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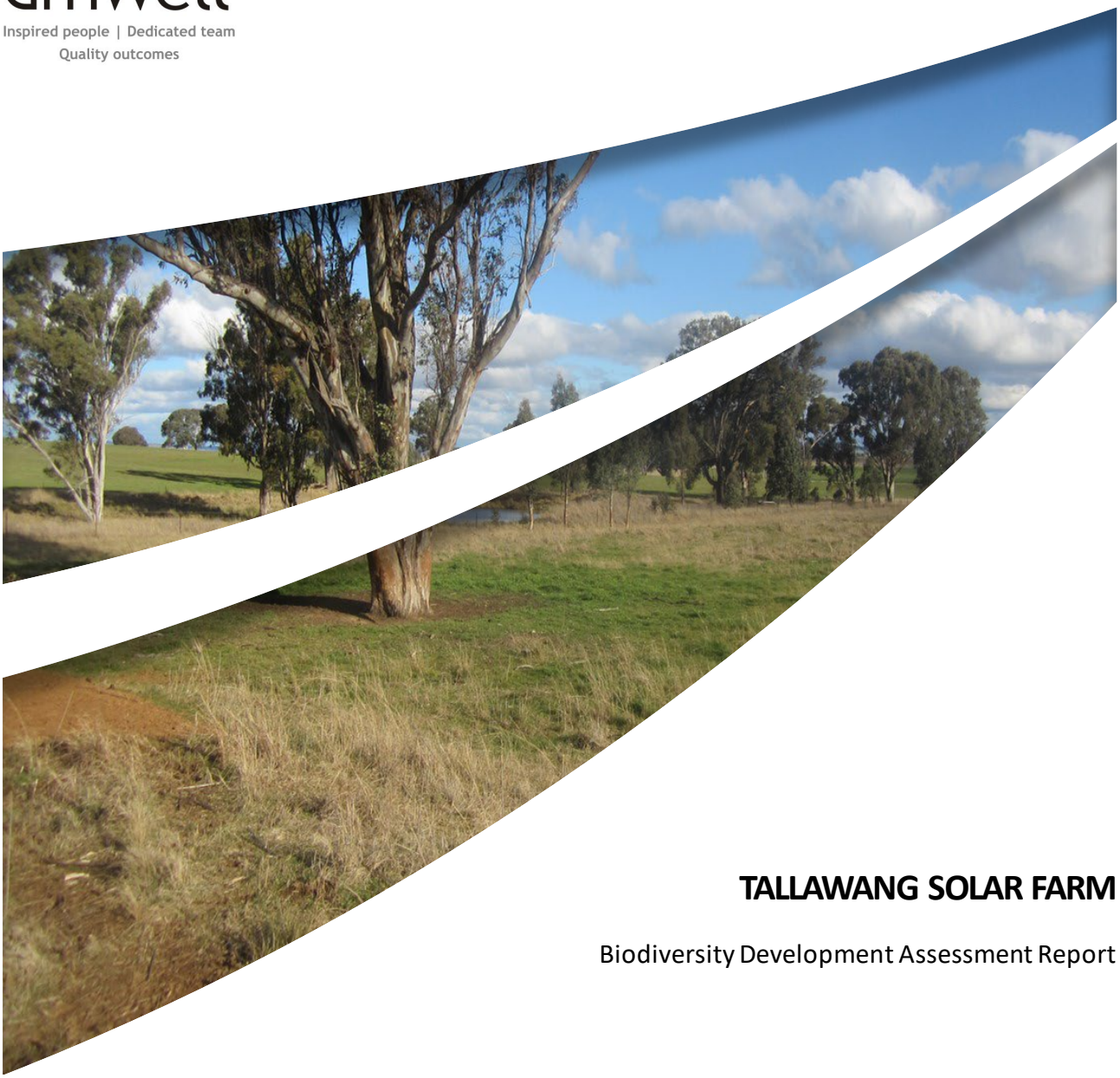

TALLAWANG SOLAR FARM

Biodiversity Development Assessment Report

FINAL

July 2022

TALLAWANG SOLAR FARM

Biodiversity Development Assessment Report

FINAL

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

Project Director:	Malinda Facey
Project Manager:	Marion O'Neil
Technical Director:	Shaun Corry
Technical Manager:	Belinda Howe
Report No.	21139/R05
Date:	July 2022

umwelt
Environmental & Social Consultants

75 York Street, Teralba, NSW 2284

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.

Document Status

Rev No.	Reviewer		Approved for Issue	
	Name	Date	Name	Date
1	Shaun Corry	18/03/2022	Malinda Facey	21/03/2022
2	Allison Riley	12/04/2022	Malinda Facey	12/04/2022
Final	Shaun Corry	5/07/2022	Malinda Facey	11/07/2022

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) on 11/07/2022

Name:	**Belinda Howe**
Signature:	
Date:	11/07/2022
BAM Assessor Accreditation No:	BAAS21019

Executive Summary

Umwelt was engaged by RES Australia Pty Ltd, the Proponent, to prepare a Biodiversity Development Assessment Report (BDAR) for the proposed Tallawang Solar Farm located north of Gulgong, NSW (the Project).

The Project will involve the construction, operation and decommissioning of a 500-megawatt (MW) solar farm with a Battery Energy Storage System (BESS) of approximately 200 MW/400 MW-hours, associated infrastructure, and a 330 kilovolt (kV) overhead transmission line of approximately 13 km long which will connect the Project to the national electricity grid. The development footprint of the Project is approximately 865.54 hectares (ha).

This BDAR has been prepared by Umwelt for RES to assess the potential biodiversity impacts of the Project in accordance with the Biodiversity Assessment Method (BAM).

Surveys identified the following Plant Community Types (PCTs) and vegetation:

- Category 1 – Exempt Land (833.9 ha within the solar farm/BESS and transmission line).
- PCT81 Western Grey Box - cypress pine shrub grass shrub tall woodland in the Brigalow Belt South Bioregion moderate condition (1.39 ha within the solar farm/BESS).
- 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 (10.96 ha, 2.63 ha within solar farm/BESS and 8.33 ha within the transmission line).
- 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 (1.47 ha within the solar farm/BESS).
- 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 derived native grassland (17.11 ha within the transmission line).

Noting dam, road, structures account for 0.75 ha, totalling the Category 1 – Exempt Land and described PCTs to the total footprint of 865.54 ha.

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 1124) are required to offset the impacts of the Project:

- 45 credits for PCT81 Western Grey Box - cypress pine shrub grass shrub tall woodland in the Brigalow Belt South Bioregion.
- 609 credits for 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 woodland
    - 146 credits within the solar farm BESS

- 463 credits within the transmission line.

- 47 credits for 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.

- 423 credits for 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 derived native grassland.

Glossary

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	Commonwealth Department of Agriculture, Water and Environment
DNG	Derived Native Grasslands
DPE	Department of Planning and Environment (formerly DPIE)
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 a 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
Project area	The total area in which the Project would be developed. The Project Area covers approximately 1,370 ha and includes the solar farm site and BESS development area and the transmission line corridor.
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.
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 Project Area that will be disturbed by the 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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Appendices

1.0 Introduction

Umwelt (Australia) Pty Ltd (Umwelt) was engaged by the RES Australia Pty Ltd (RES) to prepare a Biodiversity Development Assessment Report (BDAR) for the proposed Tallawang Solar Farm located in the mid-west region of New South Wales (NSW).

1.1 Project Description

RES is seeking to develop the proposed Tallawang Solar Farm (the Project), approximately 8 kilometres (km) northwest of Gulgong within the Mid-Western Local Government Area (LGA) of NSW (refer to **Figure 1.1**).

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 will involve the construction, operation and decommissioning of a 500 megawatt (MW) solar farm with a Battery Energy Storage System (BESS) of approximately 200 MW/400 MW-hours, associated infrastructure, and a 330 kilovolt (kV) overhead transmission line of approximately 13 km long which will connect the Project to the national electricity grid. The Project's conceptual layout is included in **Figure 1.2**. One onsite switchyard and a 330 kV substation is proposed, at two possible locations within the solar farm and BESS development area (refer **Figure 1.2**), with approval being sought for both options. The final location of the onsite switchyard and substation will be determined during detailed design and dependant on the final alignment of the CWO-REZ transmission line.

The Project will have access from the Castlereagh Highway a newly proposed access point via a local unserviced road directly south of the Project Area (refer to **Figure 1.1**). After investigation of possible accesses, the final location of the access was determined in consultation with the road authority and Mid-Western Regional Council.

The Project will connect to the grid via the proposed CWO-REZ Transmission Project (including new 500 kV and 330 kV transmission lines, substations and related infrastructure) currently being developed by the NSW Government to support the growth of the CWO-REZ. The CWO-REZ Transmission Project is subject to a separate development application process that will be progressed by the Energy Corporation of NSW (EnergyCo).

The final arrangement and design of the CWO-REZ Transmission Project has not yet been confirmed, however based on consultation between the Proponent and NSW Government, it is anticipated that the grid connection point for the Project will be via a proposed switching station near to the proposed Barneys Reef Wind Farm project area, directly north of the Tallawang Solar Farm. This proposed development does not include the development or construction of the switching yard. The proposed Barneys Reef Wind Farm is also being developed by RES and subject to a separate development application process. The switching station at the grid connection point will form part of the CWO-REZ Transmission Project. The proposed switching station will support independent connections from both the Tallawang Solar Farm and Barneys Reef Wind Farm projects. It is possible that the switching station will also be utilised to connect 3rd party renewable energy developments as part of the growth of development within the CWO-REZ.

To support the approval process, a 60 m wide corridor of approximately 13 km long has been identified by RES to support access to the anticipated connection point.

The final placement of the transmission line for the Project will reviewed once detailed information associated with the CWO-REZ becomes available to the Proponent. Variation to the alignment will be determined in coordination with the layout for the proposed Barneys Reef Wind Farm project.

The Project Area as illustrated on **Figure 1.1** encompasses eight freehold properties and some parcels of Crown Land ('paper roads'), covering an area of approximately 1,370 ha. These properties are primarily utilised for cropping and grazing activities.

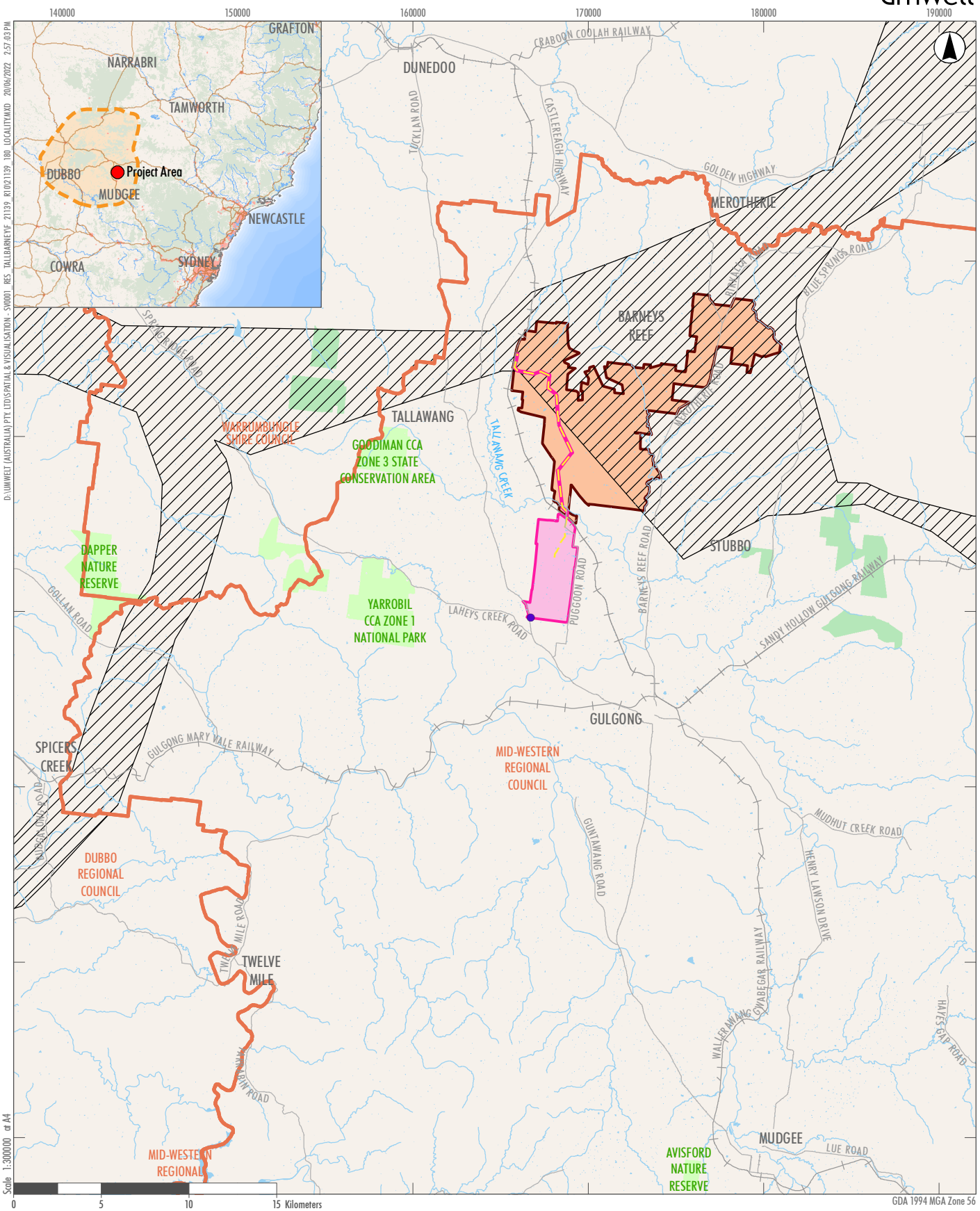
For the purposes of this assessment, the areas within the Project Area subject to direct impacts are referred to as the Subject Land and makes up approximately 866 ha of the Project Area.

The Subject Land is defined as the area inclusive of:

- Development footprint of the solar farm site and BESS development area.
- Transmission line corridor of approximately 13 km long and 60 m wide for an overhead 330kV transmission line connecting the Project to the proposed new switching station and CWO-REZ transmission project infrastructure. As the development footprint of the transmission line corridor was not known at the time of preparing this assessment, full clearing of the transmission line corridor was assumed as a conservative estimate of the area that will require clearing.

The Project is expected to generate up to 270 direct Full Time Equivalent (FTE) jobs over the 34-month construction period and 7 direct FTE jobs during operation. The operational life of the Project is expected to be 35 years.

The Project is a State Significant Development (SSD) under the State Environmental Planning Policy (Planning Systems) 2021 as the capital value of the Project is over $30 million. A development application (DA) for the Project is required to be submitted under Part 4 of the *Environmental Planning and Assessment Act 1979* (EP&A Act).



Legend

- Tallawang Solar Farm Project Area
- Barneys Reef Wind Farm Project Area
- Proposed HV Powerline
- Indicative Proposed Central West Orana REZ Transmission Corridor
- Indicative Central-West Orana Renewable Energy Zone
- Access Point
- National Parks (NPWS Estate)
- State Forest
- Road
- Drainage Line
- Railway Line

FIGURE 1.1

Location and Local Context

Image Source: Data source: Geoscience Australia; Forestry Corporation of NSW (2019); DSFI (2017); NPWS Estate (2019)

1.2 Location

The location of the solar farm and BESS, and overhead transmission line (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 1.1** 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 DPE with the submission of the BDAR.

Table 1.1 Subject Land Location in the Landscape

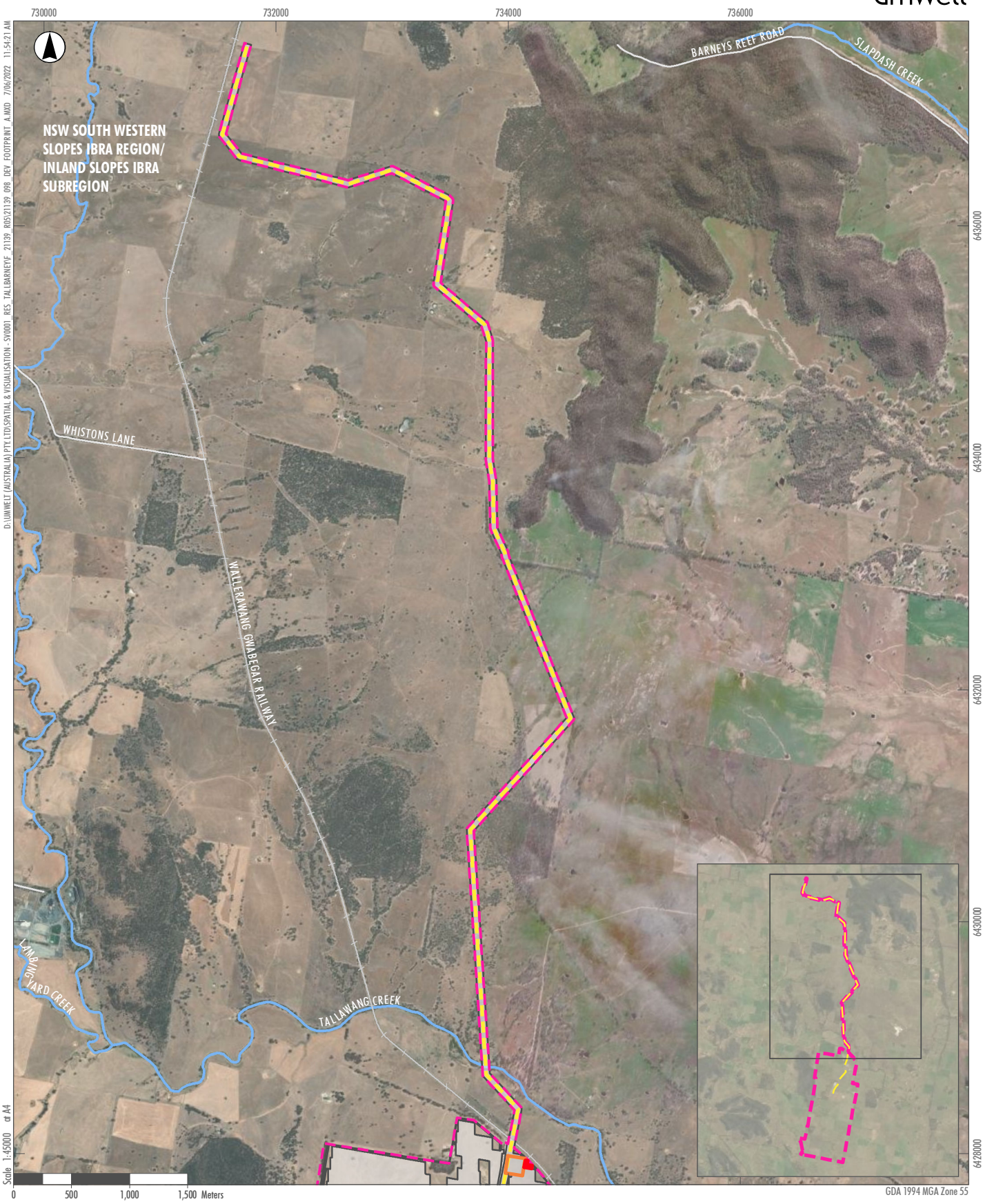
Subject Land Location in the Landscape	
IBRA Bioregion	NSW Southwestern Slopes
IBRA Subregion	Inland Slopes
Mitchell Landscape	Gulgong Ranges, Cope Hills Granite, Talbragar – Upper Macquarie Terrace Sands and Gravels
LGA	Mid-Western
Assessment Type	Major Project – Site-based
Subject Land Size	864.79 hectares

1.3 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 Project in such a way that the Subject Land assessed in this 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 contains 833.86 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. The land categorisation process was done 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 solar farm site and discuss the assessment process. the methodology used to produce this mapping is provided in **Appendix G**.



Legend

- Tallawang Solar Farm Project Area
- Proposed HV Powerline
- Subject Land

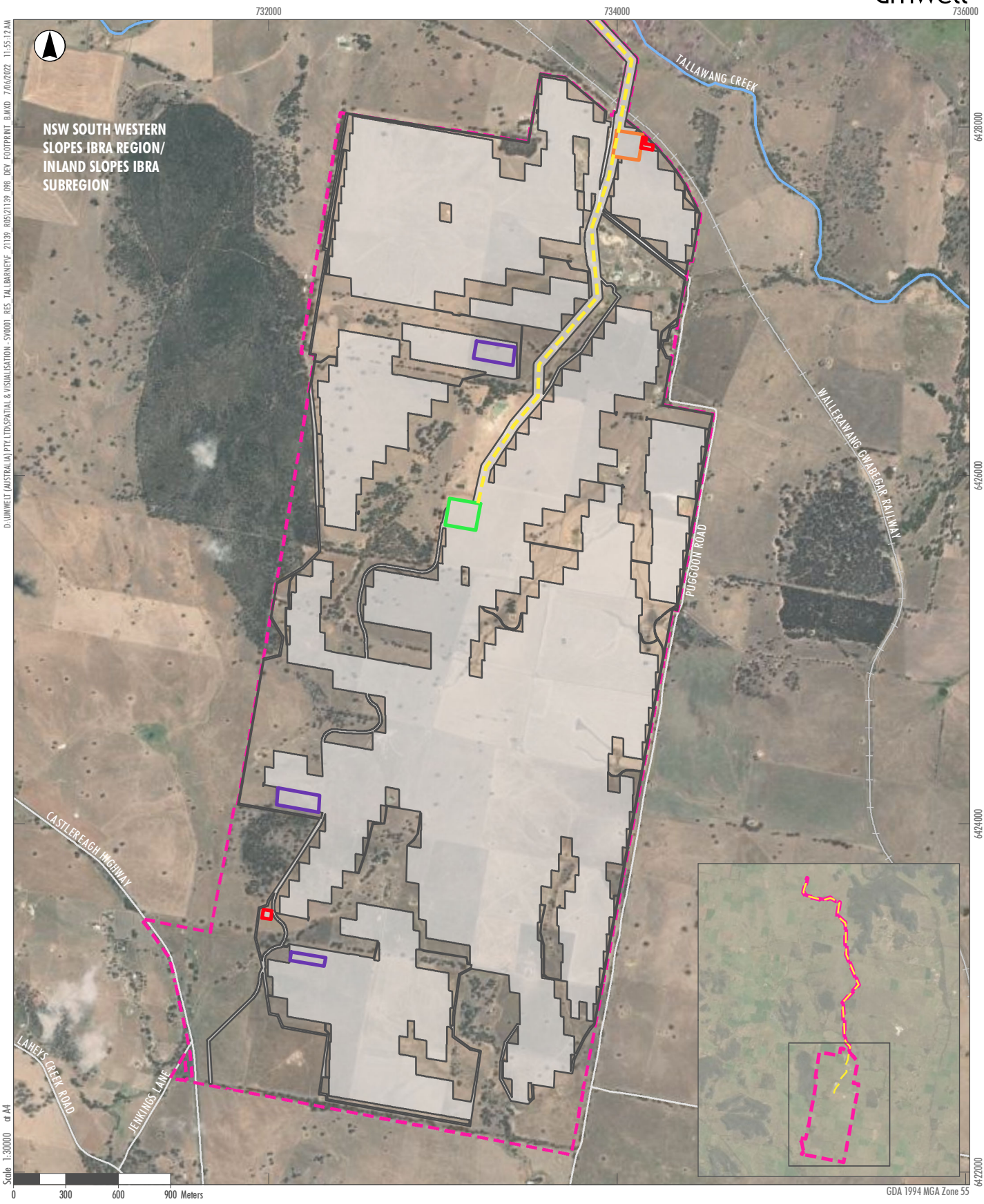
Site Infrastructure

- O&M Facility
- Proposed Substation (Northern Option)

FIGURE 1.2A

Development Footprint

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



Legend

- Tallawang Solar Farm Project Area
- Proposed HV Powerline
- Subject Land

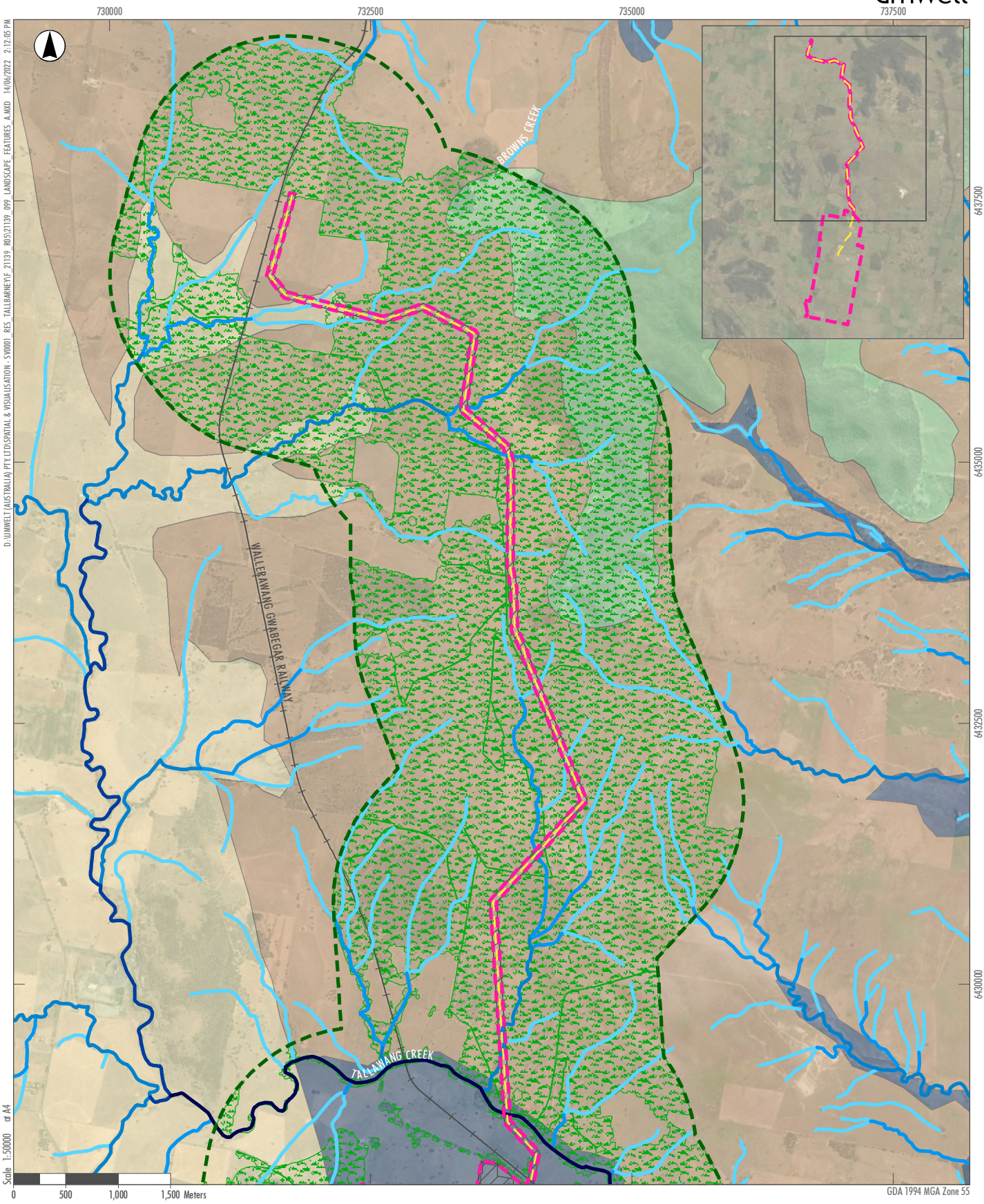
Site Infrastructure

- Construction Compound/Laydown
- O&M Facility
- Proposed Substation (Central Option)
- Proposed Substation (Northern Option)

FIGURE 1.2B

Development Footprint

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



Legend

- Tallawang Solar Farm Project Area
- Subject Land
- Proposed HV Powerline
- 1500m Buffer
- Native Vegetation

Mitchell Landscape

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

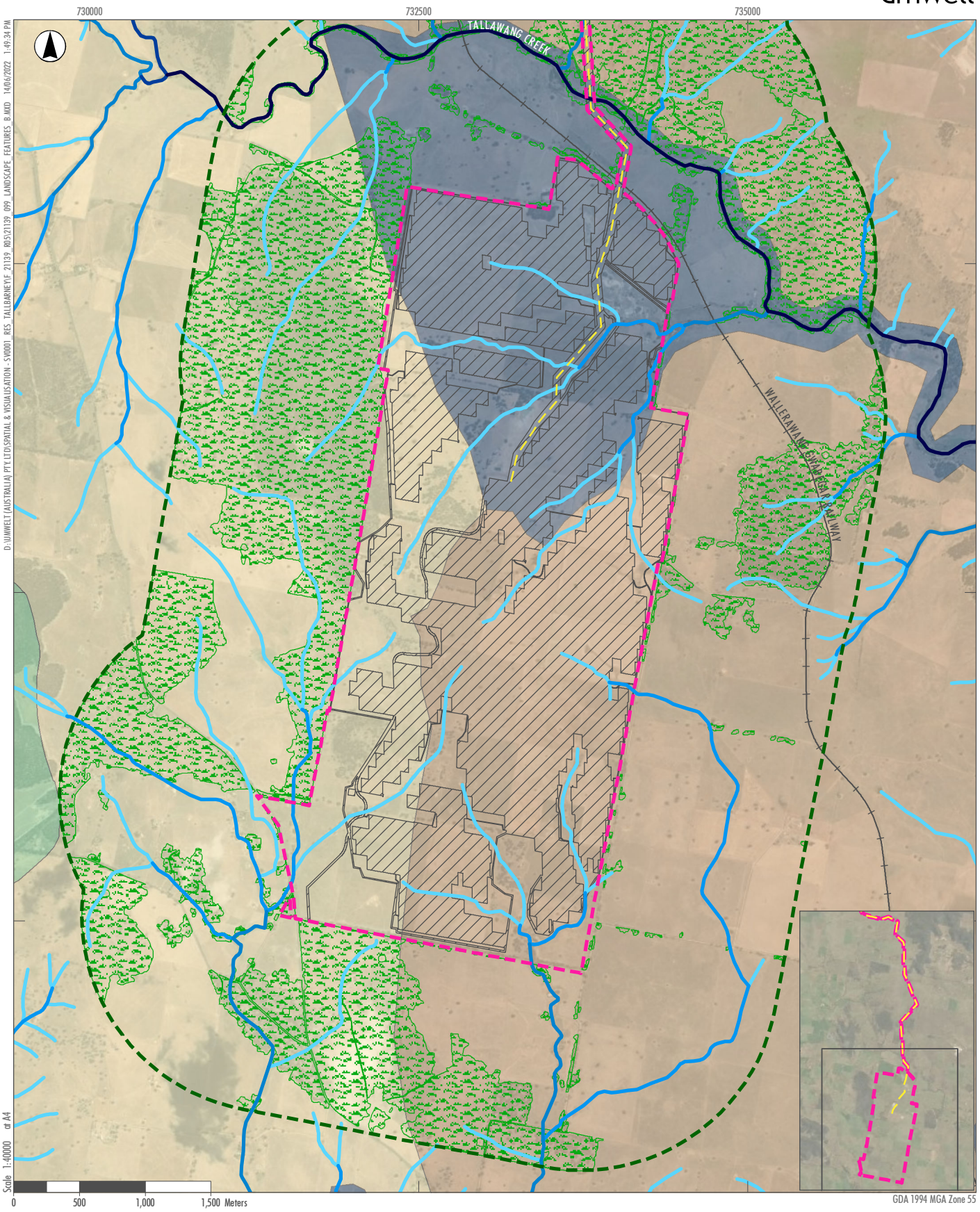
Strahler Stream Order

- 1st Order
- 2nd Order
- 3rd Order
- 4th Order
- 5th Order or Greater

FIGURE 1.3A

Landscape Features

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



Legend

- Tallawang Solar Farm Project Area
- Subject Land
- Proposed HV Powerline
- 1500m Buffer
- Native Vegetation

