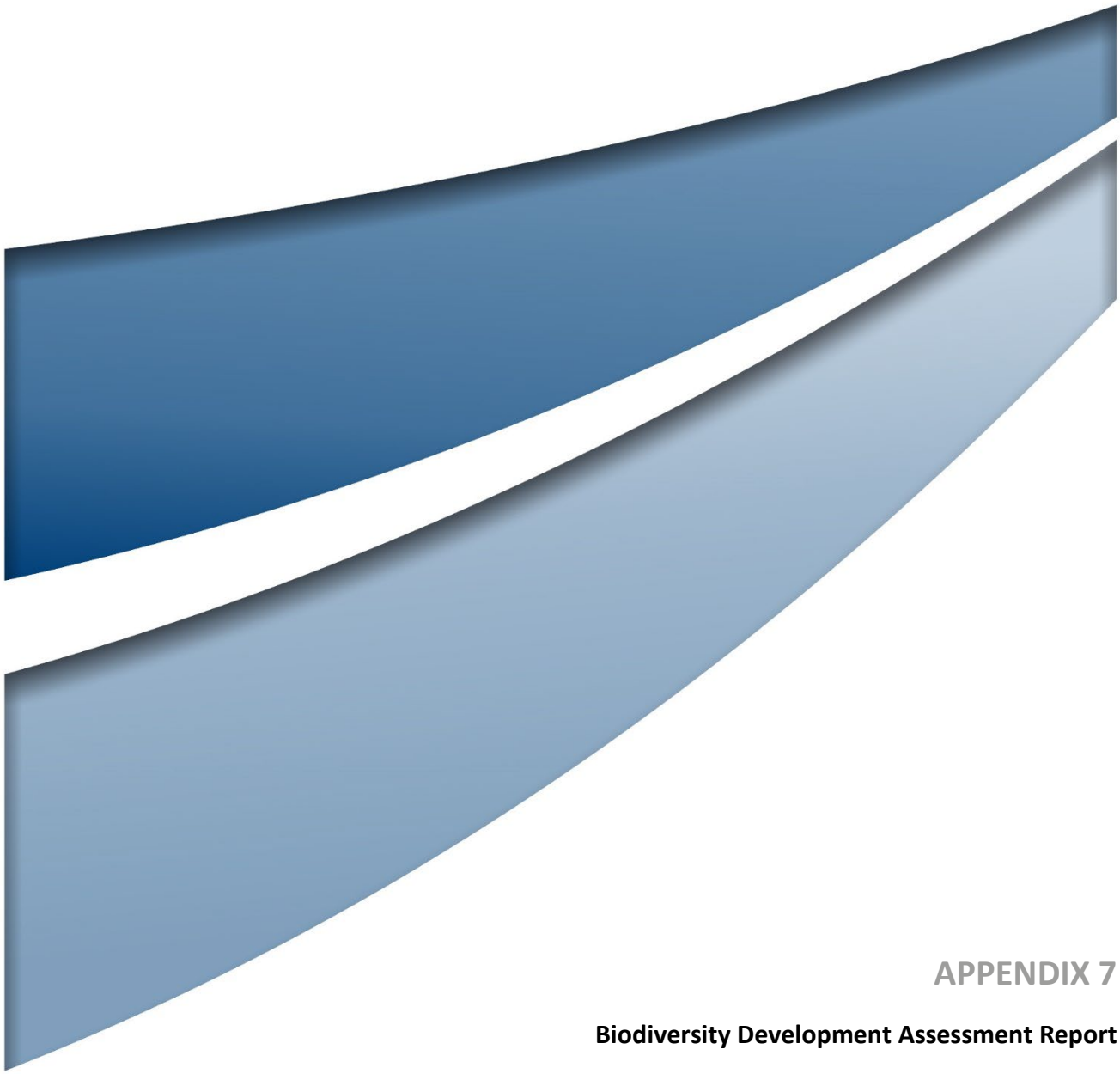


APPENDIX 7

Biodiversity Development Assessment Report

WATTLE CREEK BATTERY ENERGY STORAGE SYSTEM SSD-63345458

Biodiversity Development Assessment Report

FINAL

March 2025

WATTLE CREEK BATTERY ENERGY STORAGE SYSTEM SSD-63345458

Biodiversity Development Assessment Report

FINAL

Prepared by
Umwelt (Australia) Pty Limited
on behalf of
Spark Renewables Pty Limited

Project Director:	Paul Douglass
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Technical Manager:	Maddy Young
Report No.	22494/R15
Date:	March 2025

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

Acknowledgement of Country

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

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Document Status

Rev No.	Reviewer		Approved for Issue	
	Name	Date	Name	Date
V1	Naomi Buchhorn	17 December 2024	Naomi Buchhorn	17 December 2024
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V4	Naomi Buchhorn	14 March 2025	Naomi Buchhorn	17 March 2025

Executive Summary

Background

Umwelt was engaged by Spark Renewables Pty Ltd (Spark Renewables), the Proponent, to prepare this Biodiversity Development Assessment Report (BDAR) for the proposed Wattle Creek Battery Energy Storage System (BESS) Project (SSD-63345458) (the 'Project'), located north of the township of Marulan, within the Upper Lachlan Shire and Goulburn Mulwaree Local Government Areas (LGAs) of NSW.

The Project comprises a BESS with a storage capacity of up to 350 megawatts (MW) and related infrastructure.

The development of renewable energy generation aligns with both Federal Government and NSW State Government commitments to increase renewable energy generation and reduce carbon emissions. The location, design, technology, layout and size of the Project has been developed through consideration of several alternatives to ensure the Project would result in maximum benefits for the locality and region in the long term, whilst minimising impacts to the environment and cultural heritage during all phases of the Project.

Assessment Approach

This Report has been prepared in accordance with the requirements of the Biodiversity Assessment Method (BAM) (NSW DPIE 2020a) and Section 6.12 of the NSW *Biodiversity Conservation Act 2016* (BC Act). This Report generally follows the Department of Planning and Environment (NSW DPE 2022a) template for a BDAR. It describes the biodiversity values of the Development Footprint and assesses the biodiversity impacts of the Project.

The Project was determined to be a controlled action under section 75 of the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) as the Project is likely to have a significant impact on listed threatened species and communities (EPBC 2024/09970). The Project requires assessment and approval under the EPBC Act with the agreed assessment approach being the NSW BAM and NSW Biodiversity Offset Scheme (BOS) as provided for under the NSW Bilateral Agreement made under Section 45 of the EPBC Act relating to environmental assessments between the Commonwealth and NSW Government.

Field surveys were carried out by 16 Umwelt ecologists over approximately more than 2,000 person hours spanning 74 days and 20 nights between August 2022 and October 2024.

The Project and the separate Wattle Creek Solar Farm Project (SSD-63344210) proposed within the Project Area, include ancillary features and two transmission line options common to both projects. The assessment of the ancillary features and transmission line options have been duplicated across both BDARs, to allow both projects to be assessed and approved independently, these areas have been identified separately to avoid duplication and identify the final transmission line option if both projects proceed. To delineate the impacts between the different project impact zones, the areas assessed in this BDAR have been separated into four Biodiversity Assessment Method – Calculator (BAM-C) cases, under the one parent case (00038889). The four impact zones referenced throughout this BDAR are outlined below:

- BESS area (13.42 hectares (ha)) assessed in BAM-C child case 0038890
- Common ancillary features (47.67 ha) assessed in BAM-C child case 00047985
- Transmission line option 1 (6.12 ha) assessed in BAM-C child case 00047986
- Transmission line option 2 (8.49 ha) assessed in BAM-C child case 00047987.

Assessment Results

The biodiversity surveys completed identified the following Plant Community Types (PCTs) and vegetation zones which will be impacted by the Project:

- PCT 4063 Central and Southern Tableland River Oak Forest (2.05 hectares (ha) of moderate to degraded condition riparian forest).
- PCT 3374 Goulburn Tableland Peppermint Grassy Forest (68.8 ha including 44.13 ha of exotic dominated and low condition grassland, 19.25 ha of derived native grassland (DNG) and 5.42 ha of woodland vegetation).
- PCT 3376 Southern Tableland Grassy Box Woodland (2.12 ha including 1.23 ha of derived native grassland and 0.89 ha of woodland vegetation).

PCT 3376 is commensurate with White Box – Yellow Box – Blakely's Red Gum Grassy Woodland and Derived Native Grassland critically endangered ecological community (CEEC), listed under the BC Act and the EPBC Act and is identified under the NSWBOS as an entity with the potential for serious and irreversible impact (SAII).

The following ecosystem credit threatened species listed under the BC Act and/or the EPBC Act have been observed within the Project Area, however, impacts on these species are not considered to be significant:

- Diamond Firetail (*Stagonopleura guttata*) – listed as vulnerable under the BC Act and EPBC Act.
- Dusky Woodswallow (*Artamus cyanopterus*) – listed as vulnerable under the BC Act.
- Scarlet Robin (*Petroica boodang*) – listed as vulnerable under the BC Act.
- Speckled Warbler (*Chthonicola sagittata*) – listed as vulnerable under the BC Act.
- Spotted Harrier (*Circus assimilis*) – listed as vulnerable under the BC Act.
- Varied Sittella (*Daphoenositta chrysoptera*) – listed as vulnerable under the BC Act.

A species polygon is not required for the above ecosystem credit species and impacts to these species and their habitats will be offset through the retirement of ecosystem credits.

The following three 'species credit' threatened species entities would have residual impacts that require offsets:

- South-eastern Glossy Black-Cockatoo (*Calyptorhynchus lathami lathami*) – listed as vulnerable under the BC Act and EPBC Act.

- Gang-gang Cockatoo (*Callocephalon fimbriatum*) – listed as endangered under the BC Act and EPBC Act.
- Large-eared Pied Bat (*Chalinolobus dwyeri*) – listed as endangered under the BC Act and EPBC Act.
- Squirrel Glider (*Petaurus norfolcensis*) – listed as vulnerable under the BC Act.

Species polygons and credits have been generated to offset impacts to the above species.

Following the application of impact avoidance, minimisation and management measures, the following credits documented in **Table ES.1** and **Table ES.2** would be required to offset the residual impacts of the Project.

Table ES.1 Ecosystem Credit Requirements

Veg Zone ID	PCT No.	PCT Name	Condition Class	Vegetation Integrity Score	Area (ha)	Credits Required
BESS						
6	3374	Goulburn Tableland Peppermint Grassy Forest	DNG – exotic dominated	1	13.42	0
Common Ancillary Facilities						
1	4063	Central and Southern Tableland River Oak Forest	Moderate/Degraded	38.7	1.94	23
4	3374	Goulburn Tableland Peppermint Grassy Forest	DNG-Moderate/Degraded	17.7	14.81	98
5			DNG-low condition	2.7	1.18	0
6			DNG – exotic dominated	1	25.64	0
9	3376	Southern Tableland Grassy Box Woodland	DNG	26.2	1.23	16
10			Good/Moderate	76.9	0.44	17
-	0	Non-Native	Non-Native	-	2.42	0
Transmission Line option 1						
4	3374	Goulburn Tableland Peppermint Grassy Forest	DNG-Moderate/Degraded	17.7	2.54	17
8			Good/Moderate	76	1.39	40
7			Moderate/Degraded	69.7	0.46	12
6			DNG – exotic dominated	1	1.60	0
-	0	Non-Native	Non-Native	-	0.13	0
Transmission Line option 2						
1	4063	Central and Southern Tableland River Oak Forest	Moderate/Degraded	38.7	0.11	1
4	3374	Goulburn Tableland Peppermint Grassy Forest	DNG-Moderate/Degraded	17.7	1.90	13
6			DNG – exotic dominated	1	2.29	0
8			Good/Moderate	76	2.73	78
7			Moderate/Degraded	69.7	0.84	22

Veg Zone ID	PCT No.	PCT Name	Condition Class	Vegetation Integrity Score	Area (ha)	Credits Required
10	3376	Southern Tableland Grassy Box Woodland	Good/Moderate	76.9	0.45	17
-	0	Non-Native	Non-Native	-	0.18	0

Table ES.2 Species Credit Requirements

Species Name	Impact Area (ha)	Credits Required
BESS – no species credits generated		
Common Ancillary Features		
gang-gang cockatoo (*Callocephalon fimbriatum*)	0.44	17
south-eastern glossy black-cockatoo (*Calyptorhynchus lathami lathami*)	0.44	17
large-eared pied bat (*Chalinolobus dwyeri*)	2.38	81
squirrel glider (*Petaurus norfolcensis*)	2.38	55
Transmission Line Option 1		
gang-gang cockatoo (*Callocephalon fimbriatum*)	1.85	69
south-eastern glossy black-cockatoo (*Calyptorhynchus lathami lathami*)	1.85	69
large-eared pied bat (*Chalinolobus dwyeri*)	1.85	103
squirrel glider (*Petaurus norfolcensis*)	1.85	69
Transmission Line Option 2		
gang-gang cockatoo (*Callocephalon fimbriatum*)	4.02	150
south-eastern glossy black-cockatoo (*Calyptorhynchus lathami lathami*)	4.02	150
large-eared pied bat (*Chalinolobus dwyeri*)	4.13	229
squirrel glider (*Petaurus norfolcensis*)	4.13	152

SAII

The Project will impact the potential SAII entity, White Box - Yellow Box - Blakely's Red Gum Grassy Woodland and Derived Native Grassland CEEC as listed under the BC Act. This CEEC is considered to be at potential risk of an SAII due to:

- **Principle 1**: It will cause a further decline of the ecological community that is currently observed, estimated, inferred or reasonably suspected to be in a rapid rate of decline.
- **Principle 2**: It will further reduce the population size of the ecological community that is currently observed, estimated, inferred or reasonably suspected to have a very small population size.

A total of 35.99 ha of White Box – Yellow Box – Blakely's Red Gum Grassy Woodland and Derived Native Grassland (Box Gum Woodland) has been recorded in the Biodiversity Survey Area. The Project will impact 2.12 ha of White Box - Yellow Box - Blakely's Red Gum Grassy Woodland and Derived Native Grassland CEEC, of which 1.23 ha comprises derived native grassland and 0.89 ha comprises woodland vegetation in varying degrees of condition. The proposed impact to this CEEC represents approximately 5.89% of the extent of the CEEC in the Project Area, with 19.41 ha of the woodland CEEC being avoided through redesign of the Development Footprint. The residual area of Box Gum Woodland will not be impacted by the Proposed separate Wattle Creek Solar Farm project.

Matters of National Environmental Significance

Matters of National Environmental Significance (MNES) listed under the EPBC Act, that are known or with potential to occur within the Development Footprint, were assessed in accordance with the EPBC Act Significant Impact Guidelines (DoE 2013) and any applicable recovery plans or EPBC Act policy statements.

The assessments undertaken have identified that the Project is considered likely to result in significant impacts under the EPBC Act to the White Box – Yellow Box Blakely's Red Gum Grassy Woodland and Derived Native Grassland CEEC and the gang-gang cockatoo (*Callocephalon fimbriatum*) due to the potential removal of breeding habitat for the species, assessed in a Matters of National Significance Assessment Report (**Appendix A**). Impacts to the south-eastern glossy black-cockatoo (*Calyptorhynchus lathami lathami*), large-eared pied bat (*Chalinolobus dwyeri*) and diamond firetail (*Stagonopleura guttata*), were considered not likely to result in a significant impact.

Offsets in the form of species credits for the south-eastern glossy black-cockatoo, large-eared pied bat and gang-gang cockatoo and ecosystem credits for the White Box – Yellow Box Blakely's Red Gum Grassy Woodland and Derived Native Grassland CEEC and diamond firetail are proposed under the NSW BOS in keeping with the Bilateral Agreement.

Measures to Avoid and Minimise Impacts

The following key impact avoidance and mitigation measures have been identified for the Project:

- Development Footprint alterations to the development across the broader Project Area which have resulted in the avoidance of approximately 64.3% (reducing from 1,838.09 ha (original survey area to 656.32 (580.62 ha (separate Wattle Creek Solar Farm Project) and 75.70 ha (the Project)) of the Project Area.
- Reduction in the development footprint for the Project from 390 ha (Scoping Conceptual Layout including 2 BESS locations) to 75.70 ha (one BESS location and refined associated infrastructure layout).
- Early site investigations included a potential wind farm component within the development of the Project Area. However, the wind component was not pursued which has resulted in considerable reduction of impacts to native vegetation, TECs and threatened fauna populations. Specifically, the potential for turbine strike has been avoided for the known populations of gang-gang cockatoo, south-eastern glossy black-cockatoo, large-eared pied bat and diamond firetail.
- The BESS has been located in the areas of degraded grassland within negligible biodiversity value. Ancillary facilities, access tracks and transmission lines have been located in existing cleared land and minimised impacts to TECs, intact woodland and habitat for threatened species were practicable.

- Optimising opportunities to maintain connectivity between the Project Area and surrounding areas of intact native vegetation.
- Redesign of the Project to minimise impacts on areas of intact native woodland and hollow bearing trees which reduced impacts to suitable foraging and/or breeding habitat for the gang-gang cockatoo, south-eastern glossy black-cockatoo, squirrel glider, diamond firetail, dusky woodswallow, large-eared pied bat, scarlet robin, speckled warbler, spotted harrier and varied sittella.
- Alteration of the Development Footprint to avoid impact to planted individuals of both Paddy's River box (*Eucalyptus macarthurii*) and narrow-leaved peppermint (*Eucalyptus nicholii*).
- Reduction of the Development Footprint to avoid impacts to areas of PCT 3373 Goulburn Tableland Box-Gum Grassy Forest (which is associated with White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland which is listed as a CEEC under the BC Act and EPBC Act).
- Reduction of the Development Footprint to avoid impacts to all areas of PCT 3643 Bungonia Tableland Silvertop Ash-Stringybark Forest which comprises good condition remnant native vegetation.
- Reduction and alteration of the Development Footprint to minimise impacts to areas of the White Box - Yellow Box - Blakely's Red Gum Grassy Woodland and Derived Native Grassland CEEC. This included impact avoidance measures targeted at retaining areas of woodland with intact crown condition, areas of scattered trees and higher quality derived native grassland condition zones.
- Reduction of the Project Area to avoid riparian areas and dams with emergent vegetation that may provide habitat for threatened species.
- Impacts which cannot be avoided or minimised will be managed in the following ways:
    - The preparation and implementation of a Construction Environmental Management Plan (CEMP), Operational Environmental Management Plan (OEMP)and Vegetation Management Plan (VMP). The plans will be prepared in consultation with relevant government agencies
    - Education and training for construction and operations staff
    - Establishing vegetation protection zones for retained areas
    - Pre-clearance surveys and ecological supervision, enabling rescue of native fauna as well as salvaging habitat features (such as hollows or selected felled timber) for relocation into adjacent retained areas
    - Erosion and sediment control
    - Weed management.

A summary of the commitments to avoid, minimise and mitigate the biodiversity impacts of the Project, that are to be implemented will be included in the Construction Environmental Management Plan (CEMP) and Operation Environmental Management Plan (OEMP) with monitoring or reporting requirements, adaptive management measure, performance criteria and any additional actions relevant to the management of biodiversity.

Offsets

The proponent is committed to delivering a biodiversity offset strategy that appropriately compensates for the unavoidable loss of ecological values as a result of the Project. The biodiversity offset strategy for the Project consist of the following options listed in order of highest priority:

- Establishing a biodiversity stewardship site on the residual land within the Project Area.
- Purchasing and retiring credits from an established biodiversity stewardship site.
- Payment into the Biodiversity Conservation Fund (BCF).

Declaration

Certification under clause 6.15 *Biodiversity Conservation Act 2016*.

I certify that this report has been prepared, to the best of my knowledge, based on the requirements of, and information provided under, the Biodiversity Assessment Method (NSW DPIE 2020a) and clause 6.15 of the *Biodiversity Conservation Act 2016* (BC Act).

Name: Maddy Young



Signature

Date: 17 March 2025

BAM Assessor Accreditation no: BAAS19071

Glossary

Term/Abbreviation	Definition
AIAPs	Additional impact assessment provisions for SAII
AOBV	Areas of Outstanding Biodiversity Value
Assessment Area	Includes the Development Footprint and the area of land within the 1,500 m buffer zone surrounding the development footprint (or 500 m buffer for linear developments)
BAM	Biodiversity Assessment Method
BAM-C	Biodiversity Assessment Method Calculator
BC Act	*Biodiversity Conservation Act 2016* (NSW)
BCF	Biodiversity Conservation Fund
BCS	Biodiversity, Conservation, and Science Division within NSW Department of Climate Change Energy, the Environment and Water
BC Regulation	Biodiversity Conservation Regulation 2017 (NSW)
BDAR	Biodiversity Development Assessment Report
BESS	Battery Energy Storage System
BMP	Biodiversity Management Plan
BOAMS	Biodiversity Offsets and Agreement Management System
BOS	Biodiversity Offsets Scheme
BSA	Biodiversity Stewardship Agreement
CEEC	critically endangered ecological community
CEMP	Construction Environmental Management Plan
Commonwealth DCCEEW	Commonwealth Department of Climate Change Energy, the Environment and Water
CSEP	Community and Stakeholder Engagement Plan
Development Footprint	The area of land that is directly impacted by a proposed development
Development Site	An area of land that is subject to a proposed development under the EP&A Act, including areas which will be retained and impacted by the project (synonymous with Subject Land and Project Area)
DBH	diameter at breast height over bark
DPE	Department of Planning and Environment (NSW) (superseded, now NSW DCCEEW)
DPIE	Department of Planning, Industry, and the Environment (NSW) (superseded, now NSW DCCEEW)
EAH	Environmental Agency Head
EC	ecological community listed under the EPBC Act
EPBC Act	*Environment Protection and Biodiversity Conservation Act 1999* (Cth)
EP&A Act	*Environmental Planning and Assessment Act 1979* (NSW)

Term/Abbreviation	Definition
EEC	endangered ecological community
EIS	Environmental Impact Statement
FM Act	*Fisheries Management Act 1994* (NSW)
GIS	Geographic Information System
GPS	Global Positioning System
HTW	high threat weed
IBRA	Interim Biogeographic Regionalisation for Australia
LEP	Local Environmental Plan
LGA	Local Government Area
LLS Act	*Local Land Services Act 2013* (NSW)
MNES	matters of national environmental significance
MWh	Megawatt hour
MWp	Megawatt peak
NPW Act	*National Parks and Wildlife Act 1974* (NSW)
NSW	New South Wales
NSW DCCEEW	NSW Department of Climate Change Energy, the Environment and Water
NVR Mapping	Native Vegetation Regulatory Mapping
PCT	Plant Community Type
PMST	Protected Matters Search Tool
Project Area	The broader property area that the subject land is located within.
SAII	serious and irreversible impact
SEARs	Secretary's Environmental Assessment Requirements
SEPP	State Environmental Planning Policy
SSD	State Significant Development
SSI	State Significant Infrastructure
STVM	State Vegetation Type Map
Subject Land	The land subject to the development application (synonymous with Project Area). The Development Footprint is located within the Subject Land area.
TBDC	Threatened Biodiversity Data Collection
TEC	threatened ecological community
The Project	The proposed Wattle Creek Battery Energy Storage System (BESS). The Project includes the construction, operation and decommissioning of a BESS with a storage capacity of 350 MW.
TSSC	Threatened Species Scientific Committee
VEC	vulnerable ecological community
VI	Vegetation integrity

Table of Contents

Executive Summary i

Declaration viii

Glossary ix

1.0 Introduction 1

1.1 Overview 1

1.2 Purpose and Scope of this Report 2

1.3 Report Preparation 10

1.4 Proposed Development 11

1.4.1 Development Overview 11

1.4.2 Location and Subject Land Description 11

1.4.3 Proposed Development Description 12

1.4.4 Project Site Selection and Biodiversity Design Considerations 15

1.4.5 Other Documentation 16

1.5 Statutory Considerations 21

1.6 Biodiversity Offsets Scheme Entry 25

1.7 Biodiversity Values Map and BioNet Records 25

1.8 Excluded Impacts – NVR Mapping 25

1.9 Matters of National Environmental Significance 28

1.10 Information Sources 29

2.0 Methods 30

2.1 Site Context Methods 30

2.1.1 Landscape Features 30

2.2 Native Vegetation, Threatened Ecological Communities and Vegetation Integrity Methods 30

2.2.1 Review of Existing Information 30

2.2.2 Mapping Native Vegetation Extent 31

2.2.3 Plot-Based Vegetation Survey 32

2.3 Threatened Flora Survey Methods 36

2.3.1 Review of Existing Information and Survey Guidelines 36

2.3.2 BioNet Atlas and PMST Threatened Flora Records 36

2.3.3 Habitat Constraints Assessment 40

2.3.4 Threatened Flora Surveys 40

2.4 Threatened Fauna Survey Methods 43

2.4.1 Review of Existing Information and Survey Guidelines 43
2.4.2 BioNet Atlas Threatened Fauna Records 43
2.4.3 Habitat Constraints Assessment 48
2.4.4 Fauna Surveys 48
2.5 Threatened Fungi 56
2.6 Weather Conditions 56
2.7 Limitations 58
3.0 Site Context 59
3.1 Assessment Area 59
3.2 Patch Size 59
3.3 Landscape Features 59
3.4 IBRA Bioregions and IBRA Subregions 59
3.5 Rivers, Streams, Estuaries and Wetlands 59
3.6 Habitat Connectivity 60
3.7 Karst, Caves, Crevices, Cliffs, Rocks or Other Geographical Features of Significance 60
3.8 Soils and Landscapes 60
3.9 Areas of Outstanding Biodiversity Value 60
3.10 NSW (Mitchell) Landscapes 61
3.11 Additional Landscape Features Identified in the SEARs 61
3.12 Native Vegetation Cover 61
4.0 Native Vegetation, Threatened Ecological Communities and Vegetation Integrity 64
4.1 Native Vegetation Extent 64
4.1.1 Changes to the Mapped Native Vegetation Extent 64
4.1.2 Areas That Are Not Native Vegetation 64
4.2 Plant Community Types 66
4.2.1 Overview of PCTs Present 66
4.2.2 Description of PCT 4063 Central and Southern Tableland River Oak Forest 69
4.2.3 Description of PCT 3374 Goulburn Tableland Peppermint Grassy Forest 70
4.2.4 Description of PCT 3376 Southern Tablelands Grassy Box Woodland 76
4.2.5 Other PCTs Surveyed within the Project Area 80
4.2.6 Cleared Land and Waterbodies 80
4.3 Threatened Ecological Communities 84
4.4 Vegetation Zones 84
4.5 Vegetation Integrity (Vegetation Condition) 88
4.5.1 Vegetation Integrity Survey Plots 88

4.5.2 Use of Benchmark Data 88

5.0 Threatened Species 89

5.1 Ecosystem Species 89

5.2 Species Credit Species 97

5.2.1 Predicted Flora Species Credit Species 97

5.2.2 Predicted Fauna Species Credit Species 104

5.3 Presence of Candidate Species Credit Species 113

5.3.1 Threatened Flora Species 113

5.3.2 Threatened Fauna Species 114

5.4 Threatened Species Surveys 118

5.4.1 Expert Reports and of More Appropriate Local Data 127

5.4.2 Area or Count, and Location of Suitable Habitat for a Species Credit Species (a Species Polygon). 127

5.5 Results for BC Act Listed Ecosystem Credit Species 140

5.6 Results for EPBC Act Listed Species 140

5.7 SEPP (Biodiversity and Conservation) 2021 142

6.0 Identifying Prescribed Impacts 143

7.0 Avoid and Minimise Impacts 145

7.1 Avoid and Minimise Direct and Indirect Impacts 147

7.1.1 Project Location 150

7.1.2 Project Design and Planning 151

7.2 Avoid and Minimise Prescribed Impacts 154

7.2.1 Project Location 155

7.2.2 Project Design 155

7.3 Other Measures Considered 156

7.3.1 Do Nothing Option 156

7.4 Summary of Measures to Avoid and Minimise Impacts 157

8.0 Impact Assessment 159

8.1 Direct Impacts 159

8.1.1 Residual Direct Impacts 159

8.1.2 Change in Vegetation Integrity Score 163

8.2 Indirect Impacts 164

8.3 Impacts to MNES 169

8.4 Prescribed Impacts 169

8.4.1 Karst, Caves, Crevices, Cliffs, Rocks or Other Geological Features of Significance 170

8.4.2 Human Made Structures 170
8.4.3 Non-Native Vegetation (Category 1 Exempt Land) 170
8.4.4 Habitat Connectivity 170
8.4.5 Waterbodies, Water Quality and Hydrological Processes 171
8.4.6 Vehicle Strikes 171
8.5 Cumulative Impact Assessment 173
8.6 Mitigation 179
8.6.1 Workforce Education and Training 180
8.6.2 Implementation of Vegetation Protection Zones for Areas to be Retained 180
8.6.3 Ecologist Pre-Clearance Surveys and Supervision of Works 180
8.6.4 Erosion and Sedimentation Control 181
8.6.5 Weed Management 181
8.6.6 Fencing, Access Control and Fauna Exclusion 181
8.6.7 Preparation and Implementation of Construction Environmental Management Plan 182
8.7 Adaptive Management for Uncertain Impacts 195
8.7.1 Monitoring program and adaptive management 195
9.0 Serious and Irreversible Impacts 197
9.1 Assessment for Serious and Irreversible Impacts on Biodiversity Values 197
9.1.1 Additional Impact Assessment Provisions for TECs at Risk of an SAII 200
9.1.2 Additional Impact Assessment Provisions for Threatened Species at Risk of an SAII 205
10.0 Impact Summary 206
10.1 Determining an Offset Requirement for Impacts 206
10.1.1 Impacts on Native Vegetation and TECs (Ecosystem Credits) 206
10.1.2 Impacts on Threatened Species and their Habitat (Species Credits) 209
10.1.3 Indirect and Prescribed Impacts 209
10.2 Impacts That Do Not Need Further Assessment 209
11.0 Biodiversity Credit Report 211
11.1 Ecosystem Credits 211
11.2 Species Credits 215
11.3 Biodiversity Offset Strategy 216
12.0 References 217

Figures

Figure 1.1	Site Map	17
Figure 1.2	Location Map	18
Figure 1.3	Development Layout	19
Figure 1.4	Development Assessment Zones	20
Figure 1.5	Biodiversity Values Map and BioNet Atlas Records	26
Figure 1.6	Draft Native Vegetation Regulatory Map	27
Figure 2.1	Field Survey Locations – BAM Plot Locations	35
Figure 2.2	Threatened Flora Survey Locations	42
Figure 2.3	Threatened Fauna Survey Locations	55
Figure 3.1	Rivers, Streams, Estuaries, and Wetlands Downstream of the Project Area	62
Figure 3.2	Habitat Connectivity	63
Figure 4.1	Native Vegetation Extent	65
Figure 4.2	Plant Community Types and Vegetation Zones	68
Figure 4.3	Threatened Ecological Communities on the Development Footprint	85
Figure 5.1a	Gang-gang Cockatoo Species Polygons	130
Figure 5.2	Species Observations	141
Figure 7.1	Impact Avoidance and Minimisation Areas	149
Figure 8.1	Final Impact Areas on the Development Footprint	162
Figure 9.1	Locations of Habitat for Potential Serious and Irreversible Impact Entities	199
Figure 10.1	Thresholds for Assessing and Offsetting Impacts	210

Tables

Table 1.1	SEARs Relevant to the Biodiversity Assessment	3
Table 1.2	Supplementary SEARs Requirements	6
Table 1.3	Accredited BAM Assessors and Ecologists Involved in the Project	10
Table 1.4	BESS Project Components	14
Table 1.5	Legislation Relevant to the Project	21
Table 2.1	Landscape Features Assessed and Data Sources	30
Table 2.2	Plant Community Types Survey Plot Stratification Details	33
Table 2.3	Threatened Flora Species Predicted to Occur in the Project Area (BAM-C, BioNet, PMST)	37
Table 2.4	Candidate Threatened Flora Species Targeted and Field Survey Methods Used	41
Table 2.5	Threatened Fauna Species Predicted to Occur in the Project Area	44
Table 2.6	Details of Diurnal Threatened Fauna Surveys Completed	50
Table 2.7	Details of Nocturnal Threatened Fauna Surveys Completed	52
Table 2.8	Details of Remote Detection Threatened Fauna Surveys Completed	53
Table 2.9	Weather Conditions During Biodiversity Surveys	56
Table 3.1	Native Vegetation Cover in the Assessment Area	61
Table 4.1	VI score for Vegetation Plots Completed in Areas of Category 1 – Exempt Land	64
Table 4.2	Plant Community Types Identified within the Development Footprint	67
Table 4.3	Overview of PCT 4063 Central and Southern Tableland River Oak Forest	69
Table 4.4	Overview of PCT 3374 Goulburn Tableland Peppermint Grassy Forest	71
Table 4.5	Overview of PCT 3376 Southern Tablelands Grassy Box Woodland	76

Table 4.6	Condition Criteria (DCCEEW 2023) and Vegetation Zone 7 (PCT 3376 DNG)	78
Table 4.7	Condition Criteria (DCCEEW 2023) and Vegetation Zone 8 (PCT 3376 Good/Moderate)	79
Table 4.8	TECs within the Development Footprint	84
Table 4.9	Vegetation Condition Zones and Patch Sizes	86
Table 4.10	Vegetation Integrity Condition Scores	88
Table 5.1	Predicted Ecosystem Credit Species	90
Table 5.2	Predicted Flora Species Credit Species	99
Table 5.3	Candidate Threatened Fauna Species Credit Species	105
Table 5.4	Determining the Presence of Candidate Flora Species Credit Species in the Survey Area	113
Table 5.5	Determining the Presence of Candidate Fauna Species Credit Species in the Development Footprint	115
Table 5.6	Summary of Species Credit Threatened Flora Survey Completed	118
Table 5.7	Summary of Species Credit Threatened Fauna Surveys Completed	120
Table 5.8	Gang-gang Cockatoo Species Polygon Details	127
Table 5.9	South-eastern Glossy Black-Cockatoo Species Polygon Details	131
Table 5.10	Squirrel Glider Species Polygon Details	134
Table 5.11	Large-eared Pied Bat Species Polygon Details	137
Table 5.12	Ecosystem Credit Species Observation Details	140
Table 5.13	Results for EPBC Act Listed Species Present (recorded within Development Footprint)	140
Table 5.14	Koala Feed Tree Present within Development Footprint	142
Table 6.1	Prescribed Impacts Identified	143
Table 7.1	Wattle BESS Impact Avoidance	147
Table 7.2	Design Refinements that have Avoided and/or Minimised Prescribed Impacts	155
Table 7.3	Avoidance and Minimisation Measures for Direct, Indirect and Prescribed Impacts	157
Table 8.1	Summary of Residual Direct Impacts	160
Table 8.2	Impacts to Vegetation Integrity	163
Table 8.3	Risk Matrix Criteria	164
Table 8.4	Risk Matrix	164
Table 8.5	Potential Indirect Impacts to Biodiversity Including their Extent, Frequency, Timing, Duration and Consequence	165
Table 8.6	Cumulative Impact Assessment	174
Table 8.7	Mitigation Measures	183
Table 8.8	Proposed Monitoring and Adaptive Management Measures	195
Table 9.1	Entities at Risk of an SAII	198
Table 9.2	SAII Impact Assessment – White Box – Yellow Box – Blakely's Red Gum Grassy Woodland and Derived Native Grassland CEEC	200
Table 10.1	Impacts that Do Not Require Offset – Ecosystem Credits	206
Table 10.2	Impacts that Do Require Offset – Ecosystem Credits	207
Table 10.3	Impacts that Require an Offset – Species Credits	209
Table 11.1	Ecosystem Credit Class and Matching Credit Profiles	212
Table 11.2	Species Credit Class and Matching Credit Profiles	215

Appendices

Appendix A	EPBC Act Matters of National Environmental Significance Report
Appendix B	BAM Compliance Table
Appendix C	BAM Vegetation Integrity Data
Appendix D	BAM Calculator Reports
Appendix E	Aquatic Assessment

1.0 Introduction

1.1 Overview

Spark Renewables Pty Ltd (Spark Renewables) have engaged Umwelt to prepare this Biodiversity Development Assessment Report (BDAR) for the Wattle Creek Battery Energy Storage System (BESS) Project (SSD-63345458) (the 'Project'). The Project is located on Arthursleigh Farm (Lot 3 DP 1120270) at Brayton and Big Hill, north of the township of Marulan, within the Upper Lachlan Shire and Goulburn Mulwaree Local Government Areas of NSW.

The Project will have a storage capacity of up to 350 MW and will include approximately 415 lithium-iron phosphate battery containers, each with a capacity of approximately 3.85 Megawatt hour (MWh). The BESS will be equipped with 248 inverters rated at 4,200 kVA, paired with medium voltage transformers, and will be integrated into the on-site substation with three 300 MVA high voltage transformers. The boundary of the Project Area and Development Footprint are shown on the Site Map provided as **Figure 1.1**, the Location Map, provided as **Figure 1.2** and the Development Layout on **Figure 1.3.**

The Project Development Footprint spans approximately 75.70 hectares (ha).

This BDAR provides an assessment of the biodiversity values of the Biodiversity Survey Area, which encompasses the Development Footprint. The Biodiversity Survey Area is an amalgamation of previous and current designs of the Project and also the broader Project Area, where survey has occurred, and is shown on **Figure 1.4**. Through the process of avoidance and minimisation the current Development Footprint has been established and refined within the Biodiversity Study Area. Surveys undertaken across the entire Biodiversity Study Area have been used in this assessment.

The Project and the separate Wattle Creek Solar Farm Project (SSD-63344210) proposed within the Project Area, include ancillary features common to both projects as well as two transmission line options. The assessment of the ancillary features and transmission line options have been duplicated across both BDARs, to allow both projects to be assessed and approved independently.

To delineate the impacts between the different project impact zones, the areas assessed in this BDAR have been separated into four Biodiversity Assessment Method - Calculator (BAM-C) cases, under the one parent case (00038889). The four impact zones referenced throughout the BDAR are outlined below and shown in **Figure 1.4**):

- BESS area (13.42 ha) assessed in BAM-C child case 0038890
- Common ancillary features (47.67 ha) assessed in BAM-C child case 00047985
- Transmission line option 1 (6.12 ha) assessed in BAM-C child case 00047986
- Transmission line option 2 (8.49 ha) assessed in BAM-C child case 00047987.

1.2 Purpose and Scope of this Report

This BDAR has been prepared as part of the Environmental Impact Statement (EIS) documentation for the Project to address biodiversity components of the Secretary's Environmental Assessment Requirements (SEARs) for the Project as issued in October 2023 (refer **Table 1.1**). This report provides an assessment of the biodiversity values within the Development Footprint, documents the application of the avoid, minimise and offset framework and assesses the likely biodiversity impacts of the Project.

This BDAR has been prepared in accordance with the New South Wales (NSW) *Biodiversity Conservation Act 2016* (BC Act) and the Biodiversity Assessment Method (BAM) (NSW DPIE 2020a). The Project is a State Significant Development (SSD) under Division 4.7 of Part 4 of the NSW *Environmental Planning and Assessment Act 1979* (EP&A Act). In accordance with Section 7.9 of the BC Act, an application for development consent for SSD project is to be accompanied by a BDAR.

The Project requires approval under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act). The BAM has been endorsed as the assessment method for Matters of National Environmental Significance (MNES) under a Bilateral Agreement made under the EPBC Act. The Australian Government is the decision-maker for whether the Project will be approved under the EPBC Act. Nationally listed threatened biota and migratory species have been considered and assessed as part of this BDAR. A separate MNES assessment addressing the requirements of the Project Assessment Notes provided by the Commonwealth DCCEEW is included in **Appendix A**.

The biodiversity requirements for MNES are set out in the Supplementary SEARs issued by DPHI on the 12 December 2024 and are as replicated in **Table 1.2** including cross-references to the relevant section of the MNES report (**Appendix A**) where each requirement is addressed.

Table 1.1 SEARs Relevant to the Biodiversity Assessment

Secretary's Environment Assessment Requirements SSD 63345458	Relevant Section of BDAR
SEARs received 22/12/2023 - BCD	
The EIS must assess biodiversity impacts related to the proposed development in accordance with Section 7.9 of the *Biodiversity Conservation Act 2016* using the Biodiversity Assessment Method (BAM) 2020 and must document this assessment in a Biodiversity Development Assessment Report (BDAR), unless: a) a BDAR waiver is granted, or b) the site is on biodiversity certified land. The BDAR must include information in the form detailed in the *Biodiversity Conservation Act 2016* (s6.12), Biodiversity Conservation Regulation 2017 (s6.8) and the BAM.	A BDAR waiver is not being sought. The site is not on biodiversity certified land. Accordingly, a BDAR has been prepared in accordance with the BAM and section 7.9 of the BC Act.
The BDAR must apply the avoid, minimise and offset hierarchy including assessing all direct, indirect, uncertain and prescribed impacts in accordance with the BAM.	Measures taken to avoid and minimize impacts to biodiversity are provided in **Section 7.0.** Impacts of the Project are identified in **Section 8.0** and **Section 9.0**. Summary of impacts and offsetting requirements are outlined in **Section 10.0**.
The BDAR must be submitted with all spatial data associated with the survey and assessment as per Appendix K of the BAM.	Spatial data will be submitted in BOAMS and/or directly to the consent authority, in accordance with Appendix K of the BAM.
The BDAR must include details of the measures proposed to address the offset obligation as follows: • The total number and classes of biodiversity credits required to be retired for the development. • The number and classes of like-for-like biodiversity credits proposed to be retired. • The number and classes of biodiversity credits proposed to be retired in accordance with the variation rules. • Any proposal to fund a biodiversity conservation action. • Any proposal to conduct ecological rehabilitation (if a mining project). • 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.	A biodiversity offset strategy is provided in **Section 11.0**.
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*.	The BDAR has been prepared by an accredited BAM assessor as acknowledged in the declaration. A list of ecologists who prepared this BDAR and their qualification is provided in **Section 1.3**.

Secretary's Environment Assessment Requirements SSD 63345458	Relevant Section of BDAR
The EIS must contain a summary of the commitments set out in the BDAR to avoid, minimise and mitigate the biodiversity impacts of development that are to be implemented, post approval, by their inclusion in a Biodiversity Management Plan (BMP). The preparation of a BMP to fulfil the avoid and minimise requirements of the BDAR must be included as a condition of consent/approval, unless otherwise agreed with BCS. The BMP must include detailed measures to minimise impacts on biodiversity, monitoring and reporting requirements, proposed adaptive management measures, performance criteria recommended to meet states outcomes, remedial actions to be undertaken if actions fail to achieve stated outcomes, and any additional actions relevant to the management of biodiversity.	Summary of mitigation measures is provided in **Section 8.5**.
If the development is on biodiversity certified land, provide information to identify the site (using associated mapping) and demonstrate the proposed development is consistent with the relevant biodiversity measure conferred by the biodiversity certification	N/A
Based on the development footprint, BCS considers the following SAII entities are likely to be impacted to some level: • 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 • *Caladenia tessellata* thick lip spider orchid • *Carex klaphakei* klaphake's sedge • *Eucalyptus aquatica* broad-leaved sally • *Eucalyptus recurva* Mongarlowe mallee • *Galium australe* tangled bedstraw • *Genoplesium superbum* superb midge orchid • *Gentiana wingecarribiensis* Wingecarribee gentian • *Grevillea renwickiana* Nerriga grevillea • *Pomaderris delicata* delicate pomaderris • *Anthochaera phrygia* regent honeyeater • *Lathamus discolor* swift parrot • *Petalura gigantea* giant dragonfly • *Chalinolobus dwyeri* large-eared pied bat	Many of the threatened species listed by BCS have not been recorded within the Project Area historically or during surveys completed for this BDAR and are not likely to be impacted by the Project. The listed SAII entities have been assessed as candidate species in accordance with the BAM. Details of targeted surveys for candidate species are provided in **Section 2.0.** An assessment of entities at risk of a SAII is provided in **Section 9.0.**

Secretary's Environment Assessment Requirements SSD 63345458	Relevant Section of BDAR
• *Miniopterus australis* little bent-winged bat (breeding) • *Miniopterus orianae oceanensis* large bent-winged bat (breeding) • *Petrogale penicillata* brush-tailed rock-wallaby.	
BCS recommends early engagement between BCS and the proponent where such entities are likely to be impacted. BCS notes that box gum woodland was not identified as a Serious and Irreversible Impact (SAII) entity in the Biodiversity Constraints Assessment (BCA), however it must be included in the assessment.	Engagement with BCS occurred in March 2023 and May 2024 and October 2024. SAII assessment is provided in **Section 9.0**.
The following prescribed impacts in accordance with Clause 6.1 of the BC Act are to be assessed: The impacts of development on the following habitat of threatened species or ecological communities— • karst, caves, crevices, cliffs and other geological features of significance • rocks • human made structures • non-native vegetation • the impacts of development on the connectivity of different areas of habitat of threatened species that facilitates the movement of those species across their range • the impacts of development on movement of threatened species that maintains their lifecycle • the impacts of development on water quality, water bodies and hydrological processes that sustain threatened species and threatened ecological communities (including from subsidence or upsidence resulting from underground mining or other development) – refer to Addendum to NSW Biodiversity Offsets Policy for Major Projects: Upland swamps impacted by longwall mining subsidence (OEH, 2016) • the impacts of wind turbine strikes on protected animals – refer to Wind farms: Turbine Strike Assessment and Adaptive Management Plan: Biodiversity Assessment Method Guide (BCS, 2023) • the impacts of vehicle strikes on threatened species of animals or on animals that are part of a threatened ecological community.	An assessment of relevant prescribed impacts is provided in **Section 8.3**.
Offsets for prescribed impacts are to be considered if avoidance and mitigation measures are not applicable or will not result in the complete reduction of prescribed impacts occurring. The assessment and calculation of a predicted offset obligation in accordance with Section 7.14 of the *Biodiversity Conservation Act 2016* should be presented in the BDAR.	An assessment of prescribed impacts is provided in **Section 8.3**.
Cumulative impacts should be assessed through application of the Cumulative Impact Assessment for State Significant Projects guidance (NSW DPE, Oct 2022).	An assessment of cumulative impacts is provided in **Section 8.5**. Further assessment is provided in Appendix 19 of the EIS.

Table 1.2 Supplementary SEARs Requirements

Key Issue	Supplementary SEARs Requirement – Issued 12 December 2024	MNES Report Reference (Appendix A)
Introduction	3. The proponent must undertake an assessment of all protected matters that may be impacted by the development under the controlling provision identified in paragraph 1 (i.e. listed threatened species and communities (sections 18 and 18A). The Commonwealth Department of Climate Change, Energy, the Environment and Water (DCCEEW) considers that the proposed action is likely to have a significant impact on threatened species and communities listed in **Appendix A.**	**Appendix A**
	Appendix A The DCCEEW considers that there is likely to be a significant impact on the following MNES	
	• White Box-Yellow Box-Blakeley's Red Gum Grassy Woodland and Derived Native Grassland	Section 2.1 of **Appendix A3**
	• Gang-gang Cockatoo (*Callocephalon fimbratum*) - Endangered	Section 3.1 of **Appendix A3**
	• Diamond Firetail (*Stagonopleura guttata*) – Vulnerable	Section 4.6 of **Appendix A3**
	4.The proponent must consider each of the protected matters under the triggered controlling provisions that may be impacted by the action. Note that this may not be a complete list and it is the responsibility of the proponent to undertake an analysis of the relevant impacts and ensure all protected matters that are likely to be impacted are assessed for the Commonwealth Minister's consideration.	Whole Document
	Appendix A The DCCEEW considers that there is some risk that there may be significant impacts on the following listed threatened species and communities and levels of impact should be further investigated:	
	• Swift Parrot (*Lathamus discolor*) – Critically Endangered	Section 3.7 of **Appendix A3**
	• Regent Honeyeater (*Anthochaera phrygia*) – Critically Endangered	Section 3.8 of **Appendix A3**
	• South-eastern Hooded Robin (*Melanodryas cucullata cucullata*) – Endangered	Section 3.4 of **Appendix A3**
	• Greater Glider (southern and central) (*Petauroides volans*) – Endangered	Section 3.5 of **Appendix A3**
	• Koala (combined populations of Queensland, New South Wales and the Australian Capital Territory) (*Phascolarctos cinereus*) – Endangered	Section 3.6 of **Appendix A3**
	• Large-eared Pied Bat (*Chalinolobus dwyeri*) – Endangered	Section 3.2 of **Appendix A3**
	• Key's Matchstick Grasshopper (*Keyacris scurra*) – Endangered	Section 3.9 of **Appendix A3**
	• Brown Treecreeper (south-eastern) (*Climacteris picumnus victoriae*) – Vulnerable	Section 4.2 of **Appendix A3**

Key Issue	Supplementary SEARs Requirement – Issued 12 December 2024	MNES Report Reference (Appendix A)
	• Painted Honeyeater (*Grantiella picta*) – Vulnerable	Section 4.4 of **Appendix A3**
	• Yellow-bellied Glider (south-eastern) (*Petaurus australis australis*) – Vulnerable	Section 4.5 of **Appendix A3**
	• Pink-tailed Worm-lizard (*Aprasia parapulchella*) – Vulnerable.	Section 4.8 of **Appendix A3**
General Requirements *Relevant Regulations*	5. The Environmental Impact Statement (EIS) must address all matters outlined in Schedule 4 of the EPBC Regulations and all matters outlined below in relation to the controlling provisions.	Whole document
General Requirements ***Project Description***	6. The title of the action, background to the action and current status.	**Section 1.1**
	7. The precise location and description of all works to be undertaken (including associated offsite works and infrastructure), structures to be built or elements of the action that may have impacts on MNES.	**Section 2.2** **Section 2.3**
	8. How the action relates to any other actions that have been, or are being taken in the region affected by the action.	**Section 2.7**
	9. How the works are to be undertaken and design parameters for those aspects of the structures or elements of the action that may have relevant impacts on MNES.	**Section 5.0** **Section 5.1**
General Requirements *Impacts*	10. The EIS must include an assessment of the relevant impacts of the action on the matters protected by the controlling provisions, including: • a description and detailed assessment of the nature and extent of the likely direct, indirect and consequential impacts, including short term and long term relevant impacts; • a statement whether any relevant impacts are likely to be unknown, unpredictable or irreversible; • analysis of the significance of the relevant impacts; and • any technical data and other information used or needed to make a detailed assessment of the relevant impacts.	**Section 6.0**

Key Issue	Supplementary SEARs Requirement – Issued 12 December 2024	MNES Report Reference (Appendix A)
General Requirements ***Avoidance, mitigation and offsetting***	11. For each of the relevant matters protected that are likely to be significantly impacted by the action, the EIS must provide information on proposed avoidance and mitigation measures to manage the relevant impacts of the action including: • a description, and an assessment of the expected or predicted effectiveness of the mitigation measures; • any statutory policy basis for the mitigation measures; • the cost of the mitigation measures; • an outline of an environmental management plan that sets out the framework for continuing management, mitigation and monitoring programs for the relevant impacts of the action, including any provisions for independent environmental auditing; • the name of the agency responsible for endorsing or approving each mitigation measure or monitoring program.	**Section 5.0**
	12. Where a significant residual adverse impact to a relevant protected matter is considered likely, the EIS must provide information on the proposed offset strategy, including discussion of the conservation benefit associated with the proposed offset strategy.	**Section 7.0**
	13. For each of the relevant matters likely to be impacted by the action the EIS must provide reference to, and consideration of, relevant Commonwealth guidelines and policy statements including any: i. conservation advice or recovery plan for the species or community; ii. relevant threat abatement plan for the species or community; iii. wildlife conservation plan for the species; and iv. any strategic assessment.	**Section 3.1 and Appendix A3**
	14. In addition to the general requirements described above, specific information is required with respect to each of the determined controlling provisions. These requirements are outlined in paragraphs 15-18.	Provided below for 15–18
Biodiversity (threatened species and communities)	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.	**Section 6.2** and **Appendix A3**
Assessment Requirements	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:	**Provided for each species in Appendix A3**

Key Issue	Supplementary SEARs Requirement – Issued 12 December 2024	MNES Report Reference (Appendix A)
	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; 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.	**Section 7.0**
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	**Section 1.2**
Environmental Record	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	**Section 1.1.1**
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.	**Section 8.0**

1.3 Report Preparation

This BDAR was prepared by Maddy Young (Senior Ecologist) with review and technical direction from Naomi Buchhorn (Principal Ecologist) and Rachel Musgrave (Principal Ecologist). The BDAR was prepared in accordance with the BAM (DPIE 2020), following the specific requirements detailed within Appendix K of the BAM (see **Appendix B**).

Table 1.3 outlines the details of the ecologists involved in the biodiversity surveys, BAM calculations and reporting for the Project.

Table 1.3 Accredited BAM Assessors and Ecologists Involved in the Project

Name	Experience / Qualifications	Years of Industry Experience	BAM Accreditation Number	Contribution to the project
Maddy Young	BEnvSc (Hons)	9	BAAS19071	Biodiversity Assessment Project Manager, Accredited assessor, BDAR preparation, BAM plots, Plant Community Type (PCT) mapping and threatened species surveys
Naomi Buchhorn	BSc (Hons I)	>30	-	Document Review / Technical Project Director
Rachel Musgrave	BSc (Hons)	>16	BAAS18032	Document Review
Alex Cottle	BEnvScMgt	3	-	BDAR preparation and threatened species surveys
Adam Cavallaro	BEnvSc BushRegen Cert II Hort CertIV	>20	BAAS18056	Threatened species surveys, BAM Plots
Lachlan Laurie	Certificate IV Workplace Training and Assessment AdvPlantId UNSW	>20	BAAS18011	Threatened species surveys
Matthew Mullaney	BEnvSc	2	-	Threatened species surveys and BAM Plots
Jarmin Thornberry	BEnvScMgt Dip CLMgt	2	-	Threatened species surveys and BAM Plots
Sarah Hart	BSc (Mast) DipEnvMgt	>10	BAAS21026	Threatened species surveys
Ray Turnbull	BNatResources GradCertOrn GradDipOrn	15	-	Threatened species surveys
Brayden Luke	BSc	5	-	Threatened species surveys
Bryce Miller	BBioCons	2	-	Threatened species surveys and Anabat analysis
Michael Jones	BEnvSc BEnvSoc BSc (Hons I)	4.5	-	Threatened species surveys
Harry Ellington	BEnvSciCons	1	-	Threatened species surveys

Name	Experience / Qualifications	Years of Industry Experience	BAM Accreditation Number	Contribution to the project
Kate Schmahl	BEnvScMgt	1	-	Threatened species surveys
Tim Cusack	BZoo BEnvSc	1	-	Songmeter Call Analysis
Kealyn Madden	BSc (Animal Behaviour)	1	-	Threatened species surveys
Chloe D'Monte	BEnvSc	2	-	Threatened species surveys
Kai Dewar	BSc (Hons)	1	-	Threatened species surveys
Sharae Hurley	BSc	2	-	Threatened species surveys
Corey Miskell	BSc Grad.Cert.SpaSci	3	-	GIS Mapping
Anna McConville (Echo Ecology)	PhD, B.Env.Sc	N/A	-	Bat call analysis

1.4 Proposed Development

1.4.1 Development Overview

The Project will have a storage capacity of up to 350 MW and will include approximately 415 lithium-iron phosphate battery containers, each with a capacity of approximately 3.85 MWh. The Project will be equipped with 248 inverters rated at 4,200 kVA, paired with medium voltage transformers, and will be integrated into the on-site substation with three 300 MVA high voltage transformers.

Environmental and social matters were considered early in the project design, with revisions undertaken during the Scoping Report stage to incorporate community and stakeholder feedback towards maximising positive social, economic and environmental outcomes and minimising adverse impacts. Spark Renewables has established a community and stakeholder engagement plan (CSEP) for the Project and has undertaken extensive engagement with the local community and other valued stakeholders. This community and stakeholder engagement will continue throughout the Project planning and approvals process.

The Project is SSD as defined under State Environmental Planning Policy (SEPP) 2021 (Planning Systems SEPP) and will require development consent under Part 4 of the EP&A Act.

1.4.2 Location and Subject Land Description

The Project Area is located approximately 80 kilometres (km) west of Wollongong and 15 km north of Marulan within the Upper Lachlan Shire and Goulburn Mulwaree Council Local Government Areas (LGAs) (refer to **Figure 1.1**).

The Project Area covers approximately 6,274.04 ha, with the Development Footprint assessed within this report covers approximately 75.70 ha, including ancillary features and two transmission line options.

The Project Area encompasses the property known as Arthursleigh and the length of Canyonleigh Road between the Project Area access point and the Canyonleigh Road/Brayton Road intersection. The Arthursleigh property is bound to the south by the Wollondilly River and Canyonleigh Road, to the east by the Wollondilly River, to the north by Dead Mans Creek, and to the west by private property (refer to **Figure 1.1**). The Hume Highway is located about 11 km to the south of the Project Area.

A number of national parks, state forests and conservation reserves are in proximity to the Project Area. Tarlo River National Park is located approximately three kilometres west of the Project Area. Kerrawary Nature Reserve, Belanglo State Forest, Bangadilly National Park are located approximately two, six and ten kilometres to the north and north east, respectively.

The Project Area is zoned RU2 Rural Landscape under the Upper Lachlan Shire Council Local Environment Plan (LEP) 2011 and Goulburn Mulwaree LEP (2009). Most of the land that surrounds the Project Area is also zoned RU2 Rural Landscape, except for the land immediately east which is zoned RU1 Primary Production.

The vegetation within the Project Area comprises a mosaic of exotic dominated improved pasture, derived native grasslands subject to various degrees of disturbance, isolated paddock trees, areas of thinned trees and intact woodland and forest around the periphery of the Project Area.

The Project Area is intersected by a number of waterways including Island Creek, Wattle Creek, and Sandy Creek. The Wollondilly River intersects the Project Area's southern and eastern boundary, as well as through the southern portion of the Project Area.

The Project Area adjoins the approved (but not constructed) Marulan Gas-Fired Power Station State Significant Infrastructure (SSI) Project to the south as shown on **Figure 1.3.**

1.4.3 Proposed Development Description

The Project includes the installation, operation, maintenance and decommissioning of a BESS, ancillary infrastructure and temporary facilities associated with the construction of the Project (refer to **Figure 1.2**). The BESS will have a storage capacity of up to 350 MW and include the following key components:

- Batteries – most likely a lithium-ion technology.
- Inverters – bi-directional inverters to convert DC current to AC current (when exporting electricity) and vice versa (when importing electricity).
- Transformers – skid-mounted transformers will be installed adjacent to each inverter to step up the voltage to the internal reticulation voltage of the plant.
- Substation and transmission connection – on-site collector substation and overhead powerlines to connect the Project to the electricity transmission network via Marulan Substation.
- A substation communication mast of up to 80 metres (m) in height is also included at the substation location.
- Electrical connections – a combination of underground cables and overhead powerlines connecting BESS facility to the on-site collector substation.

- Operations and maintenance (O&M) facility – including control rooms, O&M buildings, amenities, equipment sheds, storage, a hardstand and bench, and parking areas.
- Other associated permanent infrastructure including hardstands, fencing, static water tanks or ancillary fire-fighting equipment.
- Site access points, Internal access tracks and targeted external road network upgrades are proposed to facilitate delivery of solar farm components to the Project Area as required including:
    - The existing primary access point off Canyonleigh Road will be subject to minor upgrade works and will include site entrance signage.
    - All internal access tracks will be constructed to provide all weather access for servicing and maintaining Project infrastructure, as well as access and egress during emergencies.
    - Access to the Project Area via heavy vehicle will be via Red Hills Road, Ambrose Road, Brayton Road and Canyonleigh Road. Arthursleigh Road to the east of the Project Area will not be used during construction, except in the event the access route via Canyonleigh Road is not possible (i.e. in the event of flood or fire etc).
    - Canyonleigh Road between the entrance to the Project Area and the Brayton Road/Canyonleigh Road intersection will be resurfaced as required prior to the Project construction phase.
    - Minor works will also be undertaken at the Brayton Road / Canyonleigh Road intersection to incorporate a basic right (BAR) turn treatment on the southern Brayton Road approach to the current configuration of the intersection. The proposed works will utilise the existing width provided by the wide shoulder on the western side of the southern Brayton Road approach to the intersection and detailed design will be subject to further consultation with Council.
- Temporary construction infrastructure – to facilitate construction and likely to include laydown and storage areas and site offices.
- Security fencing – to prevent unauthorised access to the Project and guard high voltage or dangerous equipment.
- Two transmission line options are being investigated, to allow for optionality during the assessment process and greater flexibility in the connection design. Only one transmission option will be constructed, the two options are being assessed separately.
- Temporary construction facilities including:
    - Construction compound/s with site office building(s).
    - On-site concrete batching plants for use during the construction phase.
    - Laydown areas used for installation and storage of BESS components.

The Development Footprint extends across the southern side of the Project Area with a total area of 75.70 ha (**Figure 1.3**) with the indicative project components outlined in **Table 1.4.**

The Project would operate continuously, with a mix of remote and onsite monitoring and maintenance activities.

The Project is expected to operate for 35 years. After the initial operating period, the Project would either be decommissioned, removing all infrastructure, and returning the Project Area to pre-existing land use as far as practicable unless otherwise agreed with landowners and regulators.

Decommissioning would involve the mobilisation of a workforce and additional temporary facilities, and the subsequent removal of equipment and infrastructure. All infrastructure will be removed during decommissioning except for the transmission lines and substation unless stated otherwise in the development consent conditions. The decommissioning phase would be expected to last 12 months.

Table 1.4 BESS Project Components

Components / Infrastructure	Approximate dimensions	Quantity
BESS		
Footprint	Approximately 13.4 ha	-
Capacity	350 MW (AC or DC coupled) and will have provision for up to four (4) hours of storage (1,400 MWh),	
Switching Site Substation	Area of 6 ha. Voltage step up of 33 kV electricity to 132 kV or 330 kV.	-
Ancillary Infrastructure		
Collector (on-site) substation	6 ha	1
Inverters	248, 4,200 MVA inverters (subject to tender)	85
Overhead transmission lines (high to low voltage)	Up to 7 km of internal overhead cables	2 options
Underground transmission cables (medium to low voltage)	Approximately 5 km	n/a
Internal access tracks	Approximately 5 km of new and/or upgraded access tracks (subject to detailed design)	n/a
Primary site access point	Canyoneleigh Road - subject to intersection design	1
Operations and maintenance facility	100 m x 80 m	1
Communication mast	Up to 80 m high	1
Research Test Bed Facility	2 ha	1
Temporary Construction Facilities		
Construction site compounds, including: construction laydown areas for equipment and supplies concrete batching plants construction compounds, site office, security compound, vehicle washdown, etc	100 m x 100 m	up to 3

1.4.4 Project Site Selection and Biodiversity Design Considerations

The following design considerations have been factored into the selection of the Development Footprint and biodiversity impact avoidance:

- The Project Area was selected for the location of a BESS due to the proximity of the Marulan substation and existing 132 kV and 330 kV transmission lines, which means that there will be no requirement for new large scale electricity transmission lines or associated impacts.
- The Project Area (6,274.04 ha) has provided flexibility in design to prioritise avoidance of high value biodiversity areas, and the subject land has been already impacted by widespread clearing and ongoing pasture improvement works for agricultural use.

Throughout the EIS preparation and scoping phases of the Project, several design refinements have occurred including:

- The BESS has been located in the areas of degraded grassland within negligible biodiversity value. Ancillary facilities, access tracks and transmission lines have been located in existing cleared land and minimised impacts to TECs, intact woodland and habitat for threatened species were practicable.
- Optimising opportunities to maintain connectivity between the Project Area and surrounding areas of intact native vegetation.
- Redesign of the Project to minimise impacts on areas of intact native woodland and habitats containing hollow bearing trees which reduced impacts to suitable foraging and/or breeding habitat for the gang-gang cockatoo (*Callocephalon fimbriatum*), south-eastern glossy black-cockatoo (*Calyptorhynchus lathami lathami*), squirrel glider (*Petaurus norfolcensis*), diamond firetail (*Stagonopleura guttata*), dusky woodswallow (*Artamus cyanopterus*), scarlet robin (*Petroica boodang*), large-eared pied bat (*Chalinolobus dwyeri*), speckled warbler (*Chthonicola sagittata*), spotted harrier (*Circus assimilis*) and varied sittella (*Daphoenositta chrysoptera*).
- Alteration of the Project to avoid impacts to planted individuals of Paddy's River box (*Eucalyptus macarthurii*) and narrow-leaved peppermint (*Eucalyptus nicholii*).
- Reduction of the Development Footprint to avoid impacts to areas of PCT 3373 Goulburn Tableland Box-Gum Grassy Forest (which is associated with 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 and EPBC Act).
- Reduction of the Development Footprint to avoid all impacts to areas of PCT 3643 Bungonia Tableland Silvertop Ash-Stringybark Forest which comprises good condition native vegetation.
- Reduction and alteration of the Development Footprint to minimise impacts to areas of the White Box - Yellow Box - Blakely's Red Gum Grassy Woodland and Derived Native Grassland CEEC. This included impact avoidance measures targeted at retaining areas of woodland with intact crown condition, areas of scattered trees and higher quality derived native grassland condition zones.
- Reduction of the Development Footprint to avoid riparian areas and dams with emergent vegetation that may provide habitat for threatened species.

1.4.5 Other Documentation

Other information sources relied upon are referenced in the text and are listed in the References Section of this Report (**Section 12.0**).

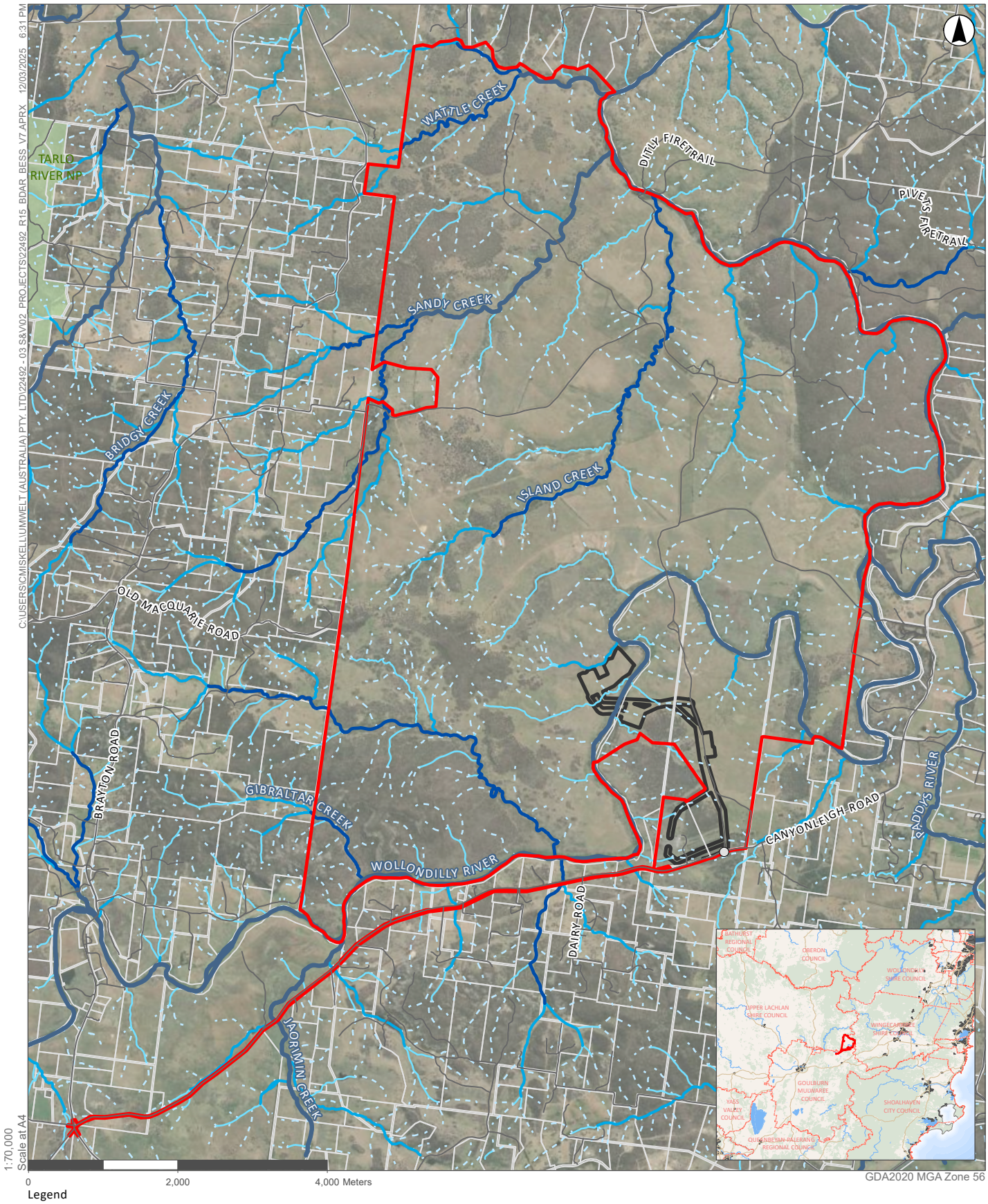
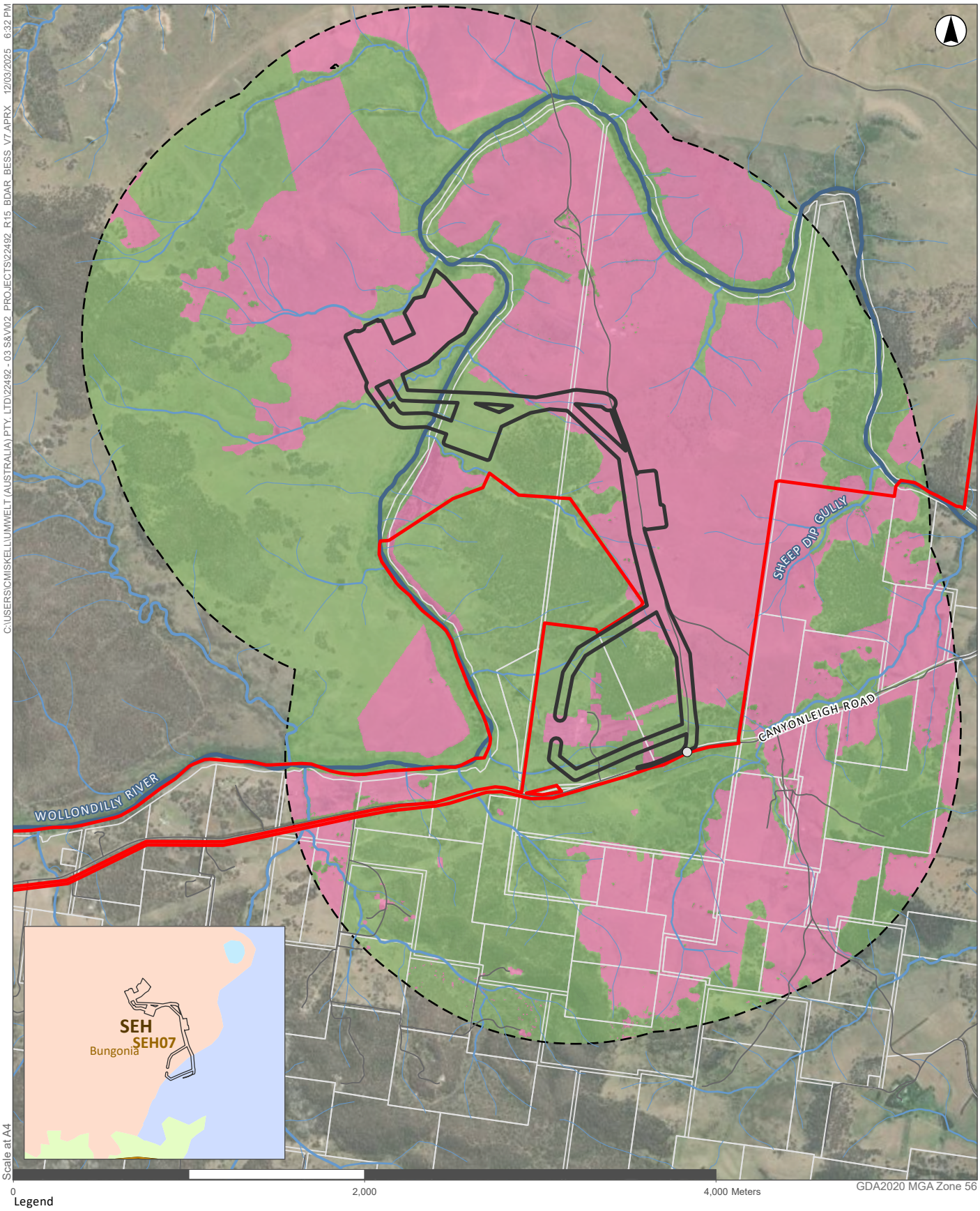


FIGURE 1.1

Site Map

Image Source: ESRI Basemap (2024) **Data source:** NSW LPI (2024), NSW DSFI (2024)



Legend

- Project Area
- Development Footprint
- 1500m Buffer Area (Total extent = 2112.39ha)
- Property Boundaries
- Existing Roads and Tracks
- Access Points

Stream Order

- 1
- 2
- 3
- 4
- > 5

- Native Vegetation Extent (1161.61ha, 54.99% of Assessment Area)
- Non-Native/Category 1- Exempt land (950.78ha, 45.01% of Assessment Area)

- IBRA Sub-Regions
- IBRA Regions

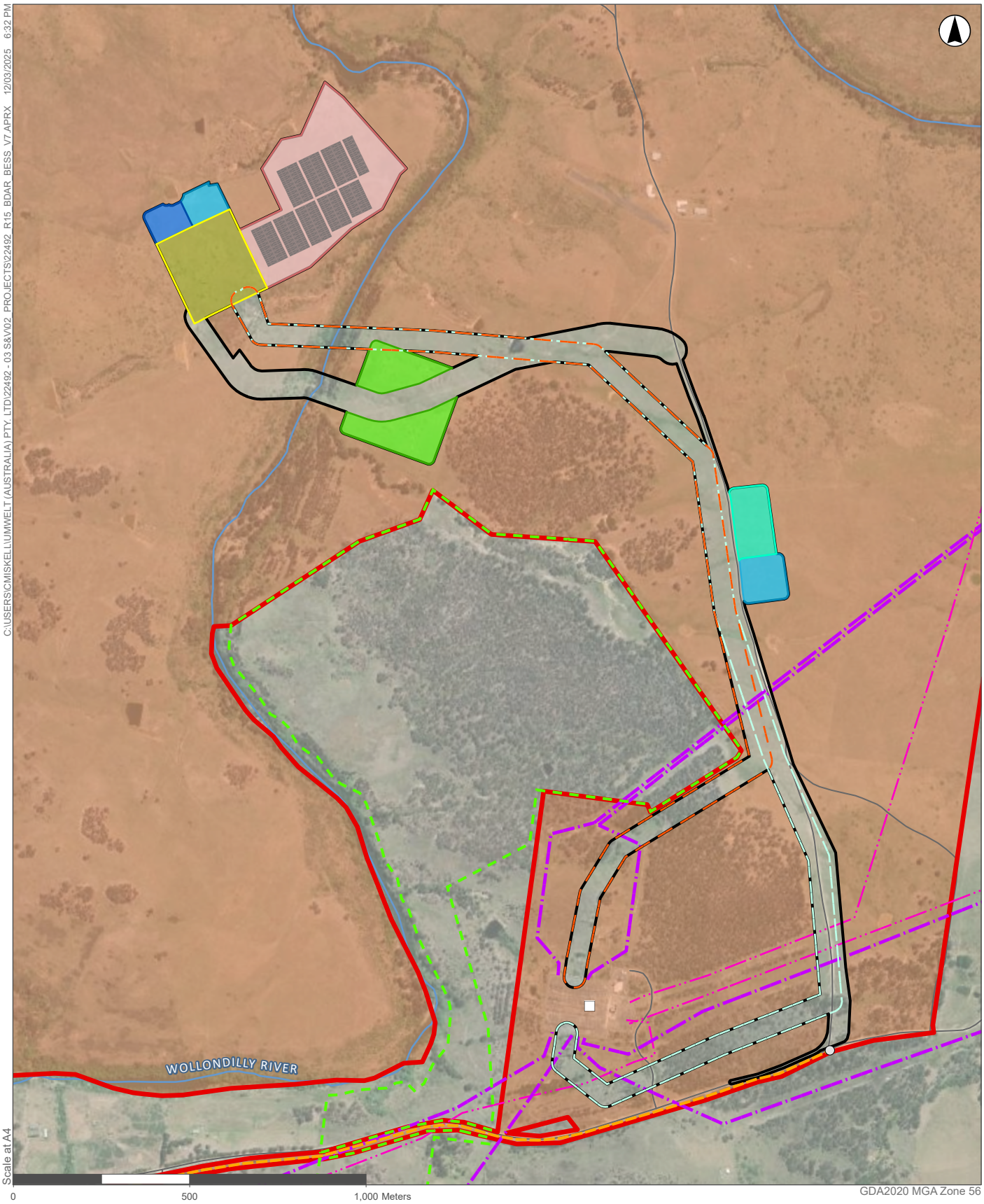
Mitchell Landscapes

- But
- Mvh
- Rbb
- Wbg

FIGURE 1.2

Location Map

Image Source: ESRI Basemap (2024) **Data source:** NSW LPI (2024), NSW DSFI (2024)



Legend

- Project Area
- Approved Marulan Gas-Fired Power Station SSI Project
- Watercourse
- Existing Roads and Tracks
- Existing Substation

Existing Transmission Lines

- 330kV
- 132kV

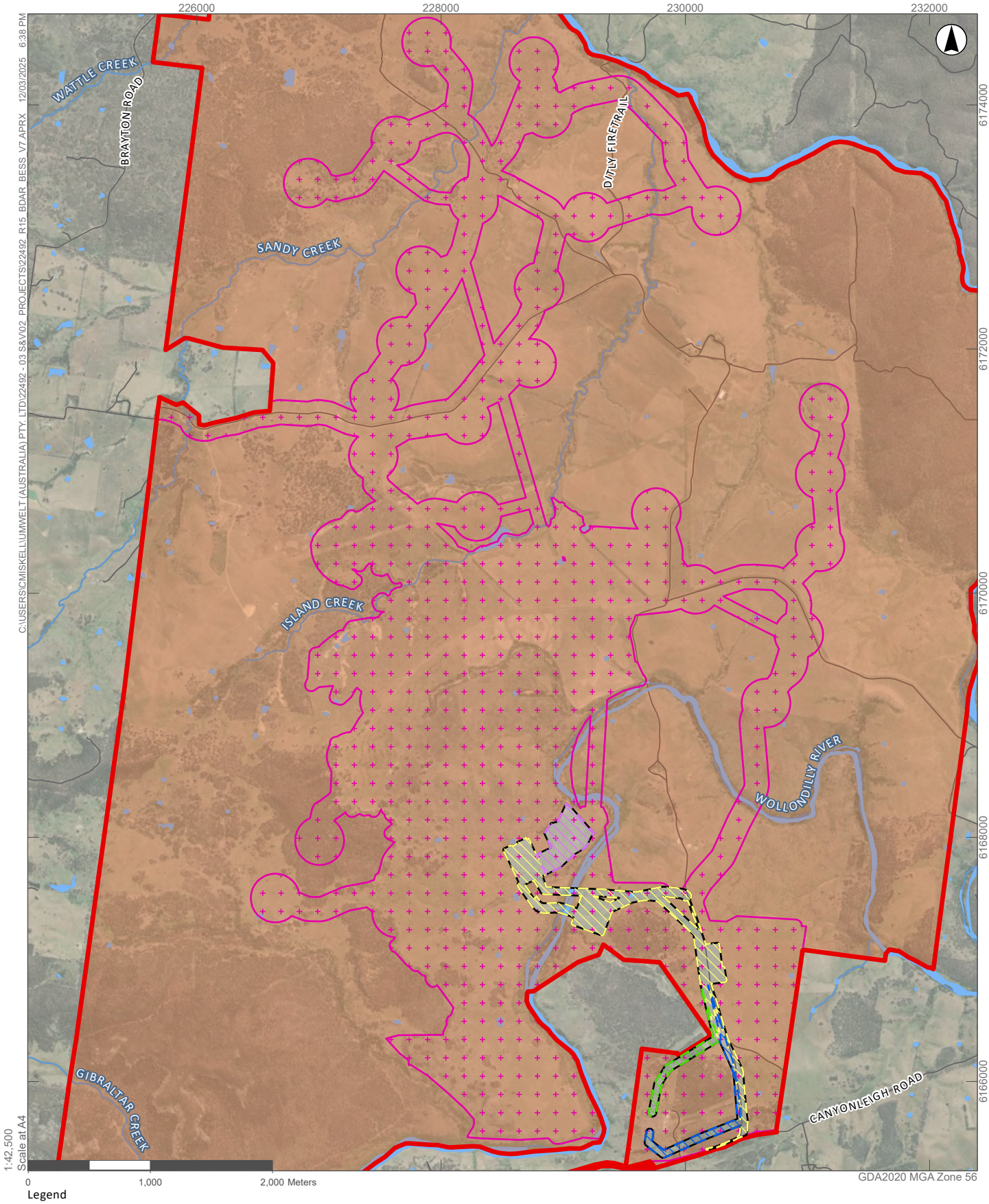
- Development Footprint
- Retained / Impact Avoidance Areas
- BESS Layout - Trina
- Proposed Transmission Line Option 1 Easement
- Proposed Transmission Line Option 2 Easement
- BESS Investigation Area
- Construction Compound
- Laydown Area
- O&M Facility
- Substation

- Test Bed
- Access Road Works
- Access Points

FIGURE 1.3

Development Layout

Image Source: ESRI Basemap (2024) **Data source:** NSW LPI (2024), NSW DSFI (2024)



Legend

- Project Area
- Waterbodies
- Watercourse
- Existing Roads and Tracks
- Development Footprint
- Retained / Impact Avoidance Areas
- Biodiversity Study Area

Development assessment zones

- Common Ancillary Features
- BESS
- Transmission Line - Option 1
- Transmission Line - Option 2

FIGURE 1.4

Development Assessment Zones

Image Source: ESRI Basemap (2024) **Data source:** NSW LPI (2024), NSW DSFI (2024), Umwelt (2024)

1.5 Statutory Considerations

Commonwealth and State legislation relevant to this BDAR is described in **Table 1.5.**

Table 1.5 Legislation Relevant to the Project

Relevant Legislation	Governing Agency	Summary
Commonwealth Legislation		
Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act)	Commonwealth Department of Climate Change, Energy, the Environment and Water (Commonwealth DCCEEW)	The EPBC Act is the Commonwealth Government's primary piece of environmental legislation and is administered by the Commonwealth DCCEEW. It is designed to protect national environmental assets, known as MNES, including threatened species of flora and fauna, threatened ecological communities, and migratory species, as well as other protected matters. It defines the categories of threat for threatened flora and fauna, identifies key threatening processes and provides for the preparation of recovery plans for threatened flora, fauna, and communities. Actions (projects) that significantly impact MNES are controlled actions under the EPBC Act. The significance of the impact of the project on MNES can be determined through self-assessment using *Significant Impact Guidelines 1.1 – Matters of National Environmental Significance* (Department of the Environment (DoE), 2013). A referral is required for actions that are likely to have a significant impact on nationally listed threatened species, TECs, and migratory species. The Project was referred to Commonwealth DCCEEW and was determined on 19 November 2024 to be a controlled action (EPBC 2024/09970) as likely to have a significant impact on listed threatened species and communities as listed under the EPBC Act. The referral decision notified that the Project, will be assessed under the assessment Bilateral Agreement between the Commonwealth and NSW, which will then be used to inform the Commonwealth Environment Minister's determination. The Supplementary SEARs issued on 12 December 2024 (refer to **Table 1.2**) set out the requirements to be considered for MNES.

Relevant Legislation	Governing Agency	Summary
NSW Legislation		
Environmental Planning and Assessment Act 1979 (EP&A Act)	NSW Department of Planning, Housing and infrastructure (DPHI)	The EP&A Act is the overarching planning legislation in NSW that provides for the creation of planning instruments that guide land use. The EP&A Act also provides for the protection of the environment, including the protection and conservation of native animals and plants. This includes threatened species, populations and ecological communities, and their habitats of biodiversity values, as listed in the NSW BC Act and NSW *Fisheries Management Act 1994* (FM Act). Section 4.36 of the EP&A Act provides for the declaration of a project as SSD. Under the EP&A Act, the declaration of a project as SSD can be made by meeting the requirements of a SEPP or by the Minister for Planning. The Planning Systems SEPP (Schedule 1, Clause 20) prescribes that development for the purpose of 'electricity generating works' that has an estimated development cost (EDC) of more than $30 million is SSD. The Project has a capital investment value of greater than $30 million and therefore is classified as a SSD. The Project will be assessed under Part 4 Division 4.7 section 4.36 of the EP&A Act. The Minister for Planning is the consent authority for SSD. The Minister (or the Minister's delegate) is required to take into consideration the matters listed under section 4.15 of the EP&A Act when determining the Development Application (DA). Under Division 4.7 section 4.39 of the EP&A Act, an EIS is required to accompany a development application that has been determined as SSD. The proponent is required to consult with the Secretary of DPHI, with regard to the matters to be addressed in the EIS. These are referred to as the SEARs. The SEARs for the Project were issued by DPHI on 22 December 2023. Broadly, the SEARs require biodiversity impacts related to all stages of a proposal to be assessed in accordance with section 7.9 of the BC Act and documented in a BDAR. The SEARs and where this BDAR addresses each requirement pertaining to biodiversity are summarised in **Table 1.1.**
Biodiversity Conservation Act 2016 (BC Act)	Biodiversity Conservation and Science Division (BCS), Environment and Heritage of NSW DCCEEW	The BC Act and its supporting regulations commenced on 25 August 2017. The BC Act sets out the environmental impact assessment framework for threatened species, TECs and Areas of Outstanding Biodiversity Value (formerly critical habitat) for Major Projects, Part 5 activities, and local development. The BC Act provides a framework to avoid, minimise and offset the impacts of proposed development and established a methodology for assessing the likely impacts on biodiversity values and calculating measure to offset those impacts (the BAM). Section 7.9 of the BC Act requires that SSDs under Part 4 of the EP&A Act that trigger the Biodiversity Offset Scheme (BOS) must be accompanied by a BDAR prepared by an accredited assessor in accordance with the BAM.

Relevant Legislation	Governing Agency	Summary
Biodiversity Conservation Regulation 2017 (BC Regulation)	BCS	The BC Regulation commenced on 25 August 2017. The object of the BC Regulation is to make provision for matters that are required or authorised to be prescribed as a consequence of the enactment of the BC Act. The BC Regulation provides the thresholds which trigger the BOS, the principles for consideration of SAII to biodiversity, rules for meeting a biodiversity offset obligation, biodiversity certification criteria, additional biodiversity impacts to which the scheme applies and compliance provisions for unauthorised clearing and accredited assessors. This BDAR has been prepared in accordance with the provisions of the BC Regulation.
Fisheries Management Act 1994 (FM Act)	Department of Primary Industries and Regional Development (DPIRD)	The objectives of the FM Act are to conserve, develop and share the fishery resources of NSW for the benefit of present and future generations. More detailed objectives relevant to the Project include: • to conserve fish stocks and key fish habitats • to conserve threatened species, populations and ecological communities of fish and marine vegetation • to promote ecologically sustainable development, including the conservation of biological diversity. An Aquatic Assessment which includes an assessment of the likely impacts on listed aquatic threatened species, populations and ecological communities under the FM Act is provided in **Appendix E**.
Biosecurity Act 2015	DPI	The *Biosecurity Act 2015* (Biosecurity Act) replaced the *Noxious Weeds Act 1993* on 1 July 2017. The primary object of this Act is to provide a framework for the prevention, elimination and minimisation of biosecurity risks posed by biosecurity matter, dealing with biosecurity matter, carriers and potential carriers, and other activities that involve biosecurity matter, carriers or potential carriers. This Act outlines the requirements of government, councils, private landholders, and public authorities in the management of biosecurity matters, including priority weeds. Priority weeds are regulated under the Biosecurity Act with a general biosecurity duty to prevent, eliminate or minimize any biosecurity risk they may pose. Some priority weeds have additional management obligations which may apply generally, or under specific circumstances. Any person who deals with any plant, who knows (or ought to know) of any biosecurity risk, has a duty to ensure the risk is prevented, eliminated or minimised as is reasonably practicable.

Relevant Legislation	Governing Agency	Summary
Local Land Services Act 2013 (LLS Act)	Local Land Services (LLS)	The LLS Act, supported by the Local Land Services Regulation 2014 (LLS Regulation), established 11 regional Local Land Services organisations to provide biosecurity, natural resources management and agricultural advisory services. Under Part 5A of the LLS Act and the supporting regulation, a Native Vegetation Regulatory (NVR) map showing the extent of categorised land in NSW has been published by the Environment Agency Head (EAH). The NVR map underpins the legislative framework for native vegetation clearing in rural areas by categorising land in NSW. However, the map applies only to the following zones (if they are not in an excluded LGA): Zone RU1 Primary Production, Zone RU2 Rural Landscape, Zone RU5 Primary Production Small Lots and Zone RU6 Transition. The staged release of the draft NVR map is now complete. The draft NVR map viewer currently displays Excluded Land, Category 1 – Exempt Land, Category 2 – Vulnerable Land, Category 2 – Sensitive Land, and Category 2 – Regulated Land. As the draft map does not have legal effect; landholders and proponents must still determine if their land is Category 1 or Category 2 under the LLS Act. A Category 1 Land Assessment report has been prepared (Umwelt 2024) to assess the Land Categorisation of the Project Area. Portions of the Development Footprint have been mapped as Category 1 – Exempt Land on the Draft Native Vegetation Regulatory map and have been confirmed during the field surveys. The results of the Category 1 land Assessment Report are provided in **Section 1.8.** The BAM does not need to be applied to land mapped as Category 1 – Exempt Land, other than for assessment of prescribed impacts. BCS have also included identified in the SEARs that '*site-based floristic assessment is required to verify the presence or absence of critically endangered ecological communities (CEECs), critically endangered plants, threatened grasslands and threatened fauna, in order to confirm at the site scale whether the criteria for Category 1 – Exempt Land is met*'. It is noted that threatened grasslands other than CEECs and threatened fauna are not relevant considerations to the determination of Category 1 – Exempt Land.
State Environmental Planning Policy (Biodiversity and Conservation) 2021	DPHI, BCS	SEPP (Biodiversity and Conservation) 2021 commenced in March 2022 and includes a number of previous planning policies including Koala Habitat Protection 2019 and Koala Habitat Protection 2021, Chapter 3 and 4, respectively. Schedule 2 identifies that the provisions of chapters 3 and 4 apply in the Upper Lachlan LGA. For all RU1 (Primary Production), RU2 (Rural Landscape) or RU3 (Forestry) zoned land outside of the Sydney Metropolitan Area and Central Coast, Chapter 3 Koala Habitat Protection 2020 applies. Chapter 3 aims to encourage the proper conservation and management of areas of natural vegetation that may provide habitat for Koalas to ensure a permanent free-living population over their present range and reverse the current trend of Koala population decline. This is to be achieved through identifying areas of core Koala habitat, including these areas in environment protection zones and where required managing development consent in relation to areas of core koala habitat. A description of koala habitat within the Development Footprint is provided in **Section 5.7**.

1.6 Biodiversity Offsets Scheme Entry

The NSW BOS applies to all SSD Projects and the SEARs received for the Project require a BDAR to be prepared as part of the EIS documentation, in accordance with Section 7.9 of the BC Act.

1.7 Biodiversity Values Map and BioNet Records

The Development Footprint includes mapped Biodiversity Values areas on the Biodiversity Values Map, as shown in **Figure 1.6**. BioNet Records for the Project Area and the 1,500 m Assessment Area are also mapped in **Figure 1.5.**

1.8 Excluded Impacts – NVR Mapping

The BC Act (at Clause 6.8(3)) specifies that the BAM is to exclude the assessment of the impacts of any clearing of native vegetation and loss of habitat on Category 1 – Exempt Land (as defined in Part 5A of the LLS Act), other than prescribed impacts (as defined in clause 6.1 of the BC Regulation).

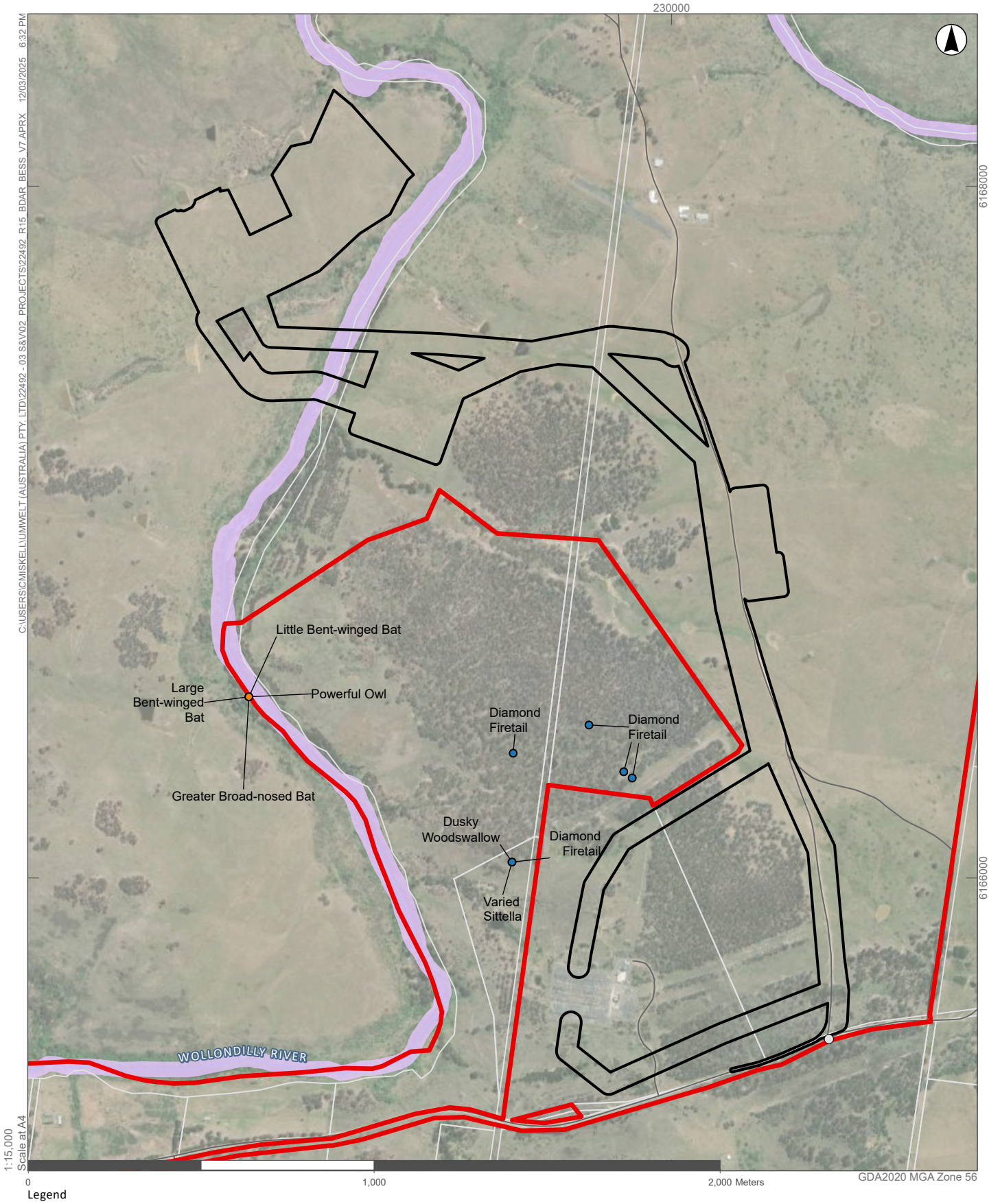
The staged release of the draft NVR map which commenced in October 2022 is now complete and available for all areas of New South Wales. Large areas of the Development Footprint have been mapped as Category 1 – Exempt Land on the draft NVR map, as shown in **Figure 1.6**. These areas have been ground-truthed during the field surveys and the results assessed and incorporated into the PCT mapping considerations for the Project. Areas confirmed as Category 1 – Exempt Land do not require impact assessment or offset calculations relating to vegetation integrity and habitat suitability under the BAM.

During December 2022, the NSW DPE released the guide "*Determining native vegetation land categorisation for application in the Biodiversity Offsets Scheme*". This document updated the NSW Government's advice on Category 1 – Exempt Land mapping and CEECs, and provides advice that CEECs and critically endangered species of plants are designated as Category 2 – sensitive regulated land (clause 108(2)(b), LLS Regulation), and that a complete a site-based floristic assessment is required to confirm the presence or absence of CEECs and/or critically endangered plants for any reasonable assessment of NVR map land category. The LLS Act identifies that Category 1 - Exempt Land excludes land mapped by the EAH as land containing a CEEC or critically endangered species of plants under the BC Act.

During detailed desktop and field assessments Umwelt identified areas of the CEEC, 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, within some areas identified in the draft NVR as Category 1 – Exempt land within the Development Footprint. These areas were primarily composed of highly degraded grazing paddocks and Derived Native Grassland (DNG) of varying condition.

For the purposes of this assessment, areas of derived native grassland that meet the final determination of the White Box – Yellow Box – Blakeley's Red Gum Woodland and Derived Native Grassland CEEC listed under the BC Act, have been considered Category 2 – Sensitive Land in the PCT mapping prepared for this BDAR and were subject to targeted threatened species surveys in accordance with the BAM.

No critically endangered species of plants were observed within Category 1 – Exempt Land and it is considered that these areas generally do not provide suitable habitat for critically endangered species of plants based on PCT associations and condition zones observed.



Legend

- Project Area
- Development Footprint
- Property Boundaries
- Watercourse
- Existing Roads and Tracks
- Access Points

Biodiversity Values Map (v16.11)

- Biodiverse riparian land

Bionet Records - Fauna

- Diamond Firetail (*Stagonopleura guttata*)
- Dusky Woodswallow (*Artamus cyanopterus*)
- Greater Broad-nosed Bat (*Scoteanax rueppellii*)
- Large Bent-winged Bat (*Miniopterus orianae oceanensis*)
- Little Bent-winged Bat (*Miniopterus australis*)
- Powerful Owl (*Ninox strenua*)
- Varied Sittella (*Daphoenositta chrysoptera*)

FIGURE 1.5

Biodiversity Values Map

Image Source: ESRI Basemap (2024) **Data source:** NSW LPI (2024), NSW DSFI (2024), NSW DPE (2024)



Legend

- Project Area
- Development Footprint
- Property Boundaries
- Watercourse
- Existing Roads and Tracks
- Access Points

Draft native vegetation regulatory map

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

FIGURE 1.6

Draft Native Vegetation Regulatory Map

Image Source: ESRI Basemap (2024) **Data source:** NSW LPI (2024), NSW DSFI (2024), NSW DPIE (2024)

1.9 Matters of National Environmental Significance

The Project was referred to the Commonwealth DCCEEW who determined that the Proposed Action would be a Controlled Action and require approval under the EPBC Act (EPBC 2024/09970). The determination states that the Proposed Action (the Project) is likely to have a significant impact on listed threatened species and communities (sections 18 and 18A of the EPBC Act), specifically the Proposed Action is likely to have a significant impact on:

- White Box-Yellow Box-Blakley's Red Gum Grassy Woodland and Derived Native Grassland – critically endangered ecological community
- gang-gang cockatoo (*Callocephalon fimbriatum*) – Endangered
- diamond firetail (*Stagonopleura guttata*) – Vulnerable.

The determination considers that other species 'known' or 'likely' to occur for which suitable habitat may be present, may be significantly impacted include:

- swift parrot (*Lathamus discolor*) – Critically Endangered
- regent honeyeater (*Anthochaera phrygia*) – Critically Endangered
- south-eastern hooded robin (*Melanodryas cucullata cucullata*) – Endangered
- greater glider (southern and central) (*Petauroides volans*) – Endangered
- koala (combined populations of Queensland, New South Wales and the Australian Capital Territory) (Phascolarctos cinereus) – Endangered
- large-eared pied bat (*Chalinolobus dwyeri*) – Endangered
- Key's matchstick grasshopper (*Keyacris scurra*) – Endangered
- brown treecreeper (south-eastern) (*Climacteris picumnus victoriae*) – Vulnerable
- painted honeyeater (*Grantiella picta*) – Vulnerable
- yellow-bellied glider (south-eastern) (*Petaurus australis australis*) – Vulnerable
- pink-tailed worm-lizard (*Aprasia parapulchella*) – Vulnerable.

The Project will be assessed under the NSW Bilateral Agreement and the Commonwealth Government will be the decision-maker for whether the Project will be approved under the EPBC Act.

Nationally listed threatened species, TECs and migratory species have been considered and assessed as part of this BDAR and an EPBC Act Assessment is provided in **Appendix A,** which has identified that there are likely to be significant impacts to:

- gang-gang cockatoo *(Callocephalon fimbriatum)* – Endangered
- White Box-Yellow Box-Blakley's Red Gum Grassy Woodland and Derived Native Grassland – critically endangered ecological community.

The following MNES have been recorded in the Project Area, but it is considered that a significant impact is unlikely to occur as a result of the proposed works:

- Vulnerable Species: diamond firetail (*Stagonopleura guttata*), large-eared pied bat (Chalinolobus dwyeri) and south-eastern glossy black-cockatoo (*Calyptorhynchus lathami lathami lathami*).

1.10 Information Sources

The following guidance documents and resources relevant to the preparation of this BDAR were reviewed:

- Biodiversity Assessment Method (NSW DPIE 2020a).
- Biodiversity Assessment Method Operational Manual – Stage 1, Stage 2 (NSW DPIE 2022a, 2023).
- Biodiversity Assessment Method Calculator User Guide (NSW DCCEEW 2024a).
- NSW BioNet including the BioNet Atlas, BioNet Vegetation Database and Threatened Species Data Collection (TBCD) (NSW DCCEEW 2024b).
- Guidance for the Biodiversity Development Assessment Report Template (including the template) (NSW DPE 2022a).
- Marulan Gas Turbine Facilities Environmental Assessment Joint Concept Application Appendix F – Flora and Fauna Assessment (URS Australia 2008).

Other information sources relied upon are referenced in the text and are listed in the References Section of this report (**Section 12.0**).

2.0 Methods

2.1 Site Context Methods

2.1.1 Landscape Features

As detailed in Section 3 of the BAM (NSW DPIE 2020a), a landscape assessment for the Project is required, which was initially conducted as a desktop assessment and confirmed during the field surveys (where practicable). The following landscape and site context features in **Table 2.1** were identified for the Assessment Area (1,500 m buffer) in accordance with Section 3 of the BAM (NSW DPIE 2020a) from analysis and reference to available spatial information.

Table 2.1 Landscape Features Assessed and Data Sources

Landscape and Site Context Features	Data Source
IBRA Bioregions	NSW Interim Biogeographic Regions of Australia Version 7 (Australian Government Department of the Environment and Energy 2018)
IBRA Subregions	NSW Interim Biogeographic Regions of Australia Version 7 (Australian Government Department of the Environment and Energy 2018)
NSW Mitchell Landscapes	NSW (Mitchell) Landscapes Version 3.1 (NSW OEH 2017b)
Native Vegetation extent within designated assessment buffer area (1500 m)	Aerial Imagery
Patch Size	Aerial Imagery
Cleared Areas	Aerial Imagery
Rivers and Streams (classified according to stream order)	NSW Hydrography
Estuaries and wetlands	Directory of important wetlands in Australia
Connectivity Features	Aerial imagery
Karst, caves, cliffs, rocks and other geological features of significance	Aerial imagery and topographic maps
Areas of outstanding biodiversity value	Areas of Outstanding Biodiversity Value Register

2.2 Native Vegetation, Threatened Ecological Communities and Vegetation Integrity Methods

2.2.1 Review of Existing Information

The following existing information was reviewed to inform the identification of PCTs in **Section 4.2** and TECs in **Section 4.3**:

- NSW State Vegetation Type Map Edition C2.0M2.0. (NSW DCCEEW 2022).

- NSW BioNet including the BioNet Atlas, BioNet Vegetation Database and Threatened Species Data Collection (TBCD) (NSW DCCEEW 2024b) – accessed 25/09/2024.
- Notice and Reason for the Final Determination for the White Box – Yellow Box – Blakely's Red Gum Grassy Woodland and Derived Native Grassland critically endangered ecological community (NSW Threatened Species Scientific Committee (TSSC) 2020a).
- Conservation Assessment of White Box – Yellow Box – Blakely's Red Gum Grassy Woodland and Derived Native Grassland (NSW TSSC 2020b).
- EPBC Act Policy Statement 3.5 – White Box – Yellow Box – Blakely's Red Gum grassy woodlands and derived native grasslands (DoEH 2006a).
- White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland Ecological Community Species List (DoEH 2006b).
- Commonwealth Listing Advice on White Box – Yellow Box – Blakely's Red Gum Grassy Woodland and Derived Native Grassland (DoEH 2006c).

2.2.2 Mapping Native Vegetation Extent

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

- Review of aerial imagery to assess vegetation distribution patterns as dictated by change in canopy texture, tone, and colour, as well as topography.
- Review of the modelled distribution of vegetation communities (State Vegetation Type Map Edition C2.0M2.0. (NSW DCCEEW 2022)) within broader scale regional based vegetation mapping State Vegetation Type Map Edition C2.0M2.0. (NSW DCCEEW 2022).
- Preparation of a draft PCT map based on interpretation of digital aerial imagery.
- Field-based ground-truthing of the draft PCT mapping.
- Confirmation of vegetation community floristic delineations based on plot data.

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

The extent of native ground-cover vegetation within offsite areas where a canopy of native trees was absent, was estimated based on the draft NVR map to identify areas of Category 1 land which is likely to include areas of cultivation and fence boundaries. Native vegetation extent mapping offsite is broad-scale and completed for the purposes of estimation of native vegetation cover under the BAM (NSW DPIE 2020a).

2.2.3 Plot-Based Vegetation Survey

Stratified plot-based vegetation surveys were completed to assess vegetation composition, structure, function, enable calculation of the vegetation integrity scores for Vegetation Condition Zones, sample areas of expected environmental variation and verify the results of previous mapping and available site information. Each plot survey consisted of a 20 m x 20 m plot nested within a larger 20 m x 50 m plot. The plot data was collected in accordance with Sections 4.2.1 and Section 4.3.4 of the BAM.

The following was recorded for each plot:

- Unique plot reference
- Plot GPS coordinates (easting and northing)
- Date of the survey
- Name of field surveyors
- Bearing along a 50 m transect through the plot
- Physiographic features that may assist in PCT identification such as slope, aspect and soil characteristics
- Signs of disturbance
- Photographs of the vegetation
- For the nested 20 m x 20 m / 400 m^2 floristic plot all required vegetation composition and structure variables were recorded including:
    - Full species name for all native and exotic flora species (where sufficient diagnostic material was present)
    - Foliage cover recorded as a percentage for all alive and dead flora species rooted within and overhanging the boundaries of the plot
    - Abundance rating for all flora species rooted within the plot
    - All vascular plants recorded within floristic plots were identified using keys and nomenclature in PlantNet NSW Flora Online Identification Keys (The Royal Botanic Gardens and Domain Trust 2024).

For the 20 m x 50 m plot all required vegetation function values were recorded including:

- Tree stem size class (presence/absence or estimated abundance).
- Tree regeneration (presence/absence).
- Combined length of all individual fallen logs ≥10 cm diameter and ≥50 cm in length.
- Hollow bearing trees (number of trees rooted in the plot with hollows ≥5 cm wide).

- Litter cover (all plant material that had detached from a plant and located on the ground surface) assessed as the average percentage cover of five 1 m^2 sub-plots spaced at 10 m intervals alternating either side of the plot midline.
- Number of large trees with a DBH ≥ the large tree benchmark for the PCT.

At each plot, approximately 45 to 60 minutes was spent searching and recording all vascular flora species present within each strata of the 20 m x 20 m floristic plot. Searches were generally undertaken through parallel transects from one side of the plot to another. An effort was made to search the tree canopy and tree trunks for mistletoes, vines, and epiphytes where present.

Plot locations were selected to ensure that they captured attributes relevant to each vegetation condition zone, to provide a representative assessment of the vegetation integrity of the vegetation condition zone, accounting for the level of variation in the broad condition state of the vegetation condition zone. Subsequent amendments to the development footprint during the design process to avoid impacts to biodiversity values have resulted in some plots being located outside, but still adjacent to and representative of PCTs within the Development Footprint.

The BAM plots were sampled by Umwelt ecologists on the following dates:

- 7 – 11 November 2022
- 21 – 25 August 2023
- 11 – 12 October 2023
- 18 – 19 December 2023
- 9 – 10 September 2024.

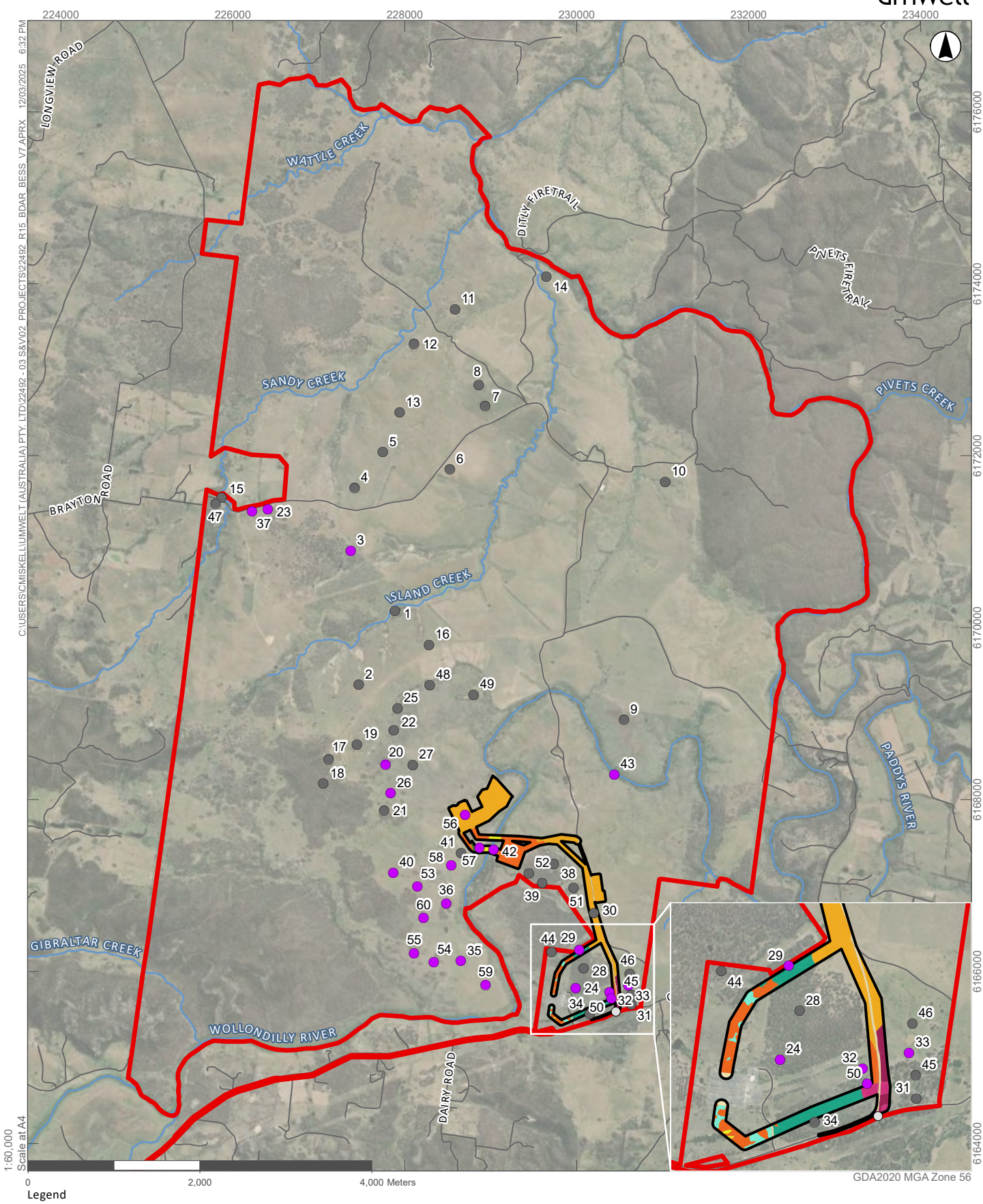
BAM plot survey stratification for each PCT are listed in **Table 2.2** and plot survey locations are mapped in **Figure 2.1**.

