, as outlined in Table 1.	+0	The Subject Land is unlikely to be important for achieving the interim recovery objectives due to the isolated nature of the Subject Land relative to other koala records.
	+1 (medium)	Uncertainty exists as to whether the habitat is important for achieving the interim recovery objectives for the relevant context, as outlined in Table 1.		
	0 (low)	Habitat is unlikely to be important for achieving the interim recovery objectives for the relevant context, as outlined in Table 1.		
		TOTAL SCORE	**4**	**≥ 5 indicates habitat critical for the survival of the koala.**

Following determination (from the Commonwealth DCCEEW) of the importance of the habitat for the koala in the Subject Land, an assessment was undertaken to determine the impacts which are likely to substantially interfere with the recovery of the koala. The Referral Guidelines (DoE 2014) identifies impacts likely to substantially interfere with the recovery of the koala.

The Amended Project may:

- result in an increase to vehicle movements, however this will be largely confined to the construction phase and will be negligible during the operational phase. It is considered unlikely to subject the koala to increased mortality levels.

The Amended Project is not expected to:

- introduce or increase dogs to the local area and therefore is unlikely to increase the threat of dog attacks to any local koala population
- result in the creation of substantial additional barriers to koala movement in the local area due to incorporation of fauna movement corridor in the project design
- facilitate the introduction or spread of pathogens as *Phytophthora cinnamomi* or *Chlamydia*
- result in hydrological changes to the surrounding environment such that the function and integrity of the existing habitat for the koala is jeopardised.

Based on the above, it is considered unlikely that the Amended Project will interfere with the recovery of the koala throughout its range in Qld, NSW and the ACT.

There are no records of the koala in the Subject Land or within five kilometres of the Subject Land in the last 10 years. The habitat assessment has identified that the Subject Land does not support habitat critical to the survival of the koala.

The original controlled action decision by the Commonwealth DCCEEW states that the Project is likely to have a significant impact on the koala as the action involves the clearing and exclusion of approximately 61.37 ha of vegetation that potentially provides foraging habitat for this species. It is acknowledged that, subsequent design changes since the original decision by the Commonwealth DCCEEW have now reduced the area of impact to potential koala habitat to 17.79 ha. Given this reduced area of impact in conjunction with the likelihood of occurrence (low), the condition of the habitat impacted (isolated, poor and related primarily to dispersal) and the importance of the habitat to the survival of the species (not critical to the survival) which is all documented in the significant impact assessment provided for the Referral variation and summarised above, the potential for a significant impact is reduced. Therefore, based on this information in the original impact assessment provided in the Referral (Umwelt 2022) and additional information provided above, it is considered that the Amended Project is unlikely to have a significant impact on a population of the koala.

2.4.3 Spotted-tailed quoll

The spotted-tailed quoll (*Dasyurus maculatus maculatus*) is a medium sized marsupial with red-brown fur and distinctive white spots over its back and tail. It is carnivorous and nocturnal, feeding on birds and small mammals. Habitat requirements include hollow logs, tree hollows, rocky outcrops or caves for den sites and an abundance of prey, and large areas of intact vegetation to forage through. Habitat for this species is highly varied, ranging from sclerophyll forest, woodlands, coastal heathlands and rainforests. Records exist from open country, grazing lands and rocky outcrops (SPRAT 2021). This species is listed as Endangered under the EPBC Act.

In NSW, the spotted-tailed quoll occurs on both sides of the Great Dividing Range, with highest densities occurring in the northeast of the state. It occurs from the coast to the snowline and inland to the Murray River (Edgar & Belcher 2008). Generally, in NSW, the species is confined to within 200 km of the coastline. For this reason, in conjunction with a lack of documented local records and the overall poor quality and fragmented nature of habitat within the Subject Land, the spotted-tailed quoll was not considered as a potential MNES at risk of significant impact and not assessed in the Referral variation.

The original controlled action decision by the Commonwealth DCCEEW determined that the spotted-tailed quoll is likely to be significantly impacted by the Project due to the removal of 1,213.07 ha of foraging habitat for the species. It is acknowledged that, subsequent design changes since the original decision by the Commonwealth DCCEEW have now reduced the area of impact to potential spotted-tailed quoll habitat to 1,042.3 ha. This includes the removal of 1,017.53 ha of degraded and previously cultivated or otherwise disturbed (grazed) grasslands that, at most, represent dispersal habitat. The agricultural nature of the area is not a recent change, with a prolonged history of agricultural activities in the area extending over decades or more. The fragmented nature of the forest and woodland vegetation within the Subject Land and the broader locality does not represent high quality habitat for this species which prefers larger tracts of vegetation and this species, albeit capable and known to move through and, at times, opportunistically forage in open areas, is unlikely to utilise such habitats in this degraded agricultural landscape on a regular basis.

Notwithstanding the above and with due consideration to the Referral Decision, an assessment of significance has been completed for this species and is provided in **Appendix B**. The results of the revised assessment have determined that the Amended Project is unlikely to result in a significant impact on the population of the spotted-tailed quoll.

2.4.4 Regent Honeyeater

The regent honeyeater is a critically endangered, partially nomadic species occurring in temperate woodlands and forests within a patchy distribution between central VIC and south-east QLD which has undergone a severe decline in recent decades (Garnett et al. 2011). The regent honeyeater's chief threat is loss of breeding and foraging habitat (DoE 2015).

The regent honeyeater is a rare visitor to the Mudgee/Gulgong region, with the most recent record 25 km from the Referral Area being recorded in 2012. In the last five years, the nearest record of the regent honeyeater was made in Munghorn Gap National Park, approximately 35 km south-east of the Referral Area. To date, it has not been recorded in the Referral Area during any ecological surveys and there are no contemporary or historic records within the Referral Area.

The original controlled action decision by the Commonwealth DCCEEW determined that the regent honeyeater has potential to be significantly impacted by the Project resulting in the removal of 13.82 ha foraging habitat of the species. It is acknowledged that, subsequent design changes since the original decision by the Commonwealth DCCEEW have now reduced the area of impact to potential regent honeyeater habitat to 6.46 ha. An assessment of significance has been completed for this species and is provided in **Appendix B**. The results of the revised assessment have determined that the Amended Project is unlikely to result in a significant impact on the regent honeyeater.

2.4.5 Large-eared Pied Bat

This species is listed under the EPBC Act as vulnerable to extinction. Known records indicate this species predominately occurs east of the Referral Area, throughout the Sydney Basin IBRA region, with some records north of the Referral Area in the Northern Tablelands. This species is highly dependent on the presence of roosting habitat, which includes disused mine shafts, caves, overhangs and disused fairy martin nests (DERM 2011). The species forages within several kilometres of roosting habitat in eucalypt woodland and gullies (DERM 2011).

Potential roost habitat has not been identified within the Project Area or in the surrounds. No maternity roosts have been recorded on or within 100 m of the Subject Land, which is consistent with the NSW Species Credit Threatened Bats and their Habitat Guidelines (DPIE 2021).

2.4.6 Corben's Long-eared Bat

This species is listed under the EPBC Act as vulnerable. The species is known to occur from central southern Queensland, central western NSW, through to north west Victoria. The species utilises a range of habitats including box, ironbark, and cypress pine woodlands, bull oak woodland, Brigalow woodland, and black box woodland. Corben's long-eared bat is known to utilise stag trees and dead limbs of living trees as roost sites. Up to 6.46 ha of potential roost and foraging habitat is present in the Subject Land. The habitat that will be removed is already highly fragmented and disturbed in nature due to the current and historic agricultural use of the land. This will cause minor loss, fragmentation, and reduction in quality of potential habitats at a local scale and is not expected to modify habitat for the species to the point where it will be at risk of further decline.

2.4.7 Grey Box Grassy Woodland and Derived Native Grassland of south-east Australia EEC

A total of 1.95ha of grey box grassy woodland and derived native grassland will be cleared as part of the Amended Project. This is a slight increase in area compared to the original Project, which was impacting 1.39 ha of this TEC. Surveys performed to identify and map this community were performed in accordance with BAM 2020 and the Commonwealth Threatened Species Scientific Committee Listing and Conservation Advice (Tozer, Simpson & NSW Threatened Species Scientific Committee 2020).

This community occurs in and along the lower slopes and plains of mainland eastern Australia, inland of the Great Dividing Range from southern Queensland through New South Wales to eastern South Australia. This community predominantly associated with the drier edge of the temperate grassy eucalypt woodland belt and ranges. It is characterised by canopy dominated by grey box (*Eucalyptus microcarpa*) and an understorey with a moderately dense to sparse shrub layer and a ground layer of perennial and annual native forbs and grasses. The grey box grassy woodlands includes patches of derived grassland, where the tree canopy and mid layer has been removed to less than 10% crown cover but the native ground layer remains largely intact.

The Subject Land supports 2.99 hectares of grey box grassy woodland and derived native grassland. There are large areas of grassland surrounding the patches of remnant Grey Box Grassy Woodland EEC and these grassland areas were assessed through rapid assessment and floristic plots. It was determined that the grassland areas of the Subject Land do not meet the criteria for Grey Box Grassy Woodland DNG EEC. Therefore, the Amended Project will remove up to 1.95 hectares of Grey Box Grassy Woodland EEC.

2.5 Assessment of Impacts to Listed Threatened Species and Communities

The Amended Project will result in direct and indirect impacts on biodiversity values. Direct impacts include the loss of native vegetation and fauna habitats as a result of clearance works and, in some instances, the long term exclusion of species from retained habitat within the Subject Land. The Amended Project is not expected to result in any substantial indirect impacts on the biodiversity values of surrounding lands. However, some minor indirect impacts associated with habitat connectivity, dust, noise, weeds, feral animals, and construction of a security fence may occur during the Amended Project. These impacts are summarised in **Table 2.6.**

The relevant impacts of the Amended Project are considered to be well known and predictable based on the extensive knowledge of the ecological values of the Subject Land and a sound understanding of the impacts of the Amended Project (e.g. clearing of vegetation, earthworks and water management). The direct impacts of the Amended Project, as they relate to the clearing of EPBC Act-listed CEEC and threatened species habitat is predicted to long-term or permanent; however, further avoidance and minimisation measures are proposed and a detailed biodiversity offset program will be prepared as part of the Amended Project in order to compensate for the residual impacts of habitat loss that cannot be adequately avoided or minimised.

Table 2.6 Predicted Impacts from the Amended Project on EPBC Act listed threatened species and communities

Impact Type	MNES	Description	Nature of Impact	Consequence of Impact	Area (ha)	Offsetting Required?
Direct	Box Gum Woodland	Loss of 3.58 ha of woodland through clearing.	Permanent	State	3.58	Yes, see **Section 4.0**
Direct	Koala	Removal of potential foraging habitat containing key feed trees. Including removal of access to foraging habitat that will be contained within a security fence.	Permanent	Local	17.79	Yes, see **Section 4.0**
Direct	Spotted-tailed quoll	Removal of potential foraging habitat. Including removal of access to foraging habitat that will be contained within a security fence.	Permanent/Long Term	Local	1,042.30	Yes, see **Section 4.0**
Direct	Regent Honeyeater	Removal of potential foraging habitat. No removal of Important Areas Mapping.	Permanent	Local	6.46	Yes, see **Section 4.0**
Direct	Large-eared Pied Bat	Removal of potential foraging habitat.	Permanent	Local	6.46	Yes, see Section 4.0
Direct	Corben's Long-eared Bat	Removal of potential foraging habitat.	Permanent	Local	6.46	Yes, see **Section 4.0**
Direct	Grey Box Grassy Woodland	Loss of 1.95 ha of woodland through clearing.	Permanent	State	1.95	Yes, see **Section 4.0**
Indirect	**Water** - Non-specific Biodiversity related MNES	Changes to hydrology are considered unlikely and the project design will include inherent measures that maintain pre-development flows from the Subject Land (quantity and quality) into the ephemeral drainage systems in the Subject Land, which are being avoided. It is therefore not expected to be of any level of significance in relation to any locally occurring threatened species, populations or communities.	Medium term	Local	-	No

Impact Type	MNES	Description	Nature of Impact	Consequence of Impact	Area (ha)	Offsetting Required?
Indirect	**Noise** - Non-specific Biodiversity related MNES	Construction noise may disrupt the roosting and foraging behaviour of fauna species and reduce the occupancy of areas of suitable habitat within the Subject Land. Regarding potential impacts on biodiversity, there will be no substantial change to noise impacts given that the solar farm, when operational, will not generate additional noise beyond noise generally present in a rural environment Any additional impacts resulting from noise emissions are not expected to be of any level of significance in relation to threatened species, populations and communities.	Medium term	Local	-	No
Indirect	**Air Quality** - Non-specific Biodiversity related MNES	Air quality impacts have the potential to adversely impact native species during ground disturbance works. Potential impacts include dust covering vegetation thereby potentially reducing vegetation health and growth. The design of the proposal will include inherent measures to minimise the potential for adverse dust impacts.	Medium term	Local	-	No

Impact Type	MNES	Description	Nature of Impact	Consequence of Impact	Area (ha)	Offsetting Required?
Indirect	**Light** - Non-specific Biodiversity related MNES	Light emissions resulting from security lighting at the solar farm may result in adverse impacts on adjacent habitats and, particularly nocturnal birds and bats. Behavioural changes in animals can occur in response to the physical presence of a development and include changes in foraging locations and mating behaviour (Gleeson and Gleeson 2012). Research into the impacts of altered lighting indicates that it can trigger behavioural and physiological responses including changes in foraging behaviour, disruptions of seasonal day length trigger cues for critical behaviour, disorientation and temporary blindness and interference with predator prey relationships (OEH 2016b). Appropriate lighting controls to minimise impacts will be implemented as part of the operation of the solar farm including minimisation of lighting emissions following Australian Standards. All lighting will be shrouded and aimed towards the ground. The proposed impact from lighting is unlikely to have a significant impact to threatened species or populations across the broader landscape.	Medium term	Local	-	No
Indirect	**Feral Animal Species** - Non-specific Biodiversity related MNES	Populations of feral fauna species such as foxes, rabbits and cats can increase and quickly populate new areas as a result of disturbance. Clearing, thinning of vegetation and the creation of tracks have the ability to assist the establishment and spread of feral fauna species. Given the already degraded nature of the Subject Land, it is unlikely that pest fauna species populations would increase significantly due to the Project. However, the security fence may increase feral predator access the adjoining remnant vegetation (Harris I.M., Mills H.R. and Bencini R. 2010). Mitigation measures outlined in Section 4.2 of the Amended BDAR will minimise the potential for feral animal spread and impacts into surrounding areas around the Subject Land.	Medium term	Local	-	No