Mitchell Landscape

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

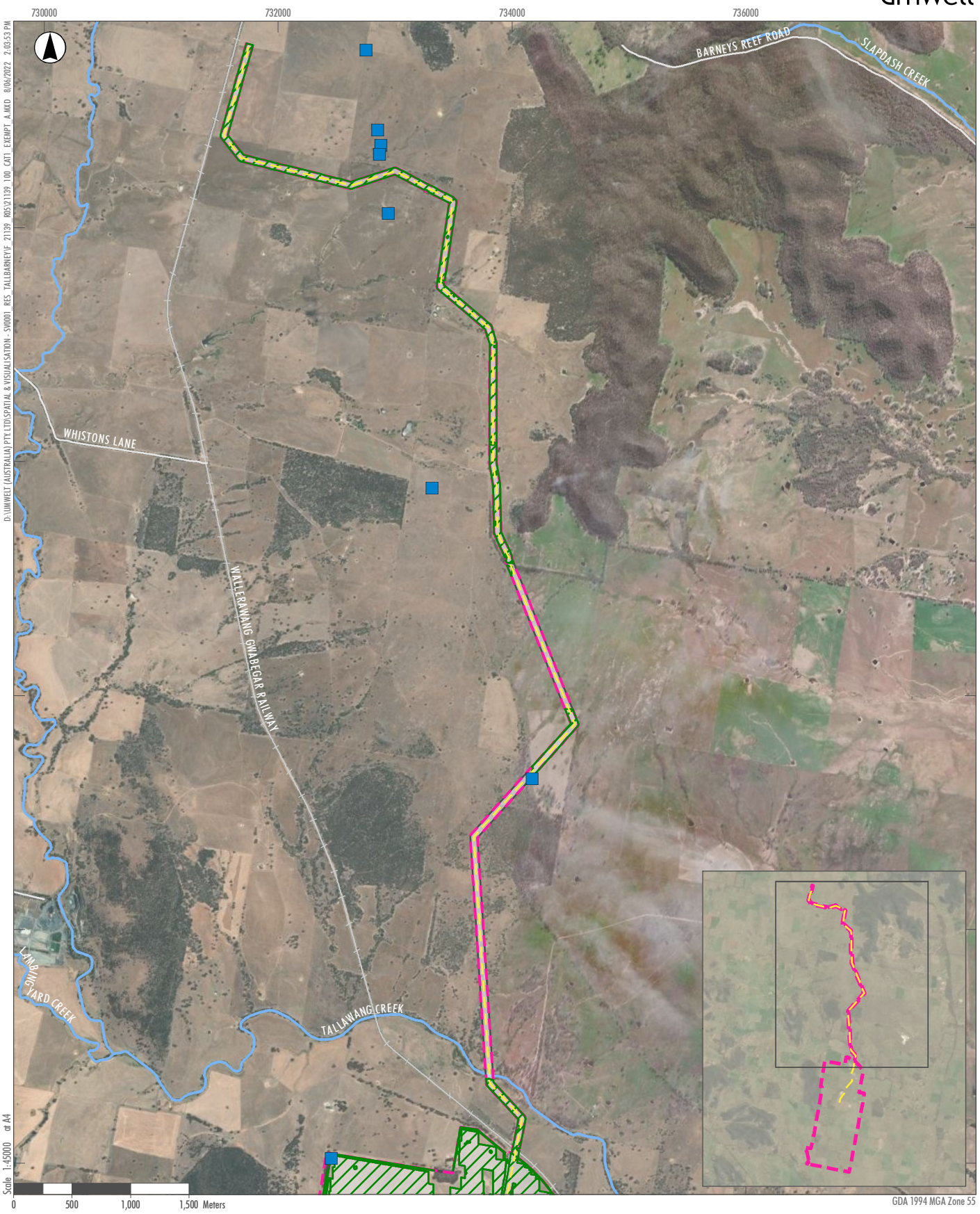
Strahler Stream Order

- 1st Order
- 2nd Order
- 3rd Order
- 4th Order
- 5th Order or Greater

FIGURE 1.3B

Landscape Features

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



Legend

- Tallawang Solar Farm Project Area
- Proposed HV Powerline
- Subject Land
- Category 1 - Exempt Land

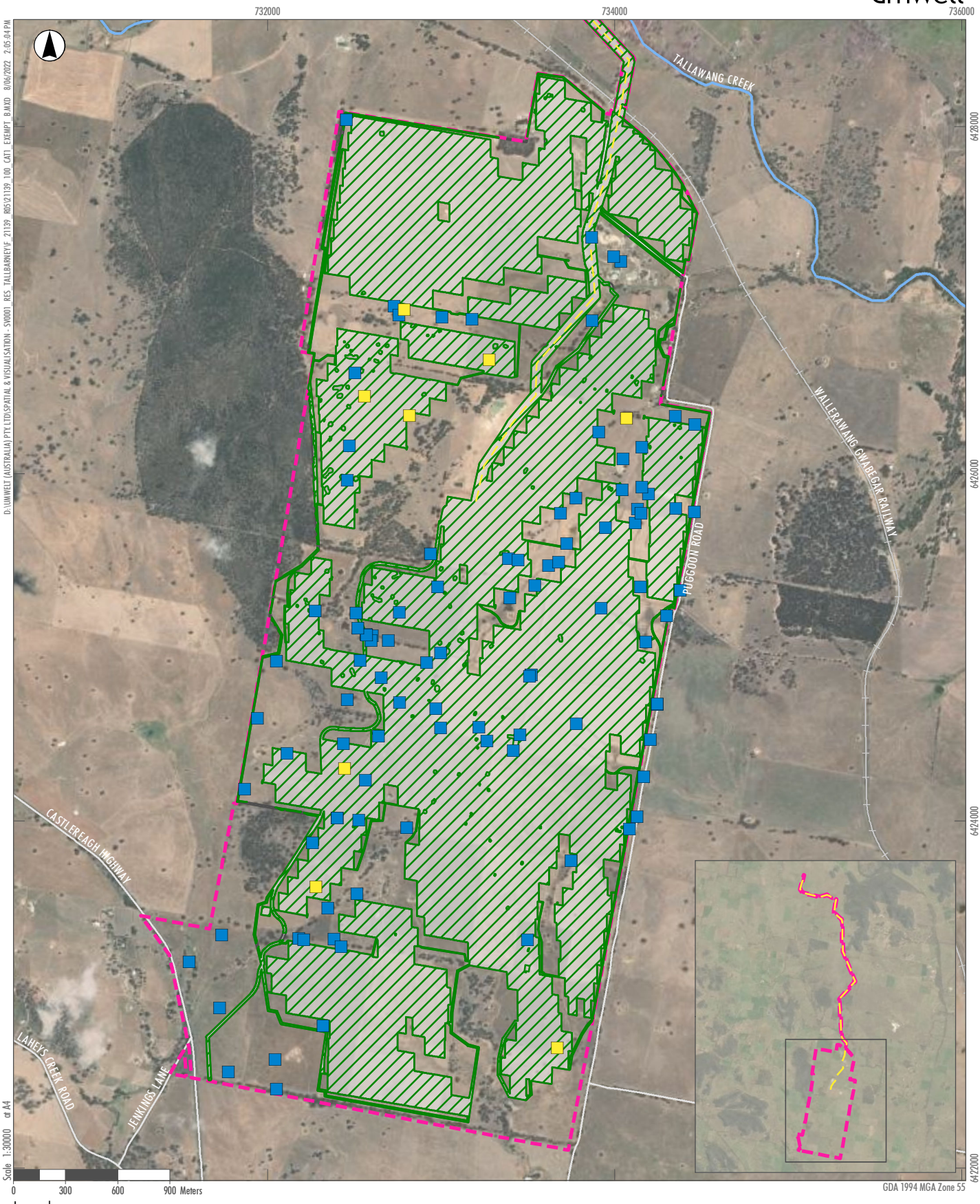
Category 1 - Exempt Land Data Collection

- Category 1 - Exempt Land Condition Rapid Assessment

FIGURE 1.4A

Category 1 - Exempt Land

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



Legend

- Tallawang Solar Farm Project Area
- Proposed HV Powerline
- Subject Land
- Category 1 - Exempt Land

Category 1 - Exempt Land Data Collection

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

FIGURE 1.4B

Category 1 - Exempt Land

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

1.3.1 Local Ecological Context

The land uses immediately surrounding the 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.

1.4 Consultation with Biodiversity Conservation and Science

Biodiversity Conservation and Science (BCS), a division of DPE, has been consulted during the preparation of this BDAR. Key elements of the biodiversity assessment discussed were:

- Assessment of Serious and Irreversible Impacts (SAII), including SAII interaction with Category 1 – Exempt Land
- Methodology used to assess and map Category 1 – Exempt Land.

A site visit was conducted on 10 June 2022 with representatives from RES, BCS, and Umwelt present. On this site visit land mapped as Category 1 – Exempt Land, remnant woodland and derived native grassland were inspected and the biodiversity assessment process for the project was discussed.

1.5 Key Resources, Policies and Documents

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

- Biodiversity Assessment Method 2020 (DPIE 2020a)
- Biodiversity Assessment Method Operational Manual (Stage 1) (DPIE 2017)
- Biodiversity Assessment Method Calculator
- BioNet Atlas of NSW Wildlife database and mapping tool (DPE 2022a), last accessed March 2022
- 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 (DPIE 2020b) and
- Commonwealth Department of Agriculture, Water and the Environment (DAWE) Protected Matters Search Tool (DAWE 2022), last accessed March 2022.

1.6 SEARs Requirements

A scoping report was prepared for the Project and SEARs were received in November 2021. In addition, the EPBC referral was submitted and accepted by the DAWE, in March 2022. **Table 1.2** details the SEARs (November 2021) provided by DPIE (now DPE) relevant to this biodiversity assessment.

Table 1.2 SEARs (November 2021) provided by DPIE relevant to this biodiversity assessment

SEARs Requirement	Relevant Report Section
Category 1 – Exempt Land	

Clearing of native vegetation on land that meets the definition of Category 1 - exempt land (as defined under the *Local Land Services Act 2013* (LLS Act)) does not require assessment or offsetting under the *Biodiversity Conservation Act 2016.* Prescribed impacts as outlined in chapter 6 of the Biodiversity Assessment Method (2020) must still be considered on Category 1 - exempt land. In addition, potential impacts to Matters of National Environmental Significance under the *Environment Protection and Biodiversity Conservation Act 1999* on Category 1 – exempt land must be considered.
Where an assessor identifies land as Category 1 – exempt land it must be adequately demonstrated that the identified land meets the criteria as set out in section 60H of the LLS Act. Multiple pieces of evidence should be used to demonstrate a Category 1 – exempt land designation. This might include:
• Publicly available data sets on the NSW Government SEED data portal, such as:
  ○ Land use mapping – used to identify and map existing and historical agricultural land use in NSW – see the NSW Landuse 2017.
  ○ Woody vegetation extent – used to identify and map native vegetation extent – see 2008 Woody Extent and 2011 Woody Extent.
  ○ State-wide Landcover and Tree Survey (SLATS) woody clearing for NSW – used to identify detectable clearing events since January 1990 – see SLATS- Woody Vegetation Change - NSW 2008-2014.
• Published information on the Native Vegetation Regulatory Map, including Category 2-sensitive regulated, Category 2-vulnerable regulated, and excluded land - see Native Vegetation Regulatory Map Viewer.
• Site-based information and records, including:
  ○ current and historical high-resolution aerial photography
  ○ current and historical photographs of the subject land
  ○ historical land management records maintained by the landowner
  ○ vegetation survey data collected on the subject land
  ○ documentation demonstrating history of authorised clearing and/or development.
The published Native Vegetation regulatory map: method statement should be reviewed to determine how the datasets can be best interrogated to support any identification of Category 1 – exempt land.
Where datasets/information provide contradictory information, a precautionary approach should be applied and the land should be categorised as Category 2 – regulated land.
Where Category 1 – exempt land is likely to be present on a development site, early engagement with BCS is encouraged. Prior to the Biodiversity Development Assessment Report being submitted to the consent authority, the accredited assessor should submit a proposed
	Appendix G

SEARs Requirement	Relevant Report Section
land categorisation method to the BCS North West Planning team at rog.nw@environment.nsw.gov.au for endorsement.	
Biodiversity	
Biodiversity impacts related to the proposed [development/project] are to be assessed in accordance with Section 7.9 of the *Biodiversity Conservation Act 2016*, the Biodiversity Assessment Method and documented in a Biodiversity Development Assessment Report (BDAR). The BDAR must include information in the form detailed in *the Biodiversity Conservation Act 2016* (s6.12), Biodiversity Conservation Regulation 2017 (s6.8) and Biodiversity Assessment Method, unless the Department determines that the proposed development is not likely to have any significant impacts on biodiversity values.	**This Document**
The BDAR must document the application of the avoid, minimise, and offset framework; including assessing all direct, indirect, and prescribed impacts in accordance with the Biodiversity Assessment Method.	**Section 5.0**
The BDAR must include details of the measures proposed to address the offset obligation as follows: a. The total number and classes of biodiversity credits required to be retired for the development/project; b. The number and classes of like-for-like biodiversity credits proposed to be retired; c. The number and classes of biodiversity credits proposed to be retired in accordance with the variation rules; d. Any proposal to fund a biodiversity conservation action; e. Any proposal to conduct ecological rehabilitation (if a mining project); f. Any proposal to make a payment to the Biodiversity Conservation Fund. If seeking approval to use the variation rules, the BDAR must contain details of the reasonable steps that have been taken to obtain requisite like-for-like biodiversity credits.	**Section 7.0**
The BDAR must be submitted with all spatial data associated with the survey and assessment as per Appendix 11 of the BAM.	**Not part of this document, to be provided separately to DPE**
The BDAR must be prepared by a person accredited in accordance with the Accreditation Scheme for the Application of the Biodiversity Assessment Method Order 2017 under s6.10 of the *Biodiversity Conservation Act 2016.*	**Section 1.6**

SEARs Requirement	Relevant Report Section
Supplementary SEARs (Biodiversity)	
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. http://www.environment.gov.au/epbc/publications/epbc-act-environmental-offsets-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 H**

SEARs Requirement	Relevant Report Section
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.	**Appendix H**
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 (*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. 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.	**Appendix H**

1.7 Report Preparation and Submission

This 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, and a number of other Umwelt ecologists under the guidance of the accredited assessor.

This BDAR was finalised on 11 July 2022 and the BAM Calculator was submitted to the authority within two weeks of the report submission.

2.0 Methods

The methods executed in this 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

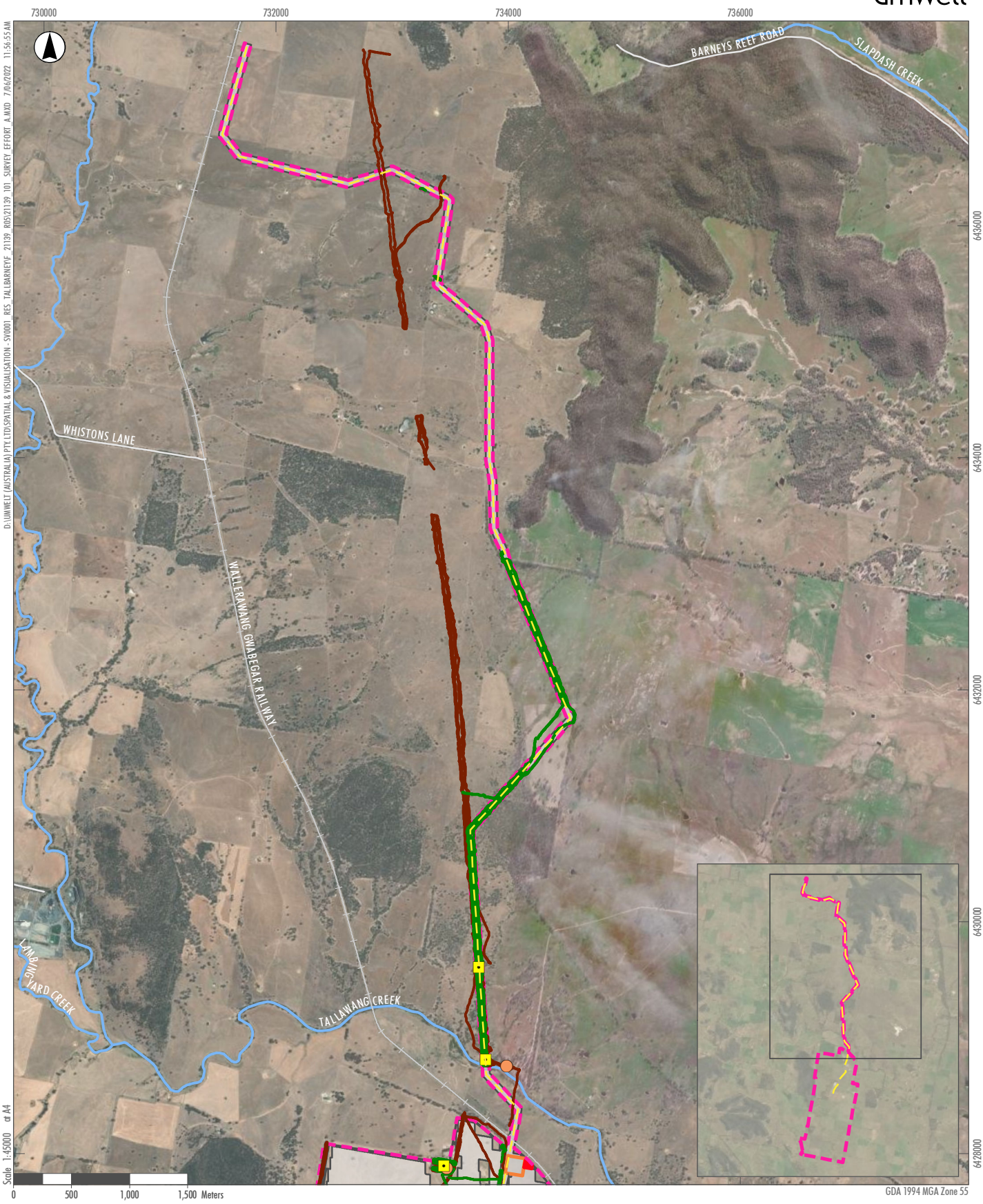
Methods Undertaken	Relevant Appendix A Section
Landscape Value	
Landscape Features and Site Context	Section A1.1
Native Vegetation Assessment	
Literature and Database Review	Section A1.2.1
Floristic and Vegetation Integrity Surveys	Section A1.2.2
Meandering Transects	Section A1.2.3
Digital Aerial Photo 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 Project Area. 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
		Solar Farm/BESS	Transmission Line	Required	Completed	
1	81 Western Grey Box - cypress pine shrub grass shrub tall woodland in the Brigalow Belt South Bioregion *Moderate Condition*	1.39	0	1	7	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*	2.63	8.33	3	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*	1.47	0	1	7	3
4	281 Rough-Barked Apple - red gum - Yellow Box woodland on alluvial clay to loam soils on valley flats in the northern NSW South Western Slopes Bioregion and Brigalow Belt South Bioregion *Derived Native Grassland* (DNG)	0	17.11	3	4	4
-	Category 1 – Exempt Land	787.75	46.11	-	13	33
-	Dam/Road/Structure	0.75	0	-	-	-
TOTAL		865.54		8	36	60



Legend

- Tallawang Solar Farm Project Area
- Proposed HV Powerline
- Subject Land

Site Infrastructure

- O&M Facility
- Proposed Substation (Northern Option)
- Remote Camera Locations
- Call Playback

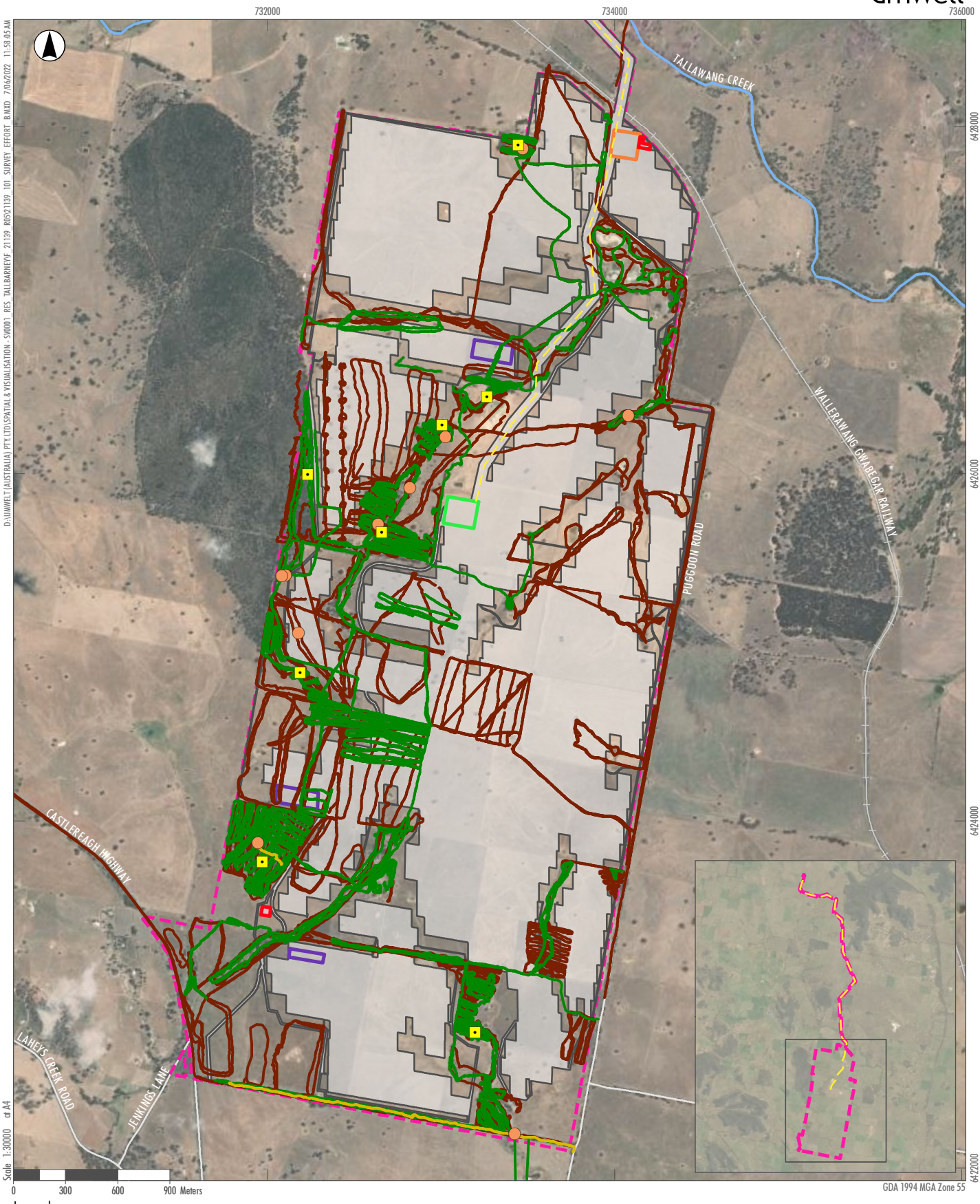
Transects

- Spring
- Summer

FIGURE 2.1A

Survey Effort

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



Legend

- Tallawang Solar Farm Project Area
- Proposed HV Powerline
- Subject Land

Site Infrastructure

- Construction Compound/Laydown
- O&M Facility
- Proposed Substation (Central Option)
- Proposed Substation (Northern Option)
- Remote Camera Locations
- Call Playback

Transects

- Spring
- Summer
- Winter

FIGURE 2.1B

Survey Effort

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

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 metre (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	Tallawang Creek beneath the Transmission line. Small, degraded first order ephemeral streams exist within the Subject Land.
Wetlands (within, adjacent to and downstream)	None
Native Vegetation Extent	Approximately 4664.17 ha in the 1,500 m buffer area (59.4%) – predominantly comprised of woodland areas and derived native grassland in various conditions.
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 (1.39 ha in the solar farm/BESS)
- 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 (10.96 ha, 2.63 in solar farm/BESS, 8.33 in transmission line)
- 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 (1.47 hectares in the solar farm/BESS)
- PCT 281 Rough-Barked Apple - red gum - Yellow Box woodland on alluvial clay to loam soils on valley flats in the northern NSW South Western Slopes Bioregion and Brigalow Belt South Bioregion derived native grassland (17.11 hectares transmission line).

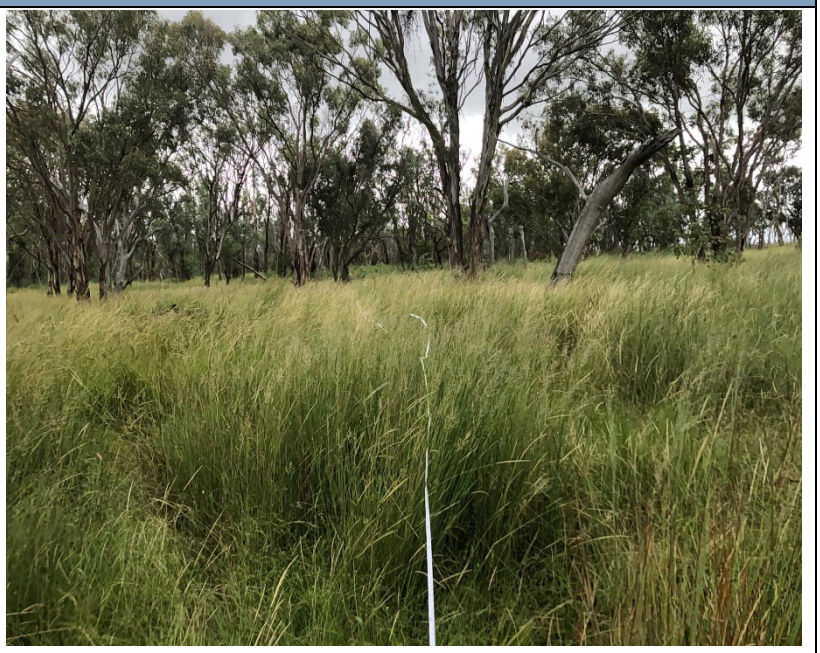
Descriptions of the vegetation zones are outlined below, and a flora species list is included in **Appendix B**.

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)	1.39 in solar farm/BESS	
Patch Size Class (ha)	101	

PCT Name	PCT 81 Western Grey Box - cypress pine shrub grass shrub tall woodland in the Brigalow Belt South Bioregion
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.
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 – 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)	10.96 (2.63 in solar farm/BESS, 8.33 in transmission line)	
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 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.	

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
	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 – 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)	1.47 in solar farm/BESS	
Patch Size Class (ha)	101	
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*).	

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

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	**Derived native grassland**	
PCT Formation	Grassy Woodlands	
PCT Class	Western Slopes Grassy Woodlands	
PCT Per cent cleared	67	
Area (ha)	17.11 in transmission line	
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	None present.	
Mid-storey Description	None present.	
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	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	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.	

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

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 Solar farm/BESS Transmission line Zone 4 – PCT 281 *DNG* (transmission line)	10.96 2.63 8.33 17.11
	Total	28.51
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* (solar farm)	1.39

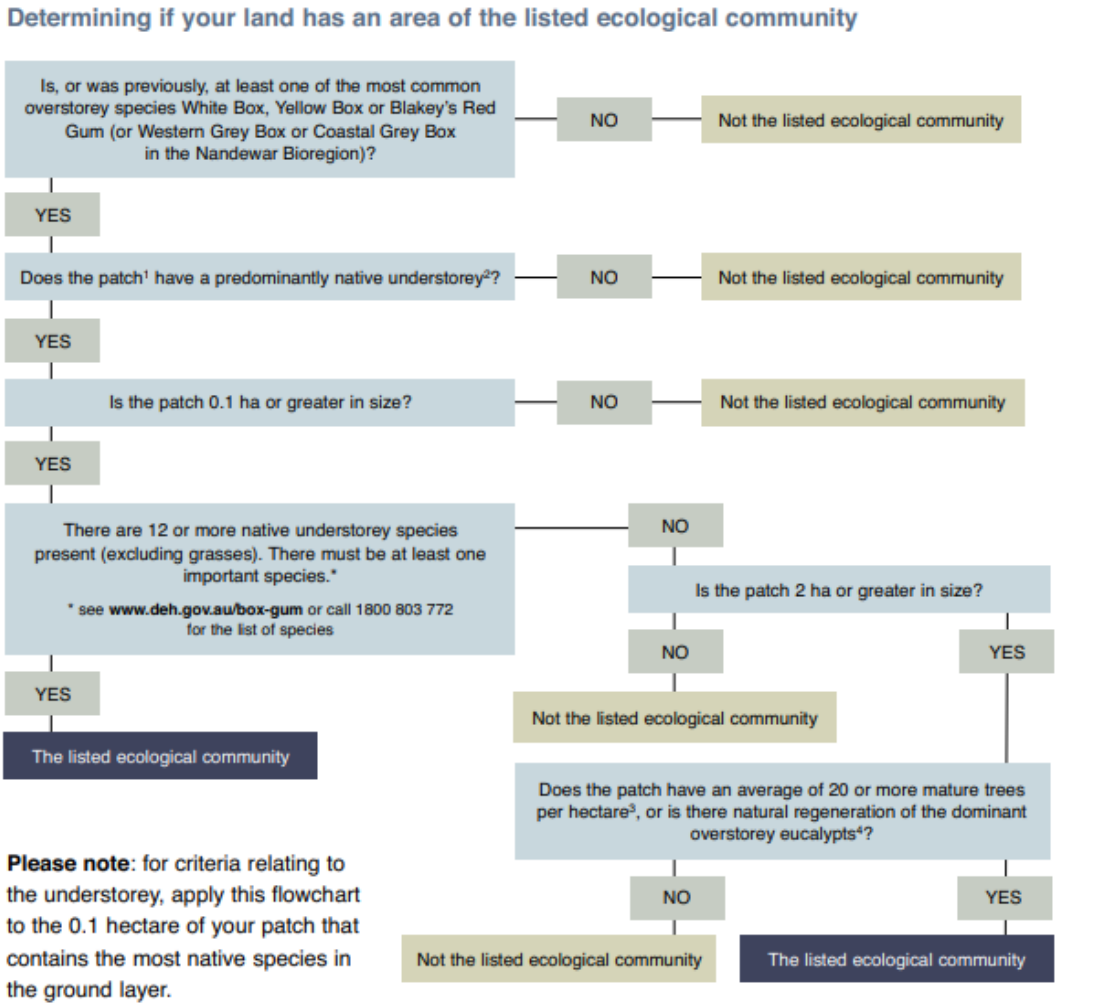
Table 3.3 Summary of TECs listed under the Commonwealth EPBC Act

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 Solar farm/BESS Transmission line Zone 4 – PCT 281 *DNG* (transmission line)	10.96 2.63 8.33 17.11
	Total	28.51
Grey Box (*Eucalyptus microcarpa*) Grassy Woodlands and Derived Native Grasslands of South-eastern Australia EEC	Zone 1 – PCT 81 moderate condition	1.39

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 Bun 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. Regenerating trees of *E. blakelyi* are present within the DNG.
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	62.4	74.8	59.2	**65.1**
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	86.3	98.2	82.7	**88.9**
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	89.5	93	47.3	**73.3**

Veg Zone	PCT Name	Presence of Hollow- bearing Trees	Composition	Structure	Function	Current Vegetation Integrity Score
4	281 Rough-Barked Apple - red gum - Yellow Box woodland on alluvial clay to loam soils on valley flats in the northern NSW South Western Slopes Bioregion and Brigalow Belt South Bioregion DNG	No	61.5	67.3	15	**39.6**

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**.