Table 2.2 Plant Community Types Survey Plot Stratification Details

Veg zone ID	PCT ID	PCT Name	Vegetation Condition Zone	Area (ha)	Quantity of Plots Required (BAM 2020 Table 3)	Plots utilised in assessment*/ Plots Completed	Plot ID
1	4063	Central and Southern Tableland River Oak Forest	Moderate – Degraded	2.05	2	2/2	22492_042 22492_043
2	3374	Goulburn Tableland Peppermint Grassy Forest	DNG-Moderate/ Degraded	19.25	3	8/10	22492_035 22492_040 22492_041 22492_046 22492_055 22492_060 P_22492_008 P_22492_26

Veg zone ID	PCT ID	PCT Name	Vegetation Condition Zone	Area (ha)	Quantity of Plots Required (BAM 2020 Table 3)	Plots utilised in assessment*/ Plots Completed	Plot ID
							P_22492_30 P_22492_32 P_22492_33
3	3374	Goulburn Tableland Peppermint Grassy Forest	DNG- low condition	1.18	1	6/6	22492_053 22492_054 22492_056 22492_057 22492_058 22492_059
4	3374	Goulburn Tableland Peppermint Grassy Forest	DNG – exotic dominated	42.95	4	8/8	P_22492_004 P_22492_005 P_22492_006 P_22492_007 P_22492_009 P_22492_013 P_22492_014 P_22492_27
5	3374	Goulburn Tableland Peppermint Grassy Forest	Moderate - Degraded	1.3	1	3/8	22492_036 22492_051 22492_38 P_22492_003 P_22492_011 P_22492_012 P_22492_020 P_22492_021
6	3374	Goulburn Tableland Peppermint Grassy Forest	Good - Moderate	4.12	2	2/4	P_22492_24 P_22492_28 P_22492_29 P_22492_34
7	3376	Southern Tableland Grassy Box Woodland	DNG	1.23	1	1/1	22492_037
8	3376	Southern Tableland Grassy Box Woodland	Good – Moderate	0.89	1	1/3	22492_045 22492_050 P_22492_31
9	0	Cleared/ Infrastructure	Non-Native	2.73	0	0/0	
			Totals	**75.70**	**15**	**31/ 60**	

*details of which plots were used in assessment provided in **Table 4.9.**



Legend

- Project Area
- Development Footprint
- Existing Roads and Tracks
- Watercourse
- Access Points
- BAM Plots (used in assessment)
- BAM Plots (not used in assessment)

Plant Community Types and Condition Zones

- Cleared/Infrastructure
- Dam

PCT 3374 - Goulburn Tableland Peppermint Grassy Forest

- DNG-Planted/Regen
- DNG-Moderate/Degraded
- DNG - Low Condition
- DNG - exotic dominated
- Good/Moderate
- Moderate/Degraded

PCT 3376 - Southern Tableland Grassy Box Woodland

- DNG
- Good/Moderate
- Moderate/Degraded

PCT 3347 - Southern tableland Creekflat Ribbon Gum Forest

- Moderate/Degraded

PCT 4063 - Central and Southern Tableland River Oak Forest

- Moderate/Degraded

FIGURE 2.1

Field Survey Locations – BAM Plot Locations

Image Source: ESRI Basemap (2024) **Data source:** NSW LPI (2024), NSW DSFI (2024), Umwelt (2024)

2.3 Threatened Flora Survey Methods

2.3.1 Review of Existing Information and Survey Guidelines

The following existing information sources and survey guidelines were reviewed to inform the threatened flora species surveys and assessment of habitat constraints and microhabitats:

- BAM Calculator (BAM-C) (available online to accredited BAM assessors) – BAM Data Version 80 (13/12/24).
- Threatened flora records held on the NSW BioNet Atlas of NSW Wildlife within 10 km of the Project Area (NSW DCCEEW 2024b) – accessed 25/09/2024.
- Surveying threatened plants and their habitats: NSW survey guide for the Biodiversity Assessment method (NSW DPIE 2020e).
- Threatened flora records predicted or know to occur within 10 km of the Project Area as shown on the Protected Matters Search Tool (PMST) (Commonwealth DCCEEW 2024) – date last accessed 11/09/2024.
- Habitat constraints listed in the Threatened Biodiversity Data Collection (TBDC) (NSW DCCEEW 2024a) – date last accessed 25/09/2024.
- Candidate threatened flora species in the BAM-C – date last accessed 12/13/2024.
- BAM Flora species with specific survey requirements spreadsheet (NSW DPIE 2020f).
- Threatened Biodiversity Survey and Assessment: Guidelines for Developments and Activities (Working Draft) (NSW DEC 2004).

2.3.2 BioNet Atlas and PMST Threatened Flora Records

Details of the threatened flora species recorded on the BioNet Atlas within 10 km of the Project Area, predicted to occur as per the PMST and BAM-C are summarised in **Table 2.3.**

An assessment of likelihood of occurrence is also provided using the following criteria:

- Known – species is known to occur within the Project Area.
- High– Suitable habitats which are known to support this species are present and the species is expected to occur within the Project Area based on observation or historical records.
- Moderate – Suitable habitats which are known to support this species are present within the development footprint and the species may occur (further surveys required).
- Low – Suitable habitats or microhabitats for this species are not present within the development footprint, or the development footprint is too disturbed to support this species, and the species is not known or likely to occur.

Species identified in BAM-C and species known to occur or with a high or moderate likelihood of occurrence have been included for further assessment within this Report.

Table 2.3 Threatened Flora Species Predicted to Occur in the Project Area (BAM-C, BioNet, PMST)

Scientific Name	Common Name	BC Status	EPBC Status	Number of Records	Source	Likelihood of Occurrence
Acacia clunies-rossiae	kanangra wattle	Vulnerable	Not listed	0	BAM-C	Low
Baloskion longipes	dense cord-rush	Vulnerable	Vulnerable	3	BioNet (NSW DCCEEW 2024b), PMST (Commonwealth DCCEEW 2024)	Low
Caladenia tessellata	thick lip spider orchid	Endangered	Vulnerable	0	PMST (Commonwealth DCCEEW 2024), SEARS (BSD 2023)	Low
Callitris oblonga	pygmy cypress pine	Vulnerable	Vulnerable	0	BAM-C	Low
Carex klaphakei	Klaphake's sedge	Endangered	Not Listed	1	BioNet (NSW DCCEEW 2024b), SEARS (BSD 2023)	Low
Commersonia prostrata	dwarf kerrawang	Endangered	Endangered	0	PMST (Commonwealth DCCEEW 2024), BAM-C	Low
Dillwynia glaucula	Michelago parrot-pea	Endangered	Not listed	0	BAM-C	Moderate
Diuris aequalis	buttercup doubletail	Endangered	Endangered	0	BAM-C	Moderate
Dodonaea procumbens	creeping hop-bush	Vulnerable	Vulnerable	0	PMST (Commonwealth DCCEEW 2024)	Low
Eucalyptus aggregata	black gum	Vulnerable	Vulnerable	5	BioNet (NSW DCCEEW 2024b), PMST (Commonwealth DCCEEW 2024), BAM-C	Low
Eucalyptus aquatica	broad-leaved sally	Vulnerable	Vulnerable	16	BioNet (NSW DCCEEW 2024b), PMST (Commonwealth DCCEEW 2024), SEARS (BSD 2023)	Low
Eucalyptus macarthurii	Paddys River box, Camden woollybutt	Endangered	Endangered	111	BioNet (NSW DCCEEW 2024b), PMST (Commonwealth DCCEEW 2024)	Recorded in Project Area, not in Development Footprint
Eucalyptus nicholii	narrow-leaved peppermint	Vulnerable	Vulnerable	0	Added in manually to the BAM-C	Recorded in Project Area, not in Development Footprint

Scientific Name	Common Name	BC Status	EPBC Status	Number of Records	Source	Likelihood of Occurrence
Eucalyptus recurva	Mongarlowe mallee	Critically Endangered	Critically Endangered	0	BAM-C, SEARS (BSD 2023)	Low
Galium australe	tangled bedstraw	Endangered	Not Listed	2	BioNet (NSW DCCEEW 2024b), SEARS (BSD 2023)	Low
Genoplesium baueri	Bauer's midge orchid	Endangered	Endangered	0	PMST (Commonwealth DCCEEW 2024)	Low
Genoplesium plumosum	Tallong midge orchid	Critically Endangered	Endangered	6	BioNet (NSW DCCEEW 2024b)	Low
Genoplesium superbum	superb midge orchid	Endangered	Not Listed	0	SEARS (BCS 2023)	Low
Gentiana wingecarribiensis	Wingecarribee gentian	Critically Endangered	Endangered	5	BioNet (NSW DCCEEW 2024b), PMST (Commonwealth DCCEEW 2024), SEARS (BSD 2023)	Low
Grevillea molyneuxii	Wingello grevillea	Vulnerable	Endangered	0	PMST (Commonwealth DCCEEW 2024)	Low
Grevillea renwickiana	Nerriga grevillea	Endangered	Not Listed	0	SEARS (BSD 2023)	Low
Grevillea raybrownii		Vulnerable	Not Listed	0	PMST (Commonwealth DCCEEW 2024)	Low
Haloragis exalata subsp. exalata	square raspwort	Vulnerable	Vulnerable	0	PMST (Commonwealth DCCEEW 2024)	Low
Helichrysum calvertianum	-	Vulnerable	Not Listed	1	BioNet (NSW DCCEEW 2024b), PMST (Commonwealth DCCEEW 2024)	Low
Kunzea cambagei	cambage kunzea	Vulnerable	Vulnerable	4	BioNet (NSW DCCEEW 2024b), PMST (Commonwealth DCCEEW 2024)	Low
Leucochrysum albicans* var. *tricolor	hoary sunray	Endangered	Endangered	9	BioNet (NSW DCCEEW 2024b), PMST (Commonwealth DCCEEW 2024), BAM-C	High
Persicaria elatior	tall knotweed	Vulnerable	Vulnerable	0	PMST (Commonwealth DCCEEW 2024)	Low
Persoonia hirsuta	hairy geebung	Endangered	Endangered	0	PMST (Commonwealth DCCEEW 2024)	Low
Persoonia mollis* subsp. *revoluta	-	Vulnerable	Not Listed	75	BioNet (NSW DCCEEW 2024b), PMST (Commonwealth DCCEEW 2024)	Moderate

Scientific Name	Common Name	BC Status	EPBC Status	Number of Records	Source	Likelihood of Occurrence
Persoonia oxycoccoides	-	Endangered	Endangered	6	BioNet (NSW DCCEEW 2024b), PMST (Commonwealth DCCEEW 2024)	Low
Phyllota humifusa	dwarf phyllota	Vulnerable	Vulnerable	95	BioNet (NSW DCCEEW 2024b), PMST (Commonwealth DCCEEW 2024)	Low
Pomaderris brunnea	brown pomaderris	Endangered	Vulnerable	1	BioNet (NSW DCCEEW 2024b), PMST (Commonwealth DCCEEW 2024)	Low
Pomaderris cotoneaster	-	Endangered	Endangered	0	PMST (Commonwealth DCCEEW 2024), BAM-C	Low
Pomaderris delicata	delicate pomaderris	Critically Endangered	Critically Endangered	0	SEARS (BSD 2023)	Low
Pomaderris pallida	pale pomaderris	Vulnerable	Vulnerable	0	PMST (Commonwealth DCCEEW 2024)	Low
Pultenaea elusa	elusive bush-pea	Critically Endangered	Endangered	0	PMST (Commonwealth DCCEEW 2024)	Low
Pultenaea pedunculata	matted bush-pea	Endangered	Not Listed	0	BAM-C	Low
Rhizanthella slateri	eastern Australian underground orchid	Vulnerable	Endangered	0	PMST (Commonwealth DCCEEW 2024)	Low
Rutidosis leptorrhynchoides	button wrinklewort	Endangered	Endangered	0	PMST (Commonwealth DCCEEW 2024)	Moderate
Solanum armourense	-	Endangered	Not Listed	0	BAM-C	Low
Swainsona sericea	silky swainson-pea	Vulnerable	Not Listed	0	BAM-C	Moderate
Thelymitra kangaloonica	Kangaloon sun orchid	Critically Endangered	Critically Endangered	0	PMST (Commonwealth DCCEEW 2024)	Low
Thesium australe	austral toadflax	Vulnerable	Vulnerable	0	PMST (Commonwealth DCCEEW 2024)	Low
Xerochrysum palustre	swamp everlasting	Not Listed	Vulnerable	0	PMST (Commonwealth DCCEEW 2024)	Low
Zieria murphyi	velvet zieria	Vulnerable	Vulnerable	0	PMST (Commonwealth DCCEEW 2024)	Low

2.3.3 Habitat Constraints Assessment

The following field-based surveys were undertaken to assess the habitat constraints for the candidate threatened flora species:

- Field searches for habitat constraints identified from the desktop review of the TBDC.
- Direct observation of the quality and suitability of micro-habitats present.
- Collection of rapid and detailed flora assessments for each PCT to assess the condition of the habitat in the Project Area.
- Collection of site photographs to assess the condition of habitats present.

The results of the site-based habitat constraints assessment were utilised to inform the assessment of the candidate threatened species assessment in the BAM-C. Where species presence could not be ruled out in accordance with Section 5.2 of the BAM, surveys were conducted. The candidate threatened species predicted to occur on the Development Footprint and justifications for ruling species out from further survey and assessment are identified in **Table 5.2** in **Section 5.2.1** and **Table 5.3** in **Section 5.2.2.**

2.3.4 Threatened Flora Surveys

Searches for threatened flora species were completed in accordance with the NSW Survey Guide, '*Surveying threatened plants and their habitats'* (NSW DPIE 2020e) and any relevant species requirements listed in the TBDC (NSW DCCEEW 2024b). Details of the field survey methods used and species targeted are listed in **Table 2.4** and the locations of the surveys completed are mapped in **Figure 2.2.**

Surveys for threatened flora were completed throughout the Development Footprint within the following PCTs:

- PCT 3374 Goulburn Tableland Peppermint Grassy Forest
- PCT 4063 Central and Southern Tableland River Oak Forest
- PCT 3376 Southern Tableland Grassy Box Woodland.

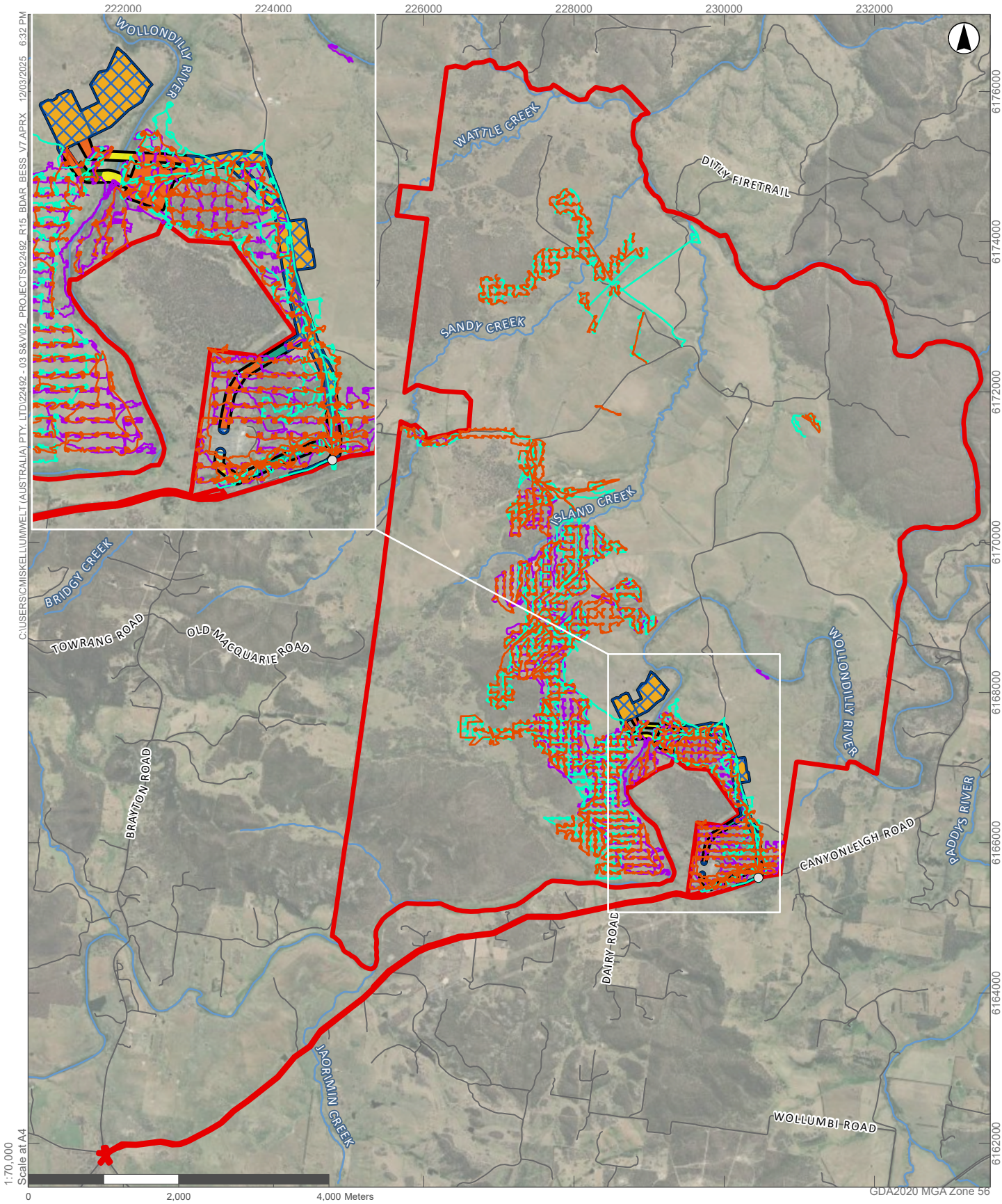
Surveys within PCT 3643, PCT 3347 and PCT 3373 were also undertaken for threatened flora, however, impacts to these PCTs were avoided as these PCTs are not outside of the development footprint due to design changes which were implemented following the completion of surveys.

Vegetation zone 6 'PCT 3374 – DNG exotic dominated' comprises Category 1 – exempt land however was assessed against the benchmarks of PCT 3374 and resulted a Vegetation Integrity (VI) scores of 1. The vegetation zone is considered too degraded to provide habitat for threatened flora species and no survey were undertaken within this vegetation zone.

Grid-based searches were completed for all survey groups as the area of suitable habitat in the Development Footprint was greater than 50 ha. Targeted searches for threatened flora species were carried out in all areas of Category 2 land within the Development Footprint. Some small areas of land were deemed inaccessible due to dense blackberry thickets which were unlikely provide habitat for threatened flora species given the degraded native of the land.

Table 2.4 Candidate Threatened Flora Species Targeted and Field Survey Methods Used

Survey Group	Target Species	Species Survey Period	Survey Dates	Survey Method	Areas Surveyed by PCT Association and/or Habitat Suitability		
					PCT 4063	PCT 3376	PCT 3374
Group 1 Forb Group	*Caladenia tessellata* *Diuris aequalis* *Leucochrysum albicans* var. *tricolor* *Swainsona sericea*	Sep to Oct Oct to Nov Sep to April Sep to Nov	24–28 October 2022	Large area grid method	x	x	x
Group 2 – Shrub Group	*Acacia clunies-rossiae* *Dillwynia glaucula* *Grevillea renwickiana* *Pomaderris delicata* *Pultenaea pedunculata* *Solanum armourense*	All year Sep to Dec All year All year Sep to Nov Aug to May	12–16 October 2023	Large area grid method	x	x	x
Group 3 – Groundcovers	*Commersonia prostrata* *Galium australe* *Genoplesium superbum*	All year Oct to Feb Feb to March	6–10 February 2023 and 12–16 February 2024	Large area grid method	x	x	x
Group 4 – Tree Group	*Callitris oblonga* *Eucalyptus aggregata* *Eucalyptus macarthurii* *Eucalyptus nicholii* *Eucalyptus recurva*	All year All year All year All year All year	6–10 February 2023 and 12–16 February 2024	Large area grid method	x	Excluding areas of DNG with no canopy species	Excluding areas of DNG with no canopy species



Legend

- Project Area
- Development Footprint
- Watercourse
- Existing Roads and Tracks
- Access Points

Plant Community Types and Condition Zones

- Cleared/Infrastructure
- Dam

PCT 3374 - Goulburn Tableland Peppermint Grassy Forest

- DNG-Moderate/Degraded
- DNG - Low Condition
- DNG - exotic dominated
- Good/Moderate
- Moderate/Degraded

PCT 3376 - Southern Tableland Grassy Box Woodland

- DNG
- Good/Moderate

PCT 4063 - Central and Southern Tableland River Oak Forest

- Moderate/Degraded

Draft Native Vegetation Regulatory Map

- Category 1 - Exempt Land

Threatened Flora Survey Transects

- February 23/24
- October 23
- October 22

FIGURE 2.2

Field Survey Locations -Threatened Flora Surveys

Image Source: ESRI Basemap (2024) **Data source:** NSW LPI (2024), NSW DSFI (2024), Umwelt (2024)

2.4 Threatened Fauna Survey Methods

2.4.1 Review of Existing Information and Survey Guidelines

The following existing information sources and surveys guidelines were reviewed to inform the threatened fauna species surveys and associated assessment of habitat constraints and microhabitats:

- NSW Survey Guide for Threatened Frogs, A guide for the survey of threatened frogs and their habitats for the Biodiversity Assessment Method (NSW DPIE 2020g).
- 'Species Credits' threatened bats and their habitats (NSW DPIE 2021).
- Threatened reptiles Biodiversity Assessment Method survey guide (NSW DPE 2022b).
- Koala (*Phascolarctos cinereus*) Biodiversity Assessment Method Survey Guide (NSW DPE 2022c).
- BAM-C (available online to accredited BAM assessors) BAM Data Version 80 -date last accessed 12/13/24.
- Threatened fauna records held on the NSW BioNet Atlas of NSW Wildlife within the 10 km of the Project Area (NSW DCCEEW 2024b - date last accessed 26/09/2024.
- Habitat constraints listed in the TBDC (NSW DCCEEW 2023b) – date last accessed 26/09/24.
- Threatened fauna records predicted or know to occur within 10 km of the Project Area as shown on the PMST (Commonwealth DCCEEW 2024) date last accessed 11/09/24.

2.4.2 BioNet Atlas Threatened Fauna Records

Details of the threatened fauna species recorded on the BioNet Atlas and PMST within 10 km of the Project Area and predicted to occur as per the PMST and BAM-C are summarised in **Table 2.5.** An assessment of likelihood of occurrence is also provided using the following criteria:

- Known – species is known to occur within the Project Area.
- High– Suitable habitats which are known to support this species are present and the species is expected to occur within the Project Area based on observation or historical records.
- Moderate – Suitable habitats which are known to support this species are present within the development footprint and the species may occur (further surveys required).
- Low – Suitable habitats or microhabitats for this species are not present within the development footprint, or the development footprint is too disturbed to support this species, and the species is not known or likely to occur.

Species identified in BAM-C and species known to occur or with a high or moderate likelihood of occurrence have been included for further assessment within this Report.

Table 2.5 Threatened Fauna Species Predicted to Occur in the Project Area

Scientific Name	Common Name	BC Act Status	EPBC Act Status	Number of Records	Source	Likelihood of Occurrence
Amphibia						
Heleioporus australiacus	giant burrowing frog	Vulnerable	Vulnerable	0	PMST (Commonwealth DCCEEW 2024), BAM-C	Low
Litoria aurea	green and golden bell frog	Endangered	Vulnerable	0	BAM-C	Low
Litoria booroolongensis	booroolong frog	Endangered	Endangered	0	BAM-C	Low
Mixophyes balbus	stuttering frog	Endangered	Vulnerable	0	BAM-C	Low
Pseudophryne australis	red-crowned toadlet	Vulnerable	Not Listed	1	BioNet (NSW DCCEEW 2024a)	Low
Aves						
Anthochaera phrygia	regent honeyeater	Critically Endangered	Critically Endangered	0	PMST (Commonwealth DCCEEW 2024), BAM-C, SEARS	Low
Aphelocephala leucopsis	southern whiteface	Vulnerable	Vulnerable	0	PMST (Commonwealth DCCEEW 2024), BAM-C	Low
Botaurus poiciloptilus	Australasian bittern	Endangered	Endangered	0	PMST (Commonwealth DCCEEW 2024)	Low
Calidris ferruginea	curlew sandpiper	Endangered	Critically Endangered	0	PMST (Commonwealth DCCEEW 2024)	Low
Callocephalon fimbriatum	gang-gang cockatoo	Endangered	Endangered	51	BioNet (NSW DCCEEW 2024a), PMST (Commonwealth DCCEEW 2024), BAM-C	High
Calyptorhynchus lathami lathami	south-eastern glossy black-cockatoo	Vulnerable	Vulnerable	52	BioNet (NSW DCCEEW 2024a), PMST (Commonwealth DCCEEW 2024), BAM-C	High
Chthonicola sagittata	speckled warbler	Vulnerable	Not Listed	9	BioNet (NSW DCCEEW 2024a)	Moderate
Climacteris picumnus victoriae	brown treecreeper (eastern subspecies)	Vulnerable	Vulnerable	4	BioNet (NSW DCCEEW 2024a), PMST (Commonwealth DCCEEW 2024)	Moderate
Daphoenositta chrysoptera	varied sittella	Vulnerable	Not Listed	19	BioNet (NSW DCCEEW 2024a)	High
Falco hypoleucos	grey falcon	Vulnerable	Vulnerable	0	PMST (Commonwealth DCCEEW 2024), BAM-C	Low

Scientific Name	Common Name	BC Act Status	EPBC Act Status	Number of Records	Source	Likelihood of Occurrence
Falco subniger	black falcon	Vulnerable	Not Listed	2	BioNet (NSW DCCEEW 2024a)	Low
Glossopsitta pusilla	little lorikeet	Vulnerable	Not Listed	1	BioNet (NSW DCCEEW 2024a)	Low
Grantiella picta	painted honeyeater	Vulnerable	Vulnerable	0	PMST (Commonwealth DCCEEW 2024)	Low
Haliaeetus leucogaster	white-bellied sea-eagle	Vulnerable	Not Listed	4	BioNet (NSW DCCEEW 2024a), BAM-C	Low
Hieraaetus morphnoides	little eagle	Vulnerable	Not Listed	6	BioNet (NSW DCCEEW 2024a), BAM-C	Moderate
Hirundapus caudacutus	white-throated needletail	Vulnerable	Vulnerable	3	BioNet (NSW DCCEEW 2024a), PMST (Commonwealth DCCEEW 2024)	Moderate
Lathamus discolor	swift parrot	Endangered	Critically Endangered	0	PMST (Commonwealth DCCEEW 2024), BAM-C, SEARS (BSD 2023)	Low
Lophoictinia isura	square-tailed kite	Vulnerable	Not Listed	1	BioNet (NSW DCCEEW 2024a)	Low
Melanodryas cucullata cucullata	hooded robin (south-eastern form)	Endangered	Endangered	1	BioNet (NSW DCCEEW 2024a), PMST (Commonwealth DCCEEW 2024)	Low
Melithreptus gularis gularis	black-chinned honeyeater (eastern subspecies)	Vulnerable	Not Listed	1	BioNet (NSW DCCEEW 2024a)	Low
Ninox connivens	barking owl	Vulnerable	Not Listed	1	BioNet (NSW DCCEEW 2024a), BAM-C	Low
Ninox strenua	powerful owl	Vulnerable	Not Listed	16	BioNet (NSW DCCEEW 2024a), BAM-C	High
Numenius madagascariensis	eastern curlew	Not Listed	Critically Endangered	0	PMST (Commonwealth DCCEEW 2024)	Low
Pachycephala olivacea	olive whistler	Vulnerable	Not Listed	1	BioNet (NSW DCCEEW 2024a)	Low
Petroica boodang	scarlet robin	Vulnerable	Not Listed	34	BioNet (NSW DCCEEW 2024a)	High
Petroica phoenicea	flame robin	Vulnerable	Not Listed	7	BioNet (NSW DCCEEW 2024a)	High
Petroica rodinogaster	pink robin	Vulnerable	Not Listed	0	BAM-C	Low
Polytelis swainsonii	superb parrot	Vulnerable	Vulnerable	0	PMST (Commonwealth DCCEEW 2024)	Low
Pycnoptilus floccosus	pilotbird	Not listed	Vulnerable	0	PMST (Commonwealth DCCEEW 2024), BAM-C	Low
Rostratula australis	Australian painted snipe	Endangered	Endangered	0	PMST (Commonwealth DCCEEW 2024)	Low

Scientific Name	Common Name	BC Act Status	EPBC Act Status	Number of Records	Source	Likelihood of Occurrence
Stagonopleura guttata	diamond firetail	Vulnerable	Vulnerable	19	BioNet (NSW DCCEEW 2024a), PMST (Commonwealth DCCEEW 2024)	High
Tyto novaehollandiae	masked owl	Vulnerable	Not Listed	1	BioNet (NSW DCCEEW 2024a)	Moderate
Insecta						
Keyacris scurra	key's matchstick grasshopper	Endangered	Endangered	0	PMST (Commonwealth DCCEEW 2024), BAM-C	Moderate
Petalura gigantea	giant dragonfly	Endangered	Not listed	0	SEARS (BSD 2023)	Low
Mammalia						
Cercartetus nanus	eastern pygmy-possum	Vulnerable	Not Listed	0	BAM-C	Low
Chalinolobus dwyeri	large-eared pied bat	Vulnerable	Endangered	4	BioNet (NSW DCCEEW 2024a), PMST (Commonwealth DCCEEW 2024), BAM-C, SEARS (BSD 2023)	Moderate
Dasyurus maculatus	spotted-tailed quoll	Vulnerable	Endangered	1	BioNet (NSW DCCEEW 2024a), PMST (Commonwealth DCCEEW 2024)	Low
Falsistrellus tasmaniensis	eastern false pipistrelle	Vulnerable	Not Listed	8	BioNet (NSW DCCEEW 2024a)	Moderate
Miniopterus australis	little bent-winged bat	Vulnerable	Not Listed	2	BioNet (NSW DCCEEW 2024a), SEARS (BSD 2023)	Moderate (foraging habitat only)
Miniopterus orianae oceanensis	large bent-winged bat	Vulnerable	Not Listed	20	BioNet (NSW DCCEEW 2024a), BAM-C, SEARS (BSD 2023)	High (foraging habitat only)
Myotis macropus	southern myotis	Vulnerable	Not Listed	6	BioNet (NSW DCCEEW 2024a), BAM-C	High
Petauroides volans	greater glider	Endangered	Endangered	22	BioNet (NSW DCCEEW 2024a), PMST (Commonwealth DCCEEW 2024), BAM-C	Moderate
Petaurus australis	yellow-bellied glider	Vulnerable	Vulnerable	6	BioNet (NSW DCCEEW 2024a), PMST (Commonwealth DCCEEW 2024)	Moderate
Petaurus norfolcensis	squirrel glider	Vulnerable	Not Listed	2	BioNet (NSW DCCEEW 2024a), BAM-C	Moderate

Scientific Name	Common Name	BC Act Status	EPBC Act Status	Number of Records	Source	Likelihood of Occurrence
Petrogale penicillata	brush-tailed rock-wallaby	Endangered	Vulnerable	1	BioNet (NSW DCCEEW 2024a), PMST (Commonwealth DCCEEW 2024), BAM-C, SEARs (BCS 2024)	Low
Phascogale tapoatafa	brush-tailed phascogale	Vulnerable	Not Listed	0	BAM-C	Low
Phascolarctos cinereus	koala	Endangered	Endangered	1011	BioNet (NSW DCCEEW 2024a), PMST (Commonwealth DCCEEW 2024), BAM-C	Moderate
Pseudomys novaehollandiae	New Holland mouse	Not Listed	Vulnerable	0	PMST (Commonwealth DCCEEW 2024)	Low
Pteropus poliocephalus	grey-headed flying-fox	Vulnerable	Vulnerable	0	PMST (Commonwealth DCCEEW 2024), BAM-C	Low
Saccolaimus flaviventris	yellow-bellied sheathtail-bat	Vulnerable	Vulnerable	2	BioNet (NSW DCCEEW 2024a)	Moderate
Scoteanax rueppellii	greater broad-nosed bat	Vulnerable	Not Listed	3	BioNet (NSW DCCEEW 2024a)	Low
Reptilia						
Aprasia parapulchella	pink-tailed legless lizard	Vulnerable	Vulnerable	0	PMST (Commonwealth DCCEEW 2024), BAM-C	Low
Delma impar	striped legless lizard	Vulnerable	Vulnerable	0	PMST (Commonwealth DCCEEW 2024), BAM-C	Moderate
Hoplocephalus bungaroides	broad-headed snake	Endangered	Endangered	0	PMST (Commonwealth DCCEEW 2024)	Low

2.4.3 Habitat Constraints Assessment

Field-based searches were undertaken to assess the habitat constraints for the candidate threatened fauna species. These searches included observation of habitat constraints identified from the desktop review of the TBDC and recording of the presence, quality and/or suitability of micro-habitats present including:

- Hollow bearing trees, particularly those of suitable size for threatened cockatoo and owl breeding habitat
- Allocasuarina and Casuarina trees
- Koalas use trees
- Aquatic habitats suitable for amphibians
- Swamps, peat and watercourses
- Rocky habitats suitable for reptiles
- Outcrops, caves, tunnels and old buildings suitable for threatened microbat species
- Mistletoe.

The results of the site-based habitat constraints assessment were utilised to inform the assessment of the confirmed candidate threatened fauna species assessment in the BAM-C. Where species presence could not be ruled out in accordance with Section 5.2 of the BAM, surveys were conducted.

2.4.4 Fauna Surveys

2.4.4.1 Fauna Survey Guidelines

Targeted surveys for candidate threatened fauna species were completed with reference to the following:

- NSW BioNet Atlas incorporating the Threatened Biodiversity Data Collection (NSW DCCEEW 2024a) – last accessed 29/09/2024.
- NSW survey guide for threatened reptiles, Threatened reptiles Biodiversity Assessment Method survey guide, (NSW DPIE 2022b).
- Koala (*Phascolarctos cinereus*) Biodiversity Assessment Method Survey Guide (NSW DPE 2022c).
- NSW survey guide for threatened frogs, A guide for the survey of threatened frogs and their habitats for the Biodiversity Assessment Method (NSW DPIE 2020g).
- Threatened Biodiversity Survey and Assessment: Guidelines for Developments and Activities, NSW Department of Environment and Conservation (NSW DEC 2004).
- 'Species credit' threatened bats and their habitats, NSW survey guide for the Biodiversity Assessment Method, (NSW DPIE 2021).

- Survey guidelines for Australia's threatened bats: Guidelines for detecting bats listed as threatened under the EPBC Act, Department of Sustainability, Environment, Water, Population and Communities (DEWHA 2010a).
- Survey guidelines for Australia's threatened reptiles: Guidelines for detecting reptiles listed as threatened under the EPBC Act, Department of Sustainability, Environment, Water, Population and Communities (DSEWPC 2011).
- Survey guidelines for Australia's threatened mammals: Guidelines for detecting mammals listed as threatened under the EPBC Act, Department of Sustainability, Environment, Water, Population and Communities (DEWHA 2010b).
- Survey guidelines for Australia's threatened birds: Guidelines for detecting birds listed as threatened under the EPBC Act, Department of Sustainability, Environment, Water, Population and Communities (DEWHA 2010c).
- Camera Trapping: wildlife management and research (Meek and Fleming 2014).

2.4.4.2 Diurnal Fauna Surveys

The following methods were utilised for targeted diurnal fauna surveys:

- Nest site searches for candidate raptor species.
- Searches for threatened cockatoo feeding and breeding trees.
- Searches and assessment of potential threatened owl nest trees.
- Searches for microbat roosts and ultrasonic call recording.
- Amphibian habitat searches and call playback.
- Opportunistic observation.
- Diurnal bird surveys
- Diurnal bird surveys.

Early in the scoping phase of the Project, 3 seasonal rounds of bird and bat utilisation surveys (BBUS) were completed at seven vantage points. A total of 126 vantage point surveys, each one hour in duration, were undertaken across the 7 vantage points in the Project Area. The survey sites were distributed in a manner that maximised spatial coverage of the Project Area. The viewshed across the surrounding landscape, proximity to potential turbine locations (no longer proposed) proximity to different habitat types and access following wet weather were the key factors considered in the survey site selection process.

Each site was surveyed on six occasions during each seasonal survey round with two surveys falling in each of the following periods (except in cases where wet weather restricted access):

- morning (dawn – 9.59 am)
- midday (10.00 am – 1.59 pm)
- afternoon (2.00 pm – dusk).

Although the BBUS data is not a formal requirement for BESS projects, these surveys have provided a comprehensive census of the bird communities in the Project Area and were completed due to early investigation within the Project Area to include a wind component (which was not pursued).

General diurnal bird census surveys were also conducted across 20-minute periods, searching woodland habitat across an approximately 2 ha area, meandering slowly and recording all visual and aural observations of birds. Surveys were undertaken by two observers experienced in identifying birds in the region. Flight behaviour of observed birds was not recorded. Temperature, wind speed, cloud cover and precipitation were recorded during each survey.

Habitat searches for bird of prey nests

Targeted and opportunistic searches for threatened birds of prey and their nests were undertaken across the Biodiversity Study Area.

Opportunistic bird searches were also undertaken concurrently during all biodiversity survey effort across the Biodiversity Study Area. Where habitat features were identified, GPS locations and relevant ecological data was recorded within digital survey platforms. Ecologists would investigate the stick nest using 10 x 40 magnification binoculars to identify the size of the stick nest, evidence of occupation, and suspected species.

Searches for cockatoo nesting trees

Targeted and opportunistic searches for gang-gang cockatoo and south-eastern glossy black-cockatoo breeding sites were undertaken across the Biodiversity Study Area. Opportunistic searches were undertaken concurrently during all biodiversity survey effort across the Biodiversity Study Area. Where suitable habitat was identified, GPS location, tree species, hollow size and location (spout, trunk, branch) were recorded within digital survey platforms.

Any hollows within suitable size for either species were revisited often during concurrent biodiversity surveys, to investigate for any changes in occupation.

The details of diurnal fauna surveys completed are provided in **Table 2.6** and fauna survey locations are mapped in **Figure 2.3.** Weather conditions are provided in **Section 2.6.**

Table 2.6 Details of Diurnal Threatened Fauna Surveys Completed

Survey Date	Survey Methods	Species Targeted	Survey Effort
8/08/2022-10/08/2022	Diurnal fauna census, habitat assessment	south-eastern glossy black-cockatoo, white-bellied sea-eagle, little eagle, key's matchstick grasshopper, pink robin, regent honeyeater and swift parrot. Habitat assessment only - barking owl, powerful owl, greater glider, yellow-bellied glider, squirrel glider, brush-tailed rock-wallaby, koala, masked owl.	5 Days of BBUS, two ecologists (60 person hours of targeted bird surveys at 7 vantage points across the site)
24/10/2022-28/10/2022	BBUS, diurnal fauna bird census	gang-gang cockatoo, white-bellied sea-eagle, little eagle, pink robin, regent honeyeater and swift parrot.	5 days of BBUS, two ecologists (60 person hours of targeted bird surveys at 7 vantage points across the site)

Survey Date	Survey Methods	Species Targeted	Survey Effort
07/11/2022-11/11/2022	BBUS, diurnal bird census	gang-gang cockatoo, white-bellied sea-eagle, pink robin, regent honeyeater and swift parrot.	5 Days of BBUS, two ecologists (60 person hours of targeted bird surveys at 7 vantage points across the site)
09/01/2023-13/01/2023	Diurnal habitat assessment and diurnal fauna census / habitat search	gang-gang cockatoo, south-eastern glossy black-cockatoo, pink robin. Habitat assessment only – koala, brush-tailed rock-wallaby, squirrel glider, yellow-bellied glider, greater glider, green and golden bell frog, eastern pygmy-possum, large-eared pied bat, large bent wing bat.	~40 person hours of habitat assessment, mapping hollow bearing trees, diurnal surveys
06/02/2023-10/02/2023	BBUS, diurnal bird surveys, Koala Spot Assessment Technique (SATs)	South-eastern glossy-black-cockatoo, pink robin, regent honeyeater and swift parrot. Habitat assessment only – koala, brush-tailed rock-wallaby, squirrel glider, yellow-bellied glider, greater glider, green and golden bell frog, eastern pygmy-possum, large-eared pied bat, large bent wing bat.	5 Days of BBUS, two ecologists (60 person hours of targeted bird surveys at 7 vantage points across the site) Approximately 40 hours of KSATS
21/08/2023-25/08/2023	Diurnal habitat assessment, active searches and diurnal bird surveys	South-eastern glossy black-cockatoo, white-bellied sea-eagle, little eagle, key's matchstick grasshopper, pink robin, regent honeyeater and swift parrot. Habitat assessment only - barking owl, powerful owl, greater glider, yellow-bellied glider, squirrel glider, brush-tailed rock-wallaby, koala, masked owl.	~40 person hours of habitat assessment, mapping hollow bearing trees, 115 min of vantage point diurnal bird surveys, 255 mins of diurnal bird transects
09/10/2023-13/10/2023	Diurnal habitat assessment, active searches and diurnal fauna surveys	Pink-tailed legless lizard (PTLL), gang-gang cockatoo, striped legless lizard (SLL), white-bellied sea-eagle, pink robin, grey-headed flying-fox, little eagle, key's matchstick grasshopper. Habitat assessment only - eastern pygmy-possum, Booroolong frog, southern myotis, barking owl, yellow-bellied glider, greater glider, squirrel glider, brush-tailed rock-wallaby, koala.	~80 person hours of targeted searches for PTLL, and SLL and 255 mins of diurnal fauna transects
26/10/2023-27/10/2023	koala SATs, diurnal fauna surveys, active searches	Koala, gang-gang cockatoo, white-bellied sea-eagle, pink robin, grey-headed flying-fox, little eagle, key's matchstick grasshopper, striped legless lizard, pink-tailed legless lizard.	8 person hours undertaken KSATS and 8 hours undertaking active fauna searches
12/02/2024-16/02/2024	Diurnal bird surveys	South-eastern glossy black-cockatoo, pink robin.	200 mins of diurnal bird survey transects
26/3/2024-27/3/2024	Diurnal fauna surveys and habitat assessment, active searches	South-eastern glossy black-cockatoo, pink robin, key's matchstick grasshopper. Habitat assessment only - eastern pygmy-possum, green and golden bell frog, southern myotis, greater glider, yellow-bellied glider, squirrel glider, brush-tailed rock-wallaby, koala.	16 hours undertaking active searches

Survey Date	Survey Methods	Species Targeted	Survey Effort
9/09/2024-10/09/2024	Diurnal bird surveys	White-bellied sea-eagle, little eagle, pink robin, regent honeyeater and swift parrot.	2 hours of surveys
16/09/2024-4/12/2024	Striped legless lizard surveys	Striped legless lizard tile searches – 600 tiles across 12 tile arrays.	~140 person hours (14hours of targeted surveys per week for 10 weeks)

2.4.4.3 Nocturnal Fauna Surveys

The following methods were utilised for targeted nocturnal fauna surveys:

- Spotlighting and stag-watching searches
- Amphibian habitat searches
- Searches for microbat roosts and ultrasonic call recording
- Amphibian habitat searches and call playback
- Quiet listening for candidate threatened fauna calls
- Targeted call playback.

Details of these surveys are provided in **Table 2.7** and survey locations are mapped in **Figure 2.3.**

Table 2.7 Details of Nocturnal Threatened Fauna Surveys Completed

Survey Date	Survey Methods	Species Targeted	Survey Effort / Time
9/01/2023-13/01/2023	Spotlighting, call playback, amphibian searches (aural and visual transect and call playback)	Eastern pygmy-possum, greater glider, squirrel glider, brush-tailed rock-wallaby, koala, yellow bellied glider, green and golden bell frog.	32 person hours (4 nights, two ecologists, approximately 4 hours per night) Covered approximately 53,500 m in spotlighting transects
21/08/2023-25/08/2023	Spotlighting, call playback	Barking owl, masked owl, powerful owl, greater glider, squirrel glider, brush-tailed rock-wallaby, koala.	32 person hours (4 nights, two ecologists, approximately 4 hours per night) Covered approximately 21,300 m in spotlighting transects
4/12/2023-8/12/2023	Spotlighting, Call playback, amphibian searches (aural and visual transect and call playback)	Eastern pygmy-possum, greater glider, squirrel glider, brush-tailed rock-wallaby, koala, green and golden bell frog, Booroolong frog.	32 person hours (4 nights, two ecologists, approximately 4 hours per night) Covered approximately 17,700 m in spotlighting transects
12/02/2024-16/02/2024	Spotlighting, Call playback, amphibian searches (aural and visual transect and call playback)	Eastern pygmy-possum, greater glider, squirrel glider, brush-tailed rock-wallaby, koala, green and golden bell frog.	32 person hours (4 nights, two ecologists, approximately 4 hours per night) Covered approximately 21,350 m in spotlighting transects

2.4.4.4 Remote Detection Fauna Surveys

The following methods were utilised for the completion of targeted fauna remote detection surveys:

- Arboreal baited remote camera surveys
- Ultrasonic microbat call recording
- Songmeter detection.

Details of these surveys and the species targeted are provided in **Table 2.8** and survey locations are mapped in **Figure 2.3.**

Table 2.8 Details of Remote Detection Threatened Fauna Surveys Completed

Survey Date	Survey Methods	Species Targeted	Survey Effort / Time
October 2022	Passive ultrasonic microbat call detection (anabat)	southern myotis	36 detection nights (6 nights x 6 devices)
November 2022	Passive ultrasonic microbat call detection (anabat)	large-eared pied bat, southern myotis	35 detection nights (7 nights x 5 devices)
January 2023	Passive ultrasonic microbat call detection (anabat)	large-eared pied bat, southern myotis	48 detection nights (6 nights x 8 devices)
February 2023	Passive ultrasonic microbat call detection (anabat)	large-eared pied bat, southern myotis	45 detection nights (5 nights x 9 devices)
January 2023	Remote Cameras – baited and arboreal	eastern pygmy-possum, yellow bellied glider, squirrel glider, koala	100 camera nights (10 cameras x 10 nights)
February 2023	Passive acoustic recorders (songmeters)	koala, eastern pygmy-possum, yellow bellied glider, squirrel glider	50 camera nights (10 cameras x 5 nights)
October 2023	Passive acoustic recorders (songmeters)	koala, eastern pygmy-possum, yellow bellied glider, squirrel glider	90 camera nights (18 cameras x 5 nights)
February 2024	Active ultrasonic microbat call detection (anabat walkabout)	large bent-winged bat, little bent-winged bat, large-eared pied bat, southern myotis	4 nights, 5 hours a night, 1 device

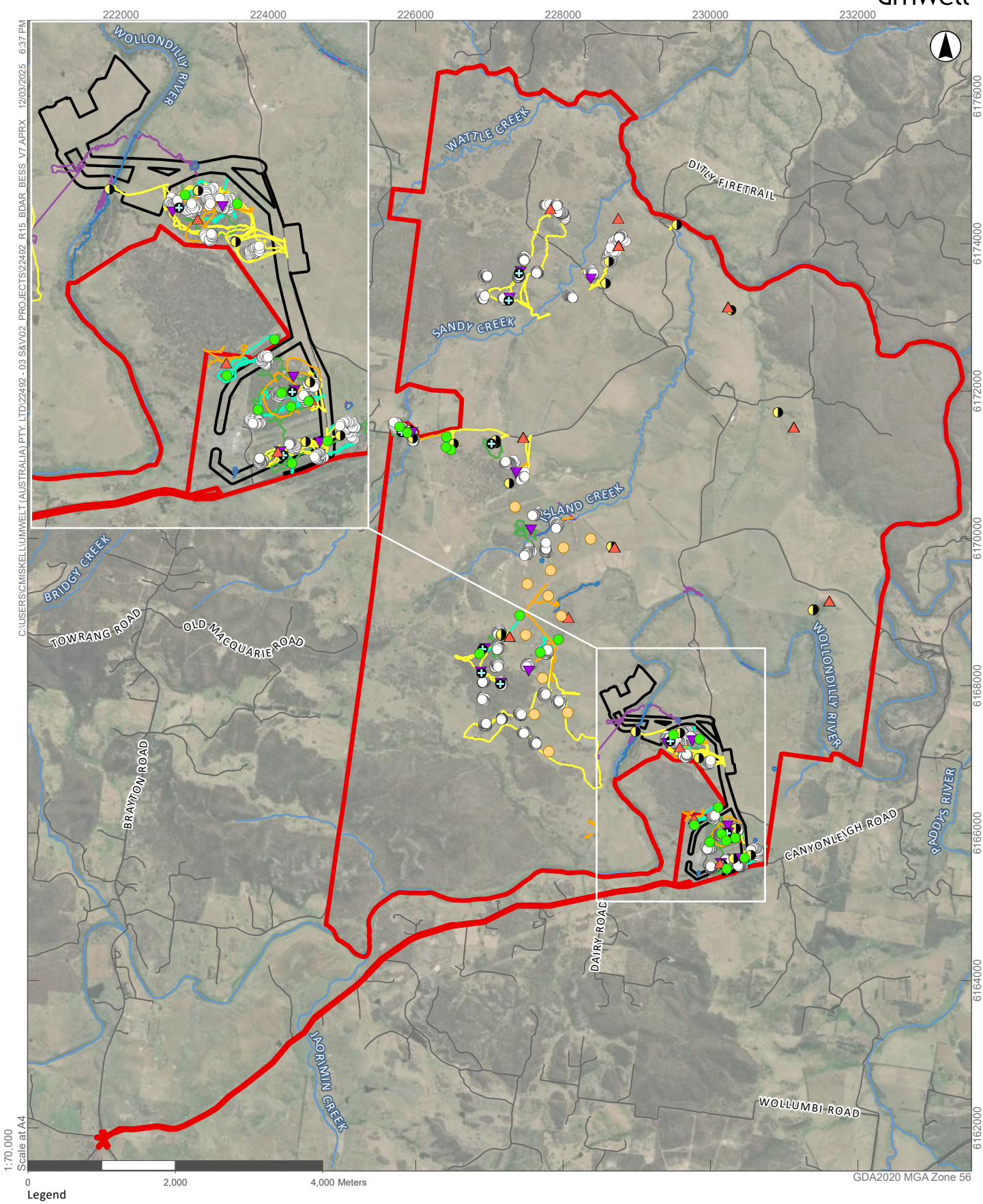
2.4.4.5 Opportunistic Fauna Survey Observations

Opportunistic and incidental observations of threatened fauna were recorded during threatened flora surveys. Opportunistic and incidental data captured included, but was not limited to:

- Hollow bearing trees:
    - Tree species and DBH
    - Hollow diameter, and abundance of hollows.
- Stick nests:
    - Size of the nest

- Evidence of occupation
- Suspected species.

- Evidence of fauna presence:
  - Large burrows
  - Scats
  - White wash
  - Sap feeding marks from gliders.



Legend

- Project Area
- Development Footprint
- Existing Roads and Tracks
- Watercourse

Spotlight Transects

- February 2024 - Ampbibians
- February 2024 - Amphibians
- February 2024 - Arboreal
- December 2023 - Amphibians
- August 2023 - Arboreal
- January 2023 - Arboreal

Bird Survey Transect

- Diurnal bird survey transect

- Striped Legless Lizard Tile location (12)
- Call Playback (19)
- Diurnal bird survey location (28)
- Remote cameras (10)
- Song meters (17)
- Anabats (27)
- Koala SAT tree location (1498)

FIGURE 2.3

Field Survey Locations
-Threatened Fauna Surveys

Image Source: ESRI Basemap (2024) **Data source:** NSW LPI (2024), NSW DSFI (2024), Umwelt (2024)

2.5 Threatened Fungi

No threatened fungi species were identified as predicted or candidate threatened species.

2.6 Weather Conditions

All surveys were completed during suitable weather conditions. The weather conditions during the fauna surveys above are listed in **Table 2.9.** Data recorded at the following weather stations are presented below (BOM 2024):

- Rainfall data recorded at the Big Hill (Glen Dusk) station (number 70119).
- Temperature data recorded at the Goulburn Airport AWS station (number 70330).

Table 2.9 Weather Conditions During Biodiversity Surveys

Date	Daily Data – Goulburn		Monthly Data – Goulburn	
	Min-Max Temp(°C)	Rainfall (mm)	Min-Max Temp (oC) (mean)	Rainfall (mm) (total)
24/10/2022	12.8–17.3	1.0	Min: 11.8 Max: 18.6	98.2
25/10/2022	11.0–23.5	1.0		
26/10/2022	11.3–20.4	1.0		
27/10/2022	9.7–20.9	3.0		
28/10/2022	9.3–17.0	0.2		
07/11/2022	8.2–23.9	4.6	Min: 12.5 Max: 20.5	111.8
08/11/2022	5.3–22.2	9.2		
09/11/2022	7.7–23.3	0		
10/11/2022	6.6–23.2	0		
11/11/2022	7.0–23.0	0		
09/01/2023	6.8–30.8	0	Min: 11.9 Max: 26.3	63.0
10/01/2023	6.0–27.3	0		
11/01/2023	14.1–28.0	0		
12/01/2023	16.2–31.2	0		
13/01/2023	15.6–29.0	0		
06/02/2023	10.9–29.7	0	Min: 11.1 Max: 27.3	14.2
07/02/2023	17.1–26.8	0		
08/02/2023	14.7–21.4	2.0		
09/02/2023	15.9–19.9	3.0		
10/02/2023	9.7–30.1	4.0		
21/08/2023	-1.3–16.9	0	Min: 0.5 Max: 15.9	35.2
22/08/2023	-1.4–21.4	0		
23/08/2023	3.6–13.0	6.0		
24/08/2023	0.1–17.4	0		
25/08/2023	-1.0–19.1	1.0		

Date	Daily Data – Goulburn		Monthly Data – Goulburn	
	Min-Max Temp(°C)	Rainfall (mm)	Min-Max Temp (oC) (mean)	Rainfall (mm) (total)
09/10/2023	-0.7–22.0	0	Min: 3.6 Max: 21.3	28.8
10/10/2023	3.5–22.2	0		
11/10/2023	9.6–23.4	0		
12/10/2023	-0.1–27.5	0		
13/10/2023	5.2–15.5	3.0		
26/10/2023	-4.7–18.0	0		
27/10/2023	-0.2–15.2	0		
04/12/2023	11.1–26.6	2.0	Min: 12.7 Max: 27.0	70.8
05/12/2023	9.4–32.6	0		
06/12/2023	13.3–33.5	0		
07/12/2023	10.3–31.9	0		
08/12/2023	17.1–34.5	1.0		
12/02/2024	11.0–30.2	0	Min: 13.3 Max: 26.5	115.0
13/02/2024	12.6–30.7	0		
14/02/2024	17.5–26.7	6.0		
15/02/2024	12.1–18.0	2.0		
16/02/2024	13.4–24.3	2.0		
26/3/2024	1.6–26.9	0	Min: 10.9 Max: 25.6	79.0
27/3/2024	9.3–24.2	0		
19/8/2024	6.0–14.4	1	Min: 3.0 Max: 15.9	36.0
20/8/2024	1.0–18.3	0		
9/9/2024	5.7–16.1	0	Min: 3.0 Max: 16.8	19.0
10/9/2024	0.4–18.9	0		
16/09/2024	-6.0–14.6	0		
25/09/2024	6.2–21.3	0		
2/10/2024	9.0–14.1	0	Min: 5.3 Max: 20.0	12.0
8/10/2024	6.2–11.4	0		
16/10/2024	2.5–20.2	0		
21/10/2024	6.5–15.5	0		
29/10/2024	10.4–20.5	0		
5/11/2024	11.7–23.7	0	Min: 8.3 Max:23.0	85.0
15/11/2024	11.6–20.2	1.0		
19/11/2024	11.1–23.3	0		
3/12/2024	14.3–23.6	0	Min: 10.8 Max: 25.9	30.0* (up to 5/12/2024)
4/12/2024	16.3–27.5	14.0		

2.7 Limitations

As with all biodiversity surveys, there are inherent limitations of time, weather and location and the biodiversity surveys completed for this project form a point in time sample.

The surveys completed were undertaken during the appropriate seasons specified within the TBDC to maximise the probability of detection. Some candidate threatened flora species which require fire for germination were surveyed as a precaution and it is considered that grazing and clearing have resulted in the disruption of natural fire regimes and the site is too disturbed to support these species.

BAM Plot surveys were also completed mostly during warmer months to ensure that both perennial and annual species were sampled within grassland plots.

All surveys for candidate threatened flora species consisted of multi-species searches in groups according to detection period and stratum as indicated in **Table 2.4.**

3.0 Site Context

3.1 Assessment Area

The Assessment Area, which includes the Development Footprint and the area of land within a 1,500 m buffer zone is shown on the Location Map in **Figure 1.2.**

3.2 Patch Size

The patch size for each vegetation zone located on the Development Footprint was calculated for each of the vegetation zones in accordance with Section 4.3.2 of the BAM. Given the large native vegetation cover across the Development Footprint, Biodiversity Study Area, and wider landscape, each vegetation zone was allocated to the largest patch size of ≥100 ha.

3.3 Landscape Features

Landscape features identified within the Development Footprint are shown on the Site Map provided as **Figure 1.1** and landscape features in the Assessment Area are shown on the Location Map provided as **Figure 1.2**. Further information on landscape features is provided in **Sections 3.4** to **Sections 3.12**.

3.4 IBRA Bioregions and IBRA Subregions

The Development Footprint is located within the South Eastern Highlands Interim Biogeographic Regionalisation for Australia (IBRA) Region and the Bungonia IBRA sub-region.

3.5 Rivers, Streams, Estuaries and Wetlands

The locations of the streams within the Development Footprint are shown on the Site Map provided as **Figure 1.1** and the locations of streams and rivers within the Project Area are shown on the Location Map provided as **Figure 1.2** and **Figure 3.1.**

The following four watercourses are within the Development Footprint:

- Wollondilly River, a 5th order watercourse
- Island Creek, a 4th order watercourse
- Sandy Creek, a 4th order watercourse
- Unnamed watercourse, tributary of Wollondilly River a 3rd order watercourse.

With the exception of Wollondilly River, minimal key fish habitat occurs in the Development Footprint. There are small semi-permanent pools along Island Creek that may occasionally provide fish habitat after rainfall. With the exception of Wollondilly River, all waterways within the Development Footprint are ephemeral and habitats within these watercourses were considered marginal for locally occurring fish species.

Access to the Project requires upgrade of an existing shallow crossing of the Wollondilly River. The Wollondilly River is classified as a Type 1, Class 1 major key fish habitat permanently flowing waterway. Two threatened fish species were predicted to occur in this reach of the river, and the river may provide habitat for protected fish species. It is classed as 'very poor habitat'.

Details of the watercourses and aquatic habitat are provided in **Appendix E.**

3.6 Habitat Connectivity

The Development Footprint contains agricultural land, comprised of grazed grasslands with patches of canopy trees. Patches of retained forest and woodland vegetation are present typically in areas surrounding watercourses and on steeper or less fertile rocky habitats.

The retained native vegetation within the Project Area comprises large patches of native peppermint and stringybark woodland and connects regionally to several other large natural areas managed for conservation including Tarlo River National Park which is approximately 3 km west of the Project Area, Kerrawary Nature Reserve, Belanglo State Forest, Bangadilly National Park approximately 2 km, 6 km and 10 km to the north and north east, respectively. Retained habitat connectivity pathways are mapped in **Figure 3.2.**

3.7 Karst, Caves, Crevices, Cliffs, Rocks or Other Geographical Features of Significance

There are no karsts or areas of geological significance within the Development Footprint.

3.8 Soils and Landscapes

The Project Area features undulating hills, slopes, crests and broad ridges and some narrow lying alluvial gullies and colluvial flats. The lowest elevation is approximately 560 m, in the south of the Development Footprint, on very gently undulating lower slop/flats associated with Wollondilly River. The elevation rises along the western boarder of the Development Footprint to 660 m. The Project Area has historically been used for Agricultural practices such as livestock grazing as well as some cropping and cultivation, with evidence of native vegetation modification due to extensive clearing.

The underlaying geology of the region has a general north-west trend, streams tend to either follow the general north-west trend or cut sharply across it. The Project Area lies within the broader region known as the Southern Tablelands within the southern portion of the Lachlan Fold Belt. Ordovician rocks are the oldest and most extensive and are usually tightly folded metasediments. The Project Area also features sandstones, quartzites, rhyolites, tuffs and alluvium.

3.9 Areas of Outstanding Biodiversity Value

The Development Footprint and Assessment Area do not contain any Areas of Outstanding Biodiversity Value (AOBV) (formerly critical habitat), as identified under the BC Act.

3.10 NSW (Mitchell) Landscapes

The Development Footprint is predominantly located within the Wollondilly – Bindook Tablelands and Gorges Mitchell Landscape, with a minority part of the Development Footprint also located in the Bungonia Tableland and Gorge Mitchell Landscape, as shown in **Figure 1.2.**

3.11 Additional Landscape Features Identified in the SEARs

There are no specific additional landscape features identified for assessment in the SEARs.

3.12 Native Vegetation Cover

The native vegetation cover within the Assessment Area was determined through site surveys of the Development Footprint and aerial photograph interpretation using ArcMap software and the Six Maps imagery base map aerial. The draft NVR map and SVTM was also considered in the mapping of the extent of the native vegetation cover with the Category 1 – Exempt Land excluded from the native vegetation cover.

Table 3.1 summarises the extent of native vegetation cover within the assessment area and **Figure 1.2** shows the extent of native vegetation cover within the assessment area.

Table 3.1 Native Vegetation Cover in the Assessment Area

Native Vegetation Cover	
1,500 m Buffer Assessment Area (ha)	2112.39
Total Area of Native Vegetation Cover (ha)	1161.61
Percentage of Native Vegetation Cover (%)	54.99%
Class (0–10, >10–30, >30–70 or >70%)	>30–70

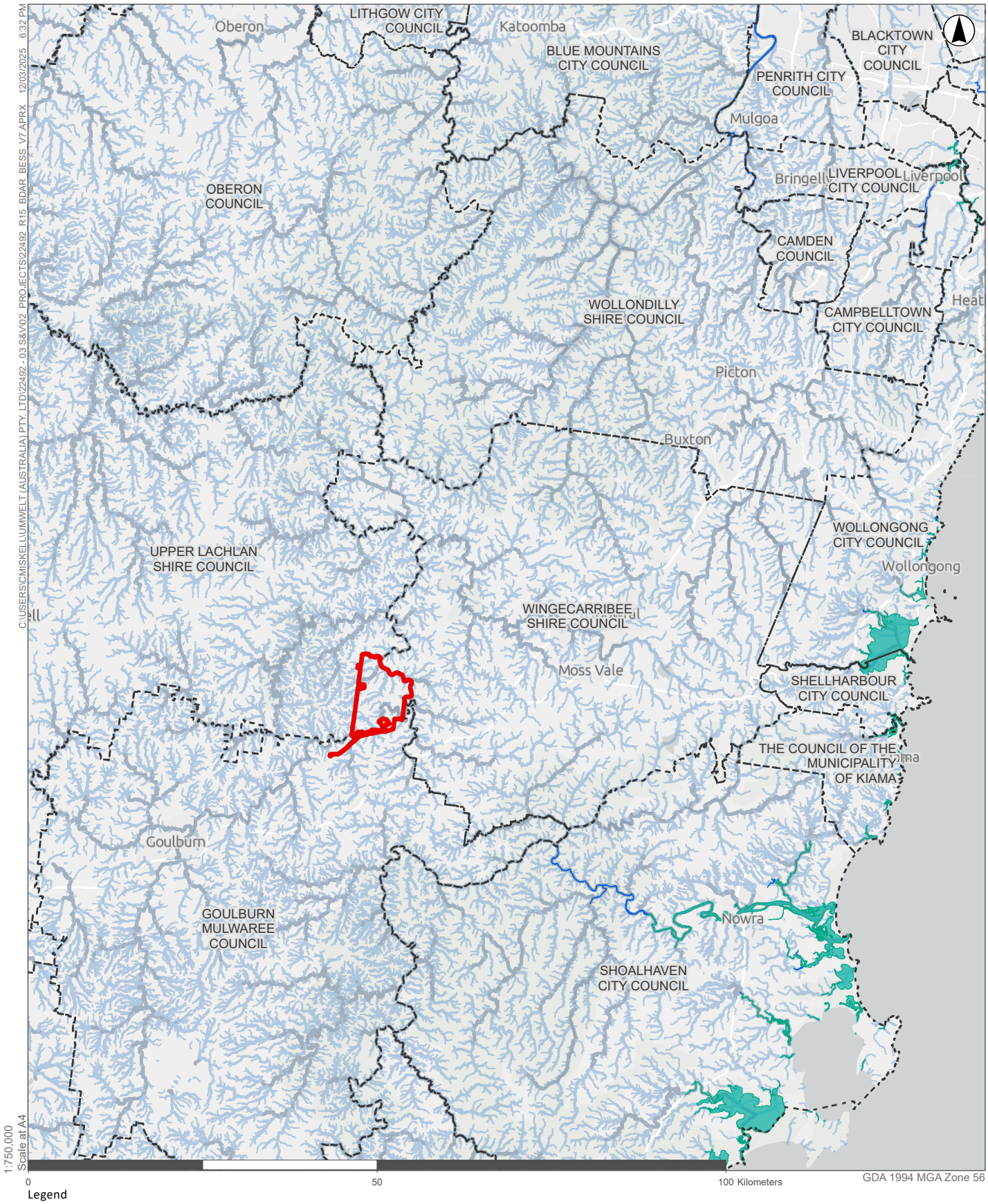
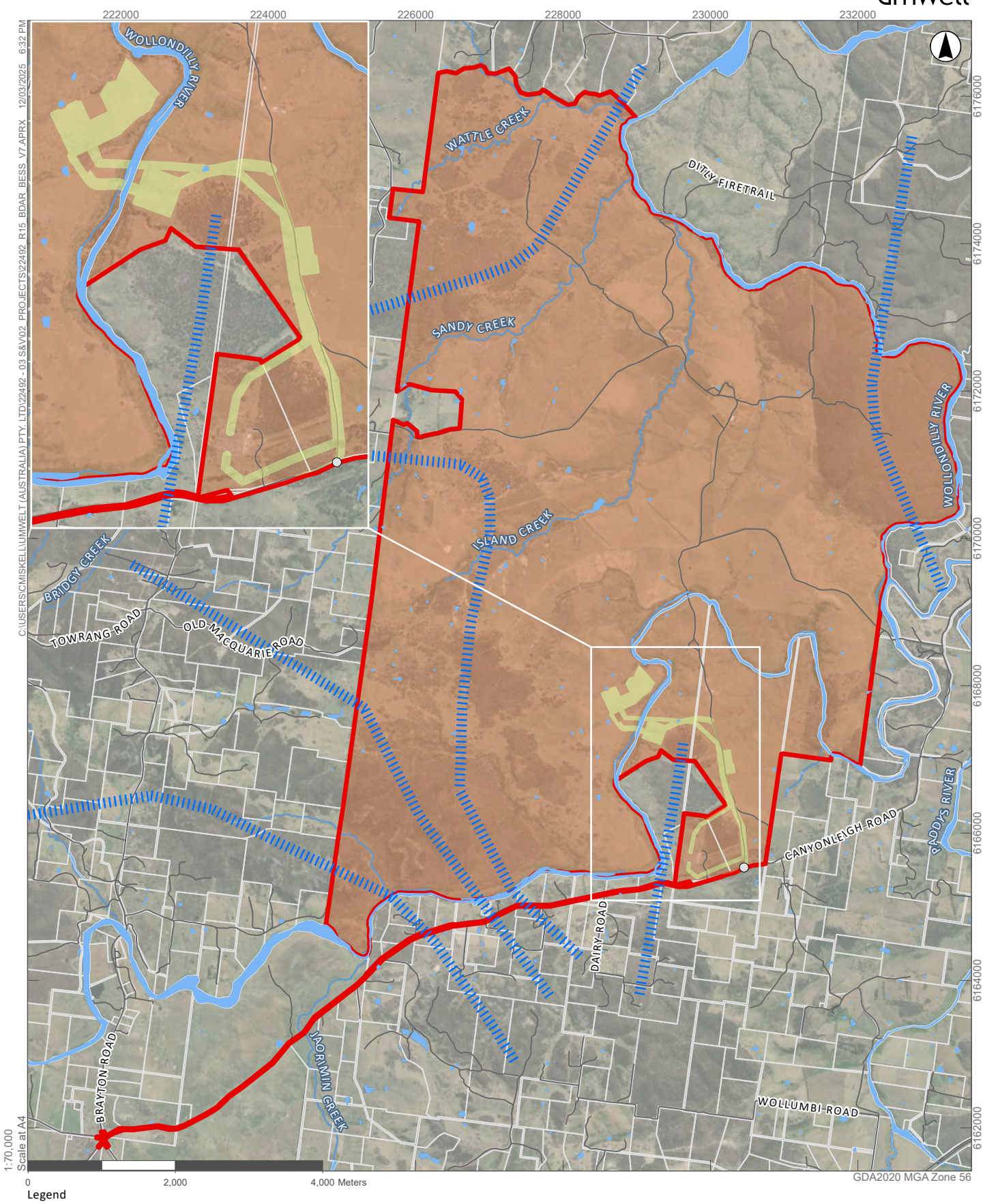


FIGURE 3.1

Rivers, Streams, Estuaries and Wetlands Downstream of the Subject Land

Image Source: ESRI Basemap (2024) **Data source:** NSW LPI (2024), NSW DSFI (2024)



Legend

- Project Area
- Property Boundaries
- Development Footprint
- Retained / Impact Avoidance Areas
- Waterbodies
- Retained Connectivity Pathway
- Watercourse
- Existing Roads and Tracks
- Access Points

FIGURE 3.2

Habitat Connectivity

Image Source: ESRI Basemap (2024) **Data source:** NSW LPI (2024), NSW DSFI (2024), NSW DPIE (2024)

4.0 Native Vegetation, Threatened Ecological Communities and Vegetation Integrity

4.1 Native Vegetation Extent

The parts of the Development Footprint assessed as native vegetation for the purposes of the vegetation integrity surveys are shown in **Figure 4.1.**

4.1.1 Changes to the Mapped Native Vegetation Extent

No notable changes to the mapped native vegetation extent were observed during surveys. Small areas identified as Category 1 – Exempt land on the draft NVR map, were re-categorised by Umwelt to Category 2 – regulated land as they were either derived native grassland of a CEEC, or moderate conservation grassland and did not meet the definition of Category 1 – Exempt Land.

4.1.2 Areas That Are Not Native Vegetation

Large areas of Category 1 – Exempt Land are located in the northern portions of the Development Footprint. These areas comprise paddocks with improved pastures and/or heavily grazed paddocks. Large areas of the Development Footprint are dominated by monocultures of serrated tussock grass (*Nassella trichotoma*).

Eight BAM vegetation integrity (VI) plots were undertaken in non-native vegetation to assist with the vegetation mapping and categorisation of the grassland areas. These plots were compared to the benchmarks of PCT 3374 and assessed in the BDAR as vegetation zone 4 'PCT 3374 – DNG exotic dominated' with the VI scores provided in **Table 4.1.** Although assessed against a native PCT, this vegetation zone is considered too degraded to provide habitat for threatened flora species and no survey were undertaken within this vegetation zone.

Table 4.1 VI score for Vegetation Plots Completed in Areas of Category 1 – Exempt Land

Plot ID	VI Score
P_22492_004	2.3
P_22492_005	2.4
P_22492_006	1.2
P_22492_007	1.2
P_22492_009	0.5
P_22492_013	1.4
P_22492_014	1.3
P_22492_27	0.9

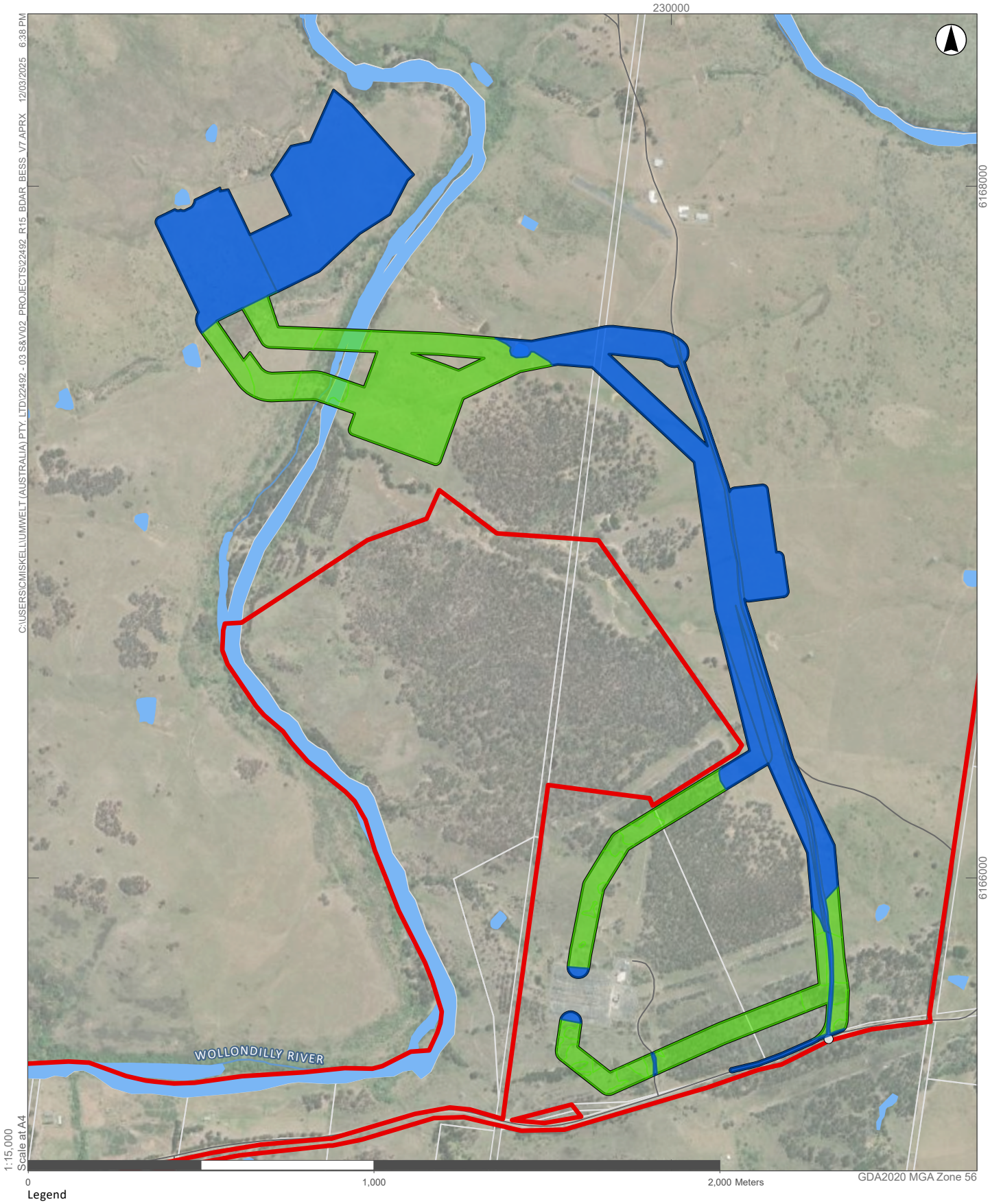


FIGURE 4.1

Native Vegetation Extent

Image Source: ESRI Basemap (2024) **Data source:** NSW LPI (2024), NSW DSFI (2024), NSW DPIE (2024), Umwelt (2024)

4.2 Plant Community Types

4.2.1 Overview of PCTs Present

The PCTs identified in this assessment are based on the revised PCTs for eastern NSW and associated update to the BAM-C which occurred in February 2023.

Vegetation within the Development Footprint has been assessed with reference to the BioNet Vegetation Classification PCTs. Extent of the PCTs within the Development Footprint are provided in **Table 4.2** and their extent is shown in **Figure 4.2**. Detailed descriptions of each PCT are provided in **Section 4.2.2.**

Due to the measures taken to avoid and mitigate impacts to biodiversity values, a number of the vegetation integrity plots sampled vegetation outside of the current Development Footprint. The vegetation sampled is contiguous with the vegetation within the Development Footprint and is considered to be a suitable representation of the condition of the impacted vegetation zones.

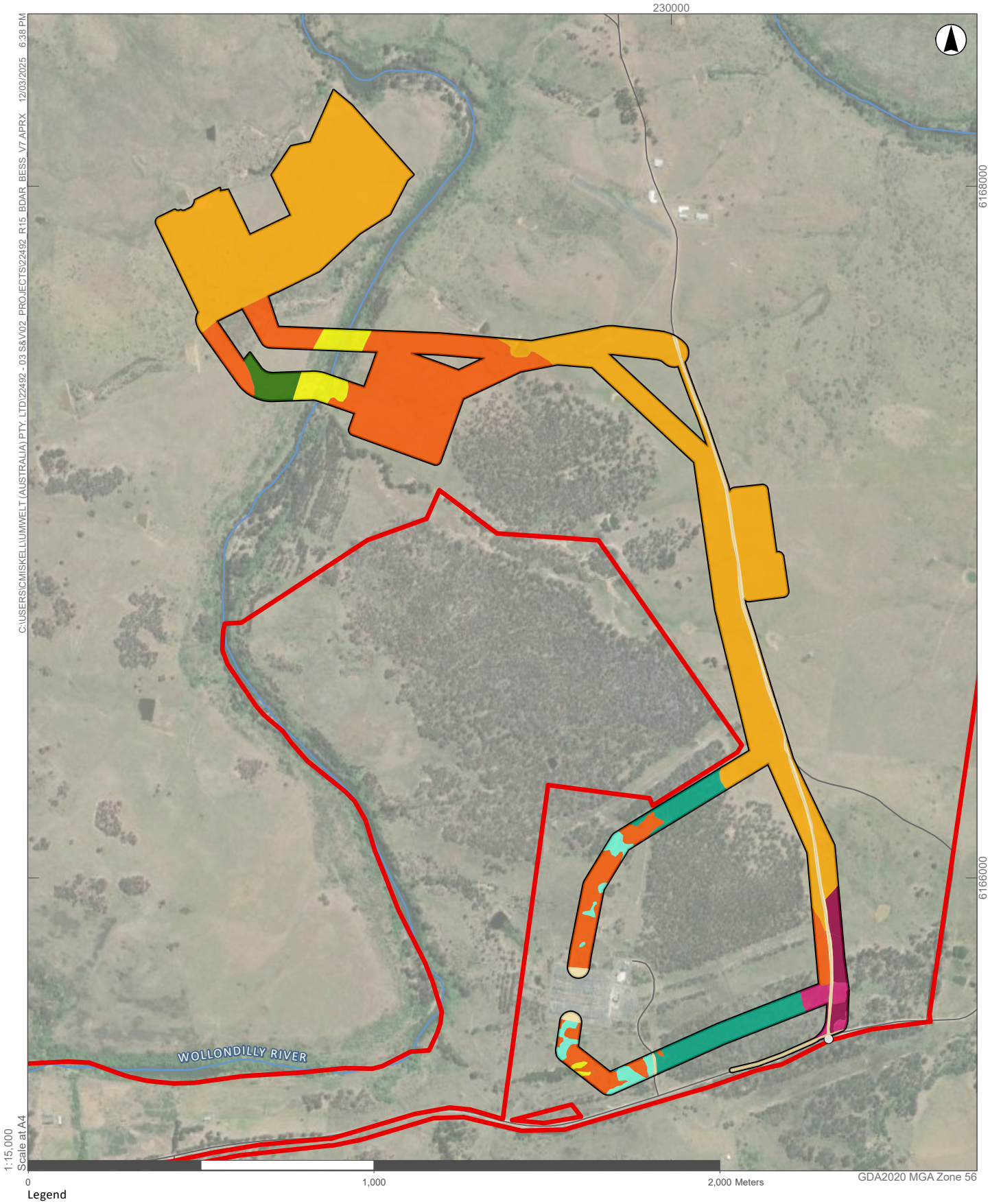
Surveys were also completed within the following PCTs which were originally part of the Development Footprint but later excluded as part of the impact avoidance measures achieved for the Project:

- PCT 3643 Bungonia Tableland Silvertop Ash-Stringybark Forest.
- PCT 3373 Goulburn Tableland Box-Gum Grassy Forest (which is associated with White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland which is listed as a CEEC under the BC Act and EPBC Act).
- PCT 3347 Southern tableland Creekflat Ribbon Gum Forest.

Table 4.2 Plant Community Types Identified within the Development Footprint

Veg Zone ID	PCT ID	PCT Name	Vegetation Class	Vegetation Formation	NSW VIS % Cleared Estimate	Development Footprint Vegetation Conditions Zone	Plots Completed	Area (ha) in BESS	Area (ha) in Common Ancillary Features	Area (ha) in Transmission Line Option 1	Area (ha) in Transmission Line Option 2	Condition Zone Area (ha)	Total PCT Area (ha)
1	4063	Central and Southern Tableland River Oak Forest	Eastern Riverine Forests	Forested Wetlands	67.93	Moderate – Degraded	2	0	1.94	0	0.11	2.05	2.05
2	3374	Goulburn Tableland Peppermint Grassy Forest	Southern Tableland Grassy Woodlands	Grassy Woodlands	80.87	DNG – Moderate/ Degraded	10	0	14.81	2.54	1.90	19.25	68.8
3						DNG – low condition	6	0	1.18	0	0	1.18	
4						DNG – Exotic Dominated	8	13.42	25.64	1.6	2.29	42.95	
5						Moderate - Degraded	8	0	0	0.46	0.84	1.3	
6						Good – Moderate	4	0	0	1.39	2.73	4.12	
7	3376	Southern Tableland Grassy Box Woodland	Southern Tablelands Grassy Woodlands	Grassy Woodlands	92.96	DNG	1	0	1.23	0	0	1.23	2.12
8						Good – Moderate	3	0	0.44	0	0.45	0.89	
9													
-	0	Cleared/ Infrastructure	-	-	-	Non-native	0	0	2.42	0.13	0.18	2.73	2.73
						Total	**60***	**13.42**	**47.66**	**6.12**	**8.50**	**75.70**	**75.70**

** Note: 18 additional plots were undertaken in vegetation zones that are now outside the Development Footprint.*



Legend

- Project Area
- Development Footprint
- Existing Roads and Tracks
- Watercourse
- Access Points

Plant Community Types and Condition Zones

- Cleared/Infrastructure
- Dam

PCT 3374 - Goulburn Tableland Peppermint Grassy Forest

- DNG-Planted/Regen
- DNG-Moderate/Degraded
- DNG - Low Condition
- DNG - exotic dominated
- Good/Moderate
- Moderate/Degraded

PCT 3376 - Southern Tableland Grassy Box Woodland

- DNG
- Good/Moderate
- Moderate/Degraded

PCT 3347 - Southern tableland Creekflat Ribbon Gum Forest

- Moderate/Degraded

PCT 4063 - Central and Southern Tableland River Oak Forest

- Moderate/Degraded

FIGURE 4.2

Plant Community Types and Vegetation Condition Zones

Image Source: ESRI Basemap (2024) **Data source:** NSW LPI (2024), NSW DSFI (2024), Umwelt (2024)

4.2.2 Description of PCT 4063 Central and Southern Tableland River Oak Forest

4.2.2.1 PCT Description

PCT 4063 Central and Southern Tableland River Oak Forest is the dominant PCT along the banks of the Wollondilly River which traverses through the southern and western portions of the Development Footprint (refer to **Table 4.3**). NSW DCCEEW (2024a) have described this PCT as a tall, dense to open grassy riparian open forest that occurs on narrow bands of shallow sand/gravel/boulder alluvium on swift-flowing streams. It is characterised by a dense and tall canopy of river oak (*Casuarina cunninghamiana* subsp. *cunninghamiana*), and a sparse to patchy shrub layer and grassy ground layer.

Table 4.3 Overview of PCT 4063 Central and Southern Tableland River Oak Forest

PCT 4063 Central and Southern Tableland River Oak Forest	
PCT ID	4063
PCT Name	Central and Southern Tableland River Oak Forest
Vegetation Formation	Forested Wetlands
Vegetation Class	Eastern Riverine Forests
Percent Cleared Value (%)	67.93
Condition States and Extent within Development Footprint (ha)	Moderate – Degraded – total area of 2.05 ha with: • 1.94 ha in the Common Ancillary Features Area • 0.11 ha in Transmission Line Option 2 Area.
Vegetation Integrity Score	38.7
Photo	
Plots	2 plots (042, 043)
Location	Along the banks of the Wollondilly River.
Floristics Description – Canopy Stratum	The canopy stratum of this PCT dominated by *Casuarina cunninghamiana* with the occasional *Eucalyptus amplifolia*.
Floristics Description – Mid Stratum	The mid stratum is typically dominated by *Acacia mearnsii.*
Floristic Description – Ground Stratum	The ground stratum is usually dominated by grasses including *Microlaena stipoides*. This stratum is also typically dominated by forb species including *Persicaria decipiens* and *Rumex brownii.*
BC Act TEC associations	Not associated with any TECs listed under the BC Act.
EPBC Act TEC associations	Not associated with any TECs listed under the EPBC Act.

4.2.2.2 Justification for PCT Selection

The NSW BioNet Vegetation Classification (NSW DCCEEW 2024a) characterised this PCT as a tall, dense to open grassy riparian open forest that occurs on narrow bands of shallow sand/gravel/boulder alluvium on swift-flowing streams. It is characterised by a dense and tall canopy of *Casuarina cunninghamiana* subsp. *cunninghamiana*, and a sparse to patchy shrub layer that may include occasional *Bursaria spinosa, Melicytus dentatus* or *Acacia dealbata*. The predominantly grassy ground layer is almost always dominated by *Microlaena stipoides* and *Lomandra longifolia*, frequently with grasses *Poa labillardierei* var. *labillardierei, Echinopogon ovatus* and *Rytidosperma racemosum*, and the tussocky riparian sedge *Carex appressa*.

The location and formation of this PCT in the Development Footprint is consistent with the description with the NSW BioNet Vegetation Classification, comprising an open grassy riparian forest on the banks of the Wollondilly River on alluvium substrate. The allocation and mapping of this PCT was based on the presence of a forested wetland on the banks of a major watercourses with a canopy dominated by *Casuarina cunninghamiana.* Other flora species identified in the BioNet Vegetation Classification present in the Development Footprint include *Eucalyptus amplifolia, Acacia mearnsii, Acacia decurrens*, *Microlaena stipoides, Poa labillardierei, Persicaria decipiens* and *Oxalis perennans.*

The following PCTs were also considered, but excluded from occurring from areas mapped as this PCT:

- PCT 3228 Wollondilly-Shoalhaven Siltstones Sheltered Forest. This PCT was excluded as it is not dominated by *Casuarina cunninghamiana.*
- PCT 4084 Southern Escarpment River Oak Forest. This PCT fit the floristic description however it was excluded as it does not occur in the Bungonia IBRA subregion.

4.2.3 Description of PCT 3374 Goulburn Tableland Peppermint Grassy Forest

4.2.3.1 PCT Description

PCT 3374 Goulburn Tableland Peppermint Grassy Forest is the dominant PCT in the Development footprint and in the locality (refer to **Table 4.4**). In the Development footprint, this PCT has been recorded in

- two woodland condition classes (good/moderate and moderate/degraded) and
- three derived native grassland condition classes (DNG-low condition, DNG- moderate/degraded and DNG – Exotic dominated).

NSW DCCEEW (2024a) have described this PCT as a tall dry grassy sclerophyll open forest restricted to areas of relatively shallow rocky soils with a sparse to mid-dense canopy almost always includes *Eucalyptus dives*, with occasional associates *Eucalyptus dalrympleana* or *Eucalyptus macrorhyncha.*

Table 4.4 Overview of PCT 3374 Goulburn Tableland Peppermint Grassy Forest

PCT 3374 Goulburn Tableland Peppermint Grassy Forest	
PCT ID	3374
PCT Name	Goulburn Tableland Peppermint Grassy Forest
Vegetation Formation	Grassy Woodlands
Vegetation Class	Southern Tableland Grassy Woodlands
Percent Cleared Value (%)	80.87
Condition States and Extent within Development Footprint (ha)	**DNG – Moderate Degraded** – total area of 19.25 ha with: • 14.81 ha in the common ancillary features area • 2.54 ha in the transmission line option 1 area • 1.90 ha in the transmission line option 2 area. **DNG – low condition** – total area of 1.18 ha with: • 1.18 ha in the common ancillary features area. **DNG – exotic dominated** total area of 42.95 ha: • 13.42 ha in the BESS area • 25.64 ha in the common ancillary features area • 1.6 ha in the transmission line option 1 area • 2.29 ha in the transmission line option 2 area. **Moderate – Degraded –** total area of 1.3 with: • 0.46 in the transmission line option 1 area • 0.84 in the transmission line option 2 area. **Good – Moderate** – total area of 4.12 ha with: • 1.39 ha in the transmission line option 1 area • 2.73 ha in the transmission line option 2 area.
Vegetation Integrity Score	**DNG – Moderate Degraded** - 17.7 **DNG - low condition** - 2.7 **DNG - exotic dominated** - 1 **Moderate – Degraded** – 69.7 **Good – Moderate** – 76
Photos	**DNG – Moderate Degraded** 

PCT 3374 Goulburn Tableland Peppermint Grassy Forest	
	DNG – Low Condition  **DNG – Exotic Dominated** 

PCT 3374 Goulburn Tableland Peppermint Grassy Forest	
	Moderate – Degraded  **Good – Moderate** 
Plots	37 plots **DNG – Moderate Degraded –** 008, 026,030, 032, 033,035, 040, 041, 046, 055, 060 **DNG - low condition -** 053, 054, 056, 057, 058, 059 **DNG – exotic dominated –** 004, 005, 006, 007, 009, 013, 014, 027 **Moderate – Degraded** – 003, 011, 012, 020, 021, 036, 038, 051 **Good – Moderate –** 024, 028, 029, 034,
Location	**DNG – Moderate Degraded –** small patches in the common ancillary facilities and both transmission line options. **DNG - low condition –** in patches throughout the common ancillary footprints. **DNG – exotic dominated -** large patches throughout the common ancillary footprints and transmission lines, associated with Category 1 – exempt land **Moderate – Degraded** –larger more intact patches in the southern portion of the development footprint. **Good – Moderate –** some large intact patches of woodland in the southern portion of the development footprint.
Floristics Description – Canopy Stratum	The canopy stratum of the woodland patches of this PCT are typically dominated by *Eucalyptus macrorhyncha, Eucalyptus dives, Eucalyptus cinerea, Eucalyptus dalrympleana* and *Eucalyptus globoidea*.

PCT 3374 Goulburn Tableland Peppermint Grassy Forest	
Floristics Description – Mid Stratum	Midstorey is spare in all condition zones with the exception of the good/moderate zone which has a dense shrub layer. Species include *Ozothamnus diosmifolius, Cassinia aculeata, Dodonaea viscosa, Acacia decurrens.*
Floristic Description – Ground Stratum	The ground stratum of this PCT is generally dominated by grass and grass-like species including *Sporobolus creber, Themeda triandra, Aristida ramosa, Eragrostis brownii* and *Eragrostis leptostachya*.
BC Act TEC associations	Not associated with any TECs listed under the BC Act.
EPBC Act TEC associations	Not associated with any TECs listed under the EPBC Act.

4.2.3.2 Justification for PCT Selection

The NSW BioNet Vegetation Classification (NSW DCCEEW 2024a) characterised PCT 3374 as a tall dry grassy sclerophyll open forest restricted to areas of relatively shallow rocky soils on the moderately high, cool plateaus of the South Eastern Highlands. It occurs at elevations of 800 – 1,200 m above sea level (asl) with mean annual rainfall of 750 – 900 mm, predominantly on Lachlan Orogen sedimentary rocks and occasionally on other adjacent geologies. A sparse to mid-dense canopy almost always includes *Eucalyptus dives*, with occasional associates *Eucalyptus dalrympleana* or *Eucalyptus macrorhyncha*. The shrub layer is sparse to very sparse and commonly includes scattered *Hibbertia obtusifolia* and *Melichrus urceolatus*, occasionally with *Acacia dealbata* or *Daviesia latifolia*. The grassy ground layer almost always includes *Poa sieberiana*, commonly with *Microlaena stipoides, Rytidosperma pallidum, Themeda triandra* and occasional *Rytidosperma racemosum*. Common forbs include *Gonocarpus tetragynus, Lomandra filiformis, Hydrocotyle laxiflora, Hypericum gramineum, Scleranthus biflorus, Hardenbergia violacea, Viola betonicifolia.*

The location and formation of this PCT in the Development Footprint is consistent with the description with the PCT comprising a tall dry grassy sclerophyll open forest. The soils are relatively shallow often with areas of exposed rocks. The allocation and mapping of this PCT and condition zones was based on the presence of the dominant canopy species *Eucalyptus macrorhyncha, Eucalyptus dives, Eucalyptus cinerea, Eucalyptus dalrympleana* and *Eucalyptus globoidea.* Other flora species identified in the BioNet Vegetation Classification for this PCT include *Allocasuarina littoralis, Melichrus urecolatus, Indigophera australis*, *Pimelea linifolia, Acacia falciformis, Bursaria spinosa, Exocarpos strictus, Acacia mearnsii, Pteridium esculentum, Lomandra filiformis, Rytidosperma pallidum, Themeda triandra, Lomandra multiflora* subsp*. multiflora, Rytidosperma racemosum, Aristida ramosa.*

The following PCTs were considered, but excluded from occurring from areas mapped as this PCT:

- PCT 3486 Wollondilly-Shoalhaven Slopes Grassy Open Forest. This PCT was excluded as the floristic composition of PCT 3374 was more consistent with the vegetation data recorded in the field surveys. The vegetation zones comprised woodland vegetation with dominant canopy species *Eucalyptus dives* and *Eucalyptus macrorhyncha* which is consistent with the PCT 3374 description. PCT 3486 was excluded due to the absence of characteristic species *Eucalyptus bridgesiana* and *Eucalyptus melliodora.*

- PCT 3366 Central Tableland Clay Apple Box Grassy Forest is described as a forest or woodland with a canopy of *Eucalyptus bridgesiana, Eucalyptus melliodora* and *Eucalyptus macrorhyncha*. Although floristically the description is similar, PCT 3374 was a better match given the dominance of *Eucalyptus dives* and *Eucalyptus macrorhyncha* which is consistent with PCT 3374. PCT 3366 was excluded due to the absence of characteristic species *Eucalyptus bridgesiana* and *Eucalyptus melliodora.*

- PCT 3643 Bungonia Tableland Silvertop Ash-Stringybark Forest. PCT 3643 was excluded due to the absence of characteristic species *Eucalyptus sieberi* and *Eucalyptus agglomerata* in the vegetation zones.

4.2.4 Description of PCT 3376 Southern Tablelands Grassy Box Woodland

4.2.4.1 PCT Description

PCT 3376 Southern Tablelands Grassy Box Woodland is present in small patches in the Development footprint and in the locality (refer to **Table 4.5**). In the Development Footprint, this PCT has been recorded in:

- One woodland condition class (good/moderate) and
- One derived native grassland condition classes (DNG).

NSW DCCEEW (2024a) have described this PCT as a tall sclerophyll woodland with a dry shrub layer that is patchy to absent and a mid-dense, grassy groundcover, widespread in the low hills of the drier parts of the Southern Tablelands.

Table 4.5 Overview of PCT 3376 Southern Tablelands Grassy Box Woodland

PCT 3376 Southern Tablelands Grassy Box Woodland	
PCT ID	3376
PCT Name	Southern Tablelands Grassy Box Woodland
Vegetation Formation	Grassy Woodlands
Vegetation Class	Southern Tablelands Grassy Woodlands
Percent Cleared Value (%)	92.96
Condition States and Extent within Development Footprint (ha)	**DNG** – total of 1.23 ha with: • 1.23 ha in common ancillary features **Good /Moderate** – total of 0.89 ha with: • 0.44 ha in the common ancillary features • 0.45 ha in the transmission line option 2
Vegetation Integrity Score	**DNG -**26.2 **Good/ Moderate –** 76.9
Photos	**DNG** 

PCT 3376 Southern Tablelands Grassy Box Woodland	
Photos	**Good/Moderate** 
Plots	4 plots **DNG -**037 **Good /Moderate –** 031, 045, 050
Location	The patches of PCT 3376 are located at the southern entrance to Artherleigh farm on Canoyonleigh Road.
Floristics Description – Canopy Stratum	The canopy stratum of this PCT is generally dominated by *Eucalyptus amplifolia, Eucalyptus melliodora, Eucalyptus eugenioides, Eucalyptus blakelyi,* and *Eucalyptus macrorhyncha*.
Floristics Description – Mid Stratum	The mid stratum generally has minimal cover with some occurrences of *Ozothamnus diosmifolius* and *Cassinia aculeata.*
Floristic Description – Ground Stratum	The ground stratum is usually dominated by grass and grass-like species including *Themeda triandra, Austrostipa scabra, Aristida ramosa, Juncus usitatus, Tripogon loliiformis,* and *Microlaena stipoides.*
BC Act TEC associations	PCT 3376 is commensurate with White Box - Yellow Box - Blakely's Red Gum Grassy Woodland and Derived Native Grassland in the NSW North Coast, New England Tableland, Nandewar, Brigalow Belt South, Sydney Basin, South Eastern Highlands, NSW South Western Slopes, South East Corner and Riverina Bioregions which is a CEEC under the BC Act.
EPBC Act TEC associations	PCT 3376 is commensurate with White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland which is listed as a CEEC under the EPBC Act.

4.2.4.2 Condition States and Alignment with BC Act and EPBC Act Listed TECs

This PCT has been mapped as occurring within the following two condition states within the Development Footprint.

PCT 3376 DNG

This vegetation zone comprises derived native grassland of PCT 3376 in a moderate condition. Section 3.3.2 of the BAM Stage 1 Manual (NSW DPE 2022a) identifies that separate vegetation zones are required for parts of the Development Footprint where the vegetation has a current VI Score of <15 for a PCT representative of a critically endangered ecological community. This approach has been applied for stratifying the areas of PCT 3376 and this condition zone represents the lowest of three condition zones for PCT 3376 with an integrity score of 26.2.

These areas contained modified pastures with no trees and low shrub species richness and cover. Native grasses and forbs occur with a mixture of exotic flora species and with low cover and species richness of native ferns and other native plants. These areas have been degraded by agricultural use and the invasion of exotic species. This condition zone typically has poor overall function attributes, with some level of native vegetation resilience still present.

This condition zone corresponds to the White Box – Yellow Box – Blakely's Red Gum Grassy Woodland and Derived Native Grassland CEEC listed under the BC Act, and EPBC Act. There is no condition threshold for this CEEC under the BC Act. The condition threshold (Class C) under the EPBC Act (DCCEW 2023) for this vegetation zone is not met, as described in **Table 4.6.**

Table 4.6 Condition Criteria (DCCEEW 2023) and Vegetation Zone 7 (PCT 3376 DNG)

Condition Class C criteria	Comment
The ground layer is predominantly native	Yes, the ground layer is predominantly native.
AND The patch contains 20 or more mature trees* per hectare	No, no canopy species in this vegetation zone.
AND/OR The patch contains natural regeneration of dominant overstorey eucalypts	No, this vegetation zone did not contain recruits of canopy species. The vegetation zone is located under a powerline easement in the southern portion of the site, it is likely that the vegetation in this area is under routine maintenance relating to the powerline infrastructure.
Outcome	Condition criteria not met, vegetation zone 7 (PCT 3376 DNG) is not commensurate with White Box - Yellow Box - Blakely's Red Gum Grassy Woodland and Derived Native Grassland CEEC as listed under the EPBC Act.

PCT 3376 Good/ Moderate

This vegetation zone comprises woodland of PCT 3376 in a good to moderate condition. This condition zone represents the best condition of the three condition zones for PCT 3376 and has an integrity score of 76.9.

These areas contained native woodland vegetation with a mostly intact understorey with some native shrub species richness and cover. Native grasses and forbs occur with a mixture of exotic flora species and with low to moderate cover and species richness of native ferns and other native plants. These areas have been somewhat degraded by agricultural use and the invasion of exotic species. This condition zone typically has moderate to good overall function attributes.

This condition zone corresponds to the White Box - Yellow Box - Blakely's Red Gum Grassy Woodland and Derived Native Grassland CEEC listed under the BC Act, and EPBC Act. There is no condition threshold for this CEEC under the BC Act. The condition threshold under the EPBC Act for this CEEC is met, as the understorey is predominantly native, all patches are > 0.1 ha in size and more than 12 native understorey species (including one listed important species) are present. The condition threshold (Class B) under the EPBC Act (DCCEW 2023) for this vegetation zone is met, as described in **Table 4.7.**

Table 4.7 Condition Criteria (DCCEEW 2023) and Vegetation Zone 8 (PCT 3376 Good/Moderate)

Condition Class B criteria	Comment
The ground layer is predominantly native	Yes, the ground layer is predominantly native.
The understorey contains at least 12 native, non-grass species (such as forbs, shrubs, ferns and sedges)	Yes, the understorey contains at least 12 native, non-grass species.
AND at least one of the understorey species should be a species recognised as 'important' (e.g. grazing sensitive, regionally significant, listed threatened or uncommon species)	Yes, at least one of the understorey species should be a species recognised as 'important'.
Outcome	Condition criteria met, vegetation zone 8 (PCT 3376 Good/Moderate) is commensurate with White Box - Yellow Box - Blakely's Red Gum Grassy Woodland and Derived Native Grassland CEEC as listed under the EPBC Act.

4.2.4.3 Justification for PCT Selection

The NSW BioNet Vegetation Classification (NSW DCCEEW 2024a) characterised PCT 3376 as a tall sclerophyll woodland with a dry shrub layer that is patchy to absent and a mid-dense, grassy groundcover, widespread in the low hills of the drier parts of the Southern Tablelands. The canopy almost always includes box eucalypts (*Eucalyptus melliodora* or *Eucalyptus bridgesiana*), occasionally associated with *Eucalyptus blakelyi* which may be locally prominent in lower parts of the landscape. The shrub layer is sparse to absent with occasional, scattered *Melichrus urceolatus, Lissanthe strigosa* or various *Acacia* species. The mid-dense ground layer typically includes grasses, forbs, graminoids and some twiners, very frequently including *Hydrocotyle laxiflora, Austrostipa scabra, Lomandra filiformis, Microlaena stipoides* and *Elymus scaber*.

The location and formation of this PCT is consistent with the description for this PCT in the NSW BioNet Vegetation Classification, comprising a tall sclerophyll woodland. The allocation and mapping of this PCT and condition zones was based on the presence of the dominant canopy species *Eucalyptus blakelyi* and *Eucalyptus melliodora.* Other flora species identified in the BioNet Vegetation Classification for this PCT include *Eucalyptus macrorhyncha, Eucalyptus dives, Eucalyptus amplifolia, Eucalyptus cinerea, Cassinia longifolia, Dodonaea viscosa, Kunzea ericoides, Cheilanthes sieberi, Lomandra filiformis, Themeda triandra, Lomandra multiflora.*

The following PCTs were considered, but excluded from occurring from areas mapped as this PCT:

- PCT 3373 Goulburn Tableland Box-Gum Grassy Forest. PCT 3373 was excluded as it has a more diverse shrub layer and *Eucalyptus macrorhyncha* and *Eucalyptus dives* are considered rare in PCT 3376.
- PCT 3747 Southern Tableland Western Hills Scribbly Gum Forest was excluded as the canopy species were similar but lacked *Eucalyptus blakelyi* as a dominant canopy species.
- PCT 3338 Goulburn Tableland Frost Hollow Grassy Woodland was excluded as the dominant canopy species was described as being *Eucalyptus pauciflora*, occasionally with *Eucalyptus rubida.*

4.2.5 Other PCTs Surveyed within the Project Area

The following PCTs were surveyed as part of a larger Development Footprint which was subsequently reduced and will now be retained as a part of the impact avoidance measures implemented for the Project:

- PCT 3373 Goulburn Tableland Box-Gum Grassy Forest. This PCT occurs in numerous patches in the northern and middle portion of the Project Areas. The tree stratum is intact and dominated by *Eucalyptus blakelyi* and *Eucalyptus mellidora*. The shrub stratum is sparse with degrees of condition classes. This PCT is associated with the White Box - Yellow Box - Blakely's Red Gum Grassy Woodland and Derived Native Grassland CEEC listed under the BC Act, and EPBC Act. This area contains good quality habitat for many threatened fauna species including the squirrel glider, gang-gang cockatoo and south-eastern glossy black-cockatoo. This patch will be retained within the eastern part of the Project Area.

- PCT 3643 Bungonia Tableland Silvertop Ash-Stringybark Forest: The surveyed areas of this PCT consist of a patch of remnant *Eucalyptus agglomerata and Eucalyptus sieberi* trees, the shrub and understorey stratum are dense with a great diversity of native shrubs, grasses, herbs and forbs. This area contains good quality habitat for many threatened fauna species including the squirrel glider, gang-gang cockatoo and south-eastern glossy black-cockatoo. This patch will be retained within the eastern part of the Project Area.

- PCT 3347 Southern Tableland Creekflat Ribbon Gum Forest is located along the banks of the creeklines and drainage lines within the Development Footprint. These areas are in early stages of regeneration and are generally in a degraded condition with a high abundance of invasive weed species including blackberry (*Rubus fruticosus* spp. agg.), serrated tussock (*Nassella trichotoma*) and St John's wort (*Hypericum perforatum*).

4.2.6 Cleared Land and Waterbodies

The Development Footprint contains 46.86 ha mapped as exotic or low condition grassland, of which is 2.73 ha is vehicle tracks, 42.95 ha mapped as Category 1 Land, and 0.004 ha mapped as waterbodies associated with farm dams.

The entirety of the land currently being proposed as Category 1 – exempt land consists of pasture improvement, cropping and exotic pasture grasses, with much of it currently being grazed by sheep and cattle. They are dominated by species such as Serrated Tussock (*Nassella trichotoma*), *Vulpia muralis*, *Lolium perenne* and *Hordeum vulgare*. When at great densities, these species can exclude all other species, including native forbs and grasses. These areas are typically subject to pasture improvement actions, including application of fertiliser and tillage of the land. These areas are not considered to provide any habitat for threatened species and will not generate biodiversity credits.

The guidance within Figure 7 in the NSW Government's 2017 Native Vegetation Regulatory Map: Method Statement has been followed whereby land mapped as 'Plantation forests – 3.1.0.' 'Cropping – 3.3.0.', 'Grazing Modified Pastures – 3.2.0.' and 'Residential and Farm Infrastructure – 5.4.0.' were assigned Category 1 – exempt land, upon verification in the field and through aerial imagery.

Areas that were dominated by native grasses at the time of survey have been mapped as derived native grassland and will be fully assessed under the BAM 2020 for potential habitat for threatened species, and for potential generation of biodiversity credits.

Similarly, where the canopy is present and forming stands of vegetation that would provide habitat for threatened flora and fauna, this has been mapped as the applicable Plant Community Type (PCT) and will be fully assessed under the BAM.

In summary, it is only those areas that are entirely dominated by exotic pasture grasses, or that have been previously or currently cropped and tilled, that have been proposed as Category 1 - exempt land. Photographs showing the land categorised as Category 1 are provided below (refer to **Photo 4.1** to **Photo 4.5**).



Photo 4.1 Example of Current Paddock Dominated by Serrated Tussock (*Nassella trichotoma*) and Hordeum vulgare



Photo 4.2 **Example of Existing Hordeum vulgare, Cropping of Paddocks in the North West of the Project Area Mapped as Category 1 – Exempt Land**



Photo 4.3 **Example of Current Degraded Paddocks that has been Heavily Grazed in the Central Portion of the Project Area that have been Mapped as Category 1 – Exempt Land**



Photo 4.4 **Exotic Grassland Consistent for Paddock. Clearly Pasture Improved, also Grazed. Dominated by *Lolium perenne, Trifolium, Hordeum vulgare, Bromus catharticus, Carthamus lanatus* and *Nassella trichotoma***



Photo 4.5 **Heavily Degraded Paddock Dominated by Great Mullein (*Verbascum Thapsus*) and Blackberry (*Rubus fruticosus* agg.)**

4.3 Threatened Ecological Communities

One TEC, the critically endangered White Box - Yellow Box - Blakely's Red Gum Grassy Woodland and Derived Native Grassland occurs within the Development Footprint. The EPBC Act listing of this CEEC corresponds to areas mapped as PCT 3376 Southern Tableland Grassy Box Woodland (Veg zone Moderate/Degraded). The BC Act listing of this CEEC includes all mapped condition zones, as the final determination identifies that it is the intent of the NSW Threatened Species Scientific Committee that all occurrences of the ecological community independent of their condition be covered by the listing under the BC Act.

The EPBC Act listing for this CEEC includes the following condition zones:

- PCT 3376 Southern Tableland Grassy Box Woodland – Good/Moderate.

Threatened ecological community associations for the PCTs observed are discussed in **Section 4.2** of this Report. The details of the threatened ecological communities identified within the Development Footprint are also listed in **Table 4.8** and the extent of each TEC is mapped in **Figure 4.3.**

Table 4.8 TECs within the Development Footprint

TEC Name	Profile ID (from TBDC)	Act and Listing Status	Area of associated PCTs and Vegetation Condition Zones within the Development Footprint
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	10837	Critically Endangered Ecological Community Listed under the BC Act	**PCT 3376 DNG** – total of 1.23 ha with: • 1.23 ha in the common ancillary features **PCT 3376 Good /Moderate** – total of 0.89 ha with: • 0.44 ha in the common ancillary features • 0.45 ha in the transmission line option 2
White Box-Yellow Box-Blakely's Red Gum Grassy Woodlands and Derived Native Grasslands	20392	Critically Endangered Ecological Community Listed under the EPBC Act	**PCT 3376 Good /Moderate** – total of 0.89 ha with: • 0.44 ha in the common ancillary features • 0.45 ha in the transmission line option 2

4.4 Vegetation Zones

A description of each vegetation condition zone within the Development Footprint is provided in **Section 4.2** of this Report. A map of the vegetation condition zones is provided in **Figure 4.2** and the details of each Condition Zone including area, patch size class and the BAM survey plots required and completed are provided in **Table 4.9.**

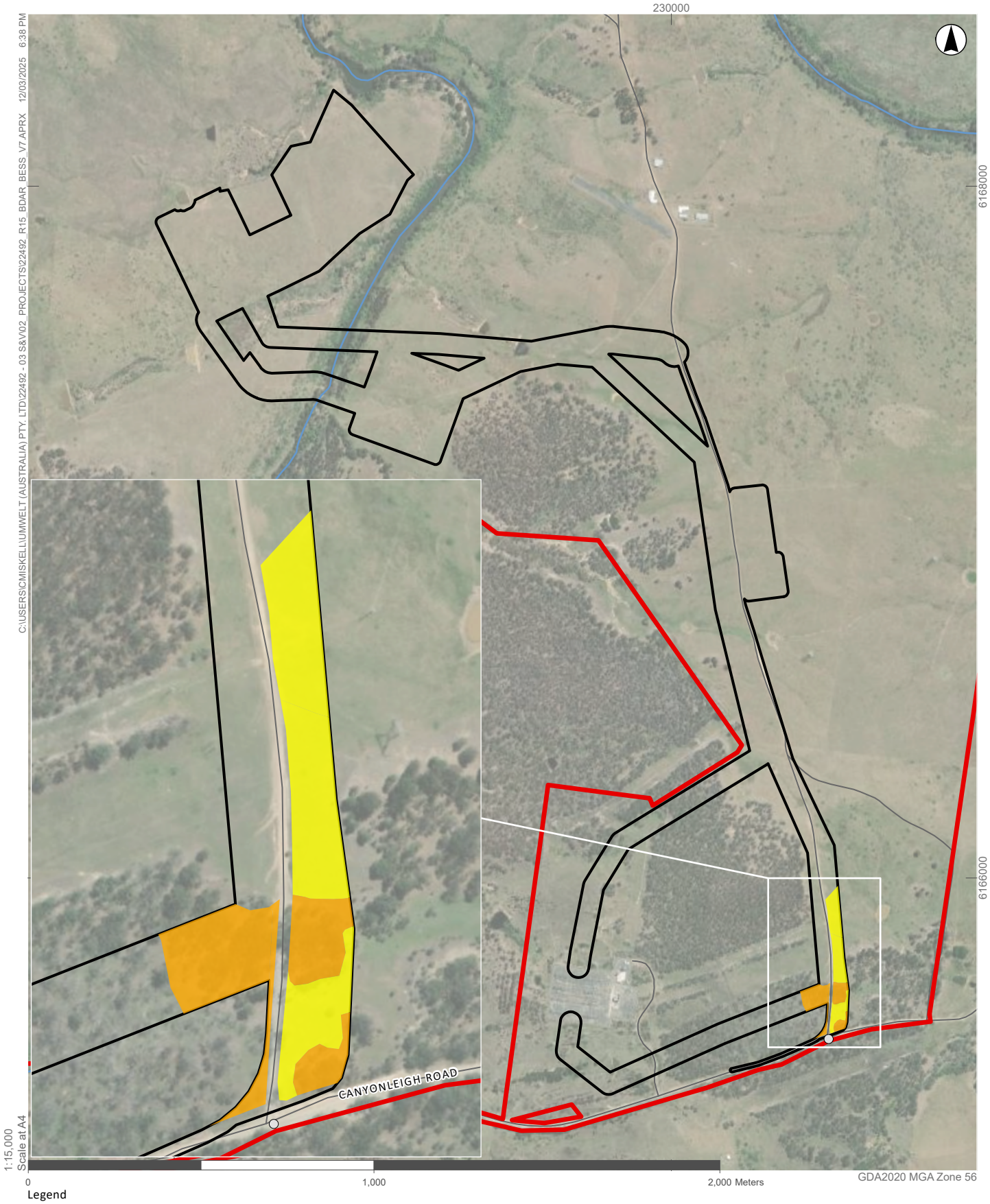


FIGURE 4.3

Threatened Ecological Communities on the Development Footprint

Image Source: ESRI Basemap (2024) **Data source:** NSW LPI (2024), NSW DSFI (2024), Umwelt (2024)

Table 4.9 Vegetation Condition Zones and Patch Sizes

Veg Zone ID	PCT ID	PCT Name	Development Footprint Vegetation Conditions Zone	Patch Size	Area (ha) in BESS Area	Area (ha) in Common Ancillary Features	Area (ha) in TXL Line Option 1	Area (ha) in TXL Line Option 2	Total Condition Zone Area (ha)	No. Vegetation Integrity Plots Required	No. Vegetation Integrity Plots Completed	Plot IDs of Vegetation Integrity Plots Used in Assessment
1	4063	Central and Southern Tableland River Oak Forest	Moderate – Degraded	☐ <5 ha ☐ 5–24 ha ☐ 25–100 ha ☒ >100 ha	0	1.94	0	0.11	2.05	2	2	22492_042, 22492_043
2	3374	Goulburn Tableland Peppermint Grassy Forest	DNG – Moderate/ Degraded	☐ <5 ha ☐ 5–24 ha ☐ 25–100 ha ☒ >100 ha	0	14.81	2.54	1.90	19.25	3	10	22492_035 22492_040 P_22492_26 P_22492_32 P_22492_33 22492_055 22492_060
3			DNG-low condition	☐ <5 ha ☐ 5–24 ha ☐ 25–100 ha ☒ >100 ha	0	1.18	0	0	1.18	1	6	22492_053 22492_054 22492_056 22492_057 22492_058 22492_059
4			DNG – exotic dominated	☐ <5 ha ☐ 5–24 ha ☐ 25–100 ha ☒ >100 ha	13.42	25.64	1.6	2.29	42.95	4	8	P_22492_004 P_22492_005 P_22492_006 P_22492_007 P_22492_009 P_22492_013 P_22492_014 P_22492_27

Veg Zone ID	PCT ID	PCT Name	Development Footprint Vegetation Conditions Zone	Patch Size	Area (ha) in BESS Area	Area (ha) in Common Ancillary Features	Area (ha) in TXL Line Option 1	Area (ha) in TXL Line Option 2	Total Condition Zone Area (ha)	No. Vegetation Integrity Plots Required	No. Vegetation Integrity Plots Completed	Plot IDs of Vegetation Integrity Plots Used in Assessment
5			Moderate - Degraded	☐ <5 ha ☐ 5–24 ha ☐ 25–100 ha ☒ >100 ha	0	0	0.46	0.84	1.3	1	8	22492_036, P_22492_003 P_22492_020
6			Good – Moderate	☐ <5 ha ☐ 5–24 ha ☐ 25–100 ha ☒ >100 ha	0	0	1.39	2.73	4.12	2	4	P_22492_024 P_22492_029
7	3376	Southern Tableland Grassy Box Woodland	DNG	☐ <5 ha ☐ 5–24 ha ☐ 25–100 ha ☒ >100 ha	0	1.23	0	0	1.23	1	2	22492_037
8			Good – Moderate	☐ <5 ha ☐ 5–24 ha ☐ 25–100 ha ☒ >100 ha	0	0.44	0	0.45	0.89	1	3	22492_050
9	0	Non Native	Non Native	☐ <5 ha ☐ 5–24 ha ☐ 25–100 ha ☒ >100 ha	0	2.42	0.13	0.18	2.73	0	0	N/A
				Total	**13.42**	**47.67**	**6.12**	**8.49**	**75.70**	**15**	**60***	

* Note: 18 additional plots were undertaken in vegetation zones that are now outside the Development Footprint.