Impact Type	MNES	Description	Nature of Impact	Consequence of Impact	Area (ha)	Offsetting Required?
Indirect	**Weed Species** - Non-specific Biodiversity related MNES	Weed species could be inadvertently brought into the Subject Land with imported materials, on vehicles or mobile plant, or could invade naturally through removal of native vegetation. The presence of weed species within the Subject Land have the potential to decrease the value of proximate extant vegetation. Mitigation measures outlined in Section 4.2 of the Amended BDAR will be implemented to minimise the potential for weed encroachment into areas surrounding the Subject Land.	Medium term	Local	-	No
Indirect	**Security Fence** - Non-specific Biodiversity related MNES	The construction of the security fence has the potential to cause indirect impact to biodiversity. The following indirect impacts have been identified and discussed: **Connectivity** The Amended Project is not directly impacting the large remnant areas present in the Amended Project Area. These areas have been avoided and will continue to contribute to the habitat values in the landscape primarily for highly mobile avifauna species. The fence location has been designed to follow the Subject Land boundary to minimise impacts to connectivity across the wider Amended Project Area. The fence location will result in the Solar Farm being divided into three separate areas that will facilitate movement from east to west through the degraded remnant drainage line. The fence design will also allow for access to vegetation and water bodies in the south eastern drainage line. The remaining changes to connectivity may have a negligible impact on fauna movement across the landscape as all other retained vegetation that will be enclosed within the Solar Farm will still be accessible for highly mobile species. The fence may also have a negligible impact on fragmentation of remnant areas. Large remnants occur on either side of the solar farm/ BESS, surrounded by degraded grasslands. They	Long term – Life of the solar farm	Local	Koala – 11.33 ha Spotted-tailed quoll – 32.69 ha	

Impact Type	MNES	Description	Nature of Impact	Consequence of Impact	Area (ha)	Offsetting Required?
		are connected through remnant vegetation along Tallawang Creek and the small remnant patches within the solar farm/BESS, While the majority of native fauna species would prefer to use woodland to navigate through their landscape, some species are able to use a matrix of vegetation types to disperse. Species that rely on a corridor of woody vegetation to traverse their landscape may become species sensitive to changes in genetic assemblage (Gascon *et al* 1999; Giubbina *et al* 2016). These woodland reliant species may experience changes to connectivity. **Changes in fauna movements** The security fence is likely to act as a barrier to movement which will change the way fauna species move through the landscape in this area. The security fence is planned to be placed around the solar farm/ BESS and will be placed 500m east of the Castlereagh Highway and 60 m to the railway line. As such, it may direct more fauna to the highway or railway line. to limit these impacts the re-designed fences is to follow the Subject Land boundary to minimise impacts to movement across the wider Amended Project Area. The fence location will result in the Solar Farm being divided into three separate areas that will facilitate movement from east to west through the degraded remnant drainage line which at is narrowest is 150m. The fence design will also allow for access to vegetation and water bodies in the south eastern drainage line It is hard to quantify the potential impacts in relation to changes in fauna movement patterns however there is the potential that the establishment of the fence could increase the occurrence of road/rail kill. **Entrapment** As discussed in Section 4.2 of the Amended BDAR the security fence has the potential to entrap fauna within the areas of				

Impact Type	MNES	Description	Nature of Impact	Consequence of Impact	Area (ha)	Offsetting Required?
		the solar farm where the risk is not appropriately managed during construction or during maintenance activities. Mitigation measures outlined in Section 4.2 of the Amended BDAR will minimise the potential for native fauna to become trapped inside the security fence. **Increased feral predator predation** As discussed above, this project has the potential to increase feral predator abundance. As established in the literature (Harris I.M., Mills H.R. and Bencini R. 2010) structures in the landscape, that can influence how native fauna transverse the landscape, can lead to increased predation by feral predators on native fauna, the security fence may act as a structure to 'funnel' native fauna to areas where they are easily predated by feral fauna. Alternatively feral predators, such as the cat (*Felis catus*) and fox (*Vulpes vulpes*), may use the fence as a tool to predate on native fauna more successfully.				

3.0 Avoidance and Mitigation of Impacts

3.1.1 Avoidance Strategies

Throughout the site selection and design process, RES has considered alternative site locations based on proximity to the NSW electricity grid (existing and proposed) and the solar generation potential of the region. This included a broad site exploration activity across the region as well as investigation of alternative site locations within the local area. Managing environmental constraints and social aspects, improving infrastructure efficiency and matching localised energy demands were the major considerations in the evaluation of alternatives. The proposed Project Area was shown to be more suitable than alternatives considered as it provides the optimal combination of:

- Availability of land of a suitable scale for a viable commercial-scale solar farm project.
- Being located wholly within the CWO-REZ.
- Proximity to high voltage transmission network.
- High quality solar irradiance and ideal climatic conditions for a commercial-scale solar farm.
- Compatible land use zoning both on the Project Area and adjacent land holdings.
- Reduced environmental constraints linking to historic widespread clearing within the Project Area and ongoing use for agriculture, with potential environmental impacts that can be managed with appropriate mitigation and management.
- Relatively flat landscape reducing the risk of soil disturbance during earthworks.
- Access to the major transport network namely the Castlereagh Highway and the Golden Highway.
- Agreements with host landholders.
- farmland with a land use history of heavy grazing and cropping activities.

Furthermore, RES went through an iterative design process to refine the development footprint to avoid as much remnant vegetation as practicable. This has resulted in remnant vegetation on the western boundary being retained by the Proponent, which provides connectivity with a much larger area of remnant vegetation off site. Similarly, creeks and major drainage lines on the Project Area are avoided with a setback buffer of between 20 m to 40 m as part of the design. While these waterways and drainage lines may be in a degraded condition, RES's design recognised that they may continue to provide some form of habitat corridor.

The biodiversity assessment commenced early in the design process which has allowed the Proponent to utilise ecological survey works to inform the progression of the conceptual layout of the Amended Project. To avoid impacts on native vegetation the current design has focused on locating as much of the solar farm infrastructure and temporary construction areas within exotic and/or previously cleared grassland areas (some of which is derived native grassland) with low biodiversity value. This method has resulted in the majority of the associated impacts being within these lower value areas.

Since the initial BDAR submission, the Project Area has changed with the removal of the transmission line to the north and the introduction of the TWA facility, intersection upgrade on the Castlereagh Highway and an increase in the Development Footprint for the Solar Farm and BESS. Where possible the original avoidance strategy has been retained by minimising impacts to degraded drainages lines. The buffer from some of the drainage lines have been reduced to 20 m from the edge of the canopy in these areas to provide flexibility for detailed design of the project post approval.

The TWA facility and TWA access road will see an increase in removal of primarily Category 1 -exempt lands. During the design process, significant refinement of the access road has occurred to ensure any impacts to native vegetation from the TWA facility and access road are minimised. The original design considered the formalisation of the road reserve to the south of the Amended Project Area by constructing a paved road to service the TWA facility. The extensive works required in this area to formalise the road would have resulted in the removal of up to 5.5 ha of the State and Commonwealth listed EEC Inland Grey Box Woodland, and 0.5 ha of State and Commonwealth Listed CEEC White Box – Yellow Box – Blakely's Red Gum Grassy Woodland and Derived Native Grassland. To minimise these impacts, the road was shifted to within the Subject Land into areas nominated as Category 1 – exempt land adjacent to the road reserve and located at least 5m from the canopy drip line to further minimise any indirect impacts to this vegetation.

In its entirety, the Subject Land is extremely degraded and consists largely of cultivated or otherwise disturbed grasslands, and areas of derived native grassland. The solar arrays, BESS, substation and associated infrastructure has been placed predominately in disturbed or other degraded areas, with only marginal stands of isolated remnant vegetation to be cleared. As previously mentioned, the only vegetation which is connected to intact remnant vegetation off site, is to be retained.

In terms of the loss of habitat, the grassland areas where the solar array and BESS development will be, typically only provide foraging habitat for more mobile threatened species of bird and bat. This aerial foraging habitat will still be present upon installation of the solar farm, and therefore, the general removal of threatened species habitat is also being minimised, due to the nature of the Amended Project.

Two NSW listed threatened forb species were detected during threatened species surveys. One individual of *Diuris tricolor* was detected in the southern remnant of the Amended Project Area and two individual *Swainsona sericea* were detected adjacent to the creek line in the south west of the Amended Project Area. All threatened species locations have been avoided in the final infrastructure layout as part of the Amended Project.

Overall, the Amended Project placement and design has resulted in the avoidance of direct impacts on approximately 107 ha of remnant woodland and derived native grassland which equates to 93.44 % of remnant woodland and derived native grassland being retained within the Amended Project Area.

3.1.2 Mitigation Measures

RES has committed to the design and implementation of a comprehensive biodiversity mitigation strategy to minimise the unavoidable impacts of the Amended Project. A Construction Environmental Management Plan (CEMP) and Operational Environmental Management Plan (OEMP) will be prepared for the Amended Project. Both plans will describe the avoidance, mitigation and management measures that will be undertaken to manage potential environmental impacts of the Amended Project. These will be prepared to meet the specific requirements of the Amended Project to avoid and minimise impacts on biodiversity values, in accordance with best practice.

The following specific control measures are recommended for the mitigation of impacts on the biodiversity features of the Subject Land:

- Salvage of biodiversity features, including habitat resources (e.g., hollow logs, tree hollows, fallen timber and rocks/boulders).
- A pre-clearing procedure will be implemented to minimise the potential for impacts on native fauna species (focusing on threatened species) as a result of the clearing of hollow-bearing trees. The pre-clearing procedure is designed to minimise impacts to hollow-dependent and ground-dwelling fauna.
- Weed management.
- Fencing and access control.
- Bushfire management.
- Erosion and sedimentation control.
- Workforce education and training.

Each of these minimisation measures will be included in the CEMP and will contribute to the maintenance of habitat quality in proximity to the Subject Land outside proposed disturbance areas.

Table 3.1 provides an outline of the avoidance and minimisation measures to be implemented by RES for the impacts described above to those MNES that are predicted to be significantly impacted by the Amended Project.

Table 3.1 Avoidance and mitigation methods for residual impacts on EPBC listed threatened species and communities

EPBC Act listed species or community	Impact	Avoidance and mitigation measures
Box gum woodland CEEC **Grey Box Grassy Woodland EEC**	Direct impact – removal of vegetation	Project planning and design stage resulted in substantial avoidance of areas of woodland. An extensive mitigation and offsetting strategy is proposed including the provision of: • the delineation of clearance areas to avoid unnecessary impacts and clearance of surrounding vegetation • the implementation of a biodiversity offset strategy in accordance with the NSW Biodiversity Offset Scheme and the EPBC Act Environmental Offsets Policy.
	Air quality impacts; dust covering vegetation impacting health and growth	A dust control plan will be prepared and incorporated into the Amended Project CEMP. The design of the Amended Project will include inherent measures to minimise the potential for adverse air quality impacts. These include: • dust suppression during construction.
	Weed encroachment	Weed species could be inadvertently brought into the Subject Land or surrounding habitats with imported materials, on vehicles and mobile plant, or could invade naturally through removal of native vegetation and the creation of a suitable growth medium. The presence of weed species has the potential to decrease the value of vegetation for native species, particularly threatened species. Weed management controls will include: • The survey and treatment of invasive weed species prior to the disturbance of topsoil within the Subject Land to prevent exacerbation of the outbreak and / or the spread of the subject species to previously unaffected areas within the Subject Land • Ongoing environmental inspections and ad hoc (as required) treatment of outbreaks of invasive weed species within the Subject Land during the construction and operation of the Amended Project • All machinery and equipment will be cleaned thoroughly prior to entering the Subject Land. Cleaning must include the removal of all mud and plant matter (inside and out), followed by washing with high pressure water.

EPBC Act listed species or community	Impact	Avoidance and mitigation measures
	Erosion and sediment control	A Stormwater Management Plan including an Erosion Sediment Control Plan will be prepared to appropriately limit post development flows and manage downstream water quality as part of the site establishment and clearing works. Measures to be implemented include: • minimising the area of disturbance (as far as practicable) • diverting run-off water around disturbed areas • installation and ongoing maintenance of temporary erosion and sediment controls (e.g., sediment fencing) throughout the duration of the construction of the Project • design, implementation, and ongoing maintenance of permanent operational phase controls (e.g. catch drains) during the operational phase of the Project; and • stabilisation (i.e., landscaping and revegetation) of all disturbed areas not required for the operation of the Project, to reduce the potential for future erosion. The Erosion and Sediment Control Plan will be drafted with regard to the Managing Urban Stormwater: Soils and Construction (Volume 1) (aka the 'Blue Book') standard or to the standard of any equivalent replacement to this standard available at the commencement of construction.

Koala
Spotted-tailed quoll
Regent Honeyeater
Large-eared Pied Bat
Corben's Long-eared Bat
	Direct impact – loss of known or potential habitat	• Project planning at design stage resulted in substantial avoidance of known and potential MNES habitats.
		• An extensive mitigation strategy is proposed including the provision of:
		  ○ the delineation of clearance areas to avoid unnecessary impacts and clearance of surrounding vegetation
		  ○ pre-clearance surveys and tree-felling supervision
		• the implementation of a biodiversity offset strategy in accordance with the NSW Biodiversity Offset Scheme and the EPBC Act Environmental Offsets Policy.