Ecosystem- credit species that are considered to have potential to occur in the Subject Land comprise glossy black- cockatoo (*Calyptorhynchus lathami*), little lorikeet (*Glossopsitta pusilla*), hooded robin (*Melanodryas cucullata cucullata*), scarlet robin (*Petroica boodang*) and flame robin (*Petroica phoenicea*). Breeding habitat for these species is fairly limited in the Subject Land. Some hollows are present though these exist in relatively small, fragmented patches of woodland.

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.

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).

Thirteen 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 3.6** lists the koala feed trees present within the Subject Land.

Table 3.6 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 bridgesiana	Apple Box
Eucalyptus conica	Fuzzy Box
Eucalyptus crebra	Narrow-leaved Ironbark
Eucalyptus dealbata	Tumbledown Red Gum
Eucalyptus goniocalyx	Bundy
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. 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 2015.

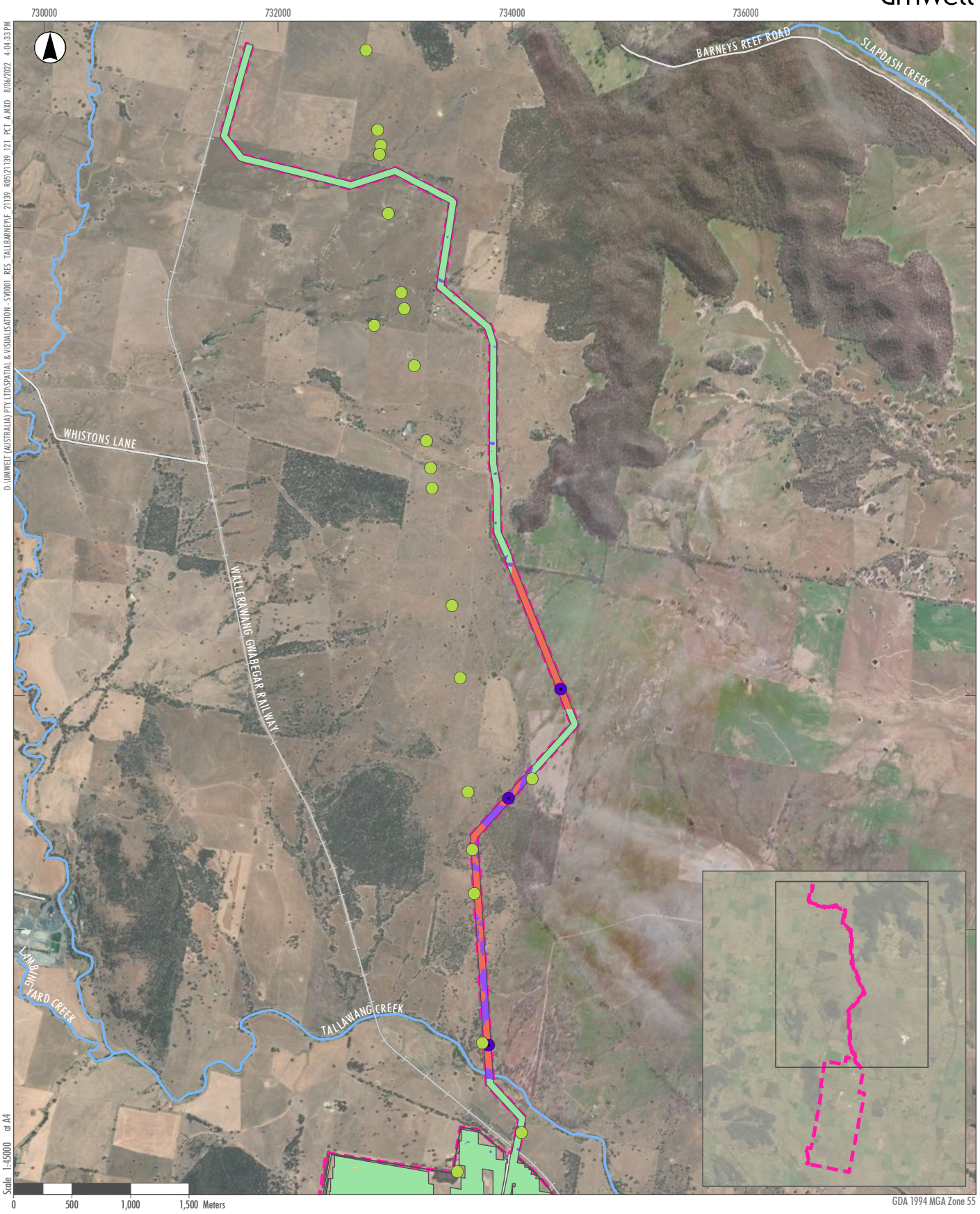
As a result, the Subject Land does not represent core koala habitat as the koala was not recorded in the Subject Land and koalas have not been recorded nearby (within 5 km) within the last 18 years. No further provisions of koala habitat protection in SEPP (Biodiversity and Conservation) 2021 apply. 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- 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 solar farm and BESS development area and traverses the overhead transmission line corridor.

The 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

- Tallawang Solar Farm Project Area
- Subject Land
- Rapid Assessment Point
- Flora Plot Location

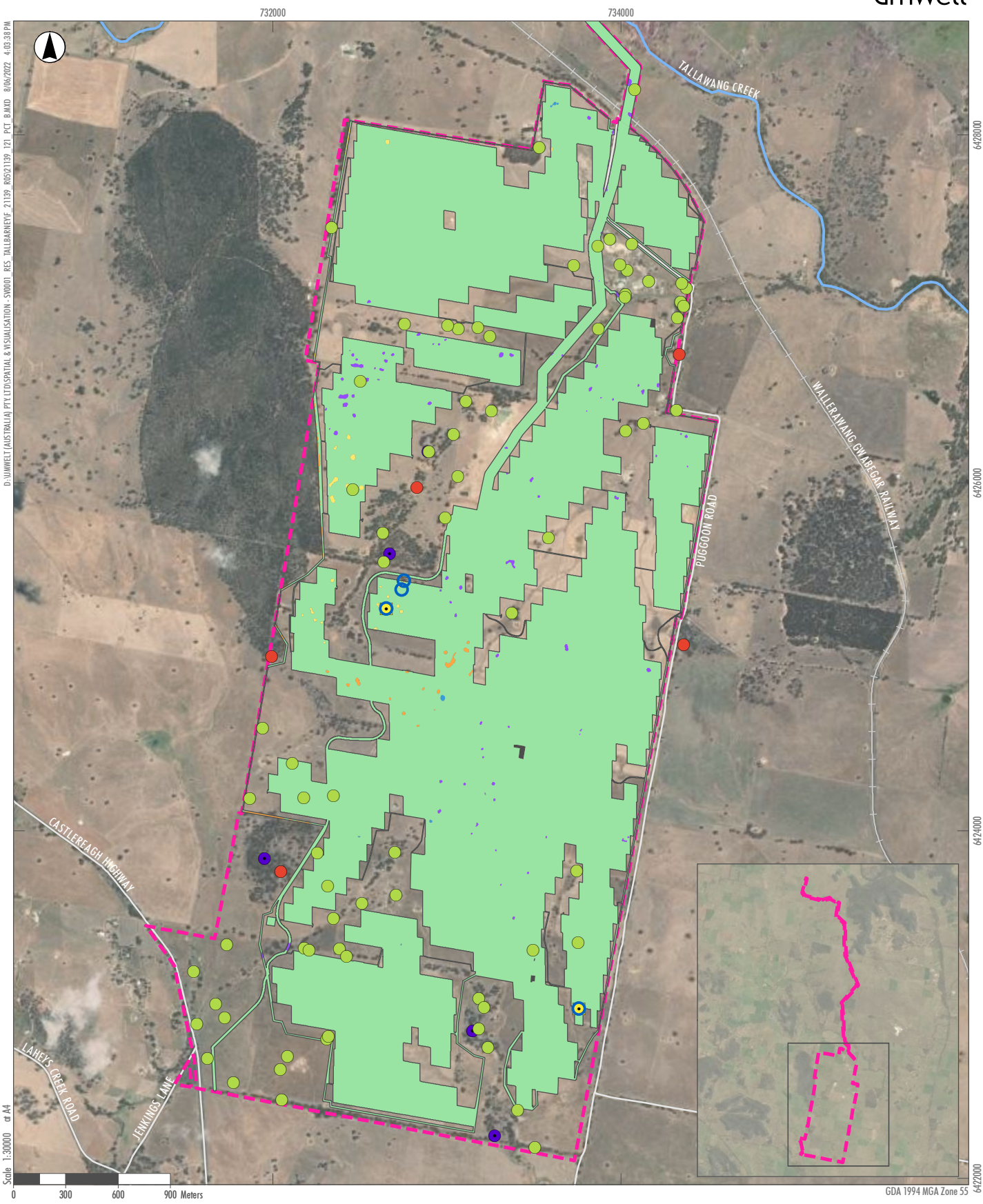
PCT

- 81 - Western Grey Box - cypress pine shrub grass shrub tall woodland Moderate Condition
- 281 - Rough-Barked Apple - red gum - Yellow Box woodland Derived Native Grassland
- 281 - Rough-Barked Apple - red gum - Yellow Box woodland Moderate Condition
- Dam
- Category 1 - Exempt Land

FIGURE 3.1A

Plant Community Types, Threatened Species and Habitat Features in the Development Footprint

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



Legend

- Tallawang Solar Farm Project Area
- Subject Land
- Rapid Assessment Point
- Large HBTs
- Extra-large HBTs
- Flora Plot Location

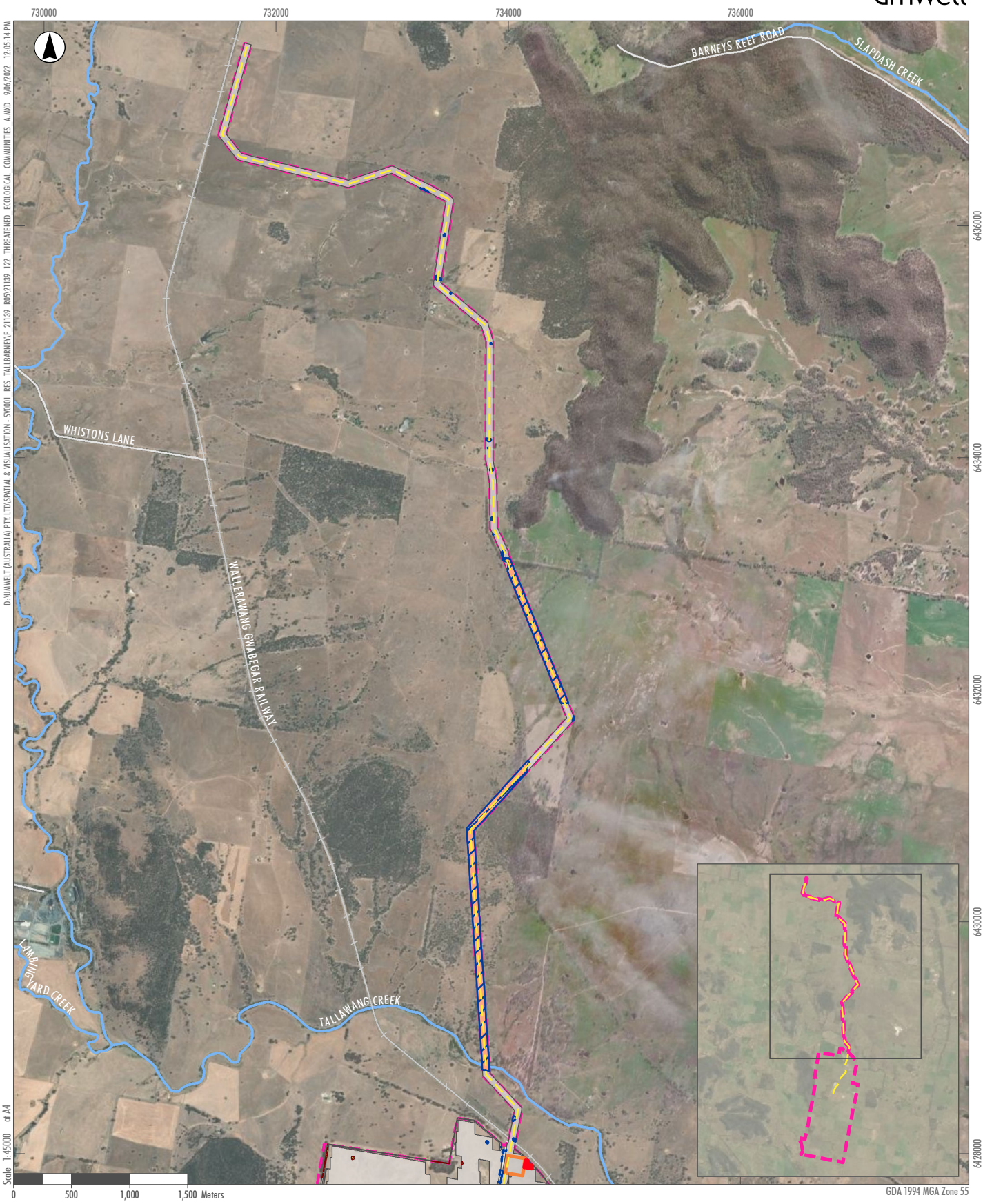
PCT

- 81 - Western Grey Box - cypress pine shrub grass shrub tall woodland Moderate 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
- Dam
- Structure
- Category 1 - Exempt Land

FIGURE 3.1B

Plant Community Types, Threatened Species and Habitat Features in the Development Footprint

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



Legend

- Tallawang Solar Farm Project Area
- Subject Land
- Proposed HV Powerline

Site Infrastructure

- O&M Facility
- Proposed Substation (Northern Option)

Federally Listed TECs

- 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

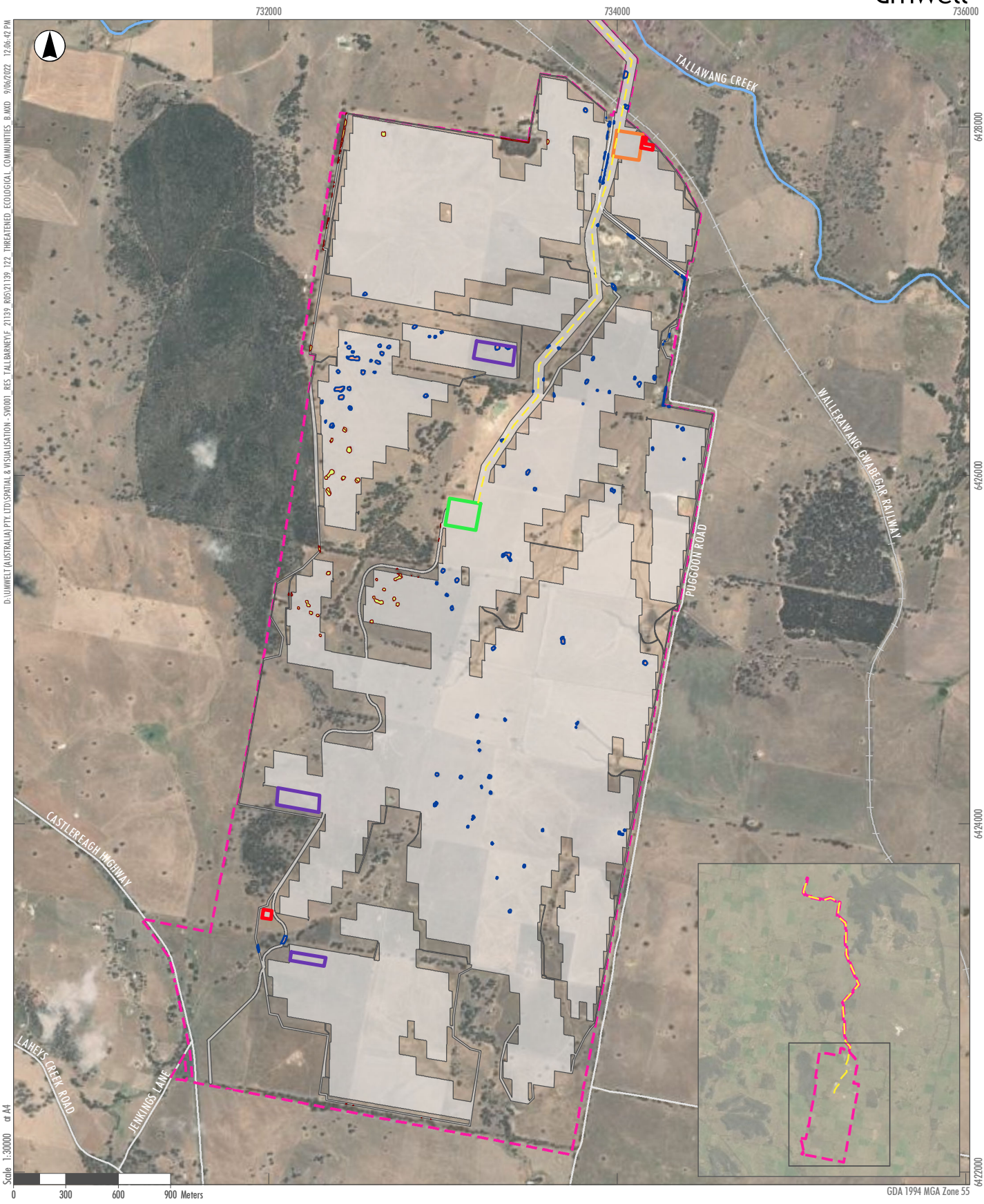
State Listed TECs

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

FIGURE 3.2A

Threatened Ecological Communities

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



Legend

- Tallawang Solar Farm Project Area
- Subject Land
- Proposed HV Powerline

Site Infrastructure

- Construction Compound/Laydown
- O&M Facility
- Proposed Substation (Central Option)
- Proposed Substation (Northern Option)

Federally Listed TECs

- 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

State Listed TECs

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

FIGURE 3.2B

Threatened Ecological Communities

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

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 involves identifying land where environmental impacts can 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, creeks and major drainage lines on the Project Area providing biodiversity value are 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**.**

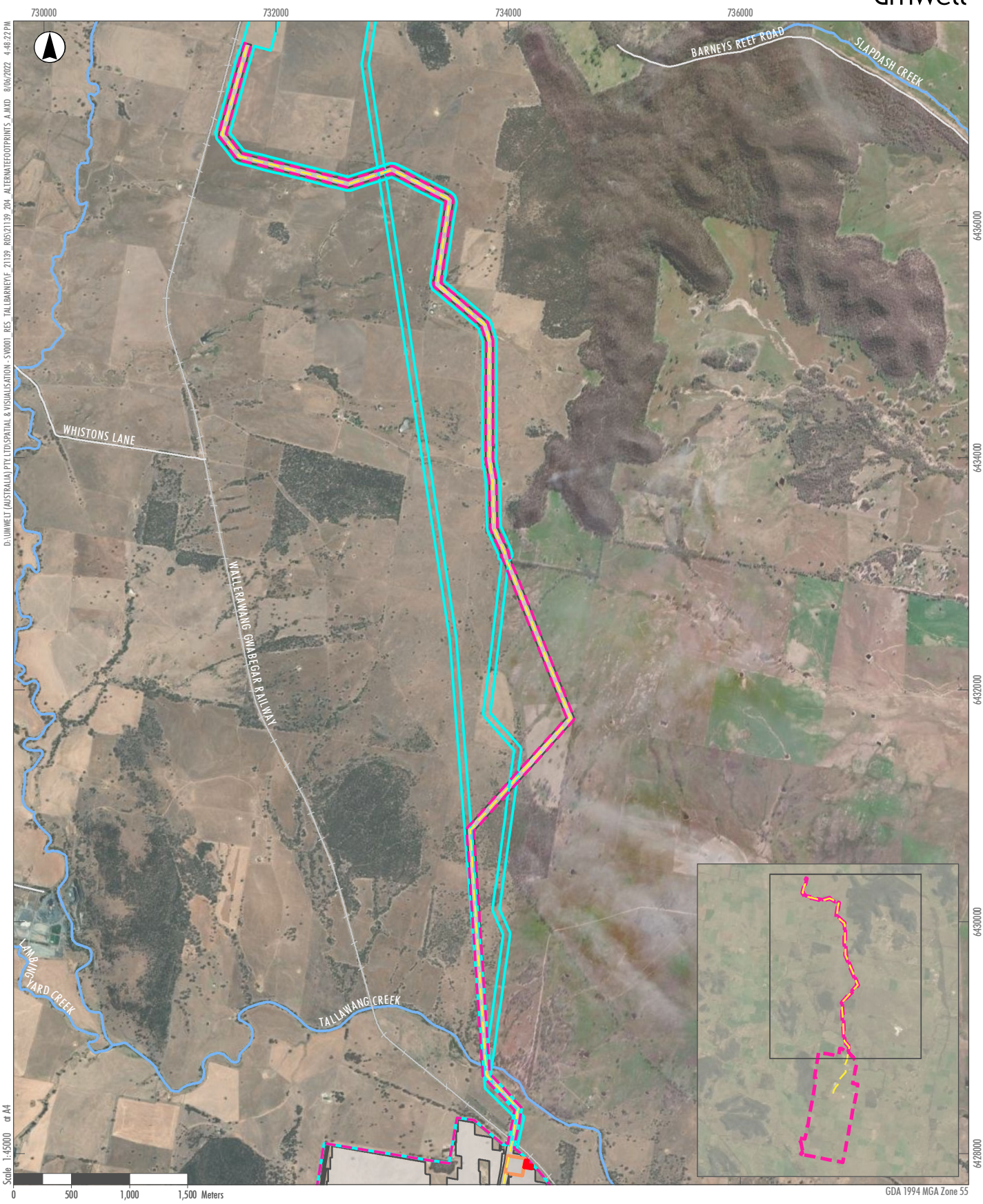
The biodiversity assessment commenced early in the design process which has allowed the Proponent to utilise ecological survey works to inform the progression of the conceptual layout of the Project. To avoid impacts on native vegetation the current design has focused on locating as much of the solar farm 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.

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, 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 Project Area and two individual *Swainsona sericea* were detected adjacent to the creek line in the south west of the Project Area. All threatened species locations have been avoided in the final infrastructure layout.

Overall, within the solar farm/ BESS Project Area, Project placement and design has resulted in the avoidance of direct impacts on approximately 100.95 ha of remnant woodland and derived native grassland which equates to 94.2% of remnant woodland and derived native grassland being retained within the Project Area.



Legend

- Tallawang Solar Farm Project Area
- Subject Land
- Proposed HV Powerline
- Alternate Variations of the Project Area

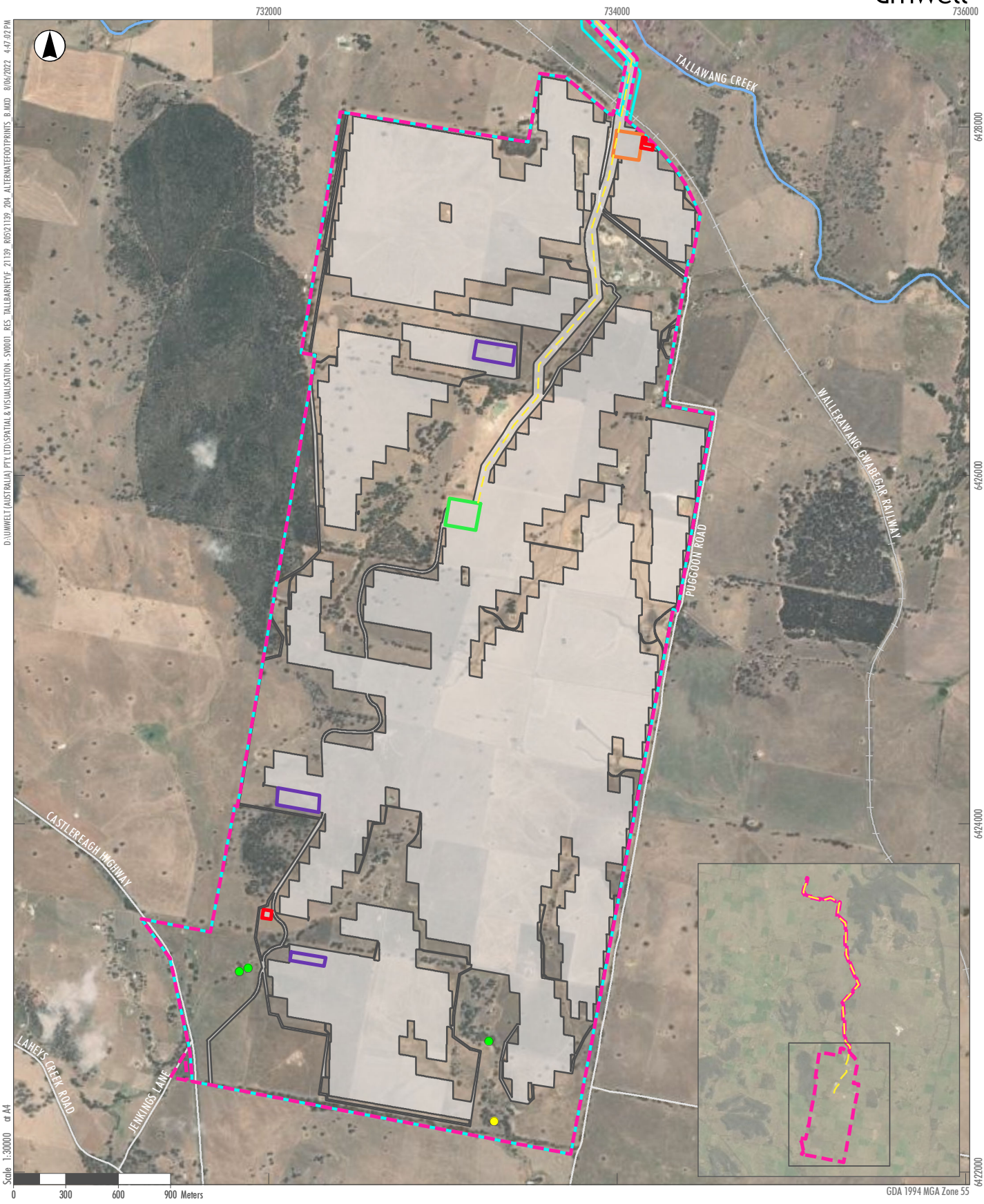
Site Infrastructure

- O&M Facility
- Proposed Substation (Northern Option)

FIGURE 4.1A

Alternative Footprints Considered

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



Legend

- Tallawang Solar Farm Project Area
- Subject Land
- Proposed HV Powerline
- Alternate Variations of the Project Area

Site Infrastructure

- Construction Compound/Laydown
- O&M Facility
- Proposed Substation (Central Option)
- Proposed Substation (Northern Option)

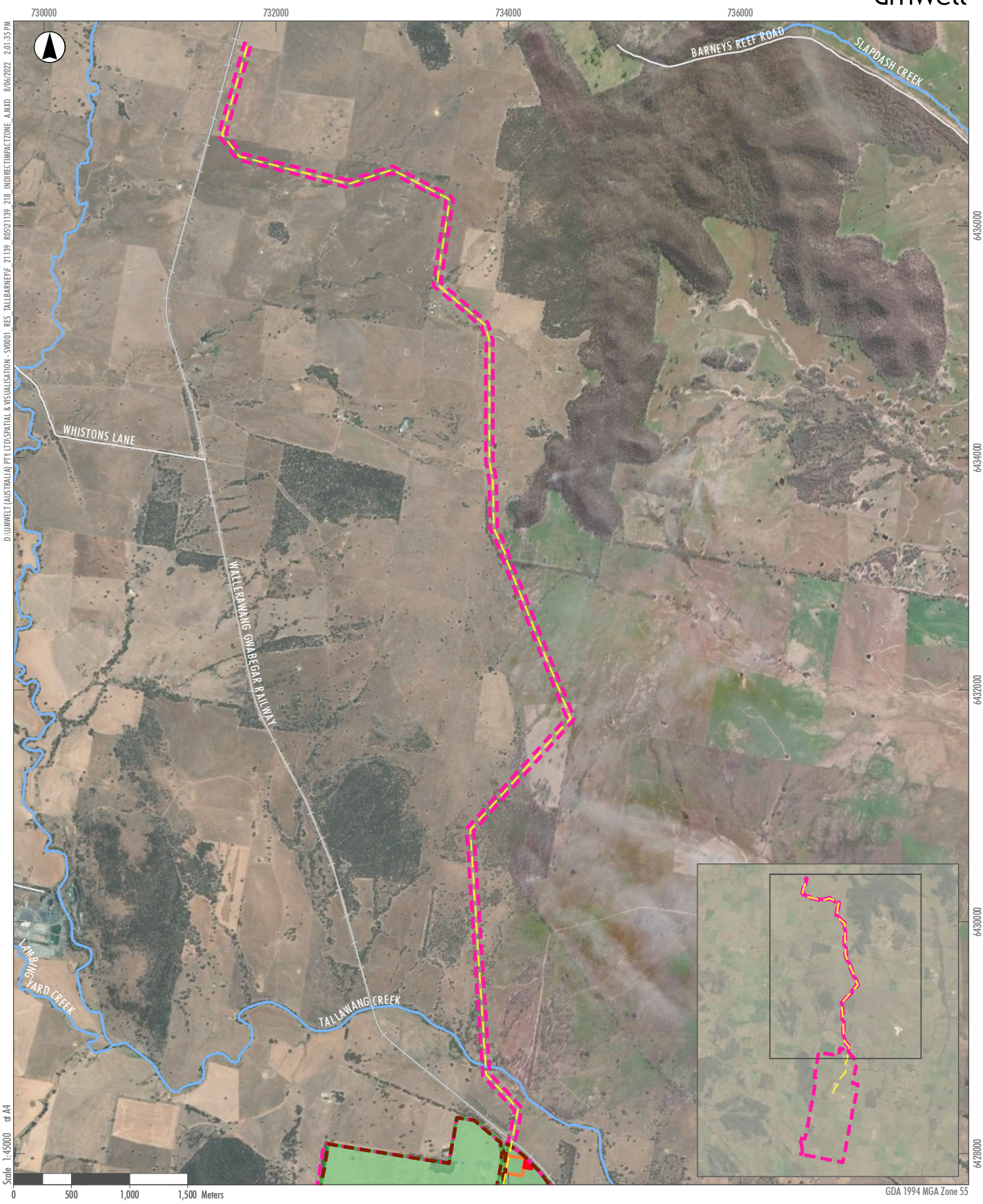
Avoided Threatened Species

- *Diuris tricolor*
- *Swainsona sericea*

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

FIGURE 4.1B

Alternative Footprints Considered



Legend

- Tallawang Solar Farm Project Area
- Proposed HV Powerline
- Security Fence
- Indirect Impact Zone