4.5 Vegetation Integrity (Vegetation Condition)

4.5.1 Vegetation Integrity Survey Plots

Details on the number of BAM plots (floristic and vegetation integrity (VI) survey plots) required and completed for each vegetation condition zone, in accordance with Table 3 of the BAM, are provided in **Table 4.10**. The vegetation integrity plot survey locations are shown in **Figure 2.1**. A summary of the BAM VI plot data is contained in **Appendix C** and a digital copy of the data has been forwarded to BCS.

The vegetation integrity condition scores for the BAM Plots completed are provided in **Table 4.10** provides the combined scores from the plots used in the BAM-C for each vegetation condition zone as well as the vegetation integrity score and presence of hollow bearing trees.

Table 4.10 Vegetation Integrity Condition Scores

Veg Zone ID	Veg Zone Name	Composition Condition Score	Structure Condition Score	Function Condition Score	Vegetation Integrity Score	Hollow Bearing Trees Present?
1	4063_ModDeg	11.6	77.3	64.7	38.7	No
2	3374_DNGModDeg	23.3	50.3	4.8	17.7	No
3	3374_DNG_Low	11.1	14.6	0.1	2.7	No
4	3374_DNG_Exotic	3.6	0	7.6	1	No
5	3374_ModDeg	80.3	55.1	76.6	69.7	Yes
6	3374_GoodMod	64.9	98.2	68.8	76	Yes
7	3376_DNG	26.1	48.3	14.2	26.2	No
8	3376_GoodMod	73.7	84.2	73.3	76.9	Yes

4.5.2 Use of Benchmark Data

The benchmarks in Version 1.5 (last updated 28/10/2024) of the BAM -C were utilised for this assessment.

5.0 Threatened Species

5.1 Ecosystem Species

Ecosystem credit species are those threatened species that can be reliably predicted to occur based on the PCTs identified within the Development Footprint. The BAM-C generates a list of predicted ecosystem credit species from numerous inputs such as landscape features and the native vegetation communities present. The ecosystem credit species applicable to the Project have been predicted using the BAM-C based on the following inputs:

- IBRA subregion: Bungonia
- Associated PCTs: 4063, 3374, 3376
- Percentage native vegetation cover class: >30–70%.
- Patch size class: >100 ha.

The ecosystem credit species predicted to occur on or use the Development Footprint are identified in **Table 5.1**. Justification is provided for any species from the BAM-C automatically populated list excluded from assessment.

Table 5.1 Predicted Ecosystem Credit Species

Common Name	Scientific Name	Listing Status		Dual Credit Species?	Sources	Habitat Constraints / Geographic Limitations	Species Retained for Further Assessment?	Justification for any Exclusions	Associated PCT and Condition Zone Species Retained Within	Sensitivity to Gain Class
		BC Act	EPBC Act							
Birds										
southern whiteface	*Aphelocephala leucopsis*	V	V	☐Yes / ☒No	☒ BAM-C ☐TBDC / BioNet Atlas ☒ PMST ☐ Previous survey ☐ Current survey ☐ Project SEARs	N/A	Yes	N/A	PCT 3374, 3376, 3347	Moderate
regent honeyeater	*Anthochaera phrygia*	CE	CE	☒Yes / ☐No	☒ BAM-C ☒ TBDC / BioNet Atlas ☒ PMST ☐ Previous survey ☐ Current survey ☐ Project SEARs	N/A	Yes	N/A	PCT 3376, 4063	High
dusky wood swallow	*Artamus cyanopterus cyanopterus*	V	-	☐Yes / ☒No	☒ BAM-C ☒ TBDC / BioNet Atlas ☐ PMST ☐ Previous survey ☒ Current survey	N/A	Yes	N/A	PCTs 3374, 3376	Moderate
Australasian bittern	*Botaurus poiciloptilus*	E	E	☐Yes / ☒No	☒ BAM-C ☐ TBDC / BioNet Atlas ☒ PMST ☐ Previous survey ☐ Current survey	Waterbodies; brackish or freshwater wetlands	Yes	N/A	PCT 4063	Moderate

Common Name	Scientific Name	Listing Status		Dual Credit Species?	Sources	Habitat Constraints / Geographic Limitations	Species Retained for Further Assessment?	Justification for any Exclusions	Associated PCT and Condition Zone Species Retained Within	Sensitivity to Gain Class
		BC Act	EPBC Act							
gang-gang cockatoo	*Callocephalon fimbriatum*	E	E	☒Yes / ☐No	☒ BAM-C ☒ TBDC / BioNet Atlas ☒PMST ☐ Previous survey ☒ Current survey	N/A	Yes	N/A	PCTs 3374, 3376, 4063	Moderate
south-eastern glossy black-cockatoo	*Calyptorhynchus lathami lathami*	V	V	☒Yes / ☐No	☒ BAM-C ☒ TBDC / BioNet Atlas ☒PMST ☐ Previous survey ☒ Current survey	Presence of *Allocasuarina* and *Casuarina* species	Yes	N/A	PCTs 3374, 3376, 4063	High
speckled warbler	*Chthonicola sagittata*	V	-	☐Yes / ☒No	☒ BAM-C ☒ TBDC / BioNet Atlas ☒PMST ☐ Previous survey ☐ Current survey	N/A	Yes	N/A	PCTs 3374, 3376, 4063	High
spotted harrier	*Circus assimilis*	V	-	☐Yes / ☒No	☒ BAM-C ☒ TBDC / BioNet Atlas ☒PMST ☐ Previous survey ☐ Current survey	N/A	Yes	N/A	PCTs 3374, 3376, 4063	Moderate
brown treecreeper (eastern subspecies)	*Climacteris picumnus victoriae*	V	V	☐Yes / ☒No	☒ BAM-C ☒ TBDC / BioNet Atlas ☒PMST ☐ Previous survey ☐ Current survey	N/A	Yes	N/A	PCTs 3374, 3376, 4063	High

Common Name	Scientific Name	Listing Status		Dual Credit Species?	Sources	Habitat Constraints / Geographic Limitations	Species Retained for Further Assessment?	Justification for any Exclusions	Associated PCT and Condition Zone Species Retained Within	Sensitivity to Gain Class
		BC Act	EPBC Act							
varied sittella	*Daphoenositta chrysoptera*	V	-	☐Yes / ☒No	☒ BAM-C ☒ TBDC / BioNet Atlas ☒PMST ☐ Previous survey ☐ Current survey	N/A	Yes	N/A	PCTs 3374, 3376, 4063	Moderate
spotted-tailed quoll	*Dasyurus maculatus*	V	E	☐Yes / ☒No	☒ BAM-C ☒ TBDC / BioNet Atlas ☒PMST ☐ Previous survey ☐ Current survey	N/A	Yes	N/A	PCTs 3374, 3376, 4063	High
black falcon	*Falco subniger*	V	-	☐Yes / ☒No	☒ BAM-C ☒ TBDC / BioNet Atlas ☒PMST ☐ Previous survey ☐ Current survey	N/A	Yes	N/A	PCTs 3374, 3376, 4063	Moderate
eastern false pipistrelle	*Falsistrellus tasmaniensis*	V	-	☐Yes / ☒No	☒ BAM-C ☒ TBDC / BioNet Atlas ☒PMST ☐ Previous survey ☐ Current survey	N/A	Yes	N/A	PCTs 3374, 3376, 4063	High
little lorikeet	*Glossopsitta pusilla*	V	-	☐Yes / ☒No	☒ BAM-C ☒ TBDC / BioNet Atlas ☒PMST ☐ Previous survey ☐ Current survey	N/A	Yes	N/A	PCTs 3374, 3376, 4063	High

Common Name	Scientific Name	Listing Status		Dual Credit Species?	Sources	Habitat Constraints / Geographic Limitations	Species Retained for Further Assessment?	Justification for any Exclusions	Associated PCT and Condition Zone Species Retained Within	Sensitivity to Gain Class
		BC Act	EPBC Act							
painted honeyeater	*Grantiella picta*	V	V	☐Yes / ☒No	☒ BAM-C ☒ TBDC / BioNet Atlas ☒PMST ☐ Previous survey ☐ Current survey	Mistletoes present at a density of greater than five mistletoes per hectare	Yes	N/A	PCTs 3376, 4063	Moderate
white-bellied sea-eagle (foraging)	*Haliaeetus leucogaster*	V	-	☒Yes / ☐No	☒ BAM-C ☒ TBDC / BioNet Atlas ☒PMST ☐ Previous survey ☐ Current survey	Within 1 km of a rivers, lakes, large dams or creeks, wetlands and coastlines	Yes	N/A	PCTs 3374, 3376, 4063	High
little eagle (foraging)	*Hieraaetus morphnoides*	V	-	☒Yes / ☐No	☒ BAM-C ☒ TBDC / BioNet Atlas ☒PMST ☐ Previous survey ☐ Current survey	None	Yes	N/A	PCTs 3374, 3376, 4063	Moderate
white-throated needletail	*Hirundapus caudacutus*	V	V	☐Yes / ☒No	☒ BAM-C ☒ TBDC / BioNet Atlas ☒PMST ☐ Previous survey ☐ Current survey	None	Yes	N/A	PCTs 3374, 3376, 4063	High
swift parrot (foraging)	*Lathamus discolor*	E	CE	☒Yes / ☐No	☒ BAM-C ☒ TBDC / BioNet Atlas ☒PMST ☐ Previous survey ☐ Current survey ☐ Project SEARs	None	Yes	N/A	PCTs 3374, 3376, 4063	Moderate

Common Name	Scientific Name	Listing Status		Dual Credit Species?	Sources	Habitat Constraints / Geographic Limitations	Species Retained for Further Assessment?	Justification for any Exclusions	Associated PCT and Condition Zone Species Retained Within	Sensitivity to Gain Class
		BC Act	EPBC Act							
south-eastern hooded robin	*Melanodryas cucullata cucullata*	E	E	☐Yes / ☒No	☒ BAM-C ☒ TBDC / BioNet Atlas ☒PMST ☐ Previous survey ☐ Current survey	None	Yes	N/A	PCTs 3374, 3376, 4063	Moderate
black-chinned honeyeater (eastern subspecies)	*Melithreptus gularis gularis*	V	-	☐Yes / ☒No	☒ BAM-C ☒ TBDC / BioNet Atlas ☒PMST ☐ Previous survey ☐ Current survey	None	Yes	N/A	PCTs 3374, 3376, 4063	Moderate
large bent-winged bat (foraging)	*Miniopterus orianae oceanensis*	V	-	☒Yes / ☐No	☒ BAM-C ☒ TBDC / BioNet Atlas ☒ PMST ☐ Previous survey ☐ Current survey ☐ Project SEARs	None	Yes	N/A	PCTs 3374 3376, 4063	High
turquoise parrot	*Neophema pulchella*	V	-	☐Yes / ☒No	☒ BAM-C ☒ TBDC / BioNet Atlas ☒PMST ☐ Previous survey ☐ Current survey	None	Yes	N/A	PCT 4063	High
olive whistler	*Pachycephala olivacea*	V	-	☐Yes / ☒No	☒ BAM-C ☒ TBDC / BioNet Atlas ☒PMST ☐ Previous survey ☐ Current survey	None	Yes	N/A	PCTs 3374, 3376	Moderate

Common Name	Scientific Name	Listing Status		Dual Credit Species?	Sources	Habitat Constraints / Geographic Limitations	Species Retained for Further Assessment?	Justification for any Exclusions	Associated PCT and Condition Zone Species Retained Within	Sensitivity to Gain Class
		BC Act	EPBC Act							
scarlet robin	*Petroica boodang*	V	-	☐Yes / ☒No	☒ BAM-C ☒ TBDC / BioNet Atlas ☒PMST ☐ Previous survey ☐ Current survey	None	Yes	N/A	PCTs 3374, 3376, 4063	Moderate
pilotbird	*Pycnoptilus floccosus*	V	V	Yes / ☒No	☒ BAM-C ☐ TBDC / BioNet Atlas ☒ PMST ☐ Previous survey ☐ Current survey	South of Kings Highway	No	Project area north of Kings Highway	N/A	Moderate
flame robin	*Petroica phoenicea*	V	-	☐Yes / ☒No	☒ BAM-C ☒ TBDC / BioNet Atlas ☒PMST ☐ Previous survey ☐ Current survey	None	Yes	N/A	PCTs 3374, 3376, 4063	Moderate
Mammals										
grey-headed flying-fox	*Pteropus poliocephalus*	V	V	☒Yes / ☐No	☒ BAM-C ☒ TBDC / BioNet Atlas ☒ PMST ☐ Previous survey ☐ Current survey	None	Yes	N/A	PCTs 3374 3376, 4063	High
yellow-bellied sheathtail-bat	*Saccolaimus flaviventris*	V	-	☐Yes / ☒No	☒ BAM-C ☐ TBDC / BioNet Atlas ☐ PMST ☐ Previous survey ☐ Current survey	None	Yes	N/A	PCT 3376	High

Common Name	Scientific Name	Listing Status		Dual Credit Species?	Sources	Habitat Constraints / Geographic Limitations	Species Retained for Further Assessment?	Justification for any Exclusions	Associated PCT and Condition Zone Species Retained Within	Sensitivity to Gain Class
		BC Act	EPBC Act							
greater broad-nosed bat	*Scoteanax rueppellii*	V	-	☐Yes / ☒No	☒ BAM-C ☐ TBDC / BioNet Atlas ☐ PMST ☐ Previous survey ☐ Current survey	None	Yes	N/A	PCT 4063	High
diamond firetail	*Stagonopleura guttata*	V	V	☐Yes / ☒No	☒ BAM-C ☒ TBDC / BioNet Atlas ☐ PMST ☐ Previous survey ☒ Current survey	None	Yes	N/A	PCTs 3374, 3376, 4063	Moderate
little whip snake	*Suta flagellum*	V	-	☐Yes / ☒No	☒ BAM-C ☐ TBDC / BioNet Atlas ☐ PMST ☐ Previous survey ☐ Current survey	None	Yes	N/A	PCT 3376	High
Rosenberg's goanna	*Varanus rosenbergi*	V	-	☐Yes / ☒No	☒ BAM-C ☐ TBDC / BioNet Atlas ☐ PMST ☐ Previous survey ☐ Current survey	None	Yes	N/A	PCTs 3374 3376, 4063	High

Key: CE = Critically Endangered, E = Endangered, V = Vulnerable, M = Migratory.

5.2 Species Credit Species

Species credit species are those threatened species that cannot be reliably predicted to use an area of land based on habitat surrogates and therefore require further consideration through an assessment of habitat suitability.

The BAM-C generates a list of species credit species based on numerous inputs such as the distribution of the species occurring within the same IBRA subregion as the Development Footprint and the presence of habitat features and components associated within these species.

The candidate species credit species predicted to occur within the Development Footprint are identified in **Table 5.2** and **Table 5.3.**

Justification is provided for any species identified automatically populated in the BAM-C that were excluded from further assessment. Geographic limitations, habitat constraints, degradation or lack of suitable microhabitats are the permitted reasons for excluding species credit species in accordance with Section 5.2.1(2)(b) and Section 5.2.2(2)(b) of the BAM.

5.2.1 Predicted Flora Species Credit Species

The flora species credit species predicted to occur on the Development Footprint are identified in **Table 5.2.**

For threatened flora species NSW DPIE (2020b) identifies that only the suitable habitat for the target species within the Development Footprint needs to be surveyed and includes areas in the Development Footprint supporting any listed habitat constraints and PCTs associated with that species in the TBDC. In this context NSW DPIE (2020b) also identify that suitable habitat for threatened flora may encompass entire PCTs or be restricted to niches determined with consideration of habitat constraints, land use history, disturbance events and climatic factors. The TBDC and the Threatened Species Profile website, along with appropriate published or peer-reviewed references and/or data must be used to determine suitable habitat (NSW DPIE 2020b).

The Draft Land Categorisation Mapping within the Development Footprint also identifies large areas of Category 1 – Exempt Land. Surveys within Category 1 – Exempt Land have not been undertaken where field habitat assessment confirmed the lack of suitable habitat for the target species.

The following threatened flora species were added into the BAM calculator:

- *Caladenia tessellata*
- *Carex klaphakei*
- *Eucalyptus aquatica*
- *Eucalyptus macarthurii*
- *Eucalyptus nicholii*
- *Galium australe*

- *Genoplesium superbum*
- *Gentiana wingecarribiensis*
- *Grevillea renwickiana*
- *Pomaderris delicata*.

Table 5.2 Predicted Flora Species Credit Species

Common Name	Scientific Name	BC Act	EPBC Act	Sources	Habitat Constraints / Geographic Limitations	Species Retained for further Assessment?	Justification if excluded from further Assessment	Associated PCT and Vegetation Zone
Kanangra wattle	*Acacia clunies-rossiae*	V	-	☒ BAM-C ☐ TBDC / BioNet Atlas ☒ PMST ☐ Previous survey ☐ Current survey	None	☒Yes / ☐No	-	PCT 4063
thick lip spider orchid	*Caladenia tessellate*	V	V	☐ BAM-C ☒ TBDC / BioNet Atlas ☐ PMST ☐ Previous survey ☐ Current survey ☒Project SEARS	None	☒Yes / ☐No	-	None
pygmy cypress pine	*Callitris oblonga*	V	V	☒ BAM-C ☐ TBDC / BioNet Atlas ☐ PMST ☐ Previous survey ☐ Current survey	Corang River catchment and between Charleyong and Nerriga	☐Yes / ☒No	Project Area is not within geographic limitations	PCT 4063
Klaphake's sedge	*Carex klaphakei*	E	-	☐ BAM-C ☐ TBDC / BioNet Atlas ☒ PMST ☐ Previous survey ☐ Current survey ☒Project SEARS	Swamps or within 50 m of a swamp	☐Yes / ☒No	No swamps are located within the Project Area	None
dwarf kerrawang	*Commersonia prostrata*	E	E	☒ BAM-C ☒ TBDC / BioNet Atlas ☒ PMST ☐ Previous survey ☐ Current survey	None	☒Yes / ☐No	-	PCT 4063

Common Name	Scientific Name	BC Act	EPBC Act	Sources	Habitat Constraints / Geographic Limitations	Species Retained for further Assessment?	Justification if excluded from further Assessment	Associated PCT and Vegetation Zone
Michelago parrot-pea	*Dillwynia glaucula*	E	-	☒ BAM-C ☐ TBDC / BioNet Atlas ☐ PMST ☐ Previous survey ☐ Current survey	None	☒Yes / ☐No	-	PCT 3376
buttercup doubletail	*Diuris aequalis*	E	E	☒ BAM-C ☐ TBDC / BioNet Atlas ☐ PMST ☐ Previous survey ☐ Current survey	None	☒Yes / ☐No	-	PCTs 3374, 3376
black gum	*Eucalyptus aggregata*	V	V	☒ BAM-C ☒ TBDC / BioNet Atlas ☒ PMST ☐ Previous survey ☐ Current survey	None	☒Yes / ☐No	-	PCTs 3374, 3376, 4063
broad-leaved sally	*Eucalyptus aquatica*	V	V	☐ BAM-C ☐ TBDC / BioNet Atlas ☒ PMST ☐ Previous survey ☐ Current survey ☒Project SEARS	Swamps Land containing peat swamps and their margins or tributaries	☐Yes / ☒No	No swamps are located within the Project Area	None
Paddys River box, Camden woollybutt	*Eucalyptus macarthurii*	E	E	☐ BAM-C ☐ TBDC / BioNet Atlas ☒ PMST ☐ Previous survey ☒ Current survey	None	☒Yes / ☐No	-	None

Common Name	Scientific Name	BC Act	EPBC Act	Sources	Habitat Constraints / Geographic Limitations	Species Retained for further Assessment?	Justification if excluded from further Assessment	Associated PCT and Vegetation Zone
narrow-leaved peppermint	*Eucalyptus nicholii*	V	V	☐ BAM-C ☐ TBDC / BioNet Atlas ☒ PMST ☐ Previous survey ☒ Current survey	None	☒Yes / ☐No	-	None
Mongarlowe mallee	*Eucalyptus recurva*	CE	CE	☐ BAM-C ☐ TBDC / BioNet Atlas ☐ PMST ☐ Previous survey ☐ Current survey ☒ Project SEARs	East of Shoalhaven River	☐Yes / ☒No	Project Area is not within geographic limitations	None
tangled bedstraw	*Galium australe*	E	-	☐ BAM-C ☐ TBDC / BioNet Atlas ☐ PMST ☐ Previous survey ☐ Current survey ☒ Project SEARs	None	☒Yes / ☐No	-	None
superb midge orchid	*Genoplesium superbum*	E	-	☐ BAM-C ☐ TBDC / BioNet Atlas ☐ PMST ☐ Previous survey ☐ Current survey ☒ Project SEARs	None	☒Yes / ☐No	-	None

Common Name	Scientific Name	BC Act	EPBC Act	Sources	Habitat Constraints / Geographic Limitations	Species Retained for further Assessment?	Justification if excluded from further Assessment	Associated PCT and Vegetation Zone
Wingecarribee gentian	*Gentiana wingecarribiensis*	CE	E	☐ BAM-C ☐ TBDC / BioNet Atlas ☐ PMST ☐ Previous survey ☐ Current survey ☒ Project SEARs	Swamps Land containing peat bogs and margins on either Sphagnum Moss humps or sedge communities	☐Yes / ☒No	No swamps are located within the Project Area	None
Nerriga grevillea	*Grevillea renwickiana*	E	-	☐ BAM-C ☐ TBDC / BioNet Atlas ☐ PMST ☐ Previous survey ☐ Current survey ☒ Project SEARs	None	☒Yes / ☐No	-	None
hoary sunray	*Leucochrysum albicans subsp. tricolor*	E	E	☒ BAM-C ☒ TBDC / BioNet Atlas ☒ PMST ☐ Previous survey ☐ Current survey	None	☒Yes / ☐No	-	PCT 3376
delicate pomaderris	*Pomaderris delicata*	CE	CE	☐ BAM-C ☐ TBDC / BioNet Atlas ☐ PMST ☐ Previous survey ☐ Current survey ☒ Project SEARs	None	☒Yes / ☐No	-	None

Common Name	Scientific Name	BC Act	EPBC Act	Sources	Habitat Constraints / Geographic Limitations	Species Retained for further Assessment?	Justification if excluded from further Assessment	Associated PCT and Vegetation Zone
matted bush-pea	*Pultenaea pedunculata*	E	-	☒ BAM-C ☐ TBDC / BioNet Atlas ☐ PMST ☐ Previous survey ☐ Current survey	Between Boro and Marulan	☐Yes / ☒No	Project Area is not within geographic limitations	PCTs 3376, 4063
solanum armourense	*Solanum armourense*	E	-	☒ BAM-C ☐ TBDC / BioNet Atlas ☐ PMST ☐ Previous survey ☐ Current survey	None	☒Yes / ☐No	-	PCTs 4063
silky swainson-pea	*Swainsona sericea*	V	-	☒ BAM-C ☒ TBDC / BioNet Atlas ☐ PMST ☐ Previous survey ☐ Current survey	None	☒Yes / ☐No	-	PCTs 3376

5.2.2 Predicted Fauna Species Credit Species

The fauna species credit species predicted to occur on the Development Footprint are identified in **Table 5.3.**

Justification is provided for any species automatically populated by the BAM-C list that has been excluded from the assessment. Geographic limitations, vagrant species, habitat constraints, degradation or lack of suitable microhabitats are the permitted reasons for excluding species credit species. Species credit fauna associated with PCT 3373 and PCT 3643 are included in the assessment in **Table 5.3** and were subject to surveys. It is noted that PCT 3373 and PCT 3643 has subsequently been removed from the Development Footprint and will not be impacted by the Project.

Table 5.3 Candidate Threatened Fauna Species Credit Species

Common Name	Scientific Name	BC Act	EPBC Act	Dual Credit?	Sources	Habitat Constraints / Geographic Limitations	Species Retained?	Justification if excluded from further Assessment	Vegetation Zones Species Retained within
regent honeyeater	*Anthochaera phrygia*	CE	CE	☒Yes / ☐No	☒ BAM-C ☒ TBDC / BioNet Atlas ☒ PMST ☐ Previous survey ☐ Current survey ☒Project SEARs	Important Habitat Map	☐Yes / ☒No	No areas on the Important Habitat Map are located on the Development footprint	N/A
pink-tailed legless lizard	*Aprasia parapulchella*	V	V	☐Yes / ☒No	☒ BAM-C ☐ TBDC / BioNet Atlas ☒ PMST ☐ Previous survey ☐ Current survey	Rocky areas or within 50 m of rocky areas	☒Yes / ☐No	-	PCT 3376, 3347 and 3374 all vegetation zones
gang-gang cockatoo	*Callocephalon fimbriatum*	E	E	☒Yes / ☐No	☒ BAM-C ☒ TBDC / BioNet Atlas ☒ PMST ☐ Previous survey ☐ Current survey	Hollow bearing trees; Eucalypt tree species with hollows at least 3 m above the ground and with hollow diameter of 7 cm or larger	☒Yes / ☐No	-	PCTs 4063, 3374, 3376 – all good/moderate and moderate/degraded vegetation zones.
south-eastern glossy black-cockatoo	*Calyptorhynchus lathami lathami*	V	V	☒Yes / ☐No	☒ BAM-C ☒ TBDC / BioNet Atlas ☒ PMST ☐ Previous survey ☐ Current survey	Hollow bearing trees; Living or dead tree with hollows greater than 15 cm diameter and greater than 8 m above ground.	☒Yes / ☐No	-	PCTs 4063, 3374, 3376 – all good/moderate and moderate/degraded vegetation zones.

Common Name	Scientific Name	BC Act	EPBC Act	Dual Credit?	Sources	Habitat Constraints / Geographic Limitations	Species Retained?	Justification if excluded from further Assessment	Vegetation Zones Species Retained within
eastern pygmy-possum	*Cercartetus nanus*	V	-	☐Yes / ☒No	☒ BAM-C ☐ TBDC / BioNet Atlas ☐ PMST ☐ Previous survey ☐ Current survey	None	☒Yes / ☐No	-	PCTs 3374, 3376 – all good/moderate and moderate/degraded vegetation zones.
large-eared pied bat	*Chalinolobus dwyeri*	V	E	☐Yes / ☒No	☒ BAM-C ☒ TBDC / BioNet Atlas ☐ PMST ☐ Previous survey ☐ Current survey ☒Project SEARs	Cliffs; Within 2 km of rocky areas containing caves, overhangs, escarpments, outcrops, or crevices, or within 2 km of old mines or tunnels.	☒Yes / ☐No	-	PCTs 4063, 3374, 3376 – all good/moderate and moderate/degraded vegetation zones.
striped legless lizard	*Delma impar*	V	V	☐Yes / ☒No	☒ BAM-C ☐ TBDC / BioNet Atlas ☒ PMST ☐ Previous survey ☐ Current survey	None	☒Yes / ☐No	-	PCT 3374, 3376 – all vegetation zones
white-bellied sea-eagle	*Haliaeetus leucogaster*	V	-	☒Yes / ☐No	☒ BAM-C ☒ TBDC / BioNet Atlas ☐ PMST ☐ Previous survey ☐ Current survey	Breeding habitat: Living or dead mature trees within suitable vegetation within 1 km of a rivers, lakes, large dams or creeks, wetlands and coastlines	☒Yes / ☐No	-	PCTs 4063, 3374, 3376 – all good/moderate and moderate/degraded vegetation zones.

Common Name	Scientific Name	BC Act	EPBC Act	Dual Credit?	Sources	Habitat Constraints / Geographic Limitations	Species Retained?	Justification if excluded from further Assessment	Vegetation Zones Species Retained within
giant burrowing frog	*Heleioporus australiacus*	V	V	☐Yes / ☒No	☒ BAM-C ☐ TBDC / BioNet Atlas ☒ PMST ☐ Previous survey ☐ Current survey	None	☐Yes / ☒No	Microhabitat is absent on the Development Footprint. Suitable breeding habitat consists of ephemeral flowing streams that have permanent pools, or in upland swamps, and are located within native vegetation (NSW DPIE 2020g). The Wollondilly River is unlikely to provide habitat to the giant burrowing frog as the river is a fast-flowing watercourses with no moist soaks or pondages. The vegetation around the other watercourses in the Development Footprint have been cleared and no giant burrowing frogs have been recorded on cleared land (DoE 2014).	N/A
little eagle	*Hieraaetus morphnoides*	V	-	☒Yes / ☐No	☒ BAM-C ☒ TBDC / BioNet Atlas ☐ PMST ☐ Previous survey ☐ Current survey	Breeding habitat: Nest trees - live (occasionally dead) large old trees within vegetation.	☒Yes / ☐No	-	PCTs 4063, 3374, 3376 – all good/moderate and moderate /degraded vegetation zones.

Common Name	Scientific Name	BC Act	EPBC Act	Dual Credit?	Sources	Habitat Constraints / Geographic Limitations	Species Retained?	Justification if excluded from further Assessment	Vegetation Zones Species Retained within
Key's matchstick grasshopper	*Keyacris scurra*	E	E	☐Yes / ☒No	☒ BAM-C ☐ TBDC / BioNet Atlas ☒ PMST ☐ Previous survey ☐ Current survey	None	☒Yes / ☐No	-	PCT 3376 all condition classes
swift parrot	*Lathamus discolor*	E	CE	☒Yes / ☐No	☒ BAM-C ☒ TBDC / BioNet Atlas ☒ PMST ☐ Previous survey ☐ Current survey ☒Project SEARs	Important Habitat Map	☐Yes / ☒No	No areas on the Important Habitat Map located on the Development footprint	N/A
green and golden bell frog	*Litoria aurea*	E	V	☐Yes / ☒No	☒ BAM-C ☐ TBDC / BioNet Atlas ☐ PMST ☐ Previous survey ☐ Current survey	Semi-permanent/ephemeral wet areas; Within 1 km of wet areas Swamps; Within 1 km of swamp Waterbodies; Within 1 km of waterbody	☒Yes / ☐No	-	PCT 3376
Booroolong frog	*Litoria booroolongensis*	E	E	☐Yes / ☒No	☒ BAM-C ☐ TBDC / BioNet Atlas ☐ PMST ☐ Previous survey ☐ Current survey	None	☒Yes / ☐No	-	PCT 4063

Common Name	Scientific Name	BC Act	EPBC Act	Dual Credit?	Sources	Habitat Constraints / Geographic Limitations	Species Retained?	Justification if excluded from further Assessment	Vegetation Zones Species Retained within
large bent-winged bat	*Miniopterus orianae oceanensis*	V	-	☒Yes / ☒No	☒ BAM-C ☒ TBDC / BioNet Atlas ☐ PMST ☐ Previous survey ☐ Current survey ☒Project SEARs	Breeding habitat: Caves; Cave, tunnel, mine, culvert or other structure known or suspected to be used for breeding.	☐Yes / ☒No	There are no Breeding habitat: Caves; Cave, tunnel, mine, culvert or other structure known or suspected to be used for breeding within the Development Footprint	N/A
little bent-winged bat	*Miniopterus australis*	V	-	☒Yes / ☒No	☒ BAM-C ☒ TBDC / BioNet Atlas ☐ PMST ☐ Previous survey ☐ Current survey ☒Project SEARs	Breeding habitat: Caves; Cave, tunnel, mine, culvert or other structure known or suspected to be used for breeding.	☐Yes / ☒No	There are no Breeding habitat: Caves; Cave, tunnel, mine, culvert or other structure known or suspected to be used for breeding within the Development Footprint	N/A
stuttering frog	*Mixophyes balbus*	E	V	☐Yes / ☒No	☒ BAM-C ☐ TBDC / BioNet Atlas ☐ PMST ☐ Previous survey ☐ Current survey	None	☐Yes / ☒No	Microhabitat is absent on the Development Footprint. The species is found in rainforest or tall wet open forest in ephemeral flowing streams that have permanent pools, or in upland swamps, and are located within native vegetation (NSW DPIE 2020g). The Wollondilly River is unlikely to provide habitat to the stuttering frog as the river is a fast-flowing watercourses with no moist soaks or pondages. The species is rarely in dry open tableland riparian vegetation (DAWE 2021).	N/A

Common Name	Scientific Name	BC Act	EPBC Act	Dual Credit?	Sources	Habitat Constraints / Geographic Limitations	Species Retained?	Justification if excluded from further Assessment	Vegetation Zones Species Retained within
southern myotis	*Myotis macropus*	V		☐Yes / ☒No	☐ BAM-C ☒ TBDC / BioNet Atlas ☒ PMST ☐ Previous survey ☐ Current survey	Waterbodies Waterbodies with permanent pools/stretches 3 m or wider, including rivers, large creeks, billabongs, lagoons, estuaries, dams and other waterbodies, on or within 200 m of the site	☒Yes / ☐No	-	All vegetation zones
barking owl	*Ninox connivens*	V	-	☒Yes / ☐No	☒ BAM-C ☐ TBDC / BioNet Atlas ☐ PMST ☐ Previous survey ☐ Current survey	Breeding habitat: Hollow bearing trees; Living or dead trees with hollows greater than 20 cm diameter and greater than 4 m above the ground.	☒Yes / ☐No	-	PCTs 4063, 3374, 3376 – all good/moderate and moderate/degraded vegetation zones.
powerful owl	*Ninox strenua*	V	-	☒Yes / ☐No	☒ BAM-C ☒ TBDC / BioNet Atlas ☐ PMST ☐ Previous survey ☐ Current survey	Breeding habitat: Hollow bearing trees; Living or dead trees with hollow greater than 20 cm diameter	☒Yes / ☐No	-	PCTs 4063, 3374, 3376 – all good/moderate and moderate/degraded vegetation zones.
giant dragonfly	*Petalura gigantea*	E	-	☐Yes / ☒No	☐ BAM-C ☐ TBDC / BioNet Atlas ☐ PMST ☐ Previous survey ☐ Current survey ☒Project SEARs	Swamps or within 500 m of a swamp	☐Yes / ☒No	No swamps are within 500 m of the Project Area.	N/A

Common Name	Scientific Name	BC Act	EPBC Act	Dual Credit?	Sources	Habitat Constraints / Geographic Limitations	Species Retained?	Justification if excluded from further Assessment	Vegetation Zones Species Retained within
southern greater glider	*Petauroides volans*	E	E	☐Yes / ☒No	☒ BAM-C ☐ TBDC / BioNet Atlas ☒ PMST ☐ Previous survey ☐ Current survey	None	☒Yes / ☐No	-	PCTs 4063, 3374, 3376 – all good/moderate and moderate/degraded vegetation zones.
squirrel glider	*Petaurus norfolcensis*	V	-	☐Yes / ☒No	☒ BAM-C ☐ TBDC / BioNet Atlas ☒ PMST ☐ Previous survey ☐ Current survey	None	☒Yes / ☐No	-	PCTs 4063, 3374, 3376 – all good/moderate and moderate/degraded vegetation zones.
yellow-bellied glider	*Petaurus australis*	V	V	☐Yes / ☒No	☐ BAM-C ☒ TBDC / BioNet Atlas ☒ PMST ☐ Previous survey ☐ Current survey	None	☒Yes / ☐No	-	PCTs 4063, 3374, 3376 – all good/moderate and moderate/degraded vegetation zones.
brush-tailed rock-wallaby	*Petrogale penicillata*	E	V	☐Yes / ☒No	☒ BAM-C ☒ TBDC / BioNet Atlas ☒ PMST ☐ Previous survey ☐ Current survey ☒Project SEARs	Breeding habitat: Land within 1 km of rocky escarpments, gorges, steep slopes, boulder piles, rock outcrops or clifflines	☒Yes / ☐No	-	All Vegetation Zones
pink robin	*Petroica rodinogaster*	V	-	☐Yes / ☒No	☒ BAM-C ☐ TBDC / BioNet Atlas ☐ PMST ☐ Previous survey ☐ Current survey	None	☒Yes / ☐No	-	PCTs 4063, 3374, 3376 – all good/moderate and moderate/degraded vegetation zones.

Common Name	Scientific Name	BC Act	EPBC Act	Dual Credit?	Sources	Habitat Constraints / Geographic Limitations	Species Retained?	Justification if excluded from further Assessment	Vegetation Zones Species Retained within
brush-tailed phascogale	*Phascogale tapoatafa*	V	-	☐Yes / ☒No	☒ BAM-C ☐ TBDC / BioNet Atlas ☐ PMST ☐ Previous survey ☐ Current survey	None	☐Yes / ☒No	Outside of known range	N/A
koala	*Phascolarctos cinereus*	E	E	☐Yes / ☒No	☐ BAM-C ☒ TBDC / BioNet Atlas ☒ PMST ☐ Previous survey ☐ Current survey	Presence of koala use trees – refer to Survey Comments field in TBDC	☒Yes / ☐No	-	PCTs 4063, 3374, 3376 – all good/moderate and moderate/degraded vegetation zones.
grey-headed flying-fox	*Pteropus poliocephalus*	V	V	☒Yes / ☐No	☒ BAM-C ☒ TBDC / BioNet Atlas ☒ PMST ☐ Previous survey ☐ Current survey	Breeding habitats: breeding camps	☐Yes / ☒No	No breeding habitat on the development site	N/A
masked owl	*Tyto novaehollandiae*	V	-	☒Yes / ☐No	☒ BAM-C ☒ TBDC / BioNet Atlas ☐ PMST ☐ Previous survey ☐ Current survey	Breeding habitat: Hollow bearing trees; Living or dead trees with hollows greater than 20 cm diameter.	☒Yes / ☐No	-	PCTs 4063, 3374, 3376 – all good/moderate and moderate/degraded vegetation zones.

Key to Listing Status: V = Vulnerable, E = Endangered, CE = Critically Endangered.

5.3 Presence of Candidate Species Credit Species

5.3.1 Threatened Flora Species

Two threatened flora species were observed within the Project Area; Paddy's River Box (*Eucalyptus macarthurii*) and Narrow-leaved Peppermint (*Eucalyptus nicholii*). The Development Footprint has been designed to avoid impacts to the species.

Targeted surveys were completed for all candidate threatened flora species. A summary of the methods used and determination of presence for candidate threatened flora species credit species is provided in **Table 5.4.**

Table 5.4 Determining the Presence of Candidate Flora Species Credit Species in the Survey Area

Common Name	Scientific Name	Listing Status		Method used to determine presence	Present?	Further Assessment Required?
		BC Act	EPBC Act			
Kanangra wattle	*Acacia clunies-rossiae*	V	-	Large area grid method	☐Yes / ☒No	☐Yes / ☒No
thick lip spider orchid	*Caladenia tessellate*	V	V	Large area grid method	☐Yes / ☒No	☐Yes / ☒No
pygmy cypress pine	*Callitris oblonga*	V	V	Large area grid method	☐Yes / ☒No	☐Yes / ☒No
Klaphake's sedge	*Carex klaphakei*	E	-	Large area grid method	☐Yes / ☒No	☐Yes / ☒No
dwarf kerrawang	*Commersonia prostrata*	E	E	Large area grid method	☐Yes / ☒No	☐Yes / ☒No
Michelago parrot-pea	*Dillwynia glaucula*	E	-	Large area grid method	☐Yes / ☒No	☐Yes / ☒No
buttercup doubletail	*Diuris aequalis*	E	E	Large area grid method	☐Yes / ☒No	☐Yes / ☒No
black gum	*Eucalyptus aggregata*	V	V	Large area grid method	☐Yes / ☒No	☐Yes / ☒No
broad-leaved sally	*Eucalyptus aquatica*	V	V	Large area grid method	☐Yes / ☒No	☐Yes / ☒No
Paddys River box, Camden woollybutt	*Eucalyptus macarthurii*	E	E	Large area grid method	☒Yes / ☐No	☐Yes / ☒No The Development Footprint has been designed to avoid impacts to the species
narrow-leaved peppermint	*Eucalyptus nicholii*	V	V	Large area grid method	☒Yes / ☐No	☐Yes / ☒No The Development Footprint has been designed to avoid impacts to the species
Mongarlowe mallee	*Eucalyptus recurva*	CE	CE	Large area grid method	☐Yes / ☒No	☐Yes / ☒No
tangled bedstraw	*Galium australe*	E	-	Large area grid method	☐Yes / ☒No	☐Yes / ☒No

Common Name	Scientific Name	Listing Status		Method used to determine presence	Present?	Further Assessment Required?
		BC Act	EPBC Act			
superb midge orchid	*Genoplesium superbum*	E		Large area grid method	☐Yes / ☒No	☐Yes / ☒No
Wingecarribee gentian	*Gentiana wingecarribiensis*	CE	E	Large area grid method	☐Yes / ☒No	☐Yes / ☒No
Nerriga grevillea	*Grevillea renwickiana*	E	-	Large area grid method	☐Yes / ☒No	☐Yes / ☒No
hoary sunray	*Leucochrysum albicans subsp. tricolor*	E	E	Large area grid method	☐Yes / ☒No	☐Yes / ☒No
delicate pomaderris	*Pomaderris delicata*	CE	CE	Large area grid method	☐Yes / ☒No	☐Yes / ☒No
matted bush-pea	*Pultenaea pedunculata*	E	-	Large area grid method	☐Yes / ☒No	☐Yes / ☒No
solanum armourense	*Solanum armourense*	E	-	Large area grid method	☐Yes / ☒No	☐Yes / ☒No
silky swainson-pea	*Swainsona sericea*	V	-	Large area grid method	☐Yes / ☒No	☐Yes / ☒No

5.3.2 Threatened Fauna Species

A summary of the methods used and determination of presence for candidate threatened fauna species credit species is provided in **Table 5.5**. Based on existing anabat data collected during targeted surveys and BioNet Atlas records (NSW DCCEEW 2024a) it is also considered that the large bent-winged bat may utilise the Development Footprint for foraging, however no breeding habitat or PCTs associated with these species will be impacted by the Project.

Table 5.5 Determining the Presence of Candidate Fauna Species Credit Species in the Development Footprint

Common Name	Scientific Name	BC Act	EPBC Act	Method Used to Determine Presence	Present?	Further Assessment Required? (BAM Subsections 5.2.5 and 5.2.6)
pink-tailed legless lizard	*Aprasia parapulchella*	V	V	Rock rolling in areas of suitable habitat on 9–13 and 26–27 October 2023. Note only small areas of suitable habitat present on the site.	☐Yes / ☒No	☐Yes / ☒No
gang-gang cockatoo	*Callocephalon fimbriatum*	E	E	Diurnal bird surveys at numerous times throughout the year as outlined in **Table 2.5** and detailed searches for potential nest trees.	☒Yes / ☐No	☒Yes / ☐No
south-eastern glossy black-cockatoo	*Calyptorhynchus lathami lathami*	V	V	Diurnal bird surveys at numerous times throughout the year as outlined in **Table 2.5** and detailed searches for potential nest trees.	☒Yes / ☐No	☒Yes / ☐No
eastern pygmy-possum	*Cercartetus nanus*	V	-	Nocturnal spotlighting transects over 12 nights in January 2023, December 2023 and February 2024. Remote cameras for 50 trap nights in February 2023	☐Yes / ☒No	☐Yes / ☒No
large-eared pied bat	*Chalinolobus dwyeri*	V	E	Ultrasonic anabat detection over 168 detection nights between October and November 2022, January and February 2023 and February 2024.	☒Yes / ☐No	☐Yes / ☒No No breeding habitat present onsite or within 2 km of the Development Footprint.
striped legless lizard	*Delma impar*	V	V	Rock rolling in areas of suitable habitat in 9–13 and 26–27 October 2023. Further tile surveys currently being undertaken and will be finished in November 2024. 600 tiles over 12 tile arrays bedded in for one month and checked for 10 consecutive weeks as agreed with BCS	☐Yes / ☒No	☐Yes / ☒No
white-bellied sea-eagle	*Haliaeetus leucogaster*	V	-	Diurnal bird surveys at numerous times throughout the year as outlined in **Table 2.5** and detailed searches for potential nest trees.	☐Yes / ☒No	☐Yes / ☒No

Common Name	Scientific Name	BC Act	EPBC Act	Method Used to Determine Presence	Present?	Further Assessment Required? (BAM Subsections 5.2.5 and 5.2.6)
little eagle	*Hieraaetus morphnoides*	V	-	Diurnal bird surveys at numerous times throughout the year as outlined in **Table 2.5** and detailed searches for potential nest trees.	☐Yes / ☒No	☐Yes / ☒No
Key's matchstick grasshopper	*Keyacris scurra*	E	E	Habitat assessment in August and October 2023 and targeted searches in March 2024.	☐Yes / ☒No	☐Yes / ☒No
green and golden bell frog	*Litoria aurea*	E	V	Targeted searches for amphibians were undertaken in watercourses, dams and soaks throughout the Development Footprint in January 2023, December 2023 and February 2024.	☐Yes / ☒No	☐Yes / ☒No
Booroolong frog	*Litoria booroolongensis*	E	E	Targeted searches for amphibians were undertaken in watercourses, dams and soaks throughout the Development Footprint in January 2023, December 2023 and February 2024.	☐Yes / ☒No	☐Yes / ☒No
southern myotis	*Myotis macropus*	V	-	Ultrasonic anabat detection over 168 trap nights between October and November 2022, January and February 2023 and February 2024.	☐Yes / ☒No	☐Yes / ☒No
barking owl	*Ninox connivens*	V	-	Nocturnal spotlighting and call playback undertaken August 2023 over four nights. Habitat assessment undertaken at numerous times throughout the year. Songmeter detection undertaken over 140 trap nights in February and October 2023.	☐Yes / ☒No	☐Yes / ☒No
powerful owl	*Ninox strenua*	V	-	Nocturnal spotlighting and call playback undertaken August 2023 over four nights. Habitat assessment undertaken at numerous times throughout the year. Songmeter detection undertaken over 140 trap nights in February and October 2023.	☐Yes / ☒No	☐Yes / ☒No
southern greater glider	*Petauroides volans*	E	E	Nocturnal spotlighting transects over 16 nights in January 2023, December 2023, August 2023 and February 2024. Remote cameras for 50 trap nights in February 2023.	☐Yes / ☒No	☐Yes / ☒No

Common Name	Scientific Name	BC Act	EPBC Act	Method Used to Determine Presence	Present?	Further Assessment Required? (BAM Subsections 5.2.5 and 5.2.6)
squirrel glider	*Petaurus norfolcensis*	V	-	Nocturnal spotlighting transects over 16 nights in January 2023, December 2023, August 2023 and February 2024. Remote cameras for 50 trap nights in January 2023.	☒Yes / ☐No Detected on remote cameras in January 2024	☒Yes / ☐No Assessed in **Section 5.4.2.4**
brush-tailed rock-wallaby	*Petrogale penicillata*	E	V	Thorough daytime searches for signs and habitat resources as outlined in **Table 2.4.** Remote cameras for 50 trap nights in January 2023 No rocky habitats in the Development Footprint. Some rocky areas approximately 400 m to the west of the site.	☐Yes / ☒No	☐Yes / ☒No
koala	*Phascolarctos cinereus*	E	E	Nocturnal spotlighting transects over 16 nights in January 2023, December 2023, August 2023 and February 2024. Remote cameras for 50 trap nights in January 2023 and songmeter detection over 140 trap nights in February and October 2023. 1498 trees were searched using the Koala Scat Assessment Technique (KSAT) throughout the Development Footprint in February and October 2023.	☐Yes / ☒No	☐Yes / ☒No
grey-headed flying-fox	*Pteropus poliocephalus*	V	V	Habitat assessment undertaken to identify lack of breeding camps on site.	☐Yes / ☒No	☐Yes / ☒No
masked owl	*Tyto novaehollandiae*	V	-	Nocturnal spotlighting and call playback undertaken August 2023 over four nights. Habitat assessment undertaken at numerous times throughout the year. Songmeter detection undertaken over 140 trap nights in February and October 2023.	☐Yes / ☒No	☐Yes / ☒No

5.4 Threatened Species Surveys

A summary of the targeted surveys completed for candidate threatened flora species is provided in **Table 5.6**, further details of the threatened flora surveys completed, and guidelines applied are provided in **Section 2.3** of this Report.

Table 5.6 Summary of Species Credit Threatened Flora Survey Completed

Common Name	Scientific Name	BC Act	EPBC Act	Threatened Flora Species Surveys			Present?	Further Assessment Required?
				Survey Method	Timing of Survey within Recommended Period?	Survey Effort (Hours & No. People)		
Kanangra wattle	*Acacia cluniesrossiae*	V	-	Large area grid method	October 2023	4 ecologists over 5 days in October 2023	☐Yes / ☒No	☐Yes / ☒No
thick lip spider orchid	*Caladenia tessellate*	V	V	Large area grid method	October 2022	3 ecologists over 6 days in October 2022	☐Yes / ☒No	☐Yes / ☒No
pygmy cypress pine	*Callitris oblonga*	V	V	Large area grid method	February 2023 and 2024	3 ecologists over 5 days in February 2023, 3 ecologists over 5 days in February 2024	☐Yes / ☒No	☐Yes / ☒No
Klaphake's Sedge	*Carex klaphakei*	E	-	Large area grid method	February 2023 and 2024	3 ecologists over 5 days in February 2023, 3 ecologists over 5 days in February 2024	☐Yes / ☒No	☐Yes / ☒No
dwarf kerrawang	*Commersonia prostrata*	E	E	Large area grid method	October 2022	3 ecologists over 6 days in October 2022	☐Yes / ☒No	☐Yes / ☒No
Michelago parrot-pea	*Dillwynia glaucula*	E	-	Large area grid method	October 2023	4 ecologists over 5 days in October 2023	☐Yes / ☒No	☐Yes / ☒No
buttercup doubletail	*Diuris aequalis*	E	E	Large area grid method	October 2022	3 ecologists over 6 days in October 2022	☐Yes / ☒No	☐Yes / ☒No
black gum	*Eucalyptus aggregata*	V	V	Large area grid method	February 2023 and 2024	3 ecologists over 5 days in February 2023, 3 ecologists over 5 days in February 2024	☐Yes / ☒No	☐Yes / ☒No

Common Name	Scientific Name	BC Act	EPBC Act	Threatened Flora Species Surveys			Present?	Further Assessment Required?
				Survey Method	Timing of Survey within Recommended Period?	Survey Effort (Hours & No. People)		
broad-leaved sally	*Eucalyptus aquatica*	V	V	Large area grid method	February 2023 and 2024	3 ecologists over 5 days in February 2023, 3 ecologists over 5 days in February 2024	☐Yes / ☒No	☐Yes / ☒No
Paddys River box, Camden woollybutt	*Eucalyptus macarthurii*	E	E	Large area grid method	February 2023 and 2024	3 ecologists over 5 days in February 2023, 3 ecologists over 5 days in February 2024	☒Yes / ☐No Impacts avoided to species as the species is outside the Development Footprint	☐Yes / ☒No
narrow-leaved peppermint	*Eucalyptus nicholii*	V	V	Large area grid method	February 2023 and 2024	3 ecologists over 5 days in February 2023, 3 ecologists over 5 days in February 2024	☒Yes / ☐No Impacts avoided to species as the species is outside the Development Footprint	☐Yes / ☒No
Mongarlowe mallee	*Eucalyptus recurva*	CE	CE	Large area grid method	February 2023 and 2024	3 ecologists over 5 days in February 2023, 3 ecologists over 5 days in February 2024	☐Yes / ☒No	☐Yes / ☒No
tangled bedstraw	*Galium australe*	E	-	Large area grid method	February 2023 and 2024	3 ecologists over 5 days in February 2023, 3 ecologists over 5 days in February 2024	☐Yes / ☒No	☐Yes / ☒No
superb midge orchid	*Genoplesium superbum*	E	-	Large area grid method	February 2023 and 2024	3 ecologists over 5 days in February 2023, 3 ecologists over 5 days in February 2024	☐Yes / ☒No	☐Yes / ☒No
Wingecarribee gentian	*Gentiana wingecarribiensis*	CE	E	Large area grid method	October 2022	3 ecologists over 6 days in October 2022	☐Yes / ☒No	☐Yes / ☒No
Nerriga grevillea	*Grevillea renwickiana*	E	-	Large area grid method	October 2023	3 ecologists over 6 days in October 2022	☐Yes / ☒No	☐Yes / ☒No

Common Name	Scientific Name	BC Act	EPBC Act	Threatened Flora Species Surveys			Present?	Further Assessment Required?
				Survey Method	Timing of Survey within Recommended Period?	Survey Effort (Hours & No. People)		
hoary sunray	*Leucochrysum albicans subsp. tricolor*	E	E	Large area grid method	October 2022	3 ecologists over 6 days in October 2022	☐Yes / ☒No	☐Yes / ☒No
delicate pomaderris	*Pomaderris delicata*	CE	CE	Large area grid method	October 2023	4 ecologists over 5 days in October 2023	☐Yes / ☒No	☐Yes / ☒No
matted bush-pea	*Pultenaea pedunculata*	E	-	Large area grid method	October 2023	4 ecologists over 5 days in October 2023	☐Yes / ☒No	☐Yes / ☒No
solanum armourense	*Solanum armourense*	E	-	Large area grid method	October 2023	4 ecologists over 5 days in October 2023	☐Yes / ☒No	☐Yes / ☒No
silky swainson-pea	*Swainsona sericea*	V	-	Large area grid method	October 2022	3 ecologists over 6 days in October 2022	☐Yes / ☒No	☐Yes / ☒No

A summary of the targeted surveys completed for candidate threatened fauna species is provided in **Table 5.7**, further details of the threatened fauna surveys completed, survey timing and guidelines followed are provided in **Section 2.4** of this Report.

Table 5.7 Summary of Species Credit Threatened Fauna Surveys Completed

Species Name	BAM-C Survey Period	Survey Effort Requirement	Extent of suitable habitat / associated PCTs	Surveys completed	Present and Further Assessment Required?
pink-tailed legless lizard ***Aprasia parapulchella***	September to November	Roll 200 rocks per 50 ha x 4 replicates within 2 hrs after sunrise or before sunset when temps are <25°C and cloud cover is <50%.	Limited habitat within the Development Footprint.	Rock rolling undertaken in all areas of suitable habitat, however most of the rocks were either too large or deeply embedded in the ground. Surveys occurred over 9–13 and 26–27 October 2023. ~88 hours of active searches 6 ecologists.	☐Yes / ☒No

Species Name	BAM-C Survey Period	Survey Effort Requirement	Extent of suitable habitat / associated PCTs	Surveys completed	Present and Further Assessment Required?
gang-gang cockatoo ***Callocephalon fimbriatum***	October to January	Surveys require searches through habitat looking for birds and breeding habitat.	6.31 ha of suitable breeding habitat is all vegetation zones containing hollow bearing trees (PCT 3374 and 3376 good/moderate and moderate/degraded).	Diurnal bird surveys undertaken in all survey periods (August, October, November, January, February, March) including three rounds of BBUS. Over 200 hours of diurnal bird surveys. 14 ecologists throughout the survey period. Over 100 hours of habitat assessment.	☒Yes / ☐No
glossy black-cockatoo ***Calyptorhynchus lathami lathami***	January to September	Surveys require searches through habitat looking for birds and breeding habitat.	6.31 ha of suitable breeding habitat is all vegetation zones containing hollow bearing trees (PCT 3374 and 3376 good/moderate and moderate/degraded).	Diurnal bird surveys undertaken in all survey periods (August, October, November, January, February, March) including three rounds of BBUS. Over 200 hours of diurnal bird surveys. 14 ecologists throughout the survey period. Over 100 hours of habitat assessment.	☒Yes / ☐No
eastern pygmy-possum ***Cercartetus nanus***	October to March	TBDC provides no species-specific guideline requirements other than mentioning species is difficult to detect especially via spotlighting.	8.63 ha of suitable habitat in all woodland PCT zones, however only small areas of woodland vegetation with a dense myrtaceous understorey.	Spotlighting for 12 nights in January 2023, December 2023 and February 2024. Remote cameras for 50 trap nights in February 2023. Spotlighting covered approximately 92,550 m by 6 ecologists over 12 nights. Approximately 96 person hours.	☐Yes / ☒No
large-eared pied bat ***Chalinolobus dwyeri***	November to December	Harp trapping or acoustic detection for 16 nights or roost searches / radio tracking. Traps should be set in woodlands, valley floors, riparian areas and relatively fertile parts of the subject land where possible.	8.63 ha of suitable foraging habitat comprising all woodland vegetation zones within 2 km of potential breeding habitat shown on Figure 5.1c.	Anabats deployed in November 2022, January 2023, February 2023, 128 trap nights (18 nights 22 devices). Over 100 hours of habitat assessment.	☒Yes / ☐No Recorded on 4 Anabat devices. No breeding habitat identified on site. Foraging habitat present.

Species Name	BAM-C Survey Period	Survey Effort Requirement	Extent of suitable habitat / associated PCTs	Surveys completed	Present and Further Assessment Required?
striped legless lizard ***Delma impar***	September to May	>50 ha, guideline suggests 10 tile grids. Each grid should be comprised of 10 x 5 tiles with 5 m spacing between tiles.	Suitable habitat in 250.28 ha of native grassland habitat (PCT 3374 DNG all condition zones).	9–13 and 26–27 October 2023 and ongoing tile surveys to be finished in November. ~88 hours of active searches. 6 ecologists.	☐Yes / ☒No Surveys currently being undertaken
white-bellied sea-eagle ***Haliaeetus leucogaster***	July to December	Surveys require searches through habitat looking for birds and signs of large stick nests.	8.63 ha of suitable breeding habitat in all woodland PCT Zones (PCT 3374, 3376, 4063). No stick nests identified.	Diurnal bird surveys undertaken in all survey periods (August, October, November, January, February, March) including three rounds of BBUS. Over 200 hours of diurnal bird surveys. 14 ecologists throughout the survey period. Over 100 hours of habitat assessment.	☐Yes / ☒No
little eagle ***Hieraaetus morphnoides***	August to October	Habitat searches looking for birds and signs of large stick nests	8.63 ha of suitable breeding habitat in all woodland PCT Zones (PCT 3374, 3376, 4063). No stick nests identified.	Diurnal bird surveys undertaken in all survey periods (August, October, November, January, February, March) including three rounds of BBUS. Over 200 hours of diurnal bird surveys. 14 ecologists throughout the survey period.	☐Yes / ☒No
Key's matchstick grasshopper ***Keyacris scurra***	March to May and August to December	Active searches in areas of suitable habitat.	1.23 ha of suitable habitat in PCT 3376 DNG.	Active searches in October 2022 and March 2024. 24 survey hours two ecologists	☐Yes / ☒No
green and golden bell frog ***Litoria aurea***	November to March	Surveys requires 4 repeat aural visual surveys or 154 acoustic recorder days. Up to 2 tadpole surveys can be done to substitute for 2 aural-visual surveys.	Small area of marginal habitat in the farm dams, however all areas of suitable habitat have been avoided.	Spotlighting undertaken in January 2023, December 2023 and February 2023. Approximately 96 hours (~4 hours a night, 12 nights with 2 ecologists per night). Over 100 hours of habitat assessment.	☐Yes / ☒No

Species Name	BAM-C Survey Period	Survey Effort Requirement	Extent of suitable habitat / associated PCTs	Surveys completed	Present and Further Assessment Required?
Booroolong frog ***Litoria booroolongensis***	October to December	Aural-visual surveys for a total of 480 minutes.	0.01 km of the Wollondilly River.	Entire stretch of the Wollondilly River surveyed including upstream and downstream of the proposed crossing location over 4 nights – December 2023 Approximately 32 hours (~4 hours a night, 4 nights with 2 ecologists per night). Over 100 hours of habitat assessment.	☐Yes / ☒No
square-tailed kite ***Lophoictinia isura***	September to January	Habitat searches looking for birds and signs of a male and female; or female with nesting material; or an individual on a large stick nest.	8.63 ha of suitable breeding habitat in all woodland PCT Zones (PCT 3374, 3376, 4063). No stick nests identified.	Diurnal bird surveys undertaken in all survey periods (August, October, November, January, February, March) including three rounds of BBUS. Over 200 hours of diurnal bird surveys. 14 ecologists throughout the survey period.	☐Yes / ☒No
southern myotis ***Myotis macropus***	October to March	Harp trapping or acoustic detection for 16 nights or roost searches / radio tracking. Traps should be set in potential habitat.	0.01 km of the Wollondilly River and farm dams.	Anabats deployed in October 2022, November 2022, January 2023, February 2023, February 2024. 168 trap nights (28 nights 29 devices). Over 100 hours of habitat assessment.	☐Yes / ☒No
barking owl ***Ninox connivens***	May to December	Diurnal surveys: habitat searches and hollow-bearing tree assessment, Nocturnal surveys: Quiet listening, Stag watching, song meters, call playback and spotlighting.	8.63 ha of suitable breeding habitat in all woodland PCT Zones (PCT 3374, 3376, 4063). No stick nests identified.	Spotlighting for 4 nights in August 2023. Habitat assessments in August, October, November, January, February, March. 32 person hours (4 nights, two ecologists, approximately 4 hours per night). Covered approximately 21,300 m in spotlighting transects. Over 100 hours of habitat assessment. Songmeter detection over 140 nights in February and October 2023.	☒Yes / ☒No

Species Name	BAM-C Survey Period	Survey Effort Requirement	Extent of suitable habitat / associated PCTs	Surveys completed	Present and Further Assessment Required?
powerful owl ***Ninox strenua***	May to August	Diurnal surveys: habitat searches and hollow-bearing tree assessment, Nocturnal surveys: Quiet listening, Stag watching, song meter detection, Call playback and spotlighting.	8.63 ha of suitable breeding habitat in all woodland PCT Zones (PCT 3374, 3376, 4063).	Spotlighting for 4 nights in August 2023. Habitat assessments in August, October, November, January, February, March. 32 person hours (4 nights, two ecologists, approximately 4 hours per night). Covered approximately 21,300 m in spotlighting transects. Over 100 hours of habitat assessment. Songmeter detection over 140 nights in February and October 2023.	☐Yes / ☒No
southern greater glider ***Petauroides volans***	All year	Nocturnal spotlighting transects. Spotlighting from a vehicle is specified at 2 x 1 km tracks with a maximum speed of 5 km per hour on 2 separate nights for up to 200 ha of stratification unit. Spotlighting on foot is specified at 2 x 1 hour and 1 km up to 200 ha of stratification unit walking at 1 km per hour on 2 separate nights.	8.63 ha of suitable habitat in all woodland PCT Zones (PCT 3374, 3376, 4063).	Spotlighting for 16 nights in January 2023, August 2023, December 2023 and February 2024. Remote cameras for 50 trap nights in February 2023. Spotlighting covered approximately 113,850 m by 8 ecologists over 16 nights. Approximately 128 person hours.	☐Yes / ☒No
squirrel glider ***Petaurus norfolcensis***	All year	Arboreal Elliot traps, remote camera traps and spotlighting as suitable methods with a requirement for spotlighting in combination with one of the other two methods. Spotlighting from a vehicle is specified at 2 x 1 km tracks with a maximum speed of 5 km per hour on 2 separate nights for up to 200 ha of stratification unit. Spotlighting on foot is specified at 2 x 1 hour and 1 km up to 200 ha of stratification unit walking at 1 km per hour on 2 separate nights.	8.63 ha of suitable habitat in all woodland PCT Zones (PCT 3374, 3376, 4063).	Spotlighting for 16 nights in January 2023, August 2023, December 2023 and February 2024. Remote cameras for 50 trap nights in February 2023. Spotlighting covered approximately 113,850 m by 8 ecologists over 16 nights. Approximately 128 person hours.	☐Yes / ☒No

Species Name	BAM-C Survey Period	Survey Effort Requirement	Extent of suitable habitat / associated PCTs	Surveys completed	Present and Further Assessment Required?
brush-tailed rock wallaby ***Petrogale penicillata***	All year	Species observation, daytime searches for habitat, daytime searches for signs of activity including tracks, scats and rock shelters worn smooth from resting, predator scat collection, baited camera traps and observations of wallabies basking from ground or helicopter.	No suitable habitat in the Development Footprint, areas of rocky habitat approximately 400 m to the west of the Development Footprint (see Figure 5.1c).	Remote cameras for 50 trap nights in February 2023. Spotlighting covered approximately 113,850 m by 8 ecologists over 16 nights. Approximately 128 person hours. Over 100 hours of habitat assessment.	☐Yes / ☒No
pink robin ***Petroica rodinogaster***	All year	Surveys require diurnal searches for birds.	8.63 ha of suitable habitat in all woodland PCT Zones (PCT 3374, 3376, 4063).	Diurnal bird surveys undertaken in all survey periods (August, October, November, January, February, March) including three rounds of BBUS. Over 200 hours of diurnal bird surveys. 14 ecologists throughout the survey period.	☐Yes / ☒No
koala ***Phascolarctos cinereus***	All year	Spot Assessment Technique (SAT) (scat surveys) or detection dog searches and spotlighting, acoustic surveys or thermal drone surveys.	8.63 ha of suitable habitat in all woodland PCT Zones (PCT 3374, 3376, 4063).	Spotlighting for 16 nights in January 2023, August 2023, December 2023 and February 2024. Remote cameras for 50 trap nights in February 2023. Songmeter detection over 140 trap nights in February and October 2023. 1498 trees were searched using the Koala Scat Assessment Technique (KSAT) throughout the Development Footprint in February and October 2023. Spotlighting covered approximately 113,850 m by 8 ecologists over 16 nights. Approximately 128 person hours. Over 100 hours of habitat assessment.	☐Yes / ☒No

Species Name	BAM-C Survey Period	Survey Effort Requirement	Extent of suitable habitat / associated PCTs	Surveys completed	Present and Further Assessment Required?
grey-headed flying-fox ***Pteropus poliocephalus***	October to December	Searches for camp sites and a check of the National Flying-fox Monitoring Viewer.	8.63 ha of suitable foraging habitat in all woodland PCT Zones (PCT 3374, 3376, 4063). No breeding camps identified in the Development Footprint.	Habitat assessments in August, October, November, January, February, March. Over 100 hours of habitat assessment.	☐Yes / ☒No
masked owl ***Tyto novaehollandiae***	May to Aug	Diurnal surveys: habitat searches and hollow-bearing tree assessment, Nocturnal surveys: Quiet listening, Stag watching, Call playback and spotlighting Songmeters.	8.63 ha of suitable breeding habitat in all woodland PCT Zones (PCT 3374, 3376, 4063).	Spotlighting for 4 nights in August 2023. Habitat assessments in August, October, November, January, February, March 32 person hours (4 nights, two ecologists, approximately 4 hours per night). Covered approximately 21,300 m in spotlighting transects. Over 100 hours of habitat assessment.	☐Yes / ☒No

5.4.1 Expert Reports and of More Appropriate Local Data

No expert reports were utilised in place of targeted surveys for the purposes of this assessment. This assessment has also not relied upon alternative data (more appropriate local data) to assess habitat suitability.

5.4.2 Area or Count, and Location of Suitable Habitat for a Species Credit Species (a Species Polygon).

5.4.2.1 Results for BC Act Listed Species Credit Entities

Species polygons have been created for the following entities:

- gang-gang cockatoo
- south-eastern glossy-black cockatoo
- squirrel glider
- large eared pied bat.

5.4.2.2 Gang-gang cockatoo (*Callocephalon fimbriatum*) Species Polygon

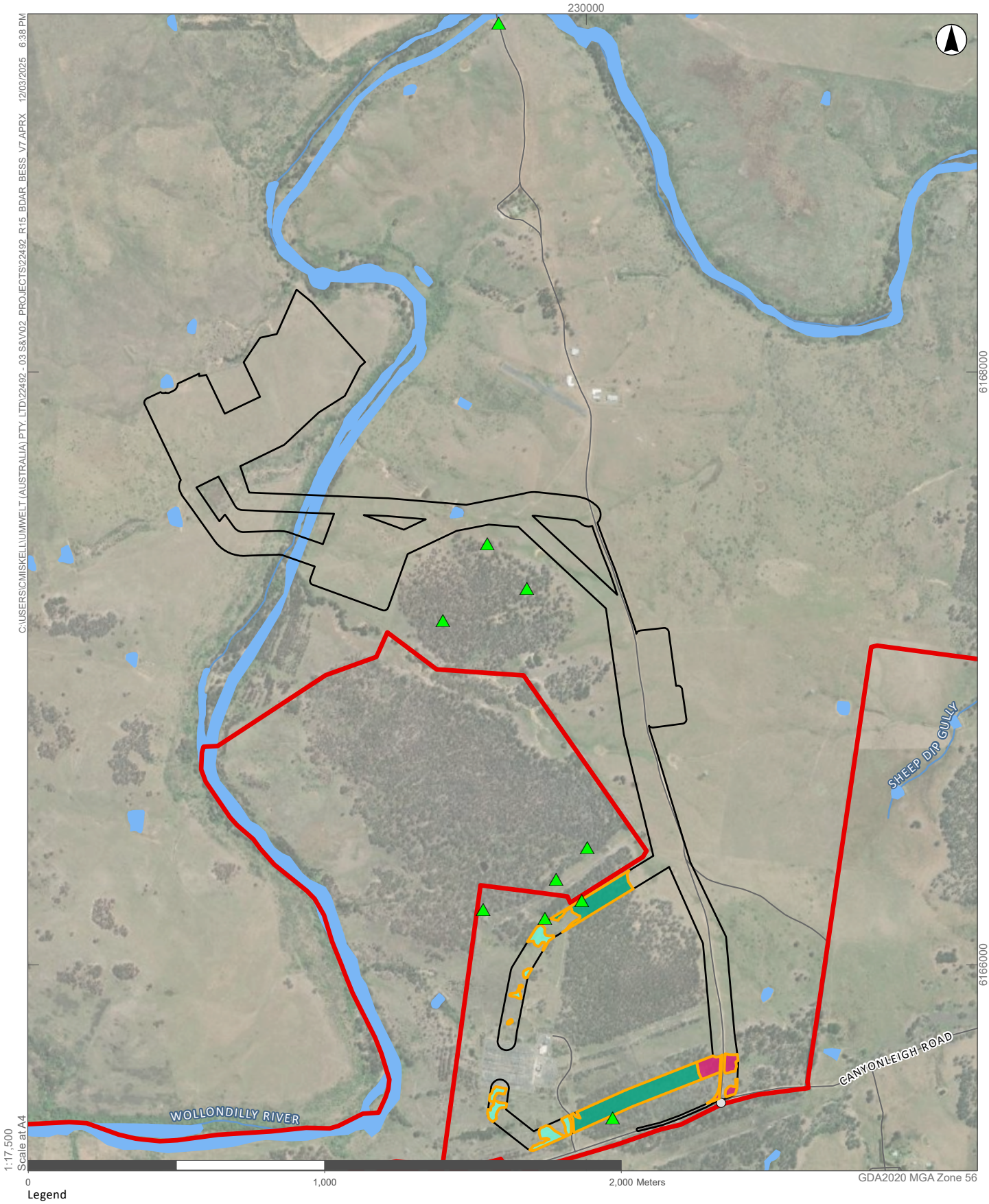
Suitable habitat for this species is present within the Development Footprint, the species polygon details are provided in **Table 5.8** and the species polygon is mapped in **Figure 5.1a.**

Table 5.8 Gang-gang Cockatoo Species Polygon Details

Information Required	Species Polygon Details
Species polygon notes	Numerous suitable hollow bearing trees are located in the Development Footprint. A breeding pair was observed within the Development Footprint and it is likely that the breeding site may be located in the Project Area. No nest tree was identified in the Project Area. The species polygon has been developed by including all suitable habitat in the Project Area. Suitable habitat has been defined as woodland vegetation containing hollow bearing trees which corresponds to PCT 3374 (condition classes good/moderate and moderate/degraded) and PCT 3376 (condition classes good/moderate). The total area of the species polygon is 6.31 ha. This method is considered to reflect the extent of the species habitat more accurately rather than 'assuming presence' of a nest tree and estimating a species polygon of a circle with a 200 m radius.
Biodiversity Risk Weighting	High (2)
SAII Entity	No
Habitat constraints / microhabitats present on the Development Footprint / vegetation zone	Hollow bearing trees: Eucalypt tree species with hollows at least 3 m above the ground and with hollow diameter of 7 cm or larger

Information Required	Species Polygon Details
Extent of suitable habitat present	**Common Ancillary Features:** • PCT 3376 – Southern Tableland Grassy Box Woodland-Good/Moderate = 0.44 ha **Transmission Line - Option 1:** • PCT 3374 – Goulburn Tableland Peppermint Grassy Forest – Good/Moderate = 1.39 ha • PCT 3374 – Goulburn Tableland Peppermint Grassy Forest – Moderate/Degraded = 0.46 ha **Transmission Line - Option 2:** • PCT 3374 – Goulburn Tableland Peppermint Grassy Forest – Good/Moderate = 2.73 ha • PCT 3374 – Goulburn Tableland Peppermint Grassy Forest – Moderate/Degraded = 0.84 ha • PCT 3376 – Southern Tableland Grassy Box Woodland-Good/Moderate = 0.45 ha The total area of the species polygon is 6.31 ha.
TBDC species specific recommendations	The TBDC recommends that for the assessment of the gang-gang cockatoo: • 1. Assessors should look for SIGNS OF BREEDING on site as follows; (a) lone adult males identified during the breeding season (October to January); or (b) an occupied nest. If breeding is presumed present, progress to Step 3. • 2. Where signs of breeding on site are present, POTENTIAL NEST TREES should be identified. Potential nest trees are forest and woodland eucalypts containing hollows that are; (i) at least 3 m above the ground and (ii) with hollow diameter of 7 cm or larger. • 3. Where potential nest trees are identified on site, monitor for this species during the breeding season (October to January) to confirm the presence of any ACTUAL NEST TREES on site. NSW DPIE is currently developing survey guidance for threatened bird species. In the interim, assessors must undertake a species survey using best practice methods that can be replicated for repeat surveys (as per the BAM threatened species survey requirements). • 4. If actual nest trees are confirmed on site, then the species polygons are to be drawn around those actual nest trees (i.e. trees that birds of the species are known to have used for nesting). The species polygons should be circular in shape and must include a buffer RADIUS of 200 m around each actual nest tree. The purpose of the buffer is to identify the essential area for breeding and minimise disturbance/avoid clearing for a development application, or conserve and improve habitat for a biodiversity stewardship agreement. The shape of the buffer can be modified where evidence provided in the Biodiversity Assessment Report indicates an alternative shape would better meet the species needs in the context of the assessment site. For example, extant vegetation is linear, and the nest tree is already located near the edge of the wooded area.
Habitat condition (vegetation integrity score for each vegetation zone in the polygon)	**Common Ancillary Features:** • PCT 3376 - Southern Tableland Grassy Box Woodland-Good/Moderate = 76.9 **Transmission Line – Option 1:** • PCT 3374 – Goulburn Tableland Peppermint Grassy Forest – Good/Moderate = 76

Information Required	Species Polygon Details
	• PCT 3374 – Goulburn Tableland Peppermint Grassy Forest – Moderate/Degraded = 69.7 **Transmission Line - Option 2:** • PCT 3374 – Goulburn Tableland Peppermint Grassy Forest – Good/Moderate = 76 • PCT 3374 – Goulburn Tableland Peppermint Grassy Forest – Moderate/Degraded = 69.7 • PCT 3376 – Southern Tableland Grassy Box Woodland – Good/Moderate = 76.9
Photo	



Legend

- Project Area
- Development Footprint
- Waterbodies
- Watercourse
- Existing Roads and Tracks
- Access Points

Threatened species records

- Gang-gang Cockatoo
- Gang-gang Cockatoo Species Polygon

Vegetation Zone

- PCT 3374 - Goulburn Tableland Peppermint Grassy Forest - Good/Moderate
- PCT 3374 - Goulburn Tableland Peppermint Grassy Forest - Moderate/Degraded
- PCT 3376 - Southern Tableland Grassy Box Woodland - Good/Moderate

FIGURE 5.1A

Gang gang cockatoo species polygon

Image Source: ESRI Basemap (2024) **Data source:** NSW LPI (2024), NSW DSFI (2024), Umwelt (2024)

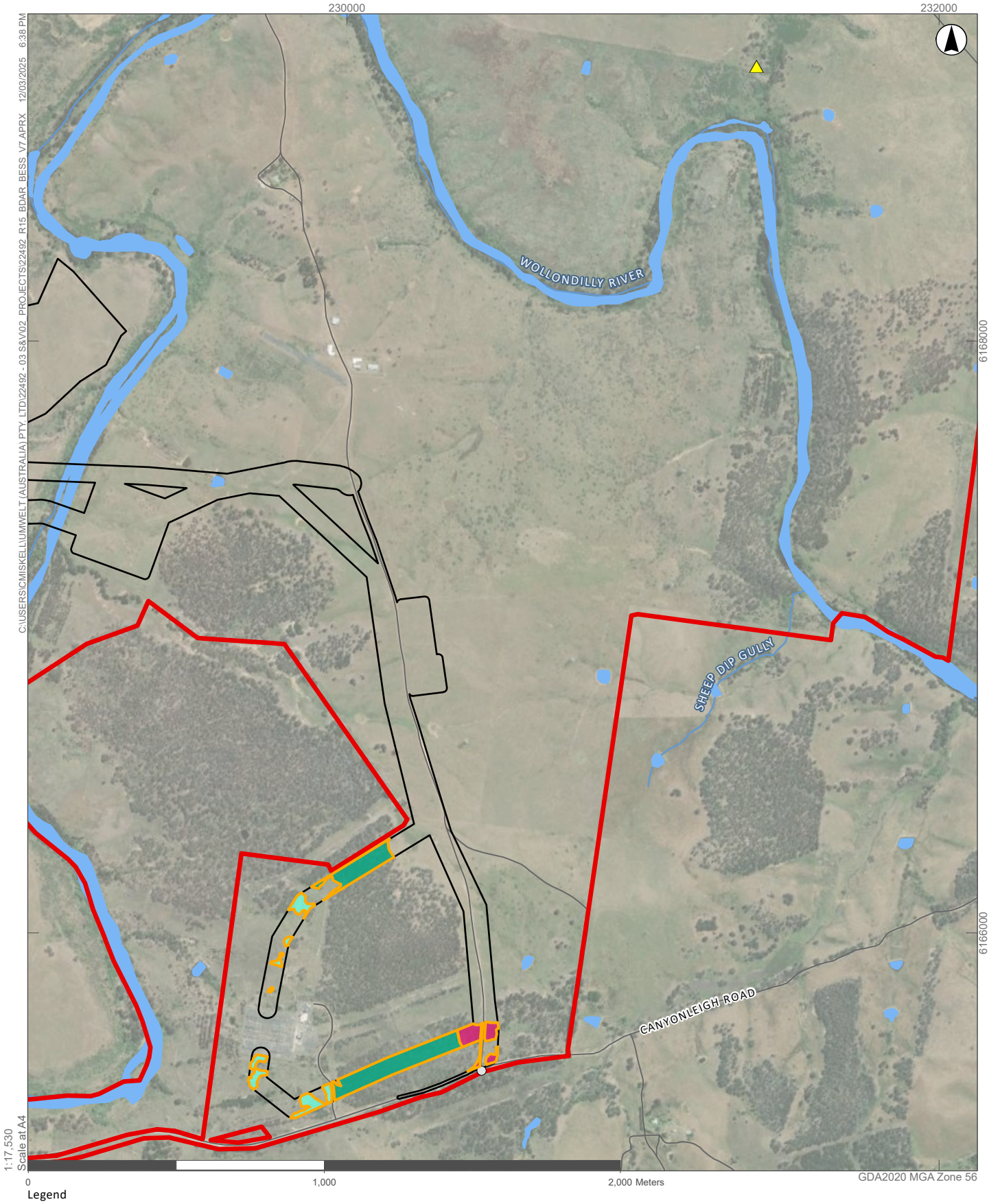
5.4.2.3 South-eastern Glossy Black-Cockatoo (*Calyptorhynchus lathami lathami*) Species Polygon

One individual was recorded in February 2023 and was not observed again during the survey period. No begging birds, occupied nests, or lone adult males during breeding season were recorded in the Project Area. As no breeding signs were observed during the surveys, it is possible that the individual was flying through, and the site does not contain breeding habitat for the species. Furthermore, the relative abundance of *Allocasuarina* and *Casuarina* species on the site is low, with the exception of PCT 4063 along the Wollondilly River. Given that the glossy black cockatoo relies solely on these species for foraging habitat, it is considered unlikely that PCT 3374 and 3376 would provide important foraging habitat for the species. No hollow bearing trees were recorded in PCT 4063. As a precautionary measure, species credits have been generated in accordance with the BAM for breeding habitat in PCT 3374 and 3376 in all woodland vegetation zones with hollows. The species polygon details are provided in **Table 5.9** and the species polygon is mapped in **Figure 5.1b.**

Table 5.9 South-eastern Glossy Black-Cockatoo Species Polygon Details

Information required	Species Polygon Details
Species polygon notes	Numerous suitable hollow bearing trees are located in the Development Footprint. No signs of breeding observed. No nest tree was identified in the Project Area. The species polygon has been developed by including all suitable habitat in the Project Area. Suitable habitat has been defined as woodland vegetation containing hollow bearing trees which corresponds to PCT 3374 (condition classes good/moderate and moderate/degraded) and PCT 3376 (condition classes good/moderate). The total area of the species polygon is 6.31 ha. This method is considered to reflect the extent of the species habitat more accurately rather than 'assuming presence' of a nest tree and estimating a species polygon of a circle with a 200 m radius.
Biodiversity Risk Weighting	High (2)
SAII Entity	No
Habitat constraints / microhabitats present on the Development Footprint / vegetation zone	Breeding habitat: Hollow bearing trees: Living or dead tree with hollows greater than 15 cm diameter and higher than 8 m above ground. Foraging habitat: Presence of *Allocasuarina* and *Casuarina* species
Extent of suitable habitat present	**Common Ancillary Features:** • PCT 3376 – Southern Tableland Grassy Box Woodland-Good/Moderate = 0.44 ha. **Transmission Line – Option 1:** • PCT 3374 – Goulburn Tableland Peppermint Grassy Forest – Good/Moderate = 1.39 ha • PCT 3374 – Goulburn Tableland Peppermint Grassy Forest – Moderate/Degraded = 0.46 ha. **Transmission Line – Option 2:** • PCT 3374 – Goulburn Tableland Peppermint Grassy Forest – Good/Moderate = 2.73 ha • PCT 3374 – Goulburn Tableland Peppermint Grassy Forest – Moderate/Degraded = 0.84 ha • PCT 3376 – Southern Tableland Grassy Box Woodland-Good/Moderate = 0.45 ha. The total area of the species polygon is 6.31 ha.

Information required	Species Polygon Details
TBDC species specific recommendations	The TBDC recommends that for the assessment of the south-eastern glossy black-cockatoo: • Assessors should look for SIGNS OF BREEDING on site as follows; (a) begging birds of any age or sex; or (b) lone adult males identified during the breeding season (April to August); or (c) an occupied nest. • Where signs of breeding on site are present, POTENTIAL NEST TREES should be identified. Potential nest trees contain hollows that are; (i) at least 8 m above the ground; and (ii) in stems with a diameter of at least 30 cm; and (iii) hollow diameter is at least 15 cm; and (iv) stem angle is at least 45 degrees, and may be near-vertical or vertical. • Where potential nest trees are identified on site, monitor for this species during the breeding season (Apr – Aug) to confirm the presence of any ACTUAL NEST TREES on site. NSW DPIE is currently developing survey guidance for threatened bird species. In the interim, assessors must undertake a species survey using best practice methods that can be replicated for repeat surveys (as per the BAM threatened species survey requirements). • If actual nest trees are confirmed on site, then the species polygons are to be drawn around those actual nest trees (i.e. trees that birds of the species are known to have used for nesting). The species polygons should be circular in shape and must include a buffer RADIUS of 200 m around each actual nest tree. The purpose of the buffer is to identify the essential area for breeding and minimise disturbance/avoid clearing for a development application, or conserve and improve habitat for a biodiversity stewardship agreement. The shape of the buffer can be modified where evidence provided in the Biodiversity Assessment Report indicates an alternative shape would better meet the species needs in the context of the assessment site. For example, Development Footprint under assessment is linear, and the nest tree is already located near the edge of the wooded area.
Habitat condition (vegetation integrity score for each vegetation zone in the polygon)	**Common Ancillary Features** • PCT 3376 – Southern Tableland Grassy Box Woodland-Good/Moderate – 76.9 **Transmission Line – Option 1** • PCT 3374 – Goulburn Tableland Peppermint Grassy Forest – Good/Moderate 76 • PCT 3374 – Goulburn Tableland Peppermint Grassy Forest – Moderate/Degraded 69.7 **Transmission Line – Option 2** • PCT 3374 – Goulburn Tableland Peppermint Grassy Forest – Good/Moderate 76 • PCT 3374 – Goulburn Tableland Peppermint Grassy Forest – Moderate/Degraded 76.9 • PCT 3376 – Southern Tableland Grassy Box Woodland-Good/Moderate – 0.45 ha



Legend

- Project Area
- Development Footprint
- Waterbodies
- Watercourse
- Existing Roads and Tracks
- Access Points

Threatened species records

- Glossy black Cockatoo
- Glossy-black Cockatoo Species Polygon

Vegetation Zone

- PCT 3374 - Goulburn Tableland Peppermint Grassy Forest - Good/Moderate
- PCT 3374 - Goulburn Tableland Peppermint Grassy Forest - Moderate/Degraded
- PCT 3376 - Southern Tableland Grassy Box Woodland - Good/Moderate

FIGURE 5.1B

Glossy black cockatoo species polygon

Image Source: ESRI Basemap (2024) **Data source:** NSW LPI (2024), NSW DSFI (2024), Umwelt (2024)

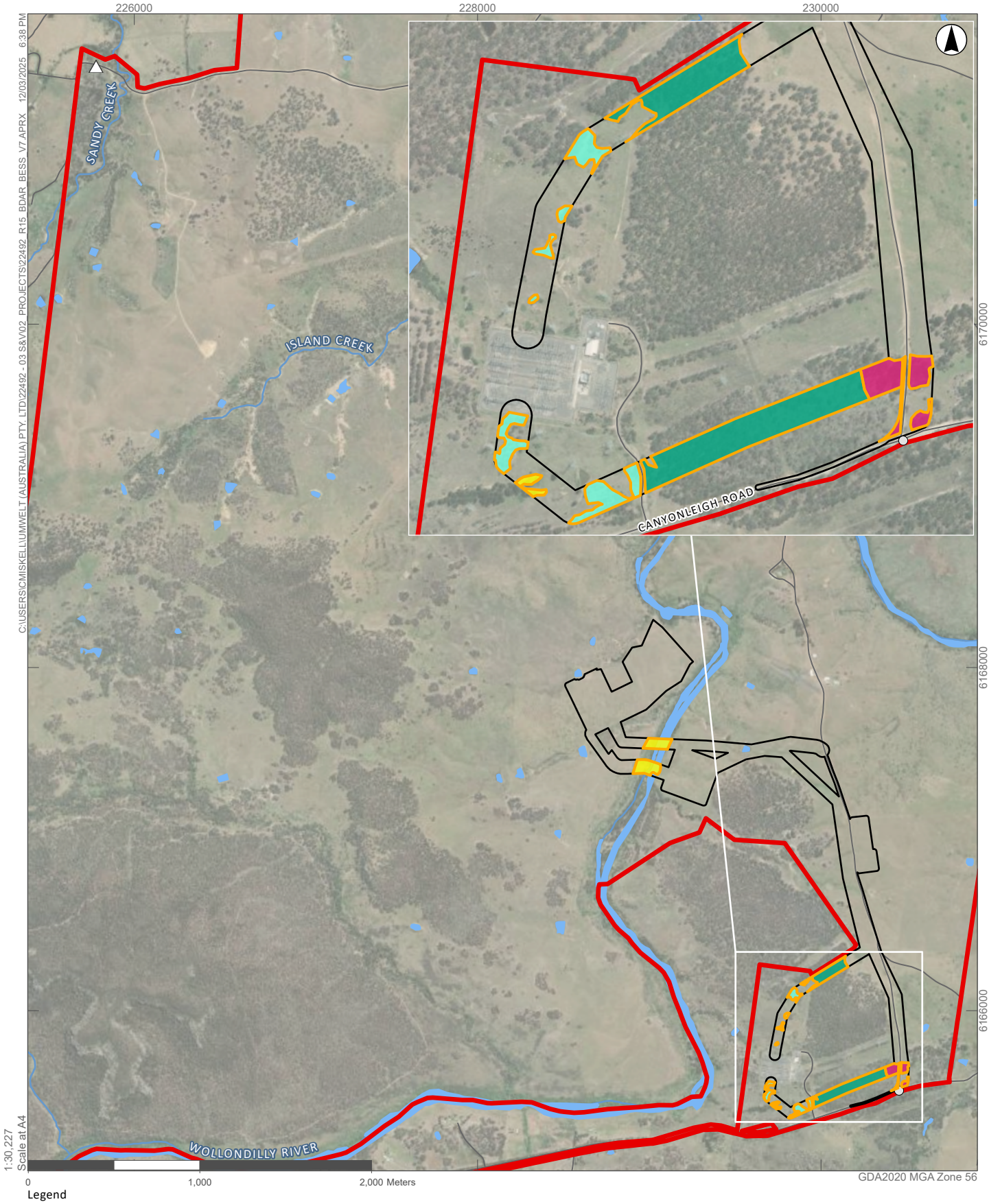
5.4.2.4 Squirrel Glider (*Petaurus norfolcensis*) Species Polygon

Suitable habitat for this species is present within the Development Footprint, the species polygon details are provided in **Table 5.10** and the species polygon is mapped in **Figure 5.1c.**

Table 5.10 Squirrel Glider Species Polygon Details

Information Required	Species Polygon Details
Species polygon notes	The entire area of all suitable habitat was used to develop species polygon. Suitable habitat was defined as all woodland vegetation on site (excluding DNG) and spans 8.63 ha.
Biodiversity Risk Weighting	High (2)
SAII Entity	No
Habitat constraints / microhabitats present on the Development Footprint / vegetation zone	No habitat constraints.
Extent of suitable habitat present	**Common Ancillary Features** • PCT 3376 – Southern Tableland Grassy Box Woodland – Good/Moderate = 0.44 ha • PCT 4063 – Central and Southern Tableland River Oak Forest – Moderate/Degraded = 1.94 ha **Transmission Line – Option 1** • PCT 3374 – Goulburn Tableland Peppermint Grassy Forest – Good/Moderate = 1.39 ha • PCT 3374 – Goulburn Tableland Peppermint Grassy Forest – Moderate/Degraded = 0.46 ha **Transmission Line – Option 2** • PCT 3374 – Goulburn Tableland Peppermint Grassy Forest – Good/Moderate = 2.73 ha • PCT 3374 – Goulburn Tableland Peppermint Grassy Forest – Moderate/Degraded = 0.84 ha • PCT 3376 – Southern Tableland Grassy Box Woodland – Good/Moderate = 0.45 ha • PCT 4063 – Central and Southern Tableland River Oak Forest – Moderate/Degraded = 0.11 ha Total species polygon spans 8.63 ha
TBDC species specific recommendations	TBDC recommends the following for the assessment of the squirrel glider: Survey year round but sites with bipinnate acacia, autumn winter flowering trees and shrubs such as *Eucalyptus robusta* and Banksia sp (*integrifolia* etc.) should be subject to a more retracted survey period of between March-August. Relies on large old trees with hollows for breeding and nesting. These trees are also critical for movement and typically need to be closely connected (i.e. no more than 50 m apart).
Habitat condition (vegetation integrity score for each vegetation zone in the polygon)	**Common Ancillary Features** • PCT 4063 – Central and Southern Tableland River Oak Forest – Moderate/Degraded = 38.7 • PCT 3376 – Southern Tableland Grassy Box Woodland – Good/Moderate = 76.9

Information Required	Species Polygon Details
	Transmission Line – Option 1 • PCT 3374 – Goulburn Tableland Peppermint Grassy Forest – Good/Moderate = 76.9 • PCT 3374 – Goulburn Tableland Peppermint Grassy Forest – Moderate/Degraded = 69.7 **Transmission Line – Option 2** • PCT 4063 – Central and Southern Tableland River Oak Forest – Moderate/Degraded = 38.7 • PCT 3374 – Goulburn Tableland Peppermint Grassy Forest – Good/Moderate = 76.9 • PCT 3374 – Goulburn Tableland Peppermint Grassy Forest – Moderate/Degraded =69.7 • PCT 3376 – Southern Tableland Grassy Box Woodland – Good/Moderate = 76.9
Photos	 



Legend

- Project Area
- Development Footprint
- Waterbodies
- Watercourse
- Existing Roads and Tracks
- Access Points

Threatened species records

- Squirrel glider
- Squirrel glider Species Polygon

Vegetation Zone

- PCT 3374 - Goulburn Tableland Peppermint Grassy Forest - Good/Moderate
- PCT 3374 - Goulburn Tableland Peppermint Grassy Forest - Moderate/Degraded
- PCT 3376 - Southern Tableland Grassy Box Woodland - Good/Moderate
- PCT 4063 - Central and Southern Tableland River Oak Forest - Moderate/Degraded

FIGURE 5.1C

Squirrel glider species polygon

Image Source: ESRI Basemap (2024) **Data source:** NSW LPI (2024), NSW DSFI (2024), Umwelt (2024)

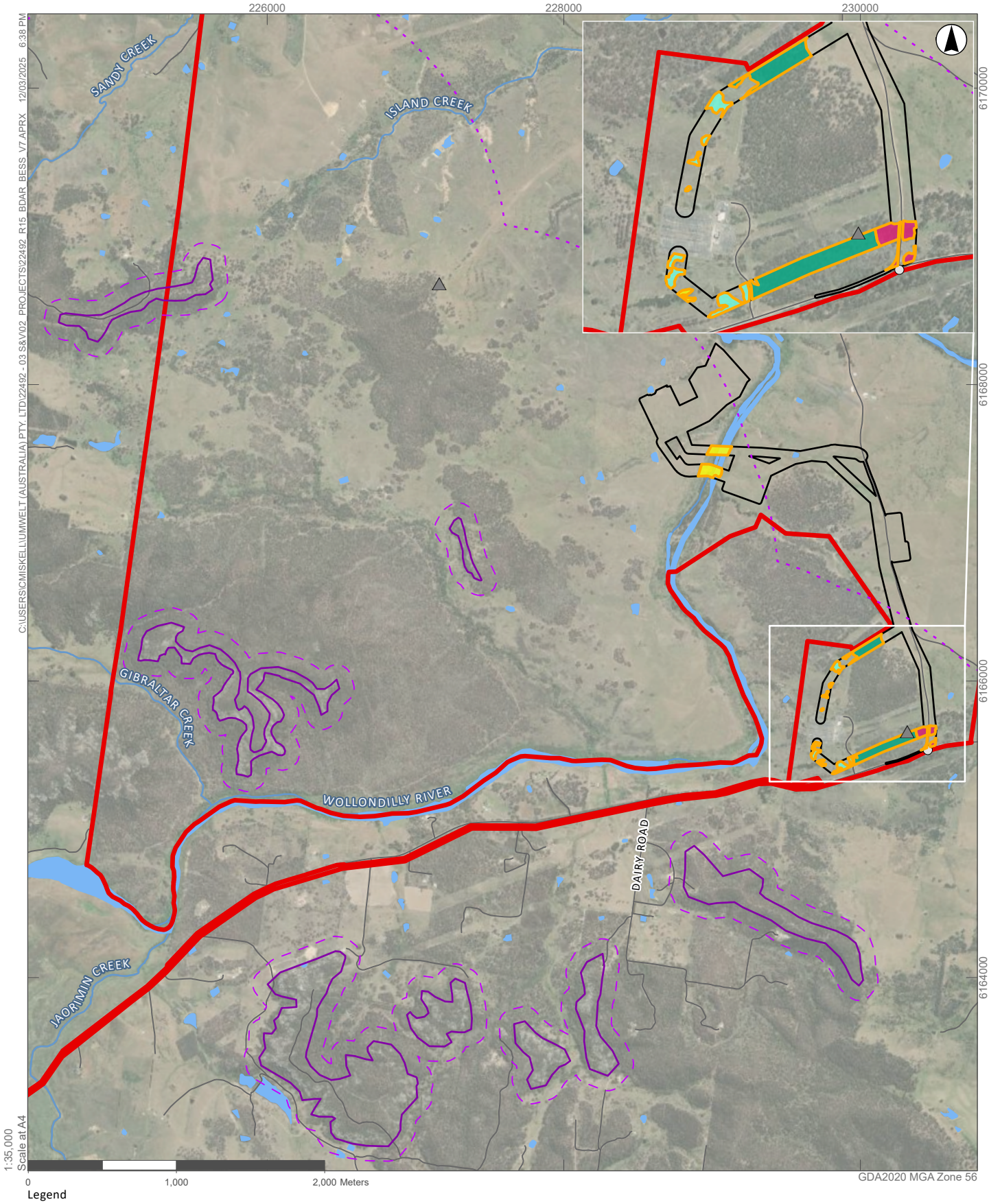
5.4.2.5 Large-eared Pied Bat (*Chalinolobus dwyeri*)

Suitable habitat for this species is present within the Development Footprint, the species polygon details are provided in **Table 5.11** and the species polygon is mapped in **Figure 5.1d**.

Table 5.11 Large-eared Pied Bat Species Polygon Details

Information Required	Species Polygon Details
Species polygon notes	Potential breeding habitat was identified outside of the Development Site, with the closest patch being 400 m to the west. All areas of the following vegetation that fall within two kilometres of the potential breeding habitat have been included in the species polygon: • PCT 3374 – Goulburn Tableland Peppermint Grassy Forest – Good/Moderate • PCT 3374 – Goulburn Tableland Peppermint Grassy Forest – Moderate/Degraded • PCT 3376 – Southern Tableland Grassy Box Woodland – Good/Moderate • PCT 4063 – Central and Southern Tableland River Oak Forest – Moderate
Biodiversity Risk Weighting	High (2)
SAII Entity	Yes, impacts to breeding habitat are considered to result in a serious and irreversible impact. No breeding habitat is likely to be impacted by the Project.
Habitat constraints / microhabitats present on the Development Footprint / vegetation zone	Breeding habitat: PCTs associated with the species within 100 m of rocky areas containing caves, or overhangs or crevices, cliffs or escarpments, or old mines, tunnels, culverts, derelict concrete buildings. Surveys must be undertaken as per the Threatened Bat Survey Guide to confirm breeding habitat. Foraging habitat: Foraging in fertile (relative to surrounding landscape) valleys and plains, as well as areas with moderately tall to taller trees in woodland along water courses and upper slopes and crests of ranges.
Extent of suitable habitat present	**Common Ancillary Features** • PCT 3376 – Southern Tableland Grassy Box Woodland – Good/Moderate = 0.44 ha • PCT 4063 – Central and Southern Tableland River Oak Forest – Moderate/Degraded = 1.94 ha **Transmission Line – Option 1** • PCT 3374 – Goulburn Tableland Peppermint Grassy Forest – Good/Moderate = 1.39 ha • PCT 3374 – Goulburn Tableland Peppermint Grassy Forest – Moderate/Degraded = 0.46 ha **Transmission Line – Option 2** • PCT 3374 – Goulburn Tableland Peppermint Grassy Forest – Good/Moderate = 2.73 ha • PCT 3374 – Goulburn Tableland Peppermint Grassy Forest – Moderate/Degraded = 0.84 ha • PCT 3376 – Southern Tableland Grassy Box Woodland – Good/Moderate = 0.45 ha • PCT 4063 – Central and Southern Tableland River Oak Forest – Moderate/Degraded = 0.11 ha **Total species polygon spans 8.63 ha.**

Information Required	Species Polygon Details
TBDC species specific recommendations	The TBDC recommends that for the assessment of the large-eared pied bat: • Species mapping polygon for breeding habitat must use high resolution aerial imagery and topographic maps to identify features on the subject land (caves, scarps, cliffs etc). • Polygon must be at least 100 m wide (or 50 m radius for point locations such as caves) with the breeding habitat features (may be multiple) as the centroid (see Threatened Bat Survey Guide). • All breeding habitat on or within 100 m of the subject land and the area immediately surrounding the feature must be identified. • All habitat on the subject land should also be mapped if present. Use high resolution aerial imagery and topographic maps to identify potential roost habitat features on the subject land within 2 km caves, scarps, cliffs etc. • Species polygon boundary should align with PCTs on the subject land to which the species is associated that are within 2 km of identified potential roost habitat features.
Habitat condition (vegetation integrity score for each vegetation zone in the polygon)	**Common Ancillary Features** • PCT 3376 – Southern Tableland Grassy Box Woodland-Good/Moderate = 76.9 • PCT 4063 – Central and Southern Tableland River Oak Forest-Moderate/Degraded = 38.7. **Transmission Line – Option 1** • PCT 3374 – Goulburn Tableland Peppermint Grassy Forest – Good/Moderate = 76.9 • PCT 3374 – Goulburn Tableland Peppermint Grassy Forest – Moderate/Degraded = 69.7 **Transmission Line – Option 2** • PCT 3374 – Goulburn Tableland Peppermint Grassy Forest – Good/Moderate = 76.9 • PCT 3374 – Goulburn Tableland Peppermint Grassy Forest – Moderate/Degraded = 69.7 • PCT 3376 – Southern Tableland Grassy Box Woodland-Good/Moderate = 76.9 • PCT 4063 – Central and Southern Tableland River Oak Forest-Moderate/Degraded = 38.7.



Legend

- Project Area
- Development Footprint
- Waterbodies
- Watercourse
- Existing Roads and Tracks
- Access Points

Threatened species records

- Large-eared pied-bat
- Large-eared pied bat- potential foraging habitat 2km buffer
- Large-eared pied bat- potential breeding habitat 100m buffer
- Large-eared pied bat - potential breeding habitat
- Large-eared pied bat Species Polygon

Vegetation Zone

- PCT 3374 - Goulburn Tableland Peppermint Grassy Forest - Good/Moderate
- PCT 3374 - Goulburn Tableland Peppermint Grassy Forest - Moderate/Degraded
- PCT 3376 - Southern Tableland Grassy Box Woodland - Good/Moderate
- PCT 4063 - Central and Southern Tableland River Oak Forest - Moderate/Degraded

Image Source: ESRI Basemap (2024) **Data source:** NSW LPI (2024), NSW DSFI (2024), Umwelt (2024)

FIGURE 5.1D

Large-eared pied bat species polygon

5.5 Results for BC Act Listed Ecosystem Credit Species

The ecosystem credit species observed within the Development Footprint are described in **Table 5.12.** The observation locations are shown on **Figure 5.2.**

Table 5.12 Ecosystem Credit Species Observation Details

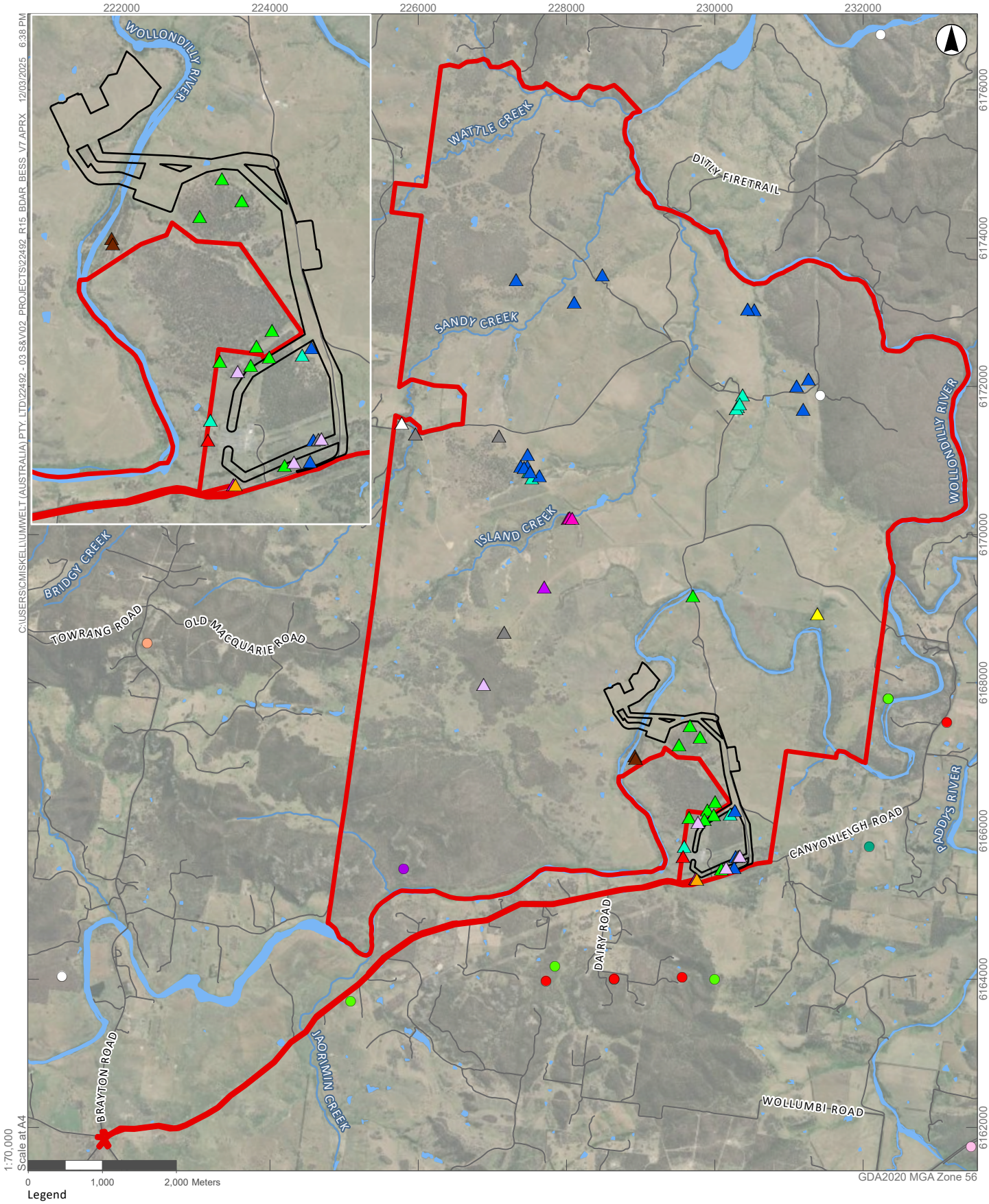
Common Name	Scientific Name	Observation Details
diamond firetail	*Stagonopleura guttata*	This species was frequently heard and observed foraging within the Project Area and Biodiversity Study Area during field surveys including BBUS Surveys, vegetation assessments and targeted threatened species surveys. The species has been observed in a pair collecting nesting material.
dusky woodswallow	*Artamus cyanopterus*	This species was frequently observed foraging within the Project Area and Biodiversity Study Area during field surveys including BBUS Surveys, vegetation assessments and targeted threatened species surveys
scarlet robin	*Petroica boodang*	Recorded near the Wollondilly River on two occasions.
speckled warbler	*Chthonicola sagittata*	Recorded once in the southern portion of the site near the existing substation, foraging in blackberry bushes.
spotted harrier	*Circus assimilis*	Recorded once in the Project Area hunting low in the grassland.
varied sittella	*Daphoenositta chrysoptera*	Recorded four time in the Project Area, often foraging in canopy.

5.6 Results for EPBC Act Listed Species

Details of the threatened species listed within the EPBC Act observed during surveys are described in **Table 5.13** with the locations of the observations shown on **Figure 5.2.**

Table 5.13 Results for EPBC Act Listed Species Present (recorded within Development Footprint)

Common Name	Scientific Name	Extent (ha) of Suitable Habitat Present on Site
gang-gang cockatoo	*Callocephalon fimbriatum*	6.31 ha of potential breeding habitat
south-eastern glossy black-cockatoo	*Calyptorhynchus lathami lathami lathami*	6.31 ha of potential breeding habitat and 2.05 ha of foraging habitat
diamond firetail	*Stagonopleura guttata*	8.63 ha
large-eared pied bat	*Chalinolobus dwyeri*	8.63 ha of foraging habitat only



Legend

- Project Area
- Development Footprint
- Waterbodies
- Existing Roads and Tracks
- Watercourse

BioNet Search Results

- Brush-tailed Rock-wallaby
- Gang-gang Cockatoo
- Koala
- Large-eared Pied Bat
- South-eastern Glossy Black-Cockatoo
- Spotted-tailed Quoll
- White-throated Needletail

Threatened species records

- Diamond Firetail
- Dusky woodswallow
- Eucalyptus macarthurii
- Eucalyptus nicholii
- Gang-gang Cockatoo
- Glossy black Cockatoo
- Large-eared pied-bat
- Scarlet Robin
- Speckled warbler
- Spotted Harrier
- Squirrel glider
- Varied sittella

FIGURE 5.2

Species observation

Image Source: ESRI Basemap (2024) **Data source:** NSW LPI (2024), NSW DSFI (2024), Umwelt (2024), Atlas BioNet (2024)

5.7 SEPP (Biodiversity and Conservation) 2021

Chapters 3 and 4 of SEPP (Biodiversity and Conservation) 2021 contain provisions for assessing impacts to koalas for Local Council assessed development applications. This SEPP is not directly relevant to State Significant Development. Chapter 3 of the SEPP has been considered below in the identification of potential koala habitat and breeding habitat to support further assessment under State and Commonwealth legislation.