	Removal of connectivity and corridor pathways for fauna movement and gene flow. Cumulative habitat loss and vegetation clearance in the locality. Construction of security fence	The Project has been designed so that the construction footprint uses existing disturbed land areas or areas approved for disturbance by other projects.
	Noise impacts may disturb the roosting and foraging behaviour of fauna species and/or reduce the occupancy of areas	A Noise and Vibration Management Plan (NVMP) will be prepared and implemented as part of the CEMP. The CEMP and NVMP will be regularly updated to account for any changes in noise and vibration management of the Project.

EPBC Act listed species or community	Impact	Avoidance and mitigation measures
	of otherwise suitable habitat.	
	Air quality impacts; increased air pollutants for native species	A dust control plan will be prepared and incorporated into the Project CEMP. The design of the Project will include inherent measures to minimise the potential for adverse air quality impacts. These include: • dust suppression during construction.
	Introduction of feral animals	The *Biosecurity Act 2015* provides the framework for managing diseases and pests that may cause harm to human, animal or plant health or the environment Biosecurity will be considered in the Project design and operation in consultation with landowners to ensure appropriate management of weeds and pests.

4.0 Proposed Biodiversity Offset Strategy

A comprehensive Biodiversity Offset Strategy (BOS) will be developed for the Amended Project in accordance with relevant NSW state legislation and/or policies, in accordance with the *Biodiversity Conservation Act 2016*. Accordingly, the offset strategy for the Amended Project will be developed in consultation with the DPHI.

The NSW and Australian governments agree that endorsement of the NSW BOS to avoid, minimise and offset biodiversity impacts on both NSW and Commonwealth listed entities provides for the best biodiversity and streamlining outcomes. The Australian Government supports the use of the Biodiversity Assessment Method as the underpinning methodology for calculating biodiversity credit requirements.

On 22 November 2019, NSW passed an amendment to the NSW Biodiversity Conservation Regulation 2017. The amendment aligns the BOS offset rules to Australian Government requirements. The NSW BOS has requirements for retiring like-for-like credits or funding conservation actions that directly benefit the species or community impacted, and these meet the Australian Government's offsetting requirements. The NSW BOS also allows for variation rules to be used after reasonable steps have been taken to source like-for-like credits. NSW amended the Biodiversity Conservation Regulation 2017 so the variation rules do not apply to offsets required for Commonwealth listed entities for controlled actions. If the NSW approval requires biodiversity offsets for NSW only listed entities, proponents will still be able to use the variation rules for these.

To meet offsets required for Commonwealth listed entities for controlled actions under the NSW BOS, RES, the Proponent, retains the ability to:

- retire biodiversity credits based on the like-for-like provisions in the Biodiversity Conservation Regulation 2017
- fund biodiversity conservation actions that are listed in the Ancillary rules: Biodiversity conservation actions and directly benefit the threatened entity impacted
- pay into the Biodiversity Conservation Fund, noting it is the proponent's responsibility to notify the Biodiversity Conservation Trust that their payment is for a controlled action.

The Biodiversity Conservation Trust is required to meet the Commonwealth offset requirement component in a like-for-like manner. This is by retiring like-for-like credits, by funding conservation actions that are listed in the Ancillary rules: Biodiversity conservation actions and benefit the threatened entity impacted or by funding other conservation measures approved by the NSW Minister for Energy and Environment that directly benefit the entity impacted. **Table 4.1** outlines the credit requirement for the relevant habitat areas for impacted MNES outlined in **Section 2.0** of this report, as calculated by the BAM. It is noted that **Table 4.1** displays areas of impact for the koala and spotted-tailed quoll that do not have credits generated for them. For both species this is due to the construction of a security fence that does not involve direct clearing of vegetation, but exclusion of the species to the enclosed vegetation. This has been identified as an indirect impact in **Section 5.0** of the BDAR. Additionally for the spotted-tailed quoll, areas of Category 1-Exempt Land have been determined as potential (low quality) foraging habitat. Category 1-Exempt Land is exempt from assessment under BAM 2020.

Table 4.1 Ecosystem and Species-credit Species credits Relevant for Impacted MNES

MNES	PCTs and Habitats	Area of Impact (ha)	Credits Required
Ecosystem Credits			
Box gum woodland CEEC	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 *Moderate Condition*	3.58	155
	TOTAL	**3.58**	**155**
Koala	81 Western Grey Box - cypress pine shrub grass shrub tall woodland in the Brigalow Belt South Bioregion *Moderate Condition*	1.95	65
	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 *Moderate Condition*	3.58	155
	318 Mugga Ironbark -Tumbledown Red Gum - Red Box - Black Cypress Pine open forest on shallow stony soils on hills in the NSW South Western Slopes Bioregion *Moderate Condition*	0.93	20
	Retained native vegetation excluded due to security fence (indirect impact)	11.33	0
	TOTAL	**17.79**	**240**
Spotted-tailed quoll	81 Western Grey Box - cypress pine shrub grass shrub tall woodland in the Brigalow Belt South Bioregion *Moderate Condition*	1.95	65
	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 *Moderate Condition*	3.58	155
	318 Mugga Ironbark -Tumbledown Red Gum - Red Box - Black Cypress Pine open forest on shallow stony soils on hills in the NSW South Western Slopes Bioregion *Moderate Condition*	0.93	20
	81 Western Grey Box - cypress pine shrub grass shrub tall woodland in the Brigalow Belt South Bioregion DNG	1.04	22
	Category 1 exempt Land	1,002.11	0
	Additional area excluded due to security fence (indirect impact)	32.69	0
	TOTAL	**1,042.30**	**262**

MNES	PCTs and Habitats	Area of Impact (ha)	Credits Required
Regent Honeyeater	81 Western Grey Box - cypress pine shrub grass shrub tall woodland in the Brigalow Belt South Bioregion *Moderate Condition*	1.95	65
	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 *Moderate Condition*	3.58	155
	318 Mugga Ironbark -Tumbledown Red Gum - Red Box - Black Cypress Pine open forest on shallow stony soils on hills in the NSW South Western Slopes Bioregion *Moderate Condition*	0.93	20
	TOTAL	**6.46**	**240**
Large-eared Pied Bat	81 Western Grey Box - cypress pine shrub grass shrub tall woodland in the Brigalow Belt South Bioregion *Moderate Condition*	1.95	65
	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 *Moderate Condition*	3.58	155
	318 Mugga Ironbark -Tumbledown Red Gum - Red Box - Black Cypress Pine open forest on shallow stony soils on hills in the NSW South Western Slopes Bioregion *Moderate Condition*	0.93	20
	TOTAL	**6.46**	**240**
Corben's Long-eared bat	81 Western Grey Box - cypress pine shrub grass shrub tall woodland in the Brigalow Belt South Bioregion *Moderate Condition*	1.95	65
	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 *Moderate Condition*	3.58	155
	318 Mugga Ironbark -Tumbledown Red Gum - Red Box - Black Cypress Pine open forest on shallow stony soils on hills in the NSW South Western Slopes Bioregion *Moderate Condition*	0.93	20
	TOTAL	**6.46**	**240**
Grey Box Grassy Woodland	81 Western Grey Box - cypress pine shrub grass shrub tall woodland in the Brigalow Belt South Bioregion *Moderate Condition*	1.95	65
	TOTAL	**1.95**	**65**

The MNES that were determined by the Commonwealth DCCEEW to be significantly impacted by the Amended Project are included in the credit liability for ecosystems required to be offset.

The Biodiversity Offset Strategy will be developed with consideration of the need to compensate for residual significant impacts to box gum woodland CEEC, the koala, and spotted-tailed quoll with the aim to maintain or improve the biodiversity values of the surrounding region in the medium to long term. This aim will be delivered through the securing of in-perpetuity 'like-for-like' land-based offsets and in conjunction with the various impact mitigation and offset strategies that are proposed to be employed as part of the Amended Project.

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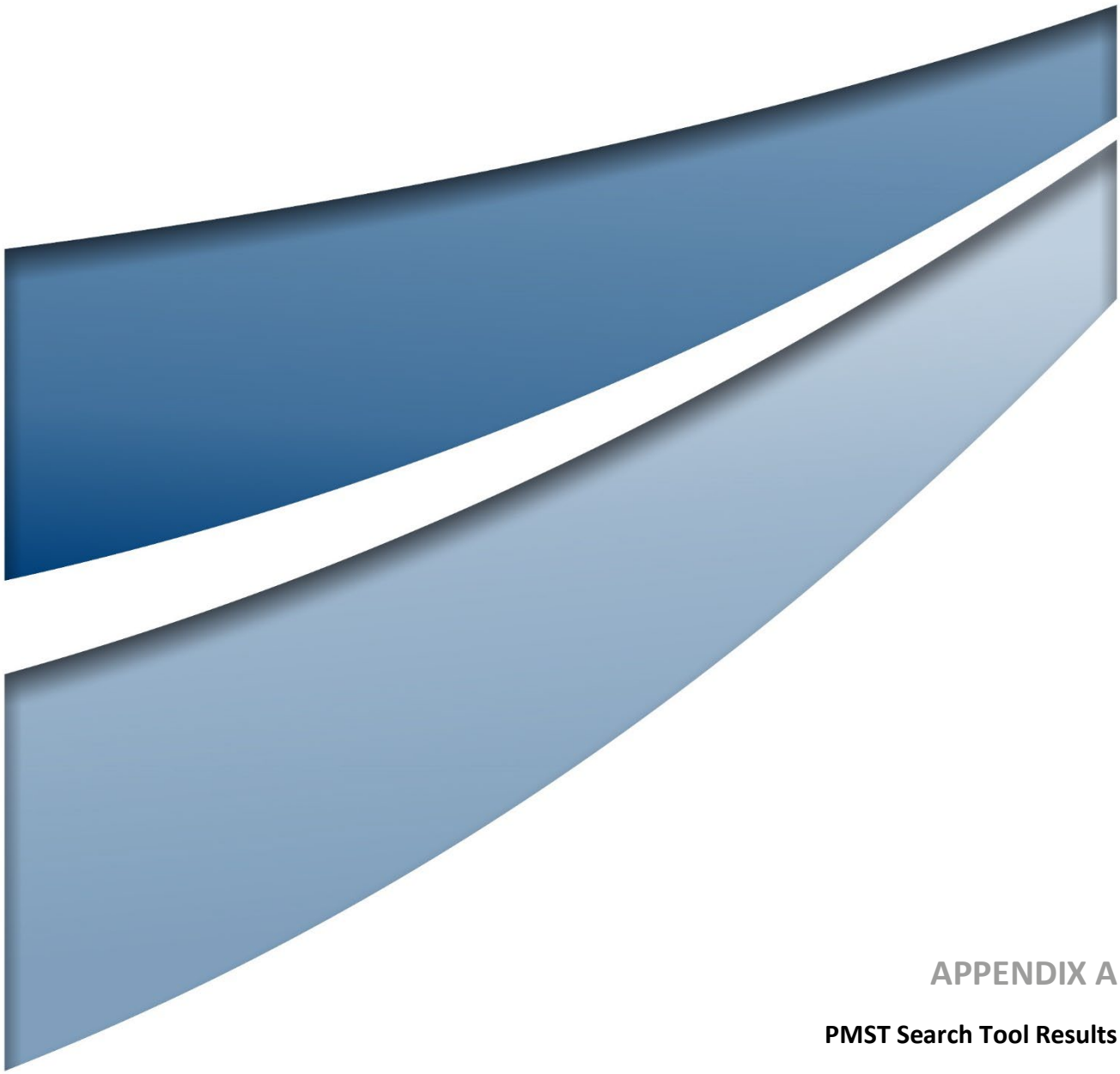
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APPENDIX A

PMST Search Tool Results

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: 24-Apr-2024

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	4
Great Barrier Reef Marine Park:	None
Commonwealth Marine Area:	None
Listed Threatened Ecological Communities:	2
Listed Threatened Species:	40
Listed Migratory Species:	10

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:	None
Commonwealth Heritage Places:	None
Listed Marine Species:	17
Whales and Other Cetaceans:	None
Critical Habitats:	None
Commonwealth Reserves Terrestrial:	None
Australian Marine Parks:	None
Habitat Critical to the Survival of Marine Turtles:	None

Extra Information

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

State and Territory Reserves:	None
Regional Forest Agreements:	None
Nationally Important Wetlands:	None
EPBC Act Referrals:	5
Key Ecological Features (Marine):	None
Biologically Important Areas:	None
Bioregional Assessments:	None
Geological and Bioregional Assessments:	None

Details

Matters of National Environmental Significance

Wetlands of International Importance (Ramsar Wetlands)	[Resource Information]
Ramsar Site Name	Proximity
Banrock station wetland complex	800 - 900km upstream from Ramsar site
Riverland	800 - 900km upstream from Ramsar site
The coorong, and lakes alexandrina and albert wetland	900 - 1000km upstream from Ramsar site
The macquarie marshes	200 - 300km upstream from Ramsar site

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
Grey Box (Eucalyptus microcarpa) Grassy Woodlands and Derived Native Grasslands of South-eastern Australia	Endangered	Community likely to occur within area
White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland	Critically Endangered	Community likely to occur within 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
BIRD		
Anthochaera phrygia		
Regent Honeyeater [82338]	Critically Endangered	Foraging, feeding or related behaviour likely to occur within area

Scientific Name	Threatened Category	Presence Text
Aphelocephala leucopsis Southern Whiteface [529]	Vulnerable	Species or species habitat likely to occur within area
Botaurus poiciloptilus Australasian Bittern [1001]	Endangered	Species or species habitat may occur within area
Calidris acuminata Sharp-tailed Sandpiper [874]	Vulnerable	Species or species habitat may occur within area
Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	Species or species habitat may occur within area
Callocephalon fimbriatum Gang-gang Cockatoo [768]	Endangered	Species or species habitat may occur within area
Calyptorhynchus lathami lathami South-eastern Glossy Black-Cockatoo [67036]	Vulnerable	Species or species habitat likely to occur within area
Climacteris picumnus victoriae Brown Treecreeper (south-eastern) [67062]	Vulnerable	Species or species habitat likely to occur within area
Falco hypoleucos Grey Falcon [929]	Vulnerable	Species or species habitat likely to occur within area
Gallinago hardwickii Latham's Snipe, Japanese Snipe [863]	Vulnerable	Species or species habitat may occur within area
Grantiella picta Painted Honeyeater [470]	Vulnerable	Species or species habitat likely to occur within area
Hirundapus caudacutus White-throated Needletail [682]	Vulnerable	Species or species habitat likely to occur within area