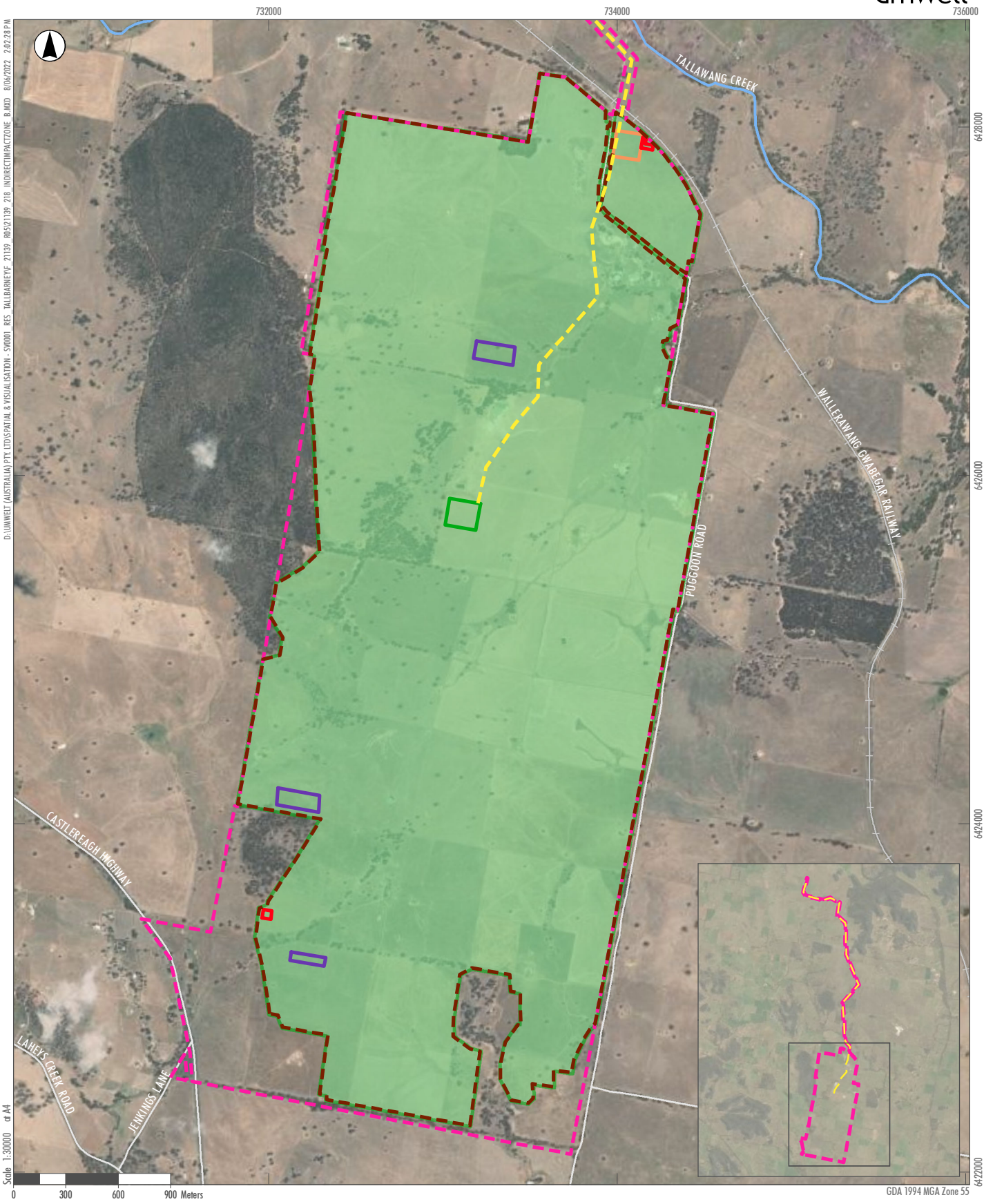
Site Infrastructure

- O&M Facility
- Proposed Substation (Northern Option)

FIGURE 4.2A

Indirect Impact Zone

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



Legend

- Tallawang Solar Farm Project Area
- Proposed HV Powerline
- Security Fence
- Indirect Impact Zone

Site Infrastructure

- Construction Compound/Laydown
- O&M Facility
- Proposed Substation (Central Option)
- Proposed Substation (Northern Option)

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

FIGURE 4.2B

Indirect Impact Zone

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 ecological values of the Subject Land primarily through general avoidance of remnant vegetation and careful placement of the solar farm. The Subject Land has been strategically located 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**.

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.
- Shaking 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 (the transmission line will not be fenced). 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. 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; and
- 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; 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) (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
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

Measure	Timing	Responsibility	Proposed Techniques	Outcome
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		• 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 Project will result in direct impacts on biodiversity values. Direct impacts include the loss of native vegetation and fauna habitat as a result of clearance works for the solar farm, BESS, and transmission line construction. 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 30.93 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 Features

Species	Area within the Subject Land (ha)	
Plant Community Type	Solar Farm/BESS	Transmission Line
81 Western Grey Box – cypress pine shrub grass shrub tall woodland in the Brigalow Belt South Bioregion *moderate condition*	1.39	0
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*	2.63	8.33
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*	1.47	0
281 Rough-Barked Apple – red gum – Yellow Box woodland on alluvial clay to loam soils on valley flats in the northern NSW South Western Slopes Bioregion and Brigalow Belt South Bioregion DNG	0	17.11
Category 1 – Exempt Land	787.75	46.11

5.1.2 Indirect Impacts

The 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**. 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**.

Table 5.2 Indirect Impacts

Impact	Description
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. It is therefore not expected to be of any level of significance in relation to any locally occurring threatened species, populations or communities.
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 from noise emissions are not expected to be of any level of significance in relation to threatened species, populations and communities.
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. 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.
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.
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.

Impact	Description
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 proposed project is not directly impacting the large remnant areas present in the Project Area. However, construction of the security fence will remove the ability for non-avian fauna to access these remnants. This change in connectivity may impact fauna movement across the landscape. Fragmentation of remnant areas reduces species ability to recover from stochastic events such as bushfire, drought, and disease. 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 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. 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** 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.
Impacts of wind turbine strikes on protected animals	No	The impacts of wind turbines are not applicable to this proposed development.

Prescribed Impact	Potential for Impact	Justification
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

Under the BC Act, a determination of whether an impact is serious and irreversible must be made in accordance with the principles prescribed in the BC Regulation. The principles have been designed to capture those impacts which are likely to contribute significantly to the risk of extinction of a threatened species or ecological community in New South Wales. These are impacts that:

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

Six species-credit species predicted by the BAM calculator for the proposed 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-wing 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 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-wing 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.

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. Notwithstanding, 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 28.07 ha of the Box Gum Woodland CEEC was identified within the Subject Land. Of the 28.07 ha of the Box Gum Woodland CEEC estimated to be impacted by the Project, only 10.96 ha (39.05%) is in moderate to good condition woodland, with the remaining 17.11 ha (60.95%) being derived native grasslands.

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 TSSC (2006) 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.

Criteria	Assessment
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 • 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	Current estimated extent in NSW is 250,729 ha. The total area of Box Gum Woodland within the development area is 25.6 ha (8.4 ha of woodland and 17.2 ha of DNG). This is equivalent to the removal of 0.1 % of the estimated current extent in NSW.

In relation to the impacts from the proposal on the species at risk of an SAII, the assessor must include data and information on:	
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.	
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	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 125.8 ha of Box Gum Woodland and 934.3 ha of Box Gum Woodland DNG in the 500 m surrounding the Subject Land. The Box Gum Woodland to be removed by the project is 28.07 ha (2.63 ha within the solar farm/BESS and 25.44 in the transmission line). 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 zones that support box gum woodland CEEC (Vegetation Zone 2 and 4). Vegetation Zone 2 comprises the woodland component of the community and Vegetation Zone 4 comprises the DNG component of the community. Vegetation zone 2 (PCT281_Moderate). VI score 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. Vegetation Zone 4 (PCT281_DNG) was a historically and currently grazed grassland area identified as a DNG variant of the TEC. The zone was characterised by an absence of forb diversity and presence of grasses that withstand regular grazing. While there were very few species commonly associated with the TEC present, the location within the landscape and the presence of regenerating characteristic canopy species trees in this zone resulted in this zone aligning with the CEEC.

<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>if the remnant is retained AND the average distance if the remnant is removed as proposed, and
• estimated maximum dispersal distance for native flora species characteristic of the TEC, and
• other information relevant to describing the impact on connectivity and fragmentation, such as the area to perimeter ratio for remaining areas of the TEC as a result of the development

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>
<table>
<tr><th>Vegetation Zone</th><th>V.I Score</th><th>Composition</th><th>Structure</th><th>Function</th></tr>
<tr><td>VZ2-Moderate</td><td>88.9</td><td>86.3</td><td>98.2</td><td>82.7</td></tr>
<tr><td>VZ4- DNG</td><td>39.6</td><td>61.5</td><td>67.3</td><td>15</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, 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).

DAWE has issued its assessment requirements which have been incorporated into the SEARs for the Project (refer to **Section 1.6**). 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
- 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 833.86 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.

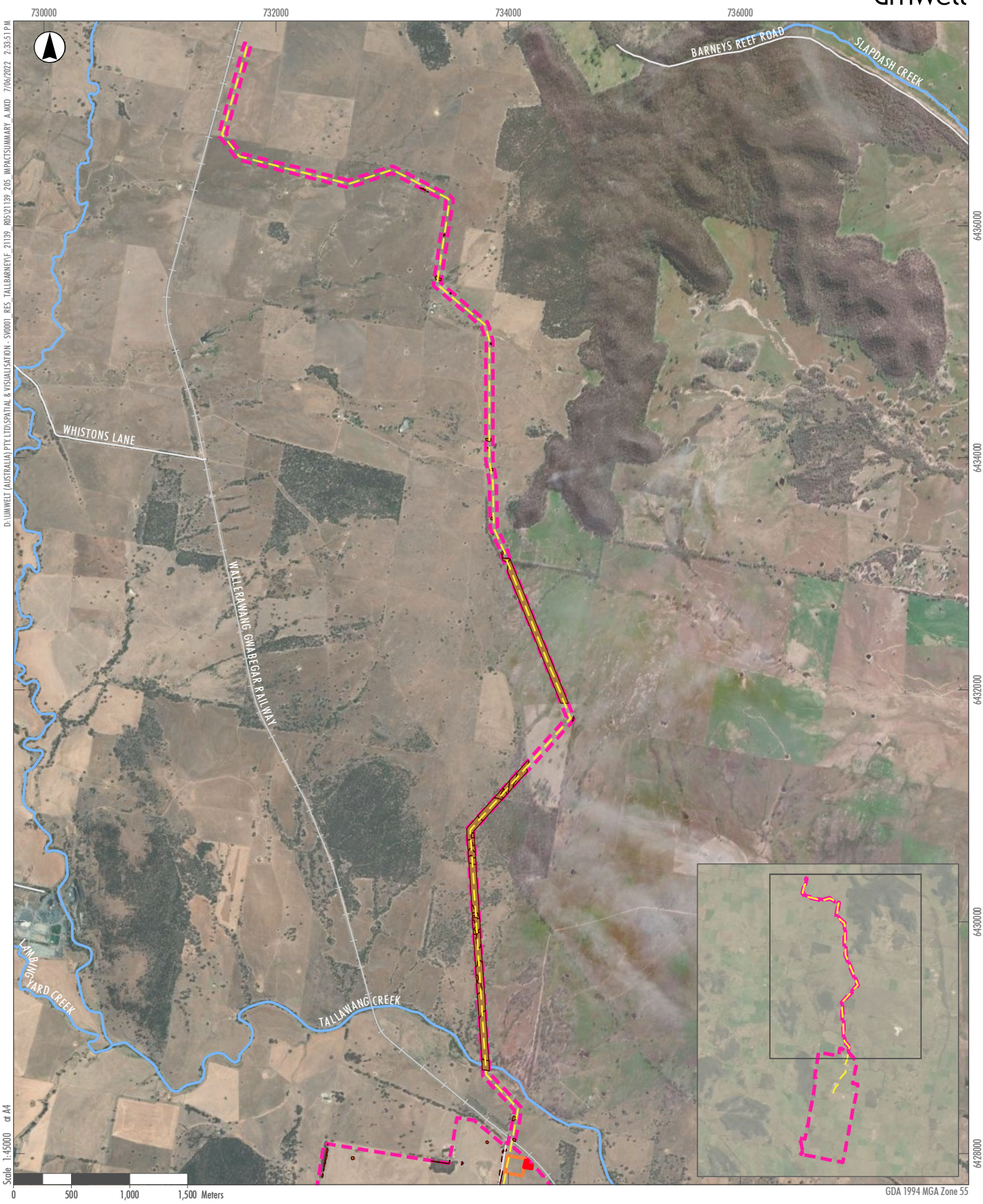
Table 6.1 Impacts Requiring Offset

Veg Zone	PCT/Species-credit species	Vegetation Integrity Score			Area (ha)		Credits Required	
		Current	Future	Change	Solar Farm/BESS	Transmission Line	Solar Farm/BESS	Transmission Line
1	81 Western Grey Box - cypress pine shrub grass shrub tall woodland in the Brigalow Belt South Bioregion *Moderate Condition*	65.1	0	-65.1	**1.39**	**0**	**45**	**0**
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*	88.9	0	-88.9	**2.63**	**8.33**	**146**	**463**
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	73.3	0	-73.3	**1.47**	**0**	**47**	**0**

Veg Zone	PCT/Species-credit species	Vegetation Integrity Score			Area (ha)		Credits Required	
		Current	Future	Change	Solar Farm/BESS	Transmission Line	Solar Farm/BESS	Transmission Line
	Slopes Bioregion *Moderate Condition*							
4	281 Rough-Barked Apple - red gum - Yellow Box woodland on alluvial clay to loam soils on valley flats in the northern NSW Southwestern Slopes Bioregion and Brigalow Belt South Bioregion DNG	39.6	0	-39.6	**0**	**17.11**	**0**	**423**
Total							**1124**	

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

- Tallawang Solar Farm Project Area
- Proposed HV Powerline
- Impacts Requiring Offsets

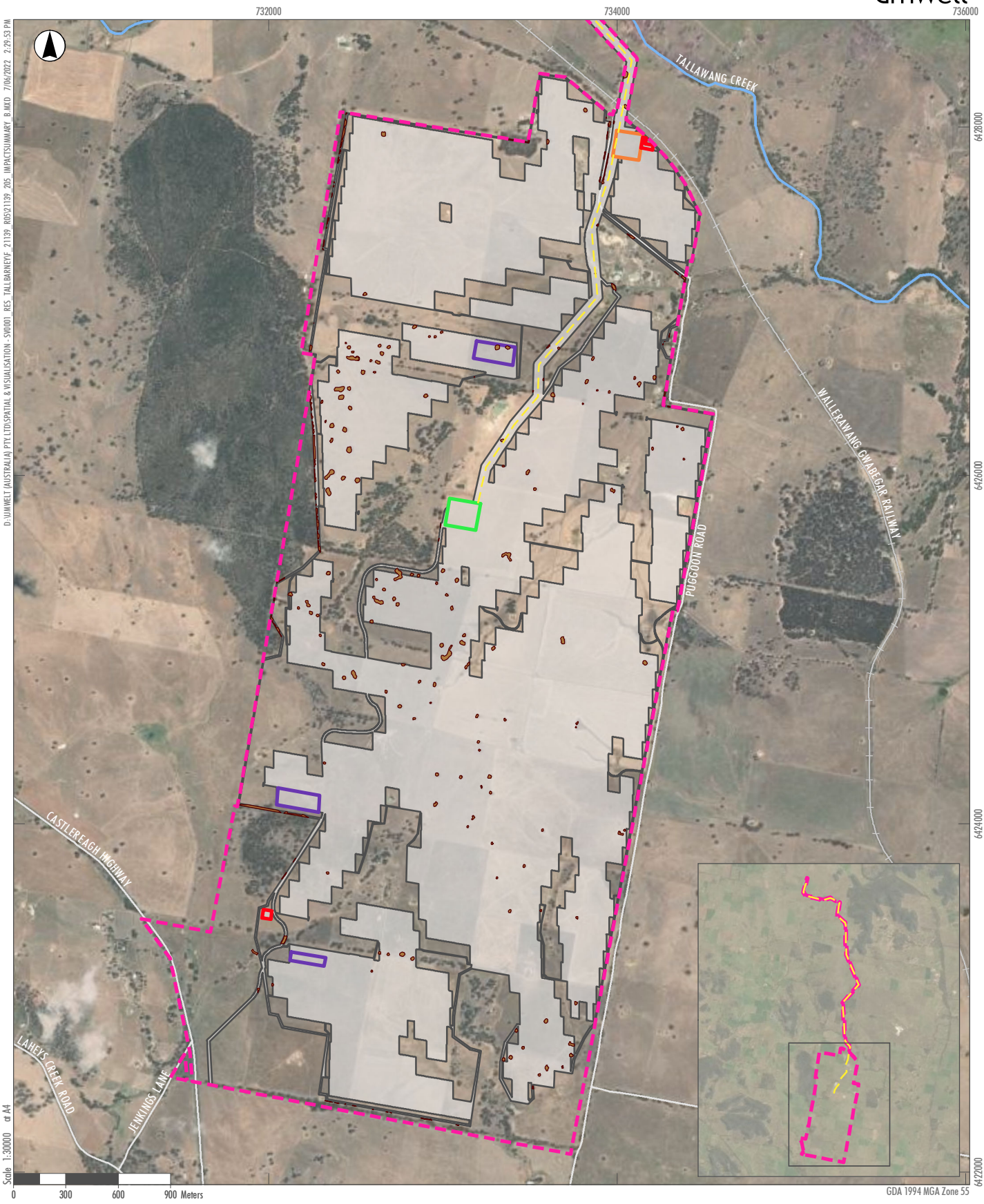
Site Infrastructure

- O&M Facility
- Proposed Substation (Northern Option)

FIGURE 6.1A

Impact Summary

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



Legend

- Tallawang Solar Farm Project Area
- Proposed HV Powerline
- Subject Land

Site Infrastructure

- Construction Compound/Laydown
- O&M Facility
- Proposed Substation (Central Option)
- Proposed Substation (Northern Option)

- Impacts Requiring Offsets

FIGURE 6.1B

Impact Summary

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

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

PCT/Species-credit	Credits Required	
Ecosystem Credits	**Solar Farm/BESS**	**Transmission Line**
81 Western Grey Box - cypress pine shrub grass shrub tall woodland in the Brigalow Belt South Bioregion *Moderate Condition*	**45**	**0**
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*	**146**	**463**
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*	**47**	**0**
281 Rough-Barked Apple - red gum - Yellow Box woodland on alluvial clay to loam soils on valley flats in the northern NSW South Western Slopes Bioregion and Brigalow Belt South Bioregion DNG	**0**	**423**
Total	**1124**	

The Proponent is still considering the proposed methods for the retirement of credits and offsetting. Whilst the desired approach remains land-based offsets secured through a Stewardship Agreement and 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 option available under the BAM (and Bilateral Agreement) are also being considered and may form part of the overall offsetting package.

8.0 References

Botanic Gardens Trust, (2021). *PlantNET* – The Plant Information Network System of Botanic Gardens Trust, Sydney, Australia (version 2.0). <http://plantnet.rbgsyd.nsw.gov.au>

Bureau of Meteorology (2021). Climate Data Online http://www.bom.gov.au/climate/data/

Cronquist, A, (1981). *An Integrated System of Classification of Flowering Plants*. Columbia University Press, New York. Department of the Environment (2013) Significant Impact Guidelines 1.1 – Matters of National Environmental Significance.

Department of Agriculture, Water and the Environment (DAWE) (2022). Protected Matters Search Tool, found at http://environment.gov.au/epbc/protected-matters-search-tool, last accessed March 2022.

Department of Environment and Conservation (DEC) (2004). Threatened Species Survey and Assessment: Guidelines for development and activities (working draft), November 2004.

Department of the Environment (DoEE) (2013). Draft Survey Guidelines for Australia's Threatened Orchids.

Department of the Environment and Heritage (DEH) (2006). White Box Yellow Box Blakely's Red Gum grassy woodlands and derived native grassland policy Statement.

DPE 2017. Native Vegetation Regulatory Map Method Statement. Accessed via [Native vegetation regulatory map: method statement (nsw.gov.au)]

Department of Planning, and Environment (DPIE) (2022a). BioNet Atlas of NSW Wildlife, last accessed March 2022.

Department of Planning, and Environment (DPIE) (2022b). Threatened Biodiversity Data Collection (TBDC), last accessed March 2022.

Department of Planning, and Environment (DPIE) (2022c). Vegetation Information System (VIS) last accessed March 2022.

Department of Planning, Industry and Environment (DPIE) (2020a). *Biodiversity Assessment Method 2020*

Department of Planning, Industry and Environment (DPIE) (2020b). *Surveying Threatened Plants and Their Habitats,* 3 April 2020.

Gascon, C., Lovejoy, T.E., Bierregaard Jr, R.O., Malcolm, J.R., Stouffer, P.C., Vasconcelos, H.L., Laurance, W.F., Zimmerman, B., Tocher, M. and Borges, S., 1999. Matrix habitat and species richness in tropical forest remnants. *Biological conservation*, *91*(2-3), pp.223-229.

Giubbina, M.F., Martensen, A.C. and Ribeiro, M.C., 2018. Sugarcane and Eucalyptus plantation equally limit the movement of two forest-dependent understory bird species. *Austral Ecology*, *43*(5), pp.527-533.

Gleeson, J. and Gleeson, D., 2012. *Reducing the impacts of development on wildlife*. CSIRO PUBLISHING.

Harden, G, J, editor, (1992). *Flora of New South Wales. Volume 3*. Royal Botanic Gardens Sydney & New South Wales University Press, Sydney.

Harden, G, J, editor, (1993). *Flora of New South Wales. Volume 4*. Royal Botanic Gardens Sydney & New South Wales University Press, Sydney.

Harden, G, J, editor, (2000). *Flora of New South Wales. Volume 1*. 2nd edition. New South Wales University Press and Royal Botanic Gardens, Sydney.

Harden, G, J, editor, (2002). *Flora of New South Wales. Volume 2*. Revised edition. Royal Botanic Gardens Sydney & New South Wales University Press, Sydney.

Harris I.M., Mills H.R. and Bencini R. (2010). Multiple individual southern brown bandicoots (Isoodon obesulus fusciventer) and foxes (Vulpes vulpes) use underpasses installed at a new highway in Perth, Western Australia. Wildlife Research. 37, 127-133

NSW Government 2020. State Environmental Planning Policy (Koala Habitat Protection) 2020. Accessed via [State Environmental Planning Policy (Koala Habitat Protection) 2020 (nsw.gov.au)]

NSW Government 2021. State Environmental Planning Policy (Koala Habitat Protection) 2021. Accessed via [State Environmental Planning Policy (Koala Habitat Protection) 2021 (nsw.gov.au)]

NSW Threatened Species Scientific Committee (NSW TSSC) 2020. *Conservation Assessment of White Box – Yellow Box – Blakely's Red Gum Grassy Woodland and Derived Native Grassland.* [online] found at: White Box Yellow Box Blakely's Red Gum Grassy Woodland and Derived Native Grassland (nsw.gov.au)

Office of Environment and Heritage (OEH) (2016a). *NSW Guide to Surveying Threatened Plants,* February 2016

Office of Environment and Heritage (OEH) (2016b) Guidelines for the mitigation of coal mining impacts on biodiversity. Report prepared for OEH, October 2016.

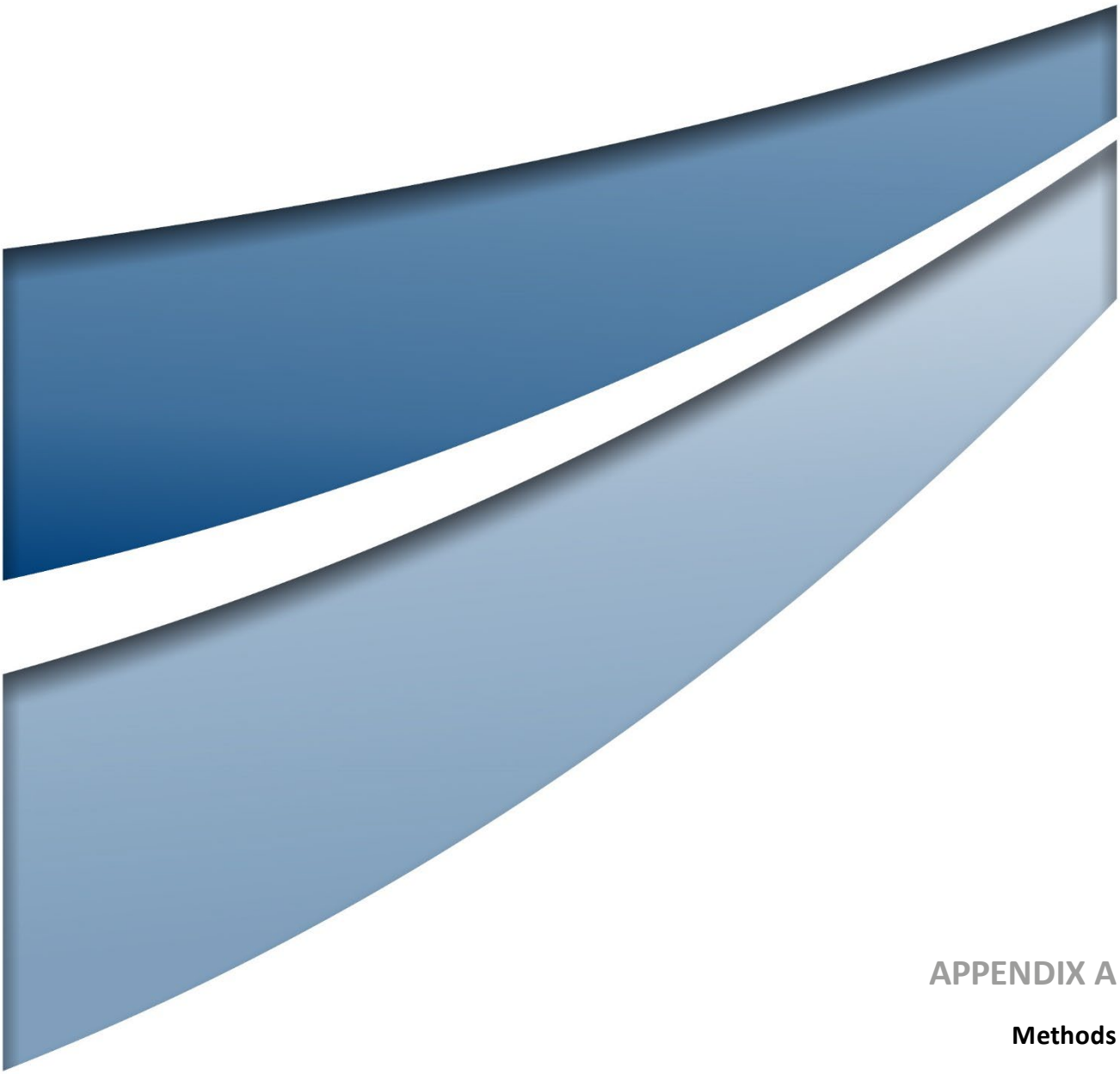
Office of Environment and Heritage OEH (2018a) A review of koala tree use across New South Wales. Sydney. July 2018

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

Office of Environment and Heritage (OEH) (2017). Guidance to Assist a Decision-Maker to Determine a Serious and Irreversible Impact, August 2017.

TSSC (Threatened Species Scientific Committee) (2006) *Commonwealth Listing Advice on White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland*. Available from: http://www.environment.gov.au/biodiversity/threatened/communities/box-gum.html. Department of the Environment and Heritage, Commonwealth of Australia.

TSSC (Threatened Species Scientific Committee) (2010). Commonwealth Listing Advice on Grey Box (Eucalyptus microcarpa) Grassy Woodlands and Derived Native Grasslands of South-eastern Australia. Department of the Environment, Water, Heritage and the Arts. Canberra, ACT: Department of the Environment, Water, Heritage and the Arts. Available from: http://www.environment.gov.au/biodiversity/threatened/communities/pubs/86-listing-advice.pdf



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 Floristic and Vegetation Integrity Survey

Floristic and vegetation integrity surveys were undertaken in February 2021, June 2021, August 2021, and January 2022. 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. 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 1m 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 five 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.

A1.2.3 Targeted Threatened Species Searches

Targeted threatened species transects were walked across the entirety of the Subject Land by Umwelt Ecologists during October 2020, and February, June and August 2021. These transects were conducted generally in accordance with the *NSW Guide to Surveying Threatened Plants* (OEH 2016a) and were walked ten to twenty metres apart where possible, whereby the observer was continually scanning left and right to search for threatened flora species.

A1.2.4 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.

A1.2.5 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.

A1.2.6 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.

A1.2.7 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.

A1.2.8 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.