For RU2 Rural Landscape zoned land, Chapter 3 Koala Habitat Protection 2020 of the SEPP 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 (NSW DPE 2022c). Eight of the tree species listed in Schedule 3 of the SEPP have been recorded within the Project Area. These tree species represent 15% or greater of the total number of trees within any PCT in the Development Footprint and, as such, all PCTs across the Development Footprint represent potential koala habitat. **Table 5.14** lists the koala feed trees present within the Development Footprint and ranking of significance for the koala (NSW DPE 2022c).

Table 5.14 Koala Feed Tree Present within Development Footprint

Scientific Name	Common Name	Koala Tree Use Rank
Eucalyptus macrorhycha	red stringybark	3 – significant use (feed or shelter trees)
Eucalyptus globoidea	white stringybark	2 – high use (feed trees)
Eucalyptus dives	broad-leaved peppermint gum	3 – significant use (feed or shelter trees)
Eucalyptus amplifolia	cabbage gum	4 – irregular or low use (feed or shelter trees).
Eucalyptus agglomerata	blue-leaved stringybark	3 – significant use (feed or shelter trees)
Eucalyptus pauciflora	white sally	3 – significant use (feed or shelter trees)
Eucalyptus viminalis	ribbon gum	1 – high preferred use (feed trees)
Eucalyptus melliodora	yellow box	3 – significant use (feed or shelter trees)

Despite the Development Footprint containing potential habitat for the koala, the koala was not recorded in the Project Area despite extensive ecological surveys. In addition, a review of the BioNet Atlas of NSW Wildlife reveals only two records (2011, 2015) of this species within 2.5 km of the Development Footprint in better quality habitat connected to Belanglo State Forest and Penrose State Forest to the east of the site. These records are associated with the known populations at Belanglo State Forest and Penrose State Forest, which are over 10 km from the Development Footprint.

As a result, the Development Footprint is unlikely to comprise core koala habitat as the koala was not recorded in the Project Area and no koalas have been recorded within 2.5 km. No further provisions of koala habitat protection in SEPP (Biodiversity and Conservation) 2021 apply. Notwithstanding this, the koala is a species credit species under the BAM and has been considered as part of this BDAR.

6.0 Identifying Prescribed Impacts

Prescribed impacts which are predicted to occur as a result of the Project are documented in **Table 6.1.**

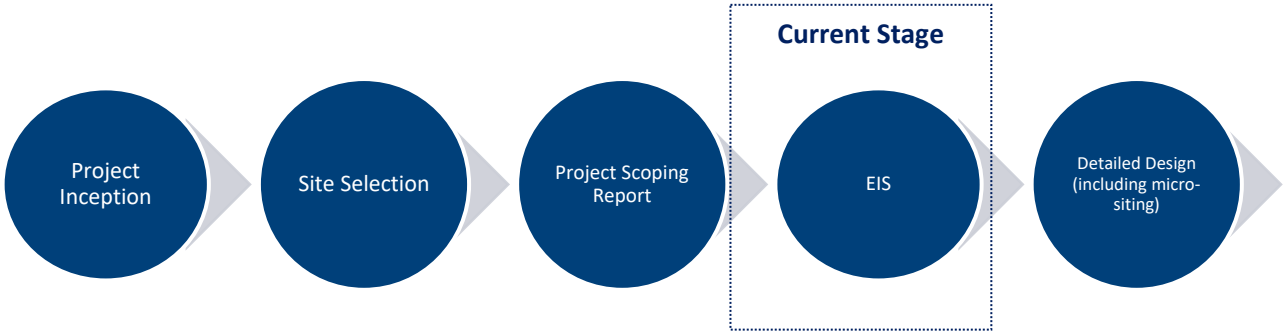
Table 6.1 Prescribed Impacts Identified

Feature	Present?	Description of feature characteristics and location	Threatened entities that use, are likely to use, or are part of the habitat feature
Karst, caves, crevices, cliffs, rocks or other geological features of significance	☒Yes / ☐No	There are no karst, caves, crevices, cliffs, rocks or other geological features of significance within the Development Footprint. There are areas of rock piles, minor rock outcropping and shallow sandstone that will be impacted by the Project however these areas are not considered geological significant.	No threatened species that are likely to utilise the rocky habitat in the Development Footprint were identified during the surveys. Most of the rocky areas are either: • very small in area which would be unsuitable for threatened species such as the brush-tailed rock-wallaby or • the rock is deeply embedded in the ground making it unsuitable for small reptiles include the pink tail legless lizard or stripped legless lizard. It is considered unlikely that the area of rocky outcrop would provide important habitat for any threatened species.
Human-made structures	☐Yes / ☒No	There are no human-made structures in the Development Footprint.	Based on the results of completed surveys, no such structures have been identified in the Development Footprint, therefore there will be no known threatened entities using the human-made structures.
Non-native vegetation	☒Yes / ☐No	The non-native vegetation has been attributed to Category 1 - Exempt Land. This consists of land used primarily for agriculture and has poor value for threatened species.	A number of the raptor species and/or insectivorous bat species may forage within agricultural grazing land on occasion.

Feature	Present?	Description of feature characteristics and location	Threatened entities that use, are likely to use, or are part of the habitat feature
Habitat connectivity	☒Yes / ☐No	There will be clearing of native vegetation including canopy trees in areas of intact native vegetation. Isolated and scattered paddock trees in areas of derived native grassland and highly disturbed agricultural land assessed as Category 1 – Exempt Land will also be impacted.	Habitat connectivity is unlikely to be impacted as corridor are retained throughout the landscape as shown on **Figure 3.2.** The threatened entities observed during surveys are highly mobile species, capable of flying over the areas proposed for development. It is likely that these species will also utilise the retained areas of connectivity in the Project Area. These species include: • diamond firetail • squirrel glider • scarlet robin • speckled warbler • varied sittella • spotted harrier • dusky woodswallow • south-eastern glossy black-cockatoo • gang-gang cockatoo
Waterbodies, water quality and hydrological processes	☒Yes / ☐No	Two farm dams are proposed for removal. Minor creek crossings are proposed on the following watercourses: • Wollondilly River • Island Creek • Sandy Creek • Unnamed watercourse, tributary of Wollondilly River	No threatened entities were observed using aquatic areas. Impacts to aquatic habitat have been assessed in a separate aquatic assessment report (**Appendix E**).
Wind turbine strikes (wind farm development only)	☐Yes / ☒No	This assessment is not a wind farm development.	Not applicable.
Vehicle strikes	☒Yes / ☐No	Vehicle movements would be on access tracks throughout the Development Footprint and would utilise existing access tracks where possible. A low speed limit would be enforced for vehicles traveling through the Project Area.	No threatened entities are likely to be affected by vehicle strikes as vehicle movements will be at low speed.

7.0 Avoid and Minimise Impacts

This section describes the efforts made to avoid and minimise impacts to biodiversity in accordance with Chapter 7 of the BAM. Biodiversity impacts have been avoided and minimised through iterative refinements to the Project Area and Development Footprint, in response to key site constraints and feedback from key stakeholders. The key stages are set out below.



At each stage of the design process, from Project inception, through Project Scoping and the development of the BDAR (and broader EIS), Spark Renewables has applied the following hierarchy (in order of priority):

- **Avoid** – in the first instance, all efforts were made to avoid potential environmental, cultural and social impacts.
- **Minimise** – where potential impacts could not be avoided, design principles sought to minimise impacts, as far as reasonably practicable.
- **Mitigate** – mitigation strategies have been identified and will be implemented to manage the extent and severity of the remaining impacts, refer to **Section 9.0.**
- **Offset** – environmental offsets are only used following all efforts to first avoid, minimise and mitigate impacts, refer to **Section 11.0.**

Key impact avoidance and mitigation measures have been applied to the Project:

- Development Footprint alterations to the broader development of the Project Area which have resulted in the avoidance of approximately 64.3 % (reducing from 1,838.09 ha (original survey area) to 656.32 (580.62 ha (Wattle Creek Solar Farm Project) and 75.70 ha (the Project)) of the Project Area.
- Reduction in the development footprint for the BESS project from 390 ha (Scoping Conceptual Layout including 2 BESS locations) to 75.70 ha (one BESS location and refined associated infrastructure layout).

- Early site investigations included a potential wind farm component within the Project Area. However, the wind component was not pursued which has resulted in considerable reduction of impacts to native vegetation, TECs and threatened fauna populations. Specifically, the potential for turbine strike has been avoided for the known populations of gang-gang cockatoo, south-eastern glossy black-cockatoo, large-eared pied bat and diamond firetail.
- The BESS has been located in the areas of degraded grassland within negligible biodiversity value. Ancillary facilities, access tracks and transmission lines have been located in existing cleared land and minimised impacts to TECs, intact woodland and habitat for threatened species were practicable.
- Optimising opportunities to maintain connectivity between the Project Area and surrounding areas of intact native vegetation.
- Redesign of the Project to minimise impacts on areas of intact native woodland and hollow bearing trees which reduced impacts to suitable foraging and/or breeding habitat for the gang-gang cockatoo, south-eastern glossy black-cockatoo, squirrel glider, diamond firetail, dusky woodswallow, scarlet robin, speckled warbler, spotted harrier and varied sittella.
- Alteration of the Development Footprint to avoid impact to individuals of Paddys River box (*Eucalyptus macarthurii*) and narrow-leaved peppermint (*Eucalyptus nicholii*).
- Reduction of the Development Footprint to avoid impacts to areas of PCT 3373 Goulburn Tableland Box-Gum Grassy Forest (which is associated with White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland which is listed as a CEEC under the BC Act and EPBC Act).
- Reduction and alteration of the Development Footprint to minimise impacts to areas of the White Box - Yellow Box - Blakely's Red Gum Grassy Woodland and Derived Native Grassland CEEC. This included impact avoidance measures targeted at retaining areas of woodland with intact crown condition, areas of scattered trees and higher quality derived native grassland condition zones.
- Reduction of the Project Area to avoid riparian areas and dams with emergent vegetation that may provide habitat for threatened species.

Impacts which cannot be avoided or minimised will be managed in the following ways:

- The preparation and implantation of a Construction Environmental Management Plan (CEMP) and Vegetation Management Plan (VMP). The plans will be prepared in consultation with relevant government agencies.
- Education and training for construction and operation staff.
- Establishing vegetation protection zones for retained areas.
- Pre-clearance surveys and ecologist supervision, enabling rescue of native fauna as well as salvaging habitat features (such as hollows or selective felled timber) for relocation into adjacent retained areas.
- Erosion and sediment control.
- Weed management.

A summary of the commitments to avoid, minimise and mitigate the biodiversity impacts of the Project, that are to be implemented will be included in a CEMP and OEMP with monitoring or reporting requirements, adaptive management measure, performance criteria and any additional actions relevant to the management of biodiversity.

7.1 Avoid and Minimise Direct and Indirect Impacts

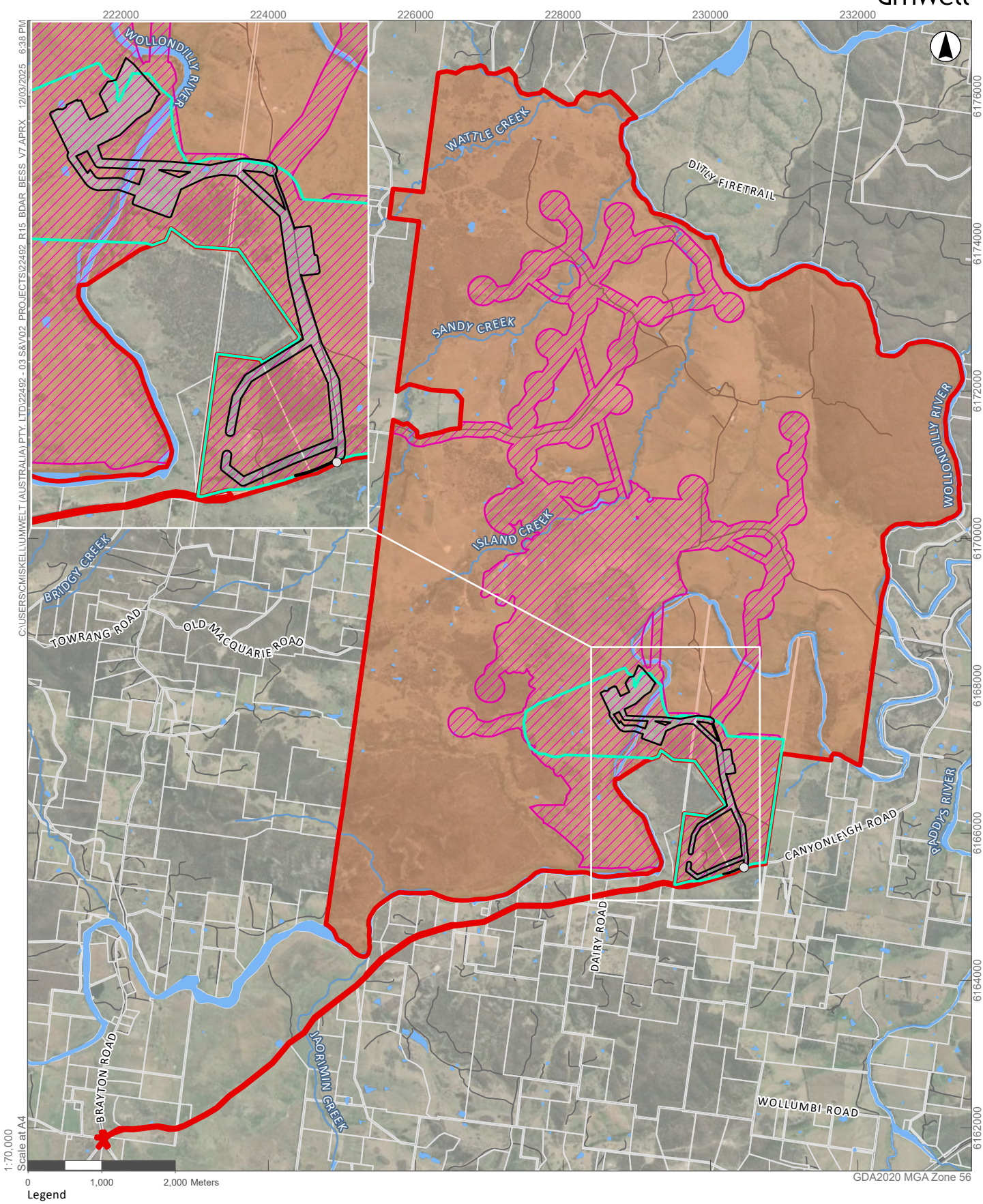
Biodiversity impacts have been avoided and minimised through refinements to the Development Footprint. From the Biodiversity Constraints Assessment (April 2022) and the Scoping Report (September 2023) to the present, the Development Footprint has greatly reduced in size in response to emerging understanding of site-specific biodiversity values/constraints and to prioritise the avoidance of impacts on potential serious and irreversible impact entities. A reduction in the total development footprint area has occurred for the BESS project, from the Scoping Conceptual Layout which spanned 390 ha and included 2 BESS locations to the current EIS layout which spans 75.70 ha and includes one BESS location and refined associated infrastructure layout. The areas avoided through the refinement of the Development Footprint includes the highest value ecological areas, which comprise TEC, habitat for threatened flora and fauna as well as riparian habitat. **Table 7.1** and **Figure 7.1** shows how avoidance has occurred across design iterations, based on the current PCT mapping for the Project Area.

The residual impacts to native woodland areas are associated with the transmission line impacts. Consultation with Transgrid has been undertaken in effort to locate the transmission lines in cleared easement, however this was deemed to be unpracticable.

Table 7.1 Wattle BESS Impact Avoidance

	Biodiversity Study Area on Figure 7.1	Design A (August 2023) Scoping Report boundary (ha)	Design B (June 2024) Current EIS Boundary (ha)	Difference (A to B) (ha)	Impact reduction
Development Footprint					
Biodiversity Study Area	1,838.09				
BESS Development Footprint	-	390	75.7	314.3	81%
Vegetation Zones					
PCT 4063 Central and Southern Tableland River Oak Forest – Moderate/Degraded	60.26	5.8	2.05	3.75	65%
PCT 3374 Goulburn Tableland Peppermint Grassy Forest – DNG-Moderate/Degraded	310.09	38.35	19.25	19.1	50%
PCT 3374 Goulburn Tableland Peppermint Grassy Forest – DNG-low condition	204	12.15	1.18	10.97	90%
PCT 3374 Goulburn Tableland Peppermint Grassy Forest – DNG-exotic dominated	350.38	199.17	42.95	156.22	78%
PCT 3374 Goulburn Tableland Peppermint Grassy Forest – Good/Moderate	70.28	38.52	4.12	34.4	89%

	Biodiversity Study Area on Figure 7.1	Design A (August 2023) Scoping Report boundary (ha)	Design B (June 2024) Current EIS Boundary (ha)	Difference (A to B) (ha)	Impact reduction
PCT 3374 Goulburn Tableland Peppermint Grassy Forest – Moderate/Degraded	110.82	72.3	1.3	71	98%
PCT 3376 Southern Tableland Grassy Box Woodland – DNG	15.16	10.23	1.23	9	88%
PCT 3376 Southern Tableland Grassy Box Woodland – Good – Moderate	6.95	6.95	0.89	6.06	87%
PCT 3376 Southern Tableland Grassy Box Woodland – Moderate/Degraded	7.39	0	0	0	0%
PCT 3373 Goulburn Tableland Box-Gum Grassy Forest – Good/Moderate	1.64	1.64	0	1.64	100%
PCT 3373 Goulburn Tableland Box-Gum Grassy Forest – Moderate/Degraded	4.89	4.89	0	4.89	100%
PCT 3643 Bungonia Tableland Silvertop Ash-Stringybark Forest – Good/Moderate	42.27	0	0	0	0%
PCT 3643 Bungonia Tableland Silvertop Ash-Stringybark Forest – DNG	18.13	0	0	0	0%
PCT 3347 Southern tableland Creekflat Ribbon Gum Forest – Moderate/Degraded	24.03	0	0	0	0%
PCT 3374 Goulburn Tableland Peppermint Grassy Forest – DNG-Planted/Regen	107.8	0	0	0	0%
Total Native Woodland Vegetation	**328.53**	**130.1**	**8.36**	**121.74**	**94%**
Non Native	504	2.73	2.73	0	0%
Threatened Species					
gang-gang cockatoo	244.24	124.3	6.31	117.99	95%
south-eastern glossy black-cockatoo	244.24	124.3	6.31	117.99	95%
squirrel glider	328.53	130.1	8.36	121.74	94%
large eared pied bat	284.6	130.1	8.36	121.74	94%



Legend

- Project Area
- Property Boundaries
- Waterbodies
- Watercourse
- Existing Roads and Tracks
- Access Points
- Development Footprint
- Scoping Report Development Corridor - October 2023
- Extent of previous boundaries (Biodiversity Study Area)
- Retained / Impact Avoidance Areas

FIGURE 7.1

Impact Avoidance and Minimisation Areas

Image Source: ESRI Basemap (2024) **Data source:** NSW LPI (2024), NSW DSFI (2024), Umwelt (2024)

7.1.1 Project Location

The Project Area has been selected due to its proximity to existing transmission line infrastructure and availability of cleared land within Arthursleigh Farm. Due to its location the Project has minimal impacts on neighbouring residents, visual amenity, aquatic biodiversity, and agricultural land use. The existing 132 kV and 330 kV transmission lines on site allows for access to the National Electricity Market with only smaller internal transmission lines required to be built to facilitate the Project.

The site selection process was the first and arguably most successful attempt at impact avoidance and mitigation, avoiding visual impacts to residents and agricultural impacts by selecting low value farmland, as well as avoiding the need for a new large scale transmission line, while minimising biodiversity impacts.

The total Project Area is 6,331 ha, which has provided flexibility in the design to prioritise avoidance of high value biodiversity areas. The Project Area has also undergone historic and widespread clearing for ongoing agricultural use.

7.1.1.1 Location of Surface Works in Areas with No or Low Biodiversity Values

1,838.09 ha of the Project Area shown in **Figure 7.1** was initially investigated for the potential establishment of the Project and subject to initial surveys. The Project Area has provided flexibility in design to prioritise avoidance of high value biodiversity areas and utilise the land historically impacted by widespread clearing and ongoing pasture improvement works for agricultural use.

The Project has been designed to take advantage of the areas of Category 1 – Exempt Land and areas of degraded derived native grassland which have been subject to historical clearing and are currently managed for livestock grazing. Most of the areas of intact forest and woodland present were avoided during the refinement of the Development Footprint in the planning process. Development Footprint alterations have resulted in biodiversity impact avoidance through the avoidance of approximately 314.3 ha of native vegetation (81% of the initial Development Footprint). This has included the following targeted measures:

- Redesign the Project to minimise impacts on areas of canopy vegetation containing hollow bearing trees that may provide important breeding habitat for the gang-gang cockatoo and south-eastern glossy black-cockatoo.
- Alteration of the Project to reduce impacts to suitable breeding and foraging habitat for the squirrel glider and large-eared pied bat.
- Reduction in the impacts to White Box - Yellow Box - Blakely's Red Gum Grassy Woodland and Derived Native Grassland CEEC to avoid areas of woodland with intact crown condition and resulting in impact minimisation to areas of woodland and derived native grassland condition zones.
- Alteration of the Project to reduce impacts to watercourses and dams.
- Alteration of the project to avoid impacts to *Eucalyptus nicholii* and *Eucalyptus macarthurii.*

7.1.1.2 Location of Sub-Surface Works in Areas with No or Low Biodiversity Values

Underground cabling will be required to connect infrastructure to the substation which is located in the south-western section of the Project area. The underground cabling has been located within the footprints of the access roads and areas with low biodiversity values.

7.1.1.3 Avoidance of Wildlife Corridors

The Development Footprint contains agricultural land, predominantly comprised of grazed grasslands with remnant trees. Patches of retained forest and woodland vegetation have mostly been avoided which maintains connectivity to the larger tracks of vegetation in the landscape.

7.1.1.4 Location of Works to Minimise Interactions with Threatened Entities

Reductions in the Development Footprint assessed by Umwelt are shown in **Figure 7.1** and have included design considerations to minimise impacts to breeding habitat for the gang-gang cockatoo, south-eastern glossy black-cockatoo, large eared pied bat and squirrel glider and areas of the White Box – Yellow Box – Blakely's Red Gum Grassy Woodland and Derived Native Grassland CEEC associated with PCT 3376 Southern Tableland Grassy Box Woodland and PCT 3373 Goulburn Tableland Box-Gum Grassy Forest.

7.1.1.5 Location of Works to Avoid Impacts on Waterbodies and Hydrological Processes

Watercourse impacts will be limited to ephemeral first and second order streams. A small section of Wollondilly River will be impacted by the project construction works to facilitate a river crossing and is assessed in the Aquatic Assessment (refer to **Appendix E**).

7.1.1.6 Alternative Routes Considered

The Project has been designed to make use of the existing access tracks present throughout the Project Area. It is considered that the use of other routes will not result in further impact minimisation or avoidance.

7.1.1.7 Alternative Sites Within the Development Footprint Considered

Approximately 2,000 ha of the Project Area shown in **Figure 7.1** was initially investigated for the potential establishment of the Project, and subject to initial surveys. Areas of intact vegetation were generally avoided early in the planning process to minimise impacts to the areas with the highest biodiversity values including the highest quality areas of the White Box - Yellow Box - Blakely's Red Gum Grassy Woodland and Derived Native Grassland CEEC.

Impact avoidance focused the Development Footprint on the previously cleared areas of historically disturbed vegetation, particularly areas with a long history of agricultural use mapped as Category 1 Exempt Land.

7.1.2 Project Design and Planning

Design refinements have been implemented as an outcome of the environmental impact assessment process. Spark Renewables have actively refined the design and incorporated environmental, heritage and social constraints into the design and layout of the Project to avoid and/or minimise impacts to sensitive environmental features and neighbouring landholders.

These refinements have been implemented as an outcome of:

- Ongoing consultation with landholders.
- Targeted ecological surveys conducted across the Project Area.
- The findings of the detailed environmental and cultural heritage assessments for the EIS.
- In response to community and stakeholder feedback during the preparation of the EIS.

7.1.2.1 Construction Approach

The majority of land comprised of DNG within the Development Footprint would not be stripped or subject to earthworks (i.e., areas of cut and /or fill). Woody vegetation would however be removed. Earthworks within the Development Footprint are expected to be limited to:

- access tracks
- security fencing, including post holes
- underground cabling (trenching and installation of inverter stations)
- Construction of onsite infrastructure.

The access tracks and onsite infrastructure would result in complete removal of the underlying PCT, which equates to less than 10% of the Development Footprint. The remainder of the Development Footprint would be partially impacted. Increased foot and vehicle traffic during construction across the site would impact ground cover; however, it is unlikely to impact the underlying seed bank, nor would it reduce the ability of the PCT to recover through assisted natural regeneration.

Clearing of derived native grassland and ground disturbance across the bulk of the Development Footprint would largely relate to the piling of post holes (for fencing). The post holes would likely be piled using a mobile drilling rig approximately the size of a small truck, which may have a caterpillar-like system. Given the rocky nature of the substrate, it is likely that temporary impacts on the derived native grassland would be no more significant than the current agricultural regime of tilling, cropping and grazing.

Where earthworks are required, the topsoil containing the seed bank would be separated, stockpiled, and re-spread within rehabilitation areas. The seed bank of the derived native grassland is therefore anticipated to be retained within the Development Footprint, as it would be rehabilitated shortly following ground disturbance activities. The seed bank and regeneration capacity are considered to be robust, given the present extent of this vegetation community across paddocks which have been consistently grazed and cropped for decades.

Whilst some compaction impacts on derived native grassland are likely during construction as a result of mobile plant, foot traffic, and temporary laydown of equipment and materials, trampling of native vegetation would largely be short term, and ground disturbance minimal.

7.1.2.2 Alterations to the Project Footprint

Several Project refinements have been incorporated into the design and layout of the Project since the preparation of the initial Scoping Report and the completion of biodiversity surveys, to avoid and/or minimise impacts to sensitive environmental features. These refinements have been implemented as an outcome of ongoing consultation with the landholder, refining the engineering design and targeted ecological surveys conducted across the Project Area. This has resulted in several iterations to the Development Footprint to achieve the current design, summarised in **Figure 7.1.**

Development Footprint alterations have resulted in biodiversity impact avoidance through the avoidance of approximately 314.3 ha of native vegetation (81% of the initial Development Footprint). This has included the following targeted measures:

- Refined Project layout removal optional BESS area and refining relating infrastructure.
- Redesign the Project to minimise impacts on areas of canopy vegetation containing hollow bearing trees that may provide important breeding habitat for the gang-gang cockatoo and south-eastern glossy black-cockatoo.
- Alteration of the Project to reduce impacts to suitable breeding and foraging habitat for the squirrel glider.
- Reduction in the impacts to White Box - Yellow Box - Blakely's Red Gum Grassy Woodland and Derived Native Grassland CEEC to avoid areas of woodland with intact crown condition and resulting in impact minimisation to areas of woodland and derived native grassland condition zones.
- Alteration of the Project to reduce impacts to watercourses and dams.
- Alteration of the project to avoid impacts to *Eucalyptus nicholii* and *Eucalyptus macarthurii.*

7.1.2.3 Design Measures

The Project has been designed to take advantage of the existing Marulan substation in the southern portion of the site, allowing easy connection to the national electricity grid and avoiding clearing of large tracts of native vegetation for transmission line infrastructure.

7.1.2.4 Location of Ancillary Structures and Sheds in Areas with No Biodiversity Values, or in Areas of Poorest Habitat

All ancillary structures and sheds will be located within the Development Footprint which will be utilised during the operational stage of the Project. Staged construction works will enable the use of the Development Footprint for ancillary structures and sheds such as site facilities, storage areas and materials stockpiles.

7.1.2.5 Location of Ancillary Structures and Sheds to Avoid Habitat of Threatened Entities

All ancillary structures and sheds will be located within the Development Footprint which will be utilised during the operational stage of the Project. Staged construction works will enable the use of the Development Footprint for ancillary structures such as site facilities, storage areas and materials stockpiles. Threatened species habitat will not be separately impacted by the location of ancillary structures.

7.1.2.6 Actions that Provide for Ecological Rehabilitation, Restoration and/or Maintenance or Retained Areas

The residual parts of the Project Area are currently being investigated for the establishment of a BSA to generate biodiversity credits to offset the impacts associated with the Project. The establishment of a BSA would provide offsets in the same locality as the Project and provide an opportunity for the rehabilitation, restoration and maintenance of the residual site areas. Specific objectives would include tree planting in areas of derived native grassland associated with the White Box – Yellow Box – Blakely's Red Gum Grassy Woodland and Derived Native Grassland CEEC and monitoring, rehabilitation and protection of gang- gang cockatoo habitat.

7.1.2.7 Alternative Modes or Technologies Considered

The proponent considered the possibility of establishing a wind farm within the Project Area. Discussions with the proponent identified that a wind farm may have a reduced direct impact footprint, however, would likely result in increased indirect impacts to birds and bats through turbine strikes and barotrauma events. This would potentially have a higher level of impact on the gang-gang cockatoo, large eared pied bat and south-eastern glossy black-cockatoo and higher visual impacts within the locality.

7.1.2.8 Project Design Constraints

The Project Area was selected for the location of a BESS due to the presence of an existing 132 kV and 330 kV transmission lines and Marulan substation, which reduces the extent of new electricity transmission lines required and the associated impact.

7.2 Avoid and Minimise Prescribed Impacts

Prescribed Impacts are additional impacts which require assessment; however, they are not impacts which require consideration when calculating the number and classes of biodiversity credits required. Clause 6.1 of the Biodiversity Conservation Regulation defines Prescribed Impacts as:

- the impacts of development on the following habitat of threatened species or ecological communities:
    - karst, caves, crevices, cliffs and other geological features of significance
    - rocks
    - human made structures
    - non-native vegetation
    - the impacts of development on the connectivity of different areas of habitat of threatened species that facilitates the movement of those species across their range
    - the impacts of development on movement of threatened species that maintains their lifecycle
    - the impacts of development on water quality, water bodies and hydrological processes that sustain threatened species and threatened ecological communities (including from subsidence or upsidence resulting from underground mining or other development)
    - the impacts of wind turbine strikes on protected animals
    - the impacts of vehicle strikes on threatened species of animals or on animals that are part of a threatened ecological community.

7.2.1 Project Location

Potential prescribed impacts of relevance to the Project are identified in **Section 6.0** and comprise disturbances to non-native vegetation, rocky outcrops and waterbodies such as dams and watercourses. Areas of non-native vegetation, rocky outcrops and waterbodies are not likely to provide important habitat for threatened entities, no additional avoidance is required to those measures outlined above.

7.2.2 Project Design

Potential prescribed impacts of relevance to the Project are identified in **Section 6.0** and comprise disturbance to non-native vegetation, rocky outcrops and waterbodies such as dams and watercourses. Areas of non-native vegetation, rocky outcrops and waterbodies are not likely to provide important habitat for threatened entities, no additional avoidance is required to those measures outlined above.

Efforts made to avoid and minimise prescribed impacts to biodiversity values (as defined by Section 8.3 of the BAM) in accordance with Section 7.2 of the BAM are summarised in **Table 7.2.**

Table 7.2 Design Refinements that have Avoided and/or Minimised Prescribed Impacts

Prescribed Impacts	Rationale for Design
Karst, caves, crevices, cliffs, rocks and other geological features of significance	Large areas of rocky outcrops have been avoided during the design phase, with negligible rocky habitat remaining in the Development Footprint.
Human-made structures or non-native vegetation	No human-made structures were recorded within the Development Footprint. Non-native vegetation may be used as hunting grounds for threatened raptor of insectivorous bat species which may occur on site. As a majority of the Project Area and surrounding habitat contains suitable foraging and hunting grounds, it is unlikely that this loss will have a significant impact on the threatened raptor or bat populations.
Habitat connectivity	The Project has sought to avoid impacts to habitat connectivity. The Project does not require large areas of clearing or the erection of barriers that would affect fauna movement or the disruption of ecosystem services (e.g. pollination, seed dispersal).
Water bodies, water quality and hydrological processes	The project has been redesigned to avoid impacts to watercourses where practicable, only small sections of the Wollondilly River, Island Creek and Sandy Creek will be impacted by the Project. These impacts are assessed in the aquatic assessment.
Vehicle strikes	Vehicle strikes are a potential impact, particularly during construction when traffic volumes are high. Thus, the maximum intensity of this impact will only be a relatively short amount of time during the construction phase. Another period of potentially high intensity impact is during periods of high intensity rain, particularly in warmer months, as threatened amphibians are likely to disperse widely across the landscape, likely crossing roads in the process. The impacts of vehicle strike can be further reduced by: • Use of existing public and private roads. • Limit vehicle to low speeds within the Project Area.

Prescribed Impacts	Rationale for Design
	• Avoiding or minimising driving at dawn and dusk when fauna activity is highest (e.g. macropods). • Avoiding or minimising driving during periods of high rainfall and warm temperatures. If driving is required, vehicle speed should be reduced when passing by waterbodies. • Worker induction to include driving protocols, including promoting driver awareness of fauna road behaviour.

7.3 Other Measures Considered

7.3.1 Do Nothing Option

The 'Do nothing' option was considered as part of environmental impact assessment for this Project. The Project Area is currently used for livestock grazing. The 'do nothing option' would allow for the continued use of the Project Area solely for agricultural purposes. The 'do nothing option' would also imply that the Project is not developed and would therefore forego the Project's identified benefits, namely:

- the provision of additional renewable energy supply to assist in reaching state and Commonwealth renewable energy targets in areas of the network that can handle the BESS infrastructure without the need for new network upgrades or powerlines such as Renewable Energy Zones;
- assistance in the transition towards cleaner electricity generation and a reduction in greenhouse gas emissions;
- increased energy security and supply into the Australian grid; and
- significant social and economic benefits created through capital investment, provision of direct and indirect employment opportunities during the construction and operation of the Project and community benefit scheme.

The adverse impacts associated with the Project are considered to be manageable through the implementation of the impact avoidance, minimisation and offsetting measures proposed. Considering the benefits of the Project, the 'do nothing option' is considered to not be a preferred option for the Proponent.

7.3.1.1 Project Justification and Need

The development of renewable energy generation aligns with both Federal and NSW commitments to increase renewable energy generation and reduce carbon emissions.

The Project will contribute to the implementation of the NSW Electricity Strategy, which seeks to establish a reliable, affordable and sustainable electricity future for NSW. The location, design, technology, layout and size of the Project has been developed through consideration of a number of alternatives to ensure the Project would result in maximum benefits for the locality and region in the long term, whilst minimising impacts to the environment and to cultural heritage during all phases of the Project.

The Project is considered to be justified and in the public interest because:

- The Project Area has access to the existing Marulan substation and associated transmission infrastructure that has capacity to transport the electricity to the grid. This minimises the need for construction works and disturbance associated with extensive additional transmission infrastructure often required to connect large-scale renewable energy projects to the electricity market.
- It would not result in significant biophysical, social, cultural or economic impacts.
- The large Project Area (6,331 ha) provides flexibility in design to prioritise avoidance of high value biodiversity areas. This includes the possibility of the remaining areas being an offset site under a BSA (currently being investigated).
- Potential to create employment opportunities and benefits to the local and regional economy.

Spark Renewables is committed to the long-term environmental management of the land within the Development Footprint. At the end of the Project's investment and operational life, the Development Footprint would be returned to its pre-existing agricultural land use or another land use as agreed by the host landholders at that time and in accordance with any legislative requirements or restrictions.

The consequences of not proceeding with the Project would result in:

- Loss of additional renewable energy supply to assist Australia in reaching the Large-scale Renewable Energy Target.
- Loss of opportunity to reduce greenhouse gas emissions and move towards cleaner electricity generation.
- Loss of increased energy security and supply into the Australian grid.
- Loss of significant social and economic benefits created through capital investment and provision of direct and indirect employment opportunities during the construction and operation of the Project.
- Lost opportunity in maximising existing infrastructure.

7.4 Summary of Measures to Avoid and Minimise Impacts

A summary of the measures proposed to avoid and minimise direct, indirect and prescribed impacts associated with the Project is provided in **Table 7.3.**

Table 7.3 Avoidance and Minimisation Measures for Direct, Indirect and Prescribed Impacts

Action	Outcome	Timing	Responsibility
Preliminary biodiversity constraints analysis	Preliminary assessment of biodiversity constraints to inform Project design and minimise impacts to areas with high biodiversity values.	This has already been undertaken throughout the project design and biodiversity survey stage.	Project Ecologist, Planning Team and Proponent

Action	Outcome	Timing	Responsibility
Location and design of works in existing disturbed areas where possible	Focus impacts on areas of low biodiversity value.	This has already been undertaken throughout the project design and biodiversity survey stage.	Project Ecologist, Planning Team and Proponent
Reduction of Development Footprint boundary / impact footprint	Avoidance and minimisation of impacts to areas of suitable habitat for the gang-gang cockatoo, south-eastern glossy black-cockatoo and squirrel glider as well as areas associated with the White Box - Yellow Box - Blakely's Red Gum Grassy Woodland and Derived Native Grassland critically endangered ecological community.	This has already been undertaken throughout the project design and biodiversity survey and assessment stage.	Proponent
Workforce education and training	Environmental awareness for workforce.	Pre-construction, construction and operation.	Engineering procurement and construction contractor (EPC)
Implement Construction Environmental Management Plan (CEMP)	Management and minimisation of potential environmental impacts.	During construction phase.	EPC Contractor
Implementation of vegetation protection zones for areas to be retained	Protect retained habitats.	During construction phase.	Project Ecologist and EPC Contractor
Ecologist pre-clearance surveys and supervision of works	Minimisation of impacts to local fauna and their habitats through identification of fauna present and management to minimise harm.	Construction / site clearing phase.	Project Ecologist and EPC Contractor
Fencing and access control	Avoidance of unplanned human and livestock interference and disturbance to retained areas.	Construction and operational phases.	EPC Contractor
Erosion and sedimentation control	Minimise erosion and sedimentation within the site and downstream habitats through installation and maintenance of erosion and sediment controls.	Construction and operational phases.	EPC Contractor
Weed management	Prevent weed incursions and spread.	During construction, site clearing and operational phases.	EPC Contractor
Fauna exclusion	Prevent entrapment of fauna within site infrastructure.	Operational phase.	EPC Contractor and Project ecologist

8.0 Impact Assessment

8.1 Direct Impacts

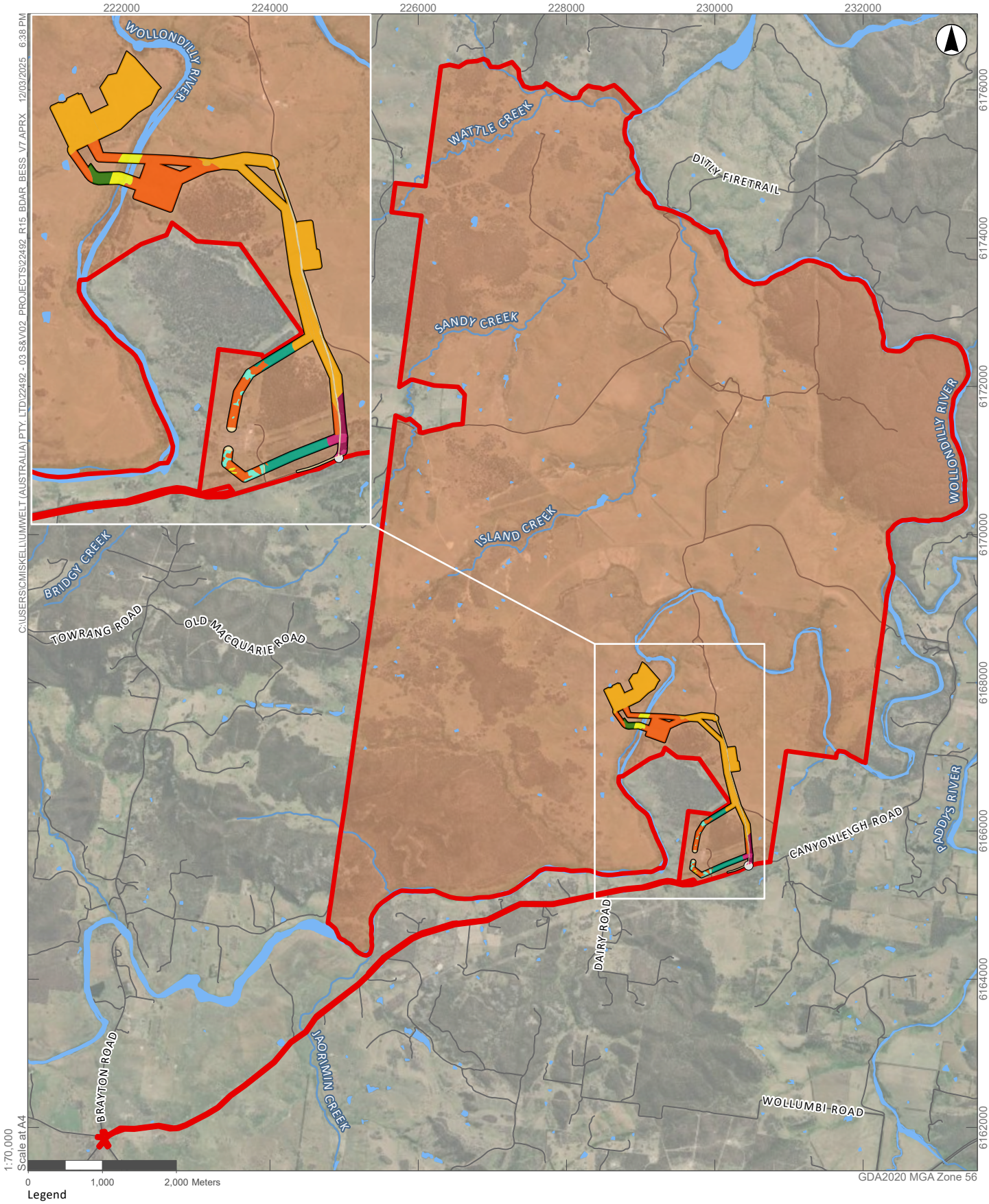
8.1.1 Residual Direct Impacts

The parts of the Development Footprint which are subject to impacts associated with the Project are mapped in **Figure 8.1**. **Table 8.1** summarises the extent of proposed residual direct impacts to PCTs and threatened entities observed or assumed to be present on the Development Footprint.

Table 8.1 Summary of Residual Direct Impacts

Direct Impact (Describe the impact on PCT/TEC/EC or threatened species and their habitat)	BC Act Status	EPBC Act Status	Potential SAII Entity	Project Phase / Timing of Impact	Extent
BESS					
PCT 3374 - Goulburn Tableland Peppermint Grassy Forest	-	-	No	Construction phase	PCT 3374 DNG (Exotic dominated) = 13.42 ha Total extent =13.42 ha
Common Ancillary Facilities					
PCT 4063 Central and Southern Tableland River Oak Forest	-	-	No	Construction phase	1.94 ha
PCT 3374 Goulburn Tableland Peppermint Grassy Forest	-	-	No	Construction phase	PCT 3374 DNG (Moderate/Degraded) =14.81 ha PCT 3374 DNG (low condition) = 1.18 ha PCT 3374 DNG (Exotic dominated) = 25.64 ha Total extent = 41.63 ha
PCT 3376 Southern Tableland Grassy Box Woodland	CEEC	CEEC	Yes, White Box - Yellow Box - Blakely's Red Gum Grassy Woodland and Derived Native Grassland	Construction phase	PCT 3376 DNG = 1.23 ha PCT 3376 Good/Moderate = 0.44 ha Total extent = 1.66 ha
gang-gang cockatoo habitat	E	E	No	Construction phase	0.44 ha
south-eastern glossy black-cockatoo	V	V	No	Construction phase	0.44 ha
squirrel glider habitat	V	-	No	Construction phase	2.38 ha
large-eared pied bat	V	E	No	Construction phase	2.38 ha
Transmission Line Option 1					
PCT 3374 Goulburn Tableland Peppermint Grassy Forest	-	-	No	Construction phase	PCT 3374 DNG (Moderate/Degraded) = 2.54 ha PCT 3374 DNG (exotic dominated) = 1.6 ha PCT 3374 (Moderate/Degraded) = 0.46 ha PCT 3374 (Good/Moderate) = 1.39 ha Total extent = 5.99 ha

Direct Impact (Describe the impact on PCT/TEC/EC or threatened species and their habitat)	BC Act Status	EPBC Act Status	Potential SAII Entity	Project Phase / Timing of Impact	Extent
gang-gang cockatoo habitat	E	E	No	Construction phase	1.85 ha
squirrel glider habitat	V	-	No	Construction phase	1.85 ha
south-easter glossy black cockatoo	V	V	No	Construction phase	1.85 ha
large-eared pied bat	V	E	No	Construction phase	1.85 ha
Transmission Line Option 2					
PCT 4063 Central and Southern Tableland River Oak Forest				Construction phase	0.11 ha
PCT 3374 Goulburn Tableland Peppermint Grassy Forest				Construction phase	PCT 3374 DNG (Moderate/Degraded = 1.9 ha PCT 3374 DNG (exotic dominated) = 2.29 ha PCT 3374 (Moderate/Degraded) = 0.84 ha PCT 3374 (Good/Moderate) = 2.73 ha Total extent = 7.76 ha
PCT 3376 Southern Tableland Grassy Box Woodland	CEEC	CEEC	Yes, White Box - Yellow Box - Blakely's Red Gum Grassy Woodland and Derived Native Grassland	Construction phase	PCT 3376 (Good/Moderate) =0.45 ha
gang-gang cockatoo habitat	E	E	No	Construction phase	4.02 ha
south-eastern glossy black-cockatoo	V	V	No	Construction phase	4.02 ha
squirrel glider habitat	V		No	Construction phase	4.13 ha
large-eared pied bat	V	E	No	Construction phase	4.13 ha



Legend

- Project Area
- Development Footprint
- Retained / Impact Avoidance Areas
- Waterbodies
- Watercourse
- Existing Roads and Tracks
- Access Points

Plant Community Types and Condition Zones

- Cleared/Infrastructure
- Dam

PCT 3374 - Goulburn Tableland Peppermint Grassy Forest

- DNG-Planted/Regen
- DNG-Moderate/Degraded
- DNG - Low Condition
- DNG - exotic dominated
- Good/Moderate
- Moderate/Degraded

PCT 3376 - Southern Tableland Grassy Box Woodland

- DNG
- Good/Moderate
- Moderate/Degraded

PCT 3347 - Southern tableland Creekflat Ribbon Gum Forest

- Moderate/Degraded

PCT 4063 - Central and Southern Tableland River Oak Forest

- Moderate/Degraded

FIGURE 8.1

Final Impact Areas on the Development Footprint

Image Source: ESRI Basemap (2024) **Data source:** NSW LPI (2024), NSW DSFI (2024), Umwelt (2024)

8.1.2 Change in Vegetation Integrity Score

Changes to the VI scores as a result of the Project are presented in **Table 8.2.** For each vegetation zone the change in VI is based on a full impact assuming a VI score of zero after construction. No vegetation integrity scores have been assessed as above zero after development and there would be no management actions required to maintain any remaining vegetation as it has been assumed that impact will occur to all vegetation within the vegetation zones.

Table 8.2 Impacts to Vegetation Integrity

PCT and Vegetation Condition Zone	Management Zone	Area (ha)	Before Development				After Development				Change in VI Score
			Composition	Structure	Function	VI Score	Composition	Structure	Function	VI Score	
1 – 4063 Moderate/Degraded	Development Footprint	2.05	11.6	77.3	64.7	38.7	0	0	0	0	-38.7
2 – 3374 DNG-Moderate/Degraded	Development Footprint	19.25	23.3	50.3	4.8	17.7	0	0	0	0	-17.7
3 – 3374 DNG low condition	Development Footprint	1.18	11.1	14.6	0.1	2.7	0	0	0	0	-2.7
4 – 3374 DNG exotic dominated	Development Footprint	228.51	0	7.6	1	1	0	0	0	0	-1
5 – 3374 Moderate/Degraded	Development Footprint	4.12	80.3	55.1	76.6	69.7	0	0	0	0	-69.7
6 – 3374 Good/Moderate	Development Footprint	1.3	64.9	98.2	68.8	76	0	0	0	0	-76
7 – 3376 – DNG	Development Footprint	1.23	26.1	48.3	14.2	26.2	0	0	0	0	-26.2
8 – 3376 – Good/Moderate	Development Footprint	0.89	73.7	84.2	73.3	76.9	0	0	0	0	-76.9

8.2 Indirect Impacts

Indirect impacts are those 'that occur when the proposal affects native vegetation and threatened species habitat beyond the Development Footprint or within retained areas. This includes impacts from activities related to the construction or operational phase of the proposal and prescribed impacts'.

A risk matrix (**Table 8.3** and **Table 8.4**) was applied to indirect impacts, as specified in the BAM, to assess the likelihood of each occurring following the implementation of all mitigation measures. The potential consequences to biodiversity during the construction and operational phases of the Project are described in **Table 8.5.**

Table 8.3 Risk Matrix Criteria

Score	Description
Likelihood of impact	
Almost certain	Very high or certain probability that impact will occur or event is of continuous nature
Likely	Likely probability that impact will occur or event is frequent (1–5 years)
Possible	Moderate probability that the impact will occur or the event is infrequent (5–20 years)
Unlikely	Low probability that impact will occur or event is very infrequent (100+ years)
Remote	Very low probability that impact will occur or may occur under extenuating circumstances. Event is very rare and stochastic in nature (frequency 1,000+ years)
Likelihood of consequence	
Significant	An impact that is widespread, permanent and may result in large-scale loss of 'critical' habitat
Major	An impact that is widespread, long lasting and may result in large-scale loss of important habitat
Moderate	Large-scale conversion of natural habitat or small-scale conversion of important habitat
Minor	Temporary and localised impact to natural habitat
Insignificant	No measurable impact

Table 8.4 Risk Matrix

		Likelihood of consequence					
		Unknown	**Insignificant**	**Minor**	**Moderate**	**Major**	**Significant**
Likelihood of impact	**Remote**	Unknown	Negligible (N)	Negligible (N)	Very Low (VL)	Low (L)	Medium (M)
	Unlikely	Unknown	Negligible (N)	Very Low (VL)	Low (L)	Medium (M)	High (H)
	Possible	Unknown	Very Low (VL)	Low (L)	Medium (M)	High (H)	Very High (VH)
	Likely	Unknown	Low (L)	Medium (M)	High (H)	Very High (VH)	Extreme (E)
	Almost certain	Unknown	Medium (M)	High (H)	Very High (VH)	Extreme (E)	Extreme (E)
	Unknown	Unknown	Unknown	Unknown	Unknown	Unknown	Unknown

Table 8.5 Potential Indirect Impacts to Biodiversity Including their Extent, Frequency, Timing, Duration and Consequence

Indirect Impact	Impacted Biodiversity	Timing and Duration	Extent	Frequency	Likelihood of Impact	Likelihood of Consequence	Indirect Impact Level	Summary and Potential Consequences
Reduced viability of adjacent habitat due to edge effects	Native vegetation Native fauna species habitat, including the squirrel glider, gang gang cockatoo and south-eastern glossy black-cockatoo	Construction phase (short-term, permanent)	Zones 1-9	During clearing	Likely	Minor	M	Earthworks, foot traffic, plant or vehicle movements may lead to introduction or spread of weed species that would reduce the quality and integrity of adjacent native vegetation and habitat. Edge effects may result in increased competition between native fauna species for resources and displacement of native fauna species.
		Operational phase (long-term, permanent)	Unknown	Throughout operational phase	Possible	Minor	L	
Reduced viability of adjacent habitat due to noise, dust or light spill	Native vegetation Native fauna species habitat, including the squirrel glider, gang gang cockatoo and south-eastern glossy black-cockatoo	Construction phase (short-term)	Zones 1-9	Throughout construction phase	Possible	Minor	L	Noise, light and dust will be managed during construction to relevant standards. There is potential for retained areas of habitat in close proximity to construction works to be affected by noise, dust and light spill as follows: Noise and light spill may lead to altered behaviour in fauna species. Increased dust may result in health impacts to fauna and reduced photosynthetic capacity for flora. Any residual noise, light and dust is likely to have negligible impacts on threatened and non-threatened fauna species.
		Operational phase (long-term)	Unknown	Throughout operational phase	Possible	Minor	L	

Indirect Impact	Impacted Biodiversity	Timing and Duration	Extent	Frequency	Likelihood of Impact	Likelihood of Consequence	Indirect Impact Level	Summary and Potential Consequences
Transport of weeds and pathogens from the site to adjacent vegetation	Native vegetation. Native fauna species habitat, including the squirrel glider, gang gang cockatoo and south-eastern glossy black-cockatoo	Construction phase (short-term)	Unknown	Throughout construction phase	Possible	Moderate	H	Given the extent of serrated tussock infestations it is likely that earthworks may result in the movement of weeds across the site and into adjacent vegetation. Vehicle movement may lead to weeds being spread across the site or lead to the introduction of weed species to the site. Increased weed and pathogens may reduce the quality of native vegetation and habitat for native fauna species.
		Operational phase (long-term)	Unknown	Throughout operational phase	Possible	Moderate	H	
Increased risk of starvation or exposure, and loss of shade or shelter	Native vegetation. Native fauna species habitat, including the squirrel glider, gang gang cockatoo and south-eastern glossy black-cockatoo	Construction phase (short-term, permanent)	Unknown	During clearance	Possible	Minor	L	Loss of vegetation may increase the risk of exposure. The removal of foraging habitat may increase competition between native fauna species for remaining resources. Loss of sheltering or breeding habitat may lead to increased competition for remaining resources.
		Operational phase (long-term, permanent)	Unknown	Throughout operational phase	Remote	Minor	N	
Loss of breeding habitat	Native fauna species habitat, including the squirrel glider, gang gang cockatoo and south-eastern glossy black-cockatoo	Construction phase (short-term, permanent)	Zones 1-9	During clearance	Possible	Moderate	M	Removal of breeding habitat may disrupt the breeding cycle of species, and potentially lead to displacement of affected species.
		Operational phase (long-term, permanent)	Unknown	Throughout operational phase	Remote	Minor	N	

Indirect Impact	Impacted Biodiversity	Timing and Duration	Extent	Frequency	Likelihood of Impact	Likelihood of Consequence	Indirect Impact Level	Summary and Potential Consequences
Rubbish dumping	Native fauna species habitat, including the squirrel glider, gang gang cockatoo and south-eastern glossy black-cockatoo	Construction phase (short-term)	Zones 1-9	Throughout construction phase	Likely	Minor	M	The dumping of rubbish may reduce the quality of native vegetation. May result in injury or mortality to native fauna species.
		Operational phase (long-term)	Unknown	Throughout operational phase	Likely	Minor	M	
Wood collection	Native fauna species habitat, including the squirrel glider, gang gang cockatoo and south-eastern glossy black-cockatoo	Construction phase (short-term)	Unknown	Throughout construction phase	Unlikely	Minor	VL	Unlawful harvesting of timber and fallen logs may reduce quality of native vegetation and the amount of habitat available for native species. Injury or mortality of native fauna species as a result of the removal.
		Operational phase (long-term)	Unknown	Throughout operational phase	Unlikely	Minor	VL	
Removal and disturbance of rocks, including bush rock	Native fauna species and their habitat. Small area of rocky habitat recorded within the Biodiversity Study Area	Construction phase (short-term)	Unknown	During clearance	Remote	Insignificant	N	Reduced availability of habitat or shelter for ground-dwelling native fauna. Injury or mortality of native fauna species as a result of removal or disturbance.
		Operational phase (long-term)	Unknown	Throughout operational phase	Remote	Insignificant	N	
Increase in predatory and pest species populations	Native fauna species habitat, including the squirrel glider, gang gang cockatoo and south-eastern glossy black-cockatoo	Construction phase (short-term)	Unknown	Throughout construction phase	Possible	Minor	L	Increased human presence, and therefore increased presence of rubbish/food, may result in an increase in the presence of pest species, including predators, in the area. Clearing of vegetation causing a reduction in the area available for fauna species to occupy, resulting in an increased concentration of pest species in an area.
		Operational phase (long-term)	Unknown	Throughout operational phase	Unlikely	Minor	VL	

Indirect Impact	Impacted Biodiversity	Timing and Duration	Extent	Frequency	Likelihood of Impact	Likelihood of Consequence	Indirect Impact Level	Summary and Potential Consequences
								Increased injury or morality of native fauna species as a result of increased competition and predation with pest species.
Increased fire risk	Native vegetation. Native fauna species habitat, including the squirrel glider, gang gang cockatoo and south-eastern glossy black-cockatoo	Construction phase (short-term)	Unknown	Throughout construction phase	Possible	Moderate	M	The use of machinery, particularly in summer, can increase the risk of fire. Storage and utilisation of flammable materials on site can increase fire risk. Human-caused fires may be detrimental to native vegetation and cause injury or mortality to native fauna species.
		Operational phase (long-term)	Unknown	Throughout operational phase	Possible	Moderate	M	
Pollutant spills	Native vegetation.	Construction phase (short-term)	Unknown	Throughout construction phase	Possible	Minor	L	Pollutant spill may contaminate and change the composition of soils, resulting in detrimental impacts to native vegetation.
		Operational phase (long-term)	Unknown	Throughout operational phase	Possible	Minor	L	

8.3 Impacts to MNES

An EPBC Act referral was submitted to Commonwealth DCCEEW in August 2024. A 'Controlled Action' decision was made by the Minister for the Environment and Water in November 2024 (EPBC 2024/09970). To meet the requirements of the Supplementary SEARs (refer to **Table 1.2**), a detailed MNES Report for threatened and migratory entities listed under the EPBC Act is provided in **Appendix A.**

Species assessed in the report include those listed within the Letter to proponent provided as part of the referral decision on 19 November 2024 and the Supplementary SEARs, as being potentially impacted by the Project, and any other that have a moderate to high likelihood of occurrence. Assessments of Significance for threatened and migratory entities were undertaken and are included in Appendix 3 of the MNES Report (**Appendix A**).

In summary:

- One TEC, White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland, listed under the EPBC Act was recorded in the Development Footprint.
- Four threatened fauna species listed under the EPBC Act were recorded within the Development Footprint. These were:
    - gang-gang cockatoo (*Callocephalon fimbriatum*)
    - south-eastern glossy black cockatoo (*Calyptorhynchus lathami lathami*)
    - large-eared pied bat (*Chalinolobus dwyeri*)
    - diamond firetail (*Stagonopleura guttata*).
- Two planted threatened flora species were recorded in the Project Area but will not be directly impacted by the Project. These were:
    - *Eucalyptus nicholii* (narrow-leaved black peppermint)
    - Eucalyptus macarthurii (Paddy's River box).
- An additional eleven species that were not recorded during surveys have potential to use habitat within the Development Footprint and have potential to be impacted by the Project during construction and operational phases.

8.4 Prescribed Impacts

Prescribed impacts associated with the Project are identified in **Section 6.0** of this report and are further documented below.

No threatened entities are considered likely to be dependent upon or may use habitat features associated with any of the prescribed impacts.

8.4.1 Karst, Caves, Crevices, Cliffs, Rocks or Other Geological Features of Significance

8.4.1.1 Nature and Extent

The Project is not likely to impact caves, crevices, cliffs or geological features of significance.

Impacts are likely to occur to small areas of rock outcropping which are unlikely to comprise important habitat structure for any threatened species. Small areas of shallow exposed rock and areas of piled rock will be removed from paddocks, these areas are unlikely to provide habitat for threatened reptile species. These impacts are likely to be long-term and permanent. Relocation of rock piles will occur to minimise potential impacts.

8.4.1.2 Duration

This is likely to be one-off, permanent impact for the life of the Project which will occur during construction.

8.4.1.3 Consequences

No threatened species have been recorded utilising these habitats and no significant consequences are predicted to occur.

8.4.2 Human Made Structures

No human made structures will be impacted by the Project.

8.4.3 Non-Native Vegetation (Category 1 Exempt Land)

8.4.3.1 Nature and Extent

The areas of Category 1 Exempt Land mapped within the Development Footprint are identified in **Figure 1.5**. PCT Mapping and BAM Plot surveys have been undertaken to assess areas of Category 1 Exempt Land. The Project will result in long-term permanent removal of these areas.

8.4.3.2 Duration

This will be a one-off, permanent impact for the life of the Project that will occur during construction and site clearing.

8.4.3.3 Consequences

This impact will reduce the extent of suitable habitat available to threatened species which are capable of utilising highly disturbed terrestrial agricultural environments. This impact may also modify or reduce the suitability of habitats for threatened species which forage during flight such as birds and bats. These areas contain highly disturbed non-woody vegetation utilised for agricultural purposes including cattle grazing.

8.4.4 Habitat Connectivity

8.4.4.1 Nature and Extent

During construction 28.84 ha of native vegetation (8.63 ha of woodland vegetation and 20.48 ha of native grassland) will be permanently removed from the Development Footprint.

8.4.4.2 Duration

This will be a one-off, permanent impact for the life of the Project that will occur during construction and site operation.

8.4.4.3 Consequences

Habitat connectivity is unlikely to be impacted as corridors will be retained throughout the landscape as shown on **Figure 3.2** and impacts to watercourse areas will be largely avoided. All areas likely to be important for habitat connectivity for woodland species have been maintained. The Project is unlikely to have any substantive impacts to connectivity as the vegetation within the Development Footprint comprises cleared and/or degraded vegetation subject to agricultural management. Species utilising these areas for connectivity are already highly mobile and disturbance tolerant. Due to the nature and layout of the site it is anticipate that there will be no overall changes to landscape connectivity for wildlife movement.

8.4.5 Waterbodies, Water Quality and Hydrological Processes

8.4.5.1 Nature and Extent

The current Development Footprint includes a 150 m portion of the Wollondilly River. It is unlikely that the entire area will be impacted directly upgrade of waterway crossing. The client has indicated the proposed water crossing will be impact an area approximately 20 m wide with a 5 m wide road surface. The crossing would have integrated culverts for normal water flow.

8.4.5.2 Duration

This will be a one-off, permanent impact for the life of the Project that will occur during construction and site operation.

8.4.5.3 Consequences

The impacts associated with waterbodies and watercourses include reduced availability of habitat for aquatic species, altered hydrology and increased erosion and sedimentation within the Development Footprint. Detailed design would minimise the width of disturbance of the river and blockage of fish passage. Suitable environmental controls will be implemented to prevent impacts to downstream environments.

8.4.6 Vehicle Strikes

8.4.6.1 Nature and Extent

The Project will result in an increase of vehicle activity during construction and the operation of the Project. The Project will involve the construction of a network of internal access tracks within the BESS and transmission line easements. Internal access tracks are located on Arthursleigh Farm and will be restricted to the farm workers, proponent's employees and contractors. Internal access tracks will have enforced speed restrictions to adequately reduce the risk of interaction between animals and vehicles.

No new public roads will be constructed for the Project, however sections of Canyonleigh Road at the southern entrance of the Project Area will be upgraded to facilitate the construction of the Project. The upgrade works will be the responsibility of the Proponent but have been designed in consultation with BCS and relevant LGAs.

Increased traffic along Canyonleigh Road and the Hume Highway will also result from the movement of the construction workforce during the construction of the Project.

8.4.6.2 Duration

The largest impact to traffic conditions and potential vehicle strike will be during construction. The operation of the Project will also result in a minor increase of traffic rates and potential vehicle strike for the life of the Project.

8.4.6.3 Consequences

The Project will result in increased traffic along the key public roads, particularly during construction. As a result, Canyonleigh Road has been identified as a potential impact location.

The following threatened fauna species have been identified as being at low risk of vehicle strike:

- diamond firetail
- squirrel glider
- dusky woodswallow
- gang-gang cockatoo
- glossy black-cockatoo
- scarlet robin
- speckled warbler
- spotted harrier
- varied sittella.

Increased rates of vehicle strikes are unlikely within the Development Footprint as a result of the Project given the internal access tracks will have enforced speed restrictions to adequately reduce the risk of interaction between animals and vehicles. Factors that increase the likelihood of vehicle strike to animals include vehicle speed, traffic volume and time of day (NSW DPIE 2020h). The current speed limits along public roads would be adhered to by the construction and BESS workforce and it is likely that most of the travel would occur during daylight hours reducing the likelihood of vehicle strike. Although increased traffic along public roads, may result in increased rates of vehicle strike it is unlikely that these impacts would result in a significant impact to any threatened fauna species.

8.5 Cumulative Impact Assessment

Cumulative impacts occur when the impacts from multiple projects or developments combine and the compounding effects are larger than any one of the projects itself has quantified and assessed.

The project will contribute to cumulative impacts on biodiversity during construction and operation from a range of SSD projects (operational, under construction, approved and proposed) in the broader southern highlands region. It is considered likely that cumulative impacts will increase the loss of similar native vegetation and threatened species habitat to the project in the region.

A review of publicly available relevant SSD projects known at the time of finalisation of this BDAR has been undertaken. Potential cumulative biodiversity impacts are provided in **Table 8.6.**

Impact information compiled from projects in initial planning stages are not accurate and the final impacts may be more or less than the data presented.

Table 8.6 Cumulative Impact Assessment

Project	Distance & Direction from the Project	Biodiversity value impacted			Planning Status & Cumulative Consideration
		PCTs and TECs	Threatened flora	Threatened fauna	
Wattle Creek Solar Farm Project	Within Project Area (less than 1 km)	Four PCTs identified in the Development Footprint with estimated impacts to 264.92 ha of native vegetation. Impacts to one TEC White Box - Yellow Box - Blakely's Red Gum Grassy Woodland and Derived Native Grassland (CEEC listed under the BC Act).	No threatened flora recorded in the Development Footprint.	Nine threatened fauna species were recorded in the Development Footprint: south-eastern glossy black-cockatoo (*Calyptorhynchus lathami lathami*), gang-gang cockatoo (*Callocephalon fimbriatum*), squirrel glider (*Petaurus norfolcensis*), diamond firetail (*Stagonopleura guttata*), dusky woodswallow (*Artamus cyanopterus*), scarlet robin (*Petroica boodang*), speckled warbler (*Chthonicola sagittata*), spotted harrier (*Circus assimilis*), varied sittella (*Daphoenositta chrysoptera*).	Proposed
Marulan Gas Fired Power Station	To south of and adjacent to Project Area	Four PCTs identified in the Development Footprinted with estimated impacts to 34.2 ha of native vegetation. No impacts to any TECs.	No threatened flora recorded in the Development Footprint.	Eight threatened species were recorded or considered likely to occur within the Project Site; diamond firetail (*Stagonopleura guttata*), gang-gang cockatoo (*Callocephalon fimbriatum*), hooded robin (*Melanodryas cucullata cucullata*), eastern falsistrelle (*Falsistrellus tasmaniensis*), eastern bent-wing bat (*Miniopterus schreibersii occeanensis*), greater broad-nosed bat (*Scoteanax rueppellii*), little bent-wing bat (*Miniopterus australis*) and the powerful owl (*Ninox strenua*).	Proposed
Marulan Solar Farm	Approx. 7 km (Southeast)	Three PCTs identified in the Development Footprint. Impacts to 26.8 ha of native vegetation, 25.47 ha of which belongs to TECs. Impacts to two TECs: 24.53 ha of White Box - Yellow Box - Blakely's Red Gum Grassy Woodland and Derived Native Grassland (CEEC listed under the BC Act) and 0.94 ha of Natural Temperate Grassland of the South Eastern Highlands (CEEC listed under the BC Act).	No threatened flora recorded in the Development Footprint.	Six threatened fauna were assumed present, pink-tailed legless lizard (*Aprasia parapulchella*), striped legless lizard (*Delma impar*), barking owl (*Ninox connivens*), south-eastern glossy black-cockatoo (*Calyptorhynchus lathami lathami*), masked owl (*Tyto novaehollandiae*), and powerful owl (*Ninox strenua*). Suitable habitat was present for a further 27 threatened fauna: little whip snake (*Suta flagellum*), Rosenberg's goanna (*Varanus rosenbergi*), black falcon *(Falco subniger*), brown treecreeper (*Climacteris picumnus victoriae*), diamond firetail (*Stagonopleura guttata*), dusky woodswallow (*Artamus cyanopterus*), flame robin (*Petroica phoenicea*), gang-gang cockatoo (*Callocephalon fimbriatum*), hooded robin	Proposed

Project	Distance & Direction from the Project	Biodiversity value impacted			Planning Status & Cumulative Consideration
		PCTs and TECs	Threatened flora	Threatened fauna	
				(*Melanodryas cucullata cucullata*), little eagle (*Hieraaetus morphnoides*), little lorikeet (*Glossopsitta pusilla*), regent honeyeater (*Anthochaera phrygia*), scarlet robin (*Petroica boodang*), speckled warbler (*Chthonicola sagittata*), superb parrot (*Polytelis swainsonii*), swift parrot (*Lathamus discolor*), turquoise parrot (*Neophema pulchella*), white-bellied sea eagle (*Haliaeetus leucogaster*), varied sitella (*Daphoenositta chrysoptera*), eastern coastal free-tailed bat (*Micrtonomus norfolkensis*), greater glider (*Petauroides volans*), grey-headed flying fox (*Pteropus poliocephalus*), koala (*Phascolarctos cinereus*), large bent-winged bat (*Miniopterus orianae oceanensis*), southern myotis (*Myotis macropus*), squirrel glider (*Petaurus norfolcensis*), and yellow-bellied sheathtail bat (*Saccolaimus flaviventris*).	
Berrima Coal Mine	12 km northeast Berrima, Wingecarribee Shire LGA	Two vegetation communities were identified within the Development Footprinted with estimated impacts to 3.59 ha of native vegetation. No impacts to any TECs.	No threatened flora recorded in the Development Footprint.	No threatened fauna recorded at the site. Potential habitat for six threatened fauna species.	Approved
Lynwood Quarry	16 km south Marulan, Goulburn Mulwaree LGA	Six vegetation communities were identified within the Development Footprinted with estimated impacts to 103 ha of native vegetation. No impacts to any TECs.	Camden Woollybutt (Paddy's River box) was recorded on site.	Five threatened species were recorded within the proposal site. These were the squirrel glider (*Petaurus norfolcensis*), speckled warbler (*Chthonicola sagittata*), eastern bent-wing bat (*Miniopterus schreibersii occeanensis*), eastern firetail bat (*Micronomus norfolkensis*) and the eastern false pipistrelle (*Falsistrellus tasmaniensis*).	Approved
Marulan South Limestone Mine Continued	16 km south Marulan, Goulburn Mulwaree LGA	Four vegetation communities were identified within the Development Footprinted with estimated impacts to 182.4 ha of native vegetation.	One threatened flora species was recorded on site; *Solanum celatum*, one individual being removed.	Nineteen threatened species were recorded within the proposal site. These were the large-eared pied bat (*Chalinolobus dwyeri*), greater broad-nosed bat (*Scoteanax rueppellii*)), eastern bent-wing bat (*Miniopterus schreibersii occeanensis*), and yellow-bellied sheathtail bat (*Saccolaimus flaviventris*), eastern free-tail bat (*Micronomus norfolkensis*), scarlet robin (*Petroica boodang*), diamond firetail	Approved

Project	Distance & Direction from the Project	Biodiversity value impacted			Planning Status & Cumulative Consideration
		PCTs and TECs	Threatened flora	Threatened fauna	
Operations Project		Impacts to one TEC (White box Yellow Box Blakely's Red Gum Grassy Woodland) being 88.6 ha.		(*Stagonopleura guttata*), glossy black-cockatoo (*Calyptorhynchus lathami lathami),* koala (*Phascolarctos cinereus*), southern myotis (*Myotis macropus*), eastern false pipistrelle (*Falsistrellus tasmaniensis*), rufous fantail (*Rhipidura rufifrons*), grey-headed flying fox (*Pteropus poliocephalus*), golden-tipped bat (*Kerivoula papuensis*), eastern cave bat (*Vespadelus troughtoni*), powerful owl (*Ninox strenua*), sooty owl (*Tyto tenebricosa*), turquoise parrot (*Neophema pulchella*), yellow-bellied glider (*Petaurus australis)*, and varied sitella (*Daphoenositta chrysoptera*).	
Peppertree Quarry	16 km south Marulan, Goulburn Mulwaree LGA	One native vegetation community was recorded on site and the entirety of it was placed into the habitat management area. No impacts to native vegetation is expected.	No threatened flora recorded in the Development Footprint.	One threatened species – eastern bent-wing bat (*Miniopterus schreibersii oceanensis*) – was found to have potential to occur on site, however, no threatened species were expected to be impacted because of the Project.	Approved
Gundary Solar Farm	Approx. 28 km (Southeast)	Preliminary mapping identified 6 PCTs in the Project Area with estimated impacts to Impacts to four TECs: 0.03 ha of River Tussock – Tall Sedge – Kangaroo Grass moist grasslands (CEEC EPBC Act); 0.46 ha of Snow Gum – Candle Bark woodland (CEEC BC Act); 6.91 ha of Wallaby Grass – Red grass – Tall Speargrass – Kangaro Grass dry tussock grassland (CEEC EPBC Act); and 5.05 ha of Yellow Box – Blakely's Red Gum grassy woodland (CEEC EPBC and BC Acts).	Potential habitat for 12 threatened flora species, *Acacia flocktoniae, Bossiaea oligosperma, Caladenia tessellata, Commersonia prostrata, Dillwynia glaucula, Diuris aequalis, Diuris tricolor, Eucalyptus aggregata, Eucalyptus macarthurii, Genoplesium superbum, Leucochrysum albicans* var. t*ricolor, Persoonia mollis* subsp. r*evoluta,* and *Pultenaea pedunculata.*	Suitable habitat was present for 25 threatened fauna: pink-tailed legless lizard (*Aprasia parapulchella*), striped legless lizard (*Delma impar*); Booroolong frog (*Litoria booroolongensis*), giant burrowing frog (*Heleioporus australasicus*), suttering frog (*Mixophyes balbus*); barking owl (*Ninox connivens*), gang-gang cockatoo (*Callocephalon fimbriatum*), glossy black-cockatoo (*Calyptorhynchus lathami lathami*), little eagle (*Hieraaetus morphnoides*), masked owl (*Tyto novaehollandiae*), pink robin (*Petroica rodinogaster*), powerful owl (*Ninox strenua*), swift parrot *(Lathamus discolor*), white-bellied sea eagle (*Haliaeetus leucogaster*), brush-tailed rock wallaby (*Petrogale penicillata*), Eastern pygmy possum (*Cercartetus nanus*), greater glider (*Petauroides volans*), koala (*Phascolarctos cinereus*), long-nosed poteroo (*Potorous tridactylis*), squirrel glider (*Petaurus norfolcensis*), grey-headed flying fox (*Pteropus poliocephalus*), large-eared pied bat (*Chalinolobus dwyeri*), large bent-winged bat (*Miniopterus orianae oceanensis*),	Approval

Project	Distance & Direction from the Project	Biodiversity value impacted			Planning Status & Cumulative Consideration
		PCTs and TECs	Threatened flora	Threatened fauna	
				little bent-wing bat (*Miniopterus australis*), and southern myotis (*Myotis macropus*).	
Merino Solar Farm	Approx. 28 km (Southeast)	Two PCTs identified on the site -- Southern Tableland Grassy Box Woodland (CEEC BC and EPBC Acts) and Southern Tableland Red Grass – Spear Grass Grassland (CEEC EPBC Act).	Potential habitat for five threatened flora species, *Amphibromus fluitans, Haloragis exalata* subsp. e*xalata, Lepidium hyssopifolium, Leucochrysum molle,* and *Pelargonium* sp. *striatellum (G.W.Carr 10345).*	Potential breeding habitat for eight threatened fauna species, Australian painted snipe (*Rostratula australis*), gang-gang cockatoo (*Callocephalon fimbriatum*), south-eastern glossy black-cockatoo (*Calyptorhynchus lathami lathami*), superb parrot (*Polytelis swainsonii*), green and golden bell frog (*Ranoidea (Litoria) aurea*), yellow spotted tree frog (*Litorea castanea*), Key's matchstick grasshopper (*Keyacris scurra*), and striped legless lizard *(Delma impar*); and potential foraging habitat for an additional seven threatened fauna speciesblack-necked stork (*Ephippiorhynchus asiaticus*), curlew sandpiper (*Calidris ferruginea*), : dusky woodswallow (*Artamus cyanopterus cyanopterus*), grey falcon (*Falco hypoleucos*), white throated needletail (*Hirundapus caudacutus*), koala (*Phascolarctos cinereus*), and grey-headed flying fox (*Pteropus poliocephalus*).	Proposed
Marulan Quarry	30 km southwest Marulan, Goulburn Mulwaree LGA	Three PCTs were identified on site; Inland Scribbly Gum-Brittle gum low Woodlands, Broad-leaved Peppermint – Red Stringybark Grassy open forest and Carex-juncus sedgeland/wet grassland. No threatened TECs were recorded on site. Removal of 31 ha of native vegetation is proposed.	No threatened flora recorded in the Development Footprint.	The proposed clearing of native vegetation will remove habitat for seven threatened fauna species recorded on site (species not listed).	Proposed

Project	Distance & Direction from the Project	Biodiversity value impacted			Planning Status & Cumulative Consideration
		PCTs and TECs	Threatened flora	Threatened fauna	
Hume Link	32 km south Wagga Wagga, Bannaby and Maragle, Wagga Wagga City LGA	The project could potentially remove 670.21 hectares of native vegetation. Potential direct impacts on five threatened ecological communities listed under the *Biodiversity Conservation Act 2016* (BC Act), two of which are also listed under the Environment Protection and *Biodiversity Conservation Act 1999* (EPBC Act).	Fifty-eight threatened flora species have been assumed present due to the presence of suitable habitat within the project footprint and survey limitations.	There are expected impacts on up to 33 threatened fauna species (12 bird, 11 mammal (including three bats), three reptile, five amphibian and two insect) and on two endangered fauna populations: Yellow-bellied Glider population on the Bago Plateau and the Squirrel Glider in the Wagga Wagga City Local Government Area. Seventeen threatened fauna species have been assumed present due to the presence of suitable habitat within the project footprint and survey limitations.	**Proposed / under assessment**
Crookwell Wind Farm	Approx. 32 km (West)	One vegetation type, Western Tablelands Dry Forest. Removal of 2.34 ha of vegetation proposed.	No threatened flora recorded in the Development Footprint.	No threatened fauna recorded at the site. Potential habitat for 36 threatened fauna species.	Operational
Shoalhaven Hydro Scheme	Approx. 38 km (West)	Seven PCTs within the assessment area and direct impact area. Removal of at least 29.5 ha of native vegetation proposed. Impacts to one TEC: 0.23 ha Southern Highlands Shale Forest and Woodland of the Sydney Basin Bioregion.	Two threatened plant species recorded in the site, *Rhodamnia rubescens* and *Hibbertia puberula. O*ne additional threatened plant species, *Genoplesium baueri,* was assumed to be present.	Six threatened fauna species recorded at the site, gang-gang cockatoo (*Callocephalon fimbriatum*), south-eastern glossy black-cockatoo (*Calyptrorhynchus lathami lathami*), greater glider (*Petauroides volans*), eastern pygmy possum (*Cercartetus nanus*), large-eared pied bat (*Chalinolobus dwyeri*), and southern myotis (*Myotis macropus*). Two other threatened fauna species, giant burrowing frog (*Helioporus australiacus*) and Littlejohns tree frog, were assumed to be present.	Operational (Extension Proposed)

8.6 Mitigation

Spark Renewables has committed to the design and implementation of a comprehensive biodiversity mitigation strategy to minimise the residual impacts of the Project.

The following management measures are proposed to mitigate the residual impacts (direct, indirect and prescribed) associated with the Project. The impact mitigation measures proposed for residual impacts are also further summarised in **Table 8.4**, with implementation details provided in **Table 8.5.**

A Construction Environmental Management Plan (CEMP) and Operational Environmental Management Plan (OEMP) will be prepared for the Project which will include relevant biodiversity management and mitigation measures. Suitable biodiversity management planning documentation would be determined, as part of overall decommissioning works plans for the Project and will include aspects of the CEMP and OEMP where relevant.

All plans will describe the avoidance, mitigation and management measures that will be undertaken to manage potential environmental impacts of the Project. They 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 Development Footprint:

- 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 including biosecurity controls to prevent importation weeds and weed management measures.
- 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 where relevant, OEMP.

Proposed mitigation measures are summarised in **Table 9.1.**

8.6.1 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 Development Footprint 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.

8.6.2 Implementation of Vegetation Protection Zones for Areas to be Retained

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 Development Footprint. Access control is an important feature in protecting and demarcating areas outside the Development Footprint from vehicle access, human access, and accidental disturbance. Proposed 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 Development Footprint
- worker education and awareness of exclusion areas, including as delivered through site induction information
- the use of GPS enabled machinery (where available) to help prevent accidental disturbance of exclusion areas.

8.6.3 Ecologist Pre-Clearance Surveys and Supervision of Works

Pre-clearance surveys and tree felling supervision will be undertaken by an appropriately qualified and experienced ecologist to minimise potential impacts to fauna species, particularly hollow-dependent fauna. A detailed tree-felling supervision protocol is to be developed and documented as part of the CEMP for the Project. Rock piles within the site should also be retained and relocated to development exclusion zones during pre-clearance surveys to avoid burial.

Clearing of hollow bearing trees will occur outside of known breeding and nesting of the gang-gang cockatoo. Known breeding time is considered to occur between October and February.

8.6.4 Erosion and Sedimentation Control

The CEMP and OEMP will include appropriate stormwater management and erosion and sediment control measures to appropriately limit post development flows and manage downstream water quality as part of the site establishment and clearing works. Measures to be implemented include:

- Minimising the area of disturbance (as far as practicable).
- Diverting run-off water around disturbed areas.
- Installation and ongoing maintenance of temporary erosion and sediment controls (e.g., sediment fencing) throughout the duration of the construction of the Project.
- Design, implementation, and ongoing maintenance of permanent operational phase controls (e.g. catch drains) during the operational phase of the Project.
- Stabilisation (i.e., landscaping and revegetation) of all disturbed areas not required for the operation of the Project, to reduce the potential for future erosion.
- The erosion and sediment control measures will be developed with regard to the Managing Urban Stormwater: Soils and Construction (Volume 1) standard or to the standard of any equivalent replacement to this standard available at the commencement of construction.

8.6.5 Weed Management

Weed species could be inadvertently brought into the Development Footprint 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 Development Footprint to prevent an outbreak and / or the spread of species to previously unaffected areas within the Development Footprint.
- Ongoing environmental inspections and treatment of outbreaks of invasive weed species as required within the Development Footprint during the construction and operation of the Project.
- All machinery and equipment will be cleaned thoroughly prior to entering the Development Footprint. Cleaning must include the removal of all mud and plant matter (inside and out), followed by washing with high pressure water.

8.6.6 Fencing, Access Control and Fauna Exclusion

To avoid native fauna (non-avian) becoming trapped within the BESS area, a security fence will be constructed to deter fauna from occupying and becoming entrapped within the site infrastructure. This fencing will occur across the three separate Development Footprint polygons.

8.6.7 Preparation and Implementation of Construction Environmental Management Plan

A CEMP will be prepared to document the environmental impact mitigation, performance targets and monitoring requirements for the construction and operational phases of the Project.

Table 8.7 Mitigation Measures

Impact	Action ID	Mitigation Measure	Timing	Likely efficacy of mitigation	Outcome	Responsibility
Removal of native vegetation	B01	Native vegetation removal will be minimised through detailed design. An initial corridor was established to identify areas of highest quality vegetation. Where possible the Development Footprint has been placed within non-native and lowest quality native vegetation. Areas of high quality vegetation have been avoided where possible. To avoid and minimise further clearing of vegetation the Development Footprint has utilised existing tracks, existing paddocks/crops and cleared areas.	Detailed design and Project surveys	Effective	The avoidance and minimisation of vegetation and habitat clearing during the Project planning	The Proponent
	B02	Buffer mapping for habitats aid in providing the construction and maintenance teams with the information necessary for OEMP and the CEMP.	Detailed design	Effective	Pre-construction	The Proponent
The clearing of habitat, native vegetation and TECs	B03	Threatened fauna habitat removal will be minimised through detailed design.	Detailed design	Effective	Identify the residual threatened species impacts	The Proponent
	B04	The preparation and approval of a CEMP prior to construction which will include the development of appropriate biodiversity management and mitigation measures prepared by a qualified ecologist with BCS consultation. Prior to clearing, the operational management component will be approved with BCS consultation. The CEMP will include but not limited to: • Implementing mitigation measures. • Evaluating mitigation measures. • Objectives for monitoring. • Performance of proposed measures. • Informing an adaptive management method for additional offsets which further impacts are identified. • Remedial action.	Pre-clearing, pre-construction, construction and operation	Effective	Planning and management to avoid, minimise and mitigate biodiversity impacts	The Proponent and contractors

Impact	Action ID	Mitigation Measure	Timing	Likely efficacy of mitigation	Outcome	Responsibility
	B05	If any unexpected threatened species (flora or fauna) are found during construction, work should be halted immediately in the vicinity of the discovery, and the onsite manager should be notified.	Pre-clearing, pre-construction, construction and operation	Effective		The Proponent and contractors
	B06	Barbed wire will be avoided for fencing where practicable to avoid entrapment of fauna on fences. Fences will be designed to ensure that fauna are not funneled toward dead ends or to create barriers between areas of habitat across the Project Area.	Detailed design	Effective		The Proponent and contractors
	B07	Mitigation measures for harm to threatened hollow dependent fauna and live animals during pre-clearing surveys and translocation activities will be detailed in the CEMP. This includes, but is not limited to: • Validation and mapping of all hollow bearing trees within the Development Footprint will be undertaken at least one month prior to vegetation removal. • Qualified and licensed ecologist or wildlife handler to rescue and re-located fauna during the pre-clearing surveys. • Protocols in place when hollow bearing trees and stick nests are being removed. Furthermore, mitigation protocols for mitigating harm to hollow or stick nest dependent threatened fauna or dependent habitat known in the Development Footprint. • Clearing of hollow bearing trees will occur outside of known breeding and nesting of the gang-gang cockatoo. Known breeding time is considered to occur between October and February.	Pre-clearance	Effective	Mitigating, avoiding and minimising impacts to biodiversity	The Proponent and contractors
	B08	During vegetation and habitat clearance work a qualified ecologist will conduct on-foot pre-clearance surveys at the start of each day prior to daily construction. This is to confirm there is no wildlife present in the area to be cleared. A qualified ecologist or qualified wildlife handler will also be present during vegetation and habitat clearing works to	During clearing and construction	Effective	Avoiding and minimising impacts to fauna during the clearing and	The Proponent and contractors

Impact	Action ID	Mitigation Measure	Timing	Likely efficacy of mitigation	Outcome	Responsibility
		rescue and relocate fauna if required in the event individuals are present at the time of clearing. Additionally: • Contracted environmental representatives are to regularly conduct sweeping by regular driving through areas of the planned construction in the Development Footprint prior to planned clearance works to disturb the area and deter fauna from utilising these areas. • In the situation that an animal or threatened species is located in the construction area during other construction works, the Project Management Site Representative and Delivery Manager are to be immediately notified. Work must immediately stop within the construction area with an ecologist or a local wildlife rescuer to be brought on-site for handling and to follow the rescue procedures listed in the CEMP.			construction processes	
	B09	Exclusion zones within the Development Footprint will be marked by a qualified surveyor on site with the boundary of clearing limits. There will be specific exclusion zones included of known areas of threatened flora and fauna habitat.	Pre-clearance, during construction and early operation	Effective	Avoiding and minimising impacts to fauna during the clearing and construction processes	The Proponent and contractors
	B10	Measures to mitigate the impacts associated with construction activities on retained native vegetation and habitat will include: • Prior to all vegetation removal, pre-clearance inspections will be undertaken by a qualified ecologist. • Where possible, trim vegetation rather than clear or removal whole plants. • Retain tree roots where possible. • Retain dead trees and tree trunks where practical.	During construction	Effective	Avoiding and minimising impacts to fauna during the clearing and construction processes	The Proponent and contractors

Impact	Action ID	Mitigation Measure	Timing	Likely efficacy of mitigation	Outcome	Responsibility
	B11	The preparation and approval of a Rehabilitation Plan (RP) prior to clearing will be prepared in consultation with BCS. The RP will detail the implementation of rehabilitation in areas of the Development Footprint. The RP will include but is not limited to: • Soil erosion preventative measures, re-establishing local PCTs, local native flora, habitat and detailed rehabilitation objectives which measure the outcomes for the success over the locations, target landforms and PCTs. • Restoring vegetation in riparian areas implementation measures to protect and improve areas of key habitat. • Remedial actions that have been triggered that includes notifying BCS through a Trigger Action Response Plan (TARP) with an agreement about the response. • Native indigenous species used for landscaping on pervious surfaces. • Stabilisation of exposed surfaces to prevent soil loss. • Ongoing maintenance which includes but is not limited to weed and pathogen management on rehabilitated areas. • During construction, the topsoil and subsoil generated will be used for rehabilitation and stored on-site.	Pre-construction, pre-clearance, during and post-construction	Effective	The avoidance and minimisation of soil erosion, weeds in disturbed areas and the spread to adjoining edges of native vegetation	The Proponent and contractors
Increase in weeds and disease pathogens in adjacent vegetation	B12	Weed monitoring and control programs are to be documented in the CEMP and Trigger Action Response Plan in relation to construction soil and water management will be detailed in the CEMP and implemented in consultation with BCS. Any deviation from measures approved are to be raised and approved. Additional monitoring and control measures for introduced plant establishment and spread should be implemented at and around locations utilised for sediment control structures.	Pre-clearance, construction and operation	Effective	Spreading of weed controls from the Project	The Proponent and contractors

Impact	Action ID	Mitigation Measure	Timing	Likely efficacy of mitigation	Outcome	Responsibility
		Weed monitoring and control programs will include adaptive management strategies for priority weed species during construction, and early operational phase.				
	B13	All priority weeds, as listed on the DPI NSW WeedWise website - https://weeds.dpi.nsw.gov.au/WeedBiosecurities?AreaId=137 for the South-East LLS Region are to be managed and controlled.				
	B14	Preparation of a vehicle and machinery hygiene strategy protocol as part of the CEMP and OEMP, will be implemented during construction and operation. The strategy will include site specific locations, timings, and methods for removing soil and plant matter from vehicles and machinery. Hygiene measures stated in the strategy protocol must be applied during construction and operation to ensure vehicle and machinery hygiene.				
	B15	Weeds will be disposed and managed appropriately during clearing works, to stop the spread of invasive weed species.				
	B16	Construction of wash down stations will occur at suitable locations to wash down vehicles and employee shoes to stop the spread of weeds, pathogens (including *Phytophthora cinnamomi*, amphibian chytrid fungus, agricultural weeds, and exotic rust fungi) and the introduction of new species to the site.				
Increase in predatory and pest species	B17	Refuse and personal waste generated throughout the construction and operational phases will be stored in bins and discarded in a suitable waste storage facility.	During construction and operation	Effective	Controlled action to mitigate, avoid and minimise introduced predators and pests to the area of construction	The Proponent
	B18	Implementation of a monitoring program for feral animals which is based on performance triggers for adaptive management. If an increase in predator activity is identified, it will trigger the need for a control program based on measures related to performance. This will be outlined in the CEMP and OEMP with control done in consultation of host landowners.				

Impact	Action ID	Mitigation Measure	Timing	Likely efficacy of mitigation	Outcome	Responsibility
Fragmentation resulting in reduced connectivity	B21	Clearing/works will be contained within approved areas	During construction	Effective	No reduction in connectivity	The Proponent and contractor
Wildlife impacts from vehicle strikes	B22	Consider 40 km/h speed limits on newly formed access tracks to reduce the risk of vehicle strikes to fauna specifically in areas surrounding permanent water bodies and close to farm dams, particularly after periods of rain.	Pre-construction, during construction and decommissioning	Effective	No wildlife vehicle strikes	The Proponent and contractor
Surface runoff changes resulting in sedimentation changes due to the removal of habitat and vegetation. **Impacts on water quality and hydrological processes that sustain threatened species.** **Contaminant pollution.**	B23	Appropriate construction soil and water management measures will be developed and included in the CEMP. This will include but not limited to: • Procedures to minimise and manage erosion and sediment transport within the project area and offsite. • The preparation of erosion and sediment control measures for construction. • Procedures to manage accidental spills with the requirement to maintain spill kits. • Procedures to manage the potential of any acid sulfate soils (ASS) in accordance with the NSW Acid Sulfate Soil Guidelines (Ahern et al. 1998). • Procedures to manage potential tannin leachate. • Procedures to manage stockpiles. • Details of surface water quality monitoring procedures. • Detailed design would minimise the width of disturbance of the river and blockage of fish passage. Suitable environmental controls will be implemented to prevent impacts to downstream environments. The Policy and Guidelines for Fish Friendly Waterway Crossings (DPI 2003).	Pre-construction, during construction and decommissioning	Effective	Avoiding and minimising impacts to aquatic habitats and threatened fish species	The Proponent and contractor

Impact	Action ID	Mitigation Measure	Timing	Likely efficacy of mitigation	Outcome	Responsibility
	B24	The CEMP will detail erosion and sediment control procedures that will be implemented within the Project Area in accordance with the principles and requirements of Managing Urban Stormwater – Soils and Construction, Volume 1 (Landcom, 2004).	Pre-construction and during construction			
	B25	To minimise and avoid any impacts threatened species and water quality, the following procedure will be implemented: • The total bare earth exposed at any time will be minimised. • Rehabilitation strategies to be implemented to minimise dust regeneration, soil erosion and weed incursion. • Rehabilitate all areas of the Project Area that are not proposed for future disturbance post construction and when decommissioning.	During construction and decommissioning			
	B26	Prior to, during and following construction and decommissioning, a surface water monitoring program will be prepared and implemented as part of the CEMP and decommissioning plan.	Pre-construction, during construction and decommissioning			
	B27	As part of the CEMP, Project specific procedures and controls will be prepared and implemented. This is to minimise the risk of spills, litter and leaks entering downstream waterways and/ or leaking into the soil and groundwater table. The CEMP will include, but is not limited to: • All liquids, chemicals and fuels to be stored in a sealed bunded area and stored on level ground within the construction compound. • Appropriate storage of equipment and hazardous substances during construction and operation. • Designated areas with spill capture and management controls for refuelling and minor activities. • An emergency spill response procedure.	During construction and decommissioning			

Impact	Action ID	Mitigation Measure	Timing	Likely efficacy of mitigation	Outcome	Responsibility
		• Regular water quality checks to be carried out at waterways within proximity to work being carried out. • Installation and maintenance of control measures such as gross pollutant traps and silt fencing.				
	B28	The management of stockpiles to minimise the transport of dust, sediment and leachate runoff. This will include, but is not limited to: • Minimising time that the stockpiles are left exposed, the number of stockpiles and the areas used for stockpiles. • Designating stockpiles away from waterways, drainage lines and areas where they would be susceptible to wind erosion. • Establishing appropriate controls for sediment, stabilising stockpiles and suppressing dust as required.	During Construction			
	B29	A concrete slab adjacent to the construction compound will locate all batch plants. Avoiding ingress from concrete waste into downstream waterways will be outlined with measures in the CEMP.				
	B30	Stormwater runoff increases during the Project operation will be managed through, but not limited to: • The design of permanent drainage and water management to meet the Project performance outcomes of no pollution of water. • Control procedures and maintenance of access tracks and scour protection to minimise erosion and impacts on water quality. • Potential impacts on channel erosion and scour to be monitored at receiving drainage channels and waterways downstream.	During Operation			
	B31	Within the detailed design, if the Project excavation exceeds the proposed maximum depth below ground level, potential impacts to GDEs will need to be re-assessed by a qualified hydrogeologist.	Detailed design and during construction	Effective	Avoiding impacts to GDE's	The Proponent

Impact	Action ID	Mitigation Measure	Timing	Likely efficacy of mitigation	Outcome	Responsibility
Fire risk during operation	B32	The Project will implement the following permanent bush fire protections: • Asset Protection Zones (APZs) around each solar panel array • APZs around the BESS and substations. • An APZ around the operation and maintenance facility (to be constructed to a BAL-12.5 standard). • Perimeter firebreak. • Ongoing vegetation management. • Access for emergency response vehicles. • A permanent, dedicated firefighting water source. • Controls on Project actions to prevent bush fire ignition. • Fire suppression systems in substations, BESS and solar panels. • A Project fire fighting vehicle.	During construction and operation	Effective	Mitigate risks to biodiversity	The Proponent
	B33	An Emergency Response Plan will be developed in accordance with Planning for Bush Fire Protection (PBP) (NSW Rural Fire Service (RFS), 2019) and in consultation with the NSW RFS (including any requirements in relation to aerial firefighting). These plans will identify all pertinent bush fire risk and mitigation strategies relating to the construction and operation of the Project, including those listed in B29 and: • Actions to prevent bush fire ignition or spread from Project activities. • Work that will not be conducted during total fire bans. • Appropriate safety procedures and storage location for any fuels or other hazardous or flammable materials. • Protocols in place to alert NSW RFS regarding work with the potential to cause a fire to the surrounding vegetation.				

Impact	Action ID	Mitigation Measure	Timing	Likely efficacy of mitigation	Outcome	Responsibility
		• Measures relating to the requirements of NSW RFS or other authorities regarding the management risk to aerial firefighting in the region. • Escalation notifying protocols with contact details for the local NSW RFS Fire Control Centre, local fire brigades, CASA, Air Services Australia, and all other relevant people and / or organisations who will be notified of an emergency at the Project Area. • The locations of any firefighting water along with alternative water supplies that may be available in the case of an emergency (including any other fire suppression equipment held on and off site). Bush fire emergency planning that includes evacuation routes, evacuation triggers and when and where to take refuge.				
Light and noise vibration impacts during night works	B34	To address noise that is likely to exceed acceptable noise management levels (NMLs) the CEMP will include appropriate noise management and mitigation measures.	During construction and operation	Effective	Mitigate risks to biodiversity	The Proponent and Contractor
	B35	Standard noise mitigation measures will be implemented were reasonably practicable, including the following: • Work limited to standard hours of construction unless permitted by the development consent. • Adopt low-noise and plant equipment, where feasible plant and equipment to be fitted out with silencing devices. • Consider using less intrusive alternatives to reverse beepers such as 'squawker' or broadband' alarms. • All plant and equipment to be well maintained. • Warrant equipment mufflers are functioning correctly and effectively.				

Impact	Action ID	Mitigation Measure	Timing	Likely efficacy of mitigation	Outcome	Responsibility
		• When feasible, employ construction techniques that produce less vibration and are quieter. • Equipment that is on-site be turn-off when not in use. • Only have necessary equipment on-site, including only having necessary size and powered equipment for tasks. • Noisy activities will be concentrated at one location and relocate as soon as possible. • Vehicle movements limited and avoided whenever feasible. • Provide training to acquaint employees with noise sensitivity. • For concentrated, noise-intensive activities implemented temporary construction noise barriers or earth mounds. • Install enclosures around noisy mobile and fixed equipment were reasonably practicable. • Where reasonably practicable avoid coincide operation of two or more noisy plants close to receivers. • Optimise the offset distance between sensitive receivers and noisy plants. • Implement parking, loading/unloading areas and traffic flow management to minimise reversing movements. • Implement routinely monitoring of construction noise levels ensure effectiveness of mitigation measures and whether revision of measures in required.				
	B36	Standard vibration mitigation measures from the *Assessing Vibration: a technical guideline* (DECC, 2006) will be implemented were reasonably practicable, including the following: • Where reasonably practicable selecting lower-impact equipment or techniques where feasible.		Effective	Mitigate risks to biodiversity	The Proponent and Contractor

Impact	Action ID	Mitigation Measure	Timing	Likely efficacy of mitigation	Outcome	Responsibility
		• Operating vibration-causing plant and equipment during the least sensitive time of day where reasonably practicable. • Avoid coincide operation of vibration-causing operations. • High-vibration activities to be located as far away from sensitive receiver areas as possible. • All plant and equipment to be well maintained. • Intensive vibration operation to not occur within the recommended safe set back distances. • Receivers to be notified regarding the nature of construction phases and vibrations-generating operations.				
Dust pollution	B37	Air quality management measures will be implemented and include but is not limited to: • Haul routes clearly marked. • Maintenance and watering of haul routes. • Vehicle speed restriction. • Immediate clean-up of any material spillage. • During adverse weather conditions e.g. during hot and windy conditions weather will be monitored.	During Construction	Effective	Avoid, minimise and mitigate impacts from dust pollution.	The Proponent and Contractor
Edge effects on adjacent native vegetation and habitat	B38	Exclusion zones will be set up at the limit of clearing.	During construction	Effective	Identify residual edge effects	The Proponent

8.7 Adaptive Management for Uncertain Impacts

8.7.1 Monitoring program and adaptive management

Some impacts, typically indirect and prescribed, are difficult to predict or assess prior to the commencement of a development (BAM Section 8.5). The adaptive management plan identifies uncertain impacts and can be used to quantify and respond to these throughout construction and operation.

Table 8.8 provides a suggested framework for the Adaptive Management Plan which includes the uncertain impacts and the potential monitoring activities, examples of appropriate methods to be used and example performance criteria required for each. This plan should be reviewed periodically and adjusted when necessary**.**

Table 8.8 Proposed Monitoring and Adaptive Management Measures

Impact being mitigated	Monitoring schedule	Example methods and triggers to be applied	Example performance criteria
Removal of native vegetation and habitat	During construction	Vegetation clearing reports to verify the area of native vegetation and threatened species habitat cleared. Trigger for compliance should clearing occur outside of Development Footprint.	No clearing outside of approved Development Footprint.
	Operation – over the life of the Project set at 5 yearly intervals	Monitor the impacts of edge effects on TEC outside of the Development Footprint. Carry out floristic plots in adjacent vegetation, at a feasible distance from the Development Footprint, and compare with baseline data collected prior to construction. Trigger for compliance action and revision of mitigation measures should vegetation integrity scores show any reduction.	No negative change in vegetation integrity scores compared with baseline data.
Changes to surface water runoff regimes due to habitat removal	During construction	After heavy rainfall events, sediment controls will be monitored. Should sediment controls be considered ineffective, mitigation measures will be revised.	Implemented sediment controls are deemed to be effective.

Impact being mitigated	Monitoring schedule	Example methods and triggers to be applied	Example performance criteria
Impacts on water quality and hydrological processes	During construction	Testing of water quality indicators (e.g., pH, turbidity) in aquatic habitats occurring downstream of the development. Should a decline in water quality be detected, work will be ceased or scaled back until additional mitigation measures are implemented and considered effective.	No detected decrease in water quality within downstream aquatic habitats.
Increase in weeds and pathogens within adjacent vegetation	During construction and operation – annually, until no corrective actions have been triggered for three consecutive years	Carry out floristic plots in adjacent vegetation, at a feasible distance from the Development Footprint, and compare with baseline data collected prior to construction. Should the acceptable limit of weed cover be exceeded, weed control and monitoring will be implemented as per the CEMP.	Set an acceptable limit of weed cover. Measures will be considered effective after meeting the performance criteria for three consecutive years post-construction.
Increase in predator and pest species populations	During construction and operation - annually, until no corrective actions have been triggered for three consecutive years	Monitoring of predator and pest species using remote cameras, focusing on areas where there is a potential for increased pest activity i.e. compound sites.	Should an increase in predator and pest species be observed during monitoring, controls will be implemented. Appropriate triggers to be decided in consultation with BCS and landholders.
Increase in vehicle strikes	During construction and operation	Monitoring of tracks/roads for evidence of fauna collision. Reporting of vehicle strikes on fauna by site personnel. Set a threshold for an acceptable number of vehicle strikes on fauna, based on relevant literature, which will trigger revision of mitigation measures.	The acceptable threshold of vehicle strikes on fauna is not exceeded.

9.0 Serious and Irreversible Impacts

9.1 Assessment for Serious and Irreversible Impacts on Biodiversity Values

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

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

SAII on biodiversity values of proposed development or activity means SAII on biodiversity values as determined under section 6.5 of the BC Act, that would remain after the measures proposed to be taken to avoid or minimise the impact on biodiversity values of the proposed development.

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

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

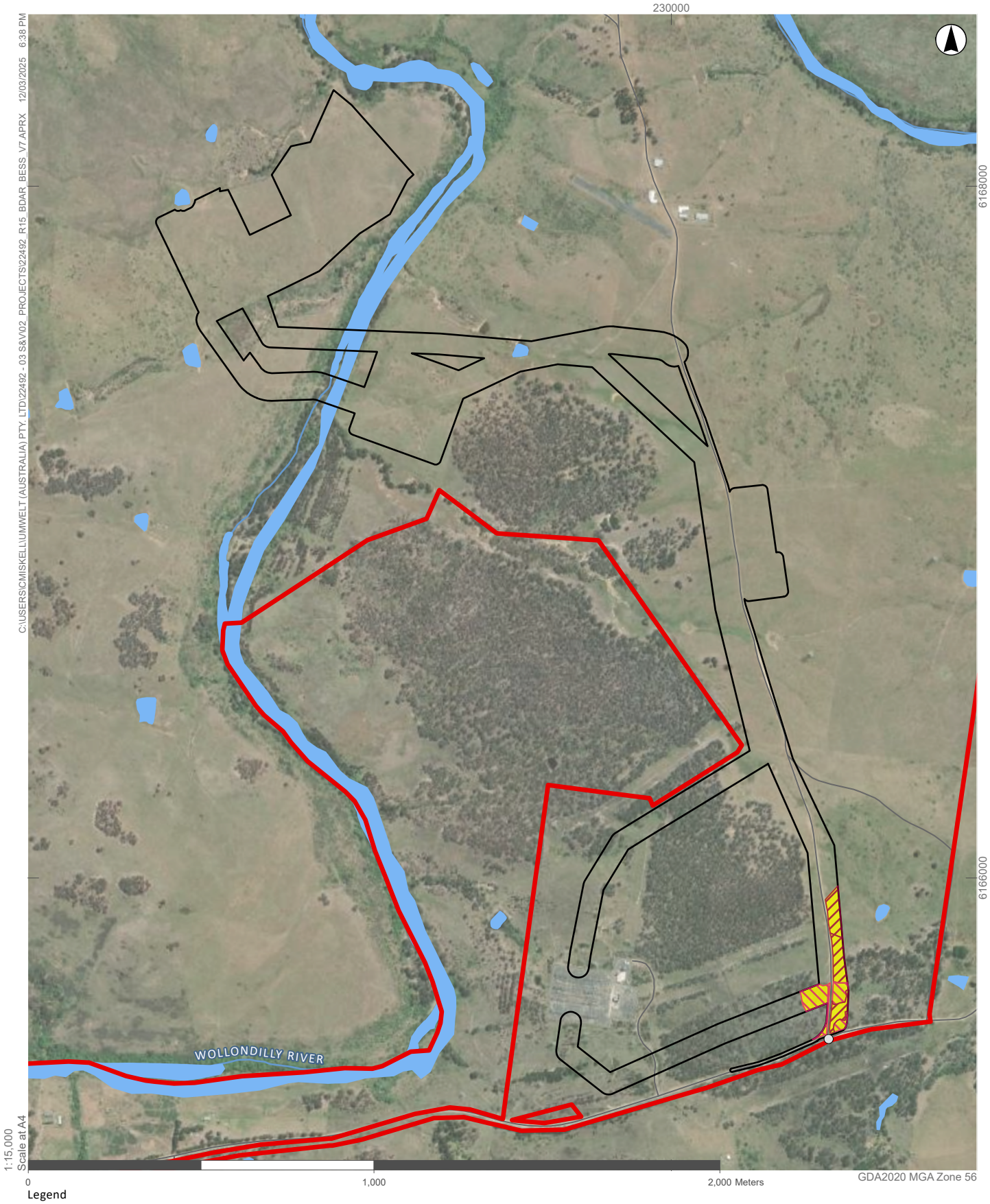
A summary of the entities of relevance to this assessment which are listed as at risk of a SAII is provided in **Table 9.1.**

Table 9.1 Entities at Risk of an SAII

Common Name	Scientific Name	Principle	Reason for
White Box – Yellow Box – Blakely's Red Gum Grassy Woodland and Derived Native Grassland Critically Endangered Ecological Community	-	1 & 2	Included in current list of entities at risk of an SAII and is likely to be impacted by the Project.
Large-eared pied bat	*Chalinolobus dwyeri*	4	Included in current list of entities at risk of an SAII. No further assessment required impacts to breeding habitat identified for this species is a potential serious and irreversible. No breeding habitat is likely to be impacted by the Project.

The extent of the White Box - Yellow Box - Blakely's Red Gum Grassy Woodland and Derived Native Grassland CEEC within the Development Footprint are mapped in **Figure 9.1.**

The SAII additional impact assessment provisions (AIAPs) from the 2020 version of the BAM are addressed in **Section 9.1.1** of this report. These AIAPs were updated in the 2020 version of the BAM from the AIAPs provided in the 2017 version of the BAM which are also currently reproduced in Appendix B of the NSW DPIE (2019) Guidance to assist a decision maker to determine serious and irreversible impacts.



Legend

- Project Area
- Development Footprint
- Waterbodies
- Watercourse
- Existing Roads and Tracks
- Access Points

Potential SAII entities

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

PCT 3376 - Southern Tableland Grassy Box Woodland

- DNG
- Good/Moderate

FIGURE 9.1

Locations of Habitat for Potential Serious and Irreversible Impact Entities

Image Source: ESRI Basemap (2024) **Data source:** NSW LPI (2024), NSW DSFI (2024), Umwelt (2024)

9.1.1 Additional Impact Assessment Provisions for TECs at Risk of an SAII

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

The additional impact assessment provisions for TEC at risk of an SAII have been addressed for the White Box - Yellow Box - Blakely's Red Gum Grassy Woodland and Derived Native Grassland CEEC in **Table 9.2**. The location of the White Box - Yellow Box - Blakely's Red Gum Grassy Woodland and Derived Native Grassland CEEC within the Development Footprint is shown in **Figure 9.1.** This ecological community is listed as critically endangered under the BC Act and the EPBC Act. The NSW Extent of this CEEC based on the NSW State Vegetation Type Mapping.

Table 9.2 SAII Impact Assessment – White Box – Yellow Box – Blakely's Red Gum Grassy Woodland and Derived Native Grassland CEEC

Response to BAM Section 9.1.1 Criteria
1. The action and measures taken to avoid the direct and indirect impact on the TEC at risk of an SAII (or reference to where these have been addressed in the relevant section of the BDAR).
A detailed description of the actions and measures proposed to avoid direct and indirect impacts on biodiversity values in general are documented in **Section 7.0** of this report. A discussion of the measures taken to avoid and minimise impacts to White Box – Yellow Box – Blakely's Red Gum Grassy Woodland and Derived Native Grassland CEEC is provided herein. The 6,331 ha Project Area has provided flexibility during the design phase in order to prioritize the avoidance of White Box – Yellow Box – Blakely's Red Gum Grassy Woodland and Derived Native Grassland CEEC. The Development Footprint has been located within an area of historical clearing and ongoing pasture improvement for agricultural use. Up to an 17,000 head of sheep have been present across the Development Footprint at any one time, with much of the footprint cropped for fodder pasture. As a result, the Development Footprint has been located within the portions of the Project Area that are the most disturbed, and contain Category 1 – Exempt land mapped on the Draft NVR map reproduced in Figure 1.5 of this report. As such, areas of higher quality White Box – Yellow Box – Blakely's Red Gum Grassy Woodland and Derived Native Grassland CEEC within the Project Area have been avoided. 23.21 ha of White Box – Yellow Box – Blakely's Red Gum Grassy Woodland and Derived Native Grassland CEEC has been avoided from the BESS Scoping Report boundary during the design stage of the Project as detailed in **Table 7.1**. A total of 32.72 ha of the CEEC will be retained in the Biodiversity Study Area.
2. The assessor must consult the TBDC and/or other sources to report on the current status of the TEC including: **a. Evidence of reduction in geographic distribution (Principle 1, clause 6.7(2)(a) BC Regulation) as the current total geographic extent of the TEC in NSW AND the estimated reduction in geographic extent of the TEC since 1970 (not including impacts of the proposal)** **b. The 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:** **vi. Change in community structure** **vii. Change in species composition** **viii. Disruption of ecological processes** **ix. Invasion and establishment of exotic species** **x. Degradation of habitat** **xi. Fragmentation of habitat**

Response to BAM Section 9.1.1 Criteria
c. 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** **iii. number of threat defined locations.** **d. Evidence that the TEC is unlikely to respond to management (Principle 4, clause 6.7(2)(d) BC Regulation).**

The TBDC has been reviewed in relation to the information available for the White Box - Yellow Box - Blakely's Red Gum Grassy Woodland and Derived Native Grassland CEEC. Additional sources relied upon are referenced within the text below.

a. The current extent of the White Box - Yellow Box - Blakely's Red Gum Grassy Woodland and Derived Native Grassland CEEC and the estimated reduction in the geographic extent since 1970 is not available in the TBDC.