Scientific Name	Threatened Category	Presence Text
Lathamus discolor		
Swift Parrot [744]	Critically Endangered	Species or species habitat likely to occur within area
Leipoa ocellata		
Malleefowl [934]	Vulnerable	Species or species habitat likely to occur within area
Melanodryas cucullata cucullata		
South-eastern Hooded Robin, Hooded Robin (south-eastern) [67093]	Endangered	Species or species habitat likely to occur within area
Neophema chrysostoma		
Blue-winged Parrot [726]	Vulnerable	Species or species habitat may occur within area
Pedionomus torquatus		
Plains-wanderer [906]	Critically Endangered	Species or species habitat may occur within area
Polytelis swainsonii		
Superb Parrot [738]	Vulnerable	Species or species habitat likely to occur within area
Rostratula australis		
Australian Painted Snipe [77037]	Endangered	Species or species habitat likely to occur within area
Stagonopleura guttata		
Diamond Firetail [59398]	Vulnerable	Species or species habitat known to occur within 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
Macquaria australasica		
Macquarie Perch [66632]	Endangered	Species or species habitat may occur within area
FROG		
Crinia sloanei		
Sloane's Froglet [59151]	Endangered	Species or species habitat may occur within area

Scientific Name	Threatened Category	Presence Text
MAMMAL		
Chalinolobus dwyeri Large-eared Pied Bat, Large Pied Bat [183]	Endangered	Species or species habitat likely to occur within 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
Nyctophilus corbeni Corben's Long-eared Bat, South-eastern Long-eared Bat [83395]	Vulnerable	Species or species habitat likely to occur within area
Phascolarctos cinereus (combined populations of Qld, NSW and the ACT) Koala (combined populations of Queensland, New South Wales and the Australian Capital Territory) [85104]	Endangered	Species or species habitat likely to occur within area
Pteropus poliocephalus Grey-headed Flying-fox [186]	Vulnerable	Foraging, feeding or related behaviour may occur within area
PLANT		
Dichanthium setosum bluegrass [14159]	Vulnerable	Species or species habitat likely to occur within area
Euphrasia arguta [4325]	Critically Endangered	Species or species habitat may occur within area
Lepidium aschersonii Spiny Peppercress [10976]	Vulnerable	Species or species habitat may occur within area
Ozothamnus tesselatus [56203]	Vulnerable	Species or species habitat may occur within area
Prasophyllum petilum Tarengo Leek Orchid [55144]	Endangered	Species or species habitat may occur within area

Scientific Name	Threatened Category	Presence Text
Prasophyllum sp. Wybong (C.Phelps ORG 5269)		
a leek-orchid [81964]	Critically Endangered	Species or species habitat may occur within area
Swainsona murrayana		
Slender Darling-pea, Slender Swainson, Murray Swainson-pea [6765]	Vulnerable	Species or species habitat may occur within area
Swainsona recta		
Small Purple-pea, Mountain Swainson-pea, Small Purple Pea [7580]	Endangered	Species or species habitat may occur within area
Thesium australe		
Austral Toadflax, Toadflax [15202]	Vulnerable	Species or species habitat may occur within area
Vincetoxicum forsteri listed as Tylophora linearis		
[92384]	Endangered	Species or species habitat may occur within area
REPTILE		
Aprasia parapulchella		
Pink-tailed Worm-lizard, Pink-tailed Legless Lizard [1665]	Vulnerable	Species or species habitat likely to occur within area
Delma impar		
Striped Legless Lizard, Striped Snake-lizard [1649]	Vulnerable	Species or species habitat may occur within area

Listed Migratory Species		[Resource Information]
Scientific Name	Threatened Category	Presence Text
Migratory Marine Birds		
Apus pacificus		
Fork-tailed Swift [678]		Species or species habitat likely to occur within area
Migratory Terrestrial Species		
Hirundapus caudacutus		
White-throated Needletail [682]	Vulnerable	Species or species habitat likely to occur within area
Motacilla flava		
Yellow Wagtail [644]		Species or species habitat may occur within area

Scientific Name	Threatened Category	Presence Text
Myiagra cyanoleuca		
Satin Flycatcher [612]		Species or species habitat likely to occur within area
Rhipidura rufifrons		
Rufous Fantail [592]		Species or species habitat may occur within area
Migratory Wetlands Species		
Actitis hypoleucos		
Common Sandpiper [59309]		Species or species habitat may occur within area
Calidris acuminata		
Sharp-tailed Sandpiper [874]	Vulnerable	Species or species habitat may occur within area
Calidris ferruginea		
Curlew Sandpiper [856]	Critically Endangered	Species or species habitat may occur within area
Calidris melanotos		
Pectoral Sandpiper [858]		Species or species habitat may occur within area
Gallinago hardwickii		
Latham's Snipe, Japanese Snipe [863]	Vulnerable	Species or species habitat may occur within area

Other Matters Protected by the EPBC Act

Listed Marine Species		[Resource Information]
Scientific Name	Threatened Category	Presence Text
Bird		
Actitis hypoleucos		
Common Sandpiper [59309]		Species or species habitat may occur within area
Apus pacificus		
Fork-tailed Swift [678]		Species or species habitat likely to occur within area overfly marine area

Scientific Name	Threatened Category	Presence Text
Bubulcus ibis as Ardea ibis Cattle Egret [66521]		Species or species habitat may occur within area overfly marine area
Calidris acuminata Sharp-tailed Sandpiper [874]	Vulnerable	Species or species habitat may occur within area
Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	Species or species habitat may occur within area overfly marine area
Calidris melanotos Pectoral Sandpiper [858]		Species or species habitat may occur within area overfly marine area
Chalcites osculans as Chrysococcyx osculans Black-eared Cuckoo [83425]		Species or species habitat likely to occur within area overfly marine area
Gallinago hardwickii Latham's Snipe, Japanese Snipe [863]	Vulnerable	Species or species habitat may occur within area overfly marine area
Haliaeetus leucogaster White-bellied Sea-Eagle [943]		Species or species habitat may occur within area
Hirundapus caudacutus White-throated Needletail [682]	Vulnerable	Species or species habitat likely to occur within area overfly marine area
Lathamus discolor Swift Parrot [744]	Critically Endangered	Species or species habitat likely to occur within area overfly marine area
Merops ornatus Rainbow Bee-eater [670]		Species or species habitat may occur within area overfly marine area

Scientific Name	Threatened Category	Presence Text
Motacilla flava Yellow Wagtail [644]		Species or species habitat may occur within area overfly marine area
Myiagra cyanoleuca Satin Flycatcher [612]		Species or species habitat likely to occur within area overfly marine area
Neophema chrysostoma Blue-winged Parrot [726]	Vulnerable	Species or species habitat may occur within area overfly marine area
Rhipidura rufifrons Rufous Fantail [592]		Species or species habitat may occur within area overfly marine area
Rostratula australis as Rostratula benghalensis (sensu lato) Australian Painted Snipe [77037]	Endangered	Species or species habitat likely to occur within area overfly marine area

Extra Information

EPBC Act Referrals			[Resource Information]
Title of referral	Reference	Referral Outcome	Assessment Status
Barneys Reef Wind Farm	2022/09358		Assessment
Central-West Orana Renewable Energy Zone Transmission Project	2022/09353		Assessment
Controlled action			
Wollar to Wellington 330kV Transmission Line Project	2005/2202	Controlled Action	Post-Approval
Not controlled action			
Improving rabbit biocontrol: releasing another strain of RHDV, sthrn two thirds of Australia	2015/7522	Not Controlled Action	Completed
Referral decision			
Proposed large-scale solar farm project	2022/9171	Referral Decision	Referral Publication

Title of referral	Reference	Referral Outcome	Assessment Status
Referral decision			

Caveat

1 PURPOSE

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

The report contains the mapped locations of:

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

2 DISCLAIMER

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

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

3 DATA SOURCES

Threatened ecological communities

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

Threatened, migratory and marine species

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

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

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

4 LIMITATIONS

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

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

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

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

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

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

Acknowledgements

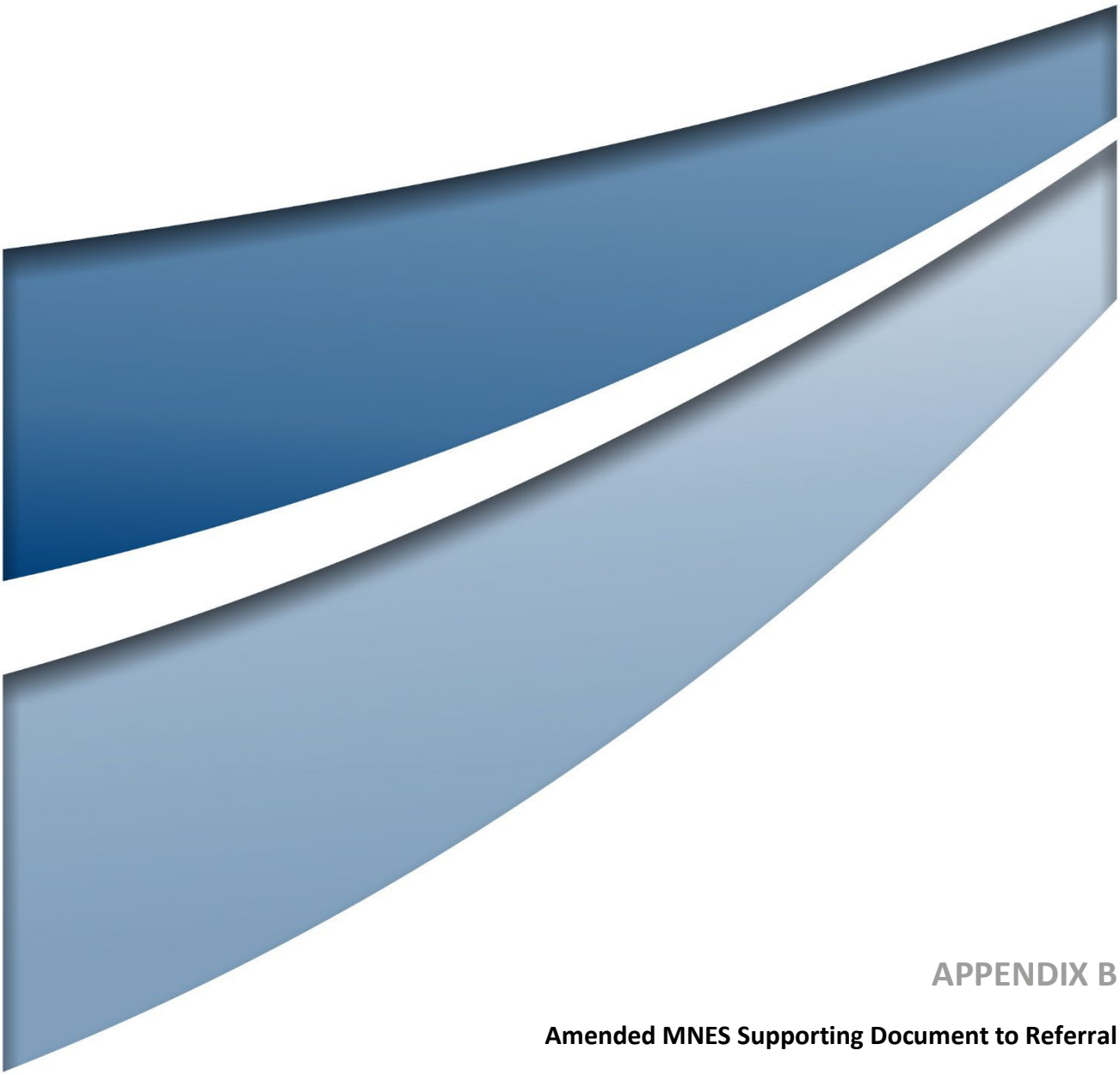
This database has been compiled from a range of data sources. The department acknowledges the following custodians who have contributed valuable data and advice:

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

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

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

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APPENDIX B

Amended MNES Supporting Document to Referral

1.0 Assessments of Significance

The 'Significant Impact Guidelines 1.1' (DoE 2013) define a significant impact as 'an impact which is important, notable, or of consequence, having regard to its context or intensity' (DoE 2013 p. 2). When determining whether a project (Proposed Action) may result in a significant impact, consideration is given to the sensitivity, value, and quality of the environment which is impacted; and upon the intensity, duration, magnitude, and geographic extend of the impacts. The 'Significant Impact Guidelines 1.1' outlines specific criteria to use when making such an assessment, based on the MNES that are being considered, which are to be complemented by additional guidelines that have been prepared for specific MNES (as available). These criteria are used as relevant in the following sections.

Any reference to the 'Proposed Action' has been replaced to reference the 'Project'.

The following species have been assessed:

- *White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland*
- *Grey Box Grassy Woodland and Derived Native Grassland of south-east Australia*
- Koala (*Phascolarctos cinereus*)
- Spotted-tailed Quoll (*Dasyurus maculatus maculatus*)
- Regent honeyeater (*Anthochaera phrygia*)
- Large-eared Pied Bat (*Chalinolobus dwyeri*)
- Corben's Long-eared Bat (*Nyctophilus corbeni*).

For the purposes of this assessment, the Amended Project is considered to represent the complete disturbance of vegetation associated with the installation of services and access.