A1.2.9 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 2022.
- Threatened Biodiversity Data Collection (DPIE 2021b) for known/predicted threatened species in the Wyong IBRA subregion, last accessed March 2022.
- PlantNET (Botanic Gardens Trust) database search for threatened plants within a 10 km radius from the Subject Land, last accessed March 2022.
- 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.1** 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.1 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* (major Mitchell's cockatoo) *Miniopterus orianae oceanensis* (large bentwing-bat) *Polytelis swainsonii* (superb parrot) *Pteropus poliocephalus* (Grey- headed flying- fox)
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*
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) Searches for large hollows	*Ninox connivens* (Barking owl) *Ninox strenua* (Powerful owl) *Tyto novaehollandiae* (Masked owl)
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)Sloane's froglet *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*

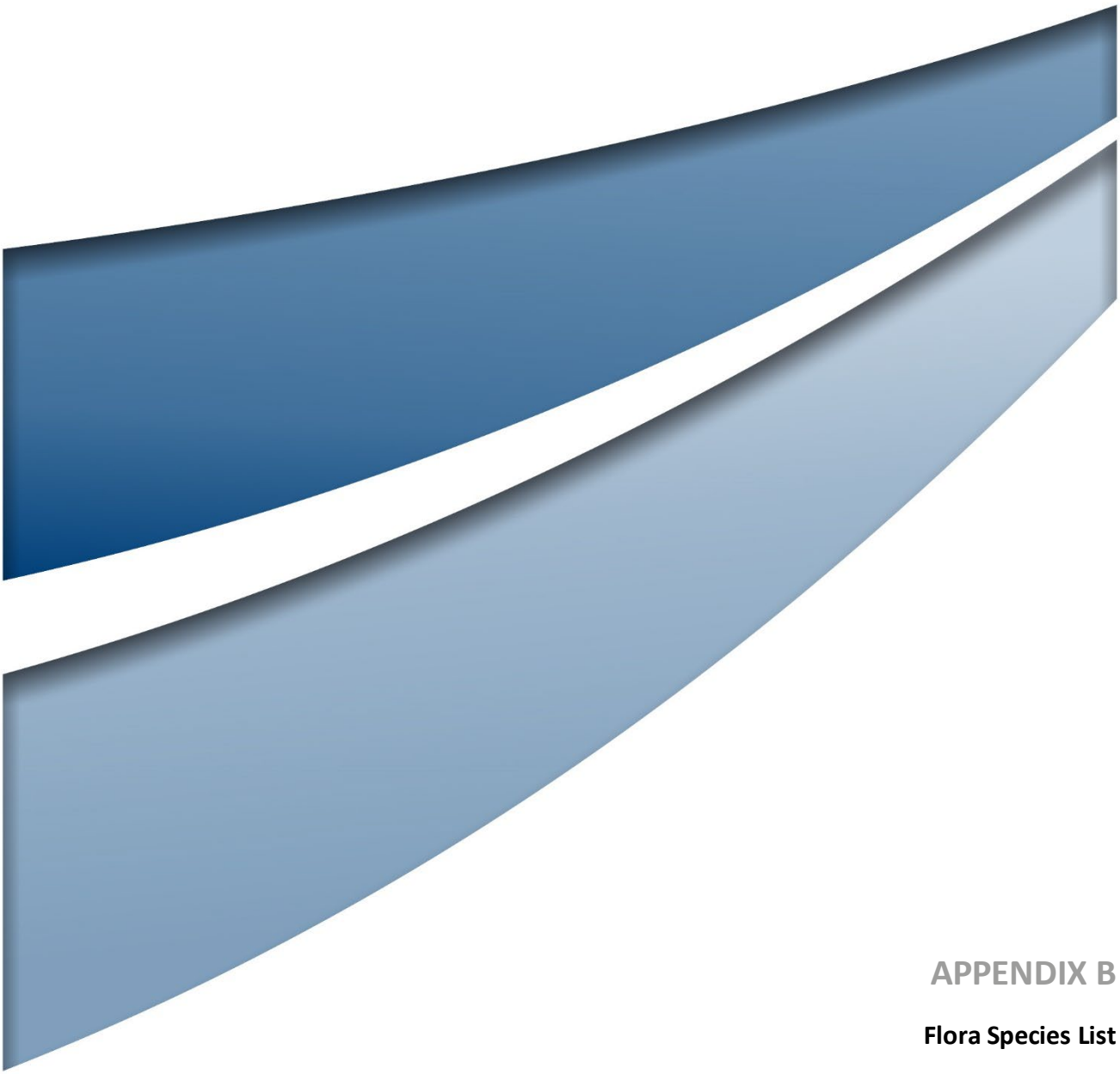
A1.4 Weather Conditions and Limitations

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) (2021).

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

Date	Daily Data			Monthly Data		
	Min-Max Temp. (°C)	Rainfall (mm)	Relative Humidity (%)	Min-Max Temp (°C) (mean)	Rainfall (mm) (total)	Relative Humidity (%) (mean)
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			



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.

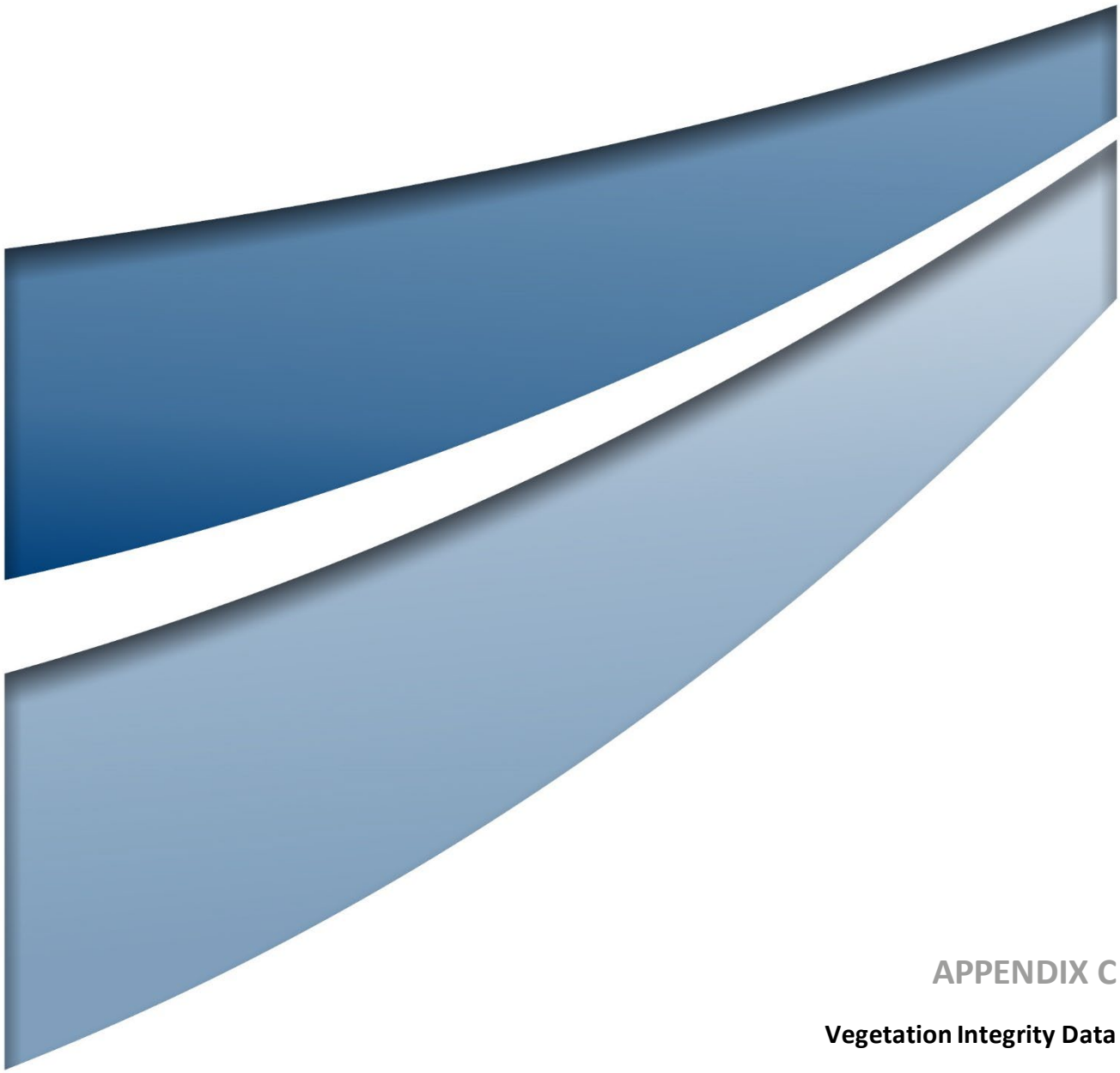
Common names used follow Harden (1992, 1993, 2000 and 2002) where available, and draw on other sources such as local names where these references do not provide a common name.

				P21139_030 VZ_1		P21139_013 VZ_2		P21139_022 VZ_2		P21139_036 VZ_2		P21139_025 VZ_3		P21139_032 VZ_4		P21139_034 VZ_4		P21139_035 VZ_4	
Family	Species Name	Common Name	Growth Form	Percent Cover	Abundance	Percent Cover	Abundance	Percent Cover	Abundance	Percent Cover	Abundance	Percent Cover	Abundance	Percent Cover	Abundance	Percent Cover	Abundance	Percent Cover	Abundance
Amaranthaceae	*Alternanthera nana*	Hairy Joyweed	FG	0	0	1	100	0	0	0	0	0	0	0	0	0	0	0	0
Anthericaceae	*Dichopogon fimbriatus*	Nodding Chocolate Lily	FG	0	0	0	0	0	0	0.1	50	0	0	0	0	0	0	0	0
Anthericaceae	*Tricoryne elatior*	Yellow Autumn-lily	FG	0	0	0	0	0	0	0.1	10	0	0	0	0	0	0	0	0
Apiaceae	*Hydrocotyle laxiflora*	Stinking Pennywort	FG	0	0	2	100	2	50	0	0	0	0	0	0	0	0	0	0
Asteraceae	*Bidens subalternans*	Greater Beggar's Ticks	EX	0	0	0	0	0	0	0.1	20	0	0	0	0	0	0	0	0
Asteraceae	*Brachyscome spathulata*		FG	0	0	0	0	0	0	0	0	0.2	100	0	0	0	0	0	0
Asteraceae	*Calotis cuneata*	Mountain Burr-Daisy	FG	0	0	0	0	0	0	0	0	0	0	0.3	30	0	0	0	0
Asteraceae	*Calotis cuneifolia*	Purple Burr-Daisy	FG	0.1	20	0.1	5	0	0	0	0	2	200	0	0	0	0	0	0
Asteraceae	*Calotis lappulacea*	Yellow Burr-daisy	FG	0	0	0.1	1	0	0	0	0	0	0	5	250	1	10	0	0
Asteraceae	*Cassinia arcuata*	Sifton Bush	SG	0.1	3	0	0	0.1	5	0	0	10	50	0.1	1	0	0	0	0
Asteraceae	*Cirsium vulgare*	Spear Thistle	EX	0	0	0.2	5	0	0	0.1	20	0	0	0	0	0	0	0	0
Asteraceae	*Conyza bonariensis*	Flaxleaf Fleabane	EX	0	0	1	100	0.2	200	0.5	100	0	0	0.5	50	0.2	200	0	0
Asteraceae	*Cymbonotus lawsonianus*		FG	0	0	0	0	0	0	0.1	20	0	0	0	0	0	0	0	0
Asteraceae	*Cymbonotus preissianus*	Austral Bear's Ear	FG	0	0	0	0	0.2	100	0	0	0	0	0	0	0	0	0	0
Asteraceae	*Euchiton involucratus*	Star Cudweed	FG	0	0	0	0	0	0	0.1	20	0	0	0	0	0	0	0	0
Asteraceae	*Hypochaeris radicata*	Catsear	EX	0	0	0	0	0	0	0.1	20	0	0	0.3	29	0.1	20	0	0
Asteraceae	*Olearia viscosa*		SG	0	0	0	0	0	0	0	0	0.1	2	0	0	0	0	0	0
Asteraceae	*Solenogyne bellioides*	Solengyne	FG	0	0	0.1	5	0	0	0	0	0	0	0	0	0	0	0	0
Asteraceae	*Taraxacum officinale*	Dandelion	EX	0	0	0.1	2	0	0	0	0	0	0	0	0	0	0	0	0
Asteraceae	*Vernonia cinerea*		FG	0	0	0	0	0	0	0.1	20	0	0	0	0	0	0	0	0
Asteraceae	*Vittadinia cuneata*		FG	0.1	20	0	0	2	500	0.3	70	0.1	20	0	0	0.2	20	0.1	5
Brassicaceae	*Hirschfeldia incana*	Buchan Weed	EX	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	20
Brassicaceae	*Lepidium africanum*	Common Peppercress	EX	0	0	0.2	100	0	0	0	0	0	0	0	0	0	0	0	0
Campanulaceae	*Pratia concolor*	Poison Pratia	FG	0	0	0	0	0	0	0.2	50	0	0	0	0	0	0	0	0
Campanulaceae	*Wahlenbergia communis*	Tufted Bluebell	FG	0	0	0	0	0	0	0	0	0	0	0	0	0.5	50	0	0
Caryophyllaceae	*Paronychia brasiliana*	Chilean Whitlow Wort, Brazilian Whitlow	EX	0	0	5	1000	0	0	0	0	0	0	0	0	0	0	0	0
Caryophyllaceae	*Petrorhagia nanteuilii*	Proliferous Pink	EX	0	0	0	0	0	0	0	0	0	0	0.3	30	0	0	0	0
Caryophyllaceae	*Stellaria media*	Common Chickweed	EX	0	0	0	0	0	0	0.5	50	0	0	0	0	0	0	0	0
Chenopodiaceae	*Einadia nutans*	Climbing Saltbush	FG	0.1	10	0	0	0.1	10	0	0	0	0	0	0	0	0	0	0
Chenopodiaceae	*Einadia trigonos*	Fishweed	FG	0	0	2	100	0	0	0	0	0	0	0	0	0	0	0	0
Clusiaceae	*Hypericum gramineum*	Small St John's Wort	FG	0.1	20	0	0	0.1	50	0.5	50	0	0	0.1	10	0	0	0	0
Clusiaceae	*Hypericum perforatum*	St. Johns Wort	HT	0	0	0	0	0	0	0	0	0	0	3	30	0	0	0	0
Convolvulaceae	*Convolvulus erubescens*	Pink Bindweed	OG	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	5
Convolvulaceae	*Dichondra repens*	Kidney Weed	FG	0	0	0.5	100	0	0	0	0	0	0	0	0	0	0	0	0
Cupressaceae	*Callitris endlicheri*	Black Cypress Pine	TG	0	0	0	0	0	0	0	0	10	10	0	0	0	0	0	0
Cyperaceae	*Carex appressa*	Tall Sedge	GG	0	0	0	0	0	0	15	1000	0	0	0	0	0	0	0	0
Cyperaceae	*Cyperus bifax*	Downs Nutgrass	GG	0	0	0	0	0	0	10	1000	0	0	0	0	0	0	0	0
Cyperaceae	*Cyperus brevifolius*		EX	0	0	0	0	0	0	3	1000	0	0	0	0	0	0	0	0
Cyperaceae	*Cyperus eragrostis*	Umbrella Sedge	HT	0	0	0	0	0	0	0	0	0	0	3	300	0	0	0	0

				P21139_030 VZ_1		P21139_013 VZ_2		P21139_022 VZ_2		P21139_036 VZ_2		P21139_025 VZ_3		P21139_032 VZ_4		P21139_034 VZ_4		P21139_035 VZ_4	
Family	Species Name	Common Name	Growth Form	Percent Cover	Abundance	Percent Cover	Abundance	Percent Cover	Abundance	Percent Cover	Abundance	Percent Cover	Abundance	Percent Cover	Abundance	Percent Cover	Abundance	Percent Cover	Abundance
Cyperaceae	*Cyperus gracilis*	Slender Flat-sedge	GG	0	0	0	0	0	0	0	0	0	0	0.2	20	0	0	0	0
Cyperaceae	*Fimbristylis dichotoma*	Common Fringe-sedge	GG	0.1	10	0	0	0	0	2	600	0	0	0	0	0.3	20	0.1	20
Dilleniaceae	*Hibbertia obtusifolia*	Hoary Guinea Flower	SG	0	0	0	0	0	0	0	0	0	0	0	0	3	5	0	0
Ericaceae	*Leucopogon ericoides*	Pink Beard-heath	SG	0	0	0	0	0	0	0	0	0.1	5	0	0	0	0	0	0
Euphorbiaceae	*Euphorbia peplus*	Petty Spurge	EX	0	0	0	0	0	0	0	0	0	0	0.3	30	5	1000	0	0
Fabaceae (Faboideae)	*Daviesia acicularis*		SG	0	0	0	0	0	0	0	0	1	10	0	0	0	0	0	0
Fabaceae (Faboideae)	*Glycine clandestina*	Twining glycine	OG	0	0	0	0	0	0	0	0	0	0	0	0	0.2	20	0	0
Fabaceae (Faboideae)	*Glycine tabacina*	Variable Glycine	OG	0	0	0.1	5	0	0	0.1	10	0	0	0.2	20	0	0	0.2	100
Fabaceae (Faboideae)	*Medicago arabica*	Spotted Burr Medic	EX	0	0	0	0	0	0	0.5	20	0	0	0	0	0	0	0	0
Fabaceae (Faboideae)	*Pultenaea retusa*		SG	0.1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Fabaceae (Faboideae)	*Trifolium repens*	White Clover	EX	0	0	0.2	20	0	0	0	0	0	0	0	0	0	0	0	0
Fabaceae (Mimosoideae)	*Acacia spp.*	Wattle	SG	0	0	0	0	0	0	0	0	0.1	1	0	0	0	0	0	0
Geraniaceae	*Geranium homeanum*		FG	0	0	0	0	0.1	10	0.2	10	0	0	0	0	0	0	0.1	20
Goodeniaceae	*Goodenia paniculata*		FG	0	0	0	0	0	0	0.2	50	0	0	0	0	0	0	0	0
Goodeniaceae	*Goodenia spp.*		FG	0	0	0	0	0.1	20	0	0	0	0	0	0	0	0	0	0
Haloragaceae	*Haloragis heterophylla*	Variable Raspwort	FG	0.1	50	0	0	0	0	8	1000	0	0	0	0	0	0	0	0
Haloragaceae	*Haloragis serra*		FG	0	0	0	0	0	0	0	0	2	200	0	0	20	3000	0	0
Juncaceae	*Juncus usitatus*		GG	0.1	10	0	0	0	0	0.2	100	0	0	0	0	0	0	0	0
Lomandraceae	*Lomandra filiformis*		GG	0	0	0	0	0	0	0	0	0.1	10	0	0	0	0	0	0
Lomandraceae	*Lomandra multiflora*	Many-flowered Mat-rush	GG	0.1	10	0	0	0	0	0	0	0.1	1	0	0	0	0	0	0
Lomandraceae	*Lomandra spp.*	Mat-rush	GG	0	0	0	0	0.2	100	0	0	0	0	0	0	0	0	0	0
Malvaceae	*Brachychiton populneus*	Kurrajong	TG	0	0	0	0	0.1	1	0	0	0	0	0	0	0	0	0	0
Malvaceae	*Modiola caroliniana*	Red-flowered Mallow	EX	0	0	0.1	3	0	0	0	0	0	0	0	0	0	0	0	0
Myoporaceae	*Eremophila debilis*	Amulla	SG	0	0	0	0	0.1	20	0	0	0	0	0	0	0	0	0	0
Myrtaceae	*Angophora floribunda*	Rough-barked Apple	TG	0	0	20	9	20	2	0	0	0	0	0.1	1	0	0	0	0
Myrtaceae	*Eucalyptus blakelyi*	Blakely's Red Gum	TG	0	0	5	1	10	3	20	5	0	0	0.4	6	0	0	0	0
Myrtaceae	*Eucalyptus dealbata*	Tumbledown Red Gum	TG	0	0	0	0	0	0	0	0	15	10	0	0	0	0	0	0
Myrtaceae	*Eucalyptus melliodora*	Yellow Box	TG	0	0	0	0	5	1	0	0	0	0	0	0	0	0	0	0
Myrtaceae	*Eucalyptus microcarpa*	Western Grey Box	TG	20	15	0	0	0	0	0	0	0	0	0.2	5	0	0	0	0
Myrtaceae	*Eucalyptus polyanthemos*	Red Box	TG	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0
Myrtaceae	*Eucalyptus sideroxylon*	Mugga Ironbark	TG	3	1	0	0	0	0	0	0	10	2	0	0	0	0	0	0
Nyctaginaceae	*Boerhavia dominii*	Tarvine	FG	0	0	0	0	0	0	0	0	0	0	0	0	0.1	10	0	0
Oxalidaceae	*Oxalis perennans*		FG	0	0	0	0	0	0	0.1	20	0	0	0.5	100	0	0	0.1	20
Phormiaceae	*Dianella longifolia*	Blueberry Lily	FG	0	0	0	0	0	0	0	0	0.1	1	0	0	0	0	0	0
Phormiaceae	*Stypandra glauca*	Nodding Blue Lily	FG	0	0	0	0	0	0	0	0	0.2	10	0	0	0	0	0	0
Plantaginaceae	*Veronica plebeia*	Trailing Speedwell	FG	0	0	0	0	0	0	0	0	0.1	10	0	0	0	0	0	0
Poaceae	*Aristida ramosa*	Purple Wiregrass	GG	0	0	0	0	50	3000	0.2	20	0	0	0.4	400	15	3000	15	3000

				P21139_030 VZ_1		P21139_013 VZ_2		P21139_022 VZ_2		P21139_036 VZ_2		P21139_025 VZ_3		P21139_032 VZ_4		P21139_034 VZ_4		P21139_035 VZ_4	
Family	Species Name	Common Name	Growth Form	Percent Cover	Abundance	Percent Cover	Abundance	Percent Cover	Abundance	Percent Cover	Abundance	Percent Cover	Abundance	Percent Cover	Abundance	Percent Cover	Abundance	Percent Cover	Abundance
Poaceae	*Aristida vagans*	Threeawn Speargrass	GG	15	200	0	0	0	0	0	0	35	1000	0	0	0	0	0	0
Poaceae	*Austrostipa bigeniculata*	Yanganbil	GG	0	0	0	0	0	0	0	0	1	50	0	0	0	0	0	0
Poaceae	*Austrostipa scabra*	Speargrass	GG	0	0	0.1	3	5	500	0	0	20	500	0	0	0	0	0	0
Poaceae	*Austrostipa verticillata*	Slender Bamboo Grass	GG	0	0	0.1	1	0	0	0	0	0	0	0	0	0	0	0	0
Poaceae	*Bothriochloa decipiens*	Red Grass	GG	0	0	0.5	100	0	0	0	0	0	0	0	0	0	0	0	0
Poaceae	*Bothriochloa macra*	Red Grass	GG	0	0	0	0	0.1	20	0	0	0	0	0.5	50	0	0	0.5	50
Poaceae	*Briza minor*	Shivery Grass	EX	0	0	0	0	0	0	0.1	50	0	0	0	0	0.2	20	0	0
Poaceae	*Bromus catharticus*	Praire Grass	EX	0	0	0.2	10	0.1	10	0	0	0	0	0	0	0	0	0	0
Poaceae	*Bromus hordeaceus*	Soft Brome	EX	0	0	0	0	0	0	0	0	0	0	5	500	10	5000	0	0
Poaceae	*Chloris truncata*	Windmill Grass	GG	0	0	0.1	3	0	0	0	0	0	0	0	0	0	0	0	0
Poaceae	*Dichanthium sericeum*	Queensland Bluegrass	GG	0	0	0	0	0	0	0.2	30	0	0	0	0	0	0	0	0
Poaceae	*Dichelachne micrantha*	Shorthair Plumegrass	GG	0	0	0	0	0	0	10	300	0	0	5	5000	0	0	0	0
Poaceae	*Digitaria brownii*	Cotton Panic Grass	GG	0	0	0.3	50	0	0	0.7	70	1	50	0	0	5	1000	2	1000
Poaceae	*Digitaria divaricatissima*	Umbrella Grass	GG	0	0	1	100	0	0	0	0	0	0	0	0	0	0	0	0
Poaceae	*Eleusine tristachya*	Goose Grass	EX	0	0	0.1	10	0	0	0	0	0	0	0	0	0	0	0	0
Poaceae	*Elymus scaber*	Common Wheatgrass	GG	0	0	0.1	3	0	0	0	0	20	1000	0.2	20	0	0	0	0
Poaceae	*Enneapogon gracilis*	Slender Nineawn	GG	0.1	20	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Poaceae	*Entolasia stricta*	Wiry Panic	GG	0.1	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Poaceae	*Eragrostis brownii*	Brown's Lovegrass	GG	0.5	200	2	100	0.1	50	1	1000	5	100	5	3000	5	1000	0	0
Poaceae	*Eragrostis curvula*	African Lovegrass	HT	0	0	0	0	0	0	0	0	0	0	0	0	0.3	30	0	0
Poaceae	*Eragrostis leptostachya*	Paddock Lovegrass	GG	0.5	200	0	0	0	0	0.5	50	0	0	0	0	0	0	2	1000
Poaceae	*Lolium perenne*	Perennial Ryegrass	EX	0	0	0.1	2	0	0	0	0	0	0	0	0	0	0	0	0
Poaceae	*Microlaena stipoides*	Weeping Grass	GG	0.1	5	60	1000	0.1	10	0	0	0	0	0	0	0	0	0	0
Poaceae	*Panicum effusum*	Hairy Panic	GG	0.1	20	0	0	0.2	100	0	0	0	0	5	500	5	1000	5	1000
Poaceae	*Paspalidium spp.*		GG	0	0	0.5	50	0	0	0	0	0	0	0	0	0	0	0	0
Poaceae	*Paspalum dilatatum*	Paspalum	HT	0	0	0.1	1	0	0	0.2	20	0	0	0	0	0	0	0	0
Poaceae	*Rytidosperma caespitosum*	Ringed Wallaby Grass	GG	0.1	10	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Poaceae	*Rytidosperma spp.*		GG	0	0	0.2	20	0	0	5	2000	0	0	0	0	0	0	0	0
Poaceae	*Setaria gracilis*	Slender Pigeon Grass	EX	0	0	0	0	0	0	1	300	0	0	0	0	10	2000	1	500
Poaceae	*Setaria parviflora*		EX	0	0	1	100	0	0	0	0	0	0	0	0	0	0	0	0
Poaceae	*Sorghum leiocladum*	Wild Sorghum	GG	0.1	10	0	0	0	0	45	8000	0	0	0	0	0	0	0	0
Poaceae	*Sporobolus creber*	Slender Rat's Tail Grass	GG	0	0	10	1000	0	0	0.5	20	0	0	15	5000	0	0	70	3000
Poaceae	*Themeda quadrivalvis*	Grader Grass	EX	0	0	0	0	0	0	0	0	0	0	30	3000	0	0	0	0
Poaceae	*Themeda triandra*		GG	0	0	0	0	25	500	0	0	0	0	0	0	0	0	0	0
Polygonaceae	*Acetosella vulgaris*	Sheep Sorrel	HT	0.1	50	0.1	10	0	0	0	0	0	0	0	0	0.1	200	0	0
Polygonaceae	*Polygonum aviculare*	Wireweed	EX	0	0	0	0	0	0	0	0	0	0	0.1	20	0	0	0	0
Polygonaceae	*Rumex brownii*	Swamp Dock	FG	0	0	0	0	0	0	0.1	100	0	0	0	0	0	0	0	0
Pteridaceae	*Cheilanthes distans*	Bristly Cloak Fern	EG	0	0	0	0	0.1	50	0	0	0.1	50	0	0	0	0	0	0
Pteridaceae	*Cheilanthes sieberi*	Rock Fern	EG	0	0	0	0	0	0	2	200	0	0	0	0	4	1000	0.1	20

				P21139_030 VZ_1		P21139_013 VZ_2		P21139_022 VZ_2		P21139_036 VZ_2		P21139_025 VZ_3		P21139_032 VZ_4		P21139_034 VZ_4		P21139_035 VZ_4	
Family	Species Name	Common Name	Growth Form	Percent Cover	Abundance	Percent Cover	Abundance	Percent Cover	Abundance	Percent Cover	Abundance	Percent Cover	Abundance	Percent Cover	Abundance	Percent Cover	Abundance	Percent Cover	Abundance
Rosaceae	*Acaena novae-zelandiae*	Bidgee-widgee	FG	0	0	0	0	0	0	0.1	10	0	0	0	0	0	0	0	0
Rosaceae	*Rubus fruticosus*	Blackberry complex	HT	0	0	0	0	0	0	0.4	5	0	0	0	0	0	0	0	0
Rubiaceae	*Pomax umbellata*	Pomax	FG	0	0	0	0	0	0	0	0	0.1	10	0	0	0	0	0	0
Sapindaceae	*Dodonaea viscosa*	Sticky Hop-bush	SG	0	0	0	0	0	0	0	0	0.1	5	0	0	0	0	0	0
Scrophulariaceae	*Verbascum thapsus*	Blanket Weed	EX	0	0	0	0	0	0	0	0	0	0	0	0	0.2	10	0	0
Solanaceae	*Lycium ferocissimum*	African Boxthorn	HT	0	0	0	0	0.1	1	0	0	0	0	0	0	0	0	0	0
Solanaceae	*Solanum cinereum*	Narrawa Burr	SG	0	0	0.1	4	0	0	0	0	0	0	0	0	0	0	0.1	5
Solanaceae	*Solanum nigrum*	Black-berry Nightshade	EX	0	0	1	100	0	0	0	0	0	0	0	0	0	0	0.1	5
Solanaceae	*Solanum spp.*		FG	0	0	0	0	0	0	0.1	2	0	0	0	0	0	0	0	0
Verbenaceae	*Verbena bonariensis*	Purpletop	EX	0	0	0.1	1	0	0	0.2	20	0	0	10	0	0.2	20	0.1	2