Threatened Species Scientific Committee

An assessment completed by Threatened Species Scientific Committee (TSSC) (2006) and reproduced by Tozer and Simpson (2020) estimate that the pre-1750 area of the White Box - Yellow Box - Blakely's Red Gum Grassy Woodland and Derived Native Grassland CEEC was 3,717,366 ha, which has been reduced to a current extent in 2020 of just 250,729 ha. This represents a 93 % reduction since 1750. Tozer and Simpson (2020) note that the very large historical decline in the geographical distribution of the CEEC has been corroborated by other sources, however, the uncertainty still exists around both the current extent of the community as well as its pre-1750 distribution and the current totals are not likely to capture most of the low quality derived native grassland component of the community.

State Vegetation Type Map

Umwelt has utilised the current available State Vegetation Type Mapping (SVTM) which identifies an estimate of the per 1750 and current extent of White Box - Yellow Box - Blakely's Red Gum Grassy Woodland and Derived Native Grassland using the best currently available mapping. The SVTM pre-1750 area of White Box - Yellow Box - Blakely's Red Gum Grassy Woodland and Derived Native Grassland CEEC is between 1,895,058 ha and 2,403,693 ha and the current SVTM extent of White Box - Yellow Box - Blakely's Red Gum Grassy Woodland and Derived Native Grassland is between 1,267,603 ha and 1,639,571 ha. The variance in the SVTM upper estimate is due to some mapped PCTs being identified as only partly being associated with the White Box - Yellow Box - Blakely's Red Gum Grassy Woodland and Derived Native Grassland CEEC.

Annual Loss and Reduction in Extent Since 1970

Tozer and Simpson (2020) have identified that the loss of the woodland component of White Box - Yellow Box - Blakely's Red Gum Grassy Woodland and Derived Native Grassland CEEC across NSW between 2009 and 2018 was 9,802 ha or 1,089.1 ha per annum distributed disproportionately between years.

Using an annual loss rate of 1,089.1 ha, an estimate of the loss over the 1970 to 2020 period of 32,673 ha of the woodland component of the CEEC has been obtained. However, it is considered the rate of loss prior to 2009 is likely to have been much greater than 1,089.1 ha per annum due to a non-linear rate of clearing attributed to less legislative restrictions protecting White Box - Yellow Box - Blakely's Red Gum Grassy Woodland and Derived Native Grassland prior to its listing. Tozer and Simpson (2020) note that the rate of clearing of the CEEC has increased in recent years, with impacts to the CEEC from agriculture increasing up 340 % (of the 2009-2016 average) for the period between 2017 and 2018, while impacts from infrastructure increased by 378 % (of the 2009–2016) average between 2017 and 2018.

b. The following information has been obtained from the Conservation Assessment of the White Box - Yellow Box - Blakely's Red Gum Grassy Woodland and Derived Native Grassland CEEC prepared by Tozer and Simpson (2020).

Changes in community structure

In relation to community structure, Tozer and Simpson (2020) note that there are essentially no remaining areas that are fully intact and most of the remaining extent has lost its understory, been invaded by exotic species, lost entire suites of species or lost its structure in terms of the loss of tree, shrub and/or ground layers.

Response to BAM Section 9.1.1 Criteria

Changes in species composition

Species composition has been adversely affected by degradation and fragmentation which has caused the loss of suites of species such as understorey components or faunal components such as reptiles, mammals and/or woodland birds. The species lost are sometimes replaced by more common species such as aggressive noisy miners, exotic flora or monocultures of native grasses.

Disruption of ecological processes

The ecological community has undergone or is likely to undergo within a time frame appropriate to the life cycle of the habitat characteristics of its component species a very large disruption of biotic processes or interactions. The changes have been such that reestablishment of the ecological processes, species composition and community structure of the original ecological community is not likely to be possible, even with immediate positive human intervention.

Invasion and establishment of exotic species

Weeds have invaded most of the remaining areas of the original pre-1750 extent of this ecological community and result in continuing detrimental change. Extensive areas have experienced elevated soil nitrogen as a result of the application of chemical fertilisers, which is associated with the invasion of weeds and eventual conversion of native to exotic pasture.

Degradation of habitat

The ecological community continues to be degraded at both the patch and landscape scale. This ongoing modification, while not necessarily leading to the destruction of all elements of the ecological community, threatens it with extinction. Cumulatively, the disruption of biotic processes and interactions caused by the implementation of management for agricultural production is very severe and less than 10 % of the original distribution of White Box – Yellow Box – Blakely's Red Gum Grassy Woodland and Derived Native Grassland is likely to have avoided the long-term impacts of pastoralism.

Fragmentation of habitat

The community has been extensively cleared throughout its range and remnants are typically small, isolated, highly fragmented and occur in predominantly cleared landscapes and exhibit highly modified understoreys.

c. The extent of occurrence of White Box - Yellow Box - Blakely's Red Gum Grassy Woodland and Derived Native Grassland throughout its entire range in Australia is identified by Tozer and Simpson (2020) as 702,800 km^2. The extent of occurrence within NSW is not identified in the TBDC or separately assessed by Tozer and Simpson (2020).

The current geographic extent of this CEEC across its range is estimated by Tozer and Simpson (2020) (reproduced from TSSC 2006) as 576,654 ha, which includes an area of occupancy of 250,729 ha within NSW.

No threat defined locations are specifically identified in the TBDC profile. It is not likely that a single threatening event in a geographically or ecologically distinct area would rapidly affect all occurrences of this CEEC.

d. This principle (principle 4) is not applicable to the White Box - Yellow Box - Blakely's Red Gum Grassy Woodland and Derived Native Grassland CEEC. The ecological community does respond to management, with some successful management measures are outlined in the document titled 'A Guide to Managing Box Gum Grassy Woodlands' (Rawlings *et al.* 2010).

While the CEEC does respond to management, not all extents of the CEEC respond to management in a linear manner. Good *et al.* (2021) describe state and transitional models for grassy eucalypt woodlands across Australia and demonstrate the non-linear and multidirectional nature of the interaction between different woodland states with respect to management practices. For example, 'Simplified 4 Woodlands', such as the derived native grassland form of the CCEC within the Development Footprint, are very unlikely transition to the 'Simplified 1 Woodland' or 'Simplified Woodland 2' (i.e. better quality) states even with management, however, are likely to degrade into low quality states when current land management practices change.

Response to BAM Section 9.1.1 Criteria
While not directly relevant to the Project the following management actions are also listed within the TBDC: • Undertake control of rabbits, hares, foxes, pigs and goats (using methods that do not disturb the native plants and animals of the remnant). • Manage stock to reduce grazing pressure in high quality remnants (i.e. those with high flora diversity or fauna habitat). • Do not harvest firewood from remnants (this includes living or standing dead trees and fallen material). • Leave fallen timber on the ground. • Erect on-site markers to alert maintenance staff to the presence of a high quality remnant or population of a threatened species. • Encourage regeneration by fencing remnants, controlling stock grazing and undertaking supplementary planting, if necessary. • Undertake weed control (taking care to spray or dig out only target species). • Protect all sites from further clearing and disturbance. • Ensure remnants remain connected or linked to each other; in cases where remnants have lost connective links, re-establish them by revegetating sites to act as steppingstones for fauna, and flora (pollen and seed dispersal). • Mark remnants onto maps (of the farm, shire, region, etc) and use to plan activities (e.g. remnant protection, rehabilitation or road, rail and infrastructure maintenance work). On-site markers can alert maintenance staff to the presence of a threatened species.
3. Where the TBDC indicates that data is 'unknown' or 'data deficient' for a TEC for a criterion listed in Section 9.1.1(2), the assessor must record this in the BDAR.
The NSW White Box – Yellow Box – Blakely's Red Gum Grassy Woodland and Derived Native Grassland CEEC is not identified as 'unknown' or 'data deficient' in the TBDC.
4. The following questions are addressed in relation to the impacts from the proposal of the TEC. **a. The impact on the geographic extent of the TEC (Principles 1 and 3) by estimating the total area of the TEC to be impacted by the proposal:** **i. in hectares** **ii. as a percentage of the current geographical extent of the TEC in NSW** **b. the extent that the proposed impacts are likely to contribute to further environmental degradation or the disruption of biotic processes (Principle 2) of the TEC by:** **i. estimating the size of any remaining, but now isolated, areas of the TEC; including areas of the TEC within 500 m of the development footprint or equivalent area for other types of proposals** **ii. describing the impacts on connectivity and fragmentation of the remaining areas of TEC measured by:** **- distance between isolated areas of the TEC, presented as the average** **- distance if the remnant is retained AND the average distance if the remnant is removed as proposed, and** **- estimated maximum dispersal distance for native flora species characteristic of the TEC, and** **- 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.**
a. The Project will impact approximately 2.12 ha of this CEEC including approximately • 0.89 ha of woodland that is described as good/moderate,

Response to BAM Section 9.1.1 Criteria

- 1.23 ha which is described as a derived native grassland.

A total of 35.99 ha of White Box - Yellow Box - Blakely's Red Gum Grassy Woodland and Derived Native Grassland has been recorded in the Biodiversity Survey Area. Impacts to 2.12 ha of the CEEC represents an impact to 5.89 % of the extent of the CEEC in the Biodiversity Survey Area.

Vegetation Condition Zone ID	PCT ID	Condition	Area impacted	VI Score
Common Ancillary Facilities				
7- 3376 - DNG	Southern Tableland Grassy Box Woodland	Derived native grassland	1.23	26.2
8- 3376 -Good Moderate	Southern Tableland Grassy Box Woodland	Good/Moderate	0.44	76.9
Transmission Line Option 2				
8- 3376 -Good Moderate	Southern Tableland Grassy Box Woodland	Good/Moderate	0.45	76.9

The Project would result in the removal of 0.89 ha woodland commensurate with of PCT 3376 (veg zones good/moderate and moderate/degraded). Impacts to this open woodland form of the CEEC make up approximately 41.98 % of the overall Project related impacts to the CEEC.

If transmission line option 1 is chosen then 0.45 ha of PCT 3376 would be impacted by the Project.

Assuming an area of occupancy of 250,729 ha as estimated by Tozer and Simpson (2020), the Project will impact approximately 0.0013% of the geographic extent of this CEEC. Of this,

- impacts to 1.23 ha moderate condition derived native grassland would impact 0.00073% of the geographical extent of the CEEC
- impacts to the 0.89 ha of CEEC containing woodland vegetation would impact 0.00058% of the geographical extent of the CEEC.

Due to the avoidance and minimisation measures carried out as part of the design revisions described above and within Section 7.0 of this report, impacts to White Box – Yellow Box – Blakely's Red Gum Grassy Woodland and Derived Native Grassland have been minimised to small areas of the CEEC.

b. The Project will not isolate any areas of the White Box - Yellow Box - Blakely's Red Gum Grassy Woodland and Derived Native Grassland CEEC, as all areas of retained vegetation are connected to larger patches of intact native woodland.

The Project will fragment areas of the White Box - Yellow Box - Blakely's Red Gum Grassy Woodland and Derived Native Grassland CEEC in derived native grassland form within the south-eastern section of the Project Area from other retained areas of the CEEC within the northern sections of the Project Area but, as stated, not isolate these from surrounding native vegetation. These areas were already separated by highly disturbed agricultural use areas. The fragmentation will occur through the removal of woodland vegetation and derived native grassland vegetation as well as some scattered trees. The retained areas will remain connected through other vegetation communities in the locality.

The main dispersal mechanisms for flora species associated with the White Box - Yellow Box - Blakely's Red Gum Grassy Woodland and Derived Native Grassland CEEC are inferred to be by one or a combination of dispersal mechanisms, including animals, wind, water runoff, and gravity. These dispersal mechanisms will not be inhibited by the proposed works.

Eucalypts within the White Box - Yellow Box - Blakely's Red Gum Grassy Woodland and Derived Native Grassland CEEC are likely to rely on animal assisted dispersal by highly mobile vertebrate pollinators (birds and bats) which disperse pollen over large areas when foraging (Southerton *et al.* 2004).

Response to BAM Section 9.1.1 Criteria
The maximum dispersal distance for native flora species characteristic of the White Box - Yellow Box - Blakely's Red Gum Grassy Woodland and Derived Native Grassland ecological community is estimated to be at least 1,000 m and potentially much further. Within the Development Footprint, areas of the White Box - Yellow Box - Blakely's Red Gum Grassy Woodland and Derived Native Grassland CEEC correspond to PCT 3376 Southern Tableland Grassy Box Woodland. All of these areas have been degraded over a relatively long time period by agricultural management, which has included clearing of trees and understorey vegetation, grazing and pasture improvement.
5. 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.
Not applicable

9.1.2 Additional Impact Assessment Provisions for Threatened Species at Risk of an SAII

No threatened species at risk of a SAII are likely to be impacted by the Project.

10.0 Impact Summary

10.1 Determining an Offset Requirement for Impacts

10.1.1 Impacts on Native Vegetation and TECs (Ecosystem Credits)

The PCTs and associated condition zones which do not require an offset (as per BAM Subsection 9.2.1(3.)), are listed in **Table 10.1** and the PCTs which require ecosystem credits are listed in **Table 10.2.**

Table 10.1 Impacts that Do Not Require Offset – Ecosystem Credits

Vegetation Zone	PCT Name	Impact Area (ha)	TEC	Entity at Risk of an SAII	Current VI Score
VZ5 PCT 3374 – Goulburn Tableland Peppermint Grassy Forest – DNG-low condition	Goulburn Tableland Peppermint Grassy Forest	1.18	N/A	N/A	2.7
VZ5 PCT 3374 – Goulburn Tableland Peppermint Grassy Forest – DNG-exotic dominated	Goulburn Tableland Peppermint Grassy Forest	49.95	N/A	N/A	1

Table 10.2 Impacts that Do Require Offset – Ecosystem Credits

Vegetation zone	PCT name	TEC	Impact area (ha)	Current VI score	Future VI score	Change in VI score	HBT	Biodiversity risk weighting	Number of ecosystem credits required
BESS									
4 -3374 DNG exotic dominated	Goulburn Tableland Peppermint Grassy Forest	N/A	13.42	1	0	-1	No	2	0
Common Ancillary Feature									
1 – 4063 Moderate/Degraded	Central and Southern Tableland River Oak Forest	N/A	1.94	38.7	0	-38.7	No	1.75	23
2 – 3374 DNG-Moderate/Degraded	Goulburn Tableland Peppermint Grassy Forest	N/A	14.81	17.7	0	-17.7	No	2	98
3 – 3374 DNG low condition	Goulburn Tableland Peppermint Grassy Forest	N/A	1.18	2.7	0	-2.7	No	2	0
4 – 3374 DNG exotic dominated	Goulburn Tableland Peppermint Grassy Forest	N/A	25.64	1	0	-1	No	2	0
7 – 3376 – DNG	Southern Tableland Grassy Box Woodland	White Box – Yellow Box – Blakely's Red Gum Grassy Woodland and Derived Native Grassland CEEC under the BC Act and EPBC Act	1.23	26.2	0	-26.2	No	2.5	16
8 – 3376 – Good/Moderate	Southern Tableland Grassy Box Woodland	White Box – Yellow Box – Blakely's Red Gum Grassy Woodland and Derived Native Grassland CEEC under the BC Act and EPBC Act	0.44	76.9	0	-76.9	Yes	2.5	17

Vegetation zone	PCT name	TEC	Impact area (ha)	Current VI score	Future VI score	Change in VI score	HBT	Biodiversity risk weighting	Number of ecosystem credits required
Transmission Line Option 1									
2- 3374 DNG-Moderate/Degraded	Goulburn Tableland Peppermint Grassy Forest	N/A	2.54	17.7	0	-19	No	2	17
4 3374 DNG exotic dominated	Goulburn Tableland Peppermint Grassy Forest	N/A	1.6	1	0	-1	No	2	40
5- 3374 - Moderate/Degraded	Goulburn Tableland Peppermint Grassy Forest	N/A	0.46	69.7	0	-69.7	Yes	2	12
6-3374 Good/Moderate	Goulburn Tableland Peppermint Grassy Forest	N/A	1.39	76	0	-76	Yes	2.5	0
Transmission Line Option 2									
1 – 4063 Moderate/Degraded	Central and Southern Tableland River Oak Forest	N/A	0.11	38.7	0	-38.7	No	1.75	1
2- 3374 DNG-Moderate/Degraded	Goulburn Tableland Peppermint Grassy Forest	N/A	1.90	17.7	0	-17.7	No	2	13
4 3374 DNG exotic dominated	Goulburn Tableland Peppermint Grassy Forest	N/A	2.29	1	0	-1	No	2	0
5- 3374 - Moderate/Degraded	Goulburn Tableland Peppermint Grassy Forest	N/A	0.84	69.7	0	-69.7	Yes	2	78
6-3374 Good/Moderate	Goulburn Tableland Peppermint Grassy Forest	N/A	2.73	76	0	-76	Yes	2.5	22
8-3376 – Good/Moderate	Southern Tableland Grassy Box Woodland	White Box - Yellow Box - Blakely's Red Gum Grassy Woodland and Derived Native Grassland CEEC under the BC Act and EPBC Act	0.45	76.9	0	-76.9	Yes	2.5	17

10.1.2 Impacts on Threatened Species and their Habitat (Species Credits)

Table 10.3 provides a summary of the species credit threatened that require an offset (as per BAM Subsection 9.2.2(2.)) and identifies the amount of credits required. The area within the Development Footprint which was included within the total of all species polygons is shown in **Figure 10.1.**

Table 10.3 Impacts that Require an Offset – Species Credits

Species Name	Impact Area (ha)	Credits Required
BESS – no species credits required		
Common Ancillary Features		
south-eastern glossy black-cockatoo (*Calyptorhynchus lathami lathami*)	0.44	17
gang-gang cockatoo (*Callocephalon fimbriatum*)	0.44	17
squirrel glider (*Petaurus norfolcensis*)	2.38	55
large eared pied bat (*Chalinolobus dwyeri*)	2.38	81
Transmission Line Option 1		
gang-gang cockatoo (*Callocephalon fimbriatum*)	1.85	69
squirrel glider (*Petaurus norfolcensis*)	1.85	69
south-eastern glossy black-cockatoo (*Calyptorhynchus lathami lathami)*	1.85	69
large eared pied bat (*Chalinolobus dwyeri*)	1.85	103
Transmission Line Option 2		
south-eastern glossy black-cockatoo (*Calyptorhynchus lathami lathami*)	4.02	150
gang-gang cockatoo (*Callocephalon fimbriatum*)	4.02	150
squirrel glider (*Petaurus norfolcensis*)	4.13	152
large eared pied bat (*Chalinolobus dwyeri*)	4.13	229

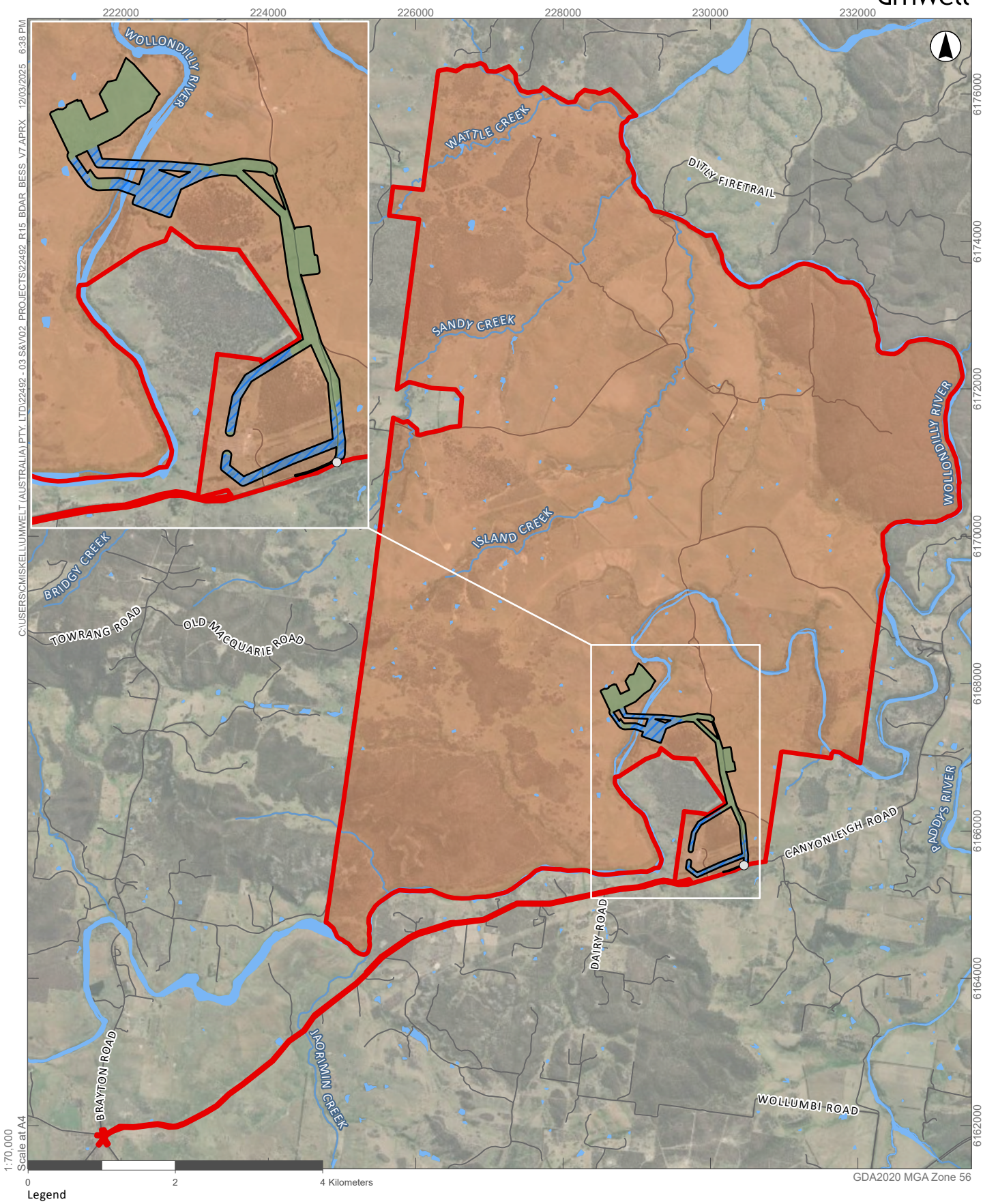
10.1.3 Indirect and Prescribed Impacts

No offsets are required or proposed for indirect and prescribed impacts.

10.2 Impacts That Do Not Need Further Assessment

Areas within the Development Footprint that do not contain native vegetation do not need to be assessed for ecosystem credits (as per BAM Section 9.3(1–2.)). Areas assessed as not containing native vegetation are limited to waterbodies, particularly farm dams, and land which is totally cleared of all vegetation such as frequently used existing vehicle tracks and the Category 1 Exempt Land described in **Section 4.2.6**.

Vegetation Zone	PCT Name	Impact Area (ha)	TEC	Entity at Risk of an SAII	Current VI Score
VZ 4 PCT 3374 DNG exotic dominated	Goulburn Tableland Peppermint Grassy Forest	19.25	N/A	N/A	1



Legend

- Project Area
- Development Footprint
- Waterbodies
- Watercourse
- Existing Roads and Tracks
- Access Points
- Retained / Impact Avoidance Areas
- Impact Areas Which Contain Native Vegetation and Require Offsets (ecosystem credits)
- Impact Areas which do not contain native vegetation (no offset required)

FIGURE 10.1

Thresholds for Assessing and Offsetting Impacts

Image Source: ESRI Basemap (2024) **Data source:** NSW LPI (2024), NSW DSFI (2024), Umwelt (2024)

11.0 Biodiversity Credit Report

The Project would directly impact up to 28.84 ha of native vegetation (8.63 ha of woodland vegetation and 20.48 ha of native grassland) within the Development Footprint.

Additionally, the impacts will be finalised following the completion of the detailed design and micro-siting of infrastructure (within the area of disturbance assessed in this BDAR). In doing so, Spark Renewables will seek to further minimise impacts to biodiversity values. A range of impact mitigation strategies have been implemented and are proposed to minimise the impact on ecological values prior to the consideration of offsetting requirements. Residual impacts that are not able to be managed through mitigation would be offset in accordance with BAM calculations for ecosystem credits and species credit species credits.

Biodiversity Credit Reports which identify the like-for-like and variation credit requirements are provided in **Appendix D.**

11.1 Ecosystem Credits

The ecosystem credit requirements and those that could be retired in accordance with the offset rules are listed in **Table 11.1.**

Table 11.1 Ecosystem Credit Class and Matching Credit Profiles

Ecosystem Credit	Rule Type	Attributes Shared with Matching Credits						
		PCT Name	PCT Vegetation Class	PCT Vegetation Formation	Associated TEC	Offset Trading Group	Hollow Bearing Trees Present?	IBRA Subregion (in which proposal is located)
BESS – no ecosystem credits required								
Common Ancillary Facilities								
PCT 4063-Central and Southern Tableland River Oak Forest **23 credits**	Like-for-like	42, 85, 485, 1714, 3020, 4061, 4063, 4066, 4070, 4072, 4073, 4075, 4077, 4080, 4081, 4085	Eastern Riverine Forests	Forested Wetlands	N/A	Eastern Riverine Forests - ≥ 50% - < 70% cleared group (including Tier 3 or higher threat status).	Yes	Bungonia, Bateman, Burragorang, Crookwell, Ettrema, Kanangra, Kybeyan-Gourock, Monaro and South East Coastal Ranges. or Any IBRA subregion that is within 100 km of the outer edge of the impacted site.
PCT 3374-Goulburn Tableland Peppermint Grassy Forest **98 credits**	Like-for-like	303, 312, 350, 654, 703, 705, 731, 1330, 3366, 3367, 3368, 3370, 3372, 3373, 3374, 3376, 3377	Southern Tableland Grassy Woodlands	Grassy Woodlands	N/A	Southern Tableland Grassy Woodlands - ≥ 70% - <90% cleared group (including Tier 2 or higher threat status).	No	
PCT 3376-Southern Tableland Grassy Box Woodland **33 credits**	Like-for-like	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, 847, 851, 921, 1099, 1303, 1304, 1307, 1324, 1329, 1330, 1332, 1383, 1606, 1608, 1611, 1691, 1693, 1695, 1698, 3314, 3359, 3363, 3373, 3376, 3387, 3388, 3394, 3395, 3396, 3397, 3398, 3399, 3406, 3415, 3533, 4147, 4149, 4150	White Box - Yellow Box - Blakely's Red Gum Grassy Woodland and Derived Native Grassland	Grassy Woodlands	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 CEEC	17 credits = Yes 16 credits = no	

Ecosystem Credit	Rule Type	Attributes Shared with Matching Credits						
		PCT Name	PCT Vegetation Class	PCT Vegetation Formation	Associated TEC	Offset Trading Group	Hollow Bearing Trees Present?	IBRA Subregion (in which proposal is located)
Transmission Line Option 1								
PCT 3374-Goulburn Tableland Peppermint Grassy Forest **69 credits**	Like-for-like	303, 312, 350, 654, 703, 705, 731, 1330, 3366, 3367, 3368, 3370, 3372, 3373, 3374, 3376, 3377	Southern Tableland Grassy Woodlands	Grassy Woodlands	N/A	Southern Tableland Grassy Woodlands - ≥ 70% - <90% cleared group (including Tier 2 or higher threat status).	52 credits = Yes 17credits = No	Bungonia, Bateman, Burragorang, Crookwell, Ettrema, Kanangra, Kybeyan-Gourock, Monaro and South East Coastal Ranges. or Any IBRA subregion that is within 100 km of the outer edge of the impacted site.
Transmission Line Option 2								
PCT 4063-Central and Southern Tableland River Oak Forest **1 credit**	Like-for-like	42, 85, 485, 1714, 3020, 4061, 4063, 4066, 4070, 4072, 4073, 4075, 4077, 4080, 4081, 4085	Eastern Riverine Forests	Forested Wetlands	N/A	Eastern Riverine Forests - ≥ 50% - < 70% cleared group (including Tier 3 or higher threat status).	Yes	Bungonia, Bateman, Burragorang, Crookwell, Ettrema, Kanangra, Kybeyan-Gourock, Monaro and South East Coastal Ranges. or
PCT 3374-Goulburn Tableland Peppermint Grassy Forest **113 credits**	Like-for-like	303, 312, 350, 654, 703, 705, 731, 1330, 3366, 3367, 3368, 3370, 3372, 3373, 3374, 3376, 3377	Southern Tableland Grassy Woodlands	Grassy Woodlands	N/A	Southern Tableland Grassy Woodlands - ≥ 70% - <90% cleared group (including Tier 2 or higher threat status).	100 credits = Yes 13 credits = No	

Ecosystem Credit	Rule Type	Attributes Shared with Matching Credits						
		PCT Name	PCT Vegetation Class	PCT Vegetation Formation	Associated TEC	Offset Trading Group	Hollow Bearing Trees Present?	IBRA Subregion (in which proposal is located)
PCT 3376-Southern Tableland Grassy Box Woodland **17 credits**	Like-for-like	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, 847, 851, 921, 1099, 1303, 1304, 1307, 1324, 1329, 1330, 1332, 1383, 1606, 1608, 1611, 1691, 1693, 1695, 1698, 3314, 3359, 3363, 3373, 3376, 3387, 3388, 3394, 3395, 3396, 3397, 3398, 3399, 3406, 3415, 3533, 4147, 4149, 4150	White Box - Yellow Box - Blakely's Red Gum Grassy Woodland and Derived Native Grassland	Grassy Woodlands	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 CEEC	yes	Any IBRA subregion that is within 100 km of the outer edge of the impacted site.

11.2 Species Credits

The species credit requirements are listed in **Table 11.2.**

Table 11.2 Species Credit Class and Matching Credit Profiles

Species Credit	Attributes Shared with Matching Credits					No. Credits
	Name of Threatened Species	Kingdom	BC Act Status	EPBC Act Status	IBRA Region	
BESS – no species credits required						
Common Ancillary Facilities						
Callocephalon fimbriatum	gang-gang cockatoo	Fauna	E	E	Like for Like Rules: Any in NSW	17
Calyptorhynchus lathami lathami	south-eastern glossy black-cockatoo	Fauna	V	V	Like for Like Rules: Any in NSW	17
Petaurus norfolcensis	squirrel glider	Fauna	V		Like for Like Rules: Any in NSW	55
Chalinolobus dwyeri	large-eared pied bat	Fauna	V	E	Like for Like Rules: Any in NSW	81
Transmission Line Option 1						
Callocephalon fimbriatum	gang-gang cockatoo	Fauna	E	E	Like for Like Rules: Any in NSW	69
Petaurus norfolcensis	squirrel glider	Fauna	V		Like for Like Rules: Any in NSW	69
Calyptorhynchus lathami lathami	south-eastern glossy black-cockatoo	Fauna	V	V	Like for Like Rules: Any in NSW	69
Chalinolobus dwyeri	large-eared pied bat	Fauna	V	E	Like for Like Rules: Any in NSW	103
Transmission Line Option 2						
Callocephalon fimbriatum	gang-gang cockatoo	Fauna	E	E	Like for Like Rules: Any in NSW	150
Calyptorhynchus lathami lathami	south-eastern glossy black-cockatoo	Fauna	V	V	Like for Like Rules: Any in NSW	150
Petaurus norfolcensis	squirrel glider	Fauna	V		Like for Like Rules: Any in NSW	152
Chalinolobus dwyeri	large-eared pied bat	Fauna	V	E	Like for Like Rules: Any in NSW	229

11.3 Biodiversity Offset Strategy

Spark Renewables is committed to delivering a biodiversity offset strategy that appropriately compensates for the unavoidable loss of ecological values as a result of the Project.

Spark Renewables has, where practicable, altered the Project to avoid and minimise ecological impacts in the planning stage, and a range of impact mitigation strategies have been included to mitigate the impact on ecological values prior to the consideration of offsetting requirements.

The retirement of biodiversity credits is proposed to be undertaken following the confirmation of the final transmission line option. The BDAR and credit calculations will be revised at this point prior to the retirement of biodiversity credits.

Spark Renewables is currently considering the merits of all options available under the BOS to satisfy the offsetting requirements for the Project. The offset options available under the BC Act and BC Regulation include:

- land based offsets through the establishment of new Stewardship Sites or by retiring credits from existing Stewardship Sites
- purchasing credits from the market, and/or
- paying into the Biodiversity Conservation Fund.

The like-for-like credit rules would be followed for nationally listed entities which require credits. The like-for-like or variation rules would be followed for all other entities which require credits.

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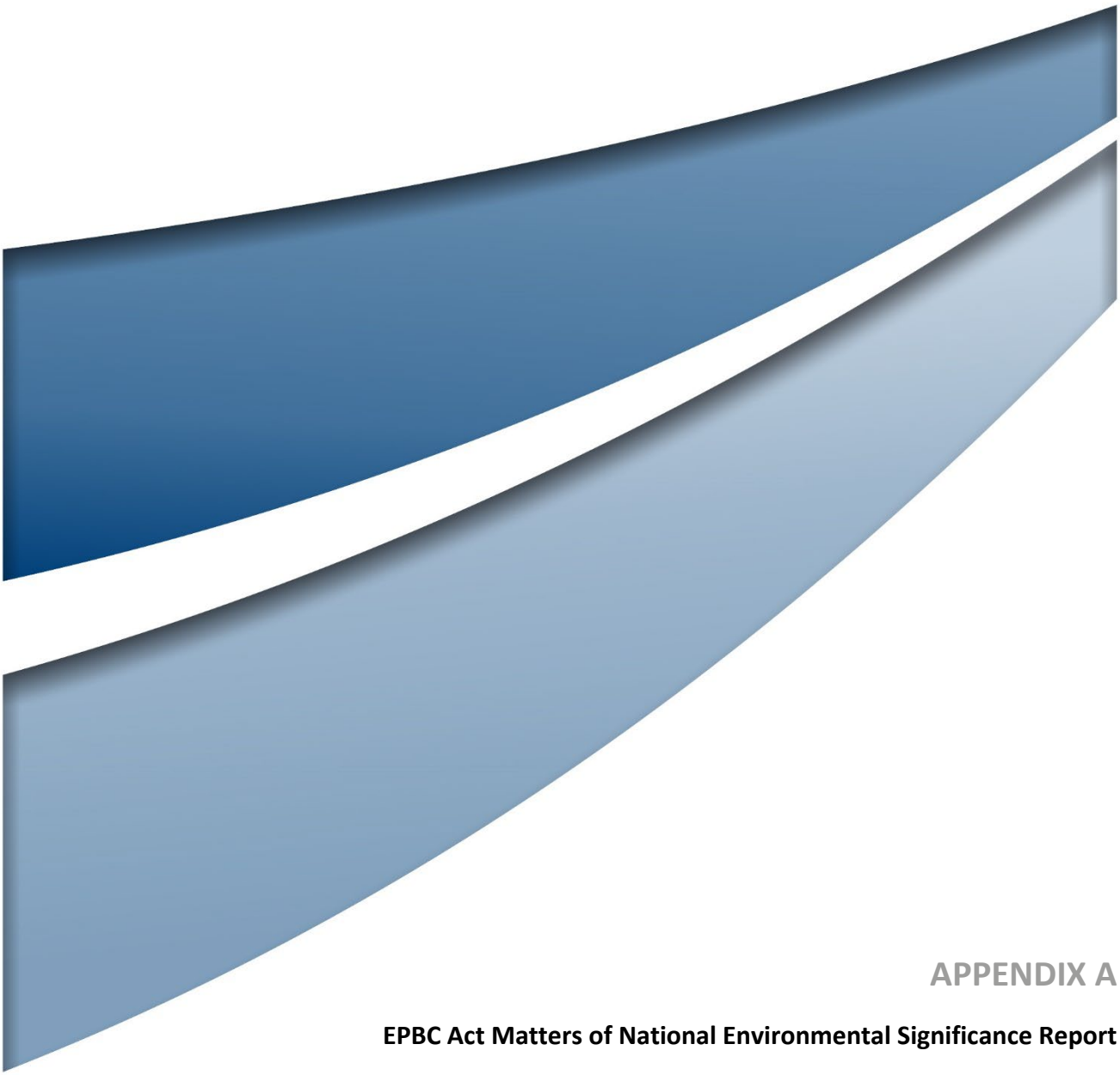
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APPENDIX A

EPBC Act Matters of National Environmental Significance Report

umwelt
Environmental & Social Consultants

SPARK RENEWABLES

WATTLE CREEK BATTERY ENERGY STORAGE SYSTEM
SSD-63345458

Bilateral Agreement MNES Assessment EPBC 2024/09970

FINAL

March 2025

WATTLE CREEK BATTERY ENERGY STORAGE SYSTEM SSD-63345458

Bilateral Agreement MNES Assessment EPBC 2024/09970

FINAL

Prepared by
Umwelt (Australia) Pty Limited
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Report No.	22494/R15/Appendix A
Date:	March 2025

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

Acknowledgement of Country

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

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Document Status

Rev No.	Reviewer		Approved for Issue	
	Name	Date	Name	Date
V1	Naomi Buchhorn	14 March 2025	Naomi Buchhorn	17 March 2025

Abbreviations

Abbreviation	Definition
AEMO	Australian Energy Market Operator
AOBV	Area of outstanding biodiversity values
agl	above ground level
AoS	Assessment of Significance
BAM	Biodiversity Assessment Method (NSW)
BAM-C	Biodiversity Assessment Method Calculator
BC Act	*Biodiversity Conservation Act 2016* NSW
BCS	NSW Biodiversity and Conservation Science Division in Environment and Heritage Group of NSW Department of Climate Change, Energy, the Environment and Water (DCCEEW)
BDAR	Biodiversity Development Assessment Report
BESS	Battery Energy Storage System
BoM	Bureau of Meteorology
BOS	Biodiversity Offset Scheme (NSW)
BVMTT	Biodiversity Values Map Threshold Tool
Commonwealth DCCEEW	Commonwealth Department of Climate Change, Energy, the Environment and Water
DEWHA	Department of the Environment, Water, Heritage and the Arts (former Commonwealth department)
DSEWPC	Department of Sustainability, Environment, Water, Population and Communities (former Commonwealth department)
DPE	NSW Department of Planning and Environment (former NSW department)
DPHI	NSW Department of Planning, Housing and Infrastructure (current)
DPIE	NSW Department of Planning, Industry and Environment (former NSW department)
EAH	Environment Agency Head
EIA	Environmental Impact Assessment
EIS	Environmental Impact Statement
EP&A Act	*Environmental Planning and Assessment Act 1979* NSW
EPBC Act	*Environment Protection and Biodiversity Conservation Act 1999* Commonwealth
FM Act	*Fisheries Management Act 1994* NSW
FTE	full time equivalent
GDE	groundwater dependent ecosystem
GHG	greenhouse gas emissions
GW	Gigawatt
IBRA	Interim Biogeographic Regionalisation for Australia

Abbreviation	Definition
KBA	Key Biodiversity Area
LALC	Local Aboriginal Land Council
LEP	Local Environment Plan
LGA	Local Government Area
LLS Act	*Local Land Services Act 2013* NSW
LLS Regulation	Local Land Services Regulation 2014 NSW
MNES	Matters of National Environmental Significance
MW	megawatts
NEM	National Electricity Market
NPW Act	*National Parks and Wildlife Act 1974* NSW
NSW	New South Wales
NVMP	Native Vegetation (Multi Attribute)
NVR Map	Native Vegetation Regulatory Map
PAH	Planning Agency Head
PCT	Plant Community Type
PMST	Protected Matters Search Tool
RES	Renewable Energy Systems
REZ	Renewable Energy Zone
RtS	Response to Submissions
SAII	Serious And Irreversible Impacts
SEARs	Secretary's Environmental Assessment Requirements
SEPP	State Environmental Planning Policy
SSD	State Significant Development
SVTM	State Vegetation Type Map
TBDC	Threatened Biodiversity Data Collection
TEC	Threatened Ecological Community
TNB	Tenaga Nasional Berhad
TSC Act	*Threatened Species Conservation Act 1995* NSW
Umwelt	Umwelt (Australia) Pty Limited

Table of Contents

Abbreviations i

1.0 Introduction 1

1.1 Title of the Action 1

1.1.1 Proponent Details 1

1.1.2 Environmental Record of the Proponent 2

1.2 Approval Pathway 3

1.2.1 NSW Approval Pathway 3

1.2.2 NSW and Commonwealth Bilateral Agreement 4

1.3 Report Requirements 4

1.3.1 Controlling Provisions 5

1.3.2 Listed Threatened Species, Ecological Communities and Migratory Species 5

1.3.3 Potential Impact on MNES 5

1.3.4 MNES Assessment Requirements under the NSW Bilateral Agreement 6

2.0 Proposed Action Overview 11

2.1 Objectives of the Proposed Action 11

2.2 Proposed Action Location and Context 12

2.3 Key Features of the Proposed Action 13

2.4 Development Footprint 15

2.5 Proposed Timeframes 16

2.6 Design Refinements 16

2.7 Current Status 17

2.8 Related Actions 17

3.0 Summary of Methodology 21

3.1 Desktop Literature and Database Review 21

3.1.1 Datasets 21

3.1.2 Survey Guidelines 23

3.2 Field Survey 24

4.0 Existing Environment 26

4.1 Landscape Context 26

4.2 Native Vegetation 27

4.3 Habitat Assessment 30

4.4 MNES Predicted to Occur 31

4.4.1 Wetlands of International Importance 31

4.4.2 Threatened Communities, Threatened and Migratory Species 31
5.0 Avoidance, Minimisation, Mitigation and Management 33
5.1 Summary of Measures to Avoid and Minimise Impacts 33
5.2 Summary of Mitigation and Management Measures 34
6.0 Impact Assessment 35
6.1 Summary of Proposed Action Impacts 35
6.1.1 Direct and Indirect Impacts 35
6.1.2 Prescribed Impacts 38
6.1.3 Cumulative Impacts 38
6.2 Summary of MNES Impact Assessment 44
7.0 Offset Requirements 47
7.1 Approach 47
7.2 Offset Credit Obligations 48
8.0 References 50

Figures

Figure 2.1	Site Map	19
Figure 2.2	Location Map	20
Figure 4.1	Vegetation Mapping	29

Tables

Table 1.1	General Information on the Action and Proponent	2
Table 1.2	Supplementary SEARs Requirements	7
Table 2.1	BESS Project Components	15
Table 3.1	Datasets	21
Table 3.2	NSW and Commonwealth Survey Guidelines	23
Table 3.3	Biodiversity Surveys Completed as part of the Proposed Action	24
Table 4.1	Landscape Context	26
Table 4.2	Plant Community Types Identified within the Development Footprint	28
Table 4.3	Summary of the MNES Identified from the Desktop Review	31
Table 6.1	Direct Impact on Native Vegetation and Non-native Vegetation	35
Table 6.2	Cumulative Impact Assessment	39
Table 6.3	Summary of impacts of the Proposed Action	45
Table 7.1	Ecosystem Credit Obligation	48
Table 7.2	Species Credit Obligation for MNES	49

Appendices

Appendix 1	Protected Matters Search Tool Results
Appendix 2	Likelihood of Occurrence Assessment
Appendix 3	Assessments of Significance for MNES
Appendix 4	Summary Table for Assessment of Predicted Impacts to MNES

1.0 Introduction

1.1 Title of the Action

Spark Renewables Pty Limited (Spark Renewables) proposes to develop the Wattle Creek Battery Energy Storage (BESS) facility located approximately 80 kilometres (km) west of Wollongong and 15 km north of Marulan within the Upper Lachlan Shire and Goulburn Mulwaree Council Local Government Areas (LGAs).

The Project is located on Arthursleigh Farm (Lot 3 DP 1120270) at Brayton and Big Hill, north of the township of Marulan. Arthursleigh Farm is bound to the south by the Wollondilly River and Canyonleigh Road, to the east by the Wollondilly River, to the north by Dead Mans Creek, and to the west by private property. The Hume Highway is located about 11 km to the south of the Project Area. The Arthursleigh property is owned by the University of Sydney (UoS).

Spark Renewables is also looking to develop the Wattle Creek Solar Farm project in the Project Area.

The Wattle Creek BESS Project and the separate Wattle Creek Solar Farm Project are being progressed through separate NSW State Significant Development (SSD) approval pathway applications, SSD-63345458 and SSD-63344210, respectively. Accordingly, separate Biodiversity Development Assessment Reports (BDARs) have been prepared to assess the biodiversity impacts of the Solar Farm and BESS. This Matters of National Environmental Significance (MNES) Assessment report forms part of the BESS BDAR and relates to the BESS component only.

The Wattle Creek BESS (Proposed Action (also referred to as the Project)) comprises a large-scale Battery Energy Storage System (BESS) supported by Ancillary Infrastructure. The BESS will have a storage capacity of up to 350 MW and will include approximately 415 lithium-iron phosphate battery containers, each with a capacity of approximately 3.85 MWh. The BESS will be equipped with 248 inverters rated at 4,200 kVA, paired with medium voltage transformers, and will be integrated into the on-site substation with three 300 MVA high voltage transformers. An overview of the Proposed ACTION is provided in **Section 2.0** of this report.

1.1.1 Proponent Details

The Proponent proposing to take the Proposed Action, is Spark Renewables.

Spark Renewables is one of Australia's leading developers and long-term owners of renewable energy generation assets. Founded in 2018, the company was established as the renewables arm for the Spark Infrastructure Group, a A$5 billion company with investments in leading energy infrastructure across Australia. Since September 2023, Spark Renewables has been owned by Tenaga Nasional Berhad (TNB), the largest listed energy utility company in Southeast Asia, with a market capitalisation of A$26 billion.

Spark Renewables has grown rapidly and employs an experienced team of 30 people, with over 250 years of experience in end-to-end development, construction and operations of wind, solar and BESS projects between them. The company retains industry experts across the key areas of engineering, development, consenting, financing, construction and commissioning, with the team having cumulatively worked on over 36 GW of capacity globally.

The company specialises in southwestern NSW, having constructed the 120 MWdc Bomen Solar Farm in Wagga Wagga, which was commissioned in 2020. The company has a development pipeline of highly advanced projects across Australia, exceeding five (5) GW of total generation capacity.

Spark Renewables is committed to supporting the communities in which they operate and committed to reconciliation. During construction, they focus on providing employment opportunities for local residents as much as possible. Spark Renewables give back to the local community by establishing community funds that seek to provide a long-term benefit to the community. Spark Renewables are committed to proactive engagement with key stakeholder as part of meeting the environment and planning requirements of their projects.

The Proposed Action will be undertaken by the Wattle Creek Energy Hub Pty Ltd as trustee for the Wattle Creek Energy Hub Trust. Spark Renewables are the project developers.

The title of the Proposed Action and details of the Proponent are provided in **Table 1.1.**

Table 1.1 General Information on the Action and Proponent

Requirement	Details
Proposed Action	
Title of the Action	Wattle Creek Energy Hub BESS Project
Street address (Location of the Action)	1001 Canyonleigh Road Brayton NSW 2579
Proponent	
Full name of the Designated Proponent	Spark Renewables Pty Limited (Spark Renewables)
Postal address of the Designated Proponent	Level 4, 1A Rialto Lane, Manly, NSW 2095
ABN	90 632 860 023
Nominated Contact	Daniel Leahy, Senior Development Manager
Trust	
Trust	Wattle Creek Energy Hub Pty Ltd
ACN	664 148 958

1.1.2 Environmental Record of the Proponent

Spark Renewables has a satisfactory record of responsible environmental management and do not have any prior proceedings under a Commonwealth, State or Territory law relating to the protection of the environment or the conservation and sustainable use of resources against them.

Spark Renewables is committed to responsible environmental management. This has been demonstrated through the construction and operation of their Bomen Solar Farm in NSW for which no environmental enforcements have occurred since approval was received in 2018.

Spark Renewables have demonstrated a commitment to sharing the benefits of their projects with the local community. They have established one of Australia's largest solar farm community funds at Bomen Solar Farm. This is a $1 million fund set up in conjunction with Westpac, who purchase electricity from the Project. Spark Renewables have also established agricultural partnerships to co-locate activities such as sheep-grazing and beekeeping at the Bomen Solar Farm and have a strong ongoing commitment to the community.

Spark Renewables does not have a specific environmental policy or planning framework for the Proposed Action. Spark Renewables will comply with all relevant environmental guidelines and legislation in the development of the Proposed Action and seek to deliver benefits to the community and environment by responsibly designing their projects and mitigating impacts via management plans.

Spark Renewables is currently developing its Health and Safety and environmental management policies following its acquisition by TNB. Wattle Creek Energy Hub (and all other projects in their portfolio) will be developed, constructed, and operated in compliance with all relevant health and safety and environmental management legislation.

1.2 Approval Pathway

1.2.1 NSW Approval Pathway

The NSW *Environmental Planning and Assessment Act 1979* (EP&A Act) is the primary instrument which regulates the environmental impact assessment and approval process for development in NSW. The relevant assessment pathway for a development is determined by environmental planning instruments such as local environmental plans and State Environmental Planning Policies (SEPPs).

State Environmental Planning Policy (Planning Systems) 2021 (SEPP Planning Systems) declares certain developments to be SSD. Planning SEPP, Schedule 1, clause 20(a) prescribes that development for the purpose of electricity generating works that has an estimated development cost of more than $30 million is SSD. As the proposed Wattle Creek BESS will generate electricity and has an estimated development cost of more than $30 million, it meets these criteria and is therefore SSD.

As an SSD, the Proposed Action is subject to the general assessment requirements under Part 4 of the EP&A Act and approval is being sought from NSW Department of Planning, Housing and Infrastructure (DPHI).

A Scoping Report was prepared by Umwelt on behalf of Spark Renewables and was submitted to the NSW Department of Planning and Environment (DPE) (now DPHI) in September 2022 (Application Number: SSD-63345458).

Umwelt has been engaged by Spark Renewables to prepare the BDAR (Umwelt 2025a) and Environmental Impact Statement (EIS) for the Proposed Action (Umwelt 2025b).

1.2.2 NSW and Commonwealth Bilateral Agreement

The Project was referred under Part 7 of the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) to the Commonwealth Department of Climate Change, Energy, the Environment and Water (Commonwealth DCCEEW). Commonwealth DCCEEW determined that the Proposed Action is a controlled action and requires assessment and approval under the EPBC Act (EPBC Number: 2024/09970).

The controlled action determination identified that the Proposed Action has the potential to impact on MNES, specifically:

- Listed threatened species and communities.

The determination identified that the Proposed Action will be assessed under the bilateral agreement with NSW. Supplementary Secretary's Environmental Assessment Requirements (SEARs) were issued by NSW DPHI for the Proposed Action to support the controlled action determination (EPBC 2023/09970 determined on 26 November 2024).

The Bilateral Agreement was made under Section 45 of the EPBC Act and allows a single environmental assessment process to be jointly implemented by the Commonwealth DCCEEW and NSW DPHI. When the assessment process for a project is complete, DPHI provides a report to Commonwealth DCCEEW assessing the potential impacts on MNES listed under the EPBC Act.

This MNES Assessment will be used by the DPHI to prepare its assessment report of the Proposed Action for Commonwealth DCCEEW review.

DPHI and Commonwealth DCCEEW will make separate approval decisions under the EP&A Act and EPBC Act, respectively.

An Amending Agreement between Commonwealth DCCEEW and DPHI was entered into on 24 March 2020, which endorses the NSW Biodiversity Offset Scheme (BOS) including the:

- NSW Biodiversity Assessment Method (BAM) for assessing impacts on MNES under the EPBC Act
- Biodiversity credit system
- Offset rules set out in the Biodiversity Conservation Regulation 2017.

Like-for-like offsets are required under the EPBC Act for any residual significant adverse impacts on listed threatened species and communities under the EPBC Act.

1.3 Report Requirements

Potential impacts of the Proposed Action have been assessed for threatened ecological communities (TECs), threatened species and migratory species that are known or likely to occur in the Development Footprint against the significant impact criteria.

This MNES assessment includes the following key information:

- Summary of the Proposed Action.

- Description of the Biodiversity Study Area and Development Footprint.
- Assessment of potential impacts on MNES.
- Confirmation that all MNES (that have the potential to be impacted by the Proposed Action) have been addressed in the EIS.
- Summary of consultation undertaken to date, and consultation activities planned, as part of the EIS.
- Measures to avoid and minimise impacts and any proposed alternatives.
- Offsetting requirements.
- Administrative details of the proponent.

1.3.1 Controlling Provisions

The determination for the Proposed Action (EPBC 2024/09970) identified that, based on the information in the EPBC Act Referral for the Proposed Action, the controlling provisions of the controlled action are listed threatened species and ecological communities.

1.3.2 Listed Threatened Species, Ecological Communities and Migratory Species

1.3.2.1 Likely significant impacts on MNES

The supplementary SEARs issued by DPHI identified that, based on the information in the EPBC Act Referral for the Proposed Action, the Proposed Action is likely to have significant impacts on the following MNES entities:

- Gang-gang Cockatoo (*Callocephalon fimbriatum*).
- Critically Endangered or Endangered Ecological Communities: One critically CEEC listed under the EBPC Act, White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland
- Diamond Firetail (*Stagonopleura guttata*)

1.3.3 Potential Impact on MNES

The determination considers that other threatened species 'known' or 'likely' to occur for which suitable habitat may be present, may be significantly impacted include:

- Swift Parrot (*Lathamus discolor*) – Critically Endangered
- Regent Honeyeater (*Anthochaera phrygia*) – Critically Endangered
- South-eastern Hooded Robin (*Melanodryas cucullata cucullata*) – Endangered
- Greater Glider (southern and central) (*Petauroides volans*) – Endangered
- Koala (combined populations of Queensland, New South Wales and the Australian Capital Territory) (*Phascolarctos cinereus*) – Endangered

- Large-eared Pied Bat (*Chalinolobus dwyeri*) – Endangered
- Key's Matchstick Grasshopper (*Keyacris scurra*) – Endangered
- Brown Treecreeper (south-eastern) (*Climacteris picumnus victoriae*) – Vulnerable
- Painted Honeyeater (*Grantiella picta*) – Vulnerable
- Yellow-bellied Glider (south-eastern) (*Petaurus australis australis*) – Vulnerable
- Pink-tailed Worm-lizard (*Aprasia parapulchella*) – Vulnerable.

Further assessment is provided in this report to demonstrate if the communities and species are present in the Development Footprint and if so the extent to which they may be impacted.

1.3.4 MNES Assessment Requirements under the NSW Bilateral Agreement

The biodiversity requirements for MNES are set out in the Supplementary SEARs as replicated in **Table 1.2**, including cross-references to the relevant section of this report where each requirement is addressed.

Table 1.2 Supplementary SEARs Requirements

Key Issue	Supplementary SEARs Requirement	MNES Report Reference (Appendix A)
Introduction	3. The proponent must undertake an assessment of all protected matters that may be impacted by the development under the controlling provision identified in paragraph 1 (i.e. listed threatened species and communities (sections 18 and 18A). The Commonwealth Department of Climate Change, Energy, the Environment and Water (DCCEEW) considers that the proposed action is likely to have a significant impact on threatened species and communities listed in Appendix A	Whole Document
	The DCCEEW considers that there is likely to be a significant impact on the following MNES	
	• White Box-Yellow Box-Blakeley's Red Gum Grassy Woodland and Derived Native Grassland	Section 2.1 of **Appendix 3**
	• Gang-gang Cockatoo (*Callocephalon fimbratum*) – Endangered	Section 3.1 of **Appendix 3**
	• Diamond Firetail (*Stagonopleura guttata*) – Vulnerable	Section 4.6 of **Appendix 3**
	4.The proponent must consider each of the protected matters under the triggered controlling provisions that may be impacted by the action. Note that this may not be a complete list and it is the responsibility of the proponent to undertake an analysis of the relevant impacts and ensure all protected matters that are likely to be impacted are assessed for the Commonwealth Minister's consideration	Whole Document
	The DCCEEW considers that there is some risk that there may be significant impacts on the following listed threatened species and communities and levels of impact should be further investigated:	
	• Swift Parrot (*Lathamus discolor*) – Critically Endangered	Section 3.7 of **Appendix 3**
	• Regent Honeyeater (*Anthochaera phrygia*) – Critically Endangered	Section 3.8 of **Appendix 3**
	• South-eastern Hooded Robin (*Melanodryas cucullata cucullata*) – Endangered	Section 3.4 of **Appendix 3**
	• Greater Glider (southern and central) (*Petauroides volans*) – Endangered	Section 3.5 of **Appendix 3**
	• Koala (combined populations of Queensland, New South Wales and the Australian Capital Territory) (*Phascolarctos cinereus*) – Endangered	Section 3.6 of **Appendix 3**
	• Large-eared Pied Bat (*Chalinolobus dwyeri*) – Endangered	Section 3.2 of **Appendix 3**
	• Key's Matchstick Grasshopper (*Keyacris scurra*) – Endangered	Section 3.9 of **Appendix 3**
	• Brown Treecreeper (south-eastern) (*Climacteris picumnus victoriae*) – Vulnerable	Section 4.2 of **Appendix 3**

Key Issue	Supplementary SEARs Requirement	MNES Report Reference (Appendix A)
	• Painted Honeyeater (*Grantiella picta*) – Vulnerable	Section 4.4 of **Appendix 3**
	• Yellow-bellied Glider (south-eastern) (*Petaurus australis australis*) – Vulnerable	Section 4.5 of **Appendix 3**
	• Pink-tailed Worm-lizard (*Aprasia parapulchella*) – Vulnerable	Section 4.8 of **Appendix 3**
General Requirements *Relevant Regulations*	5. The Environmental Impact Statement (EIS) must address all matters outlined in Schedule 4 of the EPBC Regulations and all matters outlined below in relation to the controlling provisions	Whole document
General Requirements ***Project Description***	6. The title of the action, background to the action and current status	**Section 1.1**
	7. The precise location and description of all works to be undertaken (including associated offsite works and infrastructure), structures to be built or elements of the action that may have impacts on MNES	**Section 2.2** **Section 2.3**
	8. How the action relates to any other actions that have been, or are being taken in the region affected by the action	**Section 2.8**
	9. How the works are to be undertaken and design parameters for those aspects of the structures or elements of the action that may have relevant impacts on MNES	**Section 5.0** **Section 5.1**
General Requirements *Impacts*	10. The EIS must include an assessment of the relevant impacts of the action on the matters protected by the controlling provisions, including: i. a description and detailed assessment of the nature and extent of the likely direct, indirect and consequential impacts, including short term and long term relevant impacts; ii. a statement whether any relevant impacts are likely to be unknown, unpredictable or irreversible; iii. analysis of the significance of the relevant impacts; and iv. any technical data and other information used or needed to make a detailed assessment of the relevant impacts	**Section 6.0**
General Requirements	11. For each of the relevant matters protected that are likely to be significantly impacted by the action, the EIS must provide information on proposed avoidance and mitigation measures to manage the relevant impacts of the action including: i. a description, and an assessment of the expected or predicted effectiveness of the mitigation measures; ii. any statutory policy basis for the mitigation measures;	**Section 5.0**

Key Issue	Supplementary SEARs Requirement	MNES Report Reference (Appendix A)
Avoidance, mitigation and offsetting	iii. the cost of the mitigation measures; iv. an outline of an environmental management plan that sets out the framework for continuing management, mitigation and monitoring programs for the relevant impacts of the action, including any provisions for independent environmental auditing; v. the name of the agency responsible for endorsing or approving each mitigation measure or monitoring program	
	12. Where a significant residual adverse impact to a relevant protected matter is considered likely, the EIS must provide information on the proposed offset strategy, including discussion of the conservation benefit associated with the proposed offset strategy	**Section 7.0**
	13. For each of the relevant matters likely to be impacted by the action the EIS must provide reference to, and consideration of, relevant Commonwealth guidelines and policy statements including any: i. conservation advice or recovery plan for the species or community; ii. relevant threat abatement plan for the species or community; iii. wildlife conservation plan for the species; and iv. any strategic assessment	**Section 3.1 and Appendix 3**
	14. In addition to the general requirements described above, specific information is required with respect to each of the determined controlling provisions. These requirements are outlined in paragraphs 15-17	Provided below for 15–17
Biodiversity (threatened species and communities)	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	**Section 6.2 and Appendix 3**
Assessment Requirements	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;	**Provided for each species in Appendix 3**

Key Issue	Supplementary SEARs Requirement	MNES Report Reference (Appendix A)
	iii. description of the relevant impacts of the action having regard to the full national extent of the species or community's range; 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 tooffset 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	**Section 7.0**
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	**Section 1.2**
Environmental Record	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	**Section 1.1.2**
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	**Section 8.0**

2.0 Proposed Action Overview

This overview summarises the requirements of Schedule 4 of the Environment Protection and Biodiversity Conservation Regulations 2000 (EPBC Regulations), Clause 1 general information on the Proposed Action and Clause 2 description of the Proposed Action. Where appropriate cross references have been provided to supporting information in the EIS prepared by Umwelt (2025b) for the Proposed Action.

2.1 Objectives of the Proposed Action

The objectives of the Proposed Action are to:

- Contribute to and support the National Energy Market (NEM) by providing renewable energy generation and storage capacity and improving the security, stability, and resilience of the NEM.
- Facilitate the shift away from coal-fired power generation, supporting Australia's transition towards clean and renewable sources of energy (with a capacity of up to 265 MW and potential to power approximately 190,000 NSW households per year).
- Establish a strong network of positive and long-term relationships within the local community and contribute to economic and social growth with a community fund and a neighbour benefit fund that meets the unique needs of the wider community, and delivers long-lasting social, economic, and environmental benefits for decades to come.
- Provide energy storage for sustainable renewable energy to enable continuous and reliable electricity output as part of a rapidly expanding industry in NSW.
- Make efficient use of existing transmission electrical infrastructure, notably the capacity of Marulan substation to support to new connections.
- Provide direct and indirect financial benefits to the regional and local community, including employment generation creating approximately 100 jobs during the construction phase and approximately 5 jobs during the operational phase.
- Flow on economic benefits to local services through the construction and operation phases.
- Economic empowerment of First Nations people from implementation of an Aboriginal participation Plan that will be developed following the NSW Electricity Infrastructure Roadmap First Nations Guidelines (NSW Government Office of Energy and Climate Change (OECC), 2022).
- Enabling continued research on new and emerging technologies in partnership with UoS, through the establishment of a dedicated onsite testbed facility.

The Proposed Action aligns with the current strategic direction of the NSW and Australian energy generation market and assists in achieving the planned transition to an increased contribution of renewable energy to meet Australia's energy needs.

2.2 Proposed Action Location and Context

The Project is located approximately 80 km west of Wollongong and 15 km north of Marulan within the Upper Lachlan Shire Council LGA and Goulburn Mulwaree Council LGA (refer to **Figure 2.1**). The Project Area is in a rural setting. The township of Big Hill (population 78) is directly north-west of the Project Area and the township of Marulan is the nearest population centre (population 819) to the Project Area.

The boundary of the Project Area and Development Footprint are shown on the Site Map provided as **Figure 2.1** and the Location Map, provided as **Figure 2.2.**

The Project Area covers approximately 6,274.04 hectares (ha), with the Development Footprint covering 75.70 ha. The Project Area encompasses the property known as Arthursleigh and the length of Canyonleigh Road between the Project Area access point and the Canyonleigh Road/Brayton Road intersection. The Arthursleigh property is bound to the south by the Wollondilly River and Canyonleigh Road, to the east by the Wollondilly River, to the north by Deadmans Creek, and to the west by private property (refer to **Figure 2.1**). The Hume Highway is located about 11 km to the south of the Project Area.

The Project Area is located directly north of the existing Transgrid Marulan 330/132 kV Switchyard and the approved (but not constructed) Marulan Gas-Fired Power Station. Marulan Gas Fired Power Station is located on land adjacent to the Project Area and does not form a part of the Project.

Tarlo River National Park is located approximately four kilometres to the west of the Project Area with Kerrawary Nature Reserve located approximately seven kilometres to the north of the Project Area (refer to **Figure 2.1**).

The topography across the Project Area includes valley floor, hillslopes, and ridges. The elevation ranges from between 520 m to 720 meters (m) Australian Height Datum (AHD). The topography of the Development Footprint ranges from 580 m to 676 m AHD.

The Project Area is dissected by a number of waterways including Deadmans Creek, Wattle Creek and Sandy Creek in the north, Island Creek in the centre, and the Wollondilly River in the south (refer to **Figure 2.1**).

The vegetation within the Project Area comprises a mosaic of exotic dominated pasture vegetation where pasture improvement has taken place, derived native grasslands subject to various degrees of disturbance, isolated paddock trees, areas of thinned trees and intact woodland and forest around the periphery of the Project Area.

The Project Area encompasses:

- Privately-owned property (Arthursleigh property), Lot 3 DP 1120270 bequeathed to the UoS in 1979 that is primarily used for agricultural purposes as a working farm. However, it is also used for education and research by the Faculties of Science (Agriculture and Veterinary Science Schools) and Engineering (Aviation and Robotics). There are two dwellings within the Project Area being a permanently residence of the on-site farm manager and a dwelling infrequently used as temporary accommodation by research staff and students of the University.
- Freehold property Lot 2341 DP 622834.

- Existing crossing over the Wollondilly River a crown land waterway.

The Project Area is zoned RU2 Rural Landscape under the Upper Lachlan Shire Council Local Environment Plan (LEP) 2011. Most of the land that surrounds the Project Area is also zoned RU2 Rural Landscape, except for the land immediately east which is zoned RU1 Primary Production.

The following terms are used in this report and the BDAR (Umwelt 2025a) and are shown in **Figure 2.1**:

- The Project Area is the maximum spatial extent of the Project defined by all current land access available to Spark Renewables. It includes the entire Arthursleigh property and encompasses all aspects of the Project including portions of the Transgrid owned Marulan substation. The Project Area also includes that section of Canyonleigh Road between the Project Area access point and the Canyonleigh Road/Brayton Road intersection.

- The 'Biodiversity Survey Area' is used to describe the area included in the detailed biodiversity surveys and includes avoidance areas from previous iterations of the Development Footprint boundary, including the Project Area for the Wattle Creek Solar Farm Project and a wind farm component that is no longer proposed.

- The Development Footprint is the area of land that is directly impacted by the proposed development. The Development Footprint is equivalent to the total area of impact and identified within the EIS inside the Project Area.

2.3 Key Features of the Proposed Action

The BESS Project will have a storage capacity of up to 350 MW and will include approximately 415 lithium-iron phosphate battery containers, each with a capacity of approximately 3.85 MWh. The BESS will be equipped with 248 inverters rated at 4,200 kVA, paired with medium voltage transformers, and will be integrated into the on-site substation with three 300 MVA high voltage transformers. The key components of the Proposed Action include:

- Batteries – most likely a lithium-ion technology.

- Inverters – bi-directional inverters to convert DC current to AC current (when exporting electricity) and vice versa (when importing electricity).

- Transformers – skid-mounted transformers will be installed adjacent to each inverter to step up the voltage to the internal reticulation voltage of the plant.

- Substation and transmission connection – on-site collector substation and overhead powerlines to connect the Project to the electricity transmission network via Marulan Substation.

- A substation communication mast of up to 80 metres (m) in height is also included at the substation location.

- Electrical connections – a combination of underground cables and overhead powerlines connecting BESS facility to the on-site collector substation.

- Operations and maintenance (O&M) facility – including control rooms, O&M buildings, amenities, equipment sheds, storage, a hardstand and bench, and parking areas.

- Other associated permanent infrastructure including hardstands, fencing, static water tanks or ancillary fire-fighting equipment.
- Site access points, Internal access tracks and targeted external road network upgrades are proposed to facilitate delivery of solar farm components to the Project Area as required including:
    - The existing primary access point off Canyonleigh Road will be subject to minor upgrade works and will include site entrance signage
    - All internal access tracks will be constructed to provide all weather access for servicing and maintaining Project infrastructure, as well as access and egress during emergencies
    - Access to the Project Area via heavy vehicle will be via Red Hills Road, Ambrose Road, Brayton Road and Canyonleigh Road. Arthursleigh Road to the east of the Project Area will not be used during construction, except in the event the access route via Canyonleigh Road is not possible (i.e. in the event of flood or fire etc)
    - Canyonleigh Road between the entrance to the Project Area and the Brayton Road/Canyonleigh Road intersection will be resurfaced as required prior to the Project construction phase
    - Minor works will also be undertaken at the Brayton Road / Canyonleigh Road intersection to incorporate a basic right (BAR) turn treatment on the southern Brayton Road approach to the current configuration of the intersection. The proposed works will utilise the existing width provided by the wide shoulder on the western side of the southern Brayton Road approach to the intersection and detailed design will be subject to further consultation with Council.
- Temporary construction infrastructure – to facilitate construction and likely to include laydown and storage areas and site offices.
- Security fencing – to prevent unauthorised access to the Project and guard high voltage or dangerous equipment.
- Two transmission line options are being investigated, to allow for optionality during the assessment process and greater flexibility in the connection design. Only one transmission option will be constructed. The two options are being assessed separately.
- Temporary construction facilities including:
    - Construction compound/s with site office building(s)
    - On-site concrete batching plants for use during the construction phase
    - Potential construction material areas such as borrow pits, quarry and rock crushing facilities
    - Laydown areas used for installation and storage of BESS components.

The Project would operate continuously, with a mix of remote and onsite monitoring and maintenance activities.

The Project is expected to operate for 35 years. After the initial operating period, the Project would either be decommissioned, removing all infrastructure, and returning the Project Area to pre-existing land use as far as practicable unless otherwise agreed with landowners and regulators.

Decommissioning would involve the mobilisation of a workforce and additional temporary facilities, and the subsequent removal of equipment and infrastructure. All infrastructure will be removed during decommissioning except for the transmission lines and substation unless stated otherwise in the development consent conditions. The decommissioning phase would be expected to last 12 months.

A summary of the components is provided in **Table 2.1.**

Table 2.1 BESS Project Components

Components/ Infrastructure	Approximate dimensions	Quantity
BESS		
Footprint	Approximately 13.4 ha	-
Capacity	350 MW (AC or DC coupled) and will have provision for up to four (4) hours of storage (1,400 MWh)	
Switching Site Substation	Area of 6 ha Voltage step up of 33 kV electricity to 132 kV or 330 kV	-
Ancillary Infrastructure		
Collector (on-site) substation	6 ha	1
Inverters	4,200 MVA inverters (subject to tender)	85
Overhead transmission lines (high to low voltage)	Up to 7 km of internal overhead cables	2 options
Underground transmission cables (medium to low voltage)	Approximately 5 km	n/a
Internal access tracks	Approximately 5 km (subject to detailed design)	n/a
Primary site access point	Canyonleigh Road – subject to intersection design	1
Operations and maintenance facility	100 m x 80 m	1
Communication mast	Up to 80 m high	1
Research Test Bed Facility	2 ha	1
Temporary Construction Facilities		
Construction site compounds, including: construction laydown areas for equipment and supplies concrete batching plants construction compounds, site office, security compound, vehicle washdown, etc	100 m x 100 m	up to 3

2.4 Development Footprint

Within the Project Area, a Development Footprint has been determined which includes all Proposed Action elements and temporary Development Footprints. The Development Footprint includes the BESS footprint, the ancillary features footprint and both the two proposed transmission line footprints is approximately 75.70 ha and has been established in consideration of environmental, social and engineering constraints in the immediate vicinity of the Proposed Action, including:

- Biodiversity impacts including threatened ecological communities (TECs) and areas of remnant woodland vegetation
- Heritage sites
- Waterways
- Potential visual impacts
- Slope and constructability constraints
- Landholder's ongoing usage requirements.

The extent of the Development Footprint is shown in **Figure 2.2**.

2.5 Proposed Timeframes

It is anticipated that construction will commence within one year of Proposed Action approval i.e. construction commencing in late 2026 or early 2027. The timing of construction will be driven by additional permits and authorisations, contractor selection, detailed design and procurement processes, and a final investment decision. The construction phase of the Proposed Action is anticipated to be 18 months.

In summary the anticipated timeframes for the Proposed Action are:

- Planning and approvals (prior to commencement of construction): in progress and aiming to be completed in 2025.
- Construction and commissioning are expected to be completed over approximately 18 months.
- Operation of the Proposed Action is expected to be continuous for 35 years.

2.6 Design Refinements

The following design considerations have been factored into the selection of the Project Area:

- The Project Area was selected for the location of a BESS due to the proximity of the Marulan substation and existing 132 kV and 320 kV transmission lines, which means that there will be no requirement for large scale electricity transmission line or associated impacts.
- The Project Area (6,274.04 ha) has provided flexibility in design to prioritise avoidance of high value biodiversity areas and the land has been already impacted by widespread clearing and ongoing pasture improvement works for agricultural use.
- Throughout the EIS preparation and scoping phases of the Proposed Action several design refinements have occurred including:
    - Development Footprint alterations have resulted in biodiversity impact avoidance through an initial avoidance of approximately 95.88 % (reducing from 1,838.09 ha to 75.70 ha) of the Project Area
    - Optimising opportunities to maintain connectivity between the Project Area and surrounding areas of intact native vegetation

- Redesign of the Proposed Action to minimise impacts on areas of intact native woodland and hollow-bearing trees which reduced impacts to suitable foraging and/or breeding habitat for the gang-gang cockatoo (*Callocephalon fimbriatum*), glossy black cockatoo (*Calyptorhynchus lathami*), squirrel glider (*Petaurus norfolcensis*), diamond firetail (*Stagonopleura guttata*), dusky woodswallow (*Artamus cyanopterus*), scarlet robin (*Petroica boodang*), speckled warbler (*Chthonicola sagittata*), swift parrot (*Lathamus discolor*), regent honeyeater (*Anthochaera phrygia*) spotted harrier (*Circus assimilis*) and varied sittella (*Daphoenositta chrysoptera*)
- Alteration of the Proposed Action to avoid impact to individuals of Paddy's River box (*Eucalyptus macarthurii*) and narrow-leaved black peppermint (*Eucalyptus nicholii*)
- Reduction of the Development Footprint to avoid impacts to areas of Plant Community Type (PCT) 3373 Goulburn Tableland Box-Gum Grassy Forest (which is associated with White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland which is listed as a CEEC under the BC Act and EPBC Act)
- Reduction of the Development Footprint to avoid impacts to areas of PCT 3643 Bungonia Tableland Silvertop Ash-Stringybark Forest which comprises good condition native vegetation
- Reduction and alteration of the Development Footprint to minimise impacts to areas of the White Box - Yellow Box - Blakely's Red Gum Grassy Woodland and Derived Native Grassland CEEC. This included impact avoidance measures targeted at retaining areas of woodland with intact crown condition, areas of scattered trees and higher quality derived native grassland condition zones
- Reduction of the Project Area to avoid riparian areas and dams with emergent vegetation that may provide habitat for threatened species.

2.7 Current Status

As part of the application for SSD approval, an EIS has been prepared in accordance with the SEARs and supplementary SEARs issued for the Proposed Action. The EIS will be lodged with DPHI in March 2025.

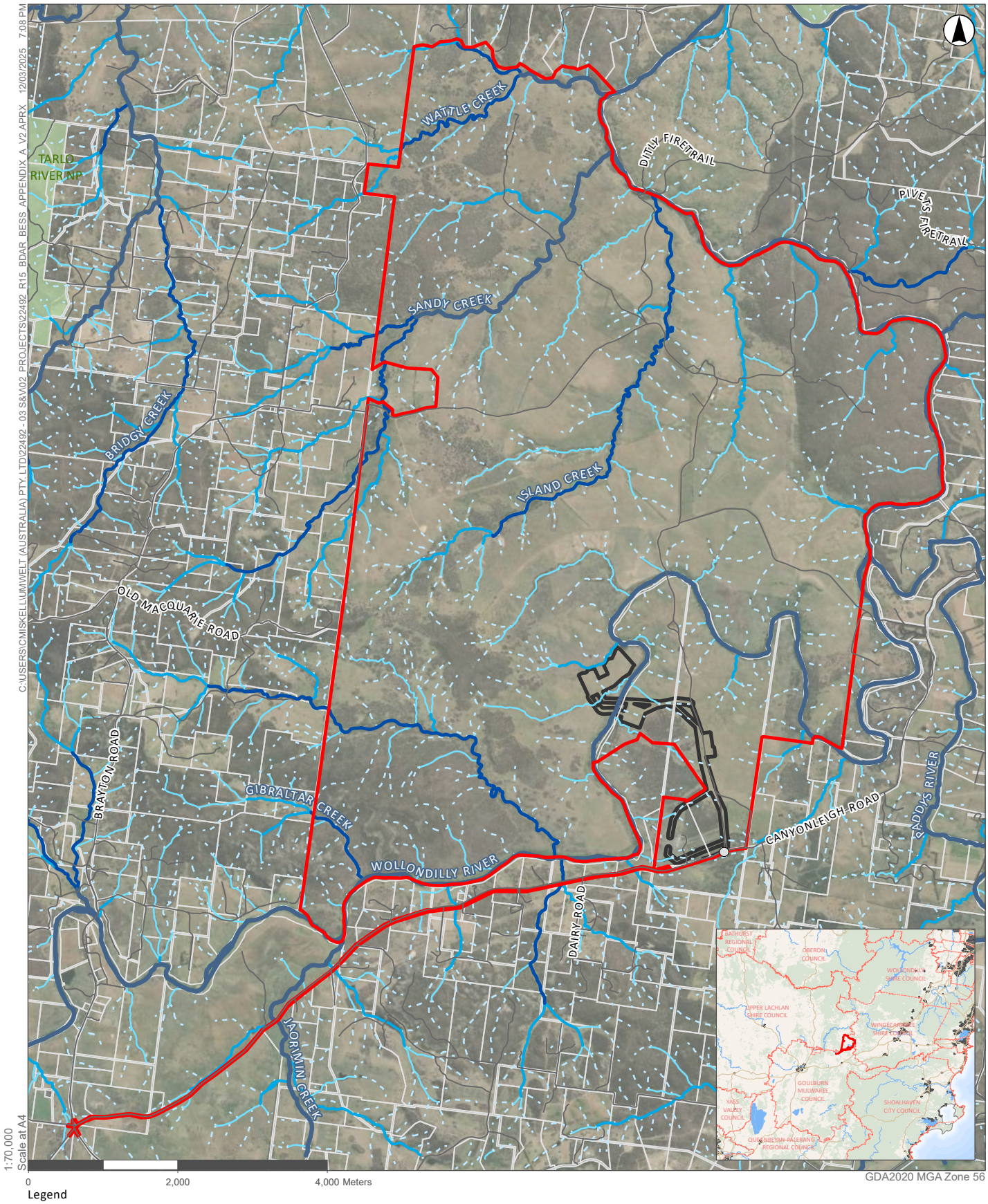
2.8 Related Actions

Related developments, as outlined in the NSW Government *State Significant Development Guidelines* (DPHI 2024), refers to any existing or approved developments that would be incorporated into, or operated in conjunction with the Proposed Action. Related developments can also include developments by the Proponent that are subject to a separate development approval process. For the purposes of the EPBC Act, Schedule 4 of the Environment Protection and Biodiversity Conservation Regulations 2000 state that related actions *include any actions (of which the proponent should reasonably be aware) that have been, or are being, taken or that have been approved in the region affected by the action*.

New and nearby renewable energy projects that have commenced a formal NSW planning application, that are located within 40 km of the Project Area and are large enough to be considered in the assessment of cumulative impacts for the Proposed Action have been assessed in the cumulative impact assessment, refer to Table 8.12 of the BDAR (Umwelt 2025a). These include Wattle Creek Solar Farm, Marulan Gas Fired Power Station, Berrima Coal Mine, Lynnwood Quarry, Marulan South Limestone Mine Continued Operations Project, Peppertree Quarry, Marulan Quarry, Hume Link, Marulan Solar Farm, Taralga Wind Farm, Gundary Solar Farm, Merino Solar Farm, Crookwell Wind Farm, Shoalhaven Hydro-Scheme.

The proposed Wattle Creek BESS Project, located within the Project Area is being progressed through a separate NSW SSD approval pathway application (SSD 63344210) and has been determined as a controlled action by Commonwealth DCCEEW (EPBC 2024/09970). Accordingly, a separate BDAR and MNES assessment have been prepared to assess the biodiversity impacts of the Solar Farm Project (Umwelt 2025c).

Consideration of potential cumulative impacts of the Proposed Action and the above related actions is provided in Table 8.12 of the BDAR (Umwelt 2025a).



Legend

- Project Area
- Development Footprint
- NSW National Parks
- Existing Roads and Tracks
- Property Boundaries
- Access Points

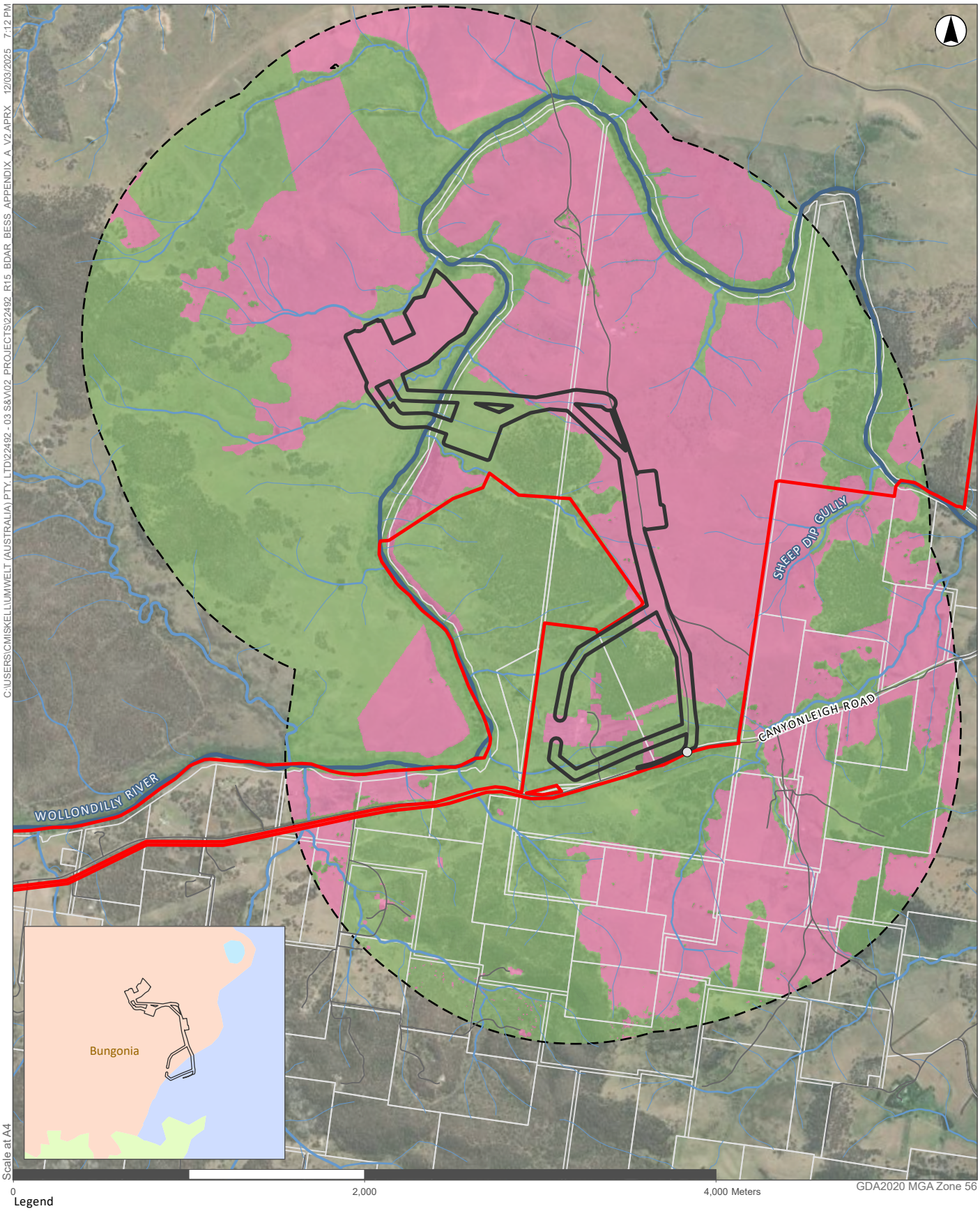
Stream Order

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

FIGURE 2.1

Site Map

Image Source: ESRI Basemap (2024) **Data source:** NSW LPI (2024), NSW DSFI (2024)



Legend

- Project Area
- Development Footprint
- 1500m Buffer Area (Total extent = 2112.39ha)
- Property Boundaries
- Existing Roads and Tracks
- Access Points

Stream Order

- 1
- 2
- 3
- 4
- > 5

- Native Vegetation Extent (1161.61ha, 54.99% of Assessment Area)
- Non-Native/Category 1- Exempt land (950.78ha, 45.01% of Assessment Area)

Mitchell Landscapes

- But
- Mvh
- Rbb
- Wbg

FIGURE 2.2

Location Map

Image Source: ESRI Basemap (2024) **Data source:** NSW LPI (2024), NSW DSFI (2024)

3.0 Summary of Methodology

This report has relied upon the findings of the BDAR (Umwelt 2025a). A detailed description of the assessment area, the vegetation survey methodology and threatened species surveys is provided in Sections 2, 3 and 4 of the BDAR (Umwelt 2025a).

3.1 Desktop Literature and Database Review

The following key information sources contain existing ecological information relevant to the Project Area and have been reviewed as part of the preparation of this report. These reports and databases were reviewed to obtain information in relation to PCTs, habitat constraints, microhabitats and previous site records for threatened species in the Project Area.

3.1.1 Datasets

The NSW and Commonwealth datasets reviewed as part of preparation of the BDAR that have informed the MNES assessment are listed in **Table 3.1**.

Table 3.1 Datasets

Resource	Source	Search Parameter
NSW Dataset		
BioNet Vegetation Classification	NSW DCCEEW https://www.environment.nsw.gov.au/topics/animals-and-plants/biodiversity/nsw-bionet	PCT profiles and vegetation data
BioNet Threatened Biodiversity Data Collection (TBDC)	NSW DCCEEW https://www.environment.nsw.gov.au/topics/animals-and-plants/biodiversity/nsw-bionet	Threatened entities
BioNet Atlas	NSW DCCEEW https://www.environment.nsw.gov.au/topics/animals-and-plants/biodiversity/nsw-bionet	10 km buffer around the Development Footprint All valid threatened flora, fauna, ecological community records
Important Area Maps	NSW DCCEEW https://customer.lmbc.nsw.gov.au/assessment/s/userlogin?startURL=%2Fassessment%2Fs%2F	Project Area
Biodiversity Assessment Method Calculator (BAM-C)	NSW DCCEEW https://customer.lmbc.nsw.gov.au/assessment/s/userlogin?startURL=%2Fassessment%2Fs%2F	Development Footprint
Transitional Native Vegetation Regulatory (NVR) Map	NSW DCCEEW https://www.lmbc.nsw.gov.au/Maps/index.html?viewer=NVRMap	Project Area
SEED - The Central Resource for Sharing and Enabling Environmental Data in NSW	NSW DCCEEW https://www.seed.nsw.gov.au/	Project Area

Resource	Source	Search Parameter
NSW WeedWise	DPI https://weeds.dpi.nsw.gov.au/	Project Area
PlantNet - NSW Flora Online	The Royal Botanic Gardens https://plantnet.rbgsyd.nsw.gov.au/	Species descriptors
Register of Declared Areas of Outstanding Biodiversity Value (AOBV)	DPE https://www.environment.nsw.gov.au/topics/animals-and-plants/biodiversity/areas-of-outstanding-biodiversity-value/area-of-outstanding-biodiversity-value-register	Project Area
NSW Department of Primary Industries (DPI) Fisheries NSW Spatial Data Portal	NSW DPI Fisheries https://webmap.industry.nsw.gov.au/Html5Viewer/index.html?viewer=Fisheries_Data_Portal	Project Area
Commonwealth Datasets		
Protected Matters Search Tool (PMST)	Commonwealth DCCEEW https://www.awe.gov.au/environment/epbc/protected-matters-search-tool	10 km buffer around the Development Footprint Refer to Appendix C2.
Register of Critical Habitat	Commonwealth DCCEEW https://www.environment.gov.au/cgi-bin/sprat/public/publicregisterofcriticalhabitat.pl	Project Area
Atlas of Groundwater Dependent Ecosystems (GDEs)	Bureau of Meteorology (BoM) http://www.bom.gov.au/water/groundwater/gde/	Project Area
Climate Data Online	BoM http://www.bom.gov.au/climate/data/?ref=ftr	Survey dates and site location
Directory of Important Wetlands	Commonwealth DCCEEW https://www.awe.gov.au/water/wetlands/australian-wetlands-database/directory-important-wetlands	10 km buffer around the Project Area
National Flying Fox Monitoring Viewer	National Flying Fox Monitoring Viewer DCCEEW https://www.environment.gov.au/webgis-framework/apps/ffc-wide/ffc-wide.jsf	LGA

3.1.2 Survey Guidelines

Table 3.2 lists the NSW and Commonwealth survey guidelines that have been applied to surveys completed within the Biodiversity Study Area. Surveys were conducted in keeping with the NSW BAM and are described in detail in the BDAR (Umwelt 2025a).

Table 3.2 NSW and Commonwealth Survey Guidelines

Resource	Source
NSW Survey Guidelines	
Biodiversity Assessment Method (2020)	NSW DPIE
Biodiversity Assessment Method Calculator User Guide (2024)	NSW DCCEEW
Biodiversity Assessment Method Operational Manual – Stage 1, Stage 2, Stage 3 (2020)	NSW DPIE
Camera Trapping: wildlife management and research (2014)	Meek and Fleming
Flora Species with Specific Survey Requirements List Version 1 (2020)	NSW DPIE
Guidance for the Biodiversity Development Assessment Report Template (2022)	NSW DPE
koala (*Phascolarctos cinereus*) Biodiversity Assessment Method Survey Guide (2022)	NSW DPE
NSW BioNet including the Bionet Atlas, Bionet Vegetation Database and Threatened Species Data Collection (TBCD) (2024)	NSW DCCEEW
NSW Survey Guide for Threatened Frogs, A guide for the survey of threatened frogs and their habitats for the Biodiversity Assessment Method (2020)	NSW DPIE
'Species Credits' threatened bats and their habitats (2021)	NSW DPIE
Survey guidelines for Australia's threatened bats: Guidelines for detecting bats listed as threatened under the EPBC Act (2010)	CoA
Survey guidelines for Australia's threatened birds: Guidelines for detecting birds listed as threatened under the EPBC Act (2010)	CoA
Survey guidelines for Australia's threatened mammals: Guidelines for detecting mammals listed as threatened under the EPBC Act (2010)	CoA
Survey guidelines for Australia's threatened reptiles: Guidelines for detecting reptiles listed as threatened under the EPBC Act.	CoA
Draft survey guidelines for Australia's threatened orchids: Guidelines for detecting orchids listed as threatened under the EPBC Act	CoA
Surveying threatened plants and their habitats: NSW survey guide for the Biodiversity Assessment method (2020)	NSW DPIE
Threatened Biodiversity Survey and Assessment: Guidelines for Developments and Activities (2004)	NSW DEC
Threatened Reptiles Biodiversity Assessment Method Survey Guide (2022)	NSW DPE

3.2 Field Survey

A range of surveys were undertaken within the Biodiversity Study Area targeting relevant threatened species, populations and ecological communities listed under the Commonwealth EPBC Act in keeping with the BAM (NSW DPIE 2020).

Field surveys were carried out by 16 Umwelt ecologists over approximately more than 2,000 person hours spanning 74 days and 20 nights between August 2022 and October 2024.

Survey methods are described in detail in Section 4.1.2 and Section 5.2 of the BDAR (Umwelt 2025a). **Table 3.3** summaries the biodiversity surveys that were undertaken as part of the Proposed Action.

Table 3.3 Biodiversity Surveys Completed as part of the Proposed Action

MNES	Survey Methods	Relevant Section of the BDAR (Umwelt 2025a)

Threatened Ecological Communities	A range of survey methods have been employed to sample TECs, including:
	• 60 floristics plots in keeping with the BAM (NSW DPIE 2020b)
	  ○ 7–11 November 2022
	  ○ 21–25 August 2023
	  ○ 11–12 October 2023
	  ○ 18–19 December 2023
	  ○ 9–10 September 2024.
	• 25 rapid vegetation assessments
	• Meandering transects throughout the Biodiversity Study Area.
		Section 2.2 and Section 4.0

Targeted Fauna Species	A range of surveys methods have been employed to survey for threatened fauna species in keeping with the NSW BAM (NSW DPIE 2020b), the TBDC survey guidelines and species survey guidelines listed in **Table 3.2**, including: • 100 remote cameras trap nights (March–April 2023). • Over 200 diurnal bird surveys targeting woodland birds over eleven survey campaigns between August 2022 and September 2024 (Aug, Oct, Nov 22, Jan, Feb, Aug, Oct 23, Feb, March, Sep 24). Including 126 seasonal vantage point surveys. • Spotlighting across 16 nights in Jan, Aug, Dec 2023 and Feb 24. • Stick nest, hollow-bearing tree and burrow searches Aug 22, Jan, Feb. Aug, Oct 23 and March 24 • Call play-back across 16 nights in Jan, Aug, Dec 2023 and Feb 24. • Bat surveys 128 detection nights. • KSATs undertaken at 1498 trees • Songmeter detection over 140 trap nights in February and October 2023. • striped legless lizard surveys – 10 weeks of tile checking from September to November 2024.	**Section 2.4.4**

MNES	Survey Methods	Relevant Section of the BDAR (Umwelt 2025a)
Threatened Flora Species	Total of 60 person days of survey in spring and summer using the two-phased grid assessment survey method. October 2022, February 2023, October 2023 and February 2024.	**Section 2.3.4**
Migratory Species	A range of surveys methods have been employed to survey for migratory species, including: • Diurnal bird surveys and vantage point surveys as part of bird utilisation surveys.	**Section 2.4.4**

4.0 Existing Environment

4.1 Landscape Context

The landscape context of the Biodiversity Study Area and Development Footprint is summarised in **Table 4.1** based on the findings of the BDAR (Umwelt 2025a) and the PMST.

Table 4.1 Landscape Context

Landscape feature	Application to the Proposed Action
IBRA bioregions and subregions	South Eastern Highlands Interim Biogeographic Regionalisation for Australia (IBRA) Region Bungonia IBRA sub-region
NSW (Mitchell) landscapes	Bungonia Tableland and Gorge (But), Moss Vale Highlands (Mvh), Robertson Basalts (Rbb), and Wollondilly – Bindook Tablelands and Gorges (Wbg) NSW Mitchell Landscapes
Native vegetation cover	The native vegetation cover within the Assessment Area was determined through site surveys of the Development Footprint and aerial photograph interpretation using ArcMap software and the Six Maps imagery base map aerial. The draft NVR maps was also considered while mapping the extent of the native vegetation cover with the Category 1 – Exempt Land excluded from the native vegetation cover. The extent of native vegetation cover within the assessment area is summarised below. • 1,500 m Buffer Assessment Area (ha): 2112.39 ha • Total Area of Native Vegetation Cover (ha): 1161.61 ha • Percentage of Native Vegetation Cover (%): 54.99% • Class (0–10, >10–30, >30–70 or >70%): >30–70
Cleared areas	Large areas of non-native vegetation are located in the northern portions of the Development Footprint. These areas comprise paddocks with improved pastures and/or heavily grazed paddocks. Large areas of the Development Footprint are dominated by monocultures of serrated tussock grass (*Nassella trichotoma*). These areas are described in more detail in the Land Categorisation section of the BDAR (Umwelt 2024). Fourteen BAM VI plots were undertaken in Non-native vegetation to assist with the vegetation mapping and categorisation of the grassland areas. These plots were compared to the Benchmarks of PCT 3374 with the VI scores provided in Table 4.1 of the BDAR.
Rivers, streams and estuaries	The Project Area is located within the Hawkesbury River basin, situated within the localised catchment of the Wollondilly River. A ridgeline through the centre of the Project Area divides the northern region of the Project Area to discharge north, and the southern region of the Project Area to discharge south. Mapped watercourses are well-defined within the Project Area and include Deadmans Creek along the northern Project Area boundary, Wattle Creek located within the north-western region, Sandy Creek and Island Creek which flows north-east from the western boundary through the Project Area. There are a number of other unnamed watercourses and drainage lines, with all watercourses discharging into Wollondilly River, which flows along the eastern and southern Project Area boundary. Water crossings are proposed for the Wollondilly River, Sandy Creek and Island Creek.
Wetlands	The PMST report identified that the Project Area is not within the catchment of any Ramsar listed Wetlands of International Importance.

Landscape feature	Application to the Proposed Action
Connectivity features	The Development Footprint contains agricultural land, comprised of grazed grasslands with patches of canopy trees. Patches of retained forest and woodland vegetation are present typically in areas surrounding watercourses and on steeper or less fertile rocky habitats. The retained native vegetation within the Project Area comprises large patches of native peppermint and stringybark woodland and connects regionally to several other large natural areas managed for conservation including Tarlo River National Park, which is approximately three kilometres west of the Project Area, Kerrawary Nature Reserve, Belanglo State Forest, Bangadilly National Park approximately two, six and ten kilometres to the north and north east, respectively.
Karst, caves, crevices, cliffs, rocks or other geological features	There are no karsts or areas of geological significance within the Development Footprint.
Soils and Landscape	The Project Area features undulating hills, slopes, crests and broad ridges and some narrow lying alluvial gullies and colluvial flats. To the south of the Development Footprint the lowest elevation is approximately 560 m on very gently undulating lower slop/flats associated with Wollondilly River and rises along the western boarder to 660 m. The Project Area has historically been used for agricultural practices such as livestock grazing as well as some cropping and cultivation, with evidence of native vegetation modification due to extensive clearing. The underlaying geology of the region has a general north-west trend, streams tend to either follow the general north-west trend or cut sharply across it. The Project Area lies within the broader region known as the Southern Tablelands within the southern portion of the Lachlan Fold Belt. Ordovician rocks are the oldest and most extensive and are usually tightly folded metasediments. The Project Area also features sandstones, quartzites, rhyolites, tuffs and alluvium.
Areas of outstanding biodiversity value (AOBV)	The Development Footprint and Assessment Area do not contain any Areas of Outstanding Biodiversity Value (AOBV) (formerly critical habitat), as identified under the BC Act.
Important Habitat Mapping	No areas on the Important Habitat Map are located on the Development footprint
Biodiversity Values Mapping	The Development Footprint includes mapped Biodiversity Values areas on the Biodiversity Values Map as shown in Figure 1.4. of the BDAR. Areas identified on the biodiversity values map are associated with the riparian areas in the Project Area.
Additional landscape features identified within the SEARs	There is no specific additional landscape features identified for assessment in the SEARs.

4.2 Native Vegetation

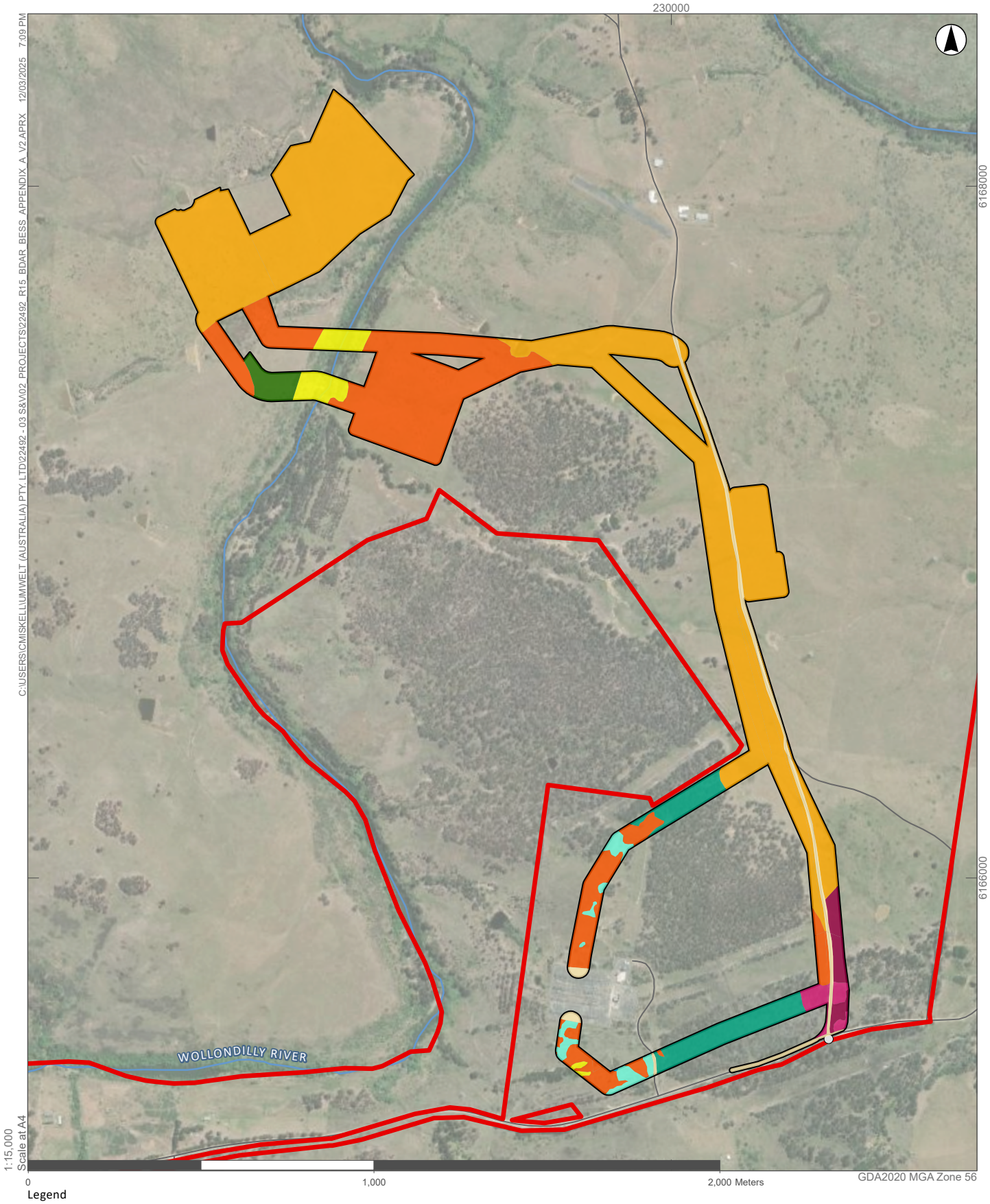
Vegetation within the Biodiversity Study Area has been assessed as aligning with the BioNet Vegetation Classification PCTs identified within **Table 4.2** and their extent is shown in **Figure 4.1**. 28.84 ha of native vegetation (8.36 ha of woodland vegetation and 267.02 ha of native grassland) has been mapped across four PCTs in the Development Footprint.

Detailed descriptions of each PCT are provided in Section 4.3 of the BDAR (Umwelt 2025a).

Table 4.2 Plant Community Types Identified within the Development Footprint

Veg zone ID	PCT ID	PCT Name	Vegetation Class	Vegetation Formation	NSW VIS % Cleared Estimate	Development Footprint Vegetation Conditions Zone	Plots Completed	Area (ha) in BESS	Area (ha) in Common Ancillary Features	Area (ha) in Transmission Line Option 1	Area (ha) in Transmission Line Option 2	Condition Zone Area (ha)	Total PCT Area (ha)
1	4063	Central and Southern Tableland River Oak Forest	Eastern Riverine Forests	Forested Wetlands	67.93	Moderate – Degraded	2	0	1.94	0	0.11	2.05	2.05
2	3374	Goulburn Tableland Peppermint Grassy Forest	Southern Tableland Grassy Woodlands	Grassy Woodlands	80.87	DNG – Moderate/ Degraded	10	0	14.81	2.54	1.90	19.25	68.79
3						DNG – low condition	6	0	1.18	0	0	1.18	
4						DNG – Exotic Dominated	8	13.42	25.64	1.6	2.29	42.94	
5						Moderate - Degraded	8	0	0	0.46	0.84	1.30	
6						Good – Moderate	4	0	0	1.39	2.73	4.12	
7	3376	Southern Tableland Grassy Box Woodland	Southern Tablelands Grassy Woodlands	Grassy Woodlands	92.96	DNG	1	0	1.23	0	0	1.23	2.12
8						Good – Moderate	3	0	0.44	0	0.45	0.89	
9	0	Cleared/ Infrastructure	-	-	-	Non-native	0	0	2.42	0.13	0.18	2.73	2.73
						Total	**60***	**13.42**	**47.66**	**6.12**	**8.50**	**75.70**	**75.70**

* Note: 18 additional plots were undertaken in vegetation zones outside of the development footprint



Legend

- Project Area
- Development Footprint
- Existing Roads and Tracks
- Watercourse
- Access Points

Plant Community Types and Condition Zones

- Cleared/Infrastructure
- Dam

PCT 3374 - Goulburn Tableland Peppermint Grassy Forest

- DNG-Planted/Regen
- DNG-Moderate/Degraded
- DNG - Low Condition
- DNG - exotic dominated
- Good/Moderate
- Moderate/Degraded

PCT 3376 - Southern Tableland Grassy Box Woodland

- DNG
- Good/Moderate
- Moderate/Degraded

PCT 3347 - Southern tableland Creekflat Ribbon Gum Forest

- Moderate/Degraded

PCT 4063 - Central and Southern Tableland River Oak Forest

- Moderate/Degraded

FIGURE 4.1

Plant Community Types and Vegetation Condition Zones

Image Source: ESRI Basemap (2024) **Data source:** NSW LPI (2024), NSW DSFI (2024), Umwelt (2024)

4.3 Habitat Assessment

There are four main habitat features across the Project Area including:

- woodland vegetation
- grassland vegetation
- rocky outcrops and surface rocks
- rivers, streams, farm dams and natural water bodies.

Across the Project Area there are large patches of woodland vegetation and isolated paddock trees that may provide potential habitat for threatened fauna species. The majority of the good condition intact woodland in the Project Area is located outside of the BESS Development Footprint. The eucalypt woodland habitat in the Development Footprint covers 8.36 ha and is predominantly open, with some scattered patches of dense shrub layer occurring throughout.

Small areas of high quality intact woodland vegetation which have not been subject to grazing and disturbance support an intact understorey with high species diversity and potential habitat for threatened fauna and flora species. The majority of the woodland vegetation within the Development Footprint has a degraded understory and is adversely impacted by grazing and previous clearing events, these areas are less likely to provide habitat for threatened flora and fauna species.

The woodland habitats feature a moderate density of hollows and logs of varying diameters, providing potential breeding or refuge habitat for hollow and log dependant threatened species. Woodland habitat is associated with most of the threatened bird and arboreal mammal species known or predicted to occur In the Biodiversity Study Area.

Grassland habitat covers 21.66 ha the Development Footprint and provides habitat for both threatened flora and fauna which are known or predicted to occur on site. The grasslands are generally devoid of logs and have some small areas of rocky outcrops. Threatened birds and bats predicted to occur onsite, may use the grasslands predominantly as foraging grounds for seeds, fruits or invertebrates, or hunting grounds for mammals, smaller birds such as quails, reptiles or amphibians.

Grassland habitat within the Project Area is in varying condition, with evidence of historic grazing and recent cultivation of pastures. The dominant groundcover species within the Biodiversity Survey Area is serrated tussock (*Nassella trichotoma*), a Weed of National Significance (WONS). While serrated tussock provides little nutritional value to native fauna, its dense tussock formations can provide refuge and foraging habitat to small reptiles and mammals. The sheep and cattle provide a disturbance pressure that may reduce the likelihood that large areas of the Biodiversity Survey Area would provide suitable habitat for threatened flora or fauna species. Good condition native grasslands within the Biodiversity Survey Area are more likely provide suitable habitat for small reptiles and flora species to persist.

Rocky outcrops are scattered throughout the Biodiversity Survey Area, existing as exposed bedrock, exfoliated surfaces and crevices and loose surface rock. These habitat features provide refuge for a range of threatened and non-threatened reptile species which rely on these rocky habitats for over-wintering, thermoregulation, and shelter, and as a refuge for juveniles and prey species. Only very small areas of loose surface rock and suitable habitat for the Pink-tailed legless lizard (*Aprasia parapulchella*) is located within the Development Footprint, with most of the surface rock deeply embedded in the soil. Patches of rocky outcrops are generally small and unlikely to provide habitat for the brush-tailed rock-wallaby (*Petrogale penicillata*).

Wattle Creek, Deadmans Creek, Sandy Creek, Island Creek are four named waterways within the north of the Project Area and Gibraltar Creek and the Wollondilly River in the south. There is also Pivets Creek which is the eastern boundary of the Project Area, these and a number of tributaries provide habitat for a number of amphibian species and provide foraging and drinking water for many fauna species.

4.4 MNES Predicted to Occur

The following sections provide a summary of MNES that are known or predicted to occur in the Project Area based on field surveys and desktop review.

A search of the Commonwealth PMST was undertaken in September 2024 (DCCEEW 2024a). The search included a 10 km buffer from the Project Area. The results of the search are provided in full in **Appendix 1.**

4.4.1 Wetlands of International Importance

The PMST report identified that the Project Area is not within the catchment of any Ramsar listed Wetlands of International Importance.

4.4.2 Threatened Communities, Threatened and Migratory Species

The search results are summarised in **Table 4.3** and the PMST report is provided in **Appendix 1.**

Table 4.3 Summary of the MNES Identified from the Desktop Review

MNES	Number of TECs or species identified in the locality		
	EPBC Act	EPBC Act Migratory	Total
Ecological communities	5	-	5
Birds	19	12	31
Fish	2	-	2
Mammals	8	-	8
Amphibians	1		1
Insects	1		1
Reptiles	3		3
Flora	30		30
Total	**69**	**12**	**81**

A likelihood of occurrence assessment has been undertaken for threatened species, TECs and Wetlands of International Importance listed under the EPBC Act. The results of this assessment area provided in **Appendix 2**.

Additionally, migratory species listed under international agreements being the Bonn Convention (Bonn), China-Australia Migratory Bird Agreement (CAMBA), Japan-Australia Migratory Bird Agreement (JAMBA) or Republic of Korea-Australia Migratory Bird Agreement (ROKAMBA) with potential to occur in the Project Area have also been identified and outlined in **Appendix 2**, based on the results of the PMST. Species which primarily inhabit marine, pelagic and estuarine environments have been omitted from the assessment due to a lack of suitable habitat.

5.0 Avoidance, Minimisation, Mitigation and Management

5.1 Summary of Measures to Avoid and Minimise Impacts

Biodiversity impacts have been avoided and minimised through refinements to the Development Footprint. From the Biodiversity Constraints Assessment (April 2022) (Umwelt 2022) and the Scoping Report (September 2023) (Umwelt 2023) to the present, the Development Footprint has greatly reduced in size in response to emerging understanding of site-specific biodiversity values/constraints and to prioritise the avoidance of impacts on potential serious and irreversible impact entities.

A reduction in the total development footprint area has occurred for the BESS project, from the Scoping Conceptual Layout which spanned 390 ha and included 2 BESS locations to the current EIS layout which spans 75.70 ha and includes one BESS location and refined associated infrastructure layout. The areas avoided through the refinement of the Development Footprint includes the highest value ecological areas, which comprise TEC, habitat for threatened flora and fauna as well as riparian habitat. **Table 7.1** and Figure 7.1 of the BDAR shows how avoidance has occurred across design iterations, based on the current PCT mapping for the Project Area.

The following key impact avoidance and mitigation measures have been identified for the Project:

- Development Footprint alterations to both the Solar and BESS components which have resulted in the avoidance of approximately 64.3 per cent (reducing from 1,838.09 ha (original survey area to 656.32 ha (580.62 ha (Solar) and 75.70 ha (BESS)) of the Project Area.
- Reduction in the Development Footprint for the BESS project from 390 ha (Scoping Conceptual Layout including 2 BESS locations) to 75.70 ha (one BESS location and refined associated infrastructure layout).
- Early site investigations included a potential wind farm component. However, the wind component was not pursued which has resulted in considerable reduction of impacts to native vegetation, TECs and threatened fauna populations. Specifically, the potential for turbine strike has been avoided for the known populations of gang-gang cockatoo, south-eastern glossy black-cockatoo, large-eared pied bat and diamond firetail.
- The BESS has been located in the areas of degraded grassland within negligible biodiversity value. Ancillary facilities, access tracks and transmission lines have been located in existing cleared land and minimised impacts to TECs, intact woodland and habitat for threatened species were practicable.
- Optimising opportunities to maintain connectivity between the Project Area and surrounding areas of intact native vegetation.
- Redesign of the Project to minimise impacts on areas of intact native woodland and hollow bearing trees which reduced impacts to suitable foraging and/or breeding habitat for the gang-gang cockatoo, glossy black cockatoo, squirrel glider, diamond firetail, dusky woodswallow, scarlet robin, speckled warbler, spotted harrier and varied sittella.