1.1 Revisions Post Referral

Revisions have been made to the assessments of significance submitted in the Tallawang Solar Farm Referral (Umwelt 2022). These changes are:

- Revisions of area calculations of all MNES (refer to **Table 2.2** of the main document).
- Addition of an Assessment of Significance for the spotted-tailed quoll, regent honeyeater, large-eared pied bat and Corben's long-eared bat.

As this assessment will be considered in relation to the Subject Land as documented in the BDAR, any reference to the Subject Land has been replaced to reference the Subject Land.

1.2 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 is listed as a critically endangered ecological community under the EPBC Act. This community occurs along the western slopes and tablelands of the Great Dividing Range from Southern Queensland through NSW to central Victoria. It is 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.

The Amended Project would result in the permanent reduction in extent of up to 3.58 ha of Box Gum Woodland CEEC.

The wider Project Area currently supports approximately 42 ha of Box Gum Woodland and Derived Native Grasslands that, across the patch, are likely to meet the condition thresholds of the EPBC Act listed White Box Yellow Box Blakely's Red Gum Woodland CEEC. As mentioned above, the Subject Land has been used extensively in the past for agricultural purposes and the likelihood of the grassland remaining in the current condition over time without land management (for conservation purposes) is low.

An action is likely to have a significant impact on a critically endangered or endangered ecological community if there is a real chance or possibility that it will:

Reduce the extent of an ecological community

The estimated total current regional extent of Box Gum Woodland and Derived Native Grasslands CEEC is estimated to be approximately 55,798 ha within the Southwest Slopes bioregion (Tozer, Simpson & NSW Threatened Species Scientific Committee, 2019). The permanent loss of up to 3.58 ha (0.006% of regional extent) of woodland and derived native grasslands as a result of the Amended Project represents a small reduction in the estimated current extent of the community across its range.

Fragment or increase fragmentation of an ecological community

This community is already highly fragmented within the local region with adjacent land typically comprising heavily disturbed agricultural land.

The Amended Project is not likely to further fragment or increase the degree of fragmentation of the ecological community within the Subject Land or local area.

Adversely affect habitat critical to the survival of an ecological community

Due to a long history of agricultural practices within the local area, the habitat of Box Gum Woodland and Derived Native Grasslands CEEC exists already in a relatively disturbed and fragmented state. The Subject Land has been used extensively in the past for agricultural purposes and the likelihood of the grassland remaining in the current condition over time without land management (for conservation purposes) is low. Therefore, the action is considered unlikely to affect habitat critical to the survival of the ecological community.

Modify or destroy abiotic (non-living) factors (such as water, nutrients, or soil) necessary for an ecological community's survival, including reduction of groundwater levels, or substantial alternation of surface water drainage patterns

The Amended Project is unlikely to modify or destroy the abiotic factors necessary of the community's survival. The solar farm will be established adjacent to remnant stands of the community, however it is not likely that the solar farm will modify any essential abiotic factors.

Cause a substantial change in the species composition of an occurrence of an ecological community, including causing a decline or loss of functionally important species, for example through regular burning or flora or fauna harvesting

The direct impacts caused by the Amended Project 3.58 ha of Box Gum Woodland) is unlikely to cause substantial change in the species composition of the community. The direct impacts are unlikely to cause a substantial change in the species composition of the community where vegetation removal occurs (3.58 ha).

Cause a substantial reduction in the quality or integrity of an occurrence of an ecological community, including, but not limited to:

- Assisting invasive species, that are harmful to the listed ecological community, to become established, or
- Causing regular mobilisation of fertilisers, herbicides or other chemicals or pollutants into the ecological community which kill or inhibit the growth of species in the ecological community.

The solar farm / BESS development area is unlikely to cause a substantial reduction in the current quality of the Box Gum Woodland that occurs within the Subject Land. Vehicles will regularly access the solar farm that have the potential to carry reproductive material of invasive plants. Management activities, including wash down of vehicles before entry to site and the treatment of noxious weed species within the Subject Land (preventing spread), can be enforced by the Proponent to mitigate this risk.

Interfere with the recovery of an ecological community

The Amended Project would result in the permanent reduction in extent of up to 3.58 ha of Box Gum Woodland. This removal of area is unlikely to interfere with the recovery of this ecological community as it involves the removal from an already highly fragmented state of the ecological community within the Subject Land or local area.

Conclusion

The Amended Project would result in the permanent reduction in extent of up to 3.58 ha of Box Gum Woodland.

Impacts related to the solar farm / BESS development are unlikely to result in a significant impact to Box Gum Woodland.

1.3 Grey Box Grassy Woodland and Derived Native Grassland of south-seat Australia

Grey Box Grassy Woodland and Derived Native Grassland of south-east Australia (Grey Box Grassy Woodland) is listed as an Endangered Ecological Community (EEC) under the EPBC Act. This community occurs in and along the lower slopes and plains of mainland eastern Australia, inland of the Great Dividing Range from southern Queensland through New South Wales to eastern South Australia. This community predominantly associated with the drier edge of the temperate grassy eucalypt woodland belt and ranges. It is characterised by canopy dominated by grey box (*Eucalyptus macrocarpa*) and an understorey with a moderately dense to sparse shrub layer and a ground layer of perennial and annual native forbs and grasses. The Grey Box Grassy Woodlands EEC includes patches of derived grassland, where the tree canopy and mid layer has been removed to less than 10% crown cover but the native ground layer remains largely intact (NSW Scientific Committee 2011).

It is estimated that the national extent of this community has reduced by about 85% such that 534,500 ha remain across the full distribution. In NSW, this ecological community formerly covered up to 1.9 million ha of which up to 332 000 ha remain in highly fragmented patches. Most patches of remnant native vegetation are now highly fragmented such that connectivity of remnants is low and relatively little of the native vegetation is managed for conservation.

The Subject Land supports 1.95 ha of grey box grassy woodland and derived native grassland. There are large areas of grassland surrounding the patches of remnant Grey Box Grassy Woodland EEC however these grassland areas were assessed through rapid assessment and floristic plots. It was determined that the grassland areas of the Subject Land do not meet the criteria for Grey Box Grassy Woodland DNG EEC.

An action is likely to have a significant impact on a critically endangered or endangered ecological community if there is a real chance or possibility that it will:

Reduce the extent of an ecological community

The Amended Project would result in the permanent reduction in extent of up to 1.95 ha of woodland. No areas conforming to derived native grasslands of Grey Box Grassy Woodland will be removed under the Amended Project.

The estimated total current extent of Grey Box Grassy Woodland EEC within the NSW South West Slopes IBRA Region is estimated to be approximately 312,000 ha within the Southwest Slopes bioregion (NSW Scientific Committee 2011). The permanent loss of up to 1.95 ha (0.0006% of regional extent) of woodland as a result of the Amended Project represents a negligible reduction in the estimated current extent of the community across its range.

Fragment or increase fragmentation of an ecological community

This community is already highly fragmented within the local region with adjacent land typically comprising heavily disturbed agricultural land. Approximately 42 ha of remnant Grey Box Grassy Woodland EEC occurs within the wider Project Area, surrounding the Subject Land. The Amended Project is not likely to significantly fragment or increase the degree of fragmentation of the ecological community within the Subject Land or local area.

Adversely affect habitat critical to the survival of an ecological community

Due to a long history of agricultural practices within the local area, the habitat of Grey Box Grassy Woodland exists already in a disturbed and fragmented state. The Subject Land has been used extensively in the past for agricultural purposes such that it meets the criteria for Category 1 Land, and the likelihood of the grassland remaining in the current condition over time without land management (for conservation purposes) is low. Therefore, the action is considered unlikely to affect habitat critical to the survival of the ecological community.

Modify or destroy abiotic (non-living) factors (such as water, nutrients, or soil) necessary for an ecological community's survival, including reduction of groundwater levels, or substantial alternation of surface water drainage patterns

The Amended Project is unlikely to modify or destroy the abiotic factors necessary of the community's survival. The solar farm will be established adjacent to remnant stands of the community; however, it is not likely that the solar farm will modify any essential abiotic factors.

Cause a substantial change in the species composition of an occurrence of an ecological community, including causing a decline or loss of functionally important species, for example through regular burning or flora or fauna harvesting

The direct impacts of the Amended Project will likely substantially change in the species composition of the community within the Subject Land due to complete removal of 1.95 ha of woodland.

Cause a substantial reduction in the quality or integrity of an occurrence of an ecological community, including, but not limited to:

- Assisting invasive species, that are harmful to the listed ecological community, to become established, or
- Causing regular mobilisation of fertilisers, herbicides or other chemicals or pollutants into the ecological community which kill or inhibit the growth of species in the ecological community.

The solar farm / BESS development area will remove 1.95 ha of Grey Box Grassy Woodland that occurs within the Subject Land. It is unlikely that the Amended Project will reduce the quality of adjacent areas of this community. Vehicles will regularly access the solar farm that have the potential to carry reproductive material of invasive plants. Management activities, including wash down of vehicles before entry to site and the treatment of noxious weed species within the Subject Land (preventing spread), can be enforced by the Proponent to mitigate this risk.

Interfere with the recovery of an ecological community

The Amended Project would result in the permanent reduction in extent of up to 1.95 ha of Grey Box Grassy Woodland that occurs within the Subject Land. This removal of area is unlikely to interfere with the recovery of this ecological community as it involves the removal from an already highly fragmented state of the ecological community within the Subject Land or local area.

Conclusion

The Amended Project would result in the permanent reduction in extent of up to 1.95 ha of Grey Box Grassy Woodland that occurs within the Subject Land. Direct impacts only relate to the solar farm / BESS development and are unlikely to result in a significant impact to Grey Box Grassy Woodland.

1.4 Koala (*Phascolarctos cinereus*)

The koala (*Phascolarctos cinereus*) is listed as endangered under the EPBC Act. The species is known to occur naturally in eucalypt woodlands and forests from north-eastern QLD, along the eastern coast of NSW, to the south-east corner of SA. The species has a fragmented distribution, and in NSW it mainly occurs on the central and north coasts, with some populations in the west of the Great Dividing Range. No koala observations have been recorded within the Subject Land and the closest known record is approximately 10 km southeast of the Subject Land.

The occurrence of habitat for the koala in the Subject Land has been assessed based on guidance provided in the NSW State Environmental Planning Policy (Koala Habitat Protection) 2021 (Koala SEPP) and the EPBC Act Referral Guidelines for the Vulnerable Koala (DoE 2014). It has been determined that koala habitat exists within the Subject Land.

The Koala SEPP defines core koala habitat as an area of highly suitable koala habitat where koalas are recorded as being present at the time or in the previous 18 years. Where highly suitable koala habitat includes recognised koala feed trees at a density of 15% or more of the canopy. Koala feed trees are identified for regions in NSW in the Koala SEPP and the Koala Habitat Information Base Technical Guide (DPIE 2019). The Subject Land occurs within the Northwest Slopes Koala Management Area where 39 regionally relevant koala feed tree species have been identified. These trees have been ranked in preference of use in the Koala Habitat Information Base (DPIE 2019). Identification of whether the PCTs identified in the Subject Land may provide habitat for the Koala has been based on the occurrence of 15% or more of the canopy being regionally significant feed trees.

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

lead to a long-term decrease in the size of a population

The koala population in NSW has declined by over 26% in the last three generations (20 years) (DAWE 2022). In the Brigalow Belt South bioregion it is estimated that the koala population has reduced over the last three generations from 18,821 individuals in 2001 to 8,281 individuals in 2021 (DAWE 2022). In the Sydney Basin bioregion it is estimated that the koala population has reduced from 5,797 individuals in 2001 to 5,565 individuals in 2021 (DAWE 2022).

The Amended Project will impact up to 17.79 ha of potential habitat within the Subject Land through direct removal and exclusion by fencing. Despite the lack of records of koala within the Subject Land and the scarcity of recent (three records in the last 20 years) records within 20 km of the Subject Land may provide habitat for a low density population of the koala. The Subject Land is unlikely to comprise populations necessary for maintaining genetic diversity and are not near the limit of the known range of this species. Therefore, the Action is unlikely to contain, or have a significant impact on, an important population of the koala.

Clearing of potential habitat may impact on individuals however implementation of pre-clearing surveys and clearing supervision reduces the risk of injury or mortality of individuals.

reduce the area of occupancy of the species

The listed population of the koala in Queensland, NSW and the ACT extent of occurrence is estimated at 19,428 km^2 (DAWE 2022). The majority of koalas in NSW are found in forests and subhumid woodlands on the central and north coast, and to the west across the Western Plains and slopes, within Pilliga forest. Areas of koala significance near the Subject Land are focused on Goulburn River National Park, and surrounds.

The Action will result in the loss of approximately 6.46 ha of vegetation that includes occurrences of key feed trees for the koala and result in the exclusion of an additional 11.33 of vegetation by fencing off this potential habitat. While this will increase existing fragmentation of habitat in the region, the Subject Land is unlikely to limit the movement of the species and will continue to allow the species to access large areas of similar habitat in the wider locality, some of which show greater evidence of koala presence and are protected, such as in Munghorn Gap National Reserve. The Amended Project will not cause fragmentation of any remnant stands and it is likely that this species will be able to traverse around the security fencing around the solar farm / BESS development area.

The Action will result in a reduction of the potential area of occupancy for the koala in the Subject Land, however this is unlikely to substantially reduce the area of occupancy of an important population in the wider locality or region.

fragment an existing population into two or more populations

The habitats within the Subject Land currently contain fragmented woodlands surrounded by tracts of derived native grasslands and agricultural land.

The Subject Land does not support a population of the koala, the Action will not result in the fragmentation of an important population of koala into two or more populations.

adversely affect habitat critical to the survival of a species

As defined by the EPBC Act, habitat critical to the survival of the koala is the area that the species relies on to avoid or halt decline and promote the recovery of the species. The conservation advice (DAWE 2022) does not provide a definition of habitat critical to the survival of the koala.