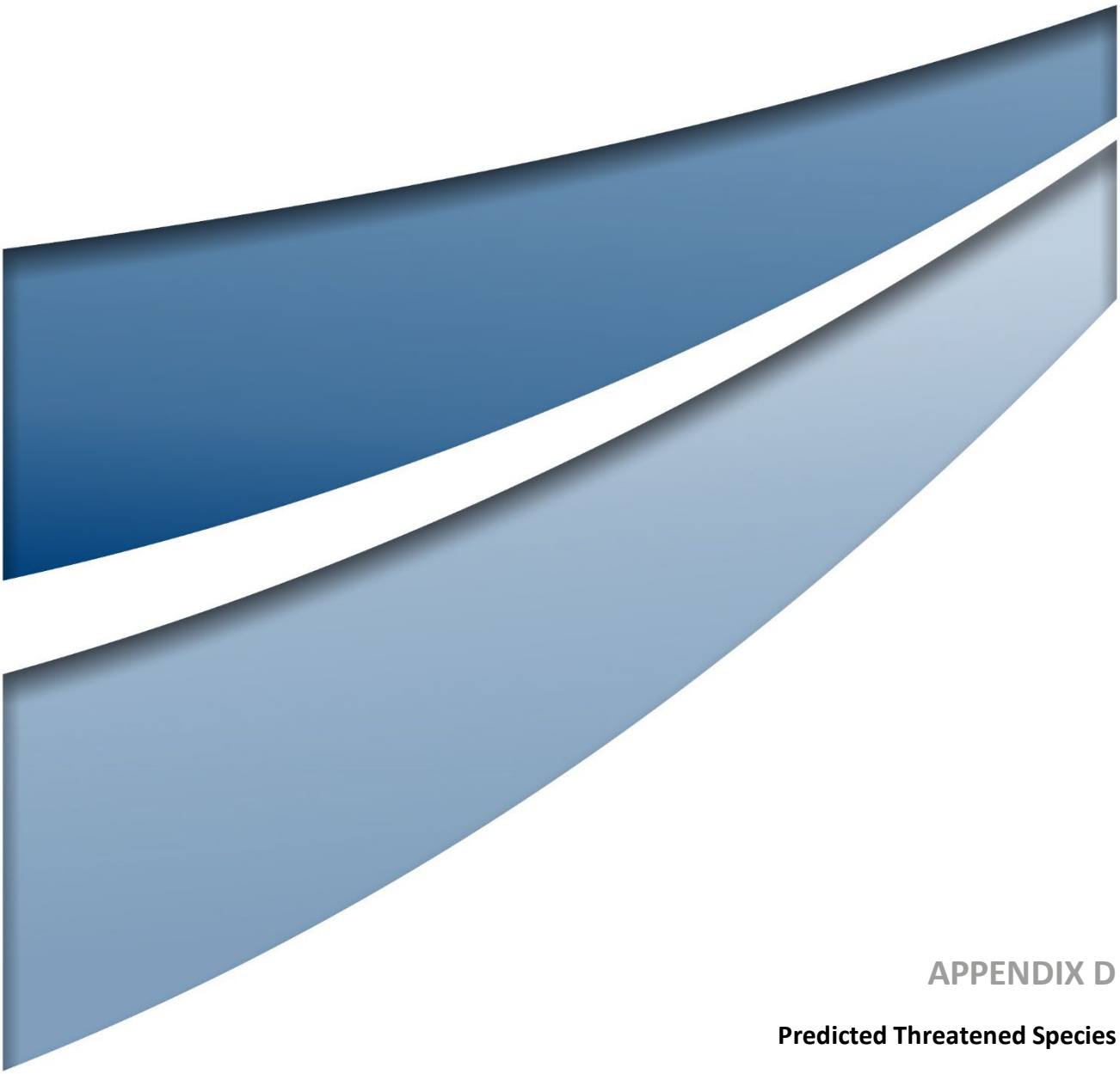


APPENDIX C

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_030 VZ_1	2	2	12	5	0	0	23	0.2	16.9	0.5	0	0	3	0	29	11.5	0	1	1	1	1	0	0.1
P21139_013 VZ_2	2	1	12	7	0	1	25	0.1	74.9	5.8	0	0.1	7	0	19.4	14.5	1	1	1	1	1	1	0.2
P21139_022 VZ_2	4	2	8	7	1	0	35.1	0.2	80.7	4.6	0.1	0	5	0	50	0.5	0	1	1	1	1	1	0.1
P21139_036 VZ_2	1	0	14	15	1	1	20	0	90.7	10.3	2	0.1	1	1	18.2	47	0	1	1	1	1	1	0.6
P21139_025 VZ_3	4	6	8	8	1	0	36	11.4	82.2	4.8	0.1	0	0	1	11	23.5	1	1	1	1	0	1	0
P21139_032 VZ_4	3	1	8	4	0	1	0.7	0.1	31.3	5.9	0	0.2	0	0	2	0	0	0	0	0	0	1	6
P21139_034 VZ_4	0	1	5	5	1	1	0	3	30.3	21.8	4	0.2	0	0	1	0	0	0	0	0	0	1	0.4
P21139_035 VZ_4	0	1	7	4	1	2	0	0.1	94.6	0.4	0.1	0.3	0	0	0.8	0	0	0	0	0	0	1	0



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	-	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	-	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	-	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
major mitchell's cockatoo *Lophochroa leadbeateri* (foraging)	V	-	Moderate	-	81
square- tailed kite *Lophoictinia isura* (foraging)	E	CE	Moderate	-	81 281 318
Hooded robin *Melanodryas cucullata cucullata*	V	-	Moderate	-	81 281 318
Black-chinned Honeyeater (eastern subspecies) *Melithreptus gularis gularis*	V	-	Moderate	-	81 281 318
Large bentwing-bat (foraging) *Miniopterus orianae oceanensis*	V	-	High	-	81 281
turquoise parrot *Neophema pulchella*	V	-	High	-	81 281 318
barking owl (foraging) *Ninox connivens*	V	-	High	-	81 281 318
powerful owl (foraging) *Ninox strenua*	V	-	High	-	281
Corben's Long-eared Bat *Nyctophilus corbeni*	V	V	High	-	81
Gilbert's Whistler *Pachycephala inornata*	V	-	Moderate	-	318

Species	BC Act	EPBC Act	Sensitivity to Gain	Habitat Constraint	Vegetation Zone Prediction
scarlet robin *Petroica boodang*	V	-	Moderate	-	281 318
flame robin *Petroica phoenicea*	V	-	Moderate	-	281 318
Koala *Phascolarctos cinereus* (foraging)	V	V	High	-	81 281 318
superb parrot *Polytelis swainsonii* (foraging)	V	V	moderate	-	81 281
grey-crowned babbler (eastern subspecies) *Pomatostomus 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	-	Moderate	-	81 281 318
masked owl (foraging) *Tyto novaehollandiae*	V	-	High	-	81 281
Rosenberg's Goanna Varanus rosenbergi	V	-	High	-	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***	V	-	Moderate	Eucalypt tree species with hollows greater than 9 cm diameter	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	-	High	Living or dead trees with hollows greater than 15 cm diameter, and greater than 5 m above ground.	Mar - Aug	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.
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.

Species	BC Act	EPBC Act	Sensitivity to Gain	Habitat Constraint	Survey Period	SAII Entity	Survey Method and Justification
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.
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. Call playback and spotlighting conducted in June 2021 and August 2021 and species not detected.
Major mitchell's cockatoo *Lophochroa leadbeateri* **(breeding)**	V	-	High	Living or dead trees with hollows greater than 10cm 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.
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.

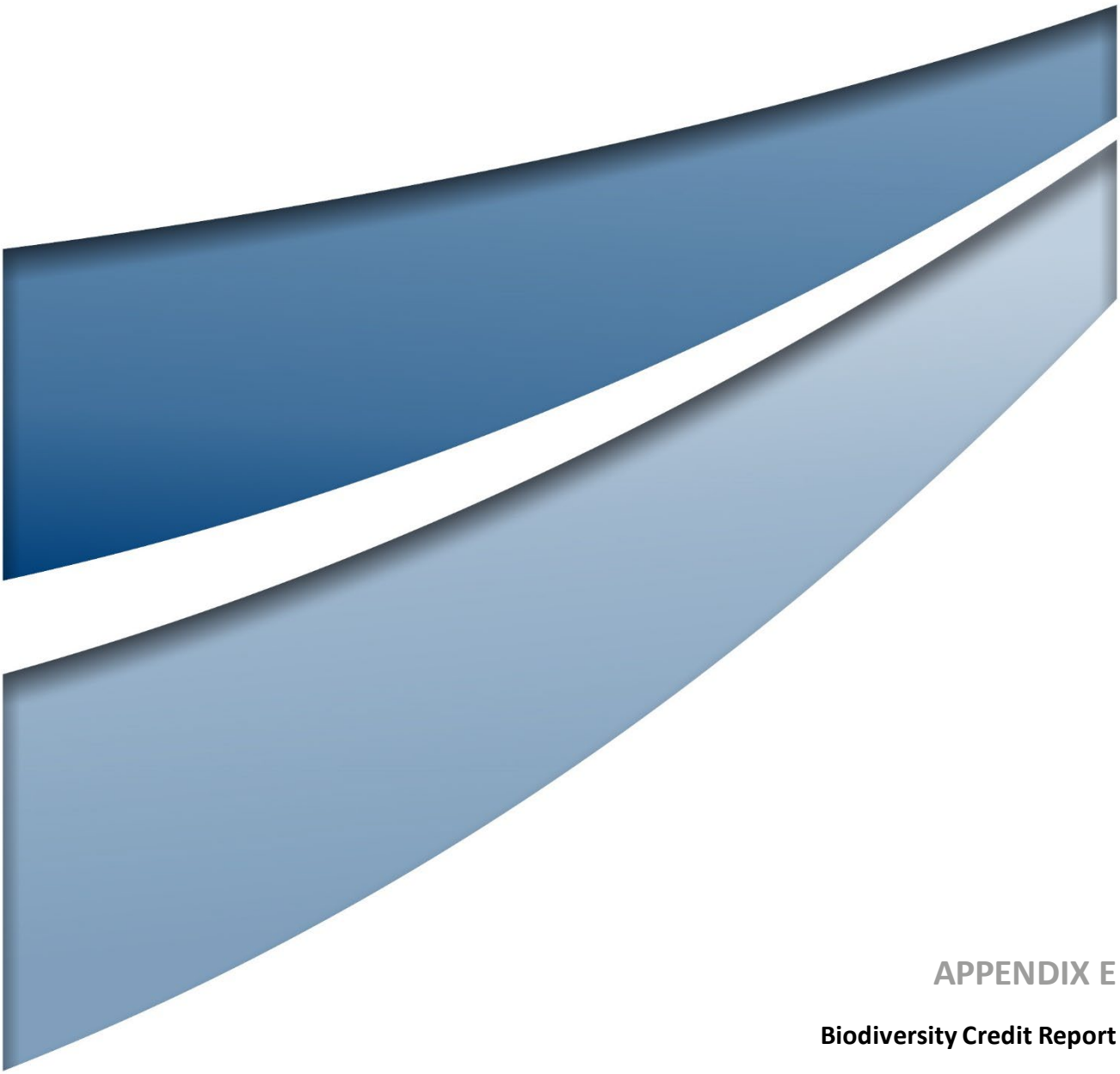
Species	BC Act	EPBC Act	Sensitivity to Gain	Habitat Constraint	Survey Period	SAII Entity	Survey Method and Justification
barking owl (breeding) *Ninox connivens*	V	-	High	Living or dead trees with hollows greater than 20 cm diameter and greater than 4 m above the ground.	May - Dec	No	**Species not detected.** 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 (breeding) *Ninox strenua*	V	-	High	Living or dead trees with hollow greater than 20 cm diameter.	May - 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 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.

Species	BC Act	EPBC Act	Sensitivity to Gain	Habitat Constraint	Survey Period	SAII Entity	Survey Method and Justification
koala (breeding) ***Phascolarctos cinereus***	V	V	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.
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'.

Species	BC Act	EPBC Act	Sensitivity to Gain	Habitat Constraint	Survey Period	SAII Entity	Survey Method and Justification
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.
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.

Species	BC Act	EPBC Act	Sensitivity to Gain	Habitat Constraint	Survey Period	SAII Entity	Survey Method and Justification
masked owl (breeding) *Tyto novaehollandiae*	V	-	High	Living or dead trees with hollows greater than 20 cm diameter.	May - 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 Biodiversity Credit Report (Like for like)

Proposal Details

Assessment Id
00022385/BAAS21019/22/00031701

Proposal Name
Tallawang SF

BAM data last updated *
16/06/2022

Assessor Name
Bill Wallach

Assessor Number
BAAS17068

BAM Data version *
54

Proponent Names

Report Created
03/08/2022

BAM Case Status
Finalised

Assessment Revision
4

Assessment Type
Major Projects

Date Finalised
03/08/2022

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

Potential Serious and Irreversible Impacts

Name of threatened ecological community	Listing status	Name of Plant Community Type/ID
White Box - Yellow Box - Blakely's Red Gum Grassy Woodland and Derived Native Grassland in the NSW North Coast, New England Tableland, Nandewar, Brigalow Belt South, Sydney Basin, South Eastern Highla	Critically Endangered Ecological Community	281-Rough-Barked Apple - red gum - Yellow Box woodland on alluvial clay to loam soils on valley flats in the northern NSW South Western Slopes Bioregion and Brigalow Belt South Bioregion
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	1.4	0	45	45
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	28.1	609	423	1032
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	1.5	47	0	47

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	-	81_Moderate_solar	No	45	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.
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	-	281_Moderate_solar	Yes	146	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.

	This includes PCT's: 74, 75, 83, 250, 266, 267, 268, 270, 274, 275, 276, 277, 278, 279, 280, 281, 282, 283, 284, 286, 298, 302, 312, 341, 342, 347, 350, 352, 356, 367, 381, 382, 395, 401, 403, 421, 433, 434, 435, 436, 437, 451, 483, 484, 488, 492, 496, 508, 509, 510, 511, 528, 538, 544, 563, 567, 571, 589, 590, 597, 599, 618, 619, 622, 633, 654, 702, 703, 704, 705, 710, 711, 796, 797, 799, 840, 847, 851, 921, 1099, 1103, 1303, 1304, 1307, 1324, 1329, 1330, 1331, 1332, 1333, 1334, 1383, 1401, 1512, 1606, 1608, 1611, 1691, 1693, 1695, 1698					
	White Box - Yellow Box - Blakely's Red Gum Grassy Woodland and Derived Native	-	281_DNG_ETL	No	423	Inland Slopes, Bogan-Macquarie, Bondo, Capertee Uplands, Capertee Valley, Crookwell, Hill End, Kerrabee, Lower Slopes, Murray Fans,

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

	1611, 1691, 1693, 1695, 1698					
	White Box - Yellow Box - Blakely's Red Gum Grassy Woodland and Derived Native Grassland in the NSW North Coast, New England Tableland, Nandewar, Brigalow Belt South, Sydney Basin, South Eastern Highla This includes PCT's: 74, 75, 83, 250, 266, 267, 268, 270, 274, 275, 276, 277, 278, 279, 280, 281, 282, 283, 284, 286, 298, 302, 312, 341, 342, 347, 350, 352, 356, 367, 381, 382, 395, 401, 403, 421, 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,	-	281_Moderate_ ETL	Yes	463	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.

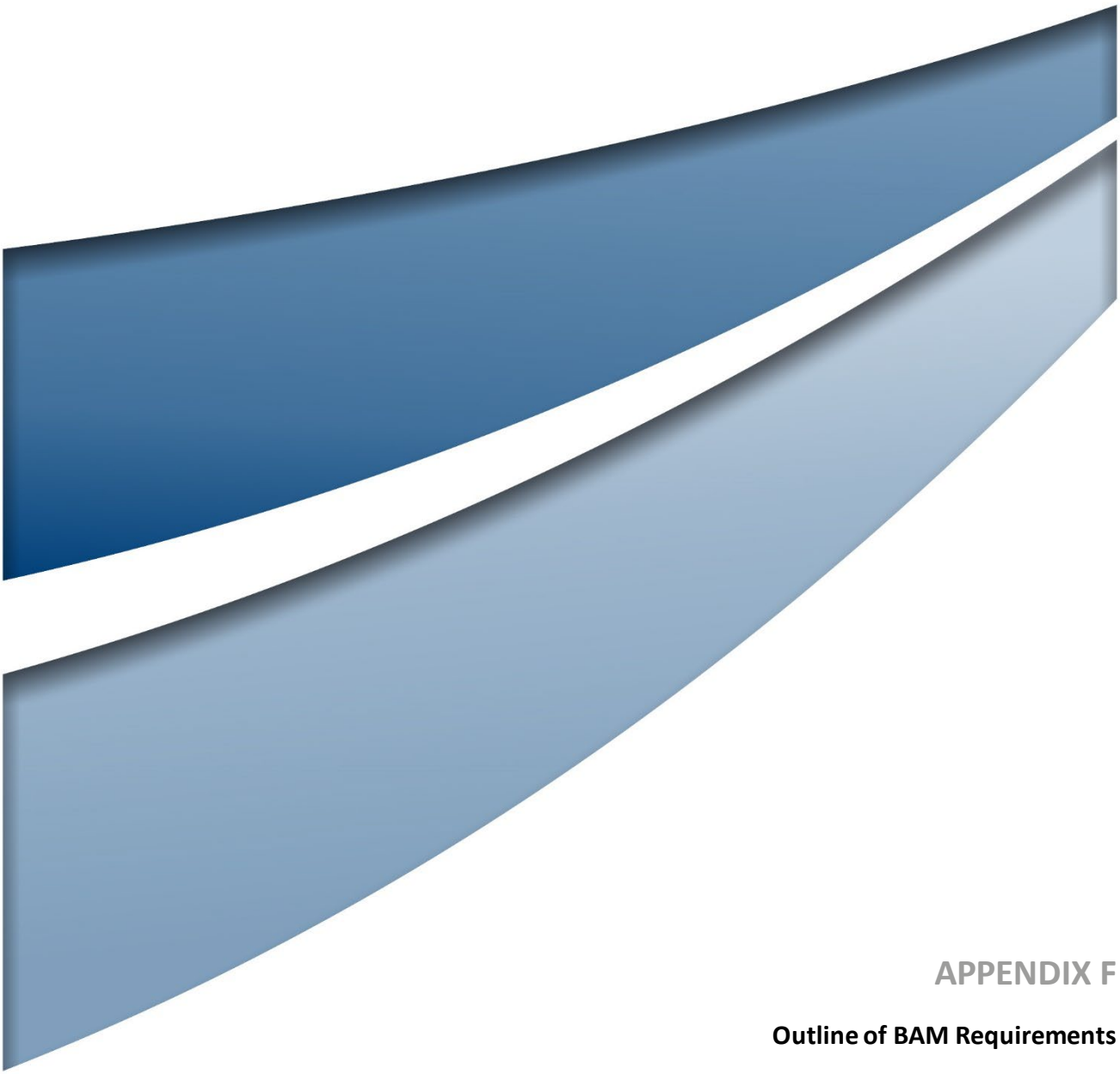
	711, 796, 797, 799, 840, 847, 851, 921, 1099, 1103, 1303, 1304, 1307, 1324, 1329, 1330, 1331, 1332, 1333, 1334, 1383, 1401, 1512, 1606, 1608, 1611, 1691, 1693, 1695, 1698					
318-Mugga Ironbark - Tumbledown Red Gum - Red Box - Black Cypress Pine open forest on shallow stony soils on hills in the NSW 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_solar	Yes	47	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.

Species Credit Summary

No Species Credit Data

Credit Retirement Options

Like-for-like credit retirement options



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 land1 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	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

Report Section	BAM Reference	Requirement
		☐ 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) ☐ 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 ☐ Boundary of subject land ☐ Cadastre of subject land ☐ Landscape features identified in BAM Subsection 3.1.3

Report Section	BAM Reference	Requirement
		☐ Location Map ☐ Digital aerial photography at 1:1,000 scale or finer ☐ Boundary of subject land ☐ 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 ☐ 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

Report Section	BAM Reference	Requirement
Section 3.2, Figure 3.1, 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 ☐ 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

Report Section	BAM Reference	Requirement
		☐ 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

Report Section	BAM Reference	Requirement
		☐ Map of TEC distribution on the subject land and table of TEC listing, status and area (ha) ☐ 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:

Report Section	BAM Reference	Requirement
		☐ 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 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) ☐ 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)

Report Section	BAM Reference	Requirement
		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 **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

Report Section	BAM Reference	Requirement
		☐ 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) ☐ 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)

Report Section	BAM Reference	Requirement
		☐ 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 4.1 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 ☐ routes that would avoid or minimise impacts on biodiversity values and justification for selecting the proposed route

Report Section	BAM Reference	Requirement
		☐ 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):

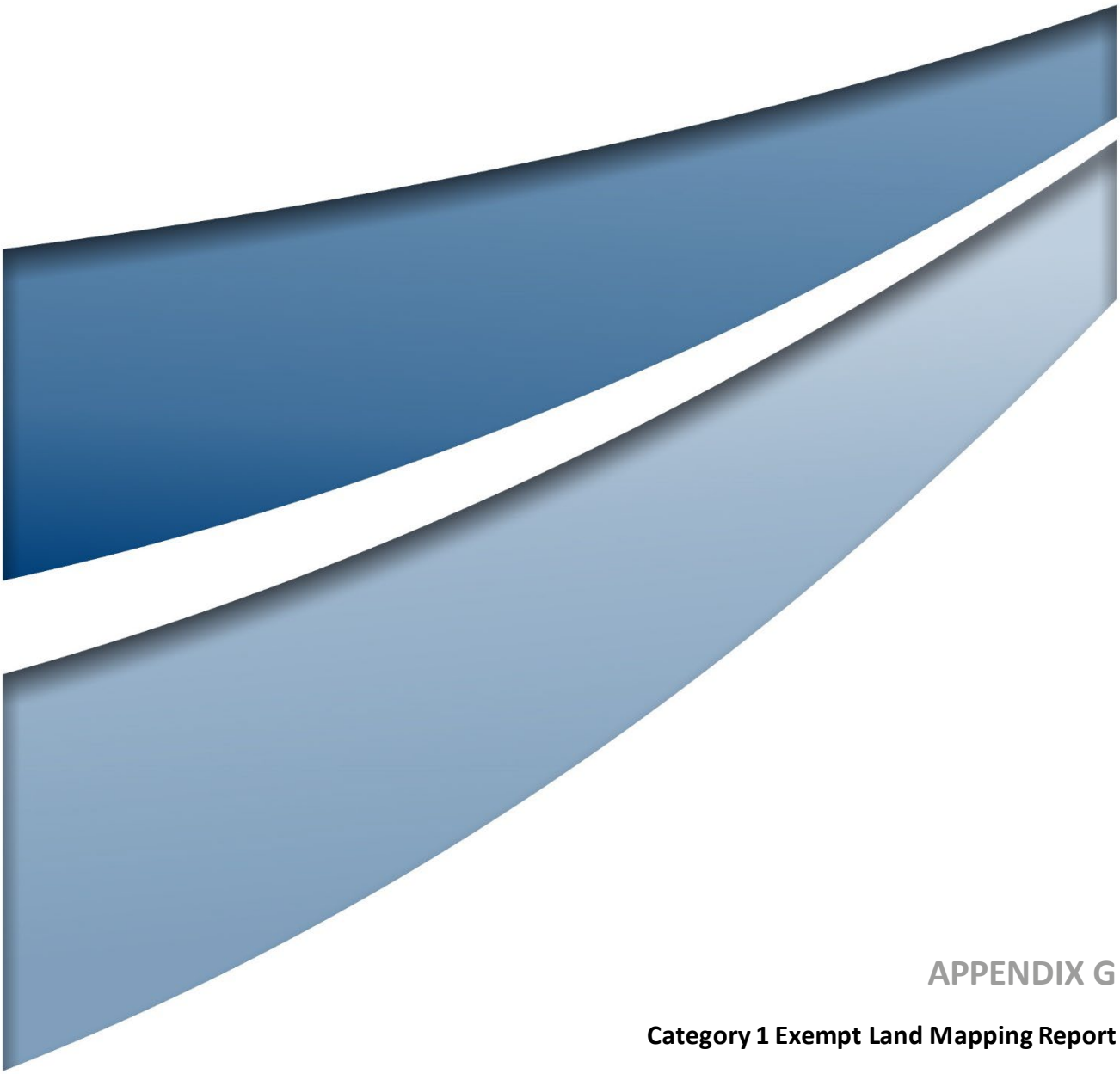
Report Section	BAM Reference	Requirement
		☐ description of the nature, extent, frequency, duration and timing of indirect impacts of the proposal ☐ documenting the consequences to vegetation and threatened species and their habitat including evidence-based justifications ☐ reporting any limitations 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 ☐ 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

Report Section	BAM Reference	Requirement
		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 ☐ 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)

Report Section	BAM Reference	Requirement
		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.) ☐ 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

Report Section	BAM Reference	Requirement
		☐ 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

July 2022

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: Shaun Corry
Technical Manager: Belinda Howe
Report No. 21139/R05 Appendix G
Date: July 2022

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.

Document Status

Rev No.	Reviewer		Approved for Issue	
	Name	Date	Name	Date
V1	Belinda Howe	20/05/2022	Shaun Corry	25/05/2022
Final	Shaun Corry	05/07/2022	Malinda Facey	12/07/2022

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Figures

Tables

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:

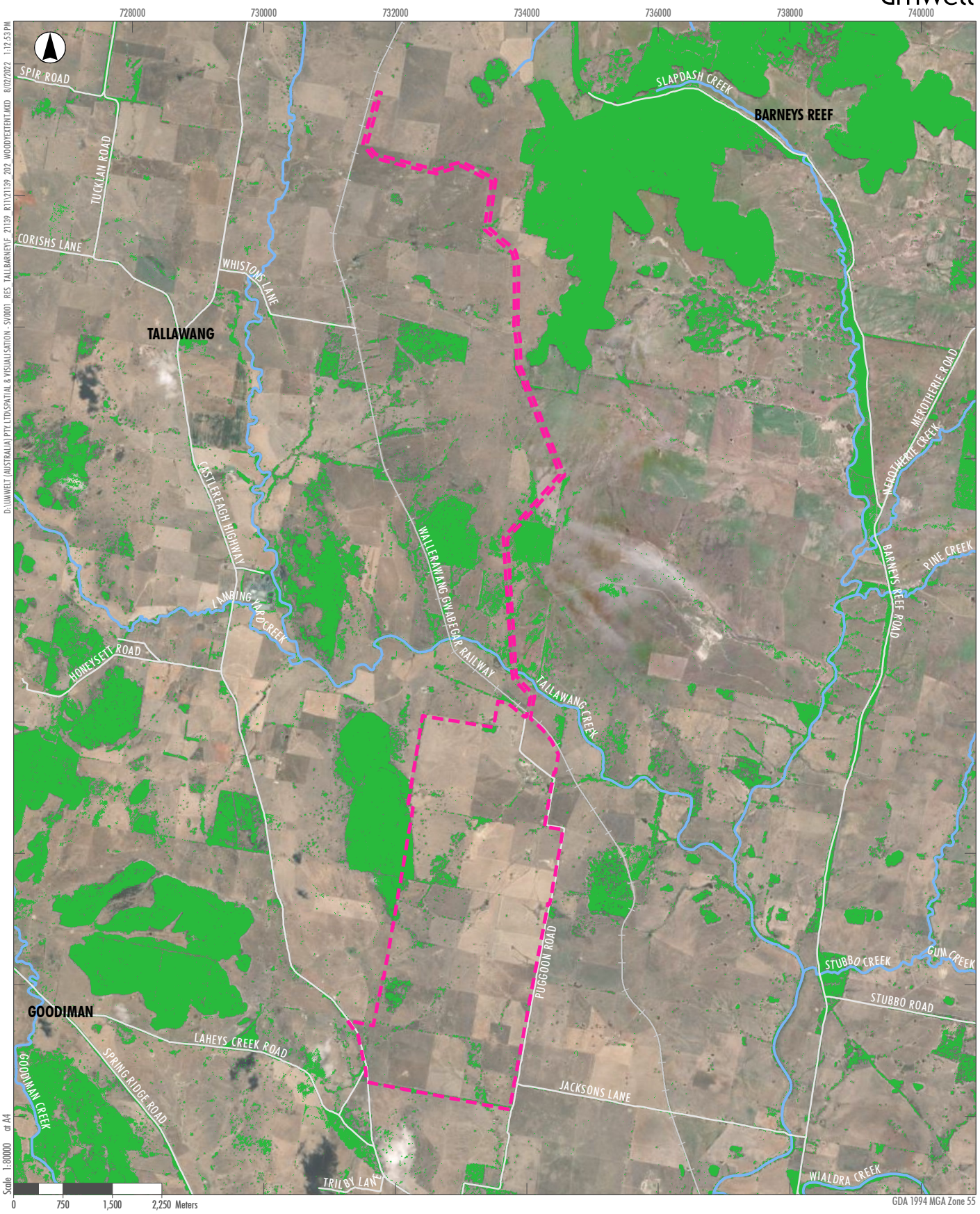
- Areas that were cropped/ploughed or significantly disturbed (see clause 114 of the LLS Regulation) for agricultural purposes.
- Areas disturbed by approved activities.

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.



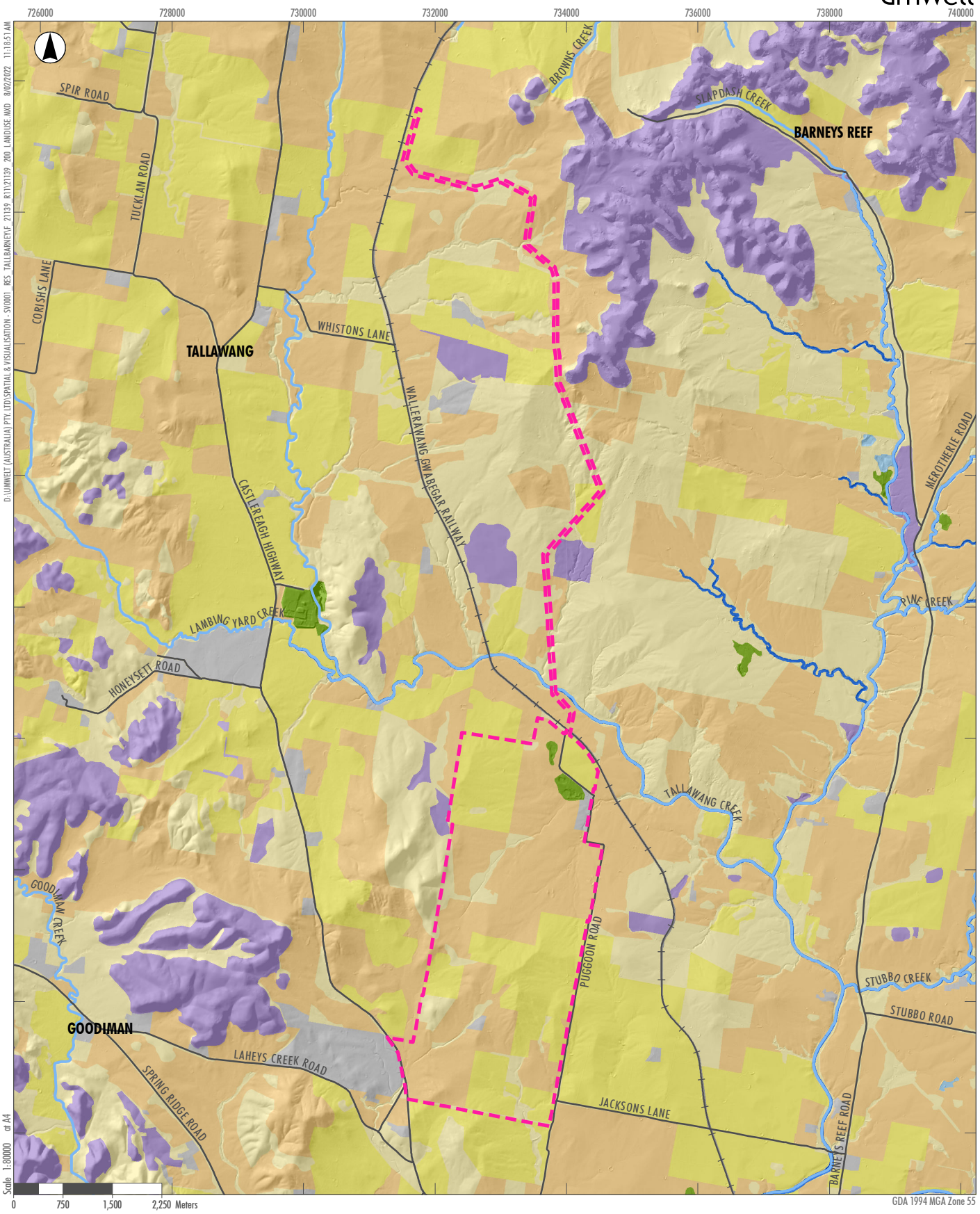
Legend

- 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

Criterion		Measure or Approach
		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.