- Alteration of the Development Footprint to avoid impact to individuals of Paddys River Box (*Eucalyptus macarthurii*) and Narrow-leaved black Peppermint (*Eucalyptus nicholii*).
- Reduction of the Development Footprint to avoid impacts to areas of PCT 3373 Goulburn Tableland Box-Gum Grassy Forest (which is associated with White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland which is listed as a CEEC under the BC Act and EPBC Act).
- Reduction and alteration of the Development Footprint to minimise impacts to areas of the White Box - Yellow Box - Blakely's Red Gum Grassy Woodland and Derived Native Grassland CEEC. This included impact avoidance measures targeted at retaining areas of woodland with intact crown condition, areas of scattered trees and higher quality derived native grassland condition zones.
- Reduction of the Project Area to avoid riparian areas and dams with emergent vegetation that may provide habitat for threatened species.

A detailed description of measures taken to avoid impacts to biodiversity is provided in Section 7.0 of the BDAR (Umwelt 2025a).

5.2 Summary of Mitigation and Management Measures

Impacts which cannot be avoided or minimised will be managed in the following ways:

- The preparation and implantation of a Construction Environmental Management Plan (CEMP), Biodiversity Management Plan (BMP) (as per the conditions of the SEARS) and Vegetation Management Plan (VMP). The plans will be prepared in consultation with relevant government agencies.
- Education and training for construction and operation staff.
- Establishing vegetation protection zones for retained areas.
- Pre-clearance surveys and ecologist supervision, enabling rescue of native fauna as well as salvaging habitat features (such as hollows or selective felled timber) for relocation into adjacent retained areas.
- Erosion and sediment control.
- Weed management.

A summary of the commitments to avoid, minimise and mitigate the biodiversity impacts of the Project, that are to be implemented will be included in a Biodiversity Management Plan (BMP) with monitoring or reporting requirements, adaptive management measure, performance criteria and any additional actions relevant to the management of biodiversity.

A detailed description of measures taken to avoid impacts to biodiversity is provided in Section 8.6 of the BDAR (Umwelt 2025a).

6.0 Impact Assessment

6.1 Summary of Proposed Action Impacts

6.1.1 Direct and Indirect Impacts

Table 6.1 summarises the extent of proposed residual direct impacts to PCTs and threatened entities observed or assumed to be present on the Development Footprint.

Table 6.1 Direct Impact on Native Vegetation and Non-native Vegetation

Direct Impact (Describe the impact on PCT/TEC/EC or threatened species and their habitat)	EPBC Act Status	Potential SAII Entity	Project Phase / Timing of Impact	Extent
BESS				
PCT 3374 – Goulburn Tableland Peppermint Grassy Forest	-	No	Construction phase	DNG (exotic dominated) = 13.42 ha
Common Ancillary Facilities				
PCT 4063 Central and Southern Tableland River Oak Forest	-	No	Construction phase	1.94 ha of woodland
PCT 3374 Goulburn Tableland Peppermint Grassy Forest	-	No	Construction phase	DNG (Moderate/Degraded) =14.81 ha DNG (low condition) = 1.18 ha DNG (Exotic dominated) = 25.64 ha Total extent = 41.63 ha
PCT 3376 Southern Tableland Grassy Box Woodland	CE	Yes, White Box - Yellow Box - Blakely's Red Gum Grassy Woodland and Derived Native Grassland	Construction phase	DNG = 1.23 ha Woodland = 0.44 ha Total extent = 1.66 ha
Known gang-gang cockatoo breeding and foraging habitat	E	No	Construction phase	0.44 ha
Known Large eared pied bat foraging habitat	E	No	Construction phase	2.38 ha
Potential south-eastern hooded robin, greater glider and koala breeding and foraging habitat	E	No	Construction phase	2.38 ha
Known glossy-black cockatoo foraging habitat	V	No	Construction phase	0.44 ha

Direct Impact (Describe the impact on PCT/TEC/EC or threatened species and their habitat)	EPBC Act Status	Potential SAII Entity	Project Phase / Timing of Impact	Extent
Known diamond firetail breeding and foraging habitat	V	No	Construction phase	2.38 ha
Potential brown treecreeper, painted honeyeater, swift parrot, regent honeyeater, yellow bellied glider and grey headed flying fox breeding and / or foraging habitat	V	No	Construction phase	2.38 ha
Potential Key's matchstick grasshopper habitat	E	No	Construction phase	1.66 ha
pink-tailed worm-lizard habitat	V	No	Construction phase	Negligible
Transmission line option 1				
PCT 3374 Goulburn Tableland Peppermint Grassy Forest	-	No	Construction phase	DNG (Moderate/Degraded) = 2.54 ha Woodland (Moderate/Degraded) = 0.46 ha DNG (Exotic dominated) = 1.6 ha Woodland (Good/Moderate) = 1.39 ha Total extent = 5.99 ha
Known gang-gang cockatoo breeding and foraging habitat	E	No	Construction phase	1.85 ha
Known glossy-black cockatoo foraging habitat	V	No	Construction phase	1.85 ha
Known Large eared pied bat foraging habitat	E	No	Construction phase	1.85 ha
Potential south-eastern hooded robin, greater glider and koala breeding and foraging habitat	E	No	Construction phase	1.85 ha
Known diamond firetail breeding and foraging habitat	V	No	Construction phase	1.85 ha
Potential brown treecreeper, painted honeyeater, swift parrot, regent honeyeater. yellow bellied glider and grey headed flying fox breeding and / or foraging habitat	V	No	Construction phase	1.85 ha
pink-tailed worm-lizard habitat	V	No	Construction phase	Negligible

Direct Impact (Describe the impact on PCT/TEC/EC or threatened species and their habitat)	EPBC Act Status	Potential SAII Entity	Project Phase / Timing of Impact	Extent
Transmission line option 2				
PCT 4063 Central and Southern Tableland River Oak Forest	-	No	Construction phase	0.11 ha of woodland
PCT 3374 Goulburn Tableland Peppermint Grassy Forest	-	No	Construction phase	DNG (Moderate/Degraded = 1.90 ha DNG (exotic dominated) = 2.29 ha Woodland (Moderate/Degraded) = 0.84 ha Woodland (Good/Moderate) = 2.73 ha Total extent = 5.47 ha
PCT 3376 Southern Tableland Grassy Box Woodland	CE	Yes, White Box - Yellow Box - Blakely's Red Gum Grassy Woodland and Derived Native Grassland	Construction phase	Woodland (Good/Moderate) =0.45 ha
Known glossy-black cockatoo foraging habitat	V	No	Construction phase	4.02 ha
Known gang-gang cockatoo breeding and foraging habitat	E	No	Construction phase	4.02 ha
Known Large eared pied bat foraging habitat	E	No	Construction phase	4.13 ha
Potential South-eastern hooded robin, greater glider and koala breeding and foraging habitat	E	No	Construction phase	4.13 ha
Known diamond firetail breeding and foraging habitat	V	No	Construction phase	4.13 ha
Potential brown treecreeper, painted honeyeater, swift parrot, regent honeyeater, yellow bellied glider and grey headed flying fox breeding and foraging habitat	V	No	Construction phase	4.13 ha
Potential Key's matchstick grasshopper habitat	E	No	Construction phase	1.45 ha
pink-tailed worm-lizard habitat	V	No	Construction phase	Negligible

6.1.2 Prescribed Impacts

Prescribed impacts associated with the Project are identified in Section 6.0 of the BDAR and the impact of the Project is assessed in Section 8.4 of the BDAR (Umwelt 2025a).

No threatened entities are considered likely to be dependent upon or may use habitat features associated with any of the prescribed impacts.

6.1.3 Cumulative Impacts

Cumulative impacts occur when the impacts from multiple projects or developments combine and the compounding effects are larger than any one of the projects itself has quantified and assessed.

The project will contribute to cumulative impacts on biodiversity during construction and operation from all clean energy projects (operational, under construction, approved and proposed) in the broader southern highlands region. It is considered likely that cumulative impacts will increase the loss of similar native vegetation and threatened species habitat to the project in the region.

A review of publicly available relevant projects known at the time of finalisation of this BDAR has been undertaken. Potential cumulative biodiversity impacts are provided **Table 6.2**. Impact information compiled from projects in initial planning stages are not accurate and the final impacts may be more or less than the data presented.

Table 6.2 Cumulative Impact Assessment

Project	Distance & Direction from the Project	Biodiversity Value Impacted			Planning Status & Cumulative Consideration
		PCTs and TECs	Threatened flora	Threatened fauna	
Wattle Creek Solar Farm	Within Project Area (less than 1 km)	Four PCTs identified in the Development Footprint with estimated impacts to 264.92 ha of native vegetation. Impacts to one TEC White Box - Yellow Box - Blakely's Red Gum Grassy Woodland and Derived Native Grassland (CEEC listed under the BC Act).	No threatened flora recorded in the Development Footprint.	Nine threatened fauna species were recorded in the Development Footprint: south-eastern glossy black-cockatoo (*Calyptorhynchus lathami lathami*), gang-gang cockatoo (*Callocephalon fimbriatum*), squirrel glider (*Petaurus norfolcensis*), diamond firetail (*Stagonopleura guttata*), dusky woodswallow (*Artamus cyanopterus*), scarlet robin (*Petroica boodang*), speckled warbler (*Chthonicola sagittata*), spotted harrier (*Circus assimilis*), varied sittella (*Daphoenositta chrysoptera*).	Proposed
Marulan Gas Fired Power Station	To the south of adjacent to the Project Area	Four PCTs identified in the Development Footprinted with estimated impacts to 34.2 ha of native vegetation. No impacts to any TECs.	No threatened flora recorded in the Development Footprint.	Eight threatened species were recorded or considered likely to occur within the Project Site; diamond firetail (*Stagonopleura guttata*), gang-gang cockatoo (*Callocephalon fimbriatum*), hooded robin (*Melanodryas cucullata cucullata*), eastern falsistrelle (*Falsistrellus tasmaniensis*), eastern bent-wing bat (*Miniopterus schreibersii occeanensis*), greater broad-nosed bat (*Scoteanax rueppellii*), little bent-wing bat (*Miniopterus australis*) and the powerful owl (*Ninox strenua*).	Proposed
Marulan Solar Farm	Approx. 7 km (Southeast)	Three PCTs identified in the Development Footprint. Impacts to 26.8 ha of native vegetation, 25.47 ha of which belongs to TECs. Impacts to two TECs: 24.53 ha of White Box - Yellow Box - Blakely's Red Gum Grassy Woodland and Derived Native Grassland (CEEC listed under the BC Act) and 0.94 ha of Natural Temperate Grassland of the South Eastern Highlands (CEEC listed under the BC Act).	No threatened flora recorded in the Development Footprint.	Six threatened fauna species were assumed present, pink-tailed legless lizard (*Aprasia parapulchella*), striped legless lizard (*Delma impar*), barking owl (*Ninox connivens*), south-eastern glossy black-cockatoo (*Calyptorhynchus lathami lathami*), masked owl (*Tyto novaehollandiae*), and powerful owl (*Ninox strenua*). Suitable habitat was present for a further 27 threatened fauna: little whip snake (*Suta flagellum*), Rosenberg's goanna (*Varanus rosenbergi*), black falcon *(Falco subniger*), brown treecreeper (*Climacteris picumnus victoriae*), diamond firetail (*Stagonopleura guttata*), dusky woodswallow (*Artamus cyanopterus*), flame robin (*Petroica phoenicea*), gang-gang cockatoo (*Callocephalon fimbriatum*), hooded robin (*Melanodryas cucullata cucullata*), little eagle (*Hieraaetus morphnoides*), little lorikeet (*Glossopsitta pusilla*), regent honeyeater (*Anthochaera phrygia*), scarlet robin (*Petroica boodang*), speckled warbler (*Chthonicola sagittata*), superb parrot (*Polytelis swainsonii*), swift parrot *(Lathamus discolor),*	Proposed

Project	Distance & Direction from the Project	Biodiversity Value Impacted			Planning Status & Cumulative Consideration
		PCTs and TECs	Threatened flora	Threatened fauna	
				turquoise parrot *(Neophema pulchella),* white-bellied sea eagle (*Haliaeetus leucogaster*), varied sitella (*Daphoenositta chrysoptera*), eastern coastal free-tailed bat (*Micrtonomus norfolkensis*), greater glider (*Petauroides volans*), grey-headed flying fox (*Pteropus poliocephalus*), koala (*Phascolarctos cinereus*), large bent-winged bat (*Miniopterus orianae oceanensis*), southern myotis (*Myotis macropus*), squirrel glider (*Petaurus norfolcensis*), and yellow-bellied sheathtail bat (*Saccolaimus flaviventris*).	
Berrima Coal Mine	12 km northeast Berrima, Wingecarribee Shire LGA	Two vegetation communities were identified within the Development Footprinted with estimated impacts to 3.59 ha of native vegetation. No impacts to any TECs.	No threatened flora recorded in the Development Footprint.	No threatened fauna recorded at the site. Potential habitat for six threatened fauna species.	Approved
Lynwood Quarry	16 km south Marulan, Goulburn Mulwaree LGA	Six vegetation communities were identified within the Development Footprinted with estimated impacts to 103 ha of native vegetation. No impacts to any TECs.	Camden woollybutt (Paddy's River box) was recorded on site.	Five threatened species were recorded within the proposal site. These were the squirrel glider (*Petaurus norfolcensis*), speckled warbler (*Chthonicola sagittata*), Eastern bent-wing bat (*Miniopterus schreibersii occeanensis*), eastern firetail bat (*Micronomus norfolkensis*) and the eastern false pipistrelle (*Falsistrellus tasmaniensis*).	Approved
Marulan South Limestone Mine Continued Operations Project	16 km south Marulan, Goulburn Mulwaree LGA	Four vegetation communities were identified within the Development Footprinted with estimated impacts to 182.4 ha of native vegetation. Impacts to one TEC (White box Yellow Box Blakely's Red Gum Grassy Woodland) being 88.6 ha.	One threatened flora species was recorded on site; *Solanum celatum*, one individual being removed.	Nineteen threatened species were recorded within the proposal site. These were the large-eared pied bat (*Chalinolobus dwyeri*), greater broad-nosed bat (Scoteanax rueppellii)), eastern bent-wing bat (Miniopterus schreibersii occeanensis), and yellow-bellied sheathtail bat (*Saccolaimus flaviventris*), eastern free-tail bat (*Micronomus norfolkensis*), scarlet robin (*Petroica boodang*), diamond firetail (*Stagonopleura guttata*), glossy black-cockatoo (*Calyptorhynchus lathami lathami),* koala (*Phascolarctos cinereus*), southern myotis (*Myotis macropus*), eastern false pipistrelle (*Falsistrellus tasmaniensis*), rufous fantail (*Rhipidura rufifrons*), grey-headed flying fox (*Pteropus poliocephalus*), golden-tipped bat (*Kerivoula papuensis*), eastern cave bat (*Vespadelus troughtoni*), powerful owl (*Ninox strenua*), sooty owl (*Tyto tenebricosa*), turquoise parrot	Approved

Project	Distance & Direction from the Project	Biodiversity Value Impacted			Planning Status & Cumulative Consideration
		PCTs and TECs	Threatened flora	Threatened fauna	
				(*Neophema pulchella*), yellow-bellied glider (*Petaurus australis)*, and varied sitella (*Daphoenositta chrysoptera*).	
Peppertree Quarry	16 km south Marulan, Goulburn Mulwaree LGA	One native vegetation community was recorded on site and the entirety of it was placed into the habitat management area. No impacts to native vegetation are expected.	No threatened flora recorded in the Development Footprint.	One threatened species – eastern bent-wing bat (*Miniopterus schreibersii oceanensis*) - was found to have potential to occur on site, however, no threatened species are expected to be impacted as a result of the proposal.	Approved
Gundary Solar Farm	Approx. 28 km (Southeast)	Preliminary mapping identified 6 PCTs in the Project Area with estimated impacts to Impacts to four TECs: 0.03 ha of River Tussock – Tall Sedge – Kangaroo Grass moist grasslands (CEEC EPBC Act); 0.46 ha of Snow Gum – Candle Bark woodland (CEEC BC Act); 6.91 ha of Wallaby Grass – Red grass – Tall Speargrass – Kangaro Grass dry tussock grassland (CEEC EPBC Act); and 5.05 ha of Yellow Box – Blakely's Red Gum grassy woodland (CEEC EPBC and BC Acts).	Potential habitat for 12 threatened flora species, *Acacia flocktoniae, Bossiaea oligosperma, Caladenia tessellata, Commersonia prostrata, Dillwynia glaucula, Diuris aequalis, Diuris tricolor, Eucalyptus aggregata, Eucalyptus macarthurii, Genoplesium superbum, Leucochrysum albicans* var. *tricolor, Persoonia mollis* subsp.	Suitable habitat was present for 25 threatened fauna: pink-tailed legless lizard (*Aprasia parapulchella*), striped legless lizard (*Delma impar*); Booroolong frog (*Litoria booroolongensis*), giant burrowing frog (*Heleioporus australasicus*), suttering frog (*Mixophyes balbus*); barking owl (*Ninox connivens*), gang-gang cockatoo (*Callocephalon fimbriatum*), glossy black-cockatoo (*Calyptorhynchus lathami lathami*), little eagle (*Hieraaetus morphnoides*), masked owl (*Tyto novaehollandiae*), pink robin (*Petroica rodinogaster*), powerful owl (*Ninox strenua*), swift parrot *(Lathamus discolor*), white-bellied sea eagle (*Haliaeetus leucogaster*), brush-tailed rock wallaby (*Petrogale penicillata*), eastern pygmy possum (*Cercartetus nanus*), greater glider (*Petauroides volans*), koala (*Phascolarctos cinereus*), long-nosed poteroo (*Potorous tridactylis*), squirrel glider (*Petaurus norfolcensis*), grey-headed flying fox (*Pteropus poliocephalus*), large-eared pied bat (*Chalinolobus dwyeri*), large bent-winged bat (*Miniopterus orianae oceanensis*), little bent-wing bat (*Miniopterus australis*), and southern myotis (*Myotis macropus*).	Approval

Project	Distance & Direction from the Project	Biodiversity Value Impacted			Planning Status & Cumulative Consideration
		PCTs and TECs	Threatened flora	Threatened fauna	
			revoluta, and *Pultenaea pedunculata.*		
Merino Solar Farm	Approx. 28 km (Southeast)	Two PCTs identified on the site -- Southern Tableland Grassy Box Woodland (CEEC BC and EPBC Acts) and Southern Tableland Red Grass – Spear Grass Grassland (CEEC EPBC Act).	Potential habitat for five threatened flora species, *Amphibromus fluitans, Haloragis exalata* subsp. *exalata, Lepidium hyssopifolium, Leucochrysum molle,* and *Pelargonium* sp. *Striatellum (G.W.Carr 10345).*	Potential breeding habitat for eight threatened fauna species, Australian painted snipe (*Rostratula australis*), gang-gang cockatoo (*Callocephalon fimbriatum*), south-eastern glossy black-cockatoo (*Calyptorhynchus lathami lathami*), superb parrot (*Polytelis swainsonii*), green and golden bell frog (*Ranoidea (Litoria) aurea*), yellow spotted tree frog (*Litorea castanea*), Key's matchstick grasshopper (*Keyacris scurra*), and striped legless lizard *(Delma impar*); and potential foraging habitat for an additional seven threatened fauna speciesblack-necked stork (*Ephippiorhynchus asiaticus*), curlew sandpiper (*Calidris ferruginea*), dusky woodswallow (*Artamus cyanopterus cyanopterus*), grey falcon (*Falco hypoleucos*), white throated needletail (*Hirundapus caudacutus*), koala (*Phascolarctos cinereus*), and grey-headed flying fox (*Pteropus poliocephalus*).	Proposed
Marulan Quarry	30 km southwest Marulan, Goulburn Mulwaree LGA	Three PCTs were identified on site; Inland Scribbly Gum-Brittle gum low Woodlands, Broad-leaved Peppermint – Red Stringybark Grassy open forest and Carex-juncus sedgeland/wet grassland. No threatened TECs were recorded on site. Removal of 31 ha of native vegetation is proposed.	No threatened flora recorded in the Development Footprint.	The proposed clearing of native vegetation will remove habitat for seven threatened fauna species recorded on site (species not listed).	Proposed

Project	Distance & Direction from the Project	Biodiversity Value Impacted			Planning Status & Cumulative Consideration
		PCTs and TECs	Threatened flora	Threatened fauna	
Hume Link	32 km south Wagga Wagga, Bannaby and Maragle, Wagga Wagga City LGA	The project could potentially remove 670.21 hectares of native vegetation. Potential direct impacts on five threatened ecological communities listed under the *Biodiversity Conservation Act 2016* (BC Act), two of which are also listed under the EPBC Act.	Fifty-eight threatened flora species have been assumed present due to the presence of suitable habitat within the project footprint and survey limitations.	There are expected impacts on up to 33 threatened fauna species (12 bird, 11 mammal (including three bats), three reptile, five amphibian and two insect) and on two endangered fauna populations: Yellow-bellied Glider population on the Bago Plateau and the Squirrel Glider in the Wagga Wagga City Local Government Area. Seventeen threatened fauna species have been assumed present due to the presence of suitable habitat within the project footprint and survey limitations.	**Proposed / under assessment**
Crookwell Wind Farm	Approx. 32 km (West)	One vegetation type, Western Tablelands Dry Forest. Removal of 2.34 ha of vegetation proposed.	No threatened flora recorded in the Development Footprint.	No threatened fauna recorded at the site. Potential habitat for 36 threatened fauna species.	Operational
Shoalhaven Hydro Scheme	Approx. 38 km (West)	Seven PCTs within the assessment area and direct impact area. Removal of at least 29.5 ha of native vegetation proposed. Impacts to one TEC: 0.23 ha Southern Highlands Shale Forest and Woodland of the Sydney Basin Bioregion.	Two threatened plant species recorded in the site, *Rhodamnia rubescens* and *Hibbertia puberula. O*ne additional threatened plant species, *Genoplesium baueri,* was assumed to be present.	Six threatened fauna species recorded at the site, gang-gang cockatoo (*Callocephalon fimbriatum*), south-eastern glossy black-cockatoo (*Calyptrorhynchus lathami lathami*), greater glider (*Petauroides volans*), eastern pygmy possum (*Cercartetus nanus*), large-eared pied bat (*Chalinolobus dwyeri*), and southern myotis (*Myotis macropus*). Two other threatened fauna species, giant burrowing frog (*Helioporus australiacus*) and Littlejohns tree frog, were assumed to be present.	Operational (Extension Proposed)

6.2 Summary of MNES Impact Assessment

Item 16 of the Supplementary SEARs specified an assessment is required for each of the EPBC Act listed threatened species, communities and migratory species assessed likely to be impacted by the Proposed Action. Consideration of the requirements of Item 16 and the assessments of significance have been prepared for EPBC Act listed TECs and threatened species that have been:

- recorded onsite during Umwelt surveys
- assumed present due to being an ecosystem species under the BAM
- species which may have suitable habitat present and medium to high likelihood of occurrence through the site.

These are provided in full in **Appendix 2** together with an Assessment of the Significance of the Impact of the Proposed Action in keeping with EPBC Act guidelines in **Appendix 3**.

A summary of the impacts of the Proposed Action, the nature, consequences and quantum of the impacts on the MNES are summarised in **Table 6.3**. The consequences of impacts on the species, population and/or extent of the community at a local, state and national scale is also identified in **Table 6.3**.

The Proposed Action is likely to have a significant impact on two MNES, the gang-gang cockatoo and White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland.

Table 6.3 Summary of impacts of the Proposed Action

Common Name	Scientific Name	EPBC Act Status	Nature of impact (direct and indirect)	Duration of impact	Residual impact requiring offsetting?	Assessment of Significance Findings
Threatened Ecological Communities						
White Box-Yellow Box-Blakeley's Red Gum Grassy Woodland and Derived Native Grassland		CE	Direct impacts to 0.89 ha of the CEEC.	During Construction	Yes, offset as an ecosystem credit in accordance with the BAM.	Likely to result in a significant impact
Critically Endangered or Endangered Species						
gang-gang cockatoo	*Callocephalon fimbriatum*	E	Direct impacts to 6.31 ha of breeding habitat.	During Construction	Yes, offset as a species credit in accordance with the BAM.	Likely to result in a significant impact.
large-eared pied bat	*Chalinolobus dwyeri*	E	Direct impacts to 8.36 ha of foraging habitat. No breeding habitat in the Development Footprint.	During Construction	Yes, offset as a species credit in accordance with the BAM.	Unlikely to result in a significant impact.
Paddys River box, Camden woollybutt	*Eucalyptus macarthurii*	E	No direct impacts, potential indirect impacts.	During Construction	No	Unlikely to result in a significant impact.
south-eastern hooded robin	*Melanodryas cucullata cucullata*	E	Direct impacts to 8.36 ha of potential foraging and breeding habitat.	During Construction	Yes, offset as an ecosystem credit in accordance with the BAM.	Unlikely to result in a significant impact.
greater glider (southern and central)	*Petauroides volans*	E	Direct impacts to 8.36 ha of potential foraging and breeding habitat.	During Construction	No, no species credits required for this species.	Unlikely to result in a significant impact.
koala	*Phascolarctos cinereus*	E	Direct impacts to 8.36 ha of potential foraging and breeding habitat.	During Construction	Yes, offset as an ecosystem credit in accordance with the BAM.	Unlikely to result in a significant impact.
Swift parrot	*Lathamus discolor*	CE	Direct impacts to 8.36 ha of potential foraging habitat.	During construction	Yes, offset as an ecosystem credit in accordance with the BAM.	Unlikely to result in a significant impact.
Regent honeyeater	*Anthochaera phrygia*	CE	Direct impacts to 8.36 ha of potential foraging habitat.	During construction	Yes, offset as an ecosystem credit in accordance with the BAM.	Unlikely to result in a significant impact.

Common Name	Scientific Name	EPBC Act Status	Nature of impact (direct and indirect)	Duration of impact	Residual impact requiring offsetting?	Assessment of Significance Findings
Key's matchstick grasshopper	*Keyacris scurra*	E	Direct impacts to 2.12 ha of potential habitat.	During construction	No.	Unlikely to result in a significant impact.
Vulnerable Species						
south-eastern glossy black cockatoo	*Calyptorhynchus lathami lathami*	V	Direct impacts to 6.31 ha of foraging habitat.	During Construction	Yes, offset as a species credit in accordance with the BAM.	Unlikely to result in a significant impact.
brown treecreeper (south-eastern)	*Climacteris picumnus victoriae*	V	Direct impacts to 8.36 ha of potential foraging and breeding habitat.	During Construction	Yes, offset as an ecosystem credit in accordance with the BAM.	Unlikely to result in a significant impact.
narrow-leaved black peppermint	*Eucalyptus nicholii*		No direct impacts, potential indirect impacts.	During Construction	No.	Unlikely to result in a significant impact.
painted honeyeater	*Grantiella picta*	V	Direct impacts to 8.36 ha of potential foraging and breeding habitat.	During Construction	Yes, offset as an ecosystem credit in accordance with the BAM.	Unlikely to result in a significant impact.
yellow-bellied glider	*Petaurus australis australis*	V	Direct impacts to 8.36 ha of potential foraging and breeding habitat.	During Construction	Yes, offset as an ecosystem credit in accordance with the BAM.	Unlikely to result in a significant impact.
diamond firetail	*Stagonopleura guttata*	V	Direct impacts to 8.36 ha of known foraging and breeding habitat.	During Construction	Yes, offset as an ecosystem credit in accordance with the BAM.	Unlikely to result in a significant impact.
grey headed flying fox	*Pteropus poliocephalus*	V	Direct impacts to 8.36 ha of potential foraging and breeding habitat.	During Construction	Yes, offset as an ecosystem credit in accordance with the BAM.	Unlikely to result in a significant impact.
Pink-tailed worm-lizard	*Aprasia parapulchella*	V	No suitable habitat onsite.	N/A	No.	Unlikely to result in a significant impact.
Migratory Species						
N/A						

7.0 Offset Requirements

7.1 Approach

The NSW and Australian governments agree that endorsement of the NSW BOS, that is to avoid, minimise and offset biodiversity impacts on both NSW and Commonwealth listed entities, provides for the best and most effective biodiversity and regulatory outcomes. The Australian Government supports the use of the BAM 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.

Spark Renewable is committed to delivering a biodiversity offset strategy that appropriately compensates for the unavoidable loss of ecological values as a result of the Project.

Spark Renewable has, where practicable, altered the Project to avoid and minimise ecological impacts in the planning stage, and a range of impact mitigation strategies have been included to mitigate the impact on ecological values prior to the consideration of offsetting requirements.

The retirement of biodiversity credits is proposed to be undertaken following the confirmation of the final transmission line option. The BDAR and credit calculations will be revised at this point prior to the retirement of biodiversity credits.

Spark Renewable is currently considering the merits of all options available under the BOS to satisfy the offsetting requirements for the Project. The offset options available under the BC Act and BC Regulation include:

- land based offsets through the establishment of new Stewardship Sites or by retiring credits from existing Stewardship Sites
- purchasing credits from the market, and/or
- paying into the Biodiversity Conservation Fund.

The like-for-like credit rules would be followed for nationally listed entities which require credits. The like-for-like or variation rules would be followed for all other entities which require credits.

Appendix 4 provides a summary of Predicted Impacts to MNES and the associated credit obligations.

7.2 Offset Credit Obligations

A summary of the predicted impacts of the Proposed Action, offset requirements and approach for EPBC Act listed Threatened Species and Communities is provided in **Table 7.1** and **Table 7.2** for entities considered 'ecosystem credit species' noting that the latter will be offset via the ecosystem credit obligation generated by the Proposed Action and 'species-credit species', respectively.

Table 7.1 Ecosystem Credit Obligation

Veg Zone ID	PCT No.	PCT Name	Condition Class	Vegetation Integrity Score	Area (ha)	Credits Required
BESS						
6	3374	Goulburn Tableland Peppermint Grassy Forest	DNG – exotic dominated	1	13.42	0
Common Ancillary Facilities						
1	4063	Central and Southern Tableland River Oak Forest	Moderate/Degraded	38.7	1.94	23
4	3374	Goulburn Tableland Peppermint Grassy Forest	DNG- Moderate/Degraded	17.7	14.81	98
5			DNG-low condition	2.7	1.18	0
6			DNG – exotic dominated	1	25.64	0
9	3376	Southern Tableland Grassy Box Woodland	DNG	26.2	1.23	16
10			Good/Moderate	76.9	0.44	17
-	0	Non-Native	Non-Native	-	2.42	0
Transmission Line option 1						
4	3374	Goulburn Tableland Peppermint Grassy Forest	DNG- Moderate/Degraded	17.7	2.54	17
8			Good/Moderate	76	1.39	40
7			Moderate/Degraded	69.7	0.46	12
6			DNG – exotic dominated	1	1.60	0
-	0	Non-Native	Non-Native	-	0.13	0
Transmission Line option 2						
1	4063	Central and Southern Tableland River Oak Forest	Moderate/Degraded	38.7	0.11	1
4	3374	Goulburn Tableland Peppermint Grassy Forest	DNG- Moderate/Degraded	17.7	1.90	13
6			Good/Moderate	76	2.73	78
8			Moderate/Degraded	69.7	0.84	22
7			DNG – exotic dominated	1	2.29	0

Veg Zone ID	PCT No.	PCT Name	Condition Class	Vegetation Integrity Score	Area (ha)	Credits Required
10	3376	Southern Tableland Grassy Box Woodland	Good/Moderate	76.9	0.45	17
-	0	Non-Native	Non-Native	-	0.18	0

Table 7.2 Species Credit Obligation for MNES

Species Name	Impact Area (ha)	Credits Required
BESS – no species credits generated		
Common Ancillary Features		
south-eastern glossy black-cockatoo (***Calyptorhynchus lathami lathami***)	0.44	17
gang-gang cockatoo (*Callocephalon fimbriatum*)	0.44	17
large eared pied bat (*Chalinolobus dwyeri*)	2.38	81
Transmission Line Option 1		
gang-gang cockatoo (*Callocephalon fimbriatum*)	1.85	69
south-eastern glossy black-cockatoo (*Calyptorhynchus lathami lathami)*	1.85	69
large eared pied bat (*Chalinolobus dwyeri*)	1.85	103
Transmission Line Option 2		
south-eastern glossy black-cockatoo (Calyptorhynchus lathami lathami)	4.02	150
gang-gang cockatoo (*Callocephalon fimbriatum*)	4.02	150
large eared pied bat (*Chalinolobus dwyeri*)	4.13	229

8.0 References

Commonwealth of Australia (CoA) 2010a. Survey guidelines for Australia's threatened bats: Guidelines for detecting bats listed as threatened under the EPBC Act.

Commonwealth of Australia (CoA) 2010b. Survey guidelines for Australia's threatened birds: Guidelines for detecting birds listed as threatened under the EPBC Act.

Commonwealth of Australia (CoA) 2010c. Survey guidelines for Australia's threatened frogs: Guidelines for detecting bats listed as threatened under the EPBC Act.

Commonwealth of Australia (CoA) 2011a. Survey guidelines for Australia's threatened mammals: Guidelines for detecting mammals listed as threatened under the EPBC Act.

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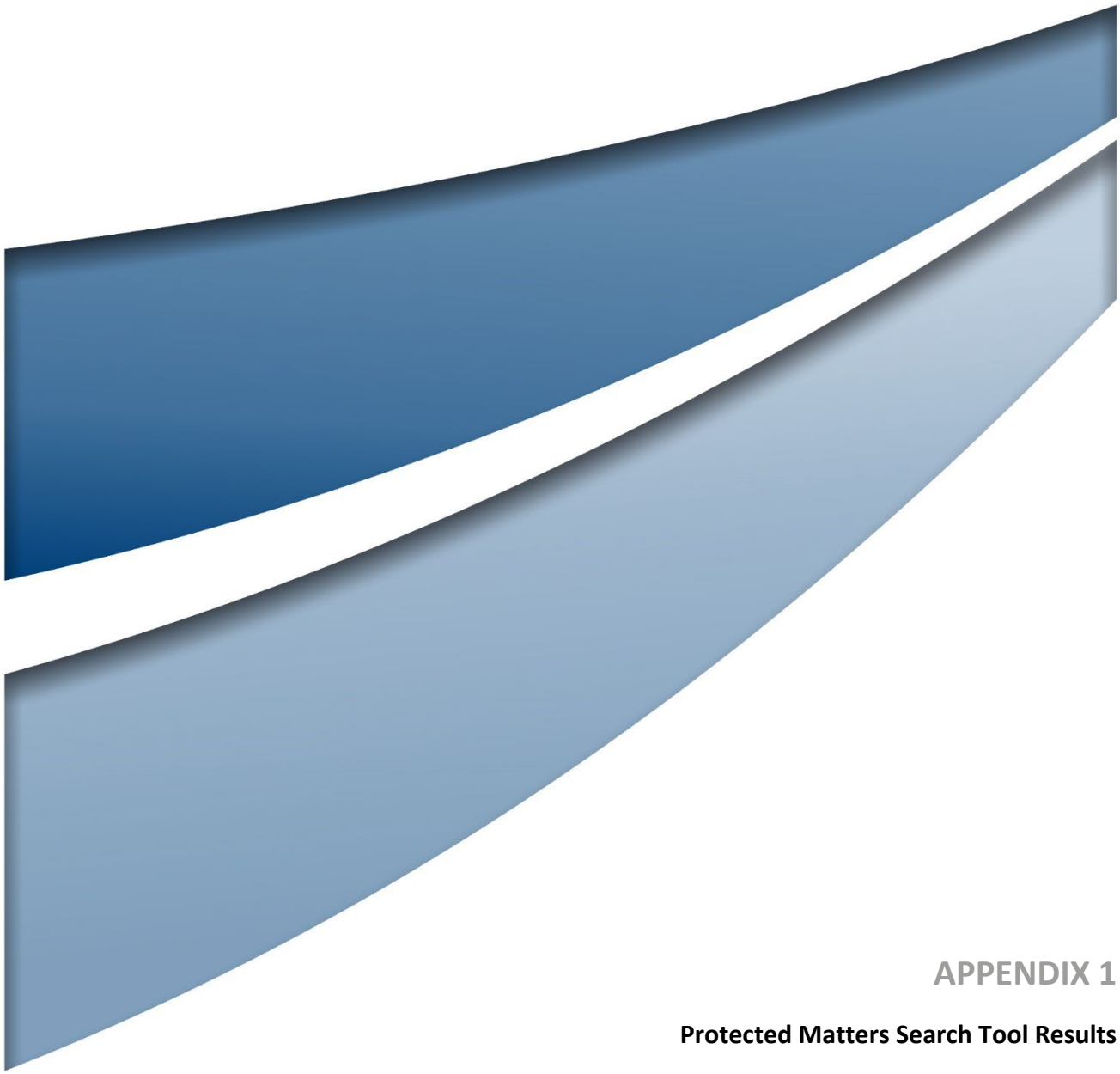
Umwelt (Australia) Pty Ltd (Umwelt) 2023. Wattle Creek Battery Energy Storage System Scoping Report. Prepared for Spark Renewables Pty Limited. September 2023.

Umwelt (Australia) Pty Limited (Umwelt) 2024. Land Categorisation Assessment Report – Wattle Creek Energy Hub. Prepared for Spark Renewable in April 2024. Unpublished Report.

Umwelt (Australia) Pty Ltd (Umwelt) 2025a. Wattle Creek Battery Energy Storage System SSD-63345458, Biodiversity Development Assessment Report. Prepared for Spark Renewables Pty Limited. March 2025.

Umwelt (Australia) Pty Ltd (Umwelt) 2025b. Wattle Creek Battery Energy Storage System SSD-63345458, Environmental Impact Statement. Prepared for Spark Renewables Pty Limited. March 2025.

Umwelt (Australia) Pty Ltd (Umwelt) 2025c. Wattle Creek Solar Farm SSD-63344210, Biodiversity Development Assessment Report. Prepared for Spark Renewables Pty Limited. March 2025.



APPENDIX 1

Protected Matters Search Tool Results

EPBC Act Protected Matters Report

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

Report created: 11-Sep-2024

Summary
Details
- Matters of NES
- Other Matters Protected by the EPBC Act
- Extra Information

Caveat
Acknowledgements

Summary

Matters of National Environment Significance

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

World Heritage Properties:	None
National Heritage Places:	None
Wetlands of International Importance (Ramsar	None
Great Barrier Reef Marine Park:	None
Commonwealth Marine Area:	None
Listed Threatened Ecological Communities:	5
Listed Threatened Species:	64
Listed Migratory Species:	12

Other Matters Protected by the EPBC Act

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

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

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

Commonwealth Lands:	3
Commonwealth Heritage Places:	None
Listed Marine Species:	21
Whales and Other Cetaceans:	None
Critical Habitats:	None
Commonwealth Reserves Terrestrial:	None
Australian Marine Parks:	None
Habitat Critical to the Survival of Marine Turtles:	None

Extra Information

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

State and Territory Reserves:	2
Regional Forest Agreements:	1
Nationally Important Wetlands:	1
EPBC Act Referrals:	7
Key Ecological Features (Marine):	None
Biologically Important Areas:	None
Bioregional Assessments:	1
Geological and Bioregional Assessments:	None

Details

Matters of National Environmental Significance

Listed Threatened Ecological Communities [Resource Information]

For threatened ecological communities where the distribution is well known, maps are derived from recovery plans, State vegetation maps, remote sensing imagery and other sources. Where threatened ecological community distributions are less well known, existing vegetation maps and point location data are used to produce indicative distribution maps.
Status of Vulnerable, Disallowed and Ineligible are not MNES under the EPBC Act.

Community Name	Threatened Category	Presence Text	Buffer Status
Natural Temperate Grassland of the South Eastern Highlands	Critically Endangered	Community likely to occur within area	In feature area
Southern Highlands Shale Forest and Woodland in the Sydney Basin Bioregion	Critically Endangered	Community may occur within area	In buffer area only
Temperate Highland Peat Swamps on Sandstone	Endangered	Community may occur within area	In buffer area only
Upland Basalt Eucalypt Forests of the Sydney Basin Bioregion	Endangered	Community may occur within area	In buffer area only
White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland	Critically Endangered	Community likely to occur within area	In feature area

Listed Threatened Species [Resource Information]

Status of Conservation Dependent and Extinct are not MNES under the EPBC Act.
Number is the current name ID.

Scientific Name	Threatened Category	Presence Text	Buffer Status
BIRD			
Anthochaera phrygia			
Regent Honeyeater [82338]	Critically Endangered	Foraging, feeding or related behaviour likely to occur within area	In feature area
Aphelocephala leucopsis			
Southern Whiteface [529]	Vulnerable	Species or species habitat known to occur within area	In feature area
Botaurus poiciloptilus			
Australasian Bittern [1001]	Endangered	Species or species habitat may occur within area	In feature area

Scientific Name	Threatened Category	Presence Text	Buffer Status
Calidris acuminata Sharp-tailed Sandpiper [874]	Vulnerable	Species or species habitat may occur within area	In feature area
Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	Species or species habitat may occur within area	In feature area
Callocephalon fimbriatum Gang-gang Cockatoo [768]	Endangered	Species or species habitat known to occur within area	In feature area
Calyptorhynchus lathami lathami South-eastern Glossy Black-Cockatoo [67036]	Vulnerable	Species or species habitat known to occur within area	In feature area
Climacteris picumnus victoriae Brown Treecreeper (south-eastern) [67062]	Vulnerable	Species or species habitat known to occur within area	In feature area
Falco hypoleucos Grey Falcon [929]	Vulnerable	Species or species habitat likely to occur within area	In feature area
Gallinago hardwickii Latham's Snipe, Japanese Snipe [863]	Vulnerable	Species or species habitat likely to occur within area	In feature area
Grantiella picta Painted Honeyeater [470]	Vulnerable	Species or species habitat likely to occur within area	In feature area
Hirundapus caudacutus White-throated Needletail [682]	Vulnerable	Species or species habitat known to occur within area	In feature area
Lathamus discolor Swift Parrot [744]	Critically Endangered	Species or species habitat known to occur within area	In feature area
Melanodryas cucullata cucullata South-eastern Hooded Robin, Hooded Robin (south-eastern) [67093]	Endangered	Species or species habitat known to occur within area	In feature area

Scientific Name	Threatened Category	Presence Text	Buffer Status
[Neophema chrysostoma](#) Blue-winged Parrot [726]	Vulnerable	Species or species habitat may occur within area	In feature area
[Polytelis swainsonii](#) Superb Parrot [738]	Vulnerable	Species or species habitat may occur within area	In feature area
[Pycnoptilus floccosus](#) Pilotbird [525]	Vulnerable	Species or species habitat likely to occur within area	In feature area
[Rostratula australis](#) Australian Painted Snipe [77037]	Endangered	Species or species habitat likely to occur within area	In feature area
[Stagonopleura guttata](#) Diamond Firetail [59398]	Vulnerable	Species or species habitat known to occur within area	In feature area
FISH			
[Macquaria australasica](#) Macquarie Perch [66632]	Endangered	Species or species habitat known to occur within area	In feature area
[Prototroctes maraena](#) Australian Grayling [26179]	Vulnerable	Species or species habitat may occur within area	In buffer area only
FROG			
[Litoria watsoni](#) Southern Heath Frog, Watson's Tree Frog [91509]	Endangered	Species or species habitat may occur within area	In buffer area only
INSECT			
[Keyacris scurra](#) Key's Matchstick Grasshopper [89739]	Endangered	Species or species habitat may occur within area	In feature area
MAMMAL			
[Chalinolobus dwyeri](#) Large-eared Pied Bat, Large Pied Bat [183]	Endangered	Species or species habitat known to occur within area	In feature area

Scientific Name	Threatened Category	Presence Text	Buffer Status
Dasyurus maculatus maculatus (SE mainland population)			
Spot-tailed Quoll, Spotted-tail Quoll, Tiger Quoll (southeastern mainland population) [75184]	Endangered	Species or species habitat known to occur within area	In feature area
Petauroides volans			
Greater Glider (southern and central) [254]	Endangered	Species or species habitat known to occur within area	In feature area
Petaurus australis australis			
Yellow-bellied Glider (south-eastern) [87600]	Vulnerable	Species or species habitat known to occur within area	In feature area
Petrogale penicillata			
Brush-tailed Rock-wallaby [225]	Vulnerable	Species or species habitat may occur within area	In feature area
Phascolarctos cinereus (combined populations of Qld, NSW and the ACT)			
Koala (combined populations of Queensland, New South Wales and the Australian Capital Territory) [85104]	Endangered	Species or species habitat known to occur within area	In feature area
Pseudomys novaehollandiae			
New Holland Mouse, Pookila [96]	Vulnerable	Species or species habitat may occur within area	In feature area
Pteropus poliocephalus			
Grey-headed Flying-fox [186]	Vulnerable	Foraging, feeding or related behaviour known to occur within area	In feature area
PLANT			
Acacia bynoeana			
Bynoe's Wattle, Tiny Wattle [8575]	Vulnerable	Species or species habitat may occur within area	In feature area
Baloskion longipes			
Dense Cord-rush [68511]	Vulnerable	Species or species habitat known to occur within area	In buffer area only
Caladenia tessellata			
Thick-lipped Spider-orchid, Daddy Long-legs [2119]	Vulnerable	Species or species habitat may occur within area	In buffer area only
Commersonia prostrata			
Dwarf Kerrawang [87152]	Endangered	Species or species habitat likely to occur within area	In feature area

Scientific Name	Threatened Category	Presence Text	Buffer Status
Corunastylis plumosa listed as Genoplesium plumosum			
Plumed Midge-orchid, Tallong Midge Orchid [78695]	Endangered	Species or species habitat likely to occur within area	In buffer area only
Dodonaea procumbens			
Trailing Hop-bush [12149]	Vulnerable	Species or species habitat may occur within area	In feature area
Eucalyptus aggregata			
Black Gum [20890]	Vulnerable	Species or species habitat likely to occur within area	In feature area
Eucalyptus aquatica			
Mountain Swamp Gum, Broad-leaved Sallee, Broad-leaved Sally [56173]	Critically Endangered	Species or species habitat known to occur within area	In buffer area only
Eucalyptus macarthurii			
Camden Woollybutt, Paddys River Box [7827]	Endangered	Species or species habitat known to occur within area	In buffer area only
Genoplesium baueri			
Yellow Gnat-orchid, Bauer's Midge Orchid, Brittle Midge Orchid [7528]	Endangered	Species or species habitat may occur within area	In buffer area only
Gentiana wingecarribiensis			
Wingecarribee Gentian [18033]	Endangered	Species or species habitat likely to occur within area	In buffer area only
Grevillea raybrownii			
[65665]	Vulnerable	Species or species habitat may occur within area	In feature area
Haloragis exalata subsp. exalata			
Wingless Raspwort, Square Raspwort [24636]	Vulnerable	Species or species habitat may occur within area	In buffer area only
Helichrysum calvertianum			
[5702]	Vulnerable	Species or species habitat may occur within area	In buffer area only
Hibbertia acaulothrix			
[87409]	Endangered	Species or species habitat may occur within area	In feature area

Scientific Name	Threatened Category	Presence Text	Buffer Status
Kunzea cambagei [11420]	Vulnerable	Species or species habitat known to occur within area	In feature area
Leucochrysum albicans subsp. tricolor Hoary Sunray, Grassland Paper-daisy [89104]	Endangered	Species or species habitat known to occur within area	In feature area
Persicaria elatior Knotweed, Tall Knotweed [5831]	Vulnerable	Species or species habitat may occur within area	In buffer area only
Persoonia mollis subsp. revoluta [56094]	Vulnerable	Species or species habitat known to occur within area	In buffer area only
Persoonia oxycoccoides [16114]	Endangered	Species or species habitat known to occur within area	In buffer area only
Phyllota humifusa Dwarf Phyllota [10133]	Vulnerable	Species or species habitat known to occur within area	In buffer area only
Pomaderris brunnea Rufous Pomaderris, Brown Pomaderris [16845]	Vulnerable	Species or species habitat known to occur within area	In feature area
Pomaderris cotoneaster Cotoneaster Pomaderris [2043]	Endangered	Species or species habitat likely to occur within area	In feature area
Pomaderris pallida Pale Pomaderris [13684]	Vulnerable	Species or species habitat likely to occur within area	In feature area
Rhizanthella slateri Eastern Underground Orchid [11768]	Endangered	Species or species habitat may occur within area	In feature area
Rutidosis leptorhynchoides Button Wrinklewort [67251]	Endangered	Species or species habitat may occur within area	In buffer area only

Scientific Name	Threatened Category	Presence Text	Buffer Status
Thelymitra kangaloonica Kangaloon Sun Orchid [81861]	Critically Endangered	Species or species habitat likely to occur within area	In buffer area only
Thesium australe Austral Toadflax, Toadflax [15202]	Vulnerable	Species or species habitat likely to occur within area	In feature area
Xerochrysum palustre Swamp Everlasting, Swamp Paper Daisy [76215]	Vulnerable	Species or species habitat may occur within area	In buffer area only
Zieria murphyi Velvet Zieria [4634]	Vulnerable	Species or species habitat may occur within area	In buffer area only
REPTILE			
Aprasia parapulchella Pink-tailed Worm-lizard, Pink-tailed Legless Lizard [1665]	Vulnerable	Species or species habitat likely to occur within area	In feature area
Delma impar Striped Legless Lizard, Striped Snake-lizard [1649]	Vulnerable	Species or species habitat may occur within area	In buffer area only
Hoplocephalus bungaroides Broad-headed Snake [1182]	Endangered	Species or species habitat may occur within area	In buffer area only

Listed Migratory Species		[Resource Information]	
Scientific Name	Threatened Category	Presence Text	Buffer Status
Migratory Marine Birds			
Apus pacificus Fork-tailed Swift [678]		Species or species habitat likely to occur within area	In feature area
Migratory Terrestrial Species			
Hirundapus caudacutus White-throated Needletail [682]	Vulnerable	Species or species habitat known to occur within area	In feature area
Monarcha melanopsis Black-faced Monarch [609]		Species or species habitat known to occur within area	In feature area

Scientific Name	Threatened Category	Presence Text	Buffer Status
[Motacilla flava](#) Yellow Wagtail [644]		Species or species habitat may occur within area	In feature area
[Myiagra cyanoleuca](#) Satin Flycatcher [612]		Breeding known to occur within area	In feature area
[Rhipidura rufifrons](#) Rufous Fantail [592]		Species or species habitat likely to occur within area	In feature area
Migratory Wetlands Species			
[Actitis hypoleucos](#) Common Sandpiper [59309]		Species or species habitat may occur within area	In feature area
[Calidris acuminata](#) Sharp-tailed Sandpiper [874]	Vulnerable	Species or species habitat may occur within area	In feature area
[Calidris ferruginea](#) Curlew Sandpiper [856]	Critically Endangered	Species or species habitat may occur within area	In feature area
[Calidris melanotos](#) Pectoral Sandpiper [858]		Species or species habitat may occur within area	In feature area
[Gallinago hardwickii](#) Latham's Snipe, Japanese Snipe [863]	Vulnerable	Species or species habitat likely to occur within area	In feature area
[Pandion haliaetus](#) Osprey [952]		Species or species habitat likely to occur within area	In buffer area only

Other Matters Protected by the EPBC Act

Commonwealth Lands [Resource Information]

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

Commonwealth Land Name	State	Buffer Status
Communications, Information Technology and the Arts - Telstra Corporation Limited		

Commonwealth Land Name	State	Buffer Status
Commonwealth Land - Australian Telecommunications Commission [11834]	NSW	In buffer area only
Commonwealth Land - Telstra Corporation Limited [11833]	NSW	In buffer area only
Transport and Regional Services - Airservices Australia		
Commonwealth Land - Airservices Australia [11832]	NSW	In buffer area only

Listed Marine Species [Resource Information]

Scientific Name	Threatened Category	Presence Text	Buffer Status
Bird			
Actitis hypoleucos Common Sandpiper [59309]		Species or species habitat may occur within area	In feature area
Apus pacificus Fork-tailed Swift [678]		Species or species habitat likely to occur within area overfly marine area	In feature area
Bubulcus ibis as Ardea ibis Cattle Egret [66521]		Species or species habitat may occur within area overfly marine area	In feature area
Calidris acuminata Sharp-tailed Sandpiper [874]	Vulnerable	Species or species habitat may occur within area	In feature area
Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	Species or species habitat may occur within area overfly marine area	In feature area
Calidris melanotos Pectoral Sandpiper [858]		Species or species habitat may occur within area overfly marine area	In feature area
Chalcites osculans as Chrysococcyx osculans Black-eared Cuckoo [83425]		Species or species habitat likely to occur within area overfly marine area	In feature area

Scientific Name	Threatened Category	Presence Text	Buffer Status
Gallinago hardwickii Latham's Snipe, Japanese Snipe [863]	Vulnerable	Species or species habitat likely to occur within area overfly marine area	In feature area
Haliaeetus leucogaster White-bellied Sea-Eagle [943]		Species or species habitat known to occur within area	In feature area
Hirundapus caudacutus White-throated Needletail [682]	Vulnerable	Species or species habitat known to occur within area overfly marine area	In feature area
Lathamus discolor Swift Parrot [744]	Critically Endangered	Species or species habitat known to occur within area overfly marine area	In feature area
Merops ornatus Rainbow Bee-eater [670]		Species or species habitat may occur within area overfly marine area	In feature area
Monarcha melanopsis Black-faced Monarch [609]		Species or species habitat known to occur within area overfly marine area	In feature area
Motacilla flava Yellow Wagtail [644]		Species or species habitat may occur within area overfly marine area	In feature area
Myiagra cyanoleuca Satin Flycatcher [612]		Breeding known to occur within area overfly marine area	In feature area
Neophema chrysostoma Blue-winged Parrot [726]	Vulnerable	Species or species habitat may occur within area overfly marine area	In feature area
Pandion haliaetus Osprey [952]		Species or species habitat likely to occur within area	In buffer area only

Scientific Name	Threatened Category	Presence Text	Buffer Status
Pterodroma cervicalis			
White-necked Petrel [59642]		Species or species habitat may occur within area	In feature area
Rhipidura rufifrons			
Rufous Fantail [592]		Species or species habitat likely to occur within area overfly marine area	In feature area
Rostratula australis as Rostratula benghalensis (sensu lato)			
Australian Painted Snipe [77037]	Endangered	Species or species habitat likely to occur within area overfly marine area	In feature area
Sterna striata			
White-fronted Tern [799]		Migration route may occur within area	In buffer area only

Extra Information

State and Territory Reserves			[Resource Information]
Protected Area Name	Reserve Type	State	Buffer Status
Kerrawary	Nature Reserve	NSW	In buffer area only
Tarlo River	National Park	NSW	In buffer area only

Regional Forest Agreements		[Resource Information]
Note that all areas with completed RFAs have been included. Please see the associated resource information for specific caveats and use limitations associated with RFA boundary information.		
RFA Name	State	Buffer Status
Southern RFA	New South Wales	In buffer area only

Nationally Important Wetlands		[Resource Information]
Wetland Name	State	Buffer Status
Long Swamp	NSW	In buffer area only

EPBC Act Referrals				[Resource Information]
Title of referral	Reference	Referral Outcome	Assessment Status	Buffer Status
Controlled action				
Gunlake Extension Project, Brayton NSW	2015/7557	Controlled Action	Post-Approval	In buffer area only
Lynwood Quarry Project, Marulan, NSW	2012/6560	Controlled Action	Post-Approval	In buffer area only
Not controlled action				

Title of referral	Reference	Referral Outcome	Assessment Status	Buffer Status
Not controlled action				
Highland Source Project	2010/5697	Not Controlled Action	Completed	In buffer area only
Improving rabbit biocontrol: releasing another strain of RHDV, sthrn two thirds of Australia	2015/7522	Not Controlled Action	Completed	In feature area
INDIGO Central Submarine Telecommunications Cable	2017/8127	Not Controlled Action	Completed	In feature area
Not controlled action (particular manner)				
INDIGO Marine Cable Route Survey (INDIGO)	2017/7996	Not Controlled Action (Particular Manner)	Post-Approval	In feature area
Lynwood Quarry Extraction Area Modification, NSW	2016/7653	Not Controlled Action (Particular Manner)	Post-Approval	In buffer area only

Bioregional Assessments			[Resource Information]
SubRegion	BioRegion	Website	Buffer Status
Sydney	Sydney Basin	BA website	In buffer area only

Caveat

1 PURPOSE

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

The report contains the mapped locations of:

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

2 DISCLAIMER

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

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

3 DATA SOURCES

Threatened ecological communities

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

Threatened, migratory and marine species

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

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

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

4 LIMITATIONS

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

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

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

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

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

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

Acknowledgements

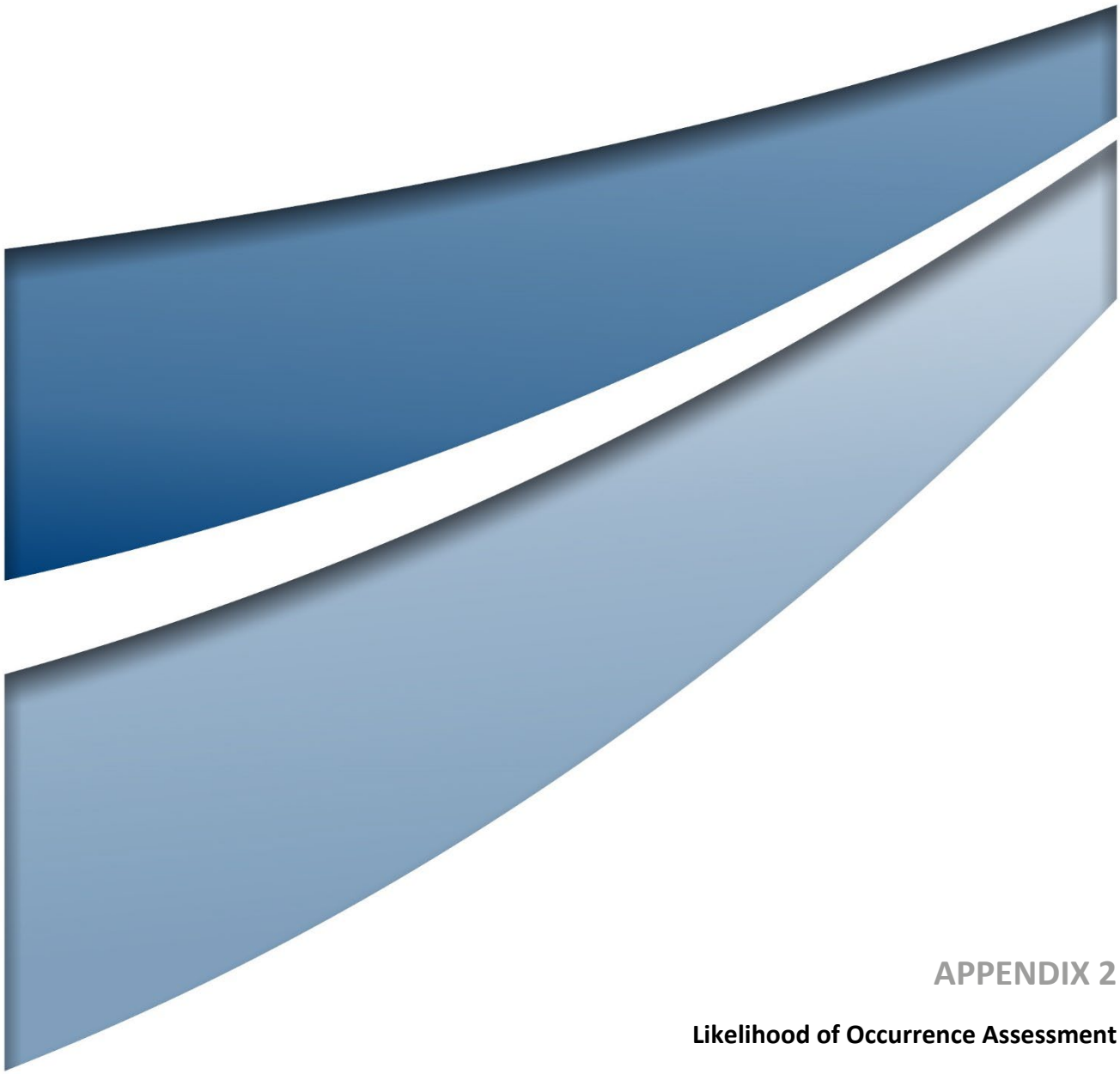
This database has been compiled from a range of data sources. The department acknowledges the following custodians who have contributed valuable data and advice:

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

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

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

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APPENDIX 2

Likelihood of Occurrence Assessment

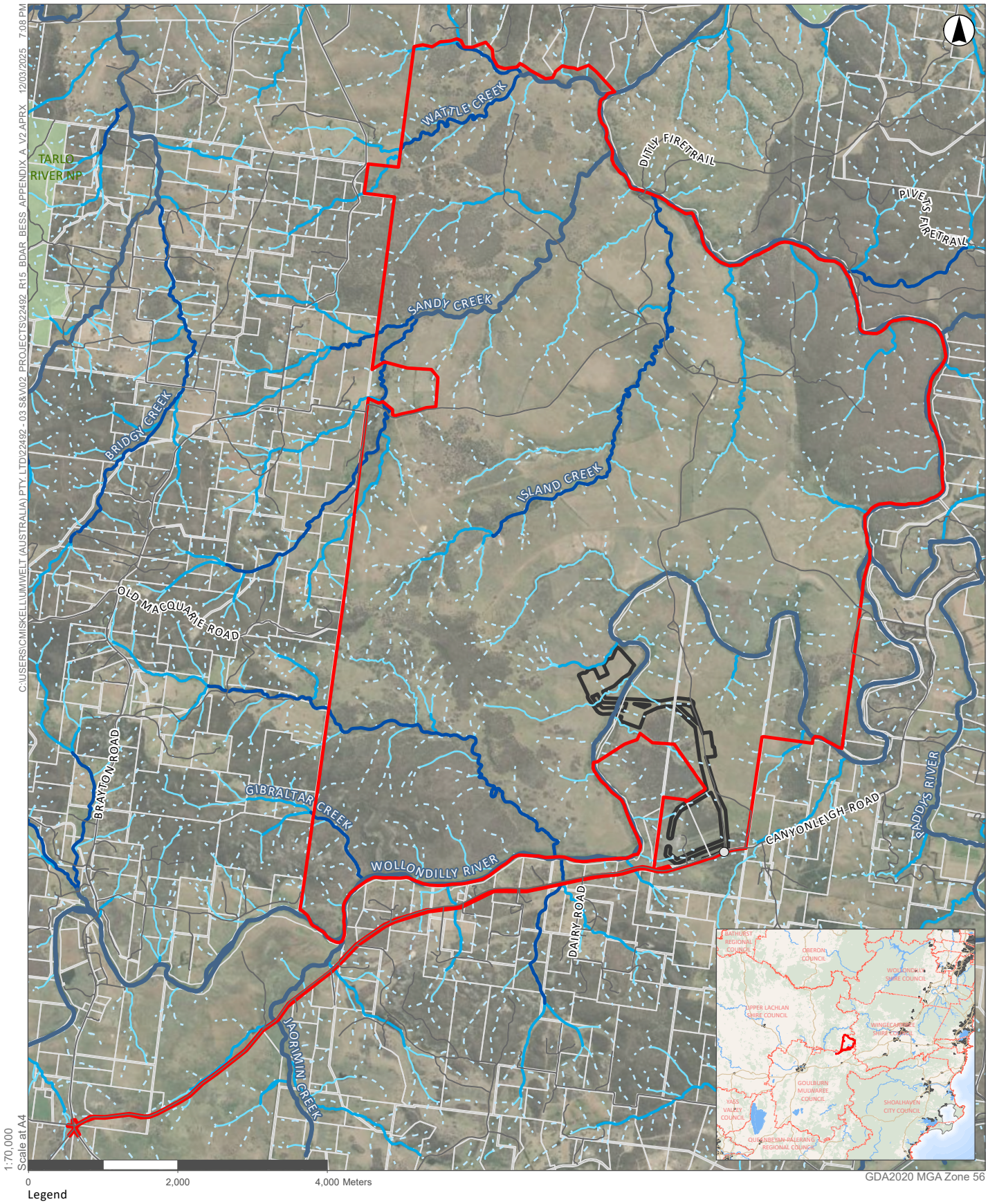
Key to abbreviations used:

- VEC – Vulnerable Ecological Community
- EEC – Endangered Ecological Community
- CEEC – Critically Endangered Ecological Community
- V – Vulnerable
- E – Endangered
- CE – Critically Endangered
- C – China-Australia Migratory Bird Agreement (CAMBA)
- J – Japan-Australia Migratory Bird Agreement (JAMBA)
- K – Republic of Korea-Australia Migratory Bird Agreement (ROKAMBA)
- B – Bonn Convention.

A.1 Threatened Ecological Communities

Five TECs were identified within the PMST as being likely impacted by the Proposed Action (refer to **Section 1.3**) The TECs considered for further assessment are detailed with **Table A2.1.**

Of the five TECs considered, only White Box - Yellow Box - Blakely's Red Gum Grassy Woodland and Derived Native Grassland Critically Endangered Ecological Community CEEC, has been retained for further assessment, as this was the only TEC listed under the EPBC Act identified as occurring within the Biodiversity Study Area. Approximately 2.12 ha of White Box - Yellow Box - Blakely's Red Gum Grassy Woodland and Derived Native Grassland Critically Endangered Ecological Community CEEC has been identified in the Biodiversity Study Area. The extent of the White Box - Yellow Box - Blakely's Red Gum Grassy Woodland and Derived Native Grassland Critically Endangered Ecological Community in the Biodiversity Study Area is shown in **Figure A2.1.**



Legend

- Project Area
- Development Footprint
- NSW National Parks
- Existing Roads and Tracks
- Property Boundaries
- Access Points

Stream Order

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

FIGURE 2.1

Site Map

Image Source: ESRI Basemap (2024) **Data source:** NSW LPI (2024), NSW DSFI (2024)

Table A2.1 MNES Recorded or with Potential to Occur within the Development Footprint

MNES Name	Status		PMST Notes	Source	Further assessment required?	Justification
	BC Act	EPBC Act				
Natural Temperate Grassland of the South Eastern Highlands	-	CE	Community likely to occur within area	☐ BAM-C ☐ BioNet ☒ PMST ☐ SEARs ☐ Current survey	No	Not recorded during field surveys. No PCTs within the Development Footprint are associated with this CEEC.
Southern Highlands Shale Forest and Woodland in the Sydney Basin Bioregion	-	CE	Community may occur within area	☐ BAM-C ☐ BioNet ☒ PMST ☐ SEARs ☐ Current survey	No.	Not recorded within the Development Footprint and unlikely to occur based on habitat requirements and known distribution.
Temperate Highland Peat Swamps on Sandstone	-	E	Community may occur within area	☐ BAM-C ☐ BioNet ☒ PMST ☐ SEARs ☐ Current survey.	No.	Not recorded within the Development Footprint and unlikely to occur based on habitat requirements and known distribution.
Upland Basalt Eucalypt Forests of the Sydney Basin Bioregion	-	E	Community may occur within area	☐ BAM-C ☐ BioNet ☒ PMST ☐ SEARs ☐ Current survey	No.	Not recorded within the Development Footprint and unlikely to occur based on habitat requirements and known distribution.

MNES Name	Status		PMST Notes	Source	Further assessment required?	Justification
	BC Act	EPBC Act				
White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland	-	CE	Community likely to occur within area	☐ BAM-C ☐ BioNet ☒ PMST ☒ Supplementary SEARs ☐ Current survey	Yes. See Appendix 3, Section 2.1	Patches of DNG and woodland vegetation have been recorded in the BESS DC. The BESS DC will be refined during the EIS and detailed design phase to avoid any patch of vegetation that meets the relevant condition thresholds of this ecological community with regards to the Proposed Action.

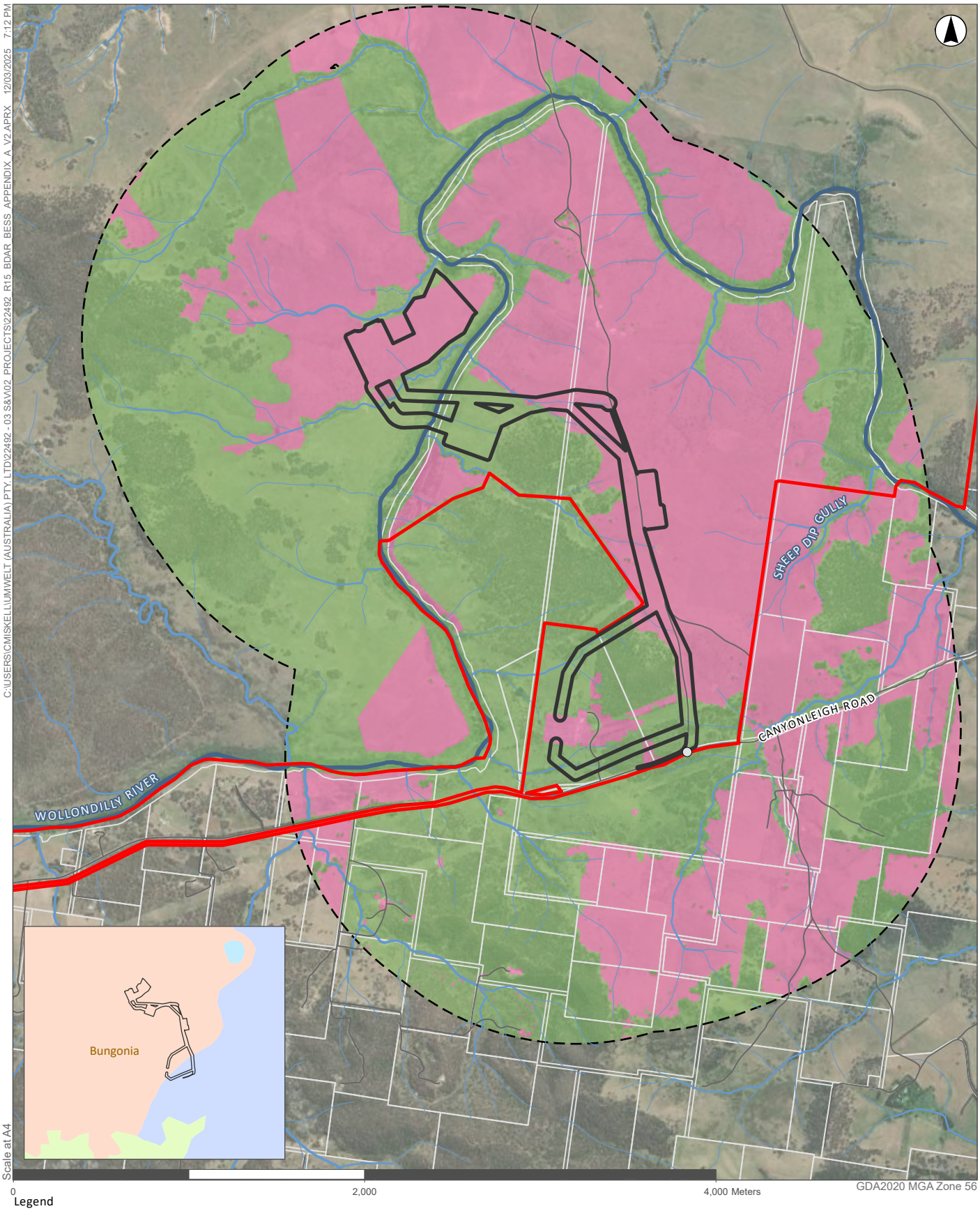
A.2 Threatened Fauna species

Threatened species identified within the Supplementary SEARs as being considered likely or possible to be potentially significantly impacted by the Proposed Action, threatened species identified within the BioNet and PMST desktop searches, and threatened species recorded in the Biodiversity Study Area are listed in **Table A2.2**. **Table A2.2** outlines if the species has been retained or excluded for further assessment. Justification for species that have been excluded for further assessment is also presented in **Table A2.2.**

Those threatened species recorded in the Biodiversity Study Area during field surveys are shown in **Figure A2.2.**

Those MNES species identified as potentially occurring in the Development Footprint in the NSW BAM-C automatically populated list as associated with PCTs, have been reviewed to identify whether they are to be retained or excluded from further assessment. Geographic limitations, vagrant species, habitat constraints, degradation or lack of suitable microhabitats are the permitted reasons for excluding species credit species.

Under the NSW BAM, ecosystem species are associated with PCT and assumed present and targeted surveys are not required. These species have been retained unless adequate surveys have been completed that would rule these species out from occurring in the Development Footprint.



Legend

- Project Area
- Development Footprint
- 1500m Buffer Area (Total extent = 2112.39ha)
- Property Boundaries
- Existing Roads and Tracks
- Access Points

Stream Order

- 1
- 2
- 3
- 4
- > 5

- Native Vegetation Extent (1161.61ha, 54.99% of Assessment Area)
- Non-Native/Category 1- Exempt land (950.78ha, 45.01% of Assessment Area)

Mitchell Landscapes

- But
- Mvh
- Rbb
- Wbg

FIGURE 2.2

Location Map

Image Source: ESRI Basemap (2024) **Data source:** NSW LPI (2024), NSW DSFI (2024)

Table A2.2 Threatened Fauna as Requiring Further Assessment

Scientific Name	Common Name	BC Act	EPBC Act	Ecosystem/ Species credit	Source	Species retained for further assessment. If not, why not?
Amphibia						
Litoria watsoni	Watson's tree frog	E	E	N/A	☐ BAM-C ☐ BioNet ☒ PMST ☐ SEARs ☐ Current survey	No. Suitable habitat is not present within the Development Area. There are no records of this species within the locality.
Heleioporus australiacus	Giant burrowing frog	V	V	Species-credit-species	☒ BAM-C ☐ BioNet ☐ PMST ☐ SEARs ☐ Current survey	No. Suitable habitat is not present within the Development Footprint. There are no records of this species within the locality.
Litoria aurea	Green and golden bell frog	E	V	Species-credit species	☒ BAM-C ☐ BioNet ☐ PMST ☐ SEARs ☐ Current survey	No. Targeted searches for amphibians were undertaken in watercourses, dams and soaks throughout the Development Footprint in January 2023, December 2023 and February 2024, and did not detect the species. Suitable habitat is present within the Development Footprint as this species is associated with PCT 3376. Two dams with emergent vegetation as well as 36 first order watercourses, 12 second order watercourses and one third order watercourses with varying abundance on emergent aquatic vegetation are present in the BESS Development Footprint. There are no records of this species within the locality.

Scientific Name	Common Name	BC Act	EPBC Act	Ecosystem/ Species credit	Source	Species retained for further assessment. If not, why not?
Mixophyes balbus	Stuttering frog	E	V	Species-credit species	☒ BAM-C ☐ BioNet ☐ PMST ☐ SEARs ☐ Current survey	No. Excluded as a candidate species, however targeted searches for amphibians were undertaken in watercourses, dams and soaks throughout the Development Footprint in January 2023, December 2023 and February 2024, and did not record the species. No suitable breeding habitat in the form of ephemeral flowing streams within native vegetation is present within the BESS Development Footprint. There are no records of this species within the locality.
Litoria booroolongensis	Booroolong frog	E	E	Species-credit species	☒ BAM-C ☐ BioNet ☐ PMST ☐ SEARs ☐ Current survey	No. Targeted searches for amphibians were undertaken in watercourses, dams and soaks throughout the Development Footprint in January 2023, December 2023 and February 2024, and did not detect the species. A small area of suitable habitat is present within the BESS Development Footprint along the Wollondilly River. There are no records of this species within the locality.
Aves						
Anthochaera phrygia	Regent honeyeater	CE	CE	Species/Ecosystems-credit-species	☒ BAM-C ☐ BioNet ☒ PMST ☒ Supplementary SEARs ☐ Current survey	No. The species is assessed for species credits via the Important Habitat Map in BOAMS. The species has not been detected in the Development Footprint despite comprehensive bird survey being undertaken in the Project Area. No Bionet records in the locality.
Aphelocephala leucopsis	Southern whiteface	V	V	N/A	☒ BAM-C ☐ BioNet ☒ PMST ☐ SEARs ☐ Current survey	No. While associated with PCTs 3374, 3376 and 3347 in the Project Area, there are no Bionet records in the locality and the species has not been detected in the Development Footprint despite comprehensive bird survey being undertaken in the Project Area.

Scientific Name	Common Name	BC Act	EPBC Act	Ecosystem/ Species credit	Source	Species retained for further assessment. If not, why not?
Botaurus poiciloptilus	Australasian bittern	E	E	Ecosystem-credit-species	☐ BAM-C ☐ BioNet ☒ PMST ☐ SEARs ☐ Current survey	No. Not associated with PCTs in the Project Area and no Bionet records in the locality. The species has not been detected in the Development Footprint despite comprehensive bird survey being undertaken in the Project Area.
Calidris acuminata	Sharp-tailed sandpiper	-	V	-	☐ BAM-C ☐ BioNet ☒ PMST ☐ SEARs ☐ Current survey	No. Not associated with PCTs in the Project Area and no Bionet records in the locality. The species has not been detected in the Development Footprint despite comprehensive bird survey being undertaken in the Project Area.
Calidris ferruginea	Curlew sandpiper	CE	CE B,C,K, K	ecosystem-credit-species	☐ BAM-C ☐ BioNet ☒ PMST ☐ SEARs ☐ Current survey	No. Not associated with PCTs in the Project Area and no Bionet records in the locality. The species has not been detected in the Development Footprint despite comprehensive bird survey being undertaken in the Project Area.
Callocephalon fimbriatum	Gang-gang cockatoo	E	E	Species/ Ecosystem-credit-species	☒ BAM-C ☒ BioNet ☒ PMST ☒ Supplementary SEARs ☒ Current survey	Yes. There is suitable habitat present within the Development Footprint as this species is associated with PCT 4063, 3374 and 3376.There are 51 records of this species within the locality. This species was recorded within the Development Footprint during diurnal bird surveys and detailed potential nest searches.

Scientific Name	Common Name	BC Act	EPBC Act	Ecosystem/ Species credit	Source	Species retained for further assessment. If not, why not?
Calyptorhynchus lathami lathami	south-eastern glossy black-cockatoo	V	V	Species/ Ecosystem-credit-species	☒ BAM-C ☒ BioNet ☒ PMST ☒ Supplementary SEARs ☒ Current survey	Yes. There is suitable habitat present within the Development Footprint as this species is associated with PCT 4063, 3374 and 3376. This species was recorded within the Development Footprint during diurnal bird surveys and detailed potential nest searches.
Climacteris picumnus victoriae	Brown treecreeper (south-eastern)	V	V	Ecosystem-credit-species	☒ BAM-C ☒ BioNet ☒ PMST ☒ Supplementary SEARs ☐ Current survey	Yes. Moderate. Suitable habitat is present within the Development Footprint as this species is associated with PCT 4063, 3374 and 3376.There are 3 records of this species within the locality.
Falco hypoleucos	Grey falcon	V	V	Ecosystem-credit-species	☐ BAM-C ☐ BioNet ☒ PMST ☐ SEARs ☐ Current survey	No. Not associated with PCTs in the Project Area and no Bionet records in the locality. The species has not been detected in the Development Footprint despite comprehensive bird survey being undertaken in the Project Area.
Gallinago hardwickii	Latham's snipe, Japanese snipe	V	V	N/A	☐ BAM-C ☐ BioNet ☒ PMST ☐ SEARs ☐ Current survey	No. Not associated with PCTs in the Project Area and no Bionet records in the locality. The species has not been detected in the Development Footprint despite comprehensive bird survey being undertaken in the Project Area.

Scientific Name	Common Name	BC Act	EPBC Act	Ecosystem/ Species credit	Source	Species retained for further assessment. If not, why not?
Grantiella picta	Painted honeyeater	V	V	Ecosystem-credit-species	☒BAM-C ☐ BioNet ☒ PMST ☒ Supplementary SEARs ☐ Current survey	Yes. Moderate. There is suitable habitat present within the Development Footprint as this species is associated with PCT 4063, 3374, and 3376. There are no records of this species within the locality.
Hirundapus caudacutus	White-throated needletail	V	V C, J, K	Ecosystem-credit-species	☒ BAM-C ☒ BioNet ☒ PMST ☐ SEARs ☐ Current survey	No. Not recorded in Project Area despite comprehensive survey effort.
Lathamus discolor	Swift parrot	E	CE	Species/Ecosystem-credit-species	☒ BAM-C ☐ BioNet ☒ PMST ☒ Supplementary SEARs ☐ Current survey	No. Suitable foraging habitat is present within the Development Footprint as this species is associated with PCT 4063, 3374 and 3376, however the species was not recorded during surveys. Only one record of this species within the locality. Development Footprint is not mapped as important habitat. The Development Footprint may not be considered habitat critical to the survival of the species given paucity of preferred foraging species.
Melanodryas cucullata cucullata	south-eastern hooded robin, hooded robin (south-eastern)	E	E	Ecosystem-credit-species	☐ BAM-C ☒ BioNet ☒ PMST ☒ Supplementary SEARs ☐ Current survey	Yes. Moderate. Suitable habitat is present within the Development Footprint as this species is associated with PCT 4063, 3374 and 3376. There is one record of this species within the locality.

Scientific Name	Common Name	BC Act	EPBC Act	Ecosystem/ Species credit	Source	Species retained for further assessment. If not, why not?
Neophema chrysostoma	Blue-winged parrot	V	V	N/A	☐ BAM-C ☐ BioNet ☒ PMST ☐ SEARs ☐ Current survey	No. There are no associated PCTs listed for this species in the TBDC. There are no records for this species within the locality.
Polytelis swainsonii	Superb parrot	V	V	Species/Ecosystem-credit-species	☐ BAM-C ☐ BioNet ☒ PMST ☐ SEARs ☐ Current survey	No. No suitable habitat is present within the Development Footprint. There are no records of this species within the locality.
Pycnoptilus floccosus	Pilotbird	-	V	Gazetted under BC Act on 9 August 2024.	☒ BAM-C ☐ BioNet ☒ PMST ☐ SEARs ☐ Current survey	No. PCT 3347 is identified as an associated PCT in the TBDC for this species but there are no records of this species within the locality and the species was not observed during field surveys in December 2022, January 2023, February 2023, and October 2023.
Rostratula australis	Australian painted snipe	E	E	Ecosystem-credit-species	☐ BAM-C ☐ BioNet ☒ PMST ☐ SEARs ☐ Current survey	No. Suitable habitat is present within the Development Footprint as this species is associated with PCT 4063. There are no records for this species within the locality.

Scientific Name	Common Name	BC Act	EPBC Act	Ecosystem/ Species credit	Source	Species retained for further assessment. If not, why not?
Stagonopleura guttata	Diamond firetail	V	V	Ecosystem-credit-species	☐ BAM-C ☒ BioNet ☒ PMST ☒ Supplementary SEARs ☒ Current survey	Yes. Suitable habitat is present within the Development Footprint as this species is associated with PCT 4063, 3374 and 3376.There are 19 records of this species within the locality. Recorded several times within the Development Footprint during field surveys in December 2022, January 2023, February 2023, and October 2023.
Mammalia						
Dasyurus maculatus maculatus (SE mainland population)	Spotted-tailed quoll	V	E	Ecosystem-credit-species.	☐ BAM-C ☒ BioNet ☒ PMST ☐ SEARs ☐ Current survey	No. Not recorded during surveys. Only 3 records of the species within the locality.
Petauroides volans	Greater glider (southern and central)	E	E	Species-credit-species	☐ BAM-C ☐ BioNet ☒ PMST ☒ Supplementary SEARs ☐ Current survey	Yes. Species was surveyed for via Nocturnal spotlighting transects, Remote camera traps and songmeter detection, and was not detected. Suitable habitat is present within the Development Footprint as this species is associated with PCT 4063, 3374 and 3376. There are 22 records of this species within the locality.
Phascolarctos cinereus (combined populations of Qld, NSW and the ACT)	koala (combined populations of Queensland, New South Wales and the Australian Capital Territory)	E	E	Species-credit-species	☒ BAM-C ☒ BioNet ☒ PMST ☒ Supplementary SEARs ☐ Current survey	Yes. The species was surveyed via nocturnal spotlighting transects, remote camera trapping and songmeter detection and KSAT. It was not detected. Suitable habitat is present within the Development Footprint as this species is associated with PCT 4063, 3374 and 3376. There are 1360 records of this species within the locality.

Scientific Name	Common Name	BC Act	EPBC Act	Ecosystem/ Species credit	Source	Species retained for further assessment. If not, why not?
Chalinolobus dwyeri	Large-eared pied bat	E	E	Species-credit-species	☒ BAM-C ☒ BioNet ☒ PMST ☒ Supplementary SEARs ☐ Current survey	Yes. No breeding habitat present onsite or within 2 km of the Development Footprint. Ultrasonic anabat detection over 168 trap nights between October and November 2022, January and February 2023 and February 2024. Suitable habitat is present within the Development Footprint as this species is associated with PCT 4063, 3374, and 3376. Rocky outcrops are common throughout the Project Area, existing as exposed bedrock, exfoliated surfaces and crevices and loose surface rock. There are five records of this species within the locality.
Pteropus poliocephalus	Grey-headed flying-fox	V	V	Species/Ecosystem-credit-species	☒ BAM-C ☐ BioNet ☒ PMST ☒ Supplementary SEARs ☐ Current survey	No. Habitat assessments and surveys undertaken on site did not identify breeding camps. The closest nationally important flying-fox camp is located approximately 80 km south east of the Development Footprint at Nowra. Suitable foraging habitat is present within the Development Footprint as this species is associated with PCT 4063, 3374, and 3376. There are 3 records of this species within the locality.
Petaurus australis australis	Yellow-bellied glider (south-eastern)	V	V	Ecosystem-credit-species	☒ BAM-C ☐ BioNet ☒ PMST ☒ Supplementary SEARs ☐ Current survey	Yes. Suitable habitat is present within the Development Footprint as this species is associated with PCT 3374. There are 5 records of this species within the locality.

Scientific Name	Common Name	BC Act	EPBC Act	Ecosystem/ Species credit	Source	Species retained for further assessment. If not, why not?
Pseudomys novaehollandiae	New Holland mouse, pookila	-	V	Ecosystem-credit-species	☐ BAM-C ☐ BioNet ☒ PMST ☐ SEARs ☐ Current survey	No. No suitable habitat is present within the Development Footprint. There are no records of this species within the locality.
Petrogale penicillata	Brush-tailed rock-wallaby	E	V	Species-credit-species	☒BAM-C ☒ BioNet ☒ PMST ☐ SEARs ☐ Current survey	No. Thorough daytime searches for signs and habitat resources and Remote cameras were utilised, and the species was not detected. Very small areas of exposed rocky outcrops are present in the BESS Development Footprint. It is unlikely that the habitat in the Project Area would provide important habitat for this species. There is one record of this species within the locality.
Insects						
Keyacris scurra	Key's matchstick grasshopper	E	E	Species-credit-species	☒ BAM-C ☐ BioNet ☒ PMST ☒ Supplementary SEARs ☐ Current survey	No. Not recorded during surveys. Suitable habitat is present within the Development Footprint as this species is associated with PCT 3376. There are no records of this species within the locality.
Fish						
Macquaria australasica	Macquarie perch	-	E	N/A	☐ BAM-C ☐ BioNet ☒ PMST ☐ SEARs ☐ Current survey	No. Low. The nearest predicted distribution is approximately 28 km from the Development Footprint in Wollondilly River.

Scientific Name	Common Name	BC Act	EPBC Act	Ecosystem/ Species credit	Source	Species retained for further assessment. If not, why not?
Prototroctes maraena	Australian grayling	-	V	N/A	☐ BAM-C ☐ BioNet ☒ PMST ☐ SEARs ☐ Current survey	No. Low. The nearest predicted distribution is approximately 29 km from the Development Footprint in the Shoalhaven River.
Reptilia						
Aprasia parapulchella	Pink-tailed worm-lizard, pink-tailed legless lizard	V	V	Species-credit-species	☒ BAM-C ☐ BioNet ☒ PMST ☒ Supplementary SEARs ☐ Current survey	No. Small areas of suitable habitat are present within the BESS Development Footprint as this species is associated with PCT 3374 and 3376. Surveys have been undertaken during suitable surveying timing, no individuals were recorded and the field team noted that the majority of the small rocks were too deeply embedded in the soil to provide the suitable microhabitat for the species. There are no records of this species within the locality.
Delma impar	Striped legless lizard	V	V	Species-credit-species	☒ BAM-C ☐ BioNet ☒ PMST ☐ SEARs ☐ Current survey	No. Suitable habitat is present within the Development Footprint as this species is associated with PCT 3376 and PCT 3347. There are no records of this species within the locality. Surveys did not detect the species, though additional tile surveys are ongoing.
Hoplocephalus bungaroides	Broad-headed snake	E	E	Species/Ecosystem-credit-species	☐ BAM-C ☐ BioNet ☒ PMST ☐ SEARs ☐ Current survey	No. There is no suitable habitat within the Development Footprint. There are no records of this species within the locality.

A.3 Threatened Flora Species

Threatened flora species identified within the Supplementary SEARs as being considered likely to potentially be impacted by the Proposed Action and threatened species identified within the BioNet and PMST desktop searches are listed in **Table A2.3. Table A2.3 i**dentifies if the species has been retained or excluded for further assessment. Justification for species that have been excluded for further assessment is also presented in **Table A2.3.**

Those MNES species identified as potentially occurring in the Development Footprint according to the NSW BAM-C, have been reviewed to identify whether they are to be retained or excluded from assessment.

No threatened flora species have been identified in the Development Footprint during targeted flora surveys conducted in keeping with the BAM. Two threatened flora species, *Eucalyptus macarthurii* and *Eucalyptus nicholii* were recorded in the Biodiversity Study Area. Impacts to these two species have been avoided through re-design of the Development Footprint.

Table A2.3 Threatened Flora as Requiring Further Assessment

Scientific Name	Common Name	BC Act	EPBC Act	Ecosystem/ Species credit	Source	Species retained for further assessment. If not, why not?
Acacia bynoeana	Bynoe's wattle, tiny wattle	V	V	Candidate species credit.	☐ BAM-C ☐ BioNet ☒ PMST ☐ SEARs ☐ Current survey	No. No suitable habitat within the Development Footprint. There are no records of this species within the locality.
Baloskion longipes	dense cord-rush	V	V	Candidate species credit.	☐ BAM-C ☒ BioNet ☒ PMST ☐ SEARs ☐ Current survey	No. No suitable habitat present in Development Footprint. Three records of this species occur within the locality.
Caladenia tessellata	thick-lipped spider-orchid, daddy long-legs	E	V	Candidate species credit.	☐ BAM-C ☐ BioNet ☒ PMST ☐ SEARs ☐ Current survey	No. No suitable habitat within the Development Footprint. There are no records of this species within the locality. Targeted surveys throughout the Development Footprint in accordance with the BAM did not record the species.
Callitris oblonga	pygmy cypress-pine	V	V	Candidate species credit.	☒ BAM-C ☐ BioNet ☐ PMST ☐ SEARs ☐ Current survey	No. Suitable habitat is present within the Development Footprint as this species is associated with PCT 4063 There are no records of this species within the locality. Targeted surveys throughout the Development Footprint in accordance with the BAM did not record the species.

Scientific Name	Common Name	BC Act	EPBC Act	Ecosystem/ Species credit	Source	Species retained for further assessment. If not, why not?
Commersonia prostrata	dwarf kerrawang	E	E	Candidate species credit.	☒ BAM-C ☐ BioNet ☒ PMST ☐ SEARs ☐ Current survey	No. Suitable habitat present in Development Footprint as the species is associated with PCT 4063. There is one record of this species within the locality. Targeted surveys throughout the Development Footprint in accordance with the BAM did not record the species.
Corunastylis plumosa	plumed midge-orchid	CE	E	Candidate species credit.	☐ BAM-C ☐ BioNet ☒ PMST ☐ SEARs ☐ Current survey	No. No suitable habitat present within the Development Footprint. There are 20 records of this species within the locality.
Dodonaea procumbens	trailing hop-bush	V	V	Candidate species credit.	☐ BAM-C ☐ BioNet ☒ PMST ☐ SEARs ☐ Current survey	No. No suitable habitat present within the Development Footprint. No records of this species within the locality.
Diuris aequalis	buttercup doubletail	E	E	Candidate species credit.	☒ BAM-C ☐ BioNet ☐PMST ☐ SEARs ☐ Current survey	No. Suitable habitat is present within the Development Footprint as this species is associated with PCT 3376. No records of this species within the locality. Targeted surveys throughout the Development Footprint in accordance with the BAM did not record the species.

Scientific Name	Common Name	BC Act	EPBC Act	Ecosystem/ Species credit	Source	Species retained for further assessment. If not, why not?
Eucalyptus aggregata	black gum	V	V	Candidate species credit.	☒ BAM-C ☒ BioNet ☒ PMST ☐ SEARs ☐ Current survey	No. Suitable habitat present within the Development Footprint as this species is associated with PCT 3376. There are 5 records of this species within the locality. Targeted surveys throughout the Development Footprint in accordance with the BAM did not record the species.
Eucalyptus aquatica	broad-leaved sally	V	V	Candidate species credit.	☐ BAM-C ☒ BioNet ☒ PMST ☒ SEARs ☐ Current survey	No. There is no suitable habitat for this species within the Development Footprint. However, there are 16 records of this species within the locality. Targeted surveys throughout the Development Footprint in accordance with the BAM did not record the species.
Eucalyptus macarthurii	Camden woollybutt, Paddys River box	E	E	Candidate species credit.	☐ BAM-C ☒ BioNet ☒ PMST ☐ SEARs ☒ Current survey	Yes. Planted individuals recorded outside Development Footprint.
Eucalyptus nicholii	narrow-leaved black peppermint	V	V	Species credit species.	☐ BAM-C ☐ BioNet ☒ PMST ☐ SEARs ☒ Current survey	Yes. Planted individuals recorded outside Development Footprint.

Scientific Name	Common Name	BC Act	EPBC Act	Ecosystem/ Species credit	Source	Species retained for further assessment. If not, why not?
Eucalyptus recurva	Mongarlowe mallee	CE	CE	Species-credit-species.	☒ BAM-C ☐ BioNet ☐ PMST ☐ SEARs ☐ Current survey	No. 'Low' LoO. Targeted surveys throughout the Development Footprint in accordance with the BAM did not record the species.
Genoplesium baueri	yellow gnat-orchid, Bauer's midge orchid, brittle midge orchid	E	E	Candidate species credit.	☐ BAM-C ☐ BioNet ☒ PMST ☐ SEARs ☐ Current survey	No. There is no suitable habitat for this species within the Development Footprint. There are no records of this species within the locality. Not recorded during surveys.
Genoplesium plumosum	Tallong midge orchid	CE	E	Species-credit-species.	☐ BAM-C ☒ BioNet ☐ PMST ☐ SEARs ☐ Current survey	No. There is no suitable habitat for this species within the Development Footprint. There are no records of this species within the locality. Not recorded during surveys.
Gentiana wingecarribiensis	Wingecarribee gentian	CE	E	Candidate species credit.	☐ BAM-C ☒ BioNet ☒ PMST ☐ SEARs ☐ Current survey	No. There is no suitable habitat for this species within the Development Footprint. However, there are 5 records of this species within the locality. Targeted surveys throughout the Development Footprint in accordance with the BAM did not record the species.

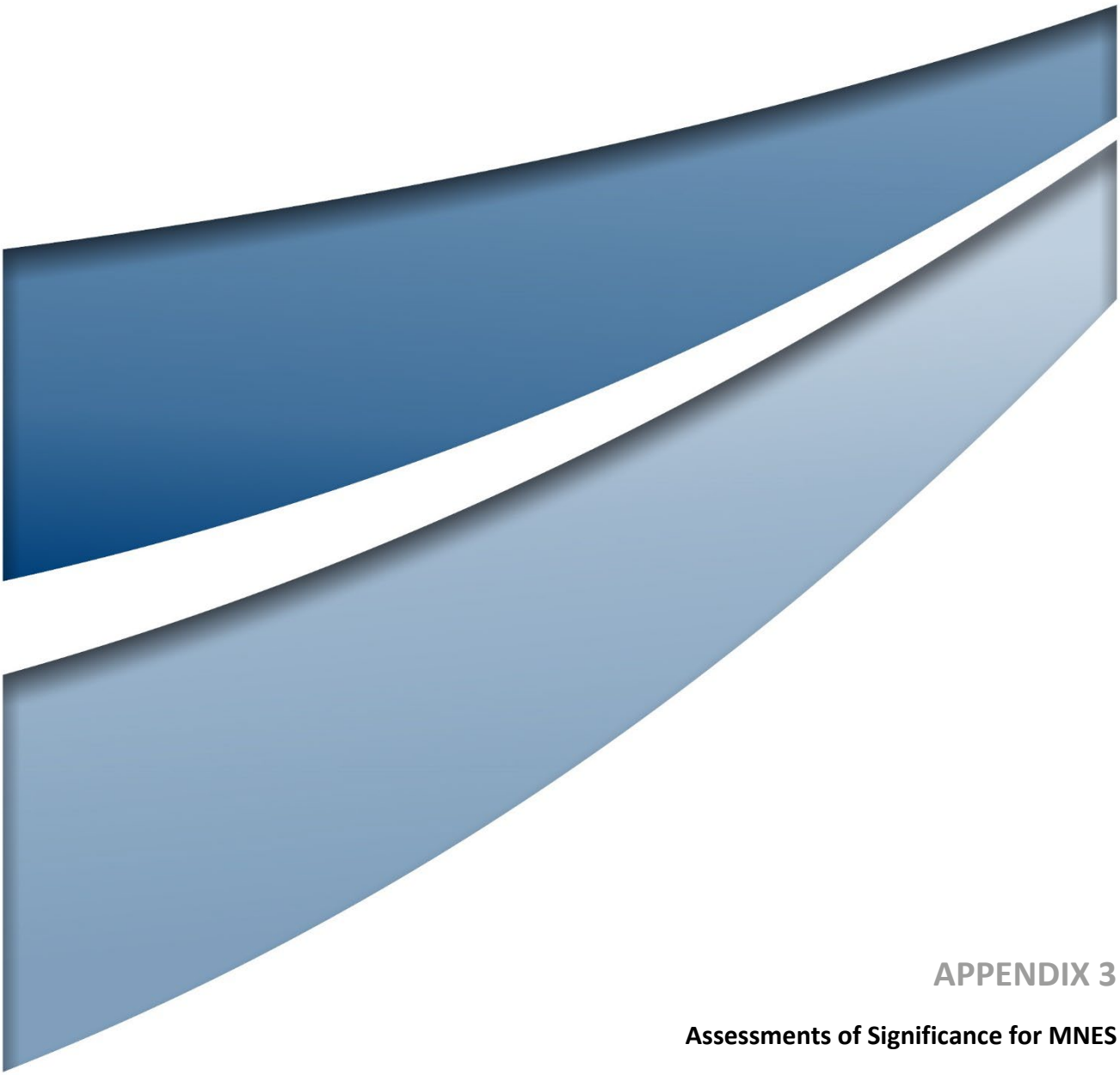
Scientific Name	Common Name	BC Act	EPBC Act	Ecosystem/ Species credit	Source	Species retained for further assessment. If not, why not?
Grevillea raybrownii	-	V	V	Candidate species credit.	☐ BAM-C ☐ BioNet ☒ PMST ☐ SEARs ☐ Current survey	No. There is no suitable habitat for this species within the Development Footprint. There are no records of this species within the locality.
Haloragis exalata subsp. exalata	wingless raspwort	V	V	Candidate species credit.	☐ BAM-C ☐ BioNet ☒ PMST ☐ SEARs ☐ Current survey	No. No suitable habitat present within the Development Footprint. No records of this species within the locality.
Helichrysum calvertianum	-	V	V	Candidate species credit.	☐ BAM-C ☒ BioNet ☒ PMST ☐ SEARs ☐ Current survey	No. No suitable habitat for this species within the Development Footprint. However, there is one record of this species within the locality.
Hibbertia acaulothrix	-	E	E	Gazetted under BC Act on 9 August 2024.	☐ BAM-C ☐ BioNet ☒ PMST ☐ SEARs ☐ Current survey	No. No suitable habitat for this species within the Development Footprint. However, there is one record of this species within the locality. Flowering all year, surveyed multiple times.

Scientific Name	Common Name	BC Act	EPBC Act	Ecosystem/ Species credit	Source	Species retained for further assessment. If not, why not?
Kunzea cambagei	Cambage kunzea	V	V	Candidate species credit.	☐ BAM-C ☒ BioNet ☒ PMST ☐ SEARs ☐ Current survey	No. No suitable habitat for this species within the Development Footprint. However, there are 4 records of this species within the locality. Not recorded during surveys.
Leucochrysum albicans subsp. tricolor	hoary sunray	E	E	Candidate species credit.	☒ BAM-C ☒ BioNet ☒ PMST ☐ SEARs ☐ Current survey	No. Suitable habitat present within the Development Footprint as this species is associated with PCT 3374 and 3376. There are 9 records of this species within the locality. Targeted surveys throughout the Development Footprint in accordance with the BAM did not record the species.
Persicaria elatior	tall knotweed	V	V	Candidate species credit.	☐ BAM-C ☐ BioNet ☒ PMST ☐ SEARs ☐ Current survey	No. No suitable habitat present within the Development Footprint. There are no records of this species within the locality.
Persoonia mollis subsp. revoluta	-	V	V	Candidate species credit.	☐ BAM-C ☒ BioNet ☒ PMST ☐ SEARs ☐ Current survey	No. No suitable habitat is present within the Development Footprint. There are 75records of this species within the locality. Not recorded during surveys.

Scientific Name	Common Name	BC Act	EPBC Act	Ecosystem/ Species credit	Source	Species retained for further assessment. If not, why not?
Persoonia oxycoccoides	-	E	E	Candidate species credit.	☐ BAM-C ☒ BioNet ☒ PMST ☐ SEARs ☐ Current survey	No. There are no associated PCTs listed for this species in the TBDC, however, it is likely there may be suitable habitat present within the Development Footprint given there are 6 records of this species within the locality. Not recorded during surveys.
Phyllota humifusa	dwarf phyllota	V	V	Candidate species credit.	☐ BAM-C ☒ BioNet ☒ PMST ☐ SEARs ☐ Current survey	No. No suitable habitat present within the Development Footprint. However, there are 95 records of this species within the locality. Not recorded during surveys.
Pomaderris brunnea	rufous pomaderris, brown pomaderris	E	V	Candidate species credit.	☐ BAM-C ☒ BioNet ☒ PMST ☐ SEARs ☐ Current survey	No. No suitable habitat for this species within the Development Footprint. However, there is one record of this species within the locality.
Pomaderris cotoneaster	cotoneaster pomaderris	E	E	Candidate species credit.	☒ BAM-C ☐ BioNet ☒ PMST ☐ SEARs ☐ Current survey	No. There is suitable habitat present within the Development Footprint. as the species is associated with PCT 3374. There are 3 records of this species within the locality. Not recorded during surveys.

Scientific Name	Common Name	BC Act	EPBC Act	Ecosystem/ Species credit	Source	Species retained for further assessment. If not, why not?
Pomaderris delicata	delicate pomaderris	CE	CE	Species-credit-species	☒ BAM-C ☐ BioNet ☐ PMST ☒ SEARs ☐ Current survey	No. Not recorded during surveys. No Targeted surveys throughout the Development Footprint in accordance with the BAM did not record the species.
Pomaderris pallida	pale pomaderris	V	V	Candidate species credit.	☐ BAM-C ☐ BioNet ☒ PMST ☐ SEARs ☐ Current survey	No. Not recorded during surveys. There is suitable habitat present within the Development Footprint as the species is associated with PCT 4063 and 3376. There are no records of this species within the locality.
Rhizanthella slateri	eastern underground orchid	V	E	Candidate species credit.	☐ BAM-C ☐ BioNet ☒ PMST ☐ SEARs ☐ Current survey	No. No suitable habitat is present within the Development Footprint. There are no records of this species within the locality.
Rutidosis leptorhynchoides	button wrinklewort	E	E	Candidate species credit.	☐ BAM-C ☐ BioNet ☒ PMST ☐ SEARs ☐ Current survey	No. No suitable habitat present within the Development Footprint. There are no records of this species within the locality.

Scientific Name	Common Name	BC Act	EPBC Act	Ecosystem/ Species credit	Source	Species retained for further assessment. If not, why not?
Thelymitra kangaloonica	Kangaloon sun orchid	CE	CE	Candidate species credit.	☐ BAM-C ☐ BioNet ☒ PMST ☐ SEARs ☐ Current survey	No. No suitable habitat present within the Development Footprint. There are no records of this species within the locality.
Thesium australe	Austral toadflax, toadflax	V	V	Candidate species credit.	☐ BAM-C ☐ BioNet ☒ PMST ☐ SEARs ☐ Current survey	No. No suitable habitat present within the Development Footprint. There are no records of this species within the locality.
Xerochrysum palustre	swamp everlasting, swamp paper daisy	-	V	Candidate species credit.	☐ BAM-C ☐ BioNet ☒ PMST ☐ SEARs ☐ Current survey	No. No suitable habitat present within the Development Footprint. There are no records of this species within the locality.
Zieria murphyi	velvet zieria	V	V	Candidate species credit.	☐ BAM-C ☐ BioNet ☐ PMST ☐ SEARs ☐ Current survey	No. No suitable habitat is present within the Development Footprint. There are no records of this species within the locality.



APPENDIX 3

Assessments of Significance for MNES

umwelt
Environmental & Social Consultants

WATTLE CREEK BESS

Bilateral Agreement MNES Assessment
EPBC 2024/09970- Appendix A3

FINAL

January 2025

WATTLE CREEK BESS

Bilateral Agreement MNES Assessment
EPBC 2024/09970- Appendix A3

FINAL

Prepared by
Umwelt (Australia) Pty Limited
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Report No.	22492_R15_App A3
Date:	January 2025

Environmental & Social Consultants

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

Acknowledgement of Country

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

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Table of Contents

1.0 Guidance Relevant to the Impact Assessment 1

1.1 MNES to be Assessed 1

1.2 NSW Bilateral Assessment Requirements 2

1.3 Significant Impact Guidelines for MNES 3

2.0 Critically Endangered or Endangered Ecological Communities 5

2.1 White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland 5

2.1.1 Description 5

2.1.2 Relevant Guidelines and Policy Statement 5

2.1.3 NSW Bilateral Assessment Requirements 7

2.1.4 Significant Impact Criteria Consideration 8

3.0 Critically Endangered and Endangered Species 10

3.1 Gang-gang Cockatoo (*Callocephalon fimbriatum*) 10

3.1.1 Description 10

3.1.2 Relevant Guidelines and Policy Statements 10

3.1.3 NSW Bilateral Assessment Requirements 11

3.1.4 Significant Impact Criteria Consideration 12

3.2 Large-eared Pied Bat (*Chalinolobus dwyeri*) 14

3.2.1 Description 14

3.2.2 Relevant Guidelines and Policy Statements 15

3.2.3 NSW Bilateral Assessment Requirements 16

3.2.4 Significant Impact Criteria Consideration 17

3.3 Paddys River box, Camden Woollybutt (*Eucalyptus macarthurii*) 19

3.3.1 Description 19

3.3.2 Relevant Guidelines and Policy Statements 20

3.3.3 NSW Bilateral Assessment Requirements 20

3.3.4 Significant Impact Criteria Consideration 21

3.4 South-eastern Hooded Robin (*Melanodryas cucullata cucullata*) 23

3.4.1 Description 23

3.4.2 Relevant Guidelines and Policy Statements 23

3.4.3 NSW Bilateral Assessment Requirements 23

3.4.4 Significant Impact Criteria Consideration 25

3.5 Greater Glider (Southern and Central) (*Petauroides volans*) 26

3.5.1 Description 26

3.5.2 Relevant Guidelines and Policy Statements 27
3.5.3 NSW Bilateral Assessment Requirements 27
3.5.4 Significant Impact Criteria Consideration 28
3.6 Koala (*Phascolarctos cinereus*) 31
3.6.1 Description 31
3.6.2 Relevant Guidelines and Policy Statements 31
3.6.3 NSW Bilateral Assessment Requirements 32
3.6.4 Significant Impact Criteria Consideration 34
3.7 Swift Parrot (*Lathamus discolor*) 36
3.7.1 Description 36
3.7.2 Relevant Guidelines and Policy Statements 38
3.7.3 NSW Bilateral Assessment Requirement 38
3.7.4 Significant Impact Criteria Consideration 40
3.8 Regent Honeyeater (*Anthochaera phrygia*) 42
3.8.1 Description 42
3.8.2 Relevant Guidelines and Policy Statements 42
3.8.3 NSW Bilateral Assessment Requirement 43
3.8.4 Significant Impact Criteria Consideration 44
3.9 Key's Matchstick Grasshopper (*Keyacris scurra*) 46
3.9.1 Description 46
3.9.2 Relevant Guidelines and Policy Statements 46
3.9.3 NSW Bilateral Assessment Requirement 46
3.9.4 Significant Impact Criteria Consideration 48
4.0 Vulnerable Species 50
4.1 South-eastern Glossy Black Cockatoo (*Calyptorhynchus lathami lathami*) 50
4.1.1 Description 50
4.1.2 Relevant Guidelines and Policy Statements 51
4.1.3 NSW Bilateral Assessment Requirement 51
4.1.4 Significant Impact Criteria Consideration 52
4.2 Brown Treecreeper (South-eastern) (*Climacteris picumnus victoriae*) 54
4.2.1 Description 54
4.2.2 Relevant Guidelines and Policy Statements 55
4.2.3 NSW Bilateral Assessment Requirement 55
4.2.4 Significant Impact Criteria Consideration 56
4.3 Narrow-leaved Black Peppermint (*Eucalyptus nicholii*) 58
4.3.1 Description 58
4.3.2 Relevant Guidelines and Policy Statements 58

4.3.3 NSW Bilateral Assessment Requirement 59
4.3.4 Significant Impact Criteria Consideration 60
4.4 Painted Honeyeater (*Grantiella picta*) 61
4.4.1 Description 61
4.4.2 Relevant Guidelines and Policy Statements 63
4.4.3 The NSW Bilateral Assessment Requirement 63
4.4.4 Significant Impact Criteria Consideration 64
4.5 Yellow-bellied Glider (*Petaurus australis australis*) 66
4.5.1 Description 66
4.5.2 Relevant Guidelines and Policy Statements 66
4.5.3 NSW Bilateral Assessment Requirement 66
4.5.4 Significant Impact Criteria Consideration 68
4.6 Diamond Firetail (*Stagonopleura guttata*) 70
4.6.1 Description 70
4.6.2 Relevant Guidelines and Policy Statements 71
4.6.3 NSW Bilateral Assessment Requirement 71
4.6.4 Significant Impact Criteria Consideration 72
4.7 Grey-headed Flying Fox (*Pteropus poliocephalus)* 74
4.7.1 Description 74
4.7.2 Relevant Guidelines and Policy Statements 75
4.7.3 NSW Bilateral Assessment Requirement 76
4.7.4 Significant Impact Criteria Consideration 77
4.8 Pink-tailed Worm-Lizard (*Aprasia parapulchella*) 79
4.8.1 Description 79
4.8.2 Relevant Guidelines and Policy Statements 80
4.8.3 NSW Bilateral Assessment Requirement 80
4.8.4 Significant Impact Criteria Consideration 81
5.0 Migratory Species 83
5.1 International Obligations for Migratory Species 83
5.1.1 Convention on International Trade in Endangered Species of Wild Fauna and Flora 83
5.1.2 The Apia Convention 83
5.1.3 Convention on Biological Diversity 83
5.1.4 Bilateral Agreement 85
5.1.5 The Bonn Convention 85
6.0 References 87

Tables

Table 1.1	MNES Likely to be Impacted by the Proposed Action	1
Table 1.2	Supplementary SEARs Requirement MNES Report Reference	2
Table 1.3	Key Concepts in the Significant Impact Guidelines (CoA 2013)	3
Table 2.1	Box Gum Woodland CEEC in the Development Footprint	6
Table 2.2	SEARs Requirement Considerations for Box-Gum Woodland CEEC	7
Table 2.3	Significant Impact Criteria Considerations for the EEC	8
Table 3.1	SEARs Requirement Considerations for the Gang-gang Cockatoo	11
Table 3.2	Significant Impact Assessment – Gang-gang Cockatoo	12
Table 3.3	SEARs Requirement Considerations for the Large-eared Pied Bat	16
Table 3.4	Significant Impact Assessment –Large Eared Pied Bat	17
Table 3.5	SEARs Requirement Considerations for Paddy's River Box	20
Table 3.6	Significant Impact Assessment *Eucalyptus macarthurii*	21
Table 3.7	South-eastern Hooded Robin SEARs Requirement Considerations	23
Table 3.8	Significant Impact Assessment – South-eastern Hooded Robin	25
Table 3.9	SEARs Requirement Considerations for the Greater Glider	27
Table 3.10	Significant Impact Assessment – Greater Glider	28
Table 3.11	Koala Feed Tree Present within Development Footprint	32
Table 3.12	SEARs Requirement Considerations for the Koala	32
Table 3.13	Significant Impact Assessment – Koala	34
Table 3.14	SEARs Requirement Considerations Swift Parrot	39
Table 3.15	Significant Impact Assessment – Swift Parrot	40
Table 3.16	SEARs Requirements Considerations Regent Honeyeater	43
Table 3.17	Significant Impact Assessment – Regent Honeyeater	44
Table 3.18	SEARs Requirement Considerations Key's Matchstick Grasshopper	47
Table 3.19	Significant Impact Assessment – Key's Matchstick Grasshopper	48
Table 4.1	SEARs Requirement Considerations for the South-eastern Glossy Black Cockatoo	51
Table 4.2	Significant Impact Assessment – South-eastern Glossy Black Cockatoo	52
Table 4.3	SEARs Requirement Considerations for the Brown Treecreeper	55
Table 4.4	Significant Impact Assessment – Brown Treecreeper	56
Table 4.5	SEARs Requirement Considerations for the Narrow-leaved Peppermint	59
Table 4.6	Significant Impact Assessment –Narrow-leaved Peppermint	60
Table 4.7	SEARs Requirement Considerations for the Painted Honeyeater	63
Table 4.8	Significant Impact Assessment –Painted Honeyeater	64
Table 4.9	SEARs Requirement Considerations for the Yellow-bellied Glider	67
Table 4.10	Significant Impact Assessment – Yellow Bellied Glider	68
Table 4.11	SEARs Requirement Considerations for the Diamond Firetail	71
Table 4.12	Significant Impact Assessment – Diamond Firetail	73
Table 4.13	SEARs Requirement Considerations for the Grey-headed Flying Fox	76
Table 4.14	Significant Impact Assessment – Grey headed Flying Fox	77
Table 4.15	SEARs Requirements Considerations for the Pink-tailed Worm Lizard	80
Table 4.16	Significant Impact Assessment – Pink-tailed Worm Lizard	81

1.0 Guidance Relevant to the Impact Assessment

1.1 MNES to be Assessed

The BDAR (Umwelt 2024a) has identified MNES that occur or may occur in the Development Footprint and are likely to be impacted by the Proposed Action. Those MNES predicted to occur in the Development Footprint and retained to be assessed for likely impacts of the Proposed Action are listed in **Table 1.1.**

Table 1.1 MNES Likely to be Impacted by the Proposed Action

Common Name	Scientific Name	EPBC Act Status	Refer to
Threatened Ecological Communities			
White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland		CE	**Section 2.1**
Critically Endangered or Endangered Species			
gang-gang cockatoo	*Callocephalon fimbriatum*	E	**Section 3.1**
large-eared pied bat	*Chalinolobus dwyeri*	E	**Section 3.2**
Paddy's River box, Camden woollybutt	*Eucalyptus macarthurii*	E	**Section 3.3**
south-eastern hooded robin	*Melanodryas cucullata cucullata*	E	**Section 3.4**
greater glider (southern and central)	*Petauroides volans*	E	**Section 3.5**
koala	*Phascolarctos cinereus*	E	**Section 3.6**
swift parrot	*Lathamus discolor*	CE	**Section 3.7**
regent honeyeater	*Anthochaera phrygia*	CE	**Section 3.8**
Key's matchstick grasshopper	*Keyacris scurra*	E	**Section 3.9**
Vulnerable Species			
south-eastern glossy black cockatoo	*Calyptorhynchus lathami lathami*	V	**Section 4.1**
brown treecreeper (south-eastern)	*Climacteris picumnus victoriae*	V	**Section 4.2**
narrow-leaved peppermint	*Eucalyptus nicholii*	V	**Section 4.3**
painted honeyeater	*Grantiella picta*	V	**Section 4.4**
yellow-bellied glider	*Petaurus australis australis*	V	**Section 4.5**
diamond firetail	*Stagonopleura guttata*	V	**Section 4.6**
grey headed flying fox	*Pteropus poliocephalus*	C	**Section 4.7**
pink-tailed worm-lizard	*Aprasia parapulchella*	V	**Section 4.8**

An assessment of impact of the Proposed Action on the individual MNES to analyse the significance of the impacts, is provided in this Appendix to the BDAR. The analysis of significance of impact addresses the NSW Bilateral Assessment Requirements and the Significant Impact Guidelines for MNES. The approach is described in **Section 1.2** and **Section 1.3**, respectively.