The removal and exclusion of approximately 17.79 ha of potential koala habitat will not contribute to fragmentation of habitat within the landscape, due to past agricultural activity, including extensive land clearing, vegetation in much of the landscape is already highly fragmented. Impacts on koala habitat are unlikely to substantially increase fragmentation of the habitat present, and movement corridors that currently permit the species to move across the landscape and access other areas of similar suitable habitat in the wider region would be retained.

The Action is unlikely to adversely affect habitat critical to the survival of the koala.

disrupt the breeding cycle of a population

The conservation advice identified that nationally there are four spatially distinct genetic koala management units including: Queensland and NSW populations north of the Clarence River Valley; in NSW south of the Clarence River Valley to north of the Sydney Basin; in NSW south of the Sydney Basin to about the border with Victoria; and the Victoria and South Australia population. The Amended Project occurs at the western edge of the third koala management unit.

No breeding populations of this species have been recorded in the Subject Land, however the presence of historical records of the koala within the last 16 years is indicative of breeding population particularly in the wider locality in the area of Goulburn River National Park and other large remnant areas (approx. 30 km east of the Subject Land). This is unlikely to present a barrier to breeding. A large area of potential koala habitat will be retained in the broader locality. The Action is therefore unlikely to disrupt the breeding cycle of an important population of this species.

modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline

The removal and exclusion of approximately 17.79 ha of potential koala habitat will not contribute to fragmentation of habitat within the landscape, due to past agricultural activity, including extensive land clearing, vegetation in much of the landscape is already highly fragmented. Any existing movement corridors will not be fragmented by the Action.

As no populations of the koala have been identified within the Subject Land, it is unlikely that the Action will modify, destroy, remove, isolate, or decrease the availability or quality of habitat for this species to the extent that the koala would be likely to decline.

result in invasive species that are harmful to a critically endangered or endangered species becoming established in the endangered or critically endangered species' habitat

The Action is not expected to result in invasive species that are harmful to the koala becoming established in koala habitat.

introduce disease that may cause the species to decline, or

The koala is known to contract strains of Chlamydia and the koala retrovirus. Chlamydia infections are known to cause blindness, pneumonia and reduced female fertility and is almost ubiquitous among koala populations (DAWE 2021b). The koala retrovirus is a gamma retrovirus that has integrated into the koala germ line of northern koala populations (DAWE 2021b). It is implicated in immunodeficiency including leukemia and lymphoma increasing susceptibility to infectious diseases such as chlamydia (DAWE 2021b).

An emerging disease that affects koala habitat is myrtle rust (*Austropuccinia psidii*) impacting on availability of foraging resources.

There are a number of interacting factors involved in susceptibility to disease correlated to population decline. Chronic stress from poor nutrition, reduced habitat quality, exposure to unnatural stressors (dogs, traffic), heat-stress, bushfires likely increase susceptibility of the koala to disease and loss of fertility. This is more likely to occur in urban and peri-urban landscapes or in areas of marginal habitat (DAWE 2021).

The Amended Project will involve loss of habitat and during construction there will be increase in traffic however this unnatural stress can be managed such that the Amended Project does not involve any processes that are likely to introduce a disease for the koala that may cause this species to decline.

interfere with the recovery of the species.

Following determination of the importance of the habitat for the koala in the Subject Land, an assessment was undertaken to determine the impacts which are likely to substantially interfere with the recovery of the koala. The Referral Guidelines (DoE 2014) identifies impacts likely to substantially interfere with the recovery of the koala.

The Amended Project may:

- result in an increase to vehicle movements, however this will be largely confined to the construction phase and primarily within the solar farm / BESS development area. Vehicle movements during operation will be largely limited to movements within the fenced solar farm / BESS development area. It is considered unlikely to subject the koala to increased mortality levels.

The Amended Project is not expected to:

- introduce or increase dogs to the local area and therefore is unlikely to increase the threat of dog attacks to any local koala population
- result in the creation of substantial additional barriers to koala movement in the local area
- facilitate the introduction or spread of pathogens as *Phytophthora cinnamomi* or Chlamydia or
- result in hydrological changes to the surrounding environment such that the function and integrity of the existing habitat for the koala is jeopardised.

Based on the above, it is considered unlikely that the Action will interfere with the recovery of the koala throughout its range in Qld, NSW and the ACT.

Conclusion

The Amended Project is unlikely to have a significant impact on the koala.

1.5 Spotted-tailed Quoll (*Dasyurus maculatus maculatus*)

The spotted-tailed quoll (*Dasyurus maculatus maculatus*) is a cat-sized marsupial with red-brown fur and distinctive white spots over its back and tail. It is carnivorous and nocturnal, feeding on birds and small mammals. Habitat requirements include hollow logs, tree hollows, rocky outcrops or caves for den sites and an abundance of prey, and large areas of intact vegetation to forage through. Habitat for this species is highly varied, ranging from sclerophyll forest, woodlands, coastal heathlands and rainforests. Records exist from open country, grazing lands and rocky outcrops (SPRAT 2021). This species is listed as Endangered under the EPBC Act.

In NSW, the spotted-tailed quoll occurs on both sides of the Great Dividing Range, with highest densities occurring in the northeast of the state. It occurs from the coast to the snowline and inland to the Murray River (Edgar & Belcher 2008). Generally in NSW, the species is generally confined to within 200 km of the coastline. There is one population ranging from Victoria to Queensland along the south-eastern part of the Australian mainland, however smaller, local populations occur within this, and in some cases the species is locally abundant. These local populations are fragmented and somewhat isolated, and it is estimated that the rate of decline since European settlement in NSW is between 25-50% (DELWP 2016).

The Amended Project will clear up to 1,009.61 ha and exclude an additional 32.69 ha (total of 1,042.3 ha) of potential foraging and dispersal habitat of the species. Within the Subject Land grasslands across the whole Subject Land have experienced an extensive history of cropping, grazing, and pasture improvement activities. 1,042.3 ha of the species habitat within the Subject Land is highly degraded due to historic agricultural activities and does not represent high quality habitat for the species. This low-quality grassland habitat was included in the species habitat area due to the construction of a security fence around the solar farm/BESS. Any habitat within the fencing would effectively be removed from the species use.

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

lead to a long-term decrease in the size of a population

The Amended Project may result in the loss or exclusion of up to 1,042.3 ha of potential habitat in the form of forest, woodlands, riparian habitat and grasslands. The Subject Land is not known as an important area for the species and the species has not been recently recorded in the locality. It is considered unlikely that the Amended Project will lead to a long-term decrease in the size of a population of spotted-tailed quolls.

reduce the area of occupancy of the species

The area of occupancy of this species is estimated at 2,512 square kilometres, with an extent of approximately 596,344 square kilometres (TSSC 2020b). It is not anticipated that the Amended Project, with an impact of 1,042.3 ha, will result in a reduction of the area or extent of occupancy of the species.

fragment an existing population into two or more populations

A population of the spotted-tailed quoll has not been recorded within the Subject Land. This species is highly dispersive and can travel many kilometres in a day (TSSC 2020b). The habitat that will be removed is already highly fragmented in nature due to the current and historic agricultural use of the land.

The construction of the security fence is not considered to fragment an existing population. For this reason, it is unlikely that an important population will be fragmented as a result of the Amended Project.

adversely affect habitat critical to the survival of a species

Habitat critical to the survival of the species includes large patches of forest with adequate denning resources and relatively high densities of medium-sized mammalian prey (Belcher 2000; Belcher and Darrant 2004; Glen & Dickman 2006). The Subject Land, with a history of agriculture, disturbance and clearing, does not fit these criteria and is not considered habitat critical to the survival of the species. The Amended Project is not considered likely to adversely affect habitat critical to the survival of the spotted-tailed quoll.

disrupt the breeding cycle of a population

No den or latrine sites or evidence of occupation of the species has been recorded in the Subject Land. The Amended Project is not expected to disrupt the breeding cycle of a population of the spotted-tailed quoll.

modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline

As no populations of the species have been identified within the Subject Land it is unlikely that the Amended Project will modify, destroy, remove, isolate, or decrease the availability or quality of habitat for this species to the extent that the spotted-tailed quoll would be likely to decline.

result in invasive species that are harmful to a critically endangered or endangered species becoming established in the endangered or critically endangered species' habitat

The Amended Project is not expected to cause a reduction in quality or integrity of the potential habitat for the spotted-tailed quoll through assisting invasive species to become established

introduce disease that may cause the species to decline, or

The Amended Project is not expected to introduce any disease that may cause the spotted-tailed quoll to decline.

interfere with the recovery of the species.

The National Recovery Plan for the spotted-tailed quoll recognises 11 objectives for the recovery of the species. One of these objectives is to reduce the rate of habitat loss and fragmentation on private land (DELWP 2016). The Amended Project will interfere with this objective by clearing and exclusion of potential habitat for the spotted-tail quoll over an area of 1042.30 ha. However, due the presence of low-quality habitat in the Subject Land and the lack of records, it is not likely that the Amended Project will interfere with the recovery of the species as a whole.

Conclusion

The Amended Project is unlikely to result in a significant impact to the spotted-tailed quoll.

1.6 Regent honeyeater (*Anthochaera phrygia*)

The regent honeyeater is a critically endangered, partially nomadic species occurring in temperate woodlands and forests within a patchy distribution between central VIC and south-east QLD which has undergone a severe decline in recent decades (Garnett et al. 2011). The regent honeyeater's chief threat is loss of breeding and foraging habitat (DoE 2015).

The regent honeyeater is a rare visitor to the Mudgee/Gulgong region, with the closest record being approximately six kilometres from the Subject Land recorded in 2012 Subject Land. In the last five years, the nearest record of the regent honeyeater was made in Munghorn Gap National Park, approximately 40 km south-east of the Subject Land. To date, it has not been recorded in the Subject Land during any ecological surveys and there are no contemporary or historic records within the Subject Land.

The proposal area does not occur within the four known breeding areas for the species where it is regularly recorded, namely Bundarra-Barraba area of NSW, the Capertee Valley in NSW, the lower Hunter Valley in NSW and the Chiltern area of north-east Victoria.

This species has not been recorded despite targeted surveys being undertaken in 2020, 2021, and 2022. The Subject Land comprises approximately 6.46 ha of potential foraging habitat. For the purpose of this assessment, it is assumed that the regent honeyeater has the potential to utilise any woodland habitat within the Subject Land, for foraging and potentially breeding, as the species is highly mobile and irregularly detected over a wide range. For the purposes of this assessment, criteria are assessed under the assumption that there is only one single population of regent honeyeater (i.e. the national population).

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

lead to a long-term decrease in the size of a population

The Amended Project is unlikely to modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that the regent honeyeater is likely to decline, through the Amended Project will removal 6.46 ha of potential foraging or breeding habitat.

reduce the area of occupancy of the species

The Amended Project would not reduce the area of occupancy of regent honeyeaters.

fragment an existing population into two or more populations

The Amended Project will not fragment an existing population of regent honeyeaters into two or more populations given the species' mobility and distribution compared to the spatial extent of the Amended Project.

adversely affect habitat critical to the survival of a species

Due to the dispersive and aerial nature of regent honeyeaters it is unlikely that there is any specific habitat critical for the survival of the species outside of their known breeding range. The Subject Land is unlikely to support habitat critical to the species' survival.

disrupt the breeding cycle of a population

Regent honeyeaters are known to use four main locations for breeding, the nearest of which is the Capertee Valley, located approximately 100 km south-east of the Subject Land.

The Amended Project is unlikely to disrupt the breeding cycle of the regent honeyeater given the Amended Project's location relative to known breeding locations.

modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline

The Amended Project is unlikely to modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the regent honeyeater is likely to decline.

result in invasive species that are harmful to a critically endangered or endangered species becoming established in the endangered or critically endangered species' habitat

The Amended Project will not result in invasive species that are harmful to the regent honeyeater becoming established in the Subject Land.

introduce disease that may cause the species to decline, or

The Amended Project is unlikely to result in the introduction of disease within the Subject Land that may cause the regent honeyeater to decline.

interfere with the recovery of the species.

The draft National Recovery Plan for the regent honeyeater identified eight high priority objectives for the recovery of the species (DoE 2015). The Amended Project will not interfere with any of the high priority recovery actions for this species.

Conclusion

The Amended Project will remove 6.46 ha of potential foraging habitat for the regent honeyeater. The removal of woodland habitats is unlikely to have a significant impact on this species where the closest known breeding area is over 100 km in Capertee Valley.

1.7 Large-eared pied bat (*Chalinolobus dwyeri*)

This species is listed under the EPBC Act as vulnerable to extinction. Known records indicate this species predominately occurs east of the Subject Land, throughout the Sydney Basin IBRA region, with some records north of the Subject Land in the Northern Tablelands. This species is highly dependent on the presence of roosting habitat, which includes disused mine shafts, caves, overhangs and disused fairy martin nests (DERM 2011). The species forages within several kilometres of roosting habitat in eucalypt woodland and gullies (DERM 2011).

No potential cave or roosting habitat has been detected within the Subject Land, or within the wider Project Area. Additionally, a radius of 2 km around the site, examined through API where possible, shows no suitable rocky areas, and no known old mines or tunnels of particular importance are known to be present. As such it is unlikely the large-eared pied bat would utilise the woodland habitat within the Subject Land. Precautionarily, for the purposes of this assessment, it is assumed that any woodland/forest area within the Subject Land is potential foraging habitat.

An Action is likely to have a significant impact on a vulnerable species if there is a real chance or possibility that it will:

lead to a long-term decrease in the size of an important population of a species

Direct impacts from the Amended Project will remove 6.46 ha of potential foraging habitat associated with woodland vegetation. The Amended Project will not remove any important breeding habitat features such as caves or overhangs. The Amended Project will reduce the availability of tree hollows which may be used as an over-night roost site but are not considered to form critical habitat for the survival of this species.

The Amended Project is not expected to decrease the size of an important population of this species.

reduce the area of occupancy of an important population

The EPBC Act listing advice states that despite detailed surveys throughout the species' extent of occurrence in NSW, only three nursery roosts are known and only one of these is currently being used. The area of occupancy in NSW during the breeding season is likely to be limited to this one site which is less than 1 km^2 (DERM 2011).