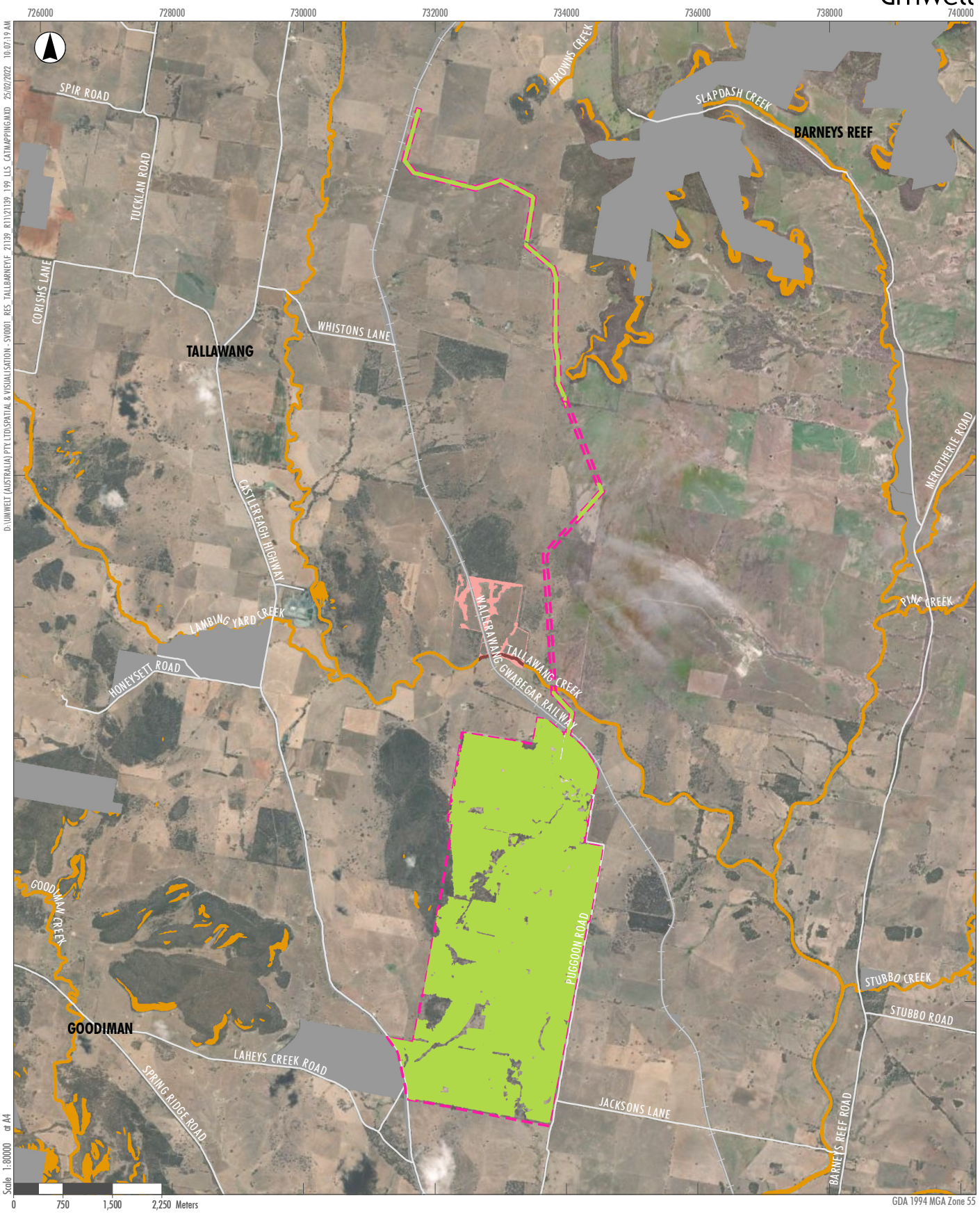
As noted in **Section 1.1.3**, the mapping of grassland and pasture areas as Category 2 Regulated Land should not be considered definitive for future assessment purposes and further groundcover survey may identify that some of the land mapped as being Category 2 land is Low Conservation Value Grassland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

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.

5.0 References

DPE 2022. Native Vegetation Regulatory Map Method Statement. Accessed via [Native vegetation regulatory map: method statement (nsw.gov.au)]

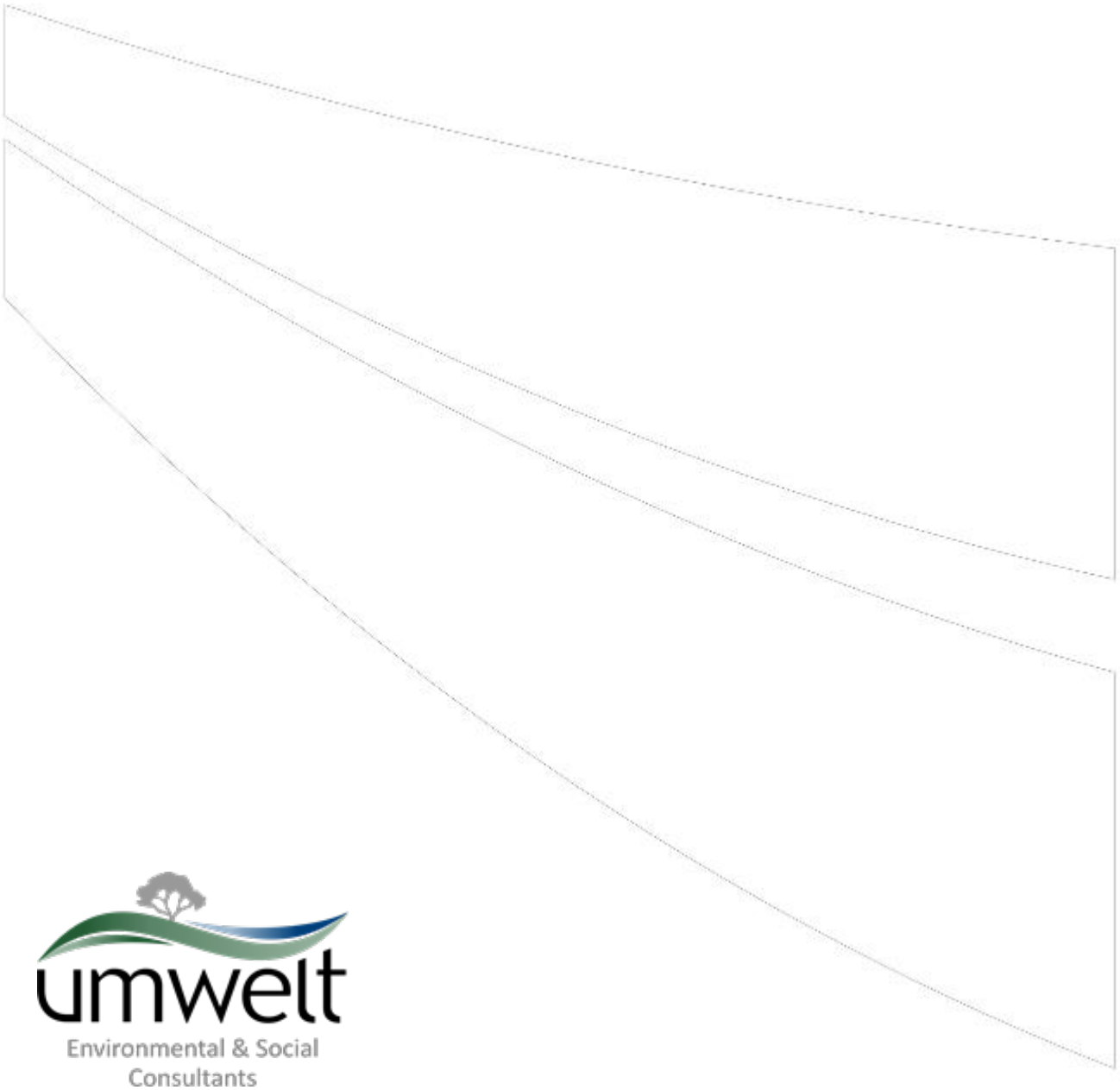
DPIE 2021. Standard Environmental Assessment Requirements Consolidated Advice (Application Number: SSD-23700028).

Local Land Services Unknown Date. Land categories and the Land Management Framework. Access March 2022. Accessed via [FACTSHEET-Land-categories-and-the-Land-Management-Framework-amendement-to-link.pdf (nsw.gov.au)] State Government of NSW and Department of Planning, Industry and Environment 2017, Land Use Mapping 2013. Available via [NSW Landuse 2013 | Anzlic Dataset | SEED]

New South Wales (NSW) Scientific Committee (2020). 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 (BC Act), referred to as White Box – Yellow Box – Blakely's Red Gum Grassy Woodland and Derived Native Grassland, Critically Endangered Ecological Committee – Final DeterminationState Government of NSW and Department of Planning, Industry and Environment 2020. Land use Mapping 2017. Available via [NSW Landuse 2017 v1.2 | Anzlic_Dataset | SEED]

State Government of NSW and Department of Planning, Industry and Environment 2011. Landsat woody extent and foliage projective cover (FPC) Ver 2.1 (25m) 2008. Available via [Landsat woody extent and foliage projective cover (FPC) Ver 2.1 (25m) 2008 | Anzlic_Dataset | SEED (nsw.gov.au)]

State Government of NSW and Department of Planning, Industry and Environment 2015. NSW Woody Vegetation Extent & FPC 2011. Available via [NSW Woody Vegetation Extent & FPC 2011 | Anzlic_Dataset | SEED]



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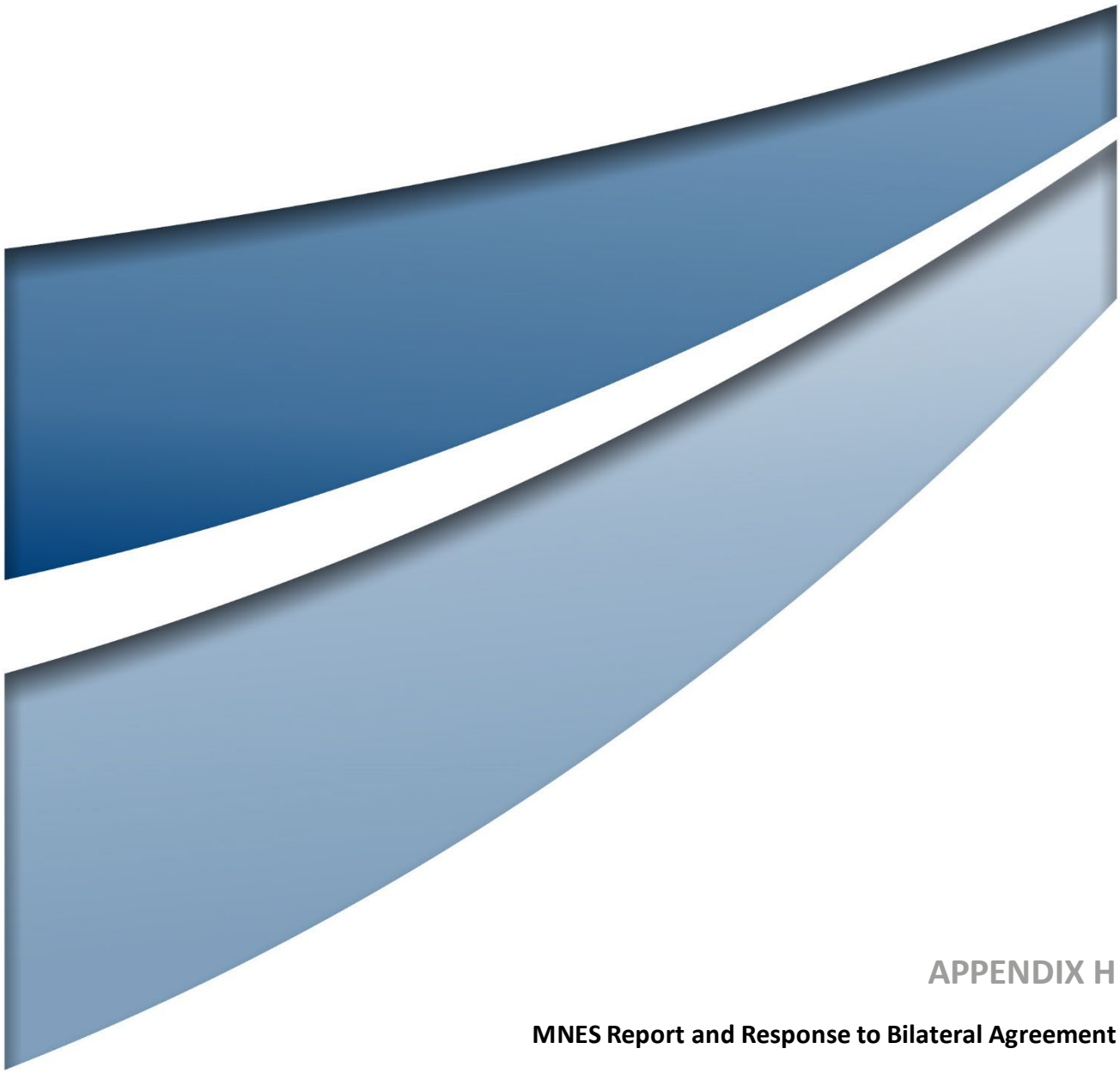

APPENDIX H

MNES Report and Response to Bilateral Agreement

umwelt
Environmental & Social Consultants

ASSESSMENT OF COMMONWEALTH MATTERS

Tallawang Solar Farm

FINAL

July 2022

ASSESSMENT OF COMMONWEALTH MATTERS

Tallawang Solar Farm

FINAL

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

Project Director: Malinda Facey
Project Manager: Marion O'Neil
Technical Director: Shaun Corry
Technical Manager: Belinda Howe
Report No. 21139/Appendix H
Date: July 2022

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.

Document Status

Rev No.	Reviewer		Approved for Issue	
	Name	Date	Name	Date
1	Shaun Corry	12/5/2022	Shaun Corry	25/5/2022
Final	Shaun Corry	05/07/2022	Malinda Facey	12/07/2022

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Tables

Appendices

1.0 Introduction

On 27 April 2022, the Department of Agriculture, Water and Environment (DAWE) confirmed the Tallawang Solar Farm (the Project) 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 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 DPE for the preparation of the Supplementary SEARs (20/6/2022), 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
- Corbens 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. DAWE 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*
- *Corbe'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 EIS and specifically the following specialist report:

- The Biodiversity Development Assessment Report (BDAR) prepared by Umwelt (Umwelt 2022) (the current document is Appendix H of the BDAR).

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

1.1 Project Overview

RES Australia Pty Ltd (RES) is seeking approval for the State Significant Development (SSD) application of the Project (Tallawang Solar Farm), approximately 8 kilometres (km) northwest of Gulgong within the Mid-Western 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 will involve the construction, operation and decommissioning of a 500 megawatt (MW) solar farm with a Battery Energy Storage System (BESS) of approximately 200 MW/400 MW-hours, associated infrastructure, and a 330 kilovolt (kV) overhead transmission line of approximately 13 km long which will connect the Project to the national electricity grid. The Project's conceptual layout is included in Figure 1.2 of the main BDAR report. One onsite switchyard and a 330 kV substation is proposed, at two possible locations within the solar farm and BESS development area (refer Figure 1.2 of the main BDAR report). The final location of the onsite switchyard and substation will be determined during detailed design.

The Project will have access from the Castlereagh Highway (refer to Figure 1.1 of the main BDAR report).

The Project will 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 CWO-REZ Transmission Project is subject to a separate development application process that will be progressed by the Energy Corporation of NSW (EnergyCo).

The final arrangement and design of the CWO-REZ Transmission Project has not yet been confirmed, however based on consultation between the Proponent and NSW Government, it is anticipated that the grid connection point for the Project will be via a proposed switching station near to the proposed Barneys Reef Wind Farm project area, directly north of the Tallawang Solar Farm. This proposed development does not include the development or construction of the switching yard. The proposed Barneys Reef Wind Farm is also being developed by RES and subject to a separate development application process. The switching station at the grid connection point will form part of the CWO-REZ Transmission Project. The proposed switching station will support independent connections from both the Tallawang Solar Farm and Barneys Reef Wind Farm projects. It is possible that the switching station will also be utilised to connect 3rd party renewable energy developments as part of the growth of development within the CWO-REZ.

To support the approval process, a 60 m wide corridor of approximately 13 km long has been identified by RES to support access to the anticipated connection point. This 60 m wide corridor has been assumed on the basis of Transgrid guidance. The final placement of the transmission line for the Project will reviewed once detailed information associated with the CWO-REZ becomes available to the Proponent. Variation to the alignment will be determined in coordination with the layout for the proposed Barneys Reef Wind Farm project.

The Subject Land, as illustrated on Figure 1.1 (of the main BDAR report), encompasses eight freehold properties and some parcels of Crown Land ('paper roads'), covering an area of approximately 1,370 ha. These properties are primarily utilised for cropping and grazing activities.

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.

Table 2.1 Changes to impact area calculations

PCT/MNES	Previous Area (ha)	Revised Area (ha)
White Box – Yellow Box – Blakely's Red Gum Grassy Woodland and derived native grassland CEEC	25.6	28.06
Grey Box (Eucalyptus microcarpa) Grassy Woodlands EEC	0.38	1.39
Koala	56.3	61.37
Regent Honeyeater	9.7	13.82
Spotted-tailed Quoll	1206.2	1213.07
Large-eared Pied Bat	9.7	13.82
Corben's Long-eared Bat	9.7	13.82

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:

- DAWE Protected Matters Search Tool (PMST) Database (2021a) 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 Planning, Industries and Environment (DPIE) BioNet Atlas of NSW Wildlife (2021b).

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	5	0
Plants	12	0
Frogs	0	0
Fish	4	0
Reptiles	2	0
Birds	11	11
Mammals	7	0

Of the species identified in the PMST, DAWE considered that the Project 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
- Corbens 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 28.06 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 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 30 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 28.06 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 Project are considered to be consistent with the relevant published survey guidelines and policy statements.

2.3.2 Koala

A total of 61.37 ha of foraging woodland will be cleared as part of the 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 and August 2021 over eight 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 koala Spot Assessment Technique surveys were undertaken in February 2021.

2.3.3 Spotted-tailed Quoll

A total of 1213.07 ha of low quality dispersal and foraging habitat will be cleared as part of the 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 and August 2021 over eight 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 13.82 ha of foraging habitat will be cleared as part of the Project. The Subject Land, along with the entire Project Area, does not contain any Important Area Mapping for the regent honeyeater. 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. 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. 13.82 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 13.82 ha of potential foraging habitat will be cleared as part of the 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).

13.82 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 1.39 ha of Grey Box Grassy Woodland and Derived Native Grassland (grey box grassy woodland) will be cleared as part of the 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 30 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
- 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 1.39 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 as part of the Project are considered to be consistent with the relevant published survey guidelines and policy statements.

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 DAWE controlled action decision. 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	Impacted area (ha)
Known Habitat (MNES recorded on site)		
Box gum woodland CEEC	Woodland	28.06
Grey Box Grassy Woodland CEEC	Woodland	1.39
Potential Habitat (MNES not recorded on site)		
Koala (*Phascolarctos cinereus*)	Foraging	61.37
Spotted-tailed quoll (*Dasyurus maculatus maculatus*)	Foraging	1213.07
Regent honeyeater (*Anthochaera phrygia*)	Foraging	13.82
Large-eared Pied Bat (*Chalinolobus dwyeri*)	Foraging	13.82
Corbens Long-eared Bat (*Nyctophilus corbeni*)	Foraging and Breeding	13.82

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 28.06 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 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 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.

The Project will interfere with the recovery of this community through clearing of up to 28.06 ha, particularly through the loss in extent and condition in relation to Objective 1. The removal of 28.06 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 a significant 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 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).

Without consideration of mitigation or the potential gain through biodiversity offsetting in accordance with the BAM, the Project could have a significant impact on the CEEC. Refer to Sections 6 and 7 of the main BDAR document 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). 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 the PCT		
			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 bridgesiana	Apple Box	Irregular use	yes	-	-
Eucalyptus conica	Fuzzy Box	High preferred use			yes
Eucalyptus crebra	Narrow-leaved Ironbark	High use	-	yes	
Eucalyptus dealbata	Tumbledown Red Gum	High preferred use	-	yes	-
Eucalyptus goniocalyx	Bundy	Irregular use	yes	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 records identifies that there are no records of the koala within 2km of the Subject Land in the last 10 years. The closest records are about 6km to the east and 13 km to the west of the Subject Land with the most recent record occurring 6 km east from 2015. 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 remnant vegetation on Barneys Reef that is surrounded by cleared grassland. This remnant was not burnt in recent 2019/2020 fires.
	+1 (medium)	Area is part of contiguous landscape < 1000 ha, but ≥ 500 ha.		

Koala Habitat Assessment Tool (Table 3 from DoE 2014)			Study Area Assessment	
	0 (low)	None of the above.		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.
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 DAWE) 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 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 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*
- 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 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 two 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 controlled action decision by DAWE states that the Project is likely to have a significant impact on the koala as the action involves the clearing of approximately 61.37 ha of vegetation that potentially provides foraging habitat for this species. It is acknowledged that, when the area of impact is considered in isolation that it is large and could be perceived as significant. However, when considered 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 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 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.

DAWE determined in the controlled action decision that the spotted-tailed quoll is likely to be significantly impacted by the Project resulting in the removal of 1213.07 ha foraging habitat of the species. Whilst the Subject Land does contain 1213.07 ha of vegetation, 831 ha of this comprises degraded and previously cultivated or otherwise disturbed (grazed) grasslands that, at most, represent dispersal habitat. The agricultural nature of the area isn't 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 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.

DAWE determined in the controlled action decision 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. 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 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.

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. 13.82 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 1.39 ha of Grey Box Grassy Woodland and Derived Native Grassland will be cleared as part of the 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).

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 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 1.39 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.

2.5 Assessment of Impacts to Listed Threatened Species and Communities

The 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 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 Project. These impacts are summarised in **Table 2.6.**

The relevant impacts of the 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 Project (e.g. clearing of vegetation, earthworks and water management). The direct impacts of the 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 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 Project on EPBC Act listed threatened species and communities

Impact Type	MNES	Description	Nature of Impact	Consequence of Impact	Direct Impact Area (ha)	Offsetting Required?
Direct	Box Gum Woodland	Loss of 28.06 ha of woodland through clearing.	Permanent	State	28.06	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	61.37	Yes, see **Section 4.0**
Direct	Spotted-tailed quoll	Removal of potential foraging habitat.	Permanent/Long Term	Local	1213.07	Yes, see **Section 4.0**
Direct	Regent Honeyeater	Removal of potential foraging habitat. No removal of Important Areas Mapping.	Permanent	Local	13.82	Yes, see **Section 4.0**
Direct	Large-eared Pied Bat	Removal of potential foraging habitat.	Permanent	Local	13.82	Yes, see Section 4.0
Direct	Corben's Long-eared Bat	Removal of potential foraging habitat.	Permanent	Local	13.82	Yes, see **Section 4.0**
Direct	Grey Box Grassy Woodland	Loss of 1.39 ha of woodland through clearing.	Permanent	State	1.39	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	Direct 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	Direct 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** 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	Direct 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** 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 proposed project is not directly impacting the large remnant areas present in the Project Area. However, construction of the security fence will remove the ability for non-avian fauna to access these remnants. This change in connectivity may impact fauna movement across the landscape. Fragmentation of remnant areas reduces species ability to recover from stochastic events such as bushfire, drought, and disease. 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 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 sensitive to changes in genetic assemblage are likely to be species that rely on a corridor of woody vegetation to traverse their landscape (Gascon *et al* 1999; Giubbina *et al* 2016). These woodland reliant species may experience changes to connectivity.	Long term - Life of the solar farm	Local	-	

Impact Type	MNES	Description	Nature of Impact	Consequence of Impact	Direct Impact Area (ha)	Offsetting Required?
		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. 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** 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 more successfully predate on native fauna.				

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 40m 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.

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 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.

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 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 Project Area and two individual *Swainsona sericea* were detected adjacent to the creek line in the south west of the Project Area. All threatened species locations have been avoided in the final infrastructure layout.

Overall, within the solar farm/ BESS Project Area, Project placement and design has resulted in the avoidance of direct impacts on approximately 101.66 ha of remnant woodland and derived native grassland which equates to 94.9 % of remnant woodland and derived native grassland being retained within the 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 Project. A Construction Environmental Management Plan (CEMP) and Operational Environmental Management Plan (OEMP) will be prepared for the Project. Both plans will describe the avoidance, mitigation and management measures that will be undertaken to manage potential environmental impacts of the Project. These will be prepared to meet the specific requirements of the 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 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 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
	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 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.

EPBC Act listed species or community	Impact	Avoidance and mitigation measures
	Noise impacts may disturb the roosting and foraging behaviour of fauna species and/or reduce the occupancy of areas of otherwise suitable habitat.	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.
	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 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 Project will be developed in consultation with the Department of Planning and Environment (DPE).

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*	10.96	609
	281 Rough-Barked Apple - red gum - Yellow Box woodland on alluvial clay to loam soils on valley flats in the northern NSW South Western Slopes Bioregion and Brigalow Belt South Bioregion DNG	17.11	423
	TOTAL	**28.06**	**1032**
Koala	81 Western Grey Box - cypress pine shrub grass shrub tall woodland in the Brigalow Belt South Bioregion *Moderate Condition*	1.39	45
	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*	10.96	609
	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*	1.47	47
	Additional Area excluded due to security fence (indirect impact)	47.55	0
	TOTAL	**61.37**	**1124**
Spotted-tailed quoll	81 Western Grey Box - cypress pine shrub grass shrub tall woodland in the Brigalow Belt South Bioregion *Moderate Condition*	1.39	45
	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*	10.96	609
	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*	1.47	47
	281 Rough-Barked Apple - red gum - Yellow Box woodland on alluvial clay to loam soils on valley flats in the northern NSW South Western Slopes Bioregion and Brigalow Belt South Bioregion DNG	17.11	423
	Category 1 exempt Land	1128.58	0
	Retained native vegetation excluded due to security fence (indirect impact)	343.1	0
	TOTAL	**1213.07**	**1124**

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*	1.39	45
	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*	10.96	609
	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*	1.47	47
	TOTAL	**13.82**	**701**
Large-eared Pied Bat	81 Western Grey Box - cypress pine shrub grass shrub tall woodland in the Brigalow Belt South Bioregion *Moderate Condition*	1.39	45
	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*	10.96	609
	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*	1.47	47
	TOTAL	**13.82**	**701**
Corben's Long-eared bat	81 Western Grey Box - cypress pine shrub grass shrub tall woodland in the Brigalow Belt South Bioregion *Moderate Condition*	1.39	45
	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*	10.96	609
	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*	1.47	47
	TOTAL	**13.82**	**701**
Grey Box Grassy Woodland	81 Western Grey Box - cypress pine shrub grass shrub tall woodland in the Brigalow Belt South Bioregion *Moderate Condition*	1.39	45
	TOTAL	**1.39**	**45**

The MNES that were determined by DAWE to be significantly impacted by the 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 Project.

5.0 References

Edgar, R. and Belcher, C. (2008) Spotted-tailed Quoll, *Dasyurus maculatus* (Kerr, 1792). In: Strahan, R., ed. The Mammals of Australia. 61-62. Carlton, Victoria.

Department of Agriculture, Water and the Environment (2022). Conservation Advice for *Phascolarctos cinereus* (Koala) combined populations of Queensland, New South Wales and the Australian Capital Territory. Canberra: Department of Agriculture, Water and the Environment. Department of Environment (DoE) (2013) Matters of National Environmental Significance: Significant impact guidelines 1.1, Environment Protection and Biodiversity Conservation Act 1999. Commonwealth of Australia.

Department of the Environment, Climate Change and Water NSW (DECCW) (2010) National Recovery Plan for White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland. Sydney. In effect under EPBC Act from 22 March 2013.

Department of Environment and Conservation (DEC) (2004) Threatened Biodiversity Survey and Assessment: Guidelines for development and activities (working draft), November 2004.

Department of the Environment (DoE) 2013. Commonwealth Matters of National Environmental Significance: Significant Impact Guidelines 1.1 EPBC Act.

Department of the Environment (DoE) (2014) EPBC Act Referral Guidelines for the Vulnerable Koala (combined populations of Queensland, New South Wales and the Australian Capital Territory). Commonwealth of Australia.

Department of the Environment (DoE) (2015) Draft National Recovery Plan for the Regent Honeyeater (*Anthochaera phrygia*). Australian Government, Canberra. Accessed November 2021 from https://www.awe.gov.au/sites/default/files/documents/draft-national-recovery-plan-regent-honeyeater.pdf

Department of Environment and Resource Management (DERM) 2011. National recovery plan for the large-eared pied bat *Chalinolobus dwyeri*. Report to the Department of Sustainability, Environment, Water, Population and Communities, Canberra.

Department of Environment, Land, Water and Planning (DELWP) (2016) National Recovery Plan for the Spotted-tailed Quoll Dasyurus maculatus. Australian Government, Canberra. Accessed November 2021 from https://www.awe.gov.au/sites/default/files/documents/national-recovery-plan-spotted-tailed-quoll.pdf

Department of Environment, Land, Water and Planning (DELWP) (2016) National Recovery Plan for the Spotted-tailed Quoll *Dasyurus maculatus*. Australian Government, Canberra. Accessed November 2021 from https://www.awe.gov.au/sites/default/files/documents/national-recovery-plan-spotted-tailed-quoll.pdf

Department of Planning, Industry and Environment (DPIE) (2022). BioNet Atlas of NSW Wildlife, last accessed February 2022.

Department of Planning, Industry and Environment (DPIE) (2019) *Koala habitat information base technical guide*.

Giubbina, M.F., Martensen, A.C. and Ribeiro, M.C., 2018. Sugarcane and Eucalyptus plantation equally limit the movement of two forest-dependent understory bird species. *Austral Ecology*, *43*(5), pp.527-533.

Gleeson, J. and Gleeson, D., 2012. *Reducing the impacts of development on wildlife*. CSIRO PUBLISHING.