1.2 NSW Bilateral Assessment Requirements

The NSW DPHI issued Supplementary SEARs that outlined the biodiversity assessment requirements for MNES likely to be impacted by the Proposed Action.

Item 16 of the Supplementary SEARs list the biodiversity assessment requirements for each of the EPBC Act listed threatened species and communities likely to be impacted by the Action. **Table 1.2** outlines Item 16 requirements of the supplementary SEARs, including cross-references to the relevant section of this report where each requirement is addressed.

Table 1.2 Supplementary SEARs Requirement MNES Report Reference

Supplementary SEARs Requirement		Where addressed for threatened species and communities
16i	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;	For each MNES assessed herein there is a description of habitat requirements and potential habitat in the Project Area. Relevant Guidelines and Policy Statements have been listed for each MNES in **Section 2.0, Section 3.0** and **Section 4.0** NSW Bilateral Assessment Requirements table for species listed in **Table 1.1.**
16ii	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;	Detailed description of survey methodology is provided in Section 4.3 and Section 4.4 of the BDAR (Umwelt 2024a). The information provided in these sections has informed the description of survey approach adopted in the BDAR (Umwelt 2024a) is provided in NSW Bilateral Assessment Requirements table for species listed in **Table 1.1.**
16iii	description of the relevant impacts of the action having regard to the full national extent of the species or community's range;	Construction impacts are described in detail in Section 10.0 of the BDAR (Umwelt 2024a). The information provided in these sections has informed the description of impacts and is provided in the NSW Bilateral Assessment Requirements table for species listed in **Table 1.1** and in the Significant Impact Criteria consideration.
16iv	description of the specific proposed avoidance and mitigation measures to deal with relevant impacts of the action;	Avoidance and mitigation measures are provided in Section 9.0 of the BDAR (Umwelt 2024a). MNES specific measures are provided in the NSW Bilateral Assessment Requirements table for species listed in **Table 1.1.**
16v	identification of significant residual adverse impacts likely to occur after the proposed activities to avoid and mitigate all impacts are taken into account;	Description of residual impacts is provided in NSW Bilateral Assessment Requirements table for species listed in **Table 1.1.**

Supplementary SEARs Requirement		Where addressed for threatened species and communities
16vi	a description of any offsets proposed to address residual adverse significant impacts and how these offsets will be established.	Summary of biodiversity credit requirements and how the NSW BAM has applied in accordance with the objects of the EPBC Act is provided in Section 11.0 and Section 12.0 of the BDAR (Umwelt 2024a) and summarised in Section 7 of the MNES Report.
16vii	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	Summary of biodiversity credit requirements and how the NSW BAM has applied in accordance with the objects of the EPBC Act is provided in Section 11.0 and Section 12.0 of the BDAR (Umwelt 2024a) and summarised in Section 7 of the MNES Report.
16viii	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.	Summary of biodiversity credit requirements and how the NSW BAM has applied in accordance with the objects of the EPBC Act is provided in Section 11.0 and Section 12.0 of the BDAR (Umwelt 2024a) and summarised in Section 7 of the MNES Report.

1.3 Significant Impact Guidelines for MNES

The Significant Impact Guidelines for MNES (CoA 2013) provide overarching guidance on determining whether an Action is likely to have significant impacts on an MNES. The definitions and concepts as outlined in the Significant Impact Guidelines 1.1 (CoA 2013) that have been applied in these assessments are summarised in **Table 1.3.**

Table 1.3 Key Concepts in the Significant Impact Guidelines (CoA 2013)

Term	
Significant impact	A significant impact is an impact which is important, notable, or of consequence, having regard to its context or intensity. A significant impact is likely if there is a real or not remote chance or possibility. In determining this the following matters are considered: • The sensitivity of the environment which will be impacted. • The timing, duration and frequency of the action and its impacts. • All on-site and off-site impacts. The total impact which can be attributed to the action over the entire geographic area affected and over time. • Existing levels of impact from other sources. • The degree of confidence with which the impact of the action are known and understood.
A population of an endangered or critically endangered species	A population of a species is an occurrence of the species in a particular area. Occurrences of the species are not limited to: • A geographically distinct regional population, or collection of local populations, or • A population, or collection of local populations, that occurs within a particular bioregion.

Term	
An important population of a vulnerable species	In the case of a vulnerable species, an important population is a population that is necessary for a species' long-term survival and recovery. This may include populations that are: • Key source populations either for breeding or dispersal; or • Populations that are necessary for maintaining genetic diversity, and/or • Populations that are near the limit of the species range.
Important habitat for migratory species	An area of 'important habitat' for a migratory species is: • habitat utilised by a migratory species occasionally or periodically within a region that supports an ecologically significant proportion of the population of the species, and/or • habitat that is of critical importance to the species at particular life-cycle stages, and/or • habitat utilised by a migratory species which is at the limit of the species range, and/or • habitat within an area where the species is declining.
Important habitat for migratory shorebirds	Important habitats in Australia for migratory shorebirds under the EPBC Act include those recognised as nationally or internationally (Ramsar listed) important. • Wetland habitat is considered internationally important if it regularly supports: o 1% of the individuals in a population of one species or subspecies of waterbird OR o a total abundance of at least 20,000 waterbirds. • Wetland habitat is considered nationally important if it regularly supports: o 0.1% of the flyway population of a single species of migratory shorebird OR o 2,000 migratory shorebirds OR o 15 migratory shorebird species (CoA 2017).
Population of a migratory species	The entire population or any geographically separate part of the population of any species or lower taxon of wild animals, a significant proportion of whose members cyclically and predictably cross one or more national jurisdictional boundaries including Australia.
Habitat critical to the survival of a species or ecological community	Habitat critical to the survival of a species or ecological community refers to areas that are necessary: • for activities such as foraging, breeding, roosting, or dispersal • for the long-term maintenance of the species or ecological community (including the maintenance of species essential to the survival of the species or ecological community, such as pollinators) • to maintain genetic diversity and long term evolutionary development, or • for the reintroduction of populations or recovery of the species or ecological community. Such habitat may be, but is not limited to: • habitat identified in a recovery plan for the species or ecological community as habitat critical for that species or ecological community; and/or • habitat listed on the Register of Critical Habitat maintained by the minister under the EPBC Act.
Register of Critical Habitat	Section 207A of the EPBC Act provides for a register of critical habitat including the location and extent information based on up to date scientific information available to the Threatened Species Scientific Committee and the Minister. At the time of preparation of this report there are only five areas of critical habitat listed in the register. None of the threatened species and ecological communities assessed in this report are included in the register of critical habitat.

2.0 Critically Endangered or Endangered Ecological Communities

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

2.1.1 Description

Box Gum Woodlands and associated grasslands occur along the western slopes and tablelands of the Great Dividing Range from southern Queensland through NSW to central Victoria. It is estimated that over 95% of Box Gum Woodlands have been cleared with those remaining representing isolated remnants. The best estimate of the area of occupancy in NSW is 151,100 km^2 based on 10 km x 10 km grid cells (TSSC 2020).

As less than 10 per cent of the original distribution of the White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland CEEC (Box Gum Woodland) in NSW is likely to have avoided structural changes (TSSC 2020), the Box Gum Woodland CEEC now occurs in a heavily fragmented and isolated form. Fragmentation is recognised as a major continuing threat to the CEEC (DCCEEW 2023a).

In NSW, the condition of remnants ranges from woodland, thinned woodland and derived native grasslands; with intact understorey through to weedy understories where only a few hardy natives are left (TSSC 2020). The CEEC occurs with intact overstories or an intact understorey but either may support high conservation value due to the flora and fauna they support. Other sites may support important faunal habitat, support threatened species, form part of remaining corridors in the landscape or have the potential for recovery (TSSC 2020). Despite the extent of fragmentation, the conservation value of occurrences may be independent of remnant size (TSSC 2020).

The Conservation Advice states that given the currently highly fragmented and degraded state of this ecological community, all areas of the ecological community that meet the minimum condition criteria should be considered critical to the survival of this ecological community (DCCEEW 2023a).

Restoration and management through management of threats (DCCEEW 2023a). The primary conservation objective for the CEEC is to prevent the risk of extinction of Box Gum Woodland and promote recovery of its biodiversity and function through protecting it from further losses and significant impacts, particularly areas that are relatively intact and of higher quality.

2.1.2 Relevant Guidelines and Policy Statement

The following documents were used to support the Assessment of Significance for the Commonwealth Box Gum Woodland CEEC:

- Approved conservation advice for Commonwealth Box Gum Woodland CEEC (DCCEEW 2023a).
- Listing advice for Commonwealth Box Gum Woodland CEEC (TSSC 2006). The recently released conservation advice does not present a revision, update or copy of the original listing advice from 2006 (DCCEEW 2023a).

- National recovery plan for Commonwealth Box Gum Woodland CEEC (DECCW 2010).
- EPBC Act policy statement for Commonwealth Box Gum Woodland CEEC (DEH 2006).
- Adopted/made threat abatement plans:
    - Threat abatement plan for the biological effects, including lethal toxic ingestion, caused by cane toads (DSEWPaC 2011).
    - Threat abatement plan for predation, habitat degradation, competition and disease transmission by feral pigs (Sus scrofa) (2017) (DoEE 2017a).
    - Threat abatement plan for disease in natural ecosystems caused by *Phytophora cinnamomi* (DoEE 2018).

White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland CEEC as listed under the EPBC Act is associated with one PCT recorded in the Development Footprint, namely PCT 3376 Southern Tableland Grassy Box Woodland. A comparison of the vegetation zones recorded in the Development Footprint with the key diagnostics and condition thresholds in the recently released approved conservation advice (DCCEEW 2023a) was undertaken to confirm the extent of the TEC in the Development Footprint (refer to Section 6.3 of the BDAR). The areas of CEEC in the Development Footprint are shown in **Table 2.1.**

Table 2.1 Box Gum Woodland CEEC in the Development Footprint

PCT ID #	PCT name	Vegetation Zone	Associated TEC	Area (ha)
BESS Development Footprint				
Ancillary facilities common to the BESS and Solar Projects				
3376	Southern Tableland Grassy Box Woodland	Southern Tableland Grassy Box Woodland-Good/Moderate	White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland CEEC (BC Act and EPBC Act)	0.44
Transmission line Option 1 – No CEEC in Development Footprint				
Transmission line Option 2				
3376	Southern Tableland Grassy Box Woodland	Southern Tableland Grassy Box Woodland-Good/Moderate	White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland CEEC (BC Act and EPBC Act)	0.45
Total EPBC Act listed CEEC in Development Footprint				**0.89**

A large portion of the CEEC occurs as Derived Native Grassland (1.23 ha) which does not conform with the EPBC Act condition class criteria outlined in approved conservation advice (DCCEEW 2023a). Up to 0.89 ha of good/moderate condition CEEC occurs in the Development Footprint which conforms with the EPBC Act condition class criteria outlined in approved conservation advice (DCCEEW 2023a).

The Proposed Action has been designed to avoid and minimise impacts to the Commonwealth Box Gum Woodland CEEC, particularly high quality patches, however it is anticipated that the Proposed Action may impact up to 0.89 ha within the BESS Development Footprint.

An assessment of how each action may have a significant impact on a critically endangered ecological community against the Significant Impact Guidelines is provided in **Table 2.2.**

2.1.3 NSW Bilateral Assessment Requirements

Table 2.2 SEARs Requirement Considerations for Box-Gum Woodland CEEC

Item 16 Requirements		Box-gum Woodland CEEC
i	Description of habitat	Box Gum Woodland CEEC is associated with one PCT recorded in the Development Footprint, PCT 3376 Southern Tableland Grassy Box Woodland. 0.89 ha of good/moderate condition Box Gum Woodland occurs within the Development Footprint. These areas contain native woodland vegetation with a mostly intact understorey with some native shrub species richness and cover. Native grasses and forbs occur with a mixture of exotic flora species and with low to moderate cover and species richness of native ferns and other native plants. These areas have been somewhat degraded by agricultural use and the invasion of exotic species. This condition zone typically has moderate to good overall function attributes. This condition zone corresponds to the White Box - Yellow Box - Blakely's Red Gum Grassy Woodland and Derived Native Grassland CEEC listed under the BC Act, and EPBC Act. There is no condition threshold for this CEEC under the BC Act. The condition threshold (Class C) under the EPBC Act (DCCEW 2023a) for this vegetation zone is met, as described in Table 6.8 f the BDAR (Umwelt 2024).

ii	Survey Methodology	A range of survey methods have been employed to sample TECs, including:
		• 60 floristics plots in keeping with the BAM (DPIE 2020)
		  ○ 7–11 November 2022
		  ○ 21–25 August 2023
		  ○ 11–12 October 2023
		  ○ 18–19 December 2023.
		  ○ 9–10 September 2024
		• 25 rapid vegetation assessments.
		Meandering transects throughout the Biodiversity Survey Area.

iii	Impacts	Direct impacts to this community will be a one-off occurrence during construction, with the potential for minor indirect impacts to the residual community occurring during the operational phase of the project. Indirect impacts will be managed by the mitigation measures outlined in Section 8.6 of the BDAR and Section 5.2 of the MNES Assessment Report.
iv	MNES specific avoidance and mitigation measures	The following key impact avoidance and mitigation measures have been identified for the Project: • Biodiversity impact avoidance through Development Footprint alterations which have resulted in the avoidance of approximately 64.3% (reducing from 1,838.09 ha (original survey area to 656.32 (580.62 ha (Solar) and 75.70 ha (BESS)) of the Project Area. • Reduction in the Development Footprint for the BESS project from 390 ha (Scoping Conceptual Layout including 2 BESS locations) to 75.70 ha (one BESS location and refined associated infrastructure layout)

Item 16 Requirements		Box-gum Woodland CEEC
		• Optimising opportunities to maintain connectivity between the Project Area and surrounding areas of intact native vegetation. • Reduction of the Development Footprint to avoid impacts to areas of PCT 3373 Goulburn Tableland Box-Gum Grassy Forest (which is associated with White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland which is listed as a CEEC under the BC Act and EPBC Act). • Reduction and alteration of the Development Footprint to minimise impacts to areas of the White Box - Yellow Box - Blakely's Red Gum Grassy Woodland and Derived Native Grassland CEEC. This included impact avoidance measures targeted at retaining areas of woodland with intact crown condition, areas of scattered trees and higher quality derived native grassland condition zones. The patches of Box-Gum Woodland within the Development Footprint are associated with the existing main access roads in the north west and south of the Project Area. The impacts are associated with the widening of these existing access tracks. The Project boundary has been refined to reduce impacts to the roadside vegetation only and minimise clearing of this community where possible.
v	Residual impact	The Proposed Action would result in the permanent loss of up to 0.89 ha of Box Gum woodland as a result of the Proposed Action. About half of these impacts are associated with the common facilities with the Solar Farm (0.44 ha) with the remainder associated with the transmission line option 2 (0.45 ha).
vi	Offsets required	The loss of Box-gum woodland would be offset through the retirement of the Proposed Action's ecosystem credit obligation for PCTs associated with the TEC. Refer to Section 7.1 of the MNES Bilateral Report for biodiversity offset strategy approach.

2.1.4 Significant Impact Criteria Consideration

The significant impact criteria considerations for the Box-gum woodland CEEC are presented in **Table 2.3.**

Table 2.3 Significant Impact Criteria Considerations for the 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 Development Footprint has been redesigned to avoid patches of vegetation that meets the relevant condition thresholds of this ecological community with regards to the Proposed Action where practicable. 0.89 ha of Box Gum Woodland that meets the EPBC Act condition classes occurs within in the Development Footprint and will be impacted by the Proposed Action. The extent of the community in the Biodiversity Survey Area will be reduced by 0.89 ha. 20.87 ha of Box Gum Woodland has been recorded in the Biodiversity Survey Area. 19.98 ha of Box Gum Woodland CEEC has been avoided through redesign of the Project Area. Impacts to 0.89 ha represent impacts to approximately 4.3 per cent of the community in the Biodiversity Survey Area. Impacts to this CEEC will be offset through the retirement of ecosystem credits associated with PCT 3376.
Fragment or increase fragmentation of an ecological community
The proposed action may fragment patches of this ecological community, contributing to the ongoing fragmentation of the CEEC. Residual patches of the CEEC retain connectivity to adjoining patches of vegetation in the landscape.

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:
Adversely affect habitat critical to the survival of an ecological community
The Proposed Action has been designed to avoid and minimise impacts to the Box Gum Woodland CEEC, particularly high quality patches, however it is anticipated that the Proposed Action will impact directly 0.89 ha of Box Gum Woodland CEEC in the Development Footprint. As the Conservation Advice states that all areas of the ecological community that meet the minimum condition criteria should be considered critical to the survival of this ecological community, it is likely that the Proposed Action will impact habitat critical to the survival of an ecological community.
Modify or destroy abiotic factors necessary for an ecological community's survival, including reduction of groundwater levels, or substantial alteration of surface water drainage patterns
The Proposed Action is not likely to result in impacts to nutrients or soils necessary for the ecological community to survive and no substantial groundwater impacts have been predicted. Increase in hard surfaces will result in changes to surface water flows that affect retained remnants indirectly. Alterations in surface water drainage may be managed through appropriate mitigation measures as outlined in section 8.6 of the BDAR.
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, or
The Proposed Action will cause substantial change in species composition in the impacted patches of vegetation as all species will be removed and/or modified by shading from the panels Appropriate mitigation measures will be implemented to minimise impacts to surrounding retained habitats as outlined in section 8.6 of the BDAR
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, or**
As the vegetation within the Development Corridor has ongoing disturbances from agricultural land uses, the presence of weeds and grazing have likely resulted in the historical and ongoing use of fertilisers, herbicides or other chemicals or pollutants. It is unlikely that the impacts of the Proposed Action will cause a substantial reduction in Box Gum Woodland CEEC quality for retained patches. Given the current degraded nature of the surrounding grasslands, weeds are likely to invade the adjacent edges of the community. However, under the current land use regime, changes to the quality or integrity of the retained patch are likely to be negligible. The Proposed Action is not expected to cause a reduction in quality or integrity of the Box Gum Woodland CEEC occurrence through assisting invasive species to become established or causing regular mobilisation of fertilisers
Interfere with the recovery of an ecological community.
The Proposed Action will impact directly and may impact indirectly on the CEEC. Where possible detailed design will seek to further avoid and minimise clearance of higher condition stands and minimise indirect impacts on retained stands. The loss of Box Gum Woodland CEEC would be offset through the retirement of the Proposed Action's ecosystem credit obligation.
Conclusion
As the Conservation Advice states that all areas of the ecological community that meet the minimum condition criteria should be considered habitat critical to the survival of this ecological community, it is likely that the Proposed Action will result in a significant impact to Box Gum Woodland CEEC.

3.0 Critically Endangered and Endangered Species

3.1 Gang-gang Cockatoo (*Callocephalon fimbriatum*)

3.1.1 Description

Gang-gang cockatoos are endemic to south-eastern Australia. It is adapted to cooler conditions and has always been more common at higher elevations and more southern latitudes (DAWE 2022a).

Gang-gang cockatoos primarily occur within the temperate eucalypt forests and woodlands of mainland south-east Australia. The species is an altitudinal migrant. During winter months, gang-gang cockatoos tend to range beyond montane forests to inhabit woodland assemblages at lower, drier altitudes. Overlapping of winter and summer ranges is common, with some individuals choosing to winter at higher altitudes, and others remaining at lower altitudes during summer (DAWE 2022a).

Gang-gang cockatoos favour old growth forest and woodland assemblages for nesting, loafing, and roosting. The species nests in the hollows of tree trunks and limbs, or within the dead sprout of large, living eucalypts. Nesting and roosting sites are often near water, where larger hollow-bearing trees can be more common. Breeding aggregations are reliant on stands of suitable hollow bearing trees. Multiple nests tend to be situated within a few hundred metres of each other. Preferred hollows generally have an entrance height of 21.3 cm (minimum entrance height 12 cm) and an average entrance width of 13.1 cm (range 9–24 cm). The hollow chambers are generally around 20 cm in floor diameter, around 50.5 cm deep (range 22–90 cm) and occur around 7.5 m (range 5–9.4 m) above the ground (DAWE 2022a).

3.1.2 Relevant Guidelines and Policy Statements

The following documents were used to support the Assessment of Significance for the gang-gang cockatoo:

- Conservation Advice for *Callocephalon fimbriatum* (gang-gang cockatoo) (DAWE 2022a)
- There is no listing advice for this species, listing assessment information may be available in the Approved Conservation Advice.
- There is no adopted or made Recovery Plan for this species.
- There are no adopted/made threat abatement plans, identified as being relevant for this species.

The Conservation Advice (DAWE 2022a) does not provide a definition of a population for the gang-gang cockatoo. A ‘population of a species’ is defined under the EPBC Act as an occurrence of the species in a particular area. In this case, a population means:

- a geographically distinct regional population, or collection of local populations
- a regional population, or collection of local populations, that occurs within a particular bioregion.

3.1.3 NSW Bilateral Assessment Requirements

There is suitable habitat present within the Development Footprint in the woodland vegetation zones of PCT 3374 and PCT 3376. A breeding pair has been observed in the southern portion of the Project Area on multiple occasions between August and December 2023 suggesting that the pair are breeding either on or in proximity to the Development Footprint. A nest tree has not been identified, but all areas containing suitable hollow bearing trees have been assumed to be suitable breeding habitat.

The Proposed Action will impact approximately 0.44 ha within the common ancillary facilities, 1.85 ha within transmission line option 1 and 4.02 ha within transmission line option 2. There are large clusters of habitat trees within the intact vegetation stands within the Development Footprint. A nesting tree has not been identified, but numerous suitable hollow bearing trees are present throughout the Development Footprint.

The NSW bilateral assessment requirement considerations for the gang-gang cockatoo are presented in **Table 3.1.**

Table 3.1 SEARs Requirement Considerations for the Gang-gang Cockatoo

Item 16 Requirements		Gang-gang cockatoo
i	Description of habitat	There is 317.89 ha (all woodland condition PCTs) of suitable habitat within the Biodiversity Survey Area, of which 6.31 ha of breeding and foraging habitat is present in the Development Footprint. Numerous suitable hollow bearing trees are located in the Development Footprint. A breeding pair was observed within the Development Footprint, and it is likely that the breeding site is located in the Project Area. No nest tree was identified in the Development Footprint or broader Project Area. Suitable habitat has been defined as woodland vegetation containing hollow bearing trees which corresponds to PCT 3374 (condition classes good/moderate and moderate/degraded) and PCT 3376 (condition class good/moderate).
ii	Survey Methodology	A range of surveys methods have been employed to survey for threatened fauna species in keeping with the NSW BAM (NSW DPIE 2020) the TBDC survey guidelines and species survey guidelines listed in **Table 3.2** of the MNES report, including: • Over 200 diurnal bird surveys targeting woodland birds over eleven survey campaigns between August 2022 and September 2024 (Aug, Oct, Nov 22, Jan, Feb, Aug, Oct 23, Feb, March, Sep 24). Including 126 seasonal vantage point surveys. • Stick nest, hollow-bearing tree and burrow searches Aug 24, Jan, Feb. Aug, Oct 23 and March 2024.
iii	Impacts	Direct impacts to this community will be a one-off occurrence during construction and comprise clearing of native vegetation including hollow bearing trees with the potential to comprise breeding habitat for the gang-gang cockatoo. Minor indirect impacts to the residual stand of suitable habitat for the species may occur during the operational phase of the project. Indirect impacts will be managed by the mitigation measures outlined in Section 8.6 of the BDAR and Section 5.2 of the MNES Assessment Report.
iv	MNES specific avoidance and mitigation measures	The following key impact avoidance and mitigation measures have been identified for the Project:

Item 16 Requirements		Gang-gang cockatoo
		• Development Footprint alterations to both the Solar and BESS components which have resulted in the avoidance of approximately 64.3 per cent (reducing from 1,838.09 ha (original survey area to 656.32 (580.62 ha (Solar) and 75.70 ha (BESS)) of the Project Area. • Reduction in the development footprint for the BESS project from 390 ha (Scoping Conceptual Layout including 2 BESS locations) to 75.70 ha (one BESS location and refined associated infrastructure layout) • Optimising opportunities to maintain connectivity between the Project Area and surrounding areas of intact native vegetation. • Redesign of the Project to minimise impacts on areas of intact native woodland and hollow bearing trees which reduced impacts to suitable foraging and/or breeding habitat for the gang-gang cockatoo • Reduction of the Project Area to avoid riparian areas and dams with emergent vegetation that may provide habitat for threatened species.
v	Residual impact	The Proposed Action would directly impact on 6.31 ha of habitat for the species. An Assessment of Significance has been provided in **Table 3.2**. The assessment has concluded that the Proposed Action is likely to have a significant impact on the gang-gang cockatoo.
vi	Offsets required	The gang-gang cockatoo is a dual credit species under the BAM. Impacts to foraging habitat for this species will be offset through the retirement of ecosystem credits for PCTs associated with the species. Impacts to breeding and foraging habitat as defined in the BAM will be offset through the retirement of species credits as part of the Proposed Action's credit obligation. Refer to Section 7.1 of the MNES Bilateral Report for biodiversity offset strategy approach.

3.1.4 Significant Impact Criteria Consideration

The significant impact criteria considerations for gang-gang cockatoo are presented in **Table 3.3**.

Table 3.2 Significant Impact Assessment – Gang-gang Cockatoo

An action is likely to have a significant impact on a critically endangered or endangered species if there is a real chance or possibility that it will:
Lead to a long-term decrease of a population
There are an estimated 25,300 (range 17,600–35,200) mature individuals in the wild with a declining trend (high reliability) (Cameron *et al*. 2021). A pair of gang-gang cockatoos were observed within the Project Area during field surveys in 2023. It is likely that the species makes use of the suitable habitats within the Development Footprint, including suitable breeding habitat given the pair were observed mating. The Proposed Action will result in the loss of up to approximately 6.31 ha of suitable foraging and breeding habitat within the Development Footprint. Given the area impacted is likely to comprise suitable breeding habitat, it is considered that the impact proposed may lead to a long-term decrease in the size of the gang-gang cockatoo population.

An action is likely to have a significant impact on a critically endangered or endangered species if there is a real chance or possibility that it will:
Reduce the area of occupancy of a population
The species' extent of occurrence (EOO) and area of occupancy (AOO) are estimated to be stable at 400,000 km^2 and 30,000 km^2, respectively (DAWE 2022a). A pair of gang-gang cockatoos were observed within the Development Footprint during field surveys in 2023. The Proposed Action involves the removal of approximately 6.31 ha of suitable habitat for the gang-gang cockatoo and suitable nesting trees. It is therefore considered that the Proposed Action is likely to reduce the area of occupancy of this species.
fragment an existing population into two or more populations
The Project Area is located south east of Tarlo River National Park and south west of Kerrawary Nature Reserve. It borders an eastern boundary of a tract of vegetation which runs south to east from Taro River National Park towards Wingello State Forest. A pair of gang-gang cockatoos were observed mating within the Project Area during field surveys in 2023, suggesting there is a local population of this species residing in the Project Area. Considering the extent of the forested area in the surrounds, the known presence of this species and the mobility of the species, the removal of vegetation is unlikely to fragment an existing population into two or more populations.
adversely affect habitat critical to the survival of a species
The Conservation Advice identifies that habitat critical to the survival of the gang-gang cockatoo includes all foraging habitat during both the breeding and non-breeding season (DAWE 2022a). Gang-gang cockatoos rely on stands of suitable hollow-bearing trees which are a key component of their breeding habitat. Habitat critical to the survival includes hollow bearing trees with known or potential gang-gang cockatoo hollow chambers that are generally around 20 cm in floor diameter, around 50.5 cm deep (range 22–90 cm) and occur between around 7.5 m (range 5–9.4 m) above the ground. The Development Footprint contains approximately 6.31 ha of suitable habitat proposed to be removed. There are numerous habitat trees among this vegetation within the Development Footprint. Given the species has been observed mating within the Development Footprint the Proposed Action has the potential to adversely affect habitat critical to the survival of this species.
disrupt the breeding cycle of a population
A pair of gang-gang cockatoos were observed mating within the Project Area during field surveys in 2023. Given the Proposed Action involves the removal of approximately 6.31 ha of suitable habitat for the gang-gang cockatoo, including potentially nesting sites, the Proposed Action is likely to disrupt the breeding cycle of a population of this species if the nest tree is cleared.
modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline
The Proposed Action will result in the loss of approximately 6.31 ha of gang-gang cockatoo habitat. It is considered that the Proposed Action will modify, destroy or isolate or decrease the availability or quality of habitat for this species and is likely to contribute to its 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
Invasive species that are identified as a significant nest-hollow competitor include feral honeybees, starlings and common mynas (DAWE 2022a). The Proposed Action is not expected to result in invasive species that are harmful to the gang-gang cockatoo becoming established in the species habitat.
introduce disease that may cause the species to decline
Gang-gang cockatoos are susceptible to Psittacine beak and feather disease. The subpopulation of gang-gang cockatoos from the Hornsby and Ku-ring-gai local government area has a high prevalence of the disease. Prevalence in other subpopulations is unknown. Beak and feather disease virus is highly prevalent in a range of abundant Australian psittacines. It is transmitted through feather dander, faeces, and saliva (DAWE 2022a). Loss of nesting habitat and increasing competition increases likelihood of disease transmission. The Proposed Action is unlikely increase competition for nesting habitat such that susceptibility to the disease will increase.

An action is likely to have a significant impact on a critically endangered or endangered species if there is a real chance or possibility that it will:
interfere substantially with the recovery of the species
There is currently no recovery plan for this species. Conservation and recovery actions identified in the conservation advice include: • Actively manage the landscape to minimise the risk of large wildfires, ensuring that this also meets the ecological requirements of the species. • Ensure fire management (fire risk reduction, fire suppression and post-fire management activities) considers impacts on key breeding locations, foraging, roosting, and nesting habitat for gang-gang cockatoo. • After fire, protect unburnt areas within or adjacent to recently burnt ground that may provide ongoing refuge. • Cease all land clearing of habitat critical to the survival of gang-gang cockatoo. • Retain hollow-bearing trees in all known gang-gang cockatoo nesting areas. • Restore forests and woodlands within the known range of gang-gang cockatoo. • Develop or improve forestry policies across the range of the species that promote the retention and recruitment of hollow-bearing trees suitable for gang-gang cockatoos. • Protect and enhance the quality of potential habitat (both breeding and foraging) of the gang-gang cockatoo. • Develop, implement, and monitor a nest box program to increase the number of nesting sites available to gang-gang cockatoos, to sites where nesting hollows are a limiting resource. • Monitor nest site competition (behavioural surveys) and monitor nesting outcomes. • Implement control programs for native and invasive species identified as significant nest/hollow competitors, such as feral honeybees, possums, starlings, noisy miners, and common mynas. • In peri-urban and urban areas with high possum densities, use nest site protection measures to safeguard roosting/nesting sites i.e., protect nests with iron tree collars to prevent possum access (DAWE 2022a). The Proposed Action will impact up to 6.31 ha of suitable breeding habitat. Given the species has been observed within the Development Footprint and the nesting site location is not known, the Proposed Action has the potential to interfere substantially with the recovery of the species.
Conclusion
The Proposed Action is likely to have a significant direct and indirect impacts on the gang-gang cockatoo in accordance with the criteria provided in the EPBC Act Significant Impact Guidelines. A large portion impacts on breeding habitat for this species is associated with the proposed transmission line options. Detailed design and consultation with Transgrid will be undertaken which will seek to avoid clearance of potential nest trees as far as practicable.

3.2 Large-eared Pied Bat (*Chalinolobus dwyeri*)

3.2.1 Description

The large-eared pied bat is patchily distributed in central-eastern NSW and south-eastern and central Queensland, from the area bounded by Shoalwater Bay, north of Rockhampton (QLD), south to Bungonia in the NSW Southern Highlands and Ulladulla on the coast, NSW (DCCEEW 2023b).

The large-eared pied bat is listed as endangered under the EPBC Act. The conservation advice for the large-eared pied bat identifies that the species' total population size likely ranges between 10,000 individuals and 20,000 individuals, although the number of mature individuals is lower (DCCEEW 2023b). It is estimated that 27% of the species' habitat occurs within areas affected by the 2019 / 2020 wildfires, with 10% of the range intersecting with severe fire (DCCEEW 2023b). Much of the known distribution of the large-eared pied bat occurs in NSW (DCCEEW 2023b).

The population structure and number of locations are poorly known however main strongholds are present in the Sydney sandstone region, Pilliga region and Central Queensland Sandstone Belt (DCCEEW 2023b). In NSW, north-east of Coolah Tops, Mt Kaputar National Park and Warrumbungle National Park, the species is present in areas of volcanic strata (DCCEEW 2023b). In NSW, maternity roosts occur in Ukerbarley State Conservation Area near Coonabarabran, Woodsreef asbestos mine near Barraba, Pilliga National Park and Nature Reserve, Ophir Reserve near Orange, and potentially near Ulan (DCCEEW 2023b). Based on this advice it is likely that the majority of the population occurs in NSW.

The national population extent of occurrence is estimated to be between 276,333 km² and 279,734 km² and the estimated area of occupancy used in the listing assessment is <500 km² (DCCEEW 2023b).

The majority of records of the species occur within several kilometres of cliff lines or caves, in which it is known to roost, however the species is known to have a foraging range between 21 ha and 145.6 ha (William and Thompson 2018). The large-eared pied bat is dependent on the presence of diurnal roosts for shelter. The species is known to roost in sandstone caves, overhangs, disused mine shafts, and abandoned *Petrochelidon ariel* (Fairy Martin) nests (DCCEEW 2023b). The structure of maternity roosts appears to be very specific with caves high and deep enough to allow juveniles to learn to fly inside with indentations to allow for clustering (DCCEEW 2023b).

The large-eared pied bat has been recorded foraging in fertile (relative to surrounding landscape) valleys and plains, as well as areas with moderately tall to taller trees in woodland along water courses and upper slopes and crests of ranges (DCCEEW 2023b). The majority of records are from canopied habitat, suggesting a sensitivity to clearing, although narrow connecting riparian strips in otherwise cleared habitat are sometimes quite heavily used. This may be because such riparian zones are highly productive (DCCEEW 2023b).

3.2.2 Relevant Guidelines and Policy Statements

Relevant guidelines and policy statements available for this species include:

- National recovery plan for the large-eared pied bat *Chalinolobus dwyeri* (DERM 2011)
- Conservation Advice for *Chalinolobus dwyeri* (large-eared pied bat) (DCCEEW 2023b)
- Listing assessment information is in the approved Conservation Advice
- No Threat Abatement Plan has been identified as being relevant for this species
- Other policy statements and guidelines: Survey guidelines for Australia's threatened bats. Guidelines for detecting bats listed as threatened under the *Environment Protection and Biodiversity Conservation Act 1999* (DEWHA 2010).

3.2.3 NSW Bilateral Assessment Requirements

Calls of the Large eared pied bat were recorded on an Anabat device on four occasions in October and November 2022 and January and February 2023. There is suitable foraging habitat present within the Project Area in PCT 4063, PCT 3374 and PCT 3376. No suitable breeding habitat is located within the Development Footprint, however suitable rocky areas exist within 2 km of the Development Footprint. The closest area of potential breeding habitat is approximately 1,500 m west of the BESS Development Corridor.

The Proposed Action will impact approximately 8.36 ha of foraging habitat comprising woodland vegetation.

Breeding habitat would not be directly impacted by the Proposed Action.

The NSW bilateral assessment requirement considerations for the large-eared pied bat are presented in **Table 3.3.**

Table 3.3 SEARs Requirement Considerations for the Large-eared Pied Bat

Item 16 Requirements		Large eared pied bat
i	Description of habitat	8.36 ha of foraging habitat is present in the Development Footprint. As identified in the conservation advice, the majority of records are from canopied habitat, suggesting a sensitivity to clearing, although narrow connecting riparian strips in otherwise cleared habitat are sometimes quite heavily used. Suitable habitat has been defined under the NSW BAM as woodland vegetation within 2 km of potential roost habitat, which corresponds to PCT 3374 (condition classes good/moderate and moderate/degraded), PCT 3376 (condition class good/moderate) and PCT 4063.
ii	Survey Methodology	A range of surveys methods have been employed to survey for threatened fauna species in keeping with the NSW BAM (DPIE 2020) the TBDC survey guidelines and species survey guidelines listed in **Table 3.2** of the MNES report, including: • Bat surveys with remote Anabat devices over 128 trap nights • 4 nights of attended bat surveys using the handheld Anabat walkabout.
iii	Impacts	Direct impacts to this community will be a one-off occurrence during construction and comprise clearing of native vegetation and foraging habitat. No suitable breeding habitat will be impacted. Minor indirect impacts to the residual stand of suitable habitat for the species may occur during the operational phase of the project. Indirect impacts will be managed by the mitigation measures outlined in Section 8.6 of the BDAR and Section 5.2 of the MNES Assessment Report.
iv	MNES specific avoidance and mitigation measures	The following key impact avoidance and mitigation measures have been identified for the Project: • Development Footprint alterations to both the Solar and BESS components which have resulted in the avoidance of approximately 64.3 per cent (reducing from 1,838.09 ha (original survey area to 656.32 (580.62 ha (Solar) and 75.70 ha (BESS)) of the Project Area. • Reduction in the Development Footprint for the BESS project from 390 ha (Scoping Conceptual Layout included 2 BESS locations) to 75.70 ha (one BESS location and refined associated infrastructure layout).

Item 16 Requirements		Large eared pied bat
		• Optimising opportunities to maintain connectivity between the Project Area and surrounding areas of intact native vegetation. • Reduction of the Project Area to avoid riparian areas and dams with emergent vegetation that may provide habitat for threatened species.
v	Residual impact	The Proposed Action would directly impact on 8.36 ha of suitable foraging habitat for the species. The Proposed Action is not likely to impact and breeding habitat. An Assessment of Significance has been provided in **Table 3.4**. The assessment has concluded that the Proposed Action is unlikely to have a significant impact on the population of large-eared pied bats.
vi	Offsets required	The large eared pied bat (foraging) is a species credit species, impacts to this species will be offset through the retirement of the Proposed Action's credit obligation. As the site is within 2 km of potential breeding habitat, a species polygon has been developed to account for impacts to foraging habitat within proximity to potential breeding locations. The impacts to this habitat will be offset through species credit offsets. Refer to Section 7.1 of the MNES Bilateral Report for biodiversity offset strategy approach.

3.2.4 Significant Impact Criteria Consideration

The significant impact criteria considerations for large eared pied bat are presented in **Table 3.4**.

Table 3.4 Significant Impact Assessment –Large Eared Pied Bat

An action is likely to have a significant impact on a critically endangered or endangered species if there is a real chance or possibility that it will:
Lead to a long-term decrease of a population
The conservation advice identifies the likely total population size as being between 10,000 and 20,000 individuals, although the number of mature individuals is lower (DCCEEW 2023b). Distribution of the large-eared pied bat is fragmented, with most individuals occurring in small and relatively isolated subpopulations due to specific requirements for foraging and roosting habitat (DCCEEW 2023b). The population structure and number of locations are poorly known however main strongholds are present in the Sydney sandstone region, Pilliga region and Central Queensland Sandstone Belt (DCCEEW 2023b). Four BioNet records of the large-eared pied bat are within the 10 km of the Biodiversity Survey Area. The species was also recorded in the Development Footprint on four occasions during Anabat surveys undertaken from November 2022 to February 2023. Approximately 317.89 ha of woodland vegetation and suitable foraging habitat for the large eared pied bat was recorded in the Biodiversity Survey Area. The Development Footprint will impact 8.36 haor 2.5 per cent of foraging habitat within the Biodiversity Survey Area. Given the large foraging range of the species, and the availability of residual suitable habitat within the Biodiversity Survey Area and broader locality it is unlikely that the Proposed Action will result in a long term-decrease of the large eared pied bat population. A biodiversity management plan and vegetation management plan would be implemented to reduce indirect impacts on residual vegetation in the Project Area.

An action is likely to have a significant impact on a critically endangered or endangered species if there is a real chance or possibility that it will:
Reduce the area of occupancy of a population
The national population extent of occurrence is estimated to be between 276,333 and 279,734 km² (DCCEEW 2023b). The estimated area of occupancy is estimated at 12 km² for known maternity roosts (a measure of the smallest area of extent for maternity roosts), <500 km² (a measure of known and unknown maternity roosts), and 3,092 km² (a measure of approximate maternity roosts and roosting sites and a 2 km x 2 km grid method) (DCCEEW 2023b). Maternity roosts are essential for the survival of existing populations, and therefore the area of occupancy can be defined by these sites (DCCEEW 2023b). This species has been recorded with foraging ranges between 21 ha and 145.6 ha (William and Thompson 2018). Given the relatively small area of impact to non-breeding habitat to be impacted by the Project, it is considered unlikely that the Proposed Action would reduce the area of occupancy of a population of this species.
fragment an existing population into two or more populations
The Development Footprint contains agricultural land, comprised of grazed grasslands with patches of canopy trees. Patches of retained forest and woodland vegetation are present typically in areas surrounding watercourses and on steeper or less fertile rocky habitats. The species was recorded on four occasions in the Development Footprint during Anabat surveys undertaken from November 2022 to February 2023 suggesting frequent use of the Development Footprint for foraging. Approximately 8.36 ha of foraging habitat would be impacted by the Proposed Action. The Project will not fragment existing patches of woodland, with retained corridors in the residual vegetation. As the large eared pied bat is a highly mobile species, the Project will not form a barrier to the species and is unlikely to fragment an existing population into two or more populations
adversely affect habitat critical to the survival of a species
The conservation advice states 'the species is dependent on the presence of diurnal roosts such as caves, overhangs, or other landscape features for shelter, any known roost site, or caves that could be roost sites, are considered habitat critical to the survival of the species'. Presence of suitable foraging habitat likely within a few kilometres of suitable breeding habitat is also considered habitat critical to the survival of the large-eared pied bat. The NSW BAM defines a few kilometres as two kilometres of breeding habitat. No suitable breeding habitat will be impacted by the Project, however foraging habitat within 2 km of the breeding habitat may be impacted.
disrupt the breeding cycle of a population
The large-eared pied bat is dependent on escarpment, cliffs and crevices acks for diurnal roost sites and caves with specific features for maternity roosts (EPSDD 2023). The Proposed Action is not anticipated to impact breeding habitat for the large eared pied bat and is unlikely to disrupt the breeding cycle of the population.
modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline
The Proposed Action would remove 8.36 ha of foraging habitat for the large eared pied bat. Given the large foraging range of the species, and the availability of residual suitable habitat within the Biodiversity Survey Area and broader locality it is considered unlikely that the Proposed Action will decrease the availability or quality of habitat to the extent that the species 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 Proposed Action is not expected to result in invasive species that are harmful to the species becoming established in the large eared pied bat's breeding habitat.
introduce disease that may cause the species to decline
The Proposed Action is not expected to introduce disease that may cause the species to decline.

An action is likely to have a significant impact on a critically endangered or endangered species if there is a real chance or possibility that it will:
interfere substantially 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 Proposed Action is not expected to: • Destroy or interfere with known maternity or other roosts. • Mine known roosts. • Cause subsidence of cliff lines. • Increase human recreational activities near known roosts. • 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. • It is unlikely that the Proposed Action would cause or exacerbate any of the impacted listed above. The Proposed Action will result in clearing 8.36 ha of vegetation which is suitable foraging habitat, with no impacts to potential roots.
Conclusion
The Proposed Action is unlikely to result in a significant impact on the population of the large-eared pied bat recorded in the Development Footprint.

3.3 Paddys River box, Camden Woollybutt (*Eucalyptus macarthurii*)

3.3.1 Description

Eucalyptus macarthurii is endemic to New South Wales. The NSW Scientific Committee's final determination notes that the two main occurrences of *E. macarthurii* are in the Southern Highlands (Wingecarribee Plateau and environs extending south to the far north of the Southern Tablelands at Marulan) and the Boyd Plateau in the southern Blue Mountains region. Limited information on the number and size of *Eucalyptus macarthurii* populations is available.

At least 1,200 trees are thought to occur in the Kanangra-Boyd National Park with approx. 1,100 trees distributed across the Southern Tablelands. The total population is likely to be less than 10,000 plants. In the Southern Highlands, *E. macarthurii* often occurs as scattered paddock trees in grazed pastures where little opportunity for regeneration exists or as small stands or small linear remnants along roads or drainage lines. Some other populations of *E. macarthurii* do occur in this region including a small population in the Cecil Hoskins Nature Reserve between Moss Vale and Bowral, Stingray Swamp Flora Reserve within the Penrose State Forest, along the lower Paddy's River and along the Wingecarribee River in West Berrima.

The species in the Project Area occurs outside the Development Footprint, 100 m to the south. One individual was observed within a row of planted eucalyptus. The NSW Scientific listing of the species mentioned planting of *E. macarthurii* for windbreaks has also occurred within the Southern Highlands and records near Marulan which are thought to be from planted individuals rather than from natural populations.

3.3.2 Relevant Guidelines and Policy Statements

Relevant guidelines and policy statements available for this species include:

- Approved Conservation Advice for *Eucalyptus macarthurii* (Camden woollybutt) DCCEEW (2023c)
- There are no adopted/made threat abatement plans, identified as being relevant for this species.

Under the reasonable assumption that the specimen is planted and not wild, noting that the EPBC Act uses the same eligibility criteria for listing as the IUCN Red List, planted individuals would not be considered 'wild' and therefore would fall outside the listing under the EPBC Act. Notwithstanding, the assessment here has precautionarily carried out a significant impact assessment on this assumed planted individual.

3.3.3 NSW Bilateral Assessment Requirements

There is not likely to be any suitable potential habitat present within the Development Footprint in the woodland vegetation zones of PCT 4063, PCT 3374 and PCT 3376 as these are not described as associated PCTs for the species in BioNet and no other individuals were located incidentally during threatened flora surveys. As such the Development Footprint has been determined to not support the species. The species would not be directly impacted by the proposed action.

The NSW bilateral assessment requirement considerations for the paddy's river box are presented in **Table 3.5.**

Table 3.5 SEARs Requirement Considerations for Paddy's River Box

Item 16 Requirements		Paddy's River Box
i	Description of habitat	The species was recorded outside the Development Footprint amongst a row of planted individuals. There is not likely to be any suitable potential habitat present within the Development Footprint in the woodland vegetation zones of PCT 4063, PCT 3374 and PCT 3376 as these are not described as associated PCTs for the species in BioNet and no other individuals were located incidentally during threatened flora surveys. As such the Development Footprint has been determined to not support the species. The species would not be directly impacted by the proposed action.
ii	Survey Methodology	A range of survey methods have been employed to survey threatened flora, including: • Meandering transects throughout the Biodiversity Survey Area • Total of 60 person days of survey in spring and summer using the two-phased grid assessment survey method.
iii	Impacts	The species will not be directly impacted by the Proposed Action and the specimens observed appear to be planted. There is a risk of Indirect impacts given proximity of the tree to the Development Footprint however these will be managed through the mitigation measures outlined in Section 8.6 of the BDAR.
iv	MNES specific avoidance and mitigation measures	The following key impact avoidance and mitigation measures have been identified for the Project: • Alteration of the Development Footprint to avoid impact to individuals of Paddy's River box (*Eucalyptus macarthurii*).

Item 16 Requirements		Paddy's River Box
		• Development Footprint alterations to both the Solar and BESS components which have resulted in the avoidance of approximately 64.3 per cent (reducing from 1,838.09 ha (original survey area to 656.32 (580.62 ha (Solar) and 75.70 ha (BESS)) of the Project Area. • Reduction in the development footprint for the BESS project from 390 ha (Scoping Conceptual Layout including 2 BESS locations) to 75.70 ha (one BESS location and refined associated infrastructure layout)
v	Residual impact	No residual impacts are anticipated.
vi	Offsets required	No offsets are required for Paddy's River box

3.3.4 Significant Impact Criteria Consideration

The significant impact criteria considerations for *Eucalyptus macarthurii* are presented in **Table 3.6.**

Table 3.6 Significant Impact Assessment *Eucalyptus macarthurii*

An action is likely to have a significant impact on a critically endangered or endangered 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 total number of mature individuals was estimated to be greater than 10 000, although the level of evidence was low (Stone 2016 as cited in DCCEEW 2023b). The extent of occurrence of the Camden woollybutt in New South Wales is calculated to be 2535 km^2, using a minimum convex polygon method based on the IUCN Red List Guidelines 2014. The calculated total area of occupancy is 144 km^2, using a 2 km x 2 km grid cell method around the locality records (DCCEEW 2023c). The Proposed Action is not expected to result in the loss of any occupied habitat or direct impacts to any plants. There is potential for indirect impacts, given proximity to the Development Footprint, however the risk will be managed through mitigation measures, such that no long-term decrease to a population is likely.
Reduce the area of occupancy of the species
The total number of mature individuals was estimated to be greater than 10,000, although the level of evidence was low (Stone 2016 as cited in DCCEEW 2023c). The extent of occurrence of the Camden woollybutt in New South Wales is calculated to be 2535 km^2, using a minimum convex polygon method based on the IUCN Red List Guidelines 2014. The calculated total area of occupancy is 144 km^2, using a 2 km x2 km grid cell method around the locality records (DCCEEW 2023c). The Proposed Action is not expected to result in the loss of any occupied habitat or direct impacts to any plants. The area of occupancy of the single plant is not likely to be reduced when mitigation measures applied.
fragment an existing population into two or more populations
The single assumably planted individual will not be directly impacted by the proposal such that no fragmentation of a population into two or more populations will occur.
adversely affect habitat critical to the survival of a species
The Conservation Advice doesn't list any particular areas of habitat critical to the survival of the species, although it notes that Southern Highlands Shale Woodlands is the primary habitat for this species. No PCTs occurring on site are listed as associated PCTs for this species in BioNet. As there are no other plants found in the Biodiversity Survey Area, the Development Footprint would not be part of any habitat critical to the survival of the species. As such no habitat critical to the survival of a species would be affected.

An action is likely to have a significant impact on a critically endangered or endangered species if there is a real chance or possibility that it will
disrupt the breeding cycle of a population
The single individual is not likely to be cross-pollinated with any speculative individuals in the locality. The single individual is unlikely to be indirectly impacted by the Proposed Action, and so would not have any impacts to any breeding cycles it may carry out.
modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline
No associated PCTs or likely suitable habitat occurs within or adjacent to the Development Footprint or the single individual.
result in invasive species that are harmful to a critically endangered or endangered species becoming established in the endangered or critically endangered species' habitat
As no suitable habitat occurs within or adjacent to the Development Footprint, the Proposed Action is not expected to result in invasive species that are harmful to the species becoming established in any habitat.
introduce disease that may cause the species to decline
The Approved Conservation Advice notes that in In South Africa, *E. macarthurii* has been shown to be susceptible to infection by *Phytophthora nicotianae* and *P. nicotianae* which are present in Australia. Symptoms of infection include wilting and collapse of infected plants. Myrtle Rust is now established in the region but there is no information in Makinson RO (2018) as to the susceptibility of *E. macarthurii* to Mrytle Rust. The proposal is not likely to significantly indirectly affect the single plant such that it may cause the species to decline.
interfere substantially with the recovery of the species
A recovery plan for the species is not recommended, because the Approved Conservation Advice provides sufficient direction to implement priority actions and mitigate against key threats. Primary conservation actions include: • Prevent land clearing and resulting habitat destruction at all indigenous localities - It is noted that the single plant is reasonably assumed to be planted. • Maintain and enhance existing and potential habitat – as the single plant is planted and the Development Footprint and adjoining areas around the plant are not associated PCTs or occupied by a wild population the species, there is no habitat to maintain or enhance. • Prevent grazing by cattle and other introduced herbivores. The single plant, while assumed to be planted may be affected by grazing of sheep and cattle. • Manage weeds at all indigenous localities - It is noted that the single plant is reasonably assumed to be planted and so not a wild plant indigenous to the locality.
Conclusion
The Proposed Action will not impact directly or indirectly *Eucalyptus macarthurii* and accordingly no significant impacts are likely. The design has been modified to avoid any direct impacts to the single planted specimen of *Eucalyptus macarthurii* and to no significant indirect impacts when mitigation measures applied.

3.4 South-eastern Hooded Robin (*Melanodryas cucullata cucullata*)

3.4.1 Description

The south-eastern hooded robin is listed as endangered under the EPBC Act. This species occurs in south-eastern Australia from far south-east Queensland to Yorke Peninsula, South Australia, intergrading with *Melanodryas cucullata picata* in the southern Murray Darling basin (DCCEEW 2023d).

South-eastern hooded robins typically occur in pairs or small groups in dry eucalypt and acacia woodlands and shrublands with an open understorey, some grassy areas and a complex ground layer (DCCEEW 2023d). South-eastern hooded robins generally avoid woodlands with tall trees or dense tree cover but sometimes occur in tall, dense heaths with scattered open areas (DCCEEW 2023d).

The south-eastern hooded robin was no recorded in the Biodiversity Survey Area during the 2022–2024 bird surveys. There is 8.36 ha of potential habitat within the Development Footprint in the woodland vegetation zones of PCT 4063, PCT 3374 and PCT 3376.

3.4.2 Relevant Guidelines and Policy Statements

Relevant guidelines and policy statements available include:

- Approved Conservation Advice for *Melanodryas cucullata cucullata* (south-eastern hooded robin). (DCCEEW 2023d).
- Listing assessment information may be available in the approved Conservation Advice.
- There is no adopted or made Recovery Plan for this species.
- No Threat Abatement Plan has been identified as being relevant for this species.

3.4.3 NSW Bilateral Assessment Requirements

The NSW bilateral assessment requirement considerations for the South-eastern hooded robin are presented in **Table 3.7.**

Table 3.7 South-eastern Hooded Robin SEARs Requirement Considerations

Item 16 Requirements		South-eastern hooded robin
i	Description of habitat	Foraging habitat for the south-eastern hooded robin has been identified in the Project Area associated with PCTs 4063, PCT 3374 and PCT 3376. There 317.89 ha is of suitable habitat within the Biodiversity Survey Area, and 8.36 ha of suitable foraging habitat for this species within the Development Footprint. Habitat critical to the survival of the hooded robin (south-eastern) include areas of: • dry eucalypt and acacia woodlands and shrublands remnants with an open understorey, some grassy areas and a complex ground layer, often in or near clearings or open areas • structurally diverse habitats featuring mature eucalypts, saplings, some small shrubs and a ground layer of moderately tall native grasses • standing dead or live trees and tree stumps are also essential for nesting, roosting and foraging

Item 16 Requirements		South-eastern hooded robin
		• moderately deep to deep soils, rocks and fallen timber which provides essential foraging habitat (DCCEEW 2023d). Habitat in the Development Footprint is generally fragmented due to land use and access tracks and is unlikely to meet definitions of habitat critical to the survival of the species. Good condition patches of PCT 3376 and PCT 3374 in the transmission line alignments may provide habitat critical to the survival of the species.
ii	Survey methodology	A range of surveys methods have been employed to survey for threatened fauna species in keeping with the NSW BAM (DPIE 2020) the TBDC survey guidelines and species survey guidelines listed in Table 3.2 of the MNES report, including: • Over 200 diurnal bird surveys targeting woodland birds over eleven survey campaigns between August 2022 and September 2024 (Aug, Oct, Nov 22, Jan, Feb, Aug, Oct 23, Feb, March, Sep 24). Including 126 seasonal vantage point surveys. • Stick nest, hollow-bearing tree and burrow searches Aug 24, Jan, Feb. Aug, Oct 23 and March 24 • A total of 126 vantage point surveys were conducted across 7 sites in the Biodiversity Survey Area from October 2022–February 2023 to assess bird occurrence and flight behaviour across the Project Area.
iii	Impacts	The Proposed Action will directly impact on 8.36 ha or 2.51 per cent of foraging habitat within the Biodiversity Survey Area. The south-eastern hooded robin is unlikely to be impacted by the operation of the Project. Mitigation measures outlined in Section 8.6 of the BDAR will be implemented to minimise indirect impacts from the operation of the BESS.
iv	MNES specific avoidance and mitigation measures	Specific design refinements made by Spark Renewables during the development of the BDAR to avoid and minimise impacts to biodiversity values, including for the south-eastern hooded robin: • Minimise impacts to native vegetation. • Optimising opportunities to maintain connectivity between the Project Area and surrounding areas of intact native vegetation • Reduction of the Project Area to avoid riparian areas and dams with emergent vegetation that may provide habitat for threatened species. • The implementation of environmental management plans and strategies including Biodiversity Management Strategy to minimise the residual impacts of the project including a CEMP and BMP Further details of avoidance, mitigation and management measures are provided in Section 7.0 and Section 9.0 of the BDAR as well as Section 5.0 of this MNES Report.
v	Residual impact	The Proposed Action would directly impact on 8.36 ha of habitat for the species. An Assessment of Significance has been provided in **Table 3.8.** The assessment has concluded that the Proposed Action is unlikely to have a significant impact on the species.
vi	Offsets required	The south-eastern hooded robin is an ecosystem credit species, impacts to this species will be offset through the retirement of the Proposed Action's credit obligation for PCTs associated with the species as listed in Section 10.1.1 of the BDAR (Umwelt 2024a) and in Appendix 4 of this report. Refer to Section 7.1 of the MNES Bilateral Report for biodiversity offset strategy approach.

3.4.4 Significant Impact Criteria Consideration

The significant impact criteria considerations for south-eastern hooded robin are presented in **Table 3.8..**

Table 3.8 Significant Impact Assessment – South-eastern Hooded Robin

An action is likely to have a significant impact on a critically endangered or endangered species if there is a real chance or possibility that it will:
Lead to a long-term decrease of a population
The population estimate for the south-eastern hooded robin is 68,000 mature individuals (DCCEEW 2023d). The south-eastern hooded robin was not recorded in the Biodiversity Survey Area during the 2022–2024 bird surveys but there is suitable habitat within the Development Footprint. Construction of the Proposed Action would directly impact on 8.36 ha of foraging habitat or 2.51 per cent of habitat identified in the Biodiversity Survey Area. It is unlikely that the Proposed Action will lead to a long-term decrease in a population of south-eastern hooded robin.
Reduce the area of occupancy of a population
The area of occupancy for the south-eastern hooded robin is estimated to be 30,000 km^2 (DCCEEW 2023d). Proposed Action will remove 8.36 ha of native vegetation associated with PCTs 4063, 3376 and 3374 which may provide suitable habitat for the south-eastern hooded robin. This small area of potential suitable habitat is considered unlikely to result in the reduction of the area of occupancy for the species.
fragment an existing population into two or more populations
Given the small scale of potentially suitable habitat proposed to be impacted, the Proposed Action is unlikely to fragment an existing population into two or more populations.
adversely affect habitat critical to the survival of a species
Habitat critical to the survival of the hooded robin (south-eastern) include areas of: • dry eucalypt and acacia woodlands and shrublands remnants with an open understorey, some grassy areas and a complex ground layer, often in or near clearings or open areas • structurally diverse habitats featuring mature eucalypts, saplings, some small shrubs and a ground layer of moderately tall native grasses • standing dead or live trees and tree stumps are also essential for nesting, roosting and foraging • moderately deep to deep soils, rocks and fallen timber which provides essential foraging habitat (DCCEEW 2023d). The Proposed Action may affect a small area of habitat that is critical to the survival of the south-eastern hooded robin. However, given the small scale of proposed impact, the Proposed Action is unlikely to adversely affect habitat critical to the survival of the species.
disrupt the breeding cycle of a population
South-eastern hooded robins form monogamous pairs and usually return to the same breeding site each season building nests in tree forks or crevices one to five metres above the ground (DCCEEW 2023d). No evidence of nesting has been recorded in the Biodiversity Survey Area. Given the small scale of potentially suitable habitat proposed to be impacted (only 2.51% of habitat in the Biodiversity Survey Area) and the unlikelihood for this species to be impacted by the operation for the Proposed Action, the Proposed Action is unlikely to disrupt the breeding cycle of a population of south-eastern hooded robin.
modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline
Given the small scale of potentially suitable habitat proposed to be impacted, the Proposed Action is unlikely to modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the south-eastern hooded robin is likely to decline.

An action is likely to have a significant impact on a critically endangered or endangered species if there is a real chance or possibility that it will:
result in invasive species that are harmful to a critically endangered or endangered species becoming established in the endangered or critically endangered species' habitat
Predation by cats and foxes is listed as a key threat to this species in the Conservation Advice (DCCEEW 2023d). The Proposed Action may lead to an increase in invasive species within the Development Footprint. Monitoring and management of invasive fauna and flora will be undertaken throughout the construction and operational phases of Proposed Action.
introduce disease that may cause the species to decline
The Conservation Advice does not identify a disease that the south-eastern hooded robin is vulnerable too. The Proposed Action is unlikely to result in the introduction of disease that may cause the south-eastern hooded robin to decline.
interfere substantially with the recovery of the species
The species is affected by serious threats, most notably habitat loss, degradation, fragmentation and removal, climate change, predation from invasive species, invasive weeds, firewood collection and competition with noisy miners (*Manorina melanocephala*) (DCCEEW 2023d). Given the small area of suitable habitat proposed to be impacted and the low likelihood of operational impacts, the Proposed Action is considered unlikely to interfere substantially with the recovery of the south-eastern hooded robin.
Conclusion
The Proposed Action is unlikely to significantly impact the south-eastern hooded robin.

3.5 Greater Glider (Southern and Central) (*Petauroides volans*)

3.5.1 Description

The greater glider (southern and central) is the largest glider in eastern Australia. It is restricted to eastern Australia, occurring from Proserpine in Queensland through to central Victoria, with an elevational range from sea level to 1,200 m above sea level (DCCEEW 2022a).

The greater glider is listed as endangered under the EPBC Act. There is no robust estimate of the population size of the greater glider with estimates in 2014 of over 100,000 mature individuals and it is highly unlikely that the number of mature individuals is less than 1,000 (DCCEEW 2022a). There is a declining trend in population, particularly following the 2019-2020 bushfires with estimates of overall population decline of greater than 20% (DCCEEW 2022b). The greater glider has been recently assessed to have undergone a severe reduction in numbers of at least 50% over the past three generations (21 years) (DCCEEW 2022a).

This species is primarily folivorous, with a diet mostly comprising eucalypt leaves, and occasionally flowers. It is typically found in highest abundance in taller, montane, moist eucalypt forests with relatively old trees and abundant hollows as the greater glider typically roosts in large hollows in large, old trees but will also occur in drier habitats (DCCEEW 2022a). The species is largely dependent on large tracts of undisturbed, tall forest with suitably large hollows (diameter greater than 10 cm) preferably in living trees with suitable sized branch hollows; each animal requires a home range of between one to four hectares up to 19 ha in less fertile sites and will use multiple den trees (DCCEEW 2022a). It is particularly sensitive to forest clearance and to fragmentation, dispersing poorly across vegetation that is not native forest (DCCEEW 2022a).

3.5.2 Relevant Guidelines and Policy Statements

Relevant guidelines and policy statements available for this species include:

- Conservation Advice for *Petauroides volans* (greater glider) (southern and central) (DCCEEW 2022a).
- There is no listing advice for this species, listing assessment information may be available in the Approved Conservation Advice.
- There is no adopted or made Recovery Plan for this species.
- There are no adopted/made threat abatement plans, identified as being relevant for this species.

3.5.3 NSW Bilateral Assessment Requirements

There is suitable habitat present within the Development Footprint in the woodland vegetation zones of PCT 4063, PCT 3374 and PCT 3376. The Proposed Action will impact approximately 8.36 ha of woodland with suitable hollow bearing trees.

The NSW bilateral assessment requirement considerations for the greater glider are presented in **Table 3.9.**

Table 3.9 SEARs Requirement Considerations for the Greater Glider

Item 16 Requirements		Greater glider
i	Description of habitat	Potential foraging and breeding habitat for the greater glider may occur in the 8.36 ha of woodland vegetation associated with PCTs 4063, PCT 3374 and PCT 3376 within the Development Footprint. Habitat critical to the survival of the greater glider is defined in the Conservation Advice as areas of: • large contiguous areas of eucalypt forest, which contain mature hollow-bearing trees and a diverse range of the species' preferred food species in a particular region • smaller or fragmented habitat patches connected to larger patches of habitat, that can facilitate dispersal of the species and/or that enable recolonization • cool microclimate forest/woodland areas (e.g. protected gullies, sheltered high elevation areas, coastal lowland areas, southern slopes) • areas identified as refuges under future climate changes scenarios • short-term or long-term post-fire refuges (i.e. unburnt habitat within or adjacent to recently burnt landscapes) that allow the species to persist, recover and recolonise burnt areas. Habitat in the Development Footprint is generally fragmented due to land use and access tracks and is unlikely to meet definitions of habitat critical to the survival of the species. Good condition patches of PCT 3374 and PCT 3376 contain moderate abundance of hollow bearing trees which may provide suitable habitat for breeding.
ii	Survey Methodology	A range of surveys methods have been employed to survey for threatened fauna species in keeping with the NSW BAM (DPIE 2020), the TBDC survey guidelines and species survey guidelines listed in **Table 3.2**, including: • Spotlighting across 16 nights in Jan, Aug, Dec 2023 and Feb 2024. • Hollow-bearing tree searches Aug 24, Jan, Feb. Aug, Oct 2023 and March 2024

Item 16 Requirements		Greater glider
iii	Impacts	The Proposed Action will directly impact on 8.36 ha or 2.51 per cent of foraging habitat within the Biodiversity Survey Area during construction. The greater glider is unlikely to be impacted by the operation of the Project. Mitigation measures outlined in Section 8.6 of the BDAR will be implemented to minimise indirect impacts from the operation of the BESS.
iv	MNES specific avoidance and mitigation measures	The following key impact avoidance and mitigation measures have been identified for the Project: • Development Footprint alterations to both the Solar and BESS components which have resulted in the avoidance of approximately 64.3 per cent (reducing from 1,838.09 ha (original survey area to 656.32 (580.62 ha (Solar) and 75.70 ha (BESS)) of the Project Area. • Reduction in the development footprint for the BESS project from 390 ha (Scoping Conceptual Layout including 2 BESS locations) to 75.70 ha (one BESS location and refined associated infrastructure layout). • Optimising opportunities to maintain connectivity between the Project Area and surrounding areas of intact native vegetation. • Redesign of the Project to minimise impacts on areas of intact native woodland and hollow bearing trees which reduced impacts to suitable foraging and/or breeding habitat for the greater glider. • Reduction of the Project Area to avoid riparian areas and dams with emergent vegetation that may provide habitat for threatened species.
v	Residual impact	The Proposed Action would directly impact on 8.36 ha of potential habitat for the species. An Assessment of Significance has been provided in **Table 3.10**. The assessment has concluded that the Proposed Action is unlikely to result in a significant impact on the greater glider and this species was not observed during surveys.
vi	Offsets required	The greater glider is a species credit species. Under the NSW BAM, offsets are not required for this species as it was not detected during targeted surveys. Offsets are not required as there will be no residual significant impacts to this species.

3.5.4 Significant Impact Criteria Consideration

The significant impact criteria considerations for greater glider are presented in **Table 3.10.**

Table 3.10 Significant Impact Assessment – Greater Glider

An action is likely to have a significant impact on a critically endangered or endangered species if there is a real chance or possibility that it will:
Lead to a long-term decrease of a population
There is no robust estimate of the population size of the greater glider with estimates in 2014 of over 100,000 mature individuals and it is highly unlikely that the number of mature individuals is less than 1,000 (DCCEEW 2022a). There is a declining trend in population particularly following the 2019-2020 bushfires with estimates of overall population decline of greater than 20% (DCCEEW 2022a). The nearby Belanglo State Forest and Bangadilly National Park supports substantial populations of this species (NPWS 2009). The greater glider was listed under the EPBC Act as vulnerable in 2016 and has been recently assessed to have undergone a severe reduction in numbers of at least 50% over the past three generations (21 years) (DCCEEW 2022a). The greater glider was upgraded to endangered status under the EPBC Act in 2022.

An action is likely to have a significant impact on a critically endangered or endangered species if there is a real chance or possibility that it will:
The greater glider was not recorded within the Project Area during field surveys undertaken between 2022 and 2024. There are 22 BioNet records within 20 km of the Development Footprint, this suggests that they greater glider may, on occasion utilise the woodland vegetation on or near the Project Area. Numerous records are located in Belanglo State Forest and Bangadilly National Park suggesting a population utilises the better quality habitat in the protected reserves. The Proposed Action will clear up to 8.36 ha of potential habitat within the Development Footprint. Given the availability of suitable habitat outside of Development Footprint and the Project Area, particularly within the Belanglo State Forest and Bangadilly National Park, it is considered unlikely that the Proposed Action will Lead to a long-term decrease of a population. Mitigation measures outlined in Section 8.6 of the BDAR includes detailed pre-clearing surveys and clearing supervision to reduce the risk of injury and mortality of individuals.
Reduce the area of occupancy of a population
The extent of occurrence of the greater glider is estimated at 1,066,146 km^2 and area of occupancy is estimated at 15,316 m^2 (DCCEEW 2022a). In the locality, the greater glider is largely restricted to the Belanglo State Forest and Bangadilly National Park to the north east of the Project Area. Proposed Action will clear up to 8.36 ha of potential habitat within the Development Footprint. As no individuals were recorded in Biodiversity Survey Area, and there are minimal records in close proximity to the site it is considered unlikely that the species frequently use the habitat in the Project Area. The Proposed Action are unlikely to reduce the area of occupancy for the greater glider in the wider locality or region.
Fragment an existing population into two or more populations
Greater gliders are sensitive to fragmentation and tend to become locally extinct in small and fragmented habitat patches (DCCEEW 2022a). Movement of the greater glider is primarily restricted to gliding between trees as the species will avoid walking on the ground. When gliding they tend not to glide further than 30 m and have a steeper trajectory than other glider species. The greater glider has been recorded in the Belanglo State Forest and Bangadilly National Park which are located approximately six and ten kilometres to the north east, respectively. If the greater glider was to utilise the site either for foraging or for movement corridors, it is unlikely that the Proposed Action would fragment an existing population into two or more populations as habitat connectivity has been retained through the landscape. The Proposed Action would not truncate wildlife corridors or form a barrier to the movement of the species through the landscape.
Adversely affect habitat critical to the survival of a species
Habitat critical to the survival of the greater glider includes: • Large contiguous areas of eucalypt forest which contain mature hollow-bearing trees and a diverse range of preferred food species. • Smaller or fragmented habitat patches connected to larger patches of habitat, that can facilitate dispersal of the species and/or that enable recolonization. • Cool microclimate forest/woodland areas (protected gullies, sheltered high elevation areas, coastal lowland area, southern slopes). • Areas identified as refuges under future climate changes scenarios. • Short-term or long-term post fire refuges that allow the species to persist, recover and recolonise burnt areas. The Proposed Action will clear approximately 8.36 ha of potential habitat for the greater glider. Through redesign of the Development Footprint, 317.91 ha of woodland vegetation has been avoided and will be retained in the Project Area. The residual vegetation maintains connectivity to the larger tracks of habitat in the landscape with the majority of potential habitat critical to the survival of the greater glider in the Project Area not being adversely affected.

An action is likely to have a significant impact on a critically endangered or endangered species if there is a real chance or possibility that it will:
Disrupt the breeding cycle of a population
The greater glider has a relatively low reproductive rate with a generation length estimated to be six to eight years. No breeding populations of this species have been recorded in the Project Area. Clearing of suitable live hollow-bearing trees, foraging resources and fragmentation of habitats may disrupt breeding cycle of the greater glider. Patches of retained forest and woodland habitat have mostly been avoided through design which maintains connectivity to the larger tracks of habitat in the landscape, such that the Proposed Action is unlikely to disrupt the breeding cycle of the species.
Modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline
The Proposed Action will result in the loss of approximately 8.36 ha of greater glider habitat. The Proposed Action will modify, destroy or isolate or decrease the availability or quality of habitat for this species. Given there were no records of the species in the Project Area during field surveys, it is unlikely that the Proposed Action will modify, destroy, remove, isolate, or decrease the availability or quality of habitat for this species to the extent that the greater glider population 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
Invasive species that are harmful to the greater glider include introduced predators (European red fox and feral cat). The Proposed Action is not expected to result in invasive species that are harmful to the greater glider becoming established in greater glider habitat.
Introduce disease that may cause the species to decline
The conservation advice for the greater glider does not identify any disease that may cause the species to decline (DCCEEW 2022a).
Interfere substantially with the recovery of the species
There is currently no recovery plan for this species. The primary conservation objective in the Conservation Advice is that within the next three generations, the population size as well as the extent, quality and connectivity of habitat required to maintain the population will have increased (DCCEEW 2022a). The Proposed Action would result in a reduction of 8.36 ha of potential habitat including hollow bearing trees and foraging resources. Mitigation standards including pre-clearance surveys and avoidance of felling of trees with large hollows will reduce impacts. The Proposed Action is not expected to: • result in further fragmentation of habitats • result in hydrological changes to the surrounding environment such that the function and integrity of the retained habitat is jeopardised. Given the species has not been observed within the Disturbance Footprint and the above, it is unlikely that the Proposed Action will interfere with the recovery of the greater glider throughout its distribution.
Conclusion
The Proposed Action is unlikely to result in a significant impact on the greater glider.

3.6 Koala (*Phascolarctos cinereus*)

3.6.1 Description

The koala is listed as endangered under the EPBC Act. The listed population of the koala has a wide but patchy distribution that spans the coastal and inland areas of Queensland north to the Herberton area, extending westwards into hotter and dryer semi-arid climates of central Queensland, NSW and the Australian Capital Territory (ACT). The koala's distribution is not continuous across this range, and it occurs in several subpopulations that are separated by cleared land or unsuitable habitat (DAWE 2022b).

In NSW the koala is found along much of the coast with major populations in the northern coastal areas and more scattered populations in the south coast (DAWE 2022c). The northern NSW distribution also includes the Mulga Lands (NSW Section), Darling Riverine Plains, Brigalow Belt South, Nandewar, New England Tablelands, and South East Queensland (NSW Section) bioregions. Their western NSW distribution extends into the South-Eastern Highlands, NSW South Western Slopes, Cobar Peneplain, Riverina, and Murray Darling Depression bioregions. The distribution of the koala in NSW has contracted significantly in the north-western and southern margins with localised declines in coastal areas due to high anthropogenic pressure (DAWE 2022c).

The number of mature individuals is estimated in the conservation advice as 92,184 down from an estimate of 115,600 in 2012 and 184,748 in 2001 (DAWE 2022b). The number of subpopulations is declining as climate suitable habitat shrinks (DAWE 2022b).

Four genetically important populations of the koala have been identified nationally:

- Queensland and NSW populations north of the Clarence River Valley (Grafton).
- In NSW south of the Clarence River Valley to the northern extent of the Sydney Basin.
- In NSW, south of the Sydney Basin to about the NSW/Victorian border.
- Victoria and South Australian (DAWE 2022c).

Low-density populations also occur west of the Great Dividing Range in semi-arid environments and are considered to be isolated from their eastern subpopulations (DAWE 2022b). Habitat in these areas is fragmented and this has resulted in a patchy distribution of koalas across their range with significant numbers occurring on privately owned land (DAWE 2022b).

Koalas occupy a wide range of habitats defined by the availability and nutritional quality of food trees, presence of suitable resting trees and microclimates, age structure of the vegetation, history and impediments to dispersal (DAWE 2022c). 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 the Pilliga forest, low woodland and forested areas (DAWE 2022b).

3.6.2 Relevant Guidelines and Policy Statements

Relevant guidelines and policy statements available for this species include:

- Conservation advice for *Phascolarctos cinereus* (koala) combined populations of Queensland, New South Wales and the Australian Capital Territory (DAWE 2022b).

- There is no listing advice for this species, listing assessment information may be available in the Approved Conservation Advice.
- National recovery plan for the koala: *Phascolarctos cinereus* (combined populations of Queensland, New South Wales and the Australian Capital Territory) (DAWE 2022c).
- There are no adopted/made threat abatement plans, identified as being relevant for this species.
- Other policy statements and guidelines:
    - Administrative Guidelines – Identify habitat for the endangered koala (DCCEEW 2022b).
    - Administrative Guidelines – Referral guidance for the endangered koala (DCCEEW 2022b).

3.6.3 NSW Bilateral Assessment Requirements

There is suitable habitat present within the Development Footprint in the woodland vegetation zones of PCT 4063, PCT 3374 and PCT 3376. The Proposed Action will impact approximately 8.36 ha of suitable eucalypt woodland. **Table 3.11** lists the koala feed trees present within the Development Footprint and ranking of significance for the koala (DPE 2022c).

Table 3.11 Koala Feed Tree Present within Development Footprint

Scientific Name	Common Name	Koala Tree Use Rank
Eucalyptus macrorhycha	red stringybark	3 - significant use (feed or shelter trees)
Eucalyptus globoidea	white stringybark	2 - high use (feed trees)
Eucalyptus dives	broad-leaved peppermint gum	3- significant use (feed or shelter trees)
Eucalyptus amplifolia	cabbage gum	4 - irregular or low use (feed or shelter trees).
Eucalyptus agglomerata	blue-leaved stringybark	3- significant use (feed or shelter trees)
Eucalyptus pauciflora	white sally	3- significant use (feed or shelter trees)
Eucalyptus viminalis	ribbon gum	1 - high preferred use (feed trees)
Eucalyptus melliodora	yellow box	3- significant use (feed or shelter trees)

The NSW bilateral assessment requirement considerations for the koala are presented in **Table 3.12.**

Table 3.12 SEARs Requirement Considerations for the Koala

Item 16 Requirements		Koala
i	Description of habitat	Potential foraging and breeding habitat for the koala may occur in the 8.36 ha of woodland vegetation associated with PCTs 4063, PCT 3374 and PCT 3376. Eight species of koala feed trees were recorded in the Development Footprint. There is not definition of habitat critical to the survival of the species in the approved conservation advice (DAWE 2022b). In NSW critical koala populations are identified as “areas of currently known high koala occupancy”. As no koalas were recorded in the Project Area, and there are no records of the species within 2.5 km of the Development Footprint, it is unlikely that koalas frequent the vegetation with the Development Footprint.

Item 16 Requirements		Koala
		Large patches of intact woodland in the north east of the Project area would comprise important habitat for the koala as it is connected to Belanglo State Forest and Penrose State Forest. The patch is the north east of the Project Area contains a koala record from 2011. This vegetation would not be impacted by the Proposed Action and would likely form part of the potential Biodiversity Stewardship Site.
ii	Survey Methodology	A range of surveys methods have been employed to survey for threatened fauna species in keeping with the NSW BAM (DPIE 2020) the TBDC survey guidelines and species survey guidelines listed in Table 3.2, including: • Deployment of 20 remote cameras (March–April 2023). • Spotlighting across 16 nights in Jan, Aug, Dec 2023 and Feb 24. • Koala Spot Assessment Method (1498 trees search for koala scats) • Call play-back across 16 nights in Jan, Aug, Dec 2023 and Feb 24. • Songmeters deployed for 140 trap nights in February and October 2023.
iii	Impacts	The Proposed Action will directly impact on 8.36 ha or 2.51% of foraging habitat within the Biodiversity Survey Area during construction. The koala is unlikely to be impacted by the operation of the Project. Mitigation measures outlined in Section 8.6 of the BDAR will be implemented to minimise indirect impacts from the operation of the BESS.
iv	MNES specific avoidance and mitigation measures	The following key impact avoidance and mitigation measures have been identified for the Project: • Development Footprint alterations to both the Solar and BESS components which have resulted in the avoidance of approximately 64.3% (reducing from 1,838.09 ha (original survey area to 656.32 (580.62 ha (Solar) and 75.70 ha (BESS)) of the Project Area. • Reduction in the development footprint for the BESS project from 390 ha (Scoping Conceptual Layout including 2 BESS locations) to 75.70 ha (one BESS location and refined associated infrastructure layout) • Optimising opportunities to maintain connectivity between the Project Area and surrounding areas of intact native vegetation. • Redesign of the Project to minimise impacts on areas of intact native woodland and hollow bearing trees which reduced impacts to suitable foraging and/or breeding habitat for the koala. Reduction of the Project Area to avoid riparian areas and dams with emergent vegetation that may provide habitat for threatened species.
v	Residual impact	The Proposed Action would directly impact on 8.36 ha of habitat for the species. An Assessment of Significance has been provided in Table 3.13. The assessment has concluded that the Proposed Action is unlikely to result in a significant impact on the koala.
vi	Offsets required	Impact to the habitat of the koala will be offset through the retirement of the Proposed Action's credit obligation, through ecosystem credits for PCTs associated with the species as listed in Section 10.1.1 of the BDAR (Umwelt 2024a) and in Appendix 4 of this report.

3.6.4 Significant Impact Criteria Consideration

The significant impact criteria considerations for koala are presented in **Table 3.13.**

Table 3.13 Significant Impact Assessment – Koala

An action is likely to have a significant impact on a critically endangered or endangered species if there is a real chance or possibility that it will:
Lead to a long-term decrease of a population
The number of mature individuals is estimated in the conservation advice as 92,184 (DAWE 2022b). The koala population in NSW has declined by over 26 per cent in the last three generations (20 years) (DAWE 2022b). In the South East Highlands IBRA Bioregion, it is estimated that the koala population has reduced by 19 per cent over the last three generations from an estimate of 1,539 individuals in 2001 to 1,246 individuals in 2021 (DAWE 2022b) The Proposed Action will clear up to 8.36 ha of potential eucalypt woodland habitat. No koalas were recorded within the Development Footprint or Biodiversity Survey Area during extensive ecological surveys and the closest recording of koala is over 2.5 km from the Development Footprint. A population of koala is associated with the Belanglo State Forest and Penrose State Forest, both of which are located over 10 km from the Development Footprint. It is considered unlikely that the vegetation within the Development Footprint comprises important habitat for the koala as no signs of koala inhabitants have been observed despite comprehensive survey effort. Considering the impacts to 8.36 ha of woodland represent approximately 4% of the available woodland in the Biodiversity Survey Area, which is only a small fraction of the available woodland in the locality, it is unlikely that the Proposed Action will lead to a long-term decrease of a population of the koala.
Reduce the area of occupancy of a population
The listed population of the koala in Queensland, NSW and the ACT extent of occurrence is estimated at 19,428 km^2 (DAWE 2022b). 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. The Proposed Action will clear up to 8.36 ha of potential habitat with known occurrences of regionally relevant feed trees for the koala. It is considered unlikely that the vegetation within the Development Footprint comprises important habitat for the koala as no signs of koala inhabitants have been observed despite comprehensive survey effort. Considering the impacts to 8.36 ha of woodland represent approximately 4% of the available woodland in the Biodiversity Survey Area, which is only a small fraction of the available woodland in the locality, it is unlikely that the Proposed Action will substantially reduce the area of occupancy of the species in the wider region.
Fragment an existing population into two or more populations
While no koalas have been recorded during biodiversity surveys in the Development Footprint, 8.36 ha of suitable koala habitat will be impacted by the Proposed Action. Clearing and modification of habitat in the Development Footprint is unlikely to fragment or create a barrier to movement for the koala as the retained woodland and forest provide adequate wildlife corridors which maintain connectivity to larger tracts of woodland in the landscape.

An action is likely to have a significant impact on a critically endangered or endangered species if there is a real chance or possibility that it will:
Adversely affect habitat critical to the survival of a species
The conservation advice (DAWE 2022b) does not define habitat critical to the survival of the koala. Use of habitats within the Development Footprint by the koala have not been recorded despite comprehensive biodiversity surveys and there are no records of the koala within 2.5 km of the Development Footprint, suggesting that the onsite vegetation does not comprise important habitat. While the Proposed Action will clear and/or modify approximately 8.36 ha of potential koala habitat in the Development Footprint it is unlikely that this vegetation comprises habitat critical to the survival of the species.
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 Proposed Action occurs within the third koala management unit (NSW south of the Sydney Basin to about the border with Victoria). No breeding populations of this species been recorded in the Development Footprint. While approximately 8.36 ha of suitable habitat will be impacted by the Proposed Action, it is unlikely that the Proposed Action would disrupt the breeding cycle of a population of the koala.
Modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline
The Proposed Action will result in the loss of approximately 8.36 ha of koala habitat. It is considered that the Proposed Action will modify, destroy or isolate or decrease the availability or quality of habitat for this species. Given the koala was not recorded in the Development Footprint during field surveys, it is unlikely that the Proposed Action will result in the decline of the species.
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 Conservation Advice for the koala does not identify any invasive species that are harmful to the koala becoming established in koala habitat. The Proposed 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
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 2022b). The koala retrovirus is a gamma retrovirus that has integrated into the koala germ line of northern koala populations (DAWE 2022b). 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 and 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 2022b). An emerging disease that affects koala habitat is myrtle rust (*Austropuccinia psidii*) impacting on availability of foraging resources It is considered unlikely that the Proposed Action would introduce or exacerbate either of these diseases. Weed and disease management measures are outlined in Section 8.6 of the BDAR to minimise the risk of spread and introduction of diseases.

An action is likely to have a significant impact on a critically endangered or endangered species if there is a real chance or possibility that it will:
Interfere substantially with the recovery of the species
The National Recovery Plan for the koala outlines three objectives to progress the long-term recovery goal: 1a) The area of occupancy and estimated size of populations that are declining, suspected to be declining, or predicted to decline are instead stabilised then increased 1b) The area of occupancy and estimated size of populations that are suspected and predicted to be stable are maintained or increased 2) Metapopulation processes are maintained or improved 3) Partners, communities and individuals have a greater role and capability in listed koala monitoring, conservation and management The Proposed Action may result in a negligible reduction (8.36 ha) in potential habitat including foraging resources and habitat connectivity however, extensive surveys found no records of koala within the Project Area. Mitigation standards including pre-clearance surveys will reduce impacts. The Proposed Action 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 cinnamomic*, myrtle rust (*Austropuccinia psidii*) 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. It is unlikely that the Proposed Action will interfere with the recovery of the koala throughout its distribution.
Conclusion
The Proposed Action is unlikely to have significant direct and indirect impacts on the koala.

3.7 Swift Parrot (*Lathamus discolor*)

3.7.1 Description

The swift parrot is a critically endangered migrant of south-eastern Australia which occurs in temperate woodlands and forests. The swift parrot breeds in Tasmania and moves to mainland Australia for the non-breeding season (usually arriving between February and March) (Saunders and Tzaros 2011). Most of the population winters in Victoria and NSW where it disperses across broad landscapes foraging on nectar and lerps in eucalypts. The occurrence of swift parrots at foraging sites is primarily associated with abundance of winter flowering nectar and lerps and non-aggressive competitors. In the western slopes region of NSW this is largely box-ironbark forest and grassy woodlands.

In NSW, swift parrots forage mostly throughout the coastal region and western slopes region along the inland slopes of the Great Dividing Range (Saunders and Tzaros 2011; DCCEEW 2024). Forests on the coastal plains from southern to northern NSW are also important and tend to support large numbers of birds particularly when inland habitats area subject to drought (DCCEEW 2024). They feed preferentially on foliage and lerps in large mature trees that provide more reliable foraging resources (DCCEEW 2024). In inland NSW the key foraging species include mugga ironbark (*Eucalyptus sideroxylon*), grey box (*Eucalyptus microcarpa*), white box (*Eucalyptus albens*) and yellow box (*Eucalyptus melliodora*) (Saunders and Tzaros

2011) and red ironbark (*Eucalyptus tricarpa*) (DCCEEW 2024). In coastal NSW the key foraging resources are swamp mahogany (*Eucalyptus robusta*), forest red gum (*Eucalyptus tereticornis*), blackbutt (*Eucalyptus pilularis*) and spotted gum (*Corymbia maculata*) (Saunders and Tzaros 2011). The swift parrot relies heavily on lerps for food (DCCEEW 2024).

The recently published recovery plan identifies that the global Key Biodiversity Areas (KBA) partnership currently recognises 18 KBAs as important for the swift parrot conservation and to support the long-term persistence of the species including three in Tasmania (breeding), six in Victoria and nine in NSW (DCCEEW 2024). All of these KBAs are also recognised as KBA for the species (DCCEEW 2024). The nine KBAs in NSW are:

- Brisbane Water in the Central Coast region.
- Capertee Valley in the west of Wollemi National Park. This KBA also supports populations of the regent honeyeater (refer to Section 3.8.1) and the painted honeyeater (refer to Section 3.7.5).
- Hastings – Macleay KBA, on the mid north coast of NSW.
- Hunter Valley KBA, a 560 km^2 tract of land around Cessnock in the lower Hunter Valley.
- Lake Macquarie in the Hunter Central Coast region.
- Richmond woodlands on the north western fringes of Sydney.
- South-west slopes of NSW, largely coincident with the bioregion.
- Tuggerah – Tuggerah Lakes on the Central Coast.
- Ulladulla to Merimbula, a strip of coastal and subcoastal land (extends 10 km inland) along south coast of NSW.

Habitat critical to the survival of the swift parrot has also been defined in the recovery plan as:

- Breeding and foraging habitat in Tasmania.
- Foraging habitat on the Australian mainland including all preferred foraging species within known and likely foraging habitat, where preferred foraging species include yellow gum; red ironbark; mugga ironbark, grey box, white box, yellow box, swamp mahogany, forest red gum, blackbutt, and spotted gum (DCCEEW 2024).

The Project Area does not occur within any of the NSW KBAs. The closest KBA is at Ulladulla to Merimbula, approximately 80 km south east of Marulan.

During the non-breeding season, the home-range varies tremendously between individuals and between years. The movements of this species on the mainland are poorly understood, but it is considered to be nomadic and irruptive, moving in response to food supply. Upon reaching their core non-breeding range there is no known geographical pattern of movement. The swift parrots return to Tasmania in spring (September–October).

The swift parrot has undergone a severe decline in recent decades due to broadscale breeding and foraging habitat loss and predation by introduced sugar gliders in their Tasmanian breeding range (Stojanovic *et al.* 2014, Heinsohn *et al*. 2015 cited in National Environmental Science Program Threatened Species Research Hub (2019b)). The current population size is uncertain with it being estimated to be below 2,000 individuals in the wild in 2010 (Garnett*, et al.* 2011) and declined to an estimated 750 (range 300 to 1000) mature individuals in 2020 (DCCEEW 2024). Recent genetic studies estimated the population to be between 60 and 338 individuals (Olah *et al.* 2020).

The swift parrot was not recorded in the Biodiversity Survey Area during the 2022–2024 bird surveys. 14.64 ha of potential habitat is located within the Development Footprint in the woodland vegetation zones of PCT 4063, PCT 3347, PCT 3374 and PCT 3376.

3.7.2 Relevant Guidelines and Policy Statements

Relevant guidelines and policy statements available for this species include:

- Conservation advice *Lathamus discolor* swift parrot (TSSC 2016a).
- There is no listing advice for this species, listing assessment information may be available in the Approved Conservation Advice.
- National Recovery Plan for the Swift Parrot *Lathamus discolor* (DCCEEW 2024).
    - Adopted/made threat abatement plans: Threat abatement plan for predation by feral cats (CoA 2015a).
    - Key threats and priority actions for the swift parrot identified in the Threatened Species Strategy Action Plan 2022–2032 (DCCEEW 2022f).
- Other policy statements and guidelines:
    - Survey guidelines for Australia's threatened birds. Guidelines for detecting birds listed as threatened under the *Environment Protection and Biodiversity Conservation Act 1999* (DEWHA 2010).

3.7.3 NSW Bilateral Assessment Requirement

The NSW bilateral assessment requirement considerations for the swift parrot are presented in **Table 3.14.**

Table 3.14 SEARs Requirement Considerations Swift Parrot

Item 16 Requirements		Swift Parrot
i	Description of habitat	Foraging habitat for the swift parrot has been identified in the Project Area associated with PCTs 4063, PCT 3347, PCT 3374 and PCT 3376. There is 317.89 ha is of suitable habitat within the Biodiversity Survey Area, and 8.36 ha of suitable foraging habitat for this species within the Development Footprint. Habitat critical to the survival of the swift parrot includes areas of: • Breeding and foraging habitat in Tasmania. • Foraging habitat on the Australian mainland including all preferred foraging species within known and likely foraging habitat, where preferred foraging species include yellow gum; red ironbark; mugga ironbark, grey box, white box, yellow box, swamp mahogany, forest red gum, blackbutt, and spotted gum (DCCEEW 2024). Canopy vegetation in the Development Footprint is generally dominated by *Eucalyptus macrorhyncha, Eucalyptus dives* or *Eucalyptus cinerea* with some small occurrences of *Eucalyptus tereticornis* (forest red gum) and Eucalyptus *melliodora* (yellow box). Given the low abundance of preferred foraging species in the Development Footprint, the available habitat is unlikely to comprise habitat critical to the survival of the swift parrot.
ii	Survey methodology	A range of surveys methods have been employed to survey for threatened fauna species in keeping with the NSW BAM (DPIE 2020) the TBDC survey guidelines and species survey guidelines listed in Table 3.2 of the MNES report, including: • Over 200 diurnal bird surveys targeting woodland birds over eleven survey campaigns between August 2022 and September 2024: 2022(Aug, Oct, Nov); 2023 (Jan, Feb, Aug and Oct); 2024 (Feb, March and Sept). Including 126 seasonal vantage point surveys. • Stick nest, hollow-bearing tree and burrow searches in 2023 (Jan, Feb. Aug, Oct) and 2024 (March and August). • A total of 126 vantage point surveys were conducted across 7 sites in the Biodiversity Survey Area from October 2022–February 2023 to assess bird occurrence and flight behaviour across the Project Area.
iii	Construction impacts	The Proposed Action will directly impact on 8.63 ha foraging habitat within the Biodiversity Survey Area. The swift parrot is unlikely to be impacted by the operation of the Project. Mitigation measures outlined in Section 8.6 of the BDAR will be implemented to minimise indirect impacts from the operation of the BESS.
iv	MNES specific avoidance and mitigation measures	Specific design refinements made by Spark Renewables during the development of the BDAR to avoid and minimise impacts to biodiversity values, including for the swift parrot: • Minimise impacts to native vegetation. • Optimising opportunities to maintain connectivity between the Project Area and surrounding areas of intact native vegetation • Reduction of the Project Area to avoid riparian areas and dams with emergent vegetation that may provide habitat for threatened species. • The implementation of environmental management plans and strategies including Biodiversity Management Strategy to minimise the residual impacts of the project including a CEMP, OEMP and BMP. Further details of avoidance, mitigation and management measures are provided in Section 7.0 and Section 9.0 of the BDAR as well as **Section 5.0** of this MNES Report.

Item 16 Requirements		Swift Parrot
v	Residual impact	The Proposed Action would directly impact on 8.36 ha of habitat for the species. An Assessment of Significance has been provided in **Table 3.15.** The assessment has concluded that the Proposed Action is unlikely to have a significant impact on the species.
vi	Offsets required	The swift parrot is a dual credit species. Impacts to habitat mapped on the BAM important habitat map are to be offset through species credits. As the Development Site is not mapped on the BAM important habitat map, residual impacts to any foraging habitat for the swift parrot will be offset through ecosystem credits, through the retirement of the Proposed Action's credit obligation.

3.7.4 Significant Impact Criteria Consideration

The significant impact criteria considerations for swift parrot are presented in **Table 3.15.**

Table 3.15 Significant Impact Assessment – Swift Parrot

An action is likely to have a significant impact on a critically endangered or endangered species if there is a real chance or possibility that it will:
Lead to a long-term decrease of a population
The swift parrot is a single migratory population (DCCEEW 2024). The conservation advice identifies that in 2010 it was estimated that there were about 2,000 mature individuals and the population was declining and likely to undergo a future very severe reduction in population size over three generations (TSSC 2016a). It was estimated to be 750 (range 300 to 1,000) mature individuals in 2020 though more recent genetic studies estimate the effective population size between 60 and 338 (DCCEEW 2024). The species is listed as critically endangered due to reduction in population size (TSSC 2016a). The Proposed Action would directly impact 8.36 ha of potential foraging habitat or 2.5 per cent of potential foraging habitat in the Biodiversity Survey Area. It is considered unlikely that the swift parrot relies on the habitat with the Development Footprint as a significant foraging resource, given the dominant canopy species are not recognised as an important foraging resource. As the site is unlikely to comprise important foraging habitat, it considered unlikely that the Proposed Action will lead to a long-term decrease in a population of swift parrot.
Reduce the area of occupancy of a population
The average area of occupancy for the swift parrot for nesting is estimated to be about 425 km^2 while the average area of occupancy for nesting and foraging for the species ranges from 18.5 km^2 to 355 km^2 between 2009 and 2014 (TSSC 2016a). In summary, the swift parrot has a restricted area of occupancy subject to extreme fluctuations (TSSC 2016a). Non-breeding range of swift parrots includes much of the east coast of mainland Australia up to south-east Queensland and inland box gum ironbark woodlands in Victoria and NSW. The conservation advice for the swift parrot recognises that there is strong evidence to support a continuing decline in the area of occupancy and that the area of occupancy fluctuates between years (TSSC 2016a). As the site is unlikely to comprise important foraging habitat for the species, impacts to 8.36 ha potential habitat is considered unlikely to result in the reduction of the area of occupancy for the species.
fragment an existing population into two or more populations
There is one national population of the swift parrot. Due to the location and extent of the Proposed Action and the species' mobility it is unlikely that the swift parrot's population will be fragmented into two as a result of the construction and operation of the Proposed Action.

An action is likely to have a significant impact on a critically endangered or endangered species if there is a real chance or possibility that it will:
adversely affect habitat critical to the survival of a species
As defined in the recovery plan, habitat critical to the survival of the swift parrot on the Australian mainland includes all preferred foraging species within known and likely foraging habitat (DCCEEW 2024). The Project Area supports low abundance of preferred foraging species, with sporadic occurrences of mugga ironbark, white box and yellow box. The swift parrot has not been recorded in the Project Area, despite extensive survey effort. Habitat critical to the survival of the swift parrot includes key breeding and foraging habitat: • Breeding and foraging habitat in Tasmania. • Foraging habitat on the Australian mainland including all preferred foraging species within known and likely foraging habitat, where preferred foraging species include yellow gum; red ironbark; mugga ironbark, grey box, white box, yellow box, swamp mahogany, forest red gum, blackbutt, and spotted gum (DCCEEW 2024). Given the low abundance of preferred foraging habitat, the habitat within the Project Area is unlikely to comprise habitat critical to the survival of the swift parrot.
disrupt the breeding cycle of a population
The Proposed Action would not disrupt the species' breeding cycle given that it breeds in Tasmania (DCCEEW 2024b).
modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline
Given the low abundance of preferred foraging habitat on the Project Area, it is unlikely that the Proposed Action would modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the swift parrot 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
There are no introduced species listed as a key threat to this species on the mainland (DCCEEW 2024b). Further, the Proposed Action is unlikely to result in invasive species that are potentially harmful to the swift parrot becoming established within the Project Area.
introduce disease that may cause the species to decline
The swift parrot is susceptible to Psittacine beak and feather disease (PBFD) (DCCEEW 2024b). The Proposed Action is unlikely to result in the introduction of PBFD that may cause the swift parrot to decline. PBFD has not been observed in the Project Area, however if present, may be increased as a result of increased competition for hollows, which can harbour the virus shed from an infected inhabitant. The most common bird species in the Project Area are all susceptible to PBFD, including galahs, crimson and eastern rosellas and sulphur-crested cockatoos.
interfere substantially with the recovery of the species
The overarching vision of the National Recovery Plan is to increase the population size to such an extent that the species no longer qualifies for listing as threatened under any of the EPBC Act listing criteria. One of the key strategies to achieve this is to "maintain known swift parrot breeding and foraging habitat at the local, regional and landscape scales". Given the small area of suitable habitat proposed to be impacted and the low likelihood of operational impacts, the Proposed Action is considered unlikely to interfere substantially with the recovery of the swift parrot.
Conclusion
The Proposed Action is unlikely to significantly impact on the swift parrot.

3.8 Regent Honeyeater (*Anthochaera phrygia*)

3.8.1 Description

The regent honeyeater is a critically endangered species listed under the EPBC Act. This species is partially nomadic, 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 primary threat is loss of breeding and foraging habitat (CoA 2016).

The regent honeyeater mostly inhabits inland slopes of the Great Dividing Range, in areas of low to moderate relief with moist, fertile soils; most commonly associated with box-ironbark eucalypt woodland and dry sclerophyll forest, but may also occur in riparian vegetation, spotted gum-ironbark associations and coastal forest dominated by swamp mahogany (Eucalyptus robusta). The regent honeyeater utilises a variety of food resources. Its diet primarily consists of nectar, but also includes invertebrates (mostly insects) and their exudates (e.g. lerps and honeydew), and occasionally fruit. Nectar is mostly obtained from eucalypts and mistletoe, and the regent honeyeater appears reliant on select species which provide reliable nectar flows, including *Eucalyptus albens* and *E. melliodora* (CoA 2016).

The Project Area does not occur within any of 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 VIC (DoE 2016).

Habitat critical to the survival of the regent honeyeater includes key breeding and foraging areas at:

- Bundarra-Barraba and subsidiary area of Pilliga Woodlands, Warrumbungles, Inverell-Ashford-Emmaville.
- Capertee Valley and subsidiary area of Mudgee-Munghorn Gap-Wollar and Burragorang River Valleys.
- Hunter Valley/Central Coast areas in NSW extending from central coast, the lower Hunter Valley to Upper Hunter Valley and Goulburn River (CoA 2016).

The regent honeyeater was not recorded in the Biodiversity Survey Area during the 2022–2024 bird surveys. 8.36 ha of potential habitat is located within the Development Footprint in the woodland vegetation zones of PCT 4063, PCT 3347, PCT 3374 and PCT 3376.

3.8.2 Relevant Guidelines and Policy Statements

Relevant guidelines and policy statements available include:

- The National Recovery Plan for the regent honeyeater (CoA 2016).
- Conservation Advice for the regent honeyeater (DoE 2015).
- Adopted/made threat abatement plans: Threat abatement plan for competition and land degradation by rabbits (DOEE 2016).
- Other policy statements and guidelines: Survey guidelines for Australia's threatened birds. Guidelines for detecting birds listed as threatened under the *Environment Protection and Biodiversity Conservation Act 1999* (DEWHA 2010).

- Key threats and priority actions for the regent honeyeater identified in the Threatened Species Strategy Action Plan 2022-2032 (DCCEEW 2022f).

3.8.3 NSW Bilateral Assessment Requirement

The NSW bilateral assessment requirement considerations for the regent honeyeater is presented in **Table 3.16.**

Table 3.16 SEARs Requirements Considerations Regent Honeyeater

Item 16 Requirements		Regent honeyeater
i	Description of habitat	Foraging habitat for the regent honeyeater has been identified in the Project Area associated with PCTs 4063, PCT 3347, PCT 3374 and PCT 3376. There is 317.89 ha of suitable habitat within the Biodiversity Survey Area, and 8.36 ha of suitable foraging habitat for this species within the Development Footprint. Habitat critical to the survival of the regent honeyeater include: • any breeding or foraging areas where the species is likely to occur. • any newly discovered breeding or foraging locations (DoE 2016). Nectar is mostly obtained from eucalypts and mistletoe, and the regent honeyeater appears reliant on select species which provide reliable nectar flows, including *Eucalyptus albens* and *E. melliodora* (DoE 2016). Canopy vegetation in the Development Footprint is generally dominated by *Eucalyptus macrorhyncha, Eucalyptus dives* or *Eucalyptus cinerea* with some small occurrences of yellow box (*Eucalyptus melliodora*). Given the low abundance of preferred foraging species in the Development Footprint, the available habitat is unlikely to comprise habitat critical to the survival of the regent honeyeater.
ii	Survey methodology	A range of surveys methods have been employed to survey for threatened fauna species in keeping with the NSW BAM (DPIE 2020) the TBDC survey guidelines and species survey guidelines listed in Table 3.2 of the MNES report, including: • Over 200 diurnal bird surveys targeting woodland birds over eleven survey campaigns between August 2022 and September 2024: 2022 (Aug, Oct and Nov), 2023 (Jan, Feb, Aug and Oct) and 2024 (Feb, March and Sep). Including 126 seasonal vantage point surveys. • Stick nest, hollow-bearing tree and burrow searches in 2023 (Jan, Feb. Aug and Oct 23) and in 2024 (March and Aug). • A total of 126 vantage point surveys were conducted across 7 sites in the Biodiversity Survey Area from October 2022–February 2023 to assess bird occurrence and flight behaviour across the Project Area.
iii	Impacts	The Proposed Action will directly impact on 8.36 ha or 2.5 per cent of foraging habitat within the Biodiversity Survey Area. The regent honeyeater is unlikely to be impacted by the operation of the Project. Mitigation measures outlined in Section 8.6 of the BDAR will be implemented to minimise indirect impacts from the operation of the BESS.
iv	MNES specific avoidance and mitigation measures	Specific design refinements made by Spark Renewables during the development of the BDAR to avoid and minimise impacts to biodiversity values, including for the regent honeyeater: • Minimise impacts to native vegetation.

Item 16 Requirements		Regent honeyeater
		• Optimising opportunities to maintain connectivity between the Project Area and surrounding areas of intact native vegetation • Reduction of the Project Area to avoid riparian areas and dams with emergent vegetation that may provide habitat for threatened species. • The implementation of environmental management plans and strategies including Biodiversity Management Strategy to minimise the residual impacts of the project including a CEMP, OEMP and BMP. Further details of avoidance, mitigation and management measures are provided in Section 7.0 and Section 9.0 of the BDAR as well as Section 5.0 of this MNES Report.
v	Residual impact	The Proposed Action would directly impact on 8.36 ha of habitat for the species. An Assessment of Significance has been provided in **Table 3.17.** The assessment has concluded that the Proposed Action is unlikely to have a significant impact on the species.
vi	Offsets required	The regent honeyeater is a dual credit species where impacts to habitat mapped on the BAM important habitat map are offset through species credits. As the Development Site is not mapped on the BAM important habitat map species credits are not required. Residual impacts to any foraging habitat for the regent honeyeater will be offset through ecosystem credits, through the retirement of the Proposed Action's credit obligation.

3.8.4 Significant Impact Criteria Consideration

The significant impact criteria considerations for regent honeyeater are presented in **Table 3.17.**

Table 3.17 Significant Impact Assessment – Regent Honeyeater

An action is likely to have a significant impact on a critically endangered or endangered species if there is a real chance or possibility that it will:
Lead to a long-term decrease of a population
The regent honeyeater is a single national population. The conservation advice for the regent honeyeater identifies that the number of mature individuals was estimated to be 350 to 400 by 2010 with a population decline of greater than 80 per cent within three generations (DoE 2015). More recent estimates are 250 mature individuals (DCCEEW 2022f). Construction of the Proposed Action would directly impact on 8.36 ha or 2.5 per cent of potential foraging habitat in the Biodiversity Survey Area. It is considered unlikely that the regent honeyeater relies on the habitat with the Development Footprint as a significant foraging resource, given the dominant canopy species are not listed as an important foraging resource. As the site is unlikely to comprise important foraging habitat, it considered unlikely that the Proposed Action will lead to a long-term decrease in a population of regent honeyeater.
Reduce the area of occupancy of a population
The area of occupancy for the regent honeyeater is estimated to be 300 km^2 and decreasing (DoE 2015a). The species is not known to occur in the locality and was not recorded in the Biodiversity Survey Area. The Proposed Action would reduce the extent of potential foraging habitat in the Development Footprint by about 8.36 ha. This small area of potential habitat is considered unlikely to result in the reduction of the area of occupancy for the species.

An action is likely to have a significant impact on a critically endangered or endangered species if there is a real chance or possibility that it will:
fragment an existing population into two or more populations
There is one national population of the regent honeyeater. Due to the location and extent of the Proposed Action and the species' mobility it is unlikely that the regent honeyeater population will be fragmented into two as a result of the construction and operation of the Proposed Action. The Proposed Action has been designed to retain connectivity in the landscape so is unlikely to fragment habitat or create barriers to movements to any population of woodland bird species.
adversely affect habitat critical to the survival of a species
Habitat critical to the survival of the regent honeyeater include key breeding and foraging areas: • Bundarra-Barraba and subsidiary area of Pilliga Woodlands, Warrumbungles, Inverell-Ashford-Emmaville • Capertee Valley and subsidiary area of Mudgee-Munghorn Gap-Wollar and Burragorang River Valleys • Hunter Valley/Central Coast areas in NSW extending from lower Hunter Valley to Upper Hunter Valley and Goulburn River. • The Project Area does occur within any of the key breeding and foraging areas. Given the low abundance of preferred foraging resources, the habitat within the Project Area is unlikely to comprise habitat critical to the survival of the regent honeyeater.
disrupt the breeding cycle of a population
The regent honeyeater mainly breeds between July and January at three key sites in NSW being the Bundarra-Barraba area, the Capertee Valley, and the Hunter Valley (DoE 2016). Breeding is in response to flowering of key eucalypts and mistletoes. The regent honeyeater has some fidelity in breeding sites but may nest within 85 km of a nest site, generally large mature trees, the following year. Breeding territories usually consists of the nest-tree and surrounding feeding areas extending up to 40 m (DoE 2016). The regent honeyeater has not been recorded in the Project Area and there is low likelihood that the Proposed Action would disrupt breeding or nesting habitat for the species.
modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline
Given the low abundance of preferred foraging habitat on the Project Area, the Proposed Action 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
Competition with feral honeybees for foraging resources is listed as a key threat to this species (DoE 2016). The Proposed Action is unlikely to result in an increase in feral honeybees within the Project Area.
introduce disease that may cause the species to decline
There are no diseases listed as a key threat within the Recovery Plan (CoA, 2016). The Proposed Action is unlikely to result in the introduction of disease that may cause the regent honeyeater to decline.
interfere substantially with the recovery of the species
The objectives of the Recovery Plan are to: • Reverse the long-term population trend of decline and increase the numbers of regent honeyeaters to a level where there is a viable, wild breeding population, even in poor breeding years; and to • Enhance the condition of habitat across the regent honeyeaters range to maximise survival and reproductive success and provide refugia during periods of extreme environmental fluctuation. The Proposed Action would remove areas of marginal foraging habitat due to the low abundance of preferred feed trees. It is considered unlikely that the Proposed Action would contribute to further decline of the regent honeyeater.
Conclusion
The Proposed Action is unlikely to significantly impact on the regent honeyeater.