This species does have reproductive characteristics that severely limit its ability to increase in population size or occupy new habitat, no breeding habitat will be impacted as part of the Amended Project. It is unlikely that the Amended Project will reduce the area of occupancy of an important population of this species.

fragment an existing important population into two or more populations

Up to 6.46 ha of potential foraging habitat will be removed as part of this Amended Project. The habitat that will be removed is already highly fragmented in nature due to the current and historic agricultural use of the land. In addition to this, the species mode of movement is flying. For this reason it is unlikely that an important population will be fragmented as a result of the Amended Project.

adversely affect habitat critical to the survival of a species

Up to 6.46 ha of potential foraging habitat will be removed as part of the Amended Project. No potential breeding habitat will be removed as part of the Amended Project. Goulburn River National Park, Cope State Forest and other reserves are located within 20 km of the Subject Land. It is unlikely that the Amended Project will adversely affect habitat critical to the survival of the species.

disrupt the breeding cycle of an important population

No breeding habitat will be removed as part of the Amended Project, it is therefore unlikely that the breeding cycle for the species will be disrupted due to this Amended Project.

modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline

Up to 6.46 ha of foraging habitat will be removed as part of this Amended Project. The habitat that will be removed is already highly fragmented and disturbed in nature due to the current and historic agricultural use of the land. This will cause minor loss, fragmentation and decrease in quality of potential habitats at a local scale but this is not expected to modify habitat for the species to the point where it will be at risk of further decline.

result in invasive species that are harmful to a vulnerable species becoming established in the vulnerable species' habitat

The Amended Project is not expected to result in invasive species that are harmful to the species becoming established in large-eared pied bat habitat.

introduce disease that may cause the species to decline, or

There are no diseases known to be a threat to the species.

interfere with the recovery of the species.

The National Recovery Plan (DERM 2011) identifies impacts likely to substantially interfere with the recovery of the large-eared pied bat.

The Amended Project may:

- result in clearing of vegetation in close vicinity to potential roosts
- result in a reduction in hollow availability.

The Amended Project is not expected to:

- Destroy or interfere with known maternity or other roosts.
- Mine known roots.
- Cause subsidence of cliff lines.
- Increase human recreational activities near known roots.

- Increase habitat disturbance by other animals (feral and agricultural).
- Increase predation by introduced predators.
- Increase the chance of fire in close proximity to known roots.
- Cause loss of genetic diversity.

Conclusion:

The removal of up to 6.46 ha of foraging habitat as a result of the Amended Project is unlikely to have a significant impact on large-eared pied bat.

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

This species is listed under the EPBC Act as vulnerable. The species is known to occur from central southern Queensland, central western NSW, through to north west Victoria. The species utilises a range of mallee and woodland habitats including box, ironbark, and cypress pine woodlands, bull oak woodland, Brigalow woodland, and black box woodland. The species is more abundant in extensive stands of vegetation where vegetation a distinct tree canopy and a dense, cluttered understorey layer in comparison to smaller woodland patches (TSSC 2015). Corben's long-eared bat is known to utilise stag trees and dead limbs of living trees as roost sites. 6.46 ha of potential roost and foraging habitat is present in the Subject Area. The nearest record of this species is located 32 km to the north east near Cassilis recorded in 2012.

An Action is likely to have a significant impact on a vulnerable species if there is a real chance or possibility that it will:

lead to a long-term decrease in the size of an important population of a species

Direct impacts from the Amended Project will remove 6.46 ha of potential foraging and roost habitat associated with woodland vegetation. Due to the lack of local records it is unlikely that the Amended Project will lead to a long-term decrease in the size of an important population of a species.

reduce the area of occupancy of an important population

The Referral Area is located within the known distribution of the species. The Amended Project will remove up to 6.46 ha of potential foraging and roosting habitat. Due to the surrounding areas of protected remnant vegetation it is unlikely that the Amended Project will result in a reduction of the area of occupancy for the species.

fragment an existing important population into two or more populations

6.46 ha of foraging and roosting habitat will be removed as part of this Amended Project. The habitat that will be removed is already highly fragmented in nature due to the current and historic agricultural use of the land. In addition to this, the species is known to use most roost sites just for a single night such that large distances are travelled at night with consecutive roost sites generally within 4 km (DoE 2013). For this reason it is unlikely that an important population will be fragmented as a result of the Amended Project.

adversely affect habitat critical to the survival of a species

6.46 ha of foraging and roosting habitat will be removed as part of the Amended Project. Goulburn River National Park, Cope State Forest and other reserves are located within 20 km of the Subject Land and support foraging and breeding habitat. It is unlikely that the Amended Project will adversely affect habitat critical to the survival of the species.

disrupt the breeding cycle of an important population

6.46 ha of foraging and roosting habitat will be removed as part of the Amended Project. Goulburn River National Park, Cope State Forest and other reserves are located within 20 km of the Subject Land and support potential breeding habitat. It is unlikely that the Amended Project will adversely affect the breeding cycle of an important population of the species.

modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline

6.46 ha of foraging and roosting habitat will be removed as part of this Amended Project. The habitat that will be removed is already highly fragmented and disturbed in nature due to the current and historic agricultural use of the land. This will cause minor loss, fragmentation and decrease in quality of potential habitats at a local scale but this is not expected to modify habitat for the species to the point where it will be at risk of further decline.

result in invasive species that are harmful to a vulnerable species becoming established in the vulnerable species' habitat

The Amended Project is not expected to result in invasive species that are harmful to the species becoming established in Corben's long-eared bat habitat.

introduce disease that may cause the species to decline, or

There are no diseases known to be a threat to the species.

interfere with the recovery of the species.

The Conservation Advice (TSSC 2015) identifies threats likely to substantially interfere with the survival of the species:

The Amended Project may:

- result in habitat loss and fragmentation
- result in a reduction in hollow availability.

The Amended Project is not expected to:

- increase the likelihood of bushfires in and around the Subject Land
- increase the likelihood of exposure to agrochemicals
- increase grazing activities in the Subject Land

- increase predation by feral animals.

Conclusion

The removal of up to 6.46 ha of foraging habitat as a result of the Amended Project is unlikely to have a significant impact on large-eared pied bat.



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APPENDIX I

Response to BCS Submissions

umwelt
Environmental & Social Consultants

TALLAWANG SOLAR FARM

Response to Submissions Report – Biodiversity, Conservation and Science Directorate

DRAFT

April 2024

TALLAWANG SOLAR FARM

Response to Submissions Report – Biodiversity, Conservation and Science Directorate

DRAFT

Prepared by
Umwelt (Australia) Pty Limited
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Report No.	21139 /R25 Appendix I
Date:	April 2024

umwelt
Environmental & Social Consultants

[Add Addresses here if required]

APPROVED COMPANY ISO 9001
QMS Certification Services

This report was prepared using Umwelt's ISO 9001 certified Quality Management System.

Acknowledgement of Country

Umwelt would like to acknowledge the traditional custodians of the country on which we work and pay respect to their cultural heritage, beliefs, and continuing relationship with the land. We pay our respect to the Elders – past, present, and future.

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Document Status

Rev No.	Reviewer		Approved for Issue	
	Name	Date	Name	Date
Draft				

Biodiversity Response to Biodiversity, Conservation and Science Directorate (BCS) Submission

The BAM-C and BDAR should be submitted to consent authority within 14 days of certifying the BDAR

In accordance with section 6.15(1) of the Biodiversity Conservation Act 2016, 'a biodiversity assessment report cannot be submitted in connection with a relevant application unless the accredited person certifies in the report that the report has been prepared on the basis of the requirements of (and information provided under) the biodiversity assessment method as at a specified date and that date is within 14 days of the date the report is so submitted.' To meet this requirement a BDAR must be certified, for instance by signing and dating the first page, within 14 days of the relevant submission date of the EIS. In addition, the date of submission of the BDAR must be within 14 days of the date shown on the relevant finalised credit report generated using the BAM-C. The BDAR for the project was certified 7 July 2022 and the BAM-C generated credit report is dated 8 August 2022, whilst the EIS was exhibited on 28 October 2022. All of the above need to be certified and finalised within 14 days of submission of the EIS.

Recommendations:

1.1 Re-certify the BDAR within 14 days of its submission date, during the Response to Submissions.

1.2 Provide a BAM calculator credit report which has been finalised within 14 days of the certification of the BDAR.

Umwelt Response

1.1 and 1.2 – The Amended BDAR will be re-certified within 14 of its submission date, and a BAM calculator (BAM-C) credit report will be finalised within 14 days of certification of the Amdneded BDAR. The BAM-C report will be submitted separately to the NSW Biodiversity Accredited Assessor System (BAAS) with the Amended BDAR.

The BDAR should confirm that all components related to the construction of the project have been accounted for

The EIS for the project details the components which will be needed for the construction and operation of the solar farm, this includes:

- The bushfire requirements for the solar farm (Section 6.13.3.2 of EIS):
  - a 10 metre (m) Asset Protection Zone (APZ) for structures and associated infrastructure,
  - a 10 m setback line around the perimeter of the project along the fence line; and
  - an additional 40m setback around vegetated areas within the project area.
- Access requirements for the solar farm (Section 6.6.2.1 of EIS)
  - primary access to the project area from the Castlereagh Highway involving a local intersection widening to allow for a three-way intersection,
  - four alternate access points along Puggoon road to allow additional access for emergency vehicles; and
  - internal access roads consisting of compacted gravel approximately 6 m wide.

It is unclear, from review of Section 1.1 of the BDAR, if these project components have been accounted for in impact assessments. All development components which will result in loss of biodiversity values, must be accounted for in the development footprint and calculated in the total direct impact required for the project.

Recommendation:

2.1 Clarify that all project components required for construction and operation of the solar farm have been accounted for in the BDAR.

Umwelt Response

2.1 – The Amended BDAR and BAMC outputs have been prepared based on a Subject Land boundary that encompasses all project components.

The vegetation cover landscape assessment requires review

Section 1.3A and 1.3B of the BDAR detail the native vegetation extent within a 1500 m buffer area.

It is noted that the native vegetation within the subject site has not been mapped within these Figures. All native vegetation, inclusive of that present within the subject site should be included within the landscape native vegetation cover assessment. Section 3.2 of the BAM Operational Manual Stage 1 provides clarification and states that mapping requirements for the landscape vegetation cover class assessment must mirror that for the subject site and must be inclusive of all areas of native vegetation, including areas which are ground cover only.

When reviewing the BAM-C for the project, it is noted that a native vegetation cover of 65% has been entered. This is different from what is presented in Table 3.1 of the BDAR (59.4%), potentially this higher figure within the BAM-C may account for the vegetation within the subject site which has not been included in Figures 1.3A and 1.3B.

Section 3.1.2 of the BAM states that a landscape assessment area should be 1500 m for development site shaped projects or 500 m along a centre line of a linear-shaped project. BCS notes that a 1500 m buffer has been included for both the solar farm (development site shaped) and the transmission line (linear shaped). This may have resulted in an overestimate of vegetation cover.

Recommendation:

3.1 Review the landscape native vegetation cover assessment to ensure that vegetation within the subject site has been included

Umwelt Response

3.1 – The Native Vegetation Extent layer has been updated to inlucde the Subject Land and re-run based on the revised layour. Note that the transmission line area has been excluded from the Project and therefore only a 1500 m buffer has been applied as the assessment area.

Provide further details on conformance with threatened flora survey guidelines

Section A.1.2.3 of the BDAR states that, threatened flora targeted surveys were "generally in accordance with the NSW Guide to Surveying Threatened Plants (OEH 2016a)". It should be noted that this guideline was superseded by the document Surveying threatened plants and their habitats NSW survey guide for the Biodiversity Assessment Method (2020), prior to surveys within the project site occurring. The BDAR should be updated to demonstrate that targeted surveys undertaken conformed to the minimum requirements of the current threatened flora survey guidelines, specifically Tables 1-3 and Section 5.1.

If surveys have been undertaken which do not conform with the minimum requirements referenced above; further survey, assuming presence or an expert report will be required.

Recommendation:

4.1 Demonstrate that surveys conformed with relevant flora survey guidelines, specifically Tables 1-3 and Section 5.1

Umwelt Response

4.1 – Methodology in the Amended BDAR (Appendix A) has been updated to conform to 2020 guidelines. This includes the methodology detailed in Surveying threatened plants and their habitats NSW survey guide for the Biodiversity Assessment Method (2020) was utilized for threatened flora surveys.

Provide justification for the exclusion of species from unsurveyed potential habitat

Figure 2.1A – B of the BDAR shows the survey effort that was undertaken during Spring (October), Summer (February) and Winter (June and August). BCS notes that Spring surveys were not undertaken within the southern portion of the transmission line alignment and instead occurred in an area outside of the subject site, in an alternative transmission line alignment (See Figure 1 below). The unsurveyed area contains both derived native grassland and woodland representing PCT 281, totalling approximately 13 h cumulatively.

The following candidate species are associated with PCT 281 which have a survey window limited to Spring:

- Ausfeld's Wattle
- Gang-gang Cockatoo
- Pine Donkey Orchid
- Booroolong Frog
- Superb Parrot
- Prasophyllum sp. Wybong
- Silky Swainson-pea

The list above would be inclusive of species which can occur in derived native grassland and/or woodland. From review of the BAM-C, these species have been excluded on the basis of targeted survey across the entire subject site.

Justification should be provided on the exclusion of the species above from the unsurveyed habitat within the southern portion of the transmission line alignment in accordance with Section 5 of the BAM. If the unsurveyed habitat represents potential habitat for any of the species above a targeted survey to determine the presence or absence of the species', an expert report or assumption of presence will be required.

Recommendations:

5.1 Provide justification on the exclusion of the candidate species listed in this response from the unsurveyed habitat within the southern portion of the transmission line alignment.

5.2 If appropriate justification cannot be provided, undertake a targeted survey to determine the presence or absence of the species, prepare an expert report or assume presence.