Harris I.M., Mills H.R. and Bencini R. (2010). Multiple individual southern brown bandicoots (Isoodon obesulus fusciventer) and foxes (Vulpes vulpes) use underpasses installed at a new highway in Perth, Western Australia. Wildlife Research. 37, 127-133

NSW Scientific Committee 2011. Inland Grey Box Woodland in the Riverina, NSW South Western Slopes, Cobar Peneplain, Nandewar and Brigalow Belt South Bioregions - Determination to make a minor amendment to Part 3 of Schedule 1 of the Threatened Species Conservation Act. Accessed via [Inland Grey Box Woodland in the Riverina, NSW South Western Slopes, Cobar Peneplain, Nandewar and Brigalow Belt South Bioregions - Determination to make a minor amendment to Part 3 of Schedule 1 of the Threatened Species Conservation Act | NSW Environment**]**

Office of Environment and Heritage (OEH) (2016b) Guidelines for the mitigation of coal mining impacts on biodiversity. Report prepared for OEH, October 2016.

Species Profiles and Threats Database (SPRAT) (2021) Profile *Dasyurus maculatus maculatus*. Accessed November 2021 from < http://www.environment.gov.au/cgi-bin/sprat/public/publicspecies.pl?taxon_id=75184 >.

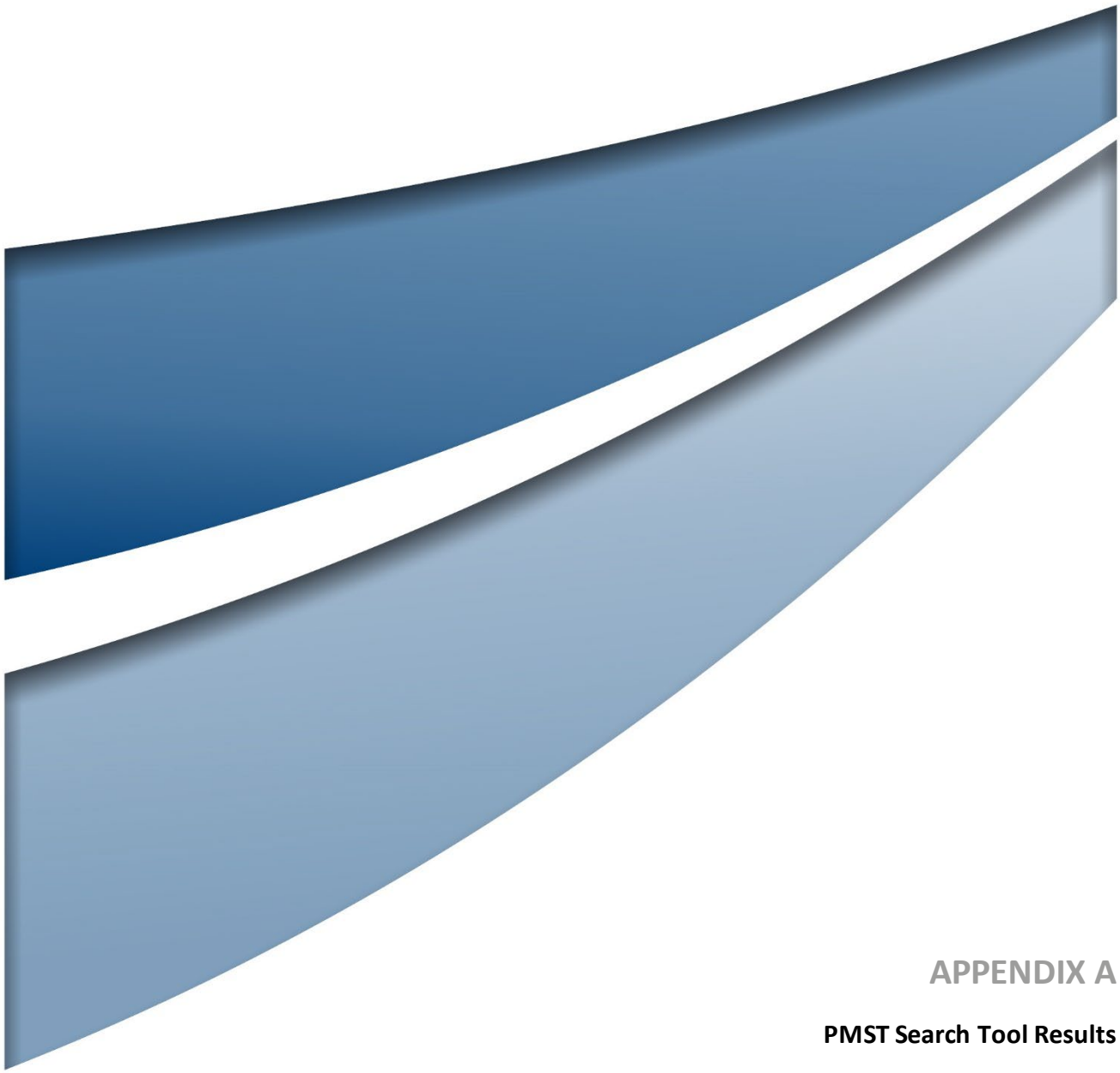
Threatened Species Scientific Committee (TSSC) (2015) Conservation Advice *Nyctophilus corbeni*. south-eastern long-eared bat. Canberra: Department of Environment and Energy Accessed November 2021 from < Conservation Advice Nyctophilus corbeni (environment.gov.au) >.

Threatened Species Scientific Committee (2020a) White Box – Yellow Box – Blakely's Red Gum Grassy Woodland and Derived Native Grassland in the NSW North Coast, New England Tableland, Nandewar, Brigalow Belt South, Sydney Basin, South Eastern Highlands, NSW South Western Slopes, South East Corner and Riverina Bioregions Critically Endangered Ecological Community (CEEC)– Final Determination. NSW July 2020.

Threatened Species Scientific Committee (TSSC) (2020b) Conservation Advice *Dasyurus maculatus maculatus* (southeastern mainland population) Spotted-Tailed Quoll, south eastern mainland. Canberra: Department of Agriculture, Water and the Environment. Accessed November 2021 from <http://www.environment.gov.au/biodiversity/threatened/species/pubs/75184-conservation-advice-01092020.pdf >.

Tozer, M, Turner, K, Simpson & NSW Threatened Species Scientific Committee (2019), Conservation Assessment of White Box – Yellow Box – Blakely's Red Gum Grassy Woodland and Derived Native Grassland, Proposed listing on NSW BC Act and EPBC Act: Critically Endangered. NSW Threatened Species Scientific Committee < https://www.environment.nsw.gov.au/-/media/OEH/Corporate-Site/Documents/Animals-and-plants/Scientific-Committee/Determinations/Preliminaries/conservation-assessment-report-white-box-yellow-box.pdf?la=en&hash=9EE922062E7C2405F614347345B34F164CB9993A

Umwelt 2022. Tallawang Solar Farm EPBC Referral.



APPENDIX A

PMST Search Tool Results

Australian Government

Department of Agriculture, Water and the Environment

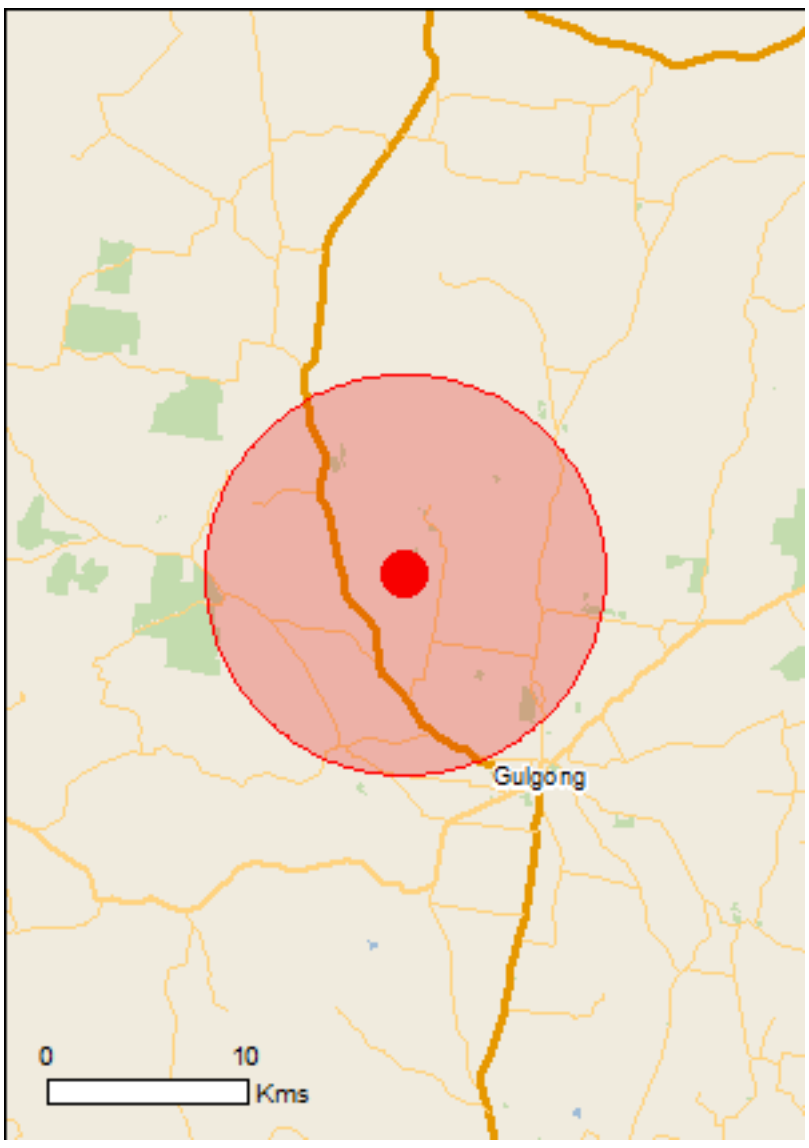
EPBC Act Protected Matters Report

This report provides general guidance on matters of national environmental significance and other matters protected by the EPBC Act in the area you have selected.

Information on the coverage of this report and qualifications on data supporting this report are contained in the caveat at the end of the report.

Information is available about Environment Assessments and the EPBC Act including significance guidelines, forms and application process details.

Report created: 03/11/20 15:43:06



Coordinates

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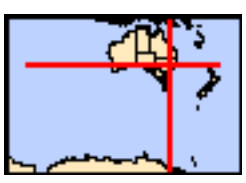

Summary

Matters of National Environmental 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:	4
Great Barrier Reef Marine Park:	None
Commonwealth Marine Area:	None
Listed Threatened Ecological Communities:	5
Listed Threatened Species:	32
Listed Migratory Species:	11

Other Matters Protected by the EPBC Act

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

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

Commonwealth Land:	1
Commonwealth Heritage Places:	None
Listed Marine Species:	18
Whales and Other Cetaceans:	None
Critical Habitats:	None
Commonwealth Reserves Terrestrial:	None
Australian Marine Parks:	None

Extra Information

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

State and Territory Reserves:	1
Regional Forest Agreements:	None
Invasive Species:	28
Nationally Important Wetlands:	None
Key Ecological Features (Marine)	None

Details

Matters of National Environmental Significance

Wetlands of International Importance (Ramsar) [Resource Information]

Name	Proximity
Banrock station wetland complex	800 - 900km upstream
Riverland	800 - 900km upstream
The coorong, and lakes alexandrina and albert wetland	900 - 1000km upstream
The macquarie marshes	200 - 300km upstream

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.

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

Name	Status	Type of Presence
Birds		
Anthochaera phrygia Regent Honeyeater [82338]	Critically Endangered	Foraging, feeding or related behaviour likely to occur within area
Botaurus poiciloptilus Australasian Bittern [1001]	Endangered	Species or species habitat may occur within area
Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	Species or species habitat may occur within area
Falco hypoleucos Grey Falcon [929]	Vulnerable	Species or species habitat likely to 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
Lathamus discolor Swift Parrot [744]	Critically Endangered	Species or species

Name	Status	Type of Presence
		habitat likely to occur within area
Leipoa ocellata Malleefowl [934]	Vulnerable	Species or species habitat likely to occur within area
Numenius madagascariensis Eastern Curlew, Far Eastern Curlew [847]	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
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
Maccullochella macquariensis Trout Cod [26171]	Endangered	Species or species habitat may occur within area
Maccullochella peelii Murray Cod [66633]	Vulnerable	Species or species habitat known to occur within area
Macquaria australasica Macquarie Perch [66632]	Endangered	Species or species habitat may occur within area
Mammals		
Chalinolobus dwyeri Large-eared Pied Bat, Large Pied Bat [183]	Vulnerable	Species or species habitat known 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]	Vulnerable	Species or species habitat known to occur within area
Pseudomys novaehollandiae New Holland Mouse, Pookila [96]	Vulnerable	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
Plants		
Androcalva procumbens [87153]	Vulnerable	Species or species habitat may occur within area
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

Name	Status	Type of Presence
Homoranthus darwinioides [12974]	Vulnerable	Species or species habitat may occur within area
Leucochrysum albicans subsp. tricolor Hoary Sunray, Grassland Paper-daisy [89104]	Endangered	Species or species habitat likely to occur within area
Prasophyllum petilum Tarengo Leek Orchid [55144]	Endangered	Species or species habitat may occur within area
Prasophyllum sp. Wybong (C.Phelps ORG 5269) a leek-orchid [81964]	Critically Endangered	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
Tylophora linearis [55231]	Endangered	Species or species habitat may occur within area
Reptiles		
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]

* Species is listed under a different scientific name on the EPBC Act - Threatened Species list.

Name	Threatened	Type of Presence
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
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]		Species or species habitat may occur within area
Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	Species or species habitat may occur within area

Name	Threatened	Type of Presence
Calidris melanotos		
Pectoral Sandpiper [858]		Species or species habitat may occur within area
Gallinago hardwickii		
Latham's Snipe, Japanese Snipe [863]		Species or species habitat may occur within area
Numenius madagascariensis		
Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat may occur within area

Other Matters Protected by the EPBC Act

Commonwealth Land [Resource Information]

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

Name
Commonwealth Land - Commonwealth Trading Bank of Australia

Listed Marine Species [Resource Information]

* Species is listed under a different scientific name on the EPBC Act - Threatened Species list.

Name	Threatened	Type of Presence
Birds		
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
Ardea alba		
Great Egret, White Egret [59541]		Species or species habitat likely to occur within area
Ardea ibis		
Cattle Egret [59542]		Species or species habitat may occur within area
Calidris acuminata		
Sharp-tailed Sandpiper [874]		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
Chrysococcyx osculans		
Black-eared Cuckoo [705]		Species or species habitat likely to occur within area
Gallinago hardwickii		
Latham's Snipe, Japanese Snipe [863]		Species or species habitat may occur within

Name	Threatened	Type of Presence
		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
Lathamus discolor Swift Parrot [744]	Critically Endangered	Species or species habitat likely to occur within area
Merops ornatus Rainbow Bee-eater [670]		Species or species habitat may occur within area
Motacilla flava Yellow Wagtail [644]		Species or species habitat may occur within area
Myiagra cyanoleuca Satin Flycatcher [612]		Species or species habitat likely to occur within area
Numenius madagascariensis Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat may occur within area
Rhipidura rufifrons Rufous Fantail [592]		Species or species habitat may occur within area
Rostratula benghalensis (sensu lato) Painted Snipe [889]	Endangered*	Species or species habitat likely to occur within area

Extra Information

State and Territory Reserves	[Resource Information]
Name	State
Yarrobil	NSW

Invasive Species	[Resource Information]

Weeds reported here are the 20 species of national significance (WoNS), along with other introduced plants that are considered by the States and Territories to pose a particularly significant threat to biodiversity. The following feral animals are reported: Goat, Red Fox, Cat, Rabbit, Pig, Water Buffalo and Cane Toad. Maps from Landscape Health Project, National Land and Water Resouces Audit, 2001.

Name	Status	Type of Presence
Birds		
Acridotheres tristis Common Myna, Indian Myna [387]		Species or species habitat likely to occur within area
Carduelis carduelis European Goldfinch [403]		Species or species habitat likely to occur within area

Name	Status	Type of Presence
Columba livia Rock Pigeon, Rock Dove, Domestic Pigeon [803]		Species or species habitat likely to occur within area
Lonchura punctulata Nutmeg Mannikin [399]		Species or species habitat likely to occur within area
Passer domesticus House Sparrow [405]		Species or species habitat likely to occur within area
Pycnonotus jocosus Red-whiskered Bulbul [631]		Species or species habitat likely to occur within area
Streptopelia chinensis Spotted Turtle-Dove [780]		Species or species habitat likely to occur within area
Sturnus vulgaris Common Starling [389]		Species or species habitat likely to occur within area
Turdus merula Common Blackbird, Eurasian Blackbird [596]		Species or species habitat likely to occur within area
Mammals		
Bos taurus Domestic Cattle [16]		Species or species habitat likely to occur within area
Canis lupus familiaris Domestic Dog [82654]		Species or species habitat likely to occur within area
Capra hircus Goat [2]		Species or species habitat likely to occur within area
Felis catus Cat, House Cat, Domestic Cat [19]		Species or species habitat likely to occur within area
Feral deer Feral deer species in Australia [85733]		Species or species habitat likely to occur within area
Lepus capensis Brown Hare [127]		Species or species habitat likely to occur within area
Mus musculus House Mouse [120]		Species or species habitat likely to occur within area
Oryctolagus cuniculus Rabbit, European Rabbit [128]		Species or species habitat likely to occur within area
Rattus rattus Black Rat, Ship Rat [84]		Species or species habitat likely to occur within area
Sus scrofa Pig [6]		Species or species habitat likely to occur within area
Vulpes vulpes Red Fox, Fox [18]		Species or species habitat likely to occur within area

Name	Status	Type of Presence
Plants		
Asparagus asparagoides Bridal Creeper, Bridal Veil Creeper, Smilax, Florist's Smilax, Smilax Asparagus [22473]		Species or species habitat likely to occur within area
Lycium ferocissimum African Boxthorn, Boxthorn [19235]		Species or species habitat likely to occur within area
Nassella trichotoma Serrated Tussock, Yass River Tussock, Yass Tussock, Nassella Tussock (NZ) [18884]		Species or species habitat likely to occur within area
Opuntia spp. Prickly Pears [82753]		Species or species habitat likely to occur within area
Pinus radiata Radiata Pine Monterey Pine, Insignis Pine, Wilding Pine [20780]		Species or species habitat may occur within area
Rubus fruticosus aggregate Blackberry, European Blackberry [68406]		Species or species habitat likely to occur within area
Salix spp. except S.babylonica, S.x calodendron & S.x reichardtii Willows except Weeping Willow, Pussy Willow and Sterile Pussy Willow [68497]		Species or species habitat likely to occur within area
Tamarix aphylla Athel Pine, Athel Tree, Tamarisk, Athel Tamarisk, Athel Tamarix, Desert Tamarisk, Flowering Cypress, Salt Cedar [16018]		Species or species habitat likely to occur within area

Caveat

The information presented in this report has been provided by a range of data sources as acknowledged at the end of the report.

This report is designed to assist in identifying the locations of places which may be relevant in determining obligations under the Environment Protection and Biodiversity Conservation Act 1999. It holds mapped locations of World and National Heritage properties, Wetlands of International and National Importance, Commonwealth and State/Territory reserves, listed threatened, migratory and marine species and listed threatened ecological communities. Mapping of Commonwealth land is not complete at this stage. Maps have been collated from a range of sources at various resolutions.

Not all species listed under the EPBC Act have been mapped (see below) and therefore a report is a general guide only. Where available data supports mapping, the type of presence that can be determined from the data is indicated in general terms. People using this information in making a referral may need to consider the qualifications below and may need to seek and consider other information sources.

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.

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

Where very little information is available for 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 reliable distribution mapping methods are used to update these distributions as time permits.

Only selected species covered by the following provisions of the EPBC Act have been mapped:

- migratory and
- marine

The following species and ecological communities have not been mapped and do not appear in reports produced from this database:

- threatened species listed as extinct or considered as vagrants
- some species and ecological communities that have only recently been listed
- some terrestrial species that overfly the Commonwealth marine area
- migratory species that are very widespread, vagrant, or only occur in small numbers

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

- non-threatened seabirds which have only been mapped for recorded breeding sites
- seals which have only been mapped for breeding sites near the Australian continent

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

Coordinates

-32.2852 149.4722

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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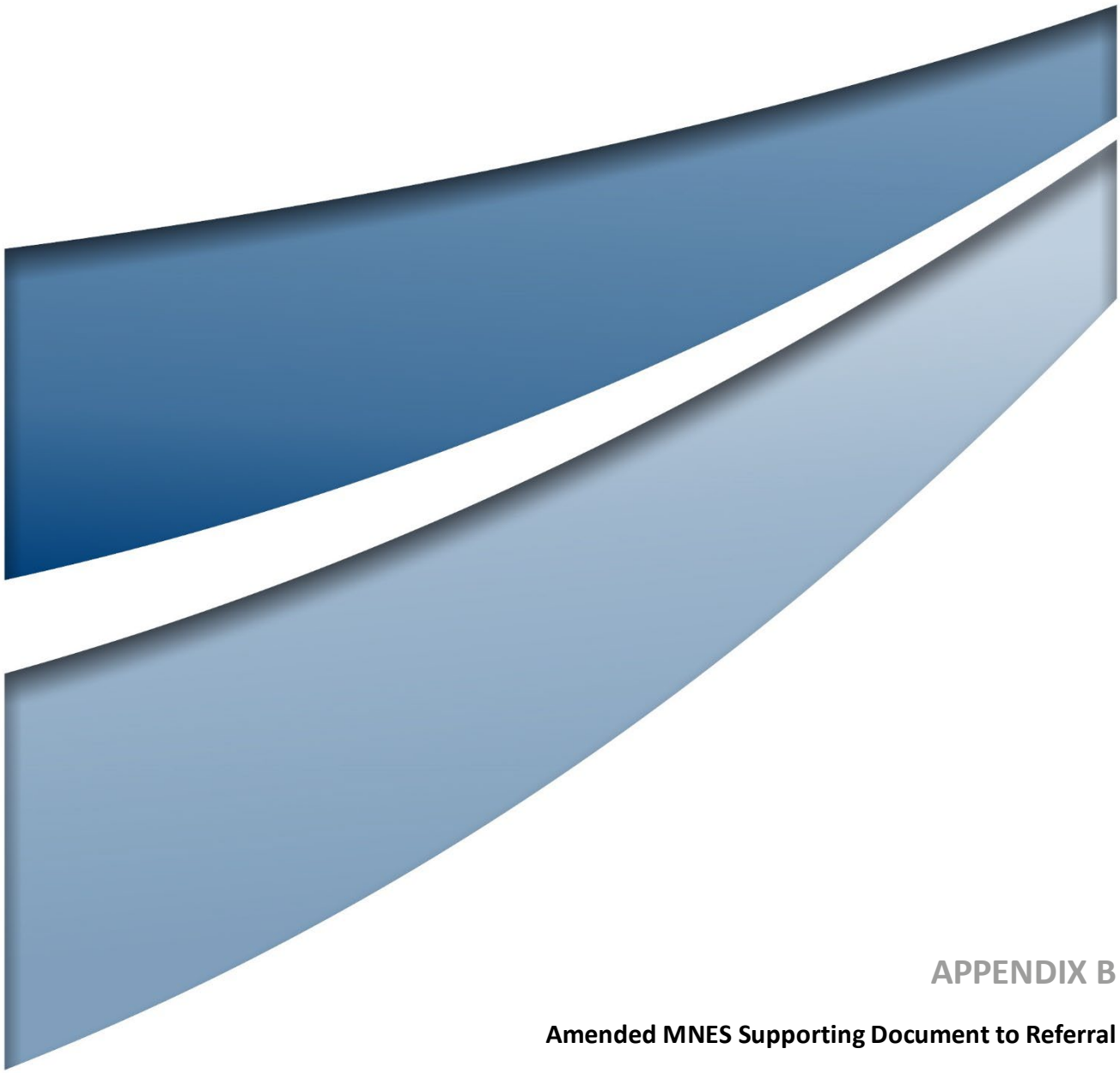

APPENDIX B

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*)
- Corbens Long-eared Bat (*Nyctophilus corbeni*).

For the purposes of this assessment, the 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 Corbens 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 Project would result in the permanent reduction in extent of up to 28.07 ha of Box Gum Woodland CEEC. This corresponds to 10.96 ha of Box Gum Woodland (2.63 ha in the solar farm / BESS development area and 8.33 ha in the transmission line corridor) and 17.11 ha of Box Gum Woodland Derived Native Grassland (0 ha within the solar farm / BESS development area and 17.11 ha within the transmission line corridor).

The wider Project Area currently supports approximately 70 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 28.07 ha (0.05% of regional extent) of woodland and derived native grasslands as a result of the 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 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 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. The transmission line is not expected to modify or destroy the abiotic factors necessary of the community's survival.

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 solar farm / BESS development area (2.63 ha of Box Gum Woodland and derived native grassland) is unlikely to cause substantial change in the species composition of the community. The direct impacts and the transmission line corridor clearing are likely to cause a substantial change in the species composition of the community where vegetation removal occurs (28.07ha). The direct impacts caused by the transmission line are unlikely to cause a change in the overall occurrence of the community.

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. The transmission line corridor clearing will remove 28.07 ha of Box Gum Woodland and Derived Native Grassland and therefore cause permanent reduction in quality and integrity of this woodland. It is unlikely that the transmission line will reduce the quality of adjacent areas of Box Gum Woodland. Vehicles will regularly access the solar farm and transmission line that have the potential to carry reproductive material of invasive plants. Management activities, including was 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 Project would result in the permanent reduction in extent of up to 10.96 ha of Box Gum Woodland (2.63 ha in the solar farm / BESS development area and 8.33 ha in the transmission line corridor) and 17.11 ha of Box Gum Woodland Derived Native Grassland (0 ha within the solar farm / BESS development area and 17.11 ha within the transmission line corridor). 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 Project would result in the permanent reduction in extent of up to 10.96 ha of Box Gum Woodland (2.63 ha in the solar farm / BESS development area and 8.33 ha in the transmission line corridor) and 17.11 ha of Box Gum Woodland Derived Native Grassland (0 ha within the solar farm / BESS development area and 17.11 ha within the transmission line corridor). Impacts related to the solar farm / BESS development are unlikely to result in a significant impact to Box Gum Woodland. The impacts related to the transmission line corridor clearing are likely to result in a significant impact on the community.

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 1.39 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 Project would result in the permanent reduction in extent of up to 1.39 ha of woodland. No areas conforming to derived native grasslands of Grey Box Grassy Woodland will be removed under the 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 1.39 ha (0.0004% of regional extent) of woodland as a result of the 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 28.85 ha of remnant Grey Box Grassy Woodland EEC occurs within the wider Project Area, surrounding the Subject Land. The 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 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. This community does not occur the transmission line alignment and is not expected to modify or destroy the abiotic factors necessary of the community's survival in the locality.

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 Project will likely substantially change in the species composition of the community within the Subject Land due to complete removal of 1.39 ha of woodland. This community does not occur the transmission line alignment and therefore will not cause substantial change in the species composition of the community.

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 1.39 ha of Grey Box Grassy Woodland that occurs within the Subject Land. This community does not occur the transmission line alignment. It is unlikely that the Project will reduce the quality of adjacent areas of this community. Vehicles will regularly access the solar farm and transmission line that have the potential to carry reproductive material of invasive plants.

Management activities, including was 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 Project would result in the permanent reduction in extent of up to 1.39 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 Project would result in the permanent reduction in extent of up to 1.39 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 Project will clear up to 61.37 ha (39.97 ha in fenced solar farm and 8.33 ha in the transmission line) of potential habitat within the Subject Land. Despite the lack of records of koala within the Subject Land and the scarcity of recent (two records in the last 20 years) records in the nearby locality, 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 61.37 ha of vegetation that includes occurrences of key feed trees for the koala. 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 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 of approximately 61.37 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 Project occurs at the western edge of the third koala management unit.

No breeding populations of this species 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. 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 of approximately 61.37 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 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 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 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, with lesser volumes required to support the transmission line construction. Vehicle movements during operation will be largely limited to movements within the fenced solar farm / BESS development area with limited movements (inspection and maintenance) required along the transmission corridor. It is considered unlikely to subject the koala to increased mortality levels.

The 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 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 Project will clear up to 1213.07 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. 1128.58 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 Project may result in the loss of up to 1213.07 ha of potential habitat in the form of forest, woodlands, riparian habitat and DNG. 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 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 Project, with an impact of 1213.07 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 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 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 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 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 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 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 Project will interfere with this objective by clearing potential habitat for the spotted-tail quoll over an area of 1213.07 ha. However, due the presence of low-quality habitat in the Subject Land and the lack of records, it is not likely that the Project will interfere with the recovery of the species as a whole.

Conclusion

The 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 13.82 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 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 Project will removal 13.82 ha of potential foraging or breeding habitat.

reduce the area of occupancy of the species

The Project would not reduce the area of occupancy of regent honeyeaters.

fragment an existing population into two or more populations

The 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 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 Project is unlikely to disrupt the breeding cycle of the regent honeyeater given the 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 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 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 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 Project will not interfere with any of the high priority recovery actions for this species.

Conclusion

The Project will remove 13.82 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 Project will remove 13.82 ha of potential foraging habitat associated with woodland vegetation. The Project will not remove any important breeding habitat features such as caves or overhangs. The 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 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 Project. It is unlikely that the 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 13.82 ha of potential foraging habitat will be removed as part of this 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 Project.

adversely affect habitat critical to the survival of a species

Up to 13.82 ha of potential foraging habitat will be removed as part of the Project. No potential breeding habitat will be removed as part of the 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 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 Project, it is therefore unlikely that the breeding cycle for the species will be disrupted due to this 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 13.82 ha of foraging habitat will be removed as part of this 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 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 Project may:

- result in clearing of vegetation in close vicinity to potential roosts
- result in a reduction in hollow availability.

The 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 13.82 ha of foraging habitat as a result of the Project is unlikely to have a significant impact on large-eared pied bat.

1.8 Corbens 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). Corbens long-eared bat is known to utilise stag trees and dead limbs of living trees as roost sites. 13.82 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 Project will remove 13.82 ha of potential foraging and roost habitat associated with woodland vegetation. Due to the lack of local records it is unlikely that the 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 Project will remove up to 13.82 ha of potential foraging and roosting habitat. Due to the surrounding areas of protected remnant vegetation it is unlikely that the Project will result in a reduction of the area of occupancy for the species.

fragment an existing important population into two or more populations

13.82 ha of foraging and roosting habitat will be removed as part of this 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 Project.

adversely affect habitat critical to the survival of a species

13.82 ha of foraging and roosting habitat will be removed as part of the 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 Project will adversely affect habitat critical to the survival of the species.

disrupt the breeding cycle of an important population

13.82 ha of foraging and roosting habitat will be removed as part of the 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 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

13.82 ha of foraging and roosting habitat will be removed as part of this 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 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 Project may:

- result in habitat loss and fragmentation
- result in a reduction in hollow availability.

The 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 13.82 ha of foraging habitat as a result of the Project is unlikely to have a significant impact on large-eared pied bat.

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