Umwelt Response

5.1 & 5.2 – The transmission line component has been removed from the Project therefore no justification is required for the exclusion.

Species surveyed outside of the survey season should be justified

From review of the BAM-C it is noted that the Brush-tailed Phascogale has been excluded as a candidate species for the project site on the basis of targeted survey. Targeted survey for this species involved deploying a camera array for 15 days in August 2021. The survey window for the Brush-tailed Phascogale is Dec-Jun. No justification has been provided in the BDAR regarding surveying out of season for Brush-tailed Phascogale. The Brush-tailed Phascogale has a semelparous breeding cycle where all mature males of this species will die-off in early winter, reducing the overall population. This has the potential to marginalise the potential detection rate of the species during winter surveys. In addition, from review of the BAM-C, the Booroolong Frog has also been excluded as a candidate species for the project on the basis of targeted survey. According to the BDAR, targeted survey for this species involved spotlighting and call playback undertaken during June and August 2021. This species shelters during the months of winter under rocks in riparian habitat and would be unlikely to respond to call-play back outside of their breeding periods. This has the potential to significantly marginalise the potential detection rate of the species during winter surveys. It is noted that the survey month of October was selected for this species in the BAM-C, it is unclear if this is a transcription error between the BDAR and BAM-C

Further information should be provided to justify that the surveys undertaken for the species above were adequate. If appropriate justification cannot be provided, a targeted survey to determine the presence or absence of the species, an expert report or assumption of presence will be required.

Recommendations:

6.1 Provide justification that the targeted surveys undertaken for the species detailed in this response were adequate to determine presence/absence.

6.2 If appropriate justification cannot be provided, undertake a targeted survey to determine the presence or absence of the species, prepare an expert report or assume presence.

Umwelt Response

6.1 & 6.2 – Further justification has been provided in Appendix D of the Amended BDAR. Both the bruth-tailed phascogale and Booroolong frog have been excluded based on lack of habitat and additional advice for the brush-tailed phascogale relating to the Subject Land being outside their predicted range. Specifically, on 6 April 2023, Umwelt received advice from the brush-tailed phascogale threatened species officer that confirms that the species can be excluded form assessment based on geographic restrictions.

Regarding Booroolong frog habitat, the proponent will not be impacting any Booroolong frog habitat as the transmission line that was to pass over the top of Tallawang Creek, has been removed from the Project. Therefore, Boorloolong frog habota associated with Tallawang Creek will not be subjected to any impacts associated with the Amended Project.

It is unclear why vegetation plots have been completed but not included in the BAM-C

Section A.1.2.2 states that, A total of 36 BAM plots were conducted within the Subject Land during the surveys undertaken for this assessment (refer to Figure 2.1), although only a total of eight plots were required to calculate the credit requirement of the Subject Land.

From reviewing the plot data provided in the BAM-C and the field data sheets it has been identified that only a subset of 8 vegetation plots have been included in the BAM-C and provided to BCS. All survey data should be provided when submitting the BDAR for review.

In addition, it is noted that 3 of the 8 vegetation plots selected for inclusion have been duplicated across the vegetation zones 281_Moderate_solar and 281_Moderate_ETL, these plots are:

- P21139_013
- P21139_022
- P21139_036

If additional plots have been completed and they are representative of the relevant vegetation zone they should be entered in the BAM-C. If plots have not been used because they are not within the project footprint, or for any other reason, this should be clearly justified in the BDAR for each plot.

Providing the spatial location and data associated with the 36 BAM plots collected on site will likely assist in providing BCS with further context and understanding behind the decision logic used to exclude and include plots.

Where plots have been duplicated to make up minimum plot numbers, justification must be provided in the BDAR as to why this was the most appropriate method for the zone. Where enough plots exist for a vegetation zone, but plots have been duplicated instead of using all collected plots, adequate justification must be provided as to why the discarded plots were not representative of the site and why duplicating plots was more appropriate. Additionally, adequate justification must be provided for the selection of the plots to be duplicated.

Recommendations:

7.1 Include all plots in the BAM-C or provide justification in the BDAR as to why they have not been entered.

7.2 Provide justification as to why discarded plots were not representative of the site and why duplicating plots was more appropriate

Umwelt Response

All plots associated with each vegetation zone represented in the Subject Land have been included in the BAM-C and Appendix C of the Amended BDAR.

The indirect impacts associated with the project are unclear and should be clarified

Section 5.1.2 of the BDAR states that "the project is not expected to result in any substantial indirect impacts on the biodiversity values of the adjacent land. One Indirect Impact Zone has been identified within the Subject Land. The indirect impact is related to the construction of a security fence around the solar farm and BESS development area and has been discussed in Section 5.2. The indirect impact zone was assessed using a 5 m buffer off the security fence layout, refer to Figure 4.2."

It is unclear from the BDAR if offsetting of residual indirect impacts is being proposed and, if so, how the buffer of the security fence has been accounted for in the BAM-C. If residual indirect impacts are expected to occur, offsetting of this residual impact should be proposed in accordance with Section 8.6 of the BAM.

It is also unclear how the indirect impacts associated with the construction of the security fence relate the indirect impact zone displayed in Figure 4.2B of the BDAR. This Figure shows an indirect impact zone across the entire of the subject site (See Figure 2).

Recommendations:

8.1 Provide further explanation on the indirect impacts associated with the security fence and if any residual indirect impacts are expected to occur

8.2 If residual indirect impacts are expected to occur, this impact should be offset

8.3 Provide clarity on the indirect impact zone displayed in Figure 4.2B of the BDAR

Umwelt response

The site security fence perimeter for the Amended Project has been realigned to improve wildlife connectivity through the site. The revised design removes fencing from around much of the native vegetation to be retained on site and provides an open corridor between the northern and western boundaries (refer to **Figure 2.1** of Amended BDAR) to minimise the indirect impacts associated with the fence. The Amended BDAR provides an updated evaluation of the indirect impacts associated with the security fence and identifies any residual indirect impacts that are expected to occur.

Figure 4.2 has been omitted to remove confusion of any suggestion of potential indirect impacts.

Review of species identification and data entry may be required

From review of the floristic data collected in BAM plot surveys Themeda quadrivalis (Grader Grass) was identified in Plot P21139_032 (contributing to 30% cover across the plot).

Detection of this species on the project sites seems unusual, as it is native to typically occurs in tropical and sub number of times within the tropical environments. In NSW it has been detected a small number of times within the NSW NorthCoast Bioregion, (Australian Virtual Herbarium 2022). Potentially this species has been mis-identified from the native species Themeda triandra (Kangaroo Grass) or there has been a transcription error when inputting data.

BCS recommend that an audit of species identification and data entry is undertaken to identify potential errors. Species identification and data entry is an important factor contributing to the data collected under the BAM, as many key aspects of the assessment are informed by species identification, including:

- PCT selection and TEC identification
- vegetation condition mapping
- compositional and structural scores for plots
- targeted flora survey

Recommendation

9.1 Audit species identification and data entry outcomes

Umwelt response:

9.1 – *Themeda quadrivalis* was an erroneous entry. The Amended BDAR has corrected this error and data used in the BAM-C has been updated accordingly. The correct species identification is *Themeda triandra*.

It is the role of the consent authority to determine whether an impact is Serious and Irreversible

Section 5.3.1 of the BDAR states:

"An impact is to be regarded as serious and irreversible if it is likely to contribute significantly to the risk of a threatened species or ecological community becoming extinct if:

- *It will cause a further decline of the species or ecological community that is currently observed, estimated, inferred, or reasonably suspected to be in a rapid rate of decline, or*
- *It will further reduce the population size of the species or ecological community that is currently observed, estimated, inferred, or reasonably suspected to have a very small population size, or*
- *The impact on the habitat of a species or ecological community that is currently observed, estimated, inferred, or reasonably suspected to have a very limited geographic distribution, or*
- *The impact on a species or ecological community that is unlikely to respond to measures to improve habitat and vegetation integrity and is therefore irreplaceable.*
- *In relation to the Box-Gum Woodland CEEC, none of the principles above are considered likely to occur as a result of the proposed project."*

It should be noted that it is the role of the consent authority to determine whether an impact will be serious and irreversible.

Recommendation:

10.1 Remove statements in relation to SAII from the BDAR which are the role of the consent authority to determine

Umwelt response

10.1 – Comments in relation to SAII have been removed from the Amended BDAR.

The consent authority notes that the proponent has undertaken reasonable steps to reduce their impacts to SAII entities

For Box Gum Woodland CEEC, the BDAR states that the project will result in a loss of:

- 10.96 ha of good condition woodlands
- 17.11 ha of derived native grasslands

Box Gum Woodland CEEC is listed as a candidate SAII entity under Principle 1 and Principle 2 in accordance with Section 6.7 of the Biodiversity Conservation Regulations 2017. These Principles state:

An impact is to be regarded as serious and irreversible if it is likely to contribute significantly to the risk of a threatened species or ecological community becoming extinct because:

- Principle 1: it will cause a further decline of the species or ecological community that is currently observed, estimated, inferred or reasonably suspected to be in a rapid rate of decline, or
- Principle 2: it will further reduce the population size of the species or ecological community that is currently observed, estimated, inferred or reasonably suspected to have a very small population size.

The Final Determination for this community lists the clearing of native vegetation as a key threating process for the CEEC. In addition, there is no minimum clearing threshold identified within relevant databases which could be considered an insignificant decline in this community, therefore any incremental loss in extent could be seen as contributing to the principles above.

Given the above, adequate avoidance of Box Gum Woodland should be a critical factor of consideration for the consent authority.

The consent authority should note that, based on the design of the project, BCS considers that the proponent has taken reasonable steps when locating the solar farm arrays to avoid higher biodiversity value representations of this SAII entity within the project site. However, further detail and justification should be provided for the transmission line alignment to demonstrate that the option proposed represents the least amount of impact to this SAII entity (See Talking Point 12 below).

Recommendation:
11.1 That the consent authority notes BCS advice in relation to SAII impacts to Box Gum Woodland CEEC when considering the adequacy of avoidance and minimisation to biodiversity impacts proposed.

Umwelt response:

11.1 – Noted. The transmission line has been removed from Project therefore no further justification required.

Avoidance measures undertaken for the transmission line should be clarified

Figure 4.1A of the BDAR details the options considered for the transmission line alignment, showing three potential considerations.

It is unclear from the Figure if the selected alignment represents the least impact to biodiversity values from the options considered.

It would provide further context if biodiversity value mapping was overlaid in this Figure and if the Figure was supported by a Table comparing the relative impact of the options.

Recommendation:

12.1 Provide further detail on the options considered for the transmission line alignment and why the proposed option represents the least impact to biodiversity values

Umwelt response:

12.1 – The transmission line has been removed from the Project. The Amendment BDAR presents an updated assessment of the biodiversity related impacts associated with the Project.

Further justification be provided on the minimum criterion applied in land category assessments

Section 2.2 of Appendix G states:

'Grasslands across the whole Project Area have experienced an extensive history of cropping, grazing, and pasture improvement activities. Noting that this previous disturbance, alone, does not preclude the presence of the TEC, further analysis has been completed to support classification of this grassland as Category 1-Exempt Land.

The analysis presented below has been completed in consideration of the Final Determination (NSW Scientific Committee 2020) to determine whether these grasslands conform to the CEEC. Where the grasslands do not conform to the CEEC they have been considered and mapped as Category 1-Exempt Land.'

In general, BCS support the approach taken to analyse potential conformance of Category 1 land with the Box Gum Woodland CEEC.

However, it is unclear how a minimum metric of "At least 20% of flora species in Vegetation Integrity Plot are characteristic of the CEEC in the Patch and Measure proportion of understorey that is native and exotic in the Patch" was determined and the justification behind this minimum criterion. BCS also notes that some of the plots used to contribute to Category 1 land mapping would represent VI scores which are ≥15, when analysed via the BAM-C.

Further justification with reference to the final determination for Box Gum Woodland should be undertaken to support the minimum metric of "At least 20% of flora species characteristic of the CEEC in the Patch and Measure proportion of understorey that is native and exotic in the Patch" applied to the areas of derived native grassland.

Recommendations:

13.1 The proponent note that BCS is supportive of the approach taken to analyse potential conformance of Category 1 and with the Box Gum Woodland CEEC

13.2 Further justification with reference to the final determination for Box Gum Woodland should be undertaken to support the minimum condition criterion referenced in this response

Umwelt response:

3.1 – Noted.

3.2 – There are no identification thresholds identified in the NSW Threatened Species Scientific Committee – final determination for Box Gum Woodland listed under the BC Act (NSW Threatened Species Scientific Committee 2020). As such an identification threshold was developed for the purposes was distinguishing between Box Gum Woodland DNG CEEC and Category 1 – Exempt Land. The thresholds developed (**Table 2.1** in Appendix G of the Amended BDAR) are conservative and it is believed that the precautionary principal was used while they were developed. For the area to be discounted, and therefore not eligible for Category 1 – Exempt Land Status, it had to have a minimum of 20% of recorded species that are characteristic Box Gum Woodland species and at least 50% native vegetation cover.

The result of this analysis against the *White Box Yellow Box Blakely's Red Gum Grassy Woodland and Derived Native Grassland CEEC* listed under the BC Act found that the grassland does not conform to the CEEC. This is because the patch does not contain sufficient box gum woodland characteristic species (~11%) and the patch is dominated by exotic species (exotic species cover of the patch is greater than 50%).

Data inconsistencies should be reviewed

As part of the data audit, BAM-C data was compared to the BAM plot data sheets submitted to BCS.

Inconsistencies were identified between plot data sheets and the data that has been entered into the BAM-C, these inconsistencies are highlighted in Table 1-3 below. The data provided in the plot data sheets must be consistent with the data entered into the BAM-C, any errors in the calculator will have an impact on the final credit liability for the project.

Recommendation:

14.1 Review the data inconsistencies referenced in this response.

Umwelt response:

14.1 – Data in BAM-C are correct. Appendix C of Amended BDAR has been updated.



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