3.9 Key's Matchstick Grasshopper (*Keyacris scurra*)

3.9.1 Description

Key's matchstick grasshopper was originally distributed from Victoria to Orange (NSW) across the wheat/sheep belt, typically recorded in native grasslands and grassy woodland. Its northern boundaries are poorly defined, with its Victorian distribution most notable in the Omeo district and more recently the species has been recorded in conservation reserves in the ACT. Its northern boundaries in the NSW Central Tablelands and Slopes are poorly defined likely due to a very low survey effort, with recent records around Bathurst the northernmost. It is currently estimated that there are less than five sites and an area of occupation of less than 124 km^2, which is contracting (TSSC 2022).

This species is typically recorded in native grasslands, secondary native grasslands or areas that contain the native grass *Themeda australis* with appropriate disturbance regimes. Disturbance is an important factor to site occupancy; the species has appeared to be absent from sites where disturbance has occurred during inappropriate times or has been deemed erratic (Rowell and Crawford 1995). Although opportunistic sightings of the species have been reported in a wide range of vegetation types, including wet sclerophyll forest, montane low forest, dry woodlands, heathland, and montane grasslands (TSSC 2022).

The species is flightless and does not disperse large distances (<10 m), hence it is likely that observations are indicative of resident populations rather than dispersing individuals (TSSC 2022).

The Key's matchstick grasshopper was not recorded in the Biodiversity Survey Area during the 2022–2024 surveys. Approximately 2.12 ha of potential habitat is located within the Development Footprint in the grassy woodland vegetation zones of PCT 3376.

3.9.2 Relevant Guidelines and Policy Statements

Relevant guidelines and policy statements available for this species include:

- Conservation Advice *Keyacris scurra* Key's matchstick (TSSC 2022)
- There is no listing advice for this species, listing assessment information may be available in the Approved Conservation Advice.
- There is no adopted or made Recovery Plan for this species.
- There are no adopted/made threat abatement plans, identified as being relevant for this species.

3.9.3 NSW Bilateral Assessment Requirement

The NSW bilateral assessment requirement considerations for the key's matchstick grasshopper are presented in **Table 3.18.**

Table 3.18 SEARs Requirement Considerations Key's Matchstick Grasshopper

Item 16 Requirements		Key's matchstick grasshopper
i	Description of habitat	Potential foraging and breeding habitat for the Key's matchstick grasshopper may occur in the 2.12 ha of grassy woodland vegetation associated PCT 3376. Habitat critical to the survival of the Key's matchstick grasshopper include areas of: • native grasslands; • secondary native grasslands; and • areas that contain the native grass *Themeda australis* with appropriate disturbance regimes. Habitat in the Development Footprint is generally fragmented due to land use and access tracks and is unlikely to meet definitions of habitat critical to the survival of the species. Good condition patches of PCT 3376 contain moderate abundance of intact grassland components which may provide suitable habitat for the Key's matchstick grasshopper.
ii	Survey Methodology	A range of surveys methods have been employed to survey for threatened fauna species in keeping with the NSW BAM (DPIE 2020) the TBDC survey guidelines and species survey guidelines listed in Table 3.2 of the BDAR, including: • Diurnal fauna surveys, habitat assessment and active searches across 16 days (2 days in Aug 2022, 5 days in Aug 2023, 7 days in Oct 2023 and 2 days Mar 2024)
iii	Impacts	The Proposed Action will directly impact on 2.12 ha of suitable habitat within the Biodiversity Survey Area during construction. The Key's matchstick grasshopper is unlikely to be impacted by the operation of the Project. Mitigation measures outlined in Section 8.6 of the BDAR will be implemented to minimise indirect impacts from the operation of the BESS.
iv	MNES specific avoidance and mitigation measures	The following key impact avoidance and mitigation measures have been identified for the Project: • Biodiversity impact avoidance through Development Footprint alterations which have resulted in biodiversity impact avoidance through an avoidance of approximately 68.42% (reducing from 1,838.09 ha to 580.62 ha) of the Project Area. • Optimising opportunities to maintain connectivity between the Project Area and surrounding areas of intact native vegetation. • Redesign of the Project to minimise impacts on areas of intact native woodland and hollow bearing trees which reduced impacts to suitable foraging and/or breeding habitat for the greater glider. • Reduction of the Project Area to avoid riparian areas and dams with emergent vegetation that may provide habitat for threatened species.
v	Residual impact	The Proposed Action would directly impact on 2.12 ha of habitat for the species. An Assessment of Significance has been provided in **Table 3.19**. The assessment has concluded that the Proposed Action is unlikely to result in a significant impact on the greater glider and this species was not observed during surveys.
vi	Offsets required	Key's matchstick grasshopper is a species credit species under the NSW BAM. Offsets are not required as there will be no residual significant impacts to this species.

3.9.4 Significant Impact Criteria Consideration

The significant impact criteria considerations for key's matchstick grasshopper are presented in

Table 3.19 Significant Impact Assessment – Key's Matchstick Grasshopper

An action is likely to have a significant impact on a critically endangered or endangered species if there is a real chance or possibility that it will:
Lead to a long-term decrease of a population
Current population numbers are unknown. Key's matchstick grasshopper was not recorded in the Biodiversity Survey Area during the 2022–2024 surveys and there is a small amount of suitable habitat within the development footprint. Construction of the Proposed Action would directly impact on 2.12 ha of potential habitat identified in the Biodiversity Survey Area. It is unlikely that the Proposed Action will lead to a long-term decrease in a population of key's matchstick grasshopper.
Reduce the area of occupancy of a population
The current estimated area of occupancy of the Key's matchstick grasshopper is less than 124 km^2, spread across multiple locations (TSSC 2022). Key's matchstick grasshopper has not been recorded in the Biodiversity Survey Area. Removal of 2.12 ha of potential habitat will not reduce of the area of occupancy of this species.
Fragment an existing population into two or more populations
The species occurs in resident patches and does not disperse large distances (TSSC 2022). The species has not been recorded in the Project Area, so it is considered unlikely that the Proposed Action would fragment an existing population into two or more populations.
Adversely affect habitat critical to the survival of a species
No habitat critical to the survival of the species has been defined.
Disrupt the breeding cycle of a population
Given the small area of suitable habitat proposed to be impacted and the lack of Key's matchstick grasshopper records in the locality, the Proposed Action is unlikely to disrupt the breeding cycle of a population.
Modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline
Habitat within the transmission lines may be temporarily disturbed during construction but is likely to regenerate during operation. Given the small area of suitable habitat proposed to be impacted, the Proposed Action is unlikely to modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the Key's matchstick grasshopper 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
Invasion of habitat by weeds, particularly exotic pasture species (e.g. *Paspalum dilatatum* and *Avena barbata*, which are present to varying extents in the Project Area and within areas of potential habitat for the species) is a threat to the Key's matchstick grasshopper (TSSC 2022). The Proposed Action may result in the encroachment of exotic pasture species into areas of suitable habitat, however given the current abundance of weeds and exotic pasture species in the Project Area the risk to Key's matchstick grasshopper habitat is considered negligible.

An action is likely to have a significant impact on a critically endangered or endangered species if there is a real chance or possibility that it will:
Introduce disease that may cause the species to decline
There are no diseases that are considered a key threat to this subspecies (TSSC 2022). The Proposed Action is unlikely to result in the introduction of disease that may cause the Key's matchstick grasshopper to decline.
Interfere substantially with the recovery of the species
There is currently no recovery plan for this species. The Proposed Action would result in a reduction of 2.12 ha of potential habitat including grassy woodland habitat and foraging resources. The Proposed Action is not expected to: • result in further fragmentation of habitats • result in hydrological changes to the surrounding environment such that the function and integrity of the existing habitat is jeopardised. Given the considerations above and the lack of records on the Project Area and in the locality, it is unlikely that the Proposed Action will interfere with the recovery of the key's matchstick grasshopper throughout its distribution.
Conclusion
The Proposed Action is unlikely to result in a significant impact on the Key's matchstick grasshopper.

4.0 Vulnerable Species

4.1 South-eastern Glossy Black Cockatoo (*Calyptorhynchus lathami lathami*)

4.1.1 Description

The south-eastern glossy black cockatoo/glossy black cockatoo (*Calyptorhynchus lathami lathami*) is listed as vulnerable under the EPBC Act, it is uncommon across its widespread distribution which spans from Mitchell in southern central Queensland to East Gippsland in Victoria (DCCEEW 2022b). Distribution is continuous through the forested regions of the Great Diving Range and coastal New South Wales, becoming more scattered inland, to as far west as the Riverina in New South Wales (DCCEEW 2022b).

The Conservation Advice for this species (DCCEEW 2022b) divides the critical habitat for the species into breeding and foraging habitat. The south-eastern glossy black cockatoo utilises hollows in both living and dead eucalypt trees. The south-eastern glossy black-cockatoo heavily relies upon on the seeds of sheoaks (*Allocasuarina* spp. and *Casuarina* spp.) as an almost exclusive food source, typically preferring to forage from a single individual feed tree. The sheoak species utilised varies between regions (DCCEEW 2022b).

While no breeding habitat was confirmed during surveys in the Development Corridor, for the purposes of the NSW BAM (DPIE 2020a), the BDAR has assessed the glossy black cockatoo as a species credit species for breeding habitat. Breeding habitat was mapped as those PCT containing suitable hollow bearing tress, PCT 3374 and PCT 3376 (good/moderate and moderate/degraded). Mapped breeding habitat was estimated at 6.31 ha within the Development Footprint. The glossy black cockatoo was also assessed as an ecosystem credit species foraging habitat associated with PCT 4063 with 2.05 ha in the Development Footprint.

Signs on breeding include:

- begging birds of any age or sex or
- lone adult males identified during the breeding season (April to August) or
- an occupied nest.

One individual was recorded in February 2023 and was not observed again during the survey period. No begging birds, occupied nests, or lone adult males during breeding season were recorded in the Project Area. As no breeding signs were observed during the surveys, it is possible that the individual was flying through, and the site does not contain important habitat for the species. Furthermore, the relative abundance of *Allocasuarina* and *Casuarina* species on the site is low, with the exception of PCT 4063 along the Wollondilly River. Given that the glossy black cockatoo relies solely on these species for foraging habitat, it is considered unlikely that PCT 3374 and PCT 3376 would provide important habitat for the species. No hollow bearing trees were recorded in PCT 4063. As a precautionary measure, species credits have been generated in accordance with the BAM for breeding habitat.

4.1.2 Relevant Guidelines and Policy Statements

Relevant guidelines and policy statements available for this species include:

- Conservation Advice for *Calyptorhynchus lathami lathami* (south-eastern glossy black cockatoo) (DCCEEW 2022b)
- There is no listing advice for this species, listing assessment information may be available in the Approved Conservation Advice.
- There is no adopted or made Recovery Plan for this species.
- There are no adopted/made threat abatement plans, identified as being relevant for this species.

4.1.3 NSW Bilateral Assessment Requirement

The NSW bilateral assessment requirement considerations for the south-eastern glossy black cockatoo are presented in **Table 4.1** below.

Table 4.1 SEARs Requirement Considerations for the South-eastern Glossy Black Cockatoo

Item 16 Requirements		Glossy black cockatoo
i	Description of habitat	While no breeding habitat was confirmed during surveys in the Development Corridor, for the purposes of the NSW BAM (DPIE 2020a), the BDAR has assessed the glossy black-cockatoo as a species credit species for breeding habitat. Breeding habitat was mapped as those PCT containing suitable hollow bearing tress, PCT 3374 and 3376 (good/moderate and moderate/degraded). Mapped breeding habitat was estimated at 6.31 ha within the Development Footprint. The glossy black-cockatoo is a dual credit species, and ecosystem credits will be provided for foraging habitat associated with PCT 4063 (2.05 ha) in the Development Footprint.
ii	Survey Methodology	A range of surveys methods have been employed to survey for threatened fauna species in keeping with the NSW BAM (DPIE 2020) the TBDC survey guidelines and species survey guidelines listed in Table 3.2 of the MNES report, including: • Over 200 diurnal bird surveys targeting woodland birds over eleven survey campaigns between August 2022 and September 2024 (Aug, Oct, Nov 22, Jan, Feb, Aug, Oct 23, Feb, March, Sep 24). Including 126 seasonal vantage point surveys. • Stick nest, hollow-bearing tree and burrow searches Aug 24, Jan, Feb. Aug, Oct 23 and March 24
iii	Impacts	Direct impacts to this community will be a one off occurrence during construction, and comprise clearing of native vegetation including hollow bearing trees with the potential to comprise breeding habitat for the glossy-black cockatoo. Minor indirect impacts to the residual patches of suitable habitat for the species may occur during the operational phase of the project. Indirect impacts will be managed by the mitigation measures outlined in Section 8.6 of the BDAR and Section 5.2 of the MNES Assessment Report.

Item 16 Requirements		Glossy black cockatoo
iv	MNES specific avoidance and mitigation measures	The following key impact avoidance and mitigation measures have been identified for the Project: • Development Footprint alterations to both the Solar and BESS components which have resulted in the avoidance of approximately 64.3% (reducing from 1,838.09 ha (original survey area to 656.32 (580.62 ha (Solar) and 75.70 ha (BESS)) of the Project Area. • Reduction in the development footprint for the BESS project from 390 ha (Scoping Conceptual Layout including 2 BESS locations) to 75.70 ha (one BESS location and refined associated infrastructure layout) • Optimising opportunities to maintain connectivity between the Project Area and surrounding areas of intact native vegetation. • Redesign of the Project to minimise impacts on areas of intact native woodland and hollow bearing trees which reduced impacts to suitable foraging and/or breeding habitat for the glossy black cockatoo • Reduction of the Project Area to avoid riparian areas and dams with emergent vegetation that may provide habitat for threatened species.
v	Residual impact	The Proposed Action would directly impact on 6.31 ha of habitat for the species. An Assessment of Significance has been provided in Table 3.2 of the MNES report. The assessment has concluded that the Proposed Action is likely to have a significant impact on the glossy black cockatoo.
vi	Offsets required	The glossy-black cockatoo is a dual credit species under the BAM. Impacts to foraging habitat this species will be offset through the retirement of ecosystem credits while impacts to breeding habitat will be offset through species credit obligations

4.1.4 Significant Impact Criteria Consideration

The significant impact criteria considerations for south-eastern glossy black cockatoo are presented in **Table 4.2.**

Table 4.2 Significant Impact Assessment – South-eastern Glossy Black Cockatoo

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
An important population of glossy black cockatoos has not been defined in the approved conservation advice (DCCEEW 2022b). Only one individual was observed during field surveys. The Proposed Action does not occur at the limit of the species range and the individual is not likely to be part of an important population. The Proposed Action will impact approximately 6.31 ha of potential breeding habitat and 2.05 ha of foraging habitat. With the exception of PCT 4063 (2.05 ha) the patches of woodland onsite have very low abundance of *Allocasuarina* spp. and *Casuarina* spp. and are unlikely to provide important habitat for the local population within the Development Footprint. It is unlikely that the Proposed Action will lead to a long-term decrease in the size of an important 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:
reduce the area of occupancy of an important population
The extent of occurrence of the south-eastern glossy back cockatoo is estimated as 470,000 km^2 and the area of occupancy for this species is estimated at 40,000 km^2 (DCCEEW 2022c). As no nest tree was identified the species polygon has been developed to include all PCTs with suitable hollow in the Development Footprint (woodland vegetation zones of PCT 3374 and PCT 3376). There is a low abundance of suitable foraging habitat within the Development Footprint with the exception of PCT 4063. There are 52 records of this species within the locality. No individuals were recorded within the Development Footprint during field surveys however, the species has been recorded within the Project Area. The Proposed Action would reduce the area of occupancy by 6.31 ha of potential breeding habitat and 2.05 ha of foraging habitat.
fragment an existing important population into two or more populations
The Proposed Action would impact 6.31 ha of potential breeding habitat and 2.05 ha of foraging habitat. The impacts would not fragment any patches of vegetation such that they would be isolated, nor would it form a barrier to fauna movement or dispersal of feed tree species. Given the mobility of the species and existing fragmentation of habitat, the Proposed Action is unlikely to fragment an existing important population into two or more populations.
adversely affect habitat critical to the survival of a species
Habitat critical to the survival of the south-eastern glossy black cockatoo is defined within the Conservation Advice as: • Foraging habitat as the species feeds exclusively on seeds of *Allocasuarina* spp and *Casuarina* spp. • Large hollows in living or dead trees. Features of potential nest hollows for the subspecies have been documented to have the following traits: greater than 8 m above the ground, in branches greater than 30 cm in diameter with the branch or stem no more than 45 degrees from vertical and the hollow has a minimum entrance diameter of greater than 15 cm. • Habitat for the long-term maintenance of the species (DCCEEW 2022c). The Proposed Action will impact approximately 2.05 ha of foraging habitat and 6.31 ha of potential breeding habitat within the Development Footprint. As the important feed tree is in low abundance in the Development Footprint and no breeding tree has been identified in the Development Footprint. It is considered the Proposed Action is unlikely to adversely affect habitat critical to the survival of the south-eastern glossy black cockatoo.
disrupt the breeding cycle of an important population
The Proposed Action will impact approximately 6.31 ha of potential foraging habitat within the Development Footprint. As the important feed tree is in low abundance in the Development Footprint, and no breeding pairs, begging birds or lone adults were observed between April and August, it is considered it is unlikely that the species would breed within the Development Footprint. Thus, the Proposed Action is unlikely to disrupt the breeding cycle of an important population of south-eastern glossy black cockatoo.
modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline
The Proposed Action will remove approximately 2.05 ha of suitable foraging habitat and 6.31 ha of potential breeding habitat within the Development Footprint, the removal of this vegetation is unlikely to decrease the availability or quality of habitat to the extent that this species is likely to decline.
result in invasive species that are harmful to a vulnerable species becoming established in the vulnerable species' habitat
Although feral cats and the European red fox are known to have predatory threats for this species, this is not considered a major threat (DCCEEW 2022c). However, competition for nest hollows by other Australian native bird species such as galahs, little corella, and sulphur-crested cockatoo are considered harmful to this species. The common brushtail possum is also a competitor for nest hollows (DCCEEW 2022c). The Proposed Action is considered unlikely to result in invasive species that are harmful to the south-eastern glossy black cockatoo.

An action is likely to have a significant impact on a vulnerable species if there is a real chance or possibility that it will:
introduce disease that may cause the species to decline
The conservation advice identifies Psittacine Beak and Feather Disease, a potentially fatal disease caused by psittacine circovirus, as a relatively low threat for this species. Loss of nesting habitat and increasing competition increases likelihood of disease transmission. The Proposed Action is unlikely increase competition for nesting habitat such that susceptibility to the disease will increase.
interfere substantially with the recovery of the species

There is currently no recovery plan for this species, however, the Conservation Advice (DCCEEW 2022) lists the primary conservation outcome as:
• A long-term objective of a stable population, such that it no longer qualifies for listing as threatened under the EPBC Act listing criteria.
• A short-term objective of:
  ○ Protect, enhance extent and quality of habitat across the subspecies' range.
  ○ Address critical knowledge gaps of the subspecies' ecological needs to guide and refine management strategies.
  ○ Enhance community awareness and stewardship of the conservation of the subspecies.
As the Development Footprint is unlikely to provide important foraging or breeding habitat for the glossy black cockatoo, the Proposed Action is unlikely to interfere substantially with the recovery of the south-eastern glossy black cockatoo.

Conclusion
The Proposed Action is unlikely to have a significant direct and indirect impact on an important population of the south-eastern glossy black cockatoo.

4.2 Brown Treecreeper (South-eastern) (*Climacteris picumnus victoriae*)

4.2.1 Description

Brown treecreeper (south-eastern) is endemic to south-eastern Australia. Their distribution occurs from the coast to the inland slopes of Great Dividing Range, and from Bunya Mountains in Queensland through central NSW to the Grampians in western Victoria (DCCEEW 2023e).

Brown treecreeper (south-eastern) occur in dry open eucalypt woodlands and forests and favour woodlands dominated by stringybarks or other rough-barked eucalypts, usually with an open grassy understorey. They also inhabit woodlands and forests which are periodically inundated (DCCEEW 2023e). Preferred habitat experiences ongoing disturbances that maintain ground cover heterogeneity (DCCEEW 2023e).

Brown treecreeper (south-eastern) forage in mature live and dead trees and on the ground. Their diet is diverse and includes a variety of invertebrate prey, nectar from paperbarks and mugga iron bark, sap, food scraps and lizards (Higgins & Peter 2002).

Standing dead or live trees and tree stumps with hollows are essential for nesting. Breeding occurs between July and February (DCCEEW 2023e).

4.2.2 Relevant Guidelines and Policy Statements

Relevant guidelines and policy statements available for this species include:

- Conservation Advice *Climacteris picumnus victoriae* (brown treecreeper) (south-eastern) (DCCEEW 2023e).
- Listing assessment information is in the approved Conservation Advice
- There is no adopted or made Recovery Plan for this species
- No Threat Abatement Plan has been identified as being relevant for this species.

4.2.3 NSW Bilateral Assessment Requirement

The NSW bilateral assessment requirement considerations for the brown treecreeper are presented in below **Table 4.3.**

Table 4.3 SEARs Requirement Considerations for the Brown Treecreeper

Item 16 Requirements		Brown treecreeper (south-eastern)
i	Description of habitat	Foraging habitat for the brown treecreeper has been identified in the Project Area associated with PCTs 4063, PCT 3374 and PCT 3376. There 317.89 ha is of suitable habitat within the Biodiversity Survey Area, and 8.36 ha of suitable foraging habitat for this species within the Development Footprint. Habitat critical to the survival of the brown treecreeper include areas of: • dry eucalypt and acacia woodlands and shrublands remnants with an open understorey, some grassy areas and a complex ground layer, often in or near clearings or open areas • structurally diverse habitats featuring: mature eucalypts, saplings, some small shrubs and a ground layer of moderately tall native grasses • standing dead or live trees and tree stumps are also essential for nesting, roosting and foraging • moderately deep to deep soils, rocks and fallen timber which provides essential foraging habitat (DCCEEW 2023d). Habitat in the Development Footprint is generally fragmented due to land use and access tracks and is unlikely to meet definitions of habitat critical to the survival of the species. • Good condition patches of PCT 3376 and PCT 3374 in the transmission line alignments may provide habitat critical to the survival of the species.
ii	Survey Methodology	A range of surveys methods have been employed to survey for threatened fauna species in keeping with the NSW BAM (DPIE 2020) the TBDC survey guidelines and species survey guidelines listed in Table 3.2 of the MNES report, including: • Over 200 diurnal bird surveys targeting woodland birds over eleven survey campaigns between August 2022 and September 2024 (Aug, Oct, Nov 22, Jan, Feb, Aug, Oct 23, Feb, March, Sep 24). Including 126 seasonal vantage point surveys. • A total of 126 vantage point surveys were conducted across seven sites in the Biodiversity Survey Area from October 2022 – February 2023 to assess bird occurrence and flight behaviour across the Project Area.

Item 16 Requirements		Brown treecreeper (south-eastern)
iii	Impacts	The Proposed Action will directly impact on 8.36 ha or 2.51% of foraging habitat within the Biodiversity Survey Area. The brown treecreeper is unlikely to be impacted by the operation of the Project. Mitigation measures outlined in Section 8.6 of the BDAR will be implemented to minimise indirect impacts from the operation of the BESS.
iv	MNES specific avoidance and mitigation measures	Specific design refinements made by Spark Renewables during the development of the BDAR to avoid and minimise impacts to biodiversity values, including for the brown treecreeper: • Minimise impacts to native vegetation. • Optimising opportunities to maintain connectivity between the Project Area and surrounding areas of intact native vegetation • Reduction of the Project Area to avoid riparian areas and dams with emergent vegetation that may provide habitat for threatened species. • The implementation of environmental management plans and strategies including Biodiversity Management Strategy to minimise the residual impacts of the project including a CEMP and BMP Further details of avoidance, mitigation and management measures are provided in Section 7.0 and Section 9.0 of the BDAR as well as Section 5.0 of this MNES Report.
v	Residual impact	The Proposed Action would directly impact on 8.36 ha of habitat for the species. An Assessment of Significance has been provided in Table 3.8. The assessment has concluded that the Proposed Action is unlikely to have a significant impact on the species.
vi	Offsets required	The brown treecreeper is an ecosystem credit species, impacts to this species will be offset through the retirement of the Proposed Action's credit obligation for PCTs associated with the species.

4.2.4 Significant Impact Criteria Consideration

The significant impact criteria considerations for brown treecreeper are presented in **Table 4.4**.

Table 4.4 Significant Impact Assessment – Brown Treecreeper

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
An important population has not been identified for the brown treecreeper (eastern subspecies). Under the Significant Impact Guidelines (2013) an 'important population' is defined as a population that is necessary for a species' long-term survival and recovery. This may include populations identified as such in recovery plans, and/or that are: • key source populations either for breeding or dispersal • populations that are necessary for maintaining genetic diversity, and/or • populations that are near the limit of the species range. Key source populations and populations for breeding or dispersal, and populations necessary for maintaining genetic diversity have not been identified in the Conservation Advice or Final Determination. As no individuals have been recorded in the Project Area, it is unlikely that the habitat within the Project Area supports an important 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:
The Proposed Action would result in an impact of up to 8.36 ha of potential foraging and breeding habitat for this species. This impact is considered to be relatively minor and would not cause a long term decrease in the size of an important population.
reduce the area of occupancy of an important population
According to the Conservation Advice (DCCEEW 2023e) the extent of occurrence is estimated at 1,100,000 km^2, but the area of occupancy is estimated to be 30,000 km^2 (3,000,000 ha) (ranging from 24,000–50,000 km^2) and is decreasing. The Proposed Action would result in removal of up to 8.36 ha of potential foraging and breeding habitat. This is a minor reduction in the area of occupancy of the brown treecreeper.
fragment an existing important population into two or more populations
The Proposed Action would impact 8.36 ha of potential foraging and breeding habitat. The impacts would not fragment any patches of vegetation such that they would be isolated, nor would it form a barrier to fauna movement or dispersal of feed tree species. Given the mobility of the species and existing fragmentation of habitat, the Proposed Action is unlikely to fragment an existing important population into two or more populations.
adversely affect habitat critical to the survival of a species
According to the conservation Advice (2023) habitat critical to the survival of the brown treecreeper (south-eastern) includes areas that have: • Relatively undisturbed grassy woodland with native understorey • Habitat structure should be quite open at ground level so that birds are able to feed on or near the ground and maintain vigilance against predators • The required degree of openness is mostly likely to be created by moderate levels of disturbance by fire and/or grazing • large living and dead trees which are essential for roosting and nesting sites and for foraging • fallen timber which provides essential foraging habitat • hollows in standing dead or live trees and tree stumps are also essential for nesting. Habitat critical to the survival of this species (DCCEEW 2023e) may be present within good/moderate conditions of PCT 3374 and PCT 3376 the Project Area. Some small patches with undisturbed understorey are present with native understorey, large living trees, fallen timber, and hollows within living and/or dead trees.
disrupt the breeding cycle of an important population
The brown treecreeper forages in mature live and dead trees and on the ground. Their diet is diverse and includes a variety of invertebrate prey, nectar from paperbarks and mugga iron bark, sap, food scraps and lizards (Higgins & Peter 2002). Standing dead or live trees and tree stumps with hollows are essential for nesting. Breeding occurs between July and February (DCCEEW 2023e). This species has been recorded within 10 km of the Project Area on BioNet. Potential suitable breeding and foraging habitat occurs within the Project Area. The Project Area would retain areas of suitable breeding and foraging habitat features for this species. Given this and the small area of impact (up to 8.36 ha) of potential foraging and breeding habitat for this species the Proposed Action is considered unlikely to disrupt the breeding cycle of an important population.
modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline
The proposed action would impact up to 8.36 ha of potential breeding and forging habitat, however this is unlikely to result in the species decline.
result in invasive species that are harmful to a vulnerable species becoming established in the vulnerable species' habitat
The Proposed Action is not expected to result in invasive species that are harmful to the brown treecreeper becoming established in the species 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:
introduce disease that may cause the species to decline
No diseases are listed as a key threat to the brown treecreeper in the Approved Conservation Advice. Further, it is unlikely that the Proposed Action would introduce a disease that would cause the species to decline.
interfere substantially with the recovery of the species
The primary conservation outcome in the approved Conservation Advice (DCCEEW 2023e) is 'Stable or increasing populations observed across the range'. The conservation and management priorities identified (DCCEEW 2023e) relevant to this action list a cessation of land clearing of habitat critical to the survival of the brown treecreeper to increase promotion of woodland connectivity on private land and ensure ground cover is patchy and with open areas for ground foraging. The impact of up to 8.36 ha woodland vegetation will result in the reduction of available habitat in the Project Area.
Conclusion
The Proposed Action is unlikely to have a significant direct and indirect impact on an important population of the brown treecreeper (south eastern).

4.3 Narrow-leaved Black Peppermint (*Eucalyptus nicholii*)

4.3.1 Description

The narrow-leaved peppermint (*Eucalyptus nicholii*) occurs in grassy or sclerophyll woodland, in association with other eucalypts that grow in the New England Tablelands, including New England Blackbutt (*E. andrewsii*) and many of the stringybarks, such as Broad-leaved Stringybark (*E. caliginosa*). The species is found on shallow, relatively infertile soils on shale and slate geology.

The species in the Project Area occurs outside the Development Footprint. Four individuals were observed planted in rows around some erosion gullies near Island Creek and appear to have been planted. These plantings are well outside of the natural range of *Eucalyptus nicholii.*

4.3.2 Relevant Guidelines and Policy Statements

Relevant guidelines and policy statements available for this species include:

- NSW Priority Action Statement for *Eucalyptus nicholii* (DECC 2005b).
- Recovery Plan not required, included on the Not Commenced List (1/11/2009).
- There is no adopted or made Recovery Plan for this species
- No Threat Abatement Plan has been identified as being relevant for this species.

Under the reasonable assumption that the specimen is planted and not wild, noting that the EPBC Act uses the same eligibility criteria for listing as the IUCN Red List, planted individuals would not be considered 'wild' and therefore would fall outside the listing under the EPBC Act. Notwithstanding, the assessment here has precautionarily carried out a significant impact assessment on this assumed planted individual.

4.3.3 NSW Bilateral Assessment Requirement

There is not likely any suitable potential habitat present within the Development Footprint in the woodland vegetation zones of PCT 4063, PCT 3374 and PCT 3376 as these are not described as associated PCTs for the species in BioNet and no other individuals were located incidentally during threatened flora surveys. As such the Development Footprint has been determined to not support the species. The species would not be directly impacted by the proposed action.

The NSW bilateral assessment requirement considerations for the narrow-leaved peppermint are presented in **Table 4.5** below.

Table 4.5 SEARs Requirement Considerations for the Narrow-leaved Peppermint

Item 16 Requirements		narrow-leaved peppermint
i	Description of habitat	This species occurs mainly within the Northern Rivers (NSW) Natural Resource Management Region, with a few occurrences in the Border Rivers–Gwydir and the Namoi (NSW) Natural Resource Management Regions. The distribution of this species overlaps with the following EPBC Act-listed threatened ecological communities: • White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland, and • Upland Wetlands of the New England Tablelands and the Monaro Plateau.

ii	Survey Methodology	A range of survey methods have been employed to sample TECs, including:
		• 60 floristics plots in keeping with the BAM (DPIE 2020)
		  ○ 7–11 November 2022
		  ○ 21–25 August 2023
		  ○ 11–12 October 2023
		  ○ 18–19 December 2023.
		  ○ 9–10 September 2024
		• 25 rapid vegetation assessments
		• Meandering transects throughout the Biodiversity Survey Area.
		Total of 60 person days of survey in spring and summer using the two-phased grid assessment survey method.

iii	Impacts	The species will not be directly impacted by the Proposed Action. Indirect impacts will be managed through the mitigation measures outlined in Section 8.6 of the BDAR and the specimen present is outside of the species natural range and is considered to have been planted.
iv	MNES specific avoidance and mitigation measures	The following key impact avoidance and mitigation measures have been identified for the Project: • Alteration of the Development Footprint to avoid impact to individuals of *Eucalyptus nicholii* • Biodiversity impact avoidance through Development Footprint alterations which have resulted in biodiversity impact avoidance through an avoidance of approximately 95.88% (reducing from 1,838.09 ha to 75.70 ha) of the Project Area.
v	Residual impact	No residual impacts are anticipated.
vi	Offsets required	No offsets required for *Eucalyptus nicholii*.

Item 16 Requirements		narrow-leaved peppermint
vii	How the BAM has been applied to offset in accordance with EPBC Act	Not applicable
viii	Offset credit profiles	Not applicable

4.3.4 Significant Impact Criteria Consideration

The significant impact criteria considerations for narrow-leaved peppermint are presented in **Table 4.6.**

Table 4.6 Significant Impact Assessment –Narrow-leaved Peppermint

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
The narrow-leaved peppermint is known from less than 40 localities on the NSW Northern Tablelands (Peacock, 1996), stretching northwards from the Walcha–Niangala district just east of Tamworth, to just north of Glen Innes (CHAH, 2008). It occurs in grassy or sclerophyll woodland in association with many other eucalypts that grow in the area, including *E. andrewsii* and many of the stringybarks, such as *E. caliginosa* (Hill, 1991). The current population is not well represented in reserve areas. Private property occurrences are therefore particularly relevant to conserving representative populations of the species (Peacock, 1996). The species is reserved in Single National Park (20+ plants) and in Oxley Wild Rivers National Park (a very small population) (Copeland, 2001). The planted individual is well outside of its natural range and is not part of an important population of the species. The Proposed Action will not lead to a long-term decrease in the size of an important population.
reduce the area of occupancy of an important population
The Proposed Action is not expected to result in the loss of any occupied habitat or direct impacts to any plants. The area of occupancy of the individual plants is not likely to be reduced when mitigation measures applied.
fragment an existing important population into two or more populations
The individuals identified during the survey of the site were a planted stock. The Proposed Action Plan will not impact this area directly and will therefore cause no fragmentation.
adversely affect habitat critical to the survival of a species
The Conservation Advice doesn't list any particular areas of habitat as critical. No PCTs occurring on site are listed as associated PCTs for this species in BioNet. As there are no other plants found in the Biodiversity Survey Area, the Development Footprint would not be part of any habitat critical to the survival of the species. As such no habitat critical to the survival of a species would be affected.
disrupt the breeding cycle of an important population
The small number of individuals are not likely to be cross-pollinated with any speculative individuals in the locality. These individuals are unlikely to be indirectly impacted by the action, and so would not have any impacts to any breeding cycles.
modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline
The main potential threat to narrow-leaved peppermint is clearing and fragmentation of habitat for agriculture or grazing and the destruction or disturbance of habitat for road construction and management (DECC, 2005a). No associated PCTs or likely suitable habitat occurs within or adjacent to the Development Footprint.

An action is likely to have a significant impact on a vulnerable species if there is a real chance or possibility that it will:
result in invasive species that are harmful to a vulnerable species becoming established in the vulnerable species' habitat
Grazing by domestic stock is one of the main threats to the narrow-leaved peppermint (DECC, 2005a). Other invasive animals, such as deer and goats, also are a threat to this species. However, the Proposed Action Plan is unlikely to facilitate the establishment of invasive species in the impacted area.
introduce disease that may cause the species to decline
Disease is not currently identified as a key threat to this species. Myrtle Rust is now established in the region but there is no information in Makinson RO (2018) as to the susceptibility of *E. nicholii* to Mrytle Rust. The proposal is not likely to significantly indirectly affect the single plant such that it may cause the species to decline.
interfere substantially with the recovery of the species
The following local priority recovery and threat abatement actions can be done to support the recovery of narrow-leaved peppermint. **Habitat Loss, Disturbance and Modification** • Minimise adverse impacts from land use at known sites. • Control firewood collection in the known habitat. • Protect populations of the listed species through the development of conservation agreements and/or covenants. **Trampling, Browsing or Grazing** • Prevent grazing pressure at known sites on leased crown land through exclusion fencing or other barriers. • • Manage known sites on private property to ensure appropriate stock grazing regimes are conducted, including the protection of seedlings to ensure regeneration. **Fire** • Implement an appropriate fire management regime for local populations. This list does not necessarily encompass all actions that may be of benefit to narrow-leaved peppermint, but highlights those that are considered to be of highest priority at the time of preparing the conservation advice. As the Proposed Action Plan does not encompass current populations of this species, and the footprint is small, the development is unlikely to interfere with the recovery of this species.
Conclusion
The Proposed Action is unlikely to have a significant direct or indirect impacts on *Eucalyptus nicholii*.

4.4 Painted Honeyeater (*Grantiella picta*)

4.4.1 Description

The painted honeyeater (*Grantiella picta*) is endemic to mainland Australia and is sparsely distributed from south-eastern Australia to north-western Queensland and eastern Northern Territory (DAWE 2021a).

This species typically exhibits seasonal north-south movements corresponding to the fruiting of mistletoe. After breeding a high number of birds move to semi-arid regions such as central and western Queensland, central Northern Territory and north-eastern South Australia. Given its dispersive and nomadic nature this species is considered to constitute a single population (DAWE 2021a).

The painted honeyeater favours woodland and forest habitats dominated by eucalypts, acacias, paperbarks, casuarinas and Callitris, particularly those with higher numbers of mature trees, as these host more mistletoes (DAWE 2021a). Many occurrences for the painted honeyeater are from scattered paddock trees or stands indicating these areas are well utilised (DAWE 2021a). Habitat areas that have undergone less fragmentation and land clearing may support a higher count of painted honeyeaters present (Oliver *et al.* 2003).

The painted honeyeater occurs singly or in pairs, and less often in small flocks. Breeding takes place from October to March when mistletoe fruits are widely available (DAWE 2021a). The highest density and majority of breeding records occur across the inland slopes of the Great Dividing Range between the Grampians, VIC and Roma, QLD (Higgins et al 2001).

It is suspected the painted honeyeater population has undergone long term decline, with less than 10,000 individual remaining (Garnett et al 2011). Habitat loss and degradation of breeding and foraging habitat are the key threats to this species.

In NSW it is estimated there remains only 5 to 30 percent of the original habitat suitable for woodland birds such as the painted honeyeater. Other threats to this species include competition from more aggressive honeyeaters, changing climate, and predation by invasive species (DAWE 2021a).

Although this species has not been recorded within 10 km of the Project Area or within the Biodiversity Survey Area it may occur seasonally due to the presence of seasonal foraging resources.

The recovery plan for the painted honeyeater identifies Key Biodiversity Areas (KBAs) for the painted honeyeater being sites of critical importance to the long-term persistence of the painted honeyeater (DAWE 2015). There are seven KBAs for the painted honeyeater in Australia including five in NSW:

- Binya and Cocoparra KBA is the Cocoparra National Park in the Riverina region, covering about 8,357 ha.
- Capertee Valley KBA which occurs partly in the Gardens of Stone National Park and Wollemi National Park.
- Goonoo KBA covers about 1034 km^2 of woodland, between the towns of Dubbo, Gilgandra and Dunedoo, which is partly within national park estate.
- Pilliga Forests/Scrub KBA covering over 5,000 km^2 of semi-arid woodland in temperate north-central NSW.
- South-west slopes of NSW and ACT KBA covers an area of 25,653 km^2 supporting significant wintering populations of a number of threatened species (DAWE 2021a).

This species is associated with three PCTs found within the Biodiversity Survey Area PCT 3374, PCT 3376, PCT 4063. Approximately 8.36 ha of potential foraging and breeding habitat within the Development Footprint that would be impacted by the Proposed Action.

4.4.2 Relevant Guidelines and Policy Statements

Relevant guidelines and policy statements available for this species include:

- National Recovery Plan for the painted honeyeater, *Grantiella picta* (DAWE 2021a).
- Conservation Advice for *Grantiella picta* (painted honeyeater) (DAWE 2015).
- Listing assessment information is in the approved Conservation Advice
- No Threat Abatement Plan has been identified as being relevant for this species.

4.4.3 The NSW Bilateral Assessment Requirement

Considerations for the painted honeyeater are presented in **Table 4.7** below.

Table 4.7 SEARs Requirement Considerations for the Painted Honeyeater

Item 16 Requirements		painted honeyeater
i	Description of habitat	There is 317.89 ha (all woodland condition PCTs) of suitable habitat within the Biodiversity Survey Area, of which 8.36 ha is within the Development Footprint and will be removed. Habitat critical to the survival of the painted honeyeater include: • Breeding habitat in boree/weeping myall, brigalow woodlands, box-gum woodlands and box-ironbark forest on the inland slopes of the Great Dividing Range. • Foraging habitat within known and likely foraging species particularly mistletoes of the genus Amyema. • Habitat for long term maintenance of the species including all KBAs for the painted honeyeater and suitable habitat in future climate change niches (DAWE 2021a). The Development Footprint is not within a KBA for the species. The Development Footprint supports marginal habitat for the painted honeyeater and is not considered habitat critical to the survival of the painted honeyeater.
ii	Survey Methodology	Targeted species searches were not carried out specifically for the painted honeyeater as it is an ecosystem-credit species. However, bird utilisation surveys undertaken seasonally from August 2022 to February 2023 and woodland bird surveys would have provided for detection of the species. A total of 126 vantage point surveys were conducted across seven sites in the Project Area to assess bird occurrence and flight behaviour across the Project Area. The painted honeyeater was not recorded during the bird surveys. This species may very occasionally disperse through the Biodiversity Survey Area.
iii	Impacts	The Proposed Action will clear approximately 8.36 ha of potential foraging and breeding habitat for the painted honeyeater. Operation impacts to the painted honeyeater are considered unlikely. Mitigation measures outline in Section 8.6 of the BDAR will be implemented to reduce any indirect impacts to the residual vegetation and habitat.

Item 16 Requirements		painted honeyeater
iv	MNES specific avoidance and mitigation measures	Specific design refinements made by Spark Renewables during the development of the BDAR to avoid and minimise impacts to biodiversity values, including for the south-eastern hooded robin: • Minimise impacts to native vegetation. • Optimising opportunities to maintain connectivity between the Project Area and surrounding areas of intact native vegetation • Reduction of the Project Area to avoid riparian areas and dams with emergent vegetation that may provide habitat for threatened species. • The implementation of environmental management plans and strategies including Biodiversity Management Strategy to minimise the residual impacts of the project including a CEMP and BMP Further details of avoidance, mitigation and management measures are provided in Section 8.6 and Section 9.0 of the BDAR as well as Section 5.0 of this MNES Report.
v	Residual impact	An AoS has been provided in Table 4.8 The assessment has concluded that the Proposed Action unlikely to have a significant impact on the species.
vi	Offsets required	As the painted honeyeater is an ecosystem credit species, impacts to this species would be offset through the retirement of the Proposed Action's credit obligation for PCTs associated with the species.

4.4.4 Significant Impact Criteria Consideration

The significant impact criteria considerations for painted honeyeater are presented in **Table 4.8.**

Table 4.8 Significant Impact Assessment –Painted Honeyeater

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
The painted honeyeater is sparsely distributed from south-eastern Australia to north-western Queensland and eastern Northern Territory (DAWE2021a). It typically travels north-south corresponding with the fruiting of mistletoe. After breeding they migrate to semi-arid regions such as central and western Queensland, central Northern Territory and north-eastern South Australia. Given its dispersive and nomadic nature this species is considered to constitute a single population (DAWE 2021a). Garnett *et al.* (2011) estimated the total number of individuals to be <10 000, based on an extrapolation of counts undertaken in areas of Victoria and NSW (DAWE 2021a). An important population is not defined in the conservation advice or the recovery plan for the Painted Honeyeater. As no individuals were recorded onsite, it is considered unlikely that an important population utilises the habitat in the Development Footprint. Given the Proposed Action would impact a small area (8.36 ha) of potential foraging and breeding habitat, and the highly dispersive and nomadic nature of this species, the Proposed Action is unlikely to lead to a decrease in the size of the population.
reduce the area of occupancy of an important population
Painted honeyeater extent of occurrence was estimated by Garnett *et al*. (2011) to be 2 800 000 km^2 and the area of occupancy to be 1,000 km^2 (DAWE 2015). Approximately 8.36 ha of potential foraging and breeding habitat would be impacted by the Proposed Action, which is approximately 0.015% of the area of occupancy. Given this and the nomadic and dispersive nature of this species the Proposed Action is not considered to reduce the area of occupancy for the painted honeyeater.

An action is likely to have a significant impact on a vulnerable species if there is a real chance or possibility that it will:
fragment an existing important population into two or more populations
The impacts would not fragment any patches of vegetation such that they would be isolated, nor would it form a barrier to fauna movement or dispersal of feed tree species. Given the mobility of the species and existing fragmentation of habitat, the Proposed Action is unlikely to fragment an existing important population into two or more populations.
adversely affect habitat critical to the survival of a species
The Recovery Plan (DAWE 2021a) states that habitat critical to the survival of this species includes: • breeding habitat – known or likely breeding habitat includes woodlands dominated by weeping myall *(Acacia pendula*) or brigalow (*A. harpopylla*), box gum woodland, or box-ironbark forest, on inland slopes of the Great Dividing Range in NSW, Victoria and southern QLD. • foraging habitat – all preferred foraging species, particularly Mistletoes of the genus *Amyema* growing on forest and woodland eucalypts and acacias. • habitat for the long-term maintenance of the species – All Key Biodiversity Areas with painted honeyeater as a Trigger species. Suitable habitat in future climate niches as information becomes available. While the Project Area does not occur in a Key Biodiversity Area it contains potential breeding and foraging habitat. Species in the genus *Amyema* are present, but not abundant in the Project Area, suggesting the habitat would be marginal foraging at best.
disrupt the breeding cycle of an important population
The Proposed Action is unlikely to disrupt the breeding cycle of the painted honeyeater given the small impact area (8.36 ha) and the marginal foraging habitat for the species.
modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline
The Proposed Action would remove and modify 8.36 ha of potential foraging and breeding habitat to this species, however is considered is unlikely to result in species decline.
result in invasive species that are harmful to a vulnerable species becoming established in the vulnerable species' habitat
The draft Recovery Plan recognises predation by invasive species such as the black rat (*Rattus rattus)* may pose a potential threat to painted honeyeaters (DAWE 2021a). The Proposed Action is not likely to result in the black rat, or other invasive species that are harmful to the painted honeyeater, becoming established in its habitat.
introduce disease that may cause the species to decline
The Proposed Action is not likely to result in the introduction of a disease that may cause this species to decline.
interfere substantially with the recovery of the species
The recovery plan objectives are that by 2031: • There is a measured and sustained positive population trend in the number of mature individuals. The extent, condition and connectivity of habitat of the painted honeyeater has been maintained or improved (DAWE 2021aThe Proposed Action would result in impacts to 8.36 ha of suitable habitat
Conclusion
The Proposed Action is unlikely to have a significant direct and indirect impact on an important population of the painted honeyeater.

4.5 Yellow-bellied Glider (*Petaurus australis australis*)

4.5.1 Description

The yellow-bellied glider is a medium-sized arboreal marsupial found along the eastern coast to the western slopes of the Great Dividing Range, from southern Queensland to Victoria. There are two subpopulations of the yellow-bellied glider with *Petaurus australis australis* (south-eastern population) separated from the northern isolated Petaurus australis (wet tropics subspecies) (DAWE 2022d). In March 2022, the yellow-bellied glider, south-eastern population was listed as vulnerable under the EPBC Act.

The south-eastern population extends along the NSW coast from Queensland to Victoria. In NSW, it predominantly occurs in forests along the coast extending inland to the western slopes in parts of the Great Dividing Range (DAWE 2022d). Across its' range, distribution is highly disjunct due to specific habitat requirements and land clearing.

The forest type preferences of this species vary with latitude and elevation: mixed coastal forests to dry escarpment forests in the north; moist coastal gullies and creek flats to tall montane forests in the south with a preference for winter-flowering and smooth-barked eucalypts. The species primarily feed on plant and insect exudates, including nectar, sap, honeydew and manna with pollen and insects providing protein. The yellow-bellied glider den in hollows of large trees and lives in family groups of two to six individuals in exclusive home ranges of about 50 ha to 65 ha (DAWE 2022d).

Known populations identified as important to the survival of the glider in NSW include Bago Plateau, Richmond Range National Park, Blacktown range, Shoalhaven populations, populations between Coffs Harbour / Dorrigo / Glen Innes and Grafton, and populations between Nimmitabel and Cathcart.
The Project Area does not occur in any of these locations.

4.5.2 Relevant Guidelines and Policy Statements

Relevant guidelines and policy statements available for this species include:

- Conservation advice for *Petaurus australis australis* (yellow-bellied glider (south-eastern)) (DAWE 2022d).
- There is no listing advice for this species, listing assessment information may be available in the Approved Conservation Advice.
- There is no adopted or made Recovery Plan for this species.
- There are no adopted/made threat abatement plans, identified as being relevant for this species.

4.5.3 NSW Bilateral Assessment Requirement

There is suitable habitat present within the Development Footprint in the woodland vegetation zones of PCT 4063, PCT 3374 and PCT 3376. The Proposed Action will impact approximately 8.36 ha of woodland with suitable hollow bearing trees.

The NSW bilateral assessment requirement considerations for the yellow-bellied glider are presented in **Table 4.9** below.

Table 4.9 SEARs Requirement Considerations for the Yellow-bellied Glider

Item 16 Requirements		Yellow-bellied glider
i	Description of habitat	Potential foraging and breeding habitat for the yellow-bellied glider may occur in the 8.36 ha of woodland vegetation associated with PCTs 4063, PCT 3374 and PCT 3376. Habitat critical to the survival of the yellow-bellied glider include areas of: • large contiguous areas of eucalypt forest, which contain mature hollow-bearing trees and a diverse range of the species' preferred food species in a particular region • smaller or fragmented habitat patches connected to larger patches of habitat, that can facilitate dispersal of the species and/or that enable recolonization • cool microclimate forest/woodland areas (e.g. protected gullies, sheltered high elevation areas, coastal lowland areas, southern slopes) • areas identified as refuges under future climate changes scenarios • short-term or long-term post-fire refuges (i.e. unburnt habitat within or adjacent to recently burnt landscapes) that allow the species to persist, recover and recolonise burnt areas. Habitat in the Development Footprint is generally fragmented due to land use and access tracks and is unlikely to meet definitions of habitat critical to the survival of the species. Good condition patches pf PCT 3374 and PCT 3376 contain moderate abundance of hollow bearing trees which may provide suitable habitat for breeding.
ii	Survey Methodology	A range of surveys methods have been employed to survey for threatened fauna species in keeping with the NSW BAM (DPIE 2020) the TBDC survey guidelines and species survey guidelines listed in Table 3.2, including: • Deployment of 20 remote cameras (March–April 2023). • Spotlighting across 16 nights in Jan, Aug, Dec 2023 and Feb 24. • Stick nest, hollow-bearing tree and burrow searches Aug 24, Jan, Feb. Aug, Oct 23 and March 24 • Call play-back across 16 nights in Jan, Aug, Dec 2023 and Feb 24.
iii	Impacts	The Proposed Action will directly impact on 8.36 ha or 2.51 per cent of foraging habitat within the Biodiversity Survey Area during construction. The yellow-bellied glider is unlikely to be impacted by the operation of the Project. Mitigation measures outlined in Section 8.6 of the BDAR will be implemented to minimise indirect impacts from the operation of the BESS.
iv	MNES specific avoidance and mitigation measures	The following key impact avoidance and mitigation measures have been identified for the Project: • Development Footprint alterations to both the Solar and BESS components which have resulted in the avoidance of approximately 64.3% (reducing from 1,838.09 ha (original survey area to 656.32 (580.62 ha (Solar) and 75.70 ha (BESS)) of the Project Area. • Reduction in the development footprint for the BESS project from 390 ha (Scoping Conceptual Layout including 2 BESS locations) to 75.70 ha (one BESS location and refined associated infrastructure layout) • Optimising opportunities to maintain connectivity between the Project Area and surrounding areas of intact native vegetation.

Item 16 Requirements		Yellow-bellied glider
		• Redesign of the Project to minimise impacts on areas of intact native woodland and hollow bearing trees which reduced impacts to suitable foraging and/or breeding habitat for the greater glider. • Reduction of the Project Area to avoid riparian areas and dams with emergent vegetation that may provide habitat for threatened species.
v	Residual impact	The Proposed Action would directly impact on 8.36 ha of habitat for the species. An Assessment of Significance has been provided in Table 3.2 of the MNES report. The assessment has concluded that the Proposed Action is unlikely to result in a significant impact on the yellow-bellied glider.
vi	Offsets required	Impact to the habitat of the yellow-bellied glider will be offset through the retirement of the Proposed Action's credit obligation, through ecosystem credits for PCTs associated with the species.

4.5.4 Significant Impact Criteria Consideration

The significant impact criteria considerations for yellow bellied glider are presented in **Table 4.10.**

Table 4.10 Significant Impact Assessment – Yellow Bellied Glider

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
Populations important to the survival of the yellow-bellied glider (south-eastern) include stronghold populations, as well as ecologically or genetically distinct populations such as those at the limits of the subspecies' range, research populations, and those where recovery actions are being implemented (DAWE 2022d). There is no reliable estimate of the national population size of the yellow-bellied glider (south-eastern). It was suggested that there are over 100,000 mature individuals in 2014 however modelling of the impact of the 2019–2020 bushfires on the population, have estimated that there has been a decline in the population by 21% to 29%. Further, the decline percentage is expected to increase in the subsequent three generations (12 to 15 years) after the fires (DAWE 2022d). The species is social and lives in family groups of two to six individuals with exclusive home range of about 56 to 65 ha. The conservation advice suggest that 150 family units is the minimum to ensure a population remains viable with a minimum habitat area to 180 to 350 km^2 (DAWE 2022d). There were no records of the yellow-bellied glider within the Project Area during diurnal and nocturnal field surveys undertaken in 2022, 2023 or 2024. The Proposed Action would clear approximately 8.36 ha of potential habitat within the Development Footprint. The avoidance of approximately 95.88% of the Project Area which includes patches of retained forest and woodland, will likely maintain connectivity to provide for gene flow and movement of individuals to the larger patches of habitat in the landscape. Clearing of potential habitat may impact individuals however implementation of pre-clearing surveys and clearing supervision reduces the risk of injury or mortality of individuals. With implementation of these management measures and avoidance of a large portion of the Project Area, the Proposed Action is unlikely to lead to a long-term decrease in the size of an important population.
Reduce the area of occupancy of an important population
The area of occupancy of the yellow-bellied glider is estimated at 12,724 km^2 and likely to be contracting due to habitat loss, bushfires and timber harvesting (DAWE 2022d). Modelling suggests that to maintain a viable population of the yellow-bellied glider, 180–350 km^2 of suitable forest habitat is required (DAWE 2022d).

An action is likely to have a significant impact on a vulnerable species if there is a real chance or possibility that it will:
The Proposed Action will clear approximately 8.36 ha of potential habitat within the Development Footprint. This represents less than 20% of the territory requirement of one social group. As there were no records of the yellow-bellied glider within the Project Area during diurnal and nocturnal field surveys, the yellow-bellied glider is likely to prefer the habitat closer to and contiguous to the populations recorded in the nearby Tarlo River National Park, Belanglo State Forest and Bangadilly National Park. As such, the Proposed Action will likely result in a negligible reduction of the potential area of occupancy for an important population of the yellow-bellied glider in the wider locality or region.
Fragment an existing important population into two or more populations
The yellow-bellied glider is vulnerable to impacts of clearing and fragmentation due to its large home range, requirement for large areas of forest and inability to cross even small areas of cleared land (DAWE 202d). The yellow-bellied glider has very low dispersal capabilities over spaces larger than its glide ratio (horizontal distance/height dropped) of about 2.0 (DAWE 2022d). The maximum gliding distance is unknown but in taller forests it may be up to 120 m to 140 m while in low-canopy forest it is only about 25 m (DAWE 2022d). The conservation advice states that a precautionary approach should be taken to maximise dispersal by considering all habitat corridors to be habitat critical to the survival (DAWE 2022d). While approximately 8.36 ha of potential habitat would be cleared by the Proposed Action in the Disturbance Footprint, there were no records of the species within the Project Area. The Proposed Action avoids 95.88% of the Project Area and retains connection to known habitat in Tarlo River National Park, Belanglo State Forest and Bangadilly National Park such that an important population is not fragmented.
Adversely affect habitat critical to the survival of a species
Habitat critical to the survival of the yellow-bellied glider includes: • large contiguous areas of floristically diverse eucalypt forest which are dominated by winter-flowering and smooth-barked eucalypts, including mature living hollow-bearing trees and sap trees • areas identified as refuges under future climate change scenarios • short-term or long-term post fire refuges that allow the species to persist, recover and recolonize burnt areas • habitat corridors between fragmented habitat patches to facilitate dispersal or recolonization • cool microclimate forest/woodland areas (protected gullies, sheltered high elevation areas, coastal lowland area, southern slopes) • areas in which some trees have evidence of use for sap extraction (DAWE 2022d). The Proposed Action will clear approximately 8.36 ha of potential habitat critical to the survival of the yellow-bellied glider. Due to there being no records of the yellow-bellied glider within the Project Area and the maintenance of connectivity to larger patches of habitat in the landscape through avoidance of patches of forest and woodland, potential habitat critical to the survival of the yellow-bellied glider in the Project Area would not be adversely affected.
Disrupt the breeding cycle of an important population
The yellow-bellied glider has a generation length estimated to be four to five years, reaching sexual maturity at around two years of age (DAWE 2022d). Clearing of suitable live hollow-bearing trees, sap trees (i.e., feeding) and fragmentation of habitat may disrupt breeding cycle of the yellow-bellied glider however, 95.88% of the Project Area will be avoided and connection of habitat for woodland species will be maintained. No breeding populations of this species have been recorded in the Project Area, such that the Proposed Action is unlikely to disrupt the breeding cycle of an important population of this species.

An action is likely to have a significant impact on a vulnerable species if there is a real chance or possibility that it will:
Modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline
The Proposed Action will result in the loss of approximately 8.36 ha of yellow-bellied glider habitat. It is considered that the Proposed Action will modify, destroy or isolate or decrease the availability or quality of habitat for this species. Given there were no records of the species found in the Project Area during field surveys, it is unlikely that the Proposed Action will modify, destroy, remove, isolate, or decrease the availability or quality of habitat for this species to the extent that the yellow-bellied glider population would be likely to decline.
Result in invasive species that are harmful to a vulnerable species becoming established in the vulnerable species' habitat
Invasive species considered a threat to the yellow-bellied glider include European fox (predation), feral cats (potential predation) and habitat degradation by feral deer (DAWE 2022d). Dieback due to *Phytophthora cinnamomi* may also be impacting the species through habitat degradation (DAWE 2002d). The Proposed Action is not expected to result in invasive species that are harmful to the species becoming established in yellow-bellied glider habitat.
Introduce disease that may cause the species to decline
The conservation advice for the yellow-bellied glider does not identify any disease that may cause the species to decline.
Interfere substantially with the recovery of the species
There is currently no recovery plan for this species. The Proposed Action may result in negligible reduction in potential habitat including den trees, sap resources and habitat connectivity. Mitigation standards including pre-clearance surveys and avoidance of felling of trees with large hollows will reduce impacts. The Proposed Action is not expected to: • introduce or increase predators • result in further fragmentation of habitats • result in hydrological changes to the surrounding environment such that the function and integrity of the existing habitat is jeopardised. Given the species has not been recorded within the Development Footprint and the above, it is unlikely that the Proposed Action will interfere with the recovery of an important population of the yellow-bellied glider.
Conclusion
The Proposed Action is unlikely to have significant direct or indirect impacts on the yellow-bellied glider.

4.6 Diamond Firetail (*Stagonopleura guttata*)

4.6.1 Description

Diamond firetails occur on the south-east mainland of Australia from south-east Queensland to Eyre Peninsula, South Australia, and about 300 km inland from the sea. Diamond firetails occur in eucalypt, acacia or casuarina woodlands, open forests and other lightly timbered habitats, including farmland and grassland with scattered trees. They prefer areas with relatively low tree density, few large logs, and little litter cover but high grass cover (DCCEEW 2023f).

Diamond firetails forage at ground level on insects, ripe and partly-ripe grass and herb seeds (DCCEEW 2023f). This species divides into small colonies for breeding between August and January. Their nests are often in the base of large stick-nest of a bird of prey but have also been identified amongst prickly foliage of shrubs such as rose bushes, boxthorn, hakeas, and the sea urchin hakea (*Hakea petiolaris*) (DCCEEW 2023f).

There is suitable habitat present within the Development Footprint within PCT 4063, PCT 3374 and PCT 3376. There are 19 BioNet records of this species within 10 km of the Project Area. This species was also recorded foraging and collecting nesting material on numerous times throughout the survey schedule.

The BESS will impact approximately 8.36 ha of potential foraging and breeding habitat within Development Footprint.

4.6.2 Relevant Guidelines and Policy Statements

Relevant guidelines and policy statements available for this species include:

- Conservation Advice for *Stagonopleura guttata* (diamond firetail) (DCCEEW 2023f).
- Listing assessment information is in the approved Conservation Advice
- There is no adopted or made Recovery Plan for this species
- No Threat Abatement Plan has been identified as being relevant for this species.

4.6.3 NSW Bilateral Assessment Requirement

The NSW bilateral assessment requirement considerations for the diamond firetail are presented in **Table 4.11.**

Table 4.11 SEARs Requirement Considerations for the Diamond Firetail

Item 16 Requirements		Diamond firetail
i	Description of habitat	Foraging habitat for the diamond firetail has been identified in the Project Area associated with PCTs 4063, PCT 3374 and PCT 3376. There 317.89 ha is of suitable habitat within the Biodiversity Survey Area, and 8.36 ha of suitable foraging habitat for this species within the Development Footprint. Habitat critical to the survival of the diamond firetail include areas of: • dry eucalypt and acacia woodlands and shrublands remnants with an open understorey, some grassy areas and a complex ground layer, often in or near clearings or open areas • structurally diverse habitats featuring: mature eucalypts, saplings, some small shrubs and a ground layer of moderately tall native grasses • standing dead or live trees and tree stumps are also essential for nesting, roosting and foraging • moderately deep to deep soils, rocks and fallen timber which provides essential foraging habitat (DCCEEW 2023d). Habitat in the Development Footprint is generally fragmented due to land use and access tracks and is unlikely to meet definitions of habitat critical to the survival of the species. Good condition patches of PCT 3376 and PCT 3374 in the transmission line alignments may provide habitat critical to the survival of the species.

Item 16 Requirements		Diamond firetail
ii	Survey Methodology	A range of surveys methods have been employed to survey for threatened fauna species in keeping with the NSW BAM (DPIE 2020) the TBDC survey guidelines and species survey guidelines listed in Table 3.2 of the MNES report, including: • Over 200 diurnal bird surveys targeting woodland birds over eleven survey campaigns between August 2022 and September 2024 (Aug, Oct, Nov 22, Jan, Feb, Aug, Oct 23, Feb, March, Sep 24). Including 126 seasonal vantage point surveys. • Stick nest, hollow-bearing tree and burrow searches Aug 24, Jan, Feb. Aug, Oct 23 and March 24 • A total of 126 vantage point surveys were conducted across seven sites in the Biodiversity Survey Area from October 2022–February 2023 to assess bird occurrence and flight behaviour across the Project Area.
iii	Impacts	The Proposed Action will directly impact on 8.36 ha or 2.51% of foraging habitat within the Biodiversity Survey Area. The diamond firetail is unlikely to be impacted by the operation of the Project. Mitigation measures outlined in Section 8.6 of the BDAR will be implemented to minimise indirect impacts from the operation of the BESS.
iv	MNES specific avoidance and mitigation measures	Specific design refinements made by Spark Renewables during the development of the BDAR to avoid and minimise impacts to biodiversity values, including for the diamond firetail: • Minimise impacts to native vegetation. • Optimising opportunities to maintain connectivity between the Project Area and surrounding areas of intact native vegetation • Reduction of the Project Area to avoid riparian areas and dams with emergent vegetation that may provide habitat for threatened species. • The implementation of environmental management plans and strategies including Biodiversity Management Strategy to minimise the residual impacts of the project including a CEMP and BMP Further details of avoidance, mitigation and management measures are provided in Section 7.0 and Section 9.0 of the BDAR as well as Section 5.0 of this MNES Report.
v	Residual impact	The Proposed Action would directly impact on 8.36 ha of habitat for the species. An Assessment of Significance has been provided in **Table 4.12.** The assessment has concluded that the Proposed Action is unlikely to have a significant impact on the species.
vi	Offsets required	The diamond firetail is an ecosystem credit species, impacts to this species will be offset through the retirement of the Proposed Action's credit obligation for PCTs associated with the species.

4.6.4 Significant Impact Criteria Consideration

The significant impact criteria considerations for diamond firetail are presented in **Table 4.12.**

Table 4.12 Significant Impact Assessment – Diamond Firetail

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
There are no defined important populations within the conservation advice (DCCEEW 2023f). Under the Significant Impact Guidelines (2013) an 'important population' is a population that is necessary for a species' long-term survival and recovery. This may include populations identified as such in recovery plans, and/or that are: • key source populations either for breeding or dispersal • populations that are necessary for maintaining genetic diversity, and/or • populations that are near the limit of the species range. Neither a key source population for breeding or dispersal, nor a population necessary for maintaining genetic diversity has been identified in the conservation advice. Diamond firetails are widespread with populations appearing to be sedentary, though some are known to move around locally (DCCEEW 2023f). It is currently estimated that there are 136,000 (range 68,000–272,000) mature individuals in the wild (DCCEEW 2023f). The diamond firetail has been recorded numerous times within the Project Area suggesting that the population utilises the habitat in the Project Area frequently. Given the availability of suitable habitat outside the Development Footprint and the highly mobile nature of the species, it is considered unlikely that the Proposed Action would result lead to a long-term decrease in the size of the local population.
reduce the area of occupancy of an important population
The area of occupancy of the national population of the diamond firetail is estimated to be 25,000 km2, hence the removal of 8.36 ha of suitable habitat would result in a 0.0006% reduction of the area of occupancy for this species. This is a negligible reduction in the area of occupancy of the diamond firetail national population.
fragment an existing important population into two or more populations
The impacts would not fragment any patches of vegetation such that they would be isolated, nor would it form a barrier to fauna movement or dispersal of feed tree species. Given the mobility of the species and existing fragmentation of habitat, the Proposed Action is unlikely to fragment an existing important population into two or more populations.
adversely affect habitat critical to the survival of a species
According to the Conservation Advice (DCCEEW 2023) habitat that is considered critical to the survival of the diamond firetail includes areas of: • Eucalypt, Acacia or Casuarina woodlands, open forests and other lightly timbered habitats. • low tree density, few large logs, and little litter cover but high grass cover for foraging, roosting and breeding. • *Allocasuarina verticillata* within the Mt Lofty Ranges. • Further, any habitat mapped as known or likely to occur in Map 1 of the conservation advice should be considered critical habitat (DCCEEW 2023). Map 1 of the conservation advice covers roughly all of Victoria, NSW and parts of South Australia and Queensland, as well as the Project Area. 8.36 ha of known habitat will be impacted by the Project, a negligible amount of habitat shown on Map 1 of the conservation advice.
disrupt the breeding cycle of an important population
Diamond firetails divide into small colonies for breeding between August and January. Their nests are often in the base of large stick-nest of a bird of prey but have also been identified amongst prickly foliage of shrubs such as rose bushes, boxthorn, hakeas, and the sea urchin hakea (*Hakea petiolaris*) (DCCEEW 2023). They forage at ground level on insects, ripe and partly-ripe grass and herb seeds (DCCEEW 2023).

An action is likely to have a significant impact on a vulnerable species if there is a real chance or possibility that it will:
The Development Footprint has been designed to minimise impacts on areas of intact native woodland which reduced impacts to suitable foraging and/or breeding habitat for this species. While up to 8.36 ha of known foraging and breeding habitat would be impacted by the Proposed Action, large areas would remain outside of the Development Footprint. A Vegetation Management Plan would be implemented to minimise impacts to residual vegetation during the operation of the Project. Diamond Firetails occurring within the Project Area are not considered to represent an important population, therefore the Proposed Action would not disrupt the breeding cycle of an important population.
modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline
The Project would impact 8.36 ha of known foraging and breeding for the diamond firetail. This species has broad habitat preferences and is mobile, and therefore the Proposed Action is unlikely to lead to a decline in the species.
result in invasive species that are harmful to a vulnerable species becoming established in the vulnerable species' habitat
The Conservation Advice states that diamond firetails are threatened by noisy miner territorial competition, habitat degradation, loss of habitat and weeds. The Proposed Action is not expected to result in invasive species that are harmful to the diamond firetail becoming established in the species habitat.
introduce disease that may cause the species to decline
No diseases are listed as a threat to this species within the Conservation Advice. The Proposed Action is unlikely to result in the introduction of disease that may cause the diamond firetail to decline.
interfere substantially with the recovery of the species
There is currently no approved Recovery Plan for this species. However, it is not considered likely that the removal of 8.36 ha of potential foraging and breeding habitat would interfere substantially with the recovery of the species.
Conclusion
The Proposed Action is unlikely to have a significant direct and indirect impact on an important population of the diamond firetail.

4.7 Grey-headed Flying Fox (*Pteropus poliocephalus)*

4.7.1 Description

The grey-headed flying-fox (*Pteropus poliocephalus*) is listed as vulnerable under the EPBC Act. Its range extends from Bundaberg in Queensland to Melbourne in Victoria, from the coast and inland to the western slopes of New South Wales. There have also been recent reports of the species within South Australia (DAWE 2021).

Grey-headed flying-fox feeds primarily on blossoms and fruit in canopy vegetation. Major food plants include fruit and blossom of rainforest species (especially figs) and blossom of *Eucalyptus*, *Corymbia*, *Angophora*, *Melaleuca*, *Banksia* and *Syzygium* species. They forage over large areas flying up to 40 km from their roosts or camps.

Habitat critical to the survival of the species including vegetation communities that:

- Support winter and spring flowering resources (*Eucalyptus tereticornis, Eucalyptus albens, Eucalyptus crebra, Eucalyptus fibrosa, Eucalyptus melliodora, Eucalyptus paniculata, Eucalyptus pilularis, Eucalyptus robusta, Eucalyptus seeana, Eucalyptus sideroxylon, Eucalyptus siderophloia, Banksia integrifolia, Castanospermum austral, Corymbia citriodora, Corymbia eximia, Corymbia maculata, Grevillea robusta, Melaleuca quinquenervia, Syncarpia glomulifera*).
- Native species flowering during the final weeks of gestation, birth, lactation and conception (August to May).
- Native species for foraging within 20 km of a nationally important camp as identified on the flying-fox viewer.
- Native and/or exotic species used for roosting at the site of a nationally important camp as identified on the flying-fox viewer (DAWE 2021).

The grey-headed flying-fox is considered to be a single mobile population. Grey- headed flying-foxes are highly mobile and appear to be a highly adaptable species in response to changes in their habitat and surrounding environment. The grey-headed flying-fox occupancy and relative abundance varies widely seasonally and temporally in response to flowering and fruiting. There are a small number of local areas that support a continuous presence while others are associated with regular, annual patterns of use (DAWE 2021). A number of ''urban'' roost sites that are occupied year-round (Sydney suburbs, Botanic Gardens in Sydney and Melbourne) have become established due to consistently available food resources and suitable roosting habitat. At other ''non-permanent'' roost sites, grey-headed flying foxes have shown themselves to be able to respond rapidly to the presence/absence of food availability (TSSC 2001).

During spring, the grey-headed flying-fox is uncommon south of Nowra but widespread in other areas of their range. In summer they are widespread throughout their range and in autumn they occupy coastal lowlands and are uncommon inland. In winter they congregate in coastal lowlands north of the Hunter Valley and are occasionally found where flowering spotted gum (*Corymbia maculata*) and north-west slopes with flowering white box (*Eucalyptus albens*) or mugga ironbark (*Eucalyptus sideroxylon*) (DAWE 2021).

4.7.2 Relevant Guidelines and Policy Statements

Relevant guidelines and policy statements available for this species include:

- There is no approved conservation advice for this species.
- Commonwealth Listing Advice on *Pteropus poliocephalus* (grey-headed flying fox) (TSSC 2001).
- National recovery plan for the grey-headed flying-fox *Pteropus poliocephalus* (DAWE 2021).
- There are no adopted/made threat abatement plans, identified as being relevant for this species.

Other policy statements and guidelines:

- Survey guidelines for Australia's threatened bats. Guidelines for detecting bats listed as threatened under the *Environment Protection and Biodiversity Conservation Act 1999* (DEWHA 2010).

- Referral guideline for management actions in Grey-headed and Spectacled flying-fox camps. EPBC Act Policy Statement (CoA 2015).

4.7.3 NSW Bilateral Assessment Requirement

The NSW bilateral assessment requirement considerations for the Grey headed flying fox are presented in **Table 4.13** below.

Table 4.13 SEARs Requirement Considerations for the Grey-headed Flying Fox

Item 16 Requirements		Grey headed flying fox
i	Description of habitat	The grey-headed flying fox requires foraging resources and roosting sites. It is a canopy-feeding frugivore and nectarivore, which utilises vegetation communities including rainforests, open forests, closed and open woodlands, Melaleuca swamps and Banksia woodlands. It also feeds on commercial fruit crops and on introduced tree species in urban areas. The primary food source is blossom from Eucalyptus and related genera but in some areas it also utilises a wide range of rainforest fruits (Eby 1998). None of the vegetation communities used by the grey-headed flying fox produce continuous foraging resources throughout the year. The grey-headed flying fox roosts in aggregations of various sizes on exposed branches. Roost sites are typically located near water, such as lakes, rivers or the coast. Roost vegetation includes rainforest patches, stands of Melaleuca, mangroves and riparian vegetation. Foraging habitat within the Development Footprint occurs as PCT 3374, PCT 3376, PCT 4063, however these areas have low abundance of winter flowering eucalypts, so would be considered marginal habitat. No breeding camps have been identified within the Project Area.
ii	Survey Methodology	A range of surveys methods have been employed to survey for threatened fauna species in keeping with the NSW BAM (DPIE 2020) the TBDC survey guidelines and species survey guidelines listed in Table 3.2 of the MNES report, including: • Over 200 diurnal bird surveys targeting woodland birds over eleven survey campaigns between August 2022 and September 2024 (Aug, Oct, Nov 22, Jan, Feb, Aug, Oct 23, Feb, March, Sep 24). t • Stick nest, hollow-bearing tree and burrow searches Aug 24, Jan, Feb. Aug, Oct 23 and March 24 • A total of 126 vantage point surveys were conducted across seven sites in the Biodiversity Survey Area from October 2022–February 2023 to assess bird occurrence and flight behaviour across the Project Area. These surveys would have identified breeding camps and/or passing bats if they were present in the Project Area.
iii	Impacts	The Proposed Action will directly impact on 8.36 ha or 2.51% of foraging habitat within the Biodiversity Survey Area. The grey headed flying fox is unlikely to be impacted by the operation of the Project. Mitigation measures outlined in Section 8.6 of the BDAR will be implemented to minimise indirect impacts from the operation of the BESS.
iv	MNES specific avoidance and mitigation measures	Specific design refinements made by Spark Renewables during the development of the BDAR to avoid and minimise impacts to biodiversity values, including for the diamond firetail: • Minimise impacts to native vegetation. • Optimising opportunities to maintain connectivity between the Project Area and surrounding areas of intact native vegetation

Item 16 Requirements		Grey headed flying fox
		• Reduction of the Project Area to avoid riparian areas and dams with emergent vegetation that may provide habitat for threatened species. • The implementation of environmental management plans and strategies including Biodiversity Management Strategy to minimise the residual impacts of the project including a CEMP and BMP Further details of avoidance, mitigation and management measures are provided in Section 7.0 and Section 9.0 of the BDAR as well as Section 5.0 of this MNES Report.
v	Residual impact	The Proposed Action would directly impact on 8.36 ha of habitat for the species. An Assessment of Significance has been provided in Table 4.14**.** The assessment has concluded that the Proposed Action is unlikely to have a significant impact on the species.
vi	Offsets required	The grey headed flying fox is an ecosystem credit species, impacts to this species will be offset through the retirement of the Proposed Action's credit obligation for associated PCTs.

4.7.4 Significant Impact Criteria Consideration

The significant impact criteria considerations for Grey headed flying fox are presented in **Table 4.14.**

Table 4.14 Significant Impact Assessment – Grey headed Flying Fox

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
Due to its wide distribution and extensive mobility, annual national counts of the grey-headed flying fox are difficult. A decade long study between 2012–22 estimated an average annual population of 580,000 individuals (CSIRO). Modelling strongly suggests a 70% chance of a slightly increasing population, versus a 30% chance the population has declined slightly. The population appeared to be stable despite exceptional events such as the 2019–20 megafires and severe heatwaves known to have killed thousands of flying foxes. Grey-headed flying foxes forage over extensive areas and have been known to fly as far as 40 km to feed, before returning to their roost the same night (Eby 1991). Based on telemetry data, Westcott et al (2015) reported the mean distance of a grey-headed flying fox foraging site from the camp in which the animal had roosted and to which it returned was 10.9 km (quartile range from 6.2–27.9 km), with the maximum distance recorded during these observations being 148.3 km. There were no records of the grey-headed flying fox within the Project Area during field surveys, despite comprehensive surveys being undertaken throughout numerous seasons. The Proposed Action would clear approximately 8.36 ha of potential habitat within the Development Footprint. The avoidance of the majority of native vegetation in the Project Area will maintain connectivity throughout the landscape. Clearing of potential habitat is unlikely to impact individuals however implementation of pre-clearing surveys and clearing supervision reduces the risk of injury or mortality of individuals. With implementation of these management measures and avoidance of a large portion of the Project Area, the Proposed Action is unlikely to lead to a long-term decrease in the size of an important 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:
reduce the area of occupancy of an important population
Given its nomadism and mobility, the grey-headed flying fox is considered to have a single national population (DAWE 2021). Grey-headed flying foxes are regularly found from the coast, inland to the tablelands and western slopes of northern New South Wales and the tablelands of southern Queensland. Breeding camps have been recorded as far north as Ingham in far north Queensland and more recently, the species has become established in South Australia, the Australian Capital Territory and Victoria and inland areas of New South Wales (DoEE 2017). There are also records of individuals on Bass Strait islands (Tidemann 1998) and mainland Tasmania (Driessen 2010). Therefore, the proposed Action Plan of 8.36 ha does not comprise an area of important population of the grey-headed flying fox.
fragment an existing important population into two or more populations
Again, given nomadism and mobility of the grey-headed flying fox, it is unlikely the Proposed Action Plan will fragment the population.
adversely affect habitat critical to the survival of a species
The grey-headed flying fox requires a continuous temporal sequence of productive foraging habitats and suitable roosting habitat. Loss of foraging habitat is considered the primary threat to the grey-headed flying fox. The species has complex habitat requirements and requires multiple populations of food trees dispersed over a large area. This makes it difficult to protect foraging habitats solely within conservation reserves, such as national parks, and leaves the species vulnerable to land-uses that may clear native vegetation or degrade habitat. Evidence of repeated food shortages during winter and spring indicates that inadequate productive foraging habitat exists in these seasons to sustain the current grey-headed flying fox population. 8.36 ha of potential foraging habitat for the grey-headed flying fox will be impacted due to the Proposed Action Plan. However, this foraging habitat is not critical to the survival of the species and is not a major roosting site for the species.
disrupt the breeding cycle of an important population
Loss of roosting habitat has also been identified as a threat to grey-headed flying foxes (Tidemann et al. 1999, NSW Scientific Committee 2001). Camp vegetation has been exposed to the same historical patterns of clearing and degradation as foraging habitat (Lunney and Moon 1997, Hall 2002). The roosting requirements of grey-headed flying foxes are however not well understood, nor are the impacts to the species from the loss of long-term sites or loss and fragmentation of urban camps. Actions and other information in this plan seek to improve our understanding and protect roosting habitats. The Proposed Action Plan does not contain known roosting/breeding areas for the grey-headed flying fox
modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline
While the initial impact to 8.36 ha of potential foraging habitat would reduce the availability of habitat for the grey-headed flying fox, post construction vegetation management would enable potential foraging habitat to reestablish. There would also be potential suitable habitat remaining outside the Development Footprint. This species has broad habitat preferences and is mobile, and therefore the Proposed Action is unlikely to lead to a decline in the species.
result in invasive species that are harmful to a vulnerable species becoming established in the vulnerable species' habitat
Invasive species are not considered to be a key threat to the grey-headed flying foxes. The Proposed Action Plan is unlikely to facilitate threats of invasive species to flying fox populations.
introduce disease that may cause the species to decline
The effects of the pathogens, Australian bat Lyssavirus (ABL), Bat Paramyxovirus and Menangle Pig virus (Hoar et al. 1998), on the grey-headed flying fox are unknown. However, the incidence of ABL in the species is very low whilst approximately 25% of wild flying-foxes carry antibodies to Menangle Pig virus (University of Sydney, 2000). The Proposed Action plan is not expected to introduce disease that may cause the species to decline.

An action is likely to have a significant impact on a vulnerable species if there is a real chance or possibility that it will:
interfere substantially with the recovery of the species
The overall objectives of the current grey-headed flying fox recovery plan are: • to improve the grey-headed flying foxes national population trend by reducing the impact of the threats outlined in this plan on grey-headed flying foxes through habitat identification, protection, restoration and monitoring, and • to assist communities and grey-headed flying foxes to coexist through better education, stakeholder engagement, research, policy and continued support to fruit growers The Proposed Action Plan may result in the degradation of some foraging habitat. However, it is not considered likely that the removal of 8.36 ha of potential foraging habitat would interfere substantially with the recovery of this species.
Conclusion
The Proposed Action is unlikely to have significant direct or indirect impacts on the grey-headed flying fox.

4.8 Pink-tailed Worm-Lizard (*Aprasia parapulchella*)

4.8.1 Description

The pink-tailed worm lizard is only known from the Central and Southern Tablelands, and the Southwestern Slopes in NSW. There is a concentration of populations in the Canberra/Queanbeyan Region. Other populations have been recorded near Cooma, Yass, Bathurst, Albury and West Wyalong (TSSC 2015). Populations are widespread and highly isolated from one another.

The species inhabits primary and secondary grassland, grassy woodland and woodland communities. They are typically found in areas with predominately native grasses, particularly *Themeda australis*. Further, sites are typically well-drained, with rocky outcrops or scattered, partially-buried rocks. The pink-tailed worm lizard is commonly found beneath small, partially-embedded rocks and appear to spend considerable time in burrows below these rocks; the burrows have been constructed by and are often still inhabited by small black ants and termites (TSSC 2015).

The pink-tailed worm lizard is associated with PCTs 3374. The area of suitable habitat is defined as patches of surface rocks, within associated PCTs in derived native grassland and scattered trees condition states, that meet the following criteria in accordance with the Threatened reptiles Biodiversity Assessment Method survey guide (DPIE 2022):

- 300 mm wide and 50 mm deep (Wong et al. 2011)
- 100–150 mm wide, 120–220 mm long, 50–150 mm deep (Jones 1999).

Targeted surveys were undertaken throughout the Biodiversity Study Area including active searches and rock rolling. Suitable habitat is scarce in the Development Footprint with most rocky areas comprising deeply embedded rocks which would not provide suitable habitat for the pink-tailed worm lizard. There are no records of this species within, or within 10 km of, the Project Area.

4.8.2 Relevant Guidelines and Policy Statements

Relevant guidelines and policy statements available for this species include:

- Conservation Advice *Aprasia parapulchella* pink-tailed worm-lizard (TSSC 2015).
- There is no adopted or made recovery plan for this species
- Adopted/made threat abatement plans: Threat abatement plan for competition and land degradation by rabbits (DOEE 2016).

4.8.3 NSW Bilateral Assessment Requirement

The NSW bilateral assessment requirement considerations for the pink-tailed worm-lizard are presented in **Table 4.15** below.

Table 4.15 SEARs Requirements Considerations for the Pink-tailed Worm Lizard

Item 16 Requirements		Pink-tailed worm lizard
i	Description of habitat	The species inhabits primary and secondary grassland, grassy woodland and woodland communities. They are typically found in areas with predominately native grasses, particularly Themeda australis. Further, sites are typically well-drained, with rocky outcrops or scattered, partially-buried rocks. The pink-tailed worm lizard is commonly found beneath small, partially-embedded rocks and appear to spend considerable time in burrows below these rocks; the burrows have been constructed by and are often still inhabited by small black ants and termites (TSSC 2015). Under the NSW BAM, the pink-tailed worm-lizard is identified as associated with PCT 3374. The habitat in the Development Footprint is largely unsuitable with most rocky areas comprising deeply embedded rocks which would not provide suitable habitat for the pink-tailed worm lizard. Surveys have been undertaken within the vegetation zones associated with PCTs 3374. There is no habitat critical to the survival of the species defined in the conservation advice, however given how few populations there are of this species, it is likely that any habitat they potentially inhabit is critical to their survival.
ii	Survey Methodology	Habitat features surveys and targeted surveys including active searches and rock rolling were undertaken in all areas of suitable habitat. Mostly of the areas initially identified as potential habitat were later excluded during targeted surveys as the rocks were either too large or deeply embedded in the ground. Surveys occurred over 9–13 and 26–27 October 2023. ~88 hours of active searches 6 ecologists. The surveys are complient with the requirements of the NSW BAM, which are generally consistent with the survey methods outlined in the conservation advice (TSSC 2015).
ii	Impacts	The Proposed Action will directly impact on 248.41 ha of grassland habitat associated with PCT 3374within the Development Footprint. This habitat has been assessed as largely unsuitable. The pink-tailed worm lizard is unlikely to be impacted by the operation of the Project. Mitigation measures outlined in Section 8.6 of the BDAR will be implemented to minimise indirect impacts from the operation of the Solar Farm.

Item 16 Requirements		Pink-tailed worm lizard
iv	MNES specific avoidance and mitigation measures	The following key impact avoidance and mitigation measures have been identified for the Project: 1. Biodiversity impact avoidance through Development Footprint alterations which have resulted in biodiversity impact avoidance through an avoidance of approximately 68.4 per cent (reducing from 1,838.09 ha to 580.62 ha) of the Project Area. 2. Optimising opportunities to maintain connectivity between the Project Area and surrounding areas of intact native vegetation. 3. Redesign of the Project to minimise impacts on areas of intact native woodland and hollow bearing trees which reduced impacts to suitable foraging and/or breeding habitat for the greater glider. 4. Reduction of the Project Area to avoid riparian areas and dams with emergent vegetation that may provide habitat for threatened species.
v	Residual impact	The Proposed Action is unlikely to impact suitable habitat for the species. However, 248.41 ha of vegetation associated with PCT 3374 will be impacted during construction. An Assessment of Significance has been provided in **Table 4.16**. The assessment has concluded that the Proposed Action is unlikely to result in a significant impact on the pink-tailed worm lizard.
vi	Offsets required	The pink-tailed worm lizard is an ecosystem credit species, impacts to this species will be offset through the retirement of the Proposed Action's credit obligation for PCTs associated with the species.

4.8.4 Significant Impact Criteria Consideration

The significant impact criteria considerations for pink-tailed worm lizard are presented in **Table 4.16.**

Table 4.16 Significant Impact Assessment – Pink-tailed Worm Lizard

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
Pink-tailed worm lizard was not recorded in the Biodiversity Survey Area during the 2022–2024 surveys. Suitable habitat is scarce in the Development Footprint with most rocky areas comprising deeply embedded rocks which would not provide suitable habitat for the pink-tailed worm lizard. An important population is not defined in the conservation advise (TSSC 2015). As no population was identified on site, and suitable habitat is scarce on the Development Footprint, it is considered unlikely that an important population utilises the habitat in the Development Footprint. Construction of the Proposed Action would not impact directly impact on any known population of pink-tailed worm lizard and is would not impact suitable habitat for the species. It is unlikely that the Proposed Action will lead to a long-term decrease in an important population of pink-tailed worm lizard.
Reduce the area of occupancy of an important population
The Proposed Action will clear approximately 248.41 ha of vegetation associated with PCT 3374 which is listed as an associated vegetation community for the pink-tailed worm lizard. Suitable habitat is scarce in the Development Footprint with most rocky areas comprising deeply embedded rocks which would not provide suitable habitat for the pink-tailed worm lizard. As the pink-tailed worm lizard was not observed on site and the habitat is considered unsuitable, the Proposed Action is unlikely to impact upon an important population, or reduce the habitat of an important 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:
Fragment an existing important population into two or more populations
Despite targeted surveys, no populations are known to utilise the habitat onsite. The Proposed Action is unlikely to fragment an existing important population into two or more populations.
Adversely affect habitat critical to the survival of a species
There is no habitat critical to the survival of the species defined in the conservation advice, however given how few populations there are of this species, it is likely that any habitat they inhabit is habitat critical to their survival. The habitat on site is not considered to be suitable habitat for the pink-tailed worm lizard. Impacts to habitat critical to the survival of the pink-tailed worm lizard are therefore unlikely.
Disrupt the breeding cycle of an important population
Despite targeted surveys, no populations are known to utilise the habitat onsite. The Proposed Action is unlikely to disrupt the breeding cycle of an important population of pink-tailed worm lizard.
Modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline
The Proposed Action will clear approximately 248.41 ha of vegetation associated with PCT 3374 which is listed as an associated vegetation community for the pink-tailed worm lizard. As the pink-tailed legless lizard was not observed on site and the habitat is considered unsuitable, the Proposed Action is considered unlikely to modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the pink-tailed worm lizard is likely to decline.
Result in invasive species that are harmful to a vulnerable species becoming established in the vulnerable species' habitat
The following processes are listed as threats to the pink-tailed worm lizard: • An increase in weeds, resulting in further degradation of suitable habitat, and • Predation by cats and foxes is considered a threat (TSSC, 2015). It is unlikely that the Proposed Action would result in an increase in these threats within the Project Area.
Introduce disease that may cause the species to decline
There are no known diseases that are considered a key threat to this species (TSSC, 2015). The Proposed Action is unlikely to introduce disease into the Project Area that may cause the species to decline.
Interfere substantially with the recovery of the species
There is no recovery plan for this species and no recovery objectives are identified in the Conservation Advice (TTSC 2015). The Proposed Action may result in reduction in marginal potential habitat including grasslands, grassy woodlands and habitat connectivity. Mitigation standards including pre-clearance surveys and avoidance of rocky outcrops will reduce impacts. The Proposed Action is not expected to: ○ introduce or increase predators ○ result in further fragmentation of habitats ○ result in hydrological changes to the surrounding environment such that the function and integrity of the existing habitat is jeopardised. Given the species has not been recorded within the Development Footprint and the above considerations, it is unlikely that the Proposed Action will interfere with the recovery of an important population of the pink-tailed worm lizard.
Conclusion
The Proposed Action is unlikely to have significant direct or indirect impacts on the pink-tailed worm lizard.

5.0 Migratory Species

No migratory species listed under the EPBC Act were recorded in the Project Area or are considered to be likely to occur in the Project Area, therefore no Assessments of Significance have been prepared to assess the impacts of the Project on migratory species.

5.1 International Obligations for Migratory Species

The EPBC Act is the key mechanism for meeting Australia's obligations and responsibilities under a number of international agreements.

5.1.1 Convention on International Trade in Endangered Species of Wild Fauna and Flora

The EPBC Act regulates movements of animals, plants and products to and from Australia. The EPBC Act helps to protect the environment from risks associated with the international movement of wildlife. It is how Australia meets its obligations under the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES). CITES is an international agreement between governments that aims to ensure that the international trade in wildlife does not threaten wild populations of plants and animals.

5.1.2 The Apia Convention

The main objective of the Convention on Conservation of Nature in the South Pacific (Apia Convention) is to commit the parties to take action for the conservation, utilisation and development of natural resources of the South Pacific region through careful planning and management for the benefit of present and future generations. The purpose of the Apia Convention is to encourage the creation of protected areas, national parks and reserves and to commit to not alter national parks so as to reduce their area except after the fullest investigations.

The Apia Convention was suspended with effect from 13 September 2006 and many of the commitments in the Apia Convention have been superseded by commitments under the Convention on Biological Diversity, 1992.

5.1.3 Convention on Biological Diversity

The Convention on Biological Diversity 1992 is dedicated to the conservation of biological diversity, sustainable use of biodiversity components and sustainable development. The Convention identifies a common problem, sets overall goals and policies, and identifies general obligations for signatory countries. Under the Convention, governments undertake to conserve and sustainably use biodiversity. Obligations include:

- Development of national biodiversity strategies and action plans to be integrated into broader national plans for environment and development.
- Identifying and monitoring the important components of biodiversity that need to be conserved and used sustainably.

- Establishing protected areas to conserve biodiversity while promoting environmentally sound development around these areas.
- Rehabilitation and restoring degraded ecosystems and promoting the recovery of threatened species in collaboration with local residents.
- Respecting, preserving and maintaining traditional knowledge of the sustainable use of biodiversity.
- Preventing the introduction of, controlling, and eradicating alien species that could threaten ecosystems, habitats or species.
- Controlling the risks posed by organisms modified by biotechnology.
- Promoting public participation, particularly in assessing environmental impacts of developments that threaten biodiversity.
- Education and reporting on goals (Secretariat of the Convention of Biological Diversity 2000).

Australia's Biodiversity Conservation Strategy 2010–2030 (CoA 2010) has been developed to meet these obligations. The strategy identifies national priorities for action to help stop the decline of Australia's biodiversity (engaging all Australians in biodiversity conservation, building ecosystem resilience in a changing climate and getting measurable results) and is the guiding policy framework for the governments and private sector approach to biodiversity conservation.

The strategy, identifies the main threats to Australia's biodiversity as:

- habitat loss, degradation and fragmentation
- invasive species
- unsustainable use and management of natural resources
- changes to the aquatic environment and water flows
- hanging fire regimes
- climate change.

These threats are inherently considered in the assessment of impact of the Proposed Action on MNES and in the environmental impact assessment framework of the EPBC Act and BC Act. The Proposed Action will result in and/or exacerbate some of these threats to biodiversity particularly habitat loss, degradation and fragmentation. Through detailed design the extent of these threats may be avoided and minimised. Implementation of management plans will minimise these threats.

Building ecosystem resilience to climate change is recognised in the strategy as a national priority action. Climate change is increasing the rate at which we are losing biodiversity by amplifying existing pressures and introducing new threats, particularly long-term changes in rainfall and temperature patterns, rising sea levels, and changes to frequency and severity of extreme events (CoA 2010). Transition from reliance on fossil fuel energy sources to renewable energy is fundamental to reducing human-induced elements of climate change. Maintaining and building resilience in ecosystems is the other main way to improve chances of a reasonable future for biodiversity (CoA 2010). This is to be achieved through reducing impacts of existing threats and maintaining large areas of linked habitat.

The Proposed Action has been designed to avoid and minimise clearance of large tracts of native vegetation and higher quality patches. As described in Section 7 of the BDAR (Umwelt 2024a), broadly speaking, much of the Development Footprint occurs where the connectivity of native vegetation and habitat corridors has been previously compromised by agricultural land uses.

The Australia's Biodiversity Conservation Strategy 2010–2030 was reviewed, and the updated strategy was released in 2017. Australia's Strategy for Nature 2019–2030 (CoA 2019) is the overarching framework for all national, state/territory and local strategies, legislation, policies and actions that target nature (CoA 2019). The Strategy for Nature has three priority goals. Relevant to the Proposed Action is the goal of care for nature in all diversity. The conservation of biological diversity refers to the maintenance of species richness, ecosystem diversity and health and the links and processes between them.

All environmental components, ecosystems and habitat values potentially affected by the Proposed Action have been assessed in the BDAR (Umwelt 2024a) which includes detailed measures to avoid and minimise impacts to biodiversity.

5.1.4 Bilateral Agreement

Australia entered into bilateral agreement to conserve migratory birds in the East Asian – Australasian Flyway with Japan (Japan-Australia Migratory Bird Agreement (JAMBA)), China (China-Australia Migratory Bird Agreement (CAMBA)) and the Republic of Korea (Republic of Korea-Australia Migratory Bird Agreement (ROKAMBA)) for:

- Protection and conservation of migratory birds and their important habitats.
- Protection from take or trade.
- The exchange of information and building cooperative relationships.

The EPBC Act gives effect to Australia's obligations to pursuing conservation outcomes for migratory birds of these agreements through the protection of migratory bird species listed under the Act and under these agreements.

There are a no MNES relevant to the Proposed Action that are listed as migratory species under these bilateral agreements.

No migratory species are likely to be impacted by the Proposed Action.

5.1.5 The Bonn Convention

Australia is signatory to the Convention on the Conservation of Migratory Species of Wild Animals (Bonn Convention). The Bonn Convention provides a global platform for the conservation and sustainable use of migratory species and their habitats and migration routes.

The convention definition of migratory species is 'the entire population or any geographically separate part of the population of any species or lower taxon of wild animals, a significant proportion of whose members cyclically and predictably cross one or more national jurisdictional boundaries'. This definition has been adopted in the EPBC Act.

The Bonn Convention prioritises protection of migratory species listed in Appendix I of the Convention as threatened with extinction, protecting these animals, conserving or restoring their habitats and mitigating obstacles to migration. Migratory species that need or would significantly benefit from international cooperation are listed in Appendix II of the Bonn Convention.

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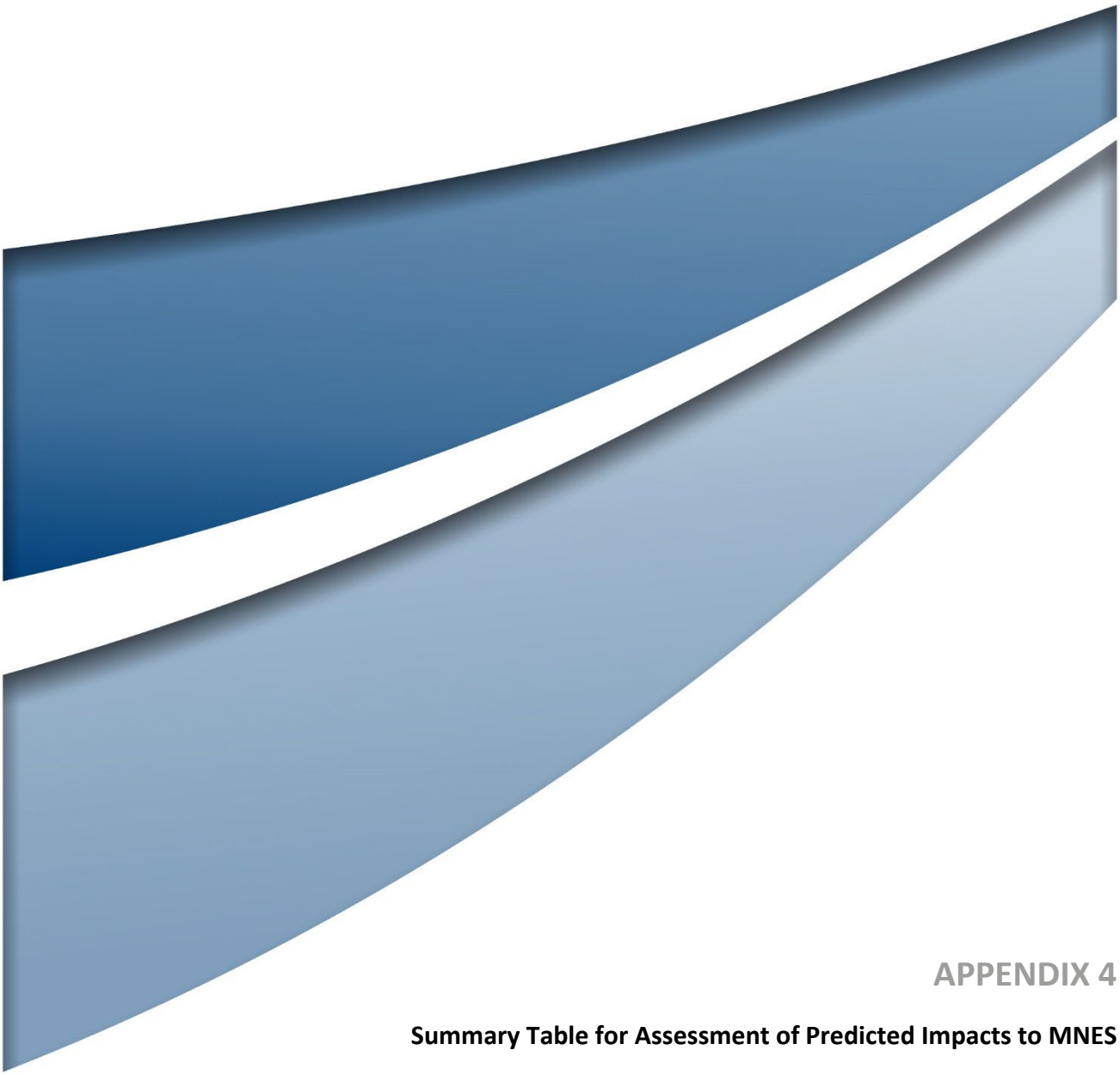
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APPENDIX 4

Summary Table for Assessment of Predicted Impacts to MNES

Table A4.1 Summary Table for Assessment of Predicted Direct Impacts on EPBC Act-listed Threatened Species and Communities

Description of Threatened Species/ Community listed under EPBC Act	Description of PCTs associated with the ecosystem cred species/ ecological community (if applicable)	Area of Predicted Direct Impact (ha)	Credits Required	Offsetting Approach	Page References
White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland CEEC	Ancillary facilities common to the BESS and Solar Projects • PCT 3376: Southern Tableland Grassy Box Woodland (good/moderate).	Removal of 0.44 ha of habitat	13 ecosystem credits	Direct impacts will be offset through ecosystem credits	MNES Assessment Appendix 3, Section 2.1 (AoS) BDAR Section 10.1.1 (Ecosystem Credits)
	Transmission line Option 2 • PCT 3376: Southern Tableland Grassy Box Woodland (good/moderate).	Removal of 0.45 ha of habitat	17 ecosystem credits		
gang-gang cockatoo	Ancillary facilities common to the BESS and Solar Projects • PCT 3376: Southern Tableland Grassy Box Woodland (good/moderate).	Removal of 0.44 ha of potential breeding and foraging habitat	17 species credits	Direct impacts to foraging habitat will be offset through ecosystem credits. Impacts to breeding habitat will be offset through species credits	MNES Assessment Appendix 3, Section 3.1 (AoS) BDAR Section 10.1.2 (Species Credits)
	Transmission line Option 1 • PCT 3376: Southern Tableland Grassy Box Woodland.	Removal of 1.85 ha of potential breeding and foraging habitat	69 species credits		
	Transmission line Option 2 • PCT 3376: Southern Tableland Grassy Box Woodland.	Removal of 4.02 ha of potential breeding and foraging habitat	150 species credits		
large-eared pied bat	Ancillary facilities common to the BESS and Solar Projects • PCT 3376: Southern Tableland Grassy Box Woodland (good/moderate) • PCT 4063: Central and Southern Tableland River Oak Forest (moderate/degraded).	Removal of 2.38 ha of foraging habitat	81 species credits	Direct impacts to foraging habitat will be offset through ecosystem credits and species credits	MNES Assessment Appendix 3, Section 3.2 (AoS) BDAR Section 10.1.2 (Species Credits)
	Transmission line Option 1 • PCT 3374: Goulburn Tableland Peppermint Grassy Fores (good/moderate) • PCT 3374: Goulburn Tableland Peppermint Grassy Forest (moderate/degraded).	Removal of 1.85 of foraging habitat	103 species credits		
	Transmission line Option 2 • PCT 3374 - Goulburn Tableland Peppermint Grassy Forest (good/moderate).	Removal of 4.13 ha of foraging habitat	229 species credits		

Description of Threatened Species/ Community listed under EPBC Act	Description of PCTs associated with the ecosystem cred species/ ecological community (if applicable)	Area of Predicted Direct Impact (ha)	Credits Required	Offsetting Approach	Page References
Paddy's River box	N/A	-	-	N/A - no direct or residual impacts predicted to this species	MNES Assessment Appendix 3, Section 3.3 (AoS)
south-eastern hooded robin	Ancillary facilities common to the BESS and Solar Projects • PCT 3376: Southern Tableland Grassy Box Woodland (good/moderate) • PCT 4063: Central and Southern Tableland River Oak Forest (moderate/degraded).	Removal of 2.38 ha of potential habitat	115 ecosystem credits	Direct impacts will be offset through ecosystem credits	MNES Assessment Appendix 3, Section 3.4 (AoS) BDAR Section 10.1.1 (Ecosystem Credits)
	Transmission line Option 1 • PCT 3374: Goulburn Tableland Peppermint Grassy Forest (good/moderate) • PCT 3374: Goulburn Tableland Peppermint Grassy Forest (moderate/good).	Removal of 1.85 ha of potential habitat	52 ecosystem credits		
	Transmission line Option 2 • PCT 3374: Goulburn Tableland Peppermint Grassy Forest (good/moderate) • PCT 3374: Goulburn Tableland Peppermint Grassy Forest (moderate/degraded) • PCT 3376: Southern Tableland Grassy Box Woodland (good/moderate) • PCT 4063: Central and Southern Tableland River Oak Forest (moderate/degraded).	Removal of 4.13 ha of potential habitat	96 ecosystem credits		

Description of Threatened Species/ Community listed under EPBC Act	Description of PCTs associated with the ecosystem cred species/ ecological community (if applicable)	Area of Predicted Direct Impact (ha)	Credits Required	Offsetting Approach	Page References
greater glider	Ancillary facilities common to the BESS and Solar Projects • PCT 3376: Southern Tableland Grassy Box Woodland (good/moderate) • PCT 4063: Central and Southern Tableland River Oak Forest (moderate/degraded).	Removal of 2.38 ha of potential habitat	115 ecosystem credits	Species credit species. As no residual impacts no credits required.	MNES Assessment Appendix 3, Section 3.5 (AoS) BDAR Section 10.1.1 (Ecosystem Credits)
	Transmission line Option 1 • PCT 3374: Goulburn Tableland Peppermint Grassy Forest (good/moderate) • PCT 3374: Goulburn Tableland Peppermint Grassy Forest (moderate/good).	Removal of 1.85 h of potential habitat	52 ecosystem credits		
	Transmission line Option 2 • PCT 3374: Goulburn Tableland Peppermint Grassy Forest (good/moderate) • PCT 3374: Goulburn Tableland Peppermint Grassy Forest (moderate/degraded) • PCT 3376: Southern Tableland Grassy Box Woodland (good/moderate) • PCT 4063: Central and Southern Tableland River Oak Forest (moderate/degraded).	Removal of 4.13 ha of potential habitat	96 ecosystem credits		

Description of Threatened Species/ Community listed under EPBC Act	Description of PCTs associated with the ecosystem cred species/ ecological community (if applicable)	Area of Predicted Direct Impact (ha)	Credits Required	Offsetting Approach	Page References
koala	Ancillary facilities common to the BESS and Solar Projects • PCT 3376: Southern Tableland Grassy Box Woodland (good/moderate) • PCT 4063: Central and Southern Tableland River Oak Forest (moderate/degraded).	Removal of 2.38 ha of potential foraging habitat	115 ecosystem credits	Direct impacts will be offset through ecosystem credits	MNES Assessment Appendix 3, Section 3.6 (AoS) BDAR Section 10.1.1 (Ecosystem Credits)
	Transmission line Option 1 • PCT 3374: Goulburn Tableland Peppermint Grassy Forest (good/moderate) • PCT 3374: Goulburn Tableland Peppermint Grassy Forest (moderate/good).	Removal of 1.85 h of potential foraging habitat	52 ecosystem credits		
	Transmission line Option 2 • PCT 3374: Goulburn Tableland Peppermint Grassy Forest (good/moderate) • PCT 3374: Goulburn Tableland Peppermint Grassy Forest (moderate/degraded) • PCT 3376: Southern Tableland Grassy Box Woodland (good/moderate) • PCT 4063: Central and Southern Tableland River Oak Forest (moderate/degraded).	Removal of 4.13 ha of potential foraging habitat	96 ecosystem credits		
swift parrot	Ancillary facilities common to the BESS and Solar Projects • PCT 3376: Southern Tableland Grassy Box Woodland (good/moderate) PCT 4063: Central and Southern Tableland River Oak Forest (moderate/degraded)	Removal of 2.38 ha of potential habitat	115 ecosystem credits	Direct impacts will be offset through ecosystem credits	MNES Assessment Appendix A3, Section 3.7 (AoS) BDAR Section 10.1.1 (Ecosystem Credits)

Description of Threatened Species/ Community listed under EPBC Act	Description of PCTs associated with the ecosystem cred species/ ecological community (if applicable)	Area of Predicted Direct Impact (ha)	Credits Required	Offsetting Approach	Page References
	Transmission line Option 1 • PCT 3374: Goulburn Tableland Peppermint Grassy Forest (good/moderate) PCT 3374: Goulburn Tableland Peppermint Grassy Forest (moderate/good)	Removal of 1.85 h of potential habitat	52 ecosystem credits		
	Transmission line Option 2 • PCT 3374: Goulburn Tableland Peppermint Grassy Forest (good/moderate) • PCT 3374: Goulburn Tableland Peppermint Grassy Forest (moderate/degraded) • PCT 3376: Southern Tableland Grassy Box Woodland (good/moderate) PCT 4063: Central and Southern Tableland River Oak Forest (moderate/degraded)	Removal of 4.13 ha of potential habitat	96 ecosystem credits		
Regent honeyeater	Ancillary facilities common to the BESS and Solar Projects • PCT 3376: Southern Tableland Grassy Box Woodland (good/moderate) PCT 4063: Central and Southern Tableland River Oak Forest (moderate/degraded)	Removal of 2.38 ha of potential habitat	115 ecosystem credits	Direct impacts will be offset through ecosystem credits	MNES Assessment Appendix A3, Section 3.8 (AoS) BDAR Section 10.1.1 (Ecosystem Credits)
	Transmission line Option 1 • PCT 3374: Goulburn Tableland Peppermint Grassy Forest (good/moderate) PCT 3374: Goulburn Tableland Peppermint Grassy Forest (moderate/good)	Removal of 1.85 h of potential habitat	52 ecosystem credits		

Description of Threatened Species/ Community listed under EPBC Act	Description of PCTs associated with the ecosystem cred species/ ecological community (if applicable)	Area of Predicted Direct Impact (ha)	Credits Required	Offsetting Approach	Page References
	Transmission line Option 2 • PCT 3374: Goulburn Tableland Peppermint Grassy Forest (good/moderate) • PCT 3374: Goulburn Tableland Peppermint Grassy Forest (moderate/degraded) • PCT 3376: Southern Tableland Grassy Box Woodland (good/moderate) PCT 4063: Central and Southern Tableland River Oak Forest (moderate/degraded).	Removal of 4.13 ha of potential habitat	96 ecosystem credits		
Key's matchstick grasshopper	Ancillary facilities common to the BESS and Solar Projects PCT 3376: Southern Tableland Grassy Box Woodland (good/moderate)	Removal of 0.44 ha of habitat	Species credit species. As no residual impacts no credits required.	Species credit species. As no residual impacts no credits required	MNES Assessment Appendix 3, Section3.9 (AoS).
	Transmission line Option 2 PCT 3376: Southern Tableland Grassy Box Woodland (good/moderate).	Removal of 0.45 ha of habitat			
south-eastern glossy black cockatoo	Ancillary facilities common to the BESS and Solar Projects • PCT 3376: Southern Tableland Grassy Box Woodland (good/moderate).	Removal of 0.44 ha of potential breeding and foraging habitat	17 species credits	Dual credit species under the BAM. Direct impacts to foraging habitat will be offset through ecosystem credits. Impacts to breeding habitat will be offset through species credits	MNES Assessment Appendix 3, Section 4,1 (AoS) BDAR Section 10.1.2 (Species Credits)
	• Transmission line Option 1 • PCT 3376: Southern Tableland Grassy Box Woodland.	Removal of 1.85 ha of potential breeding and foraging habitat	69 species credits		
	Transmission line Option 2 • PCT 3376: Southern Tableland Grassy Box Woodland.	Removal of 4.02 ha of potential breeding and foraging habitat	150 species credits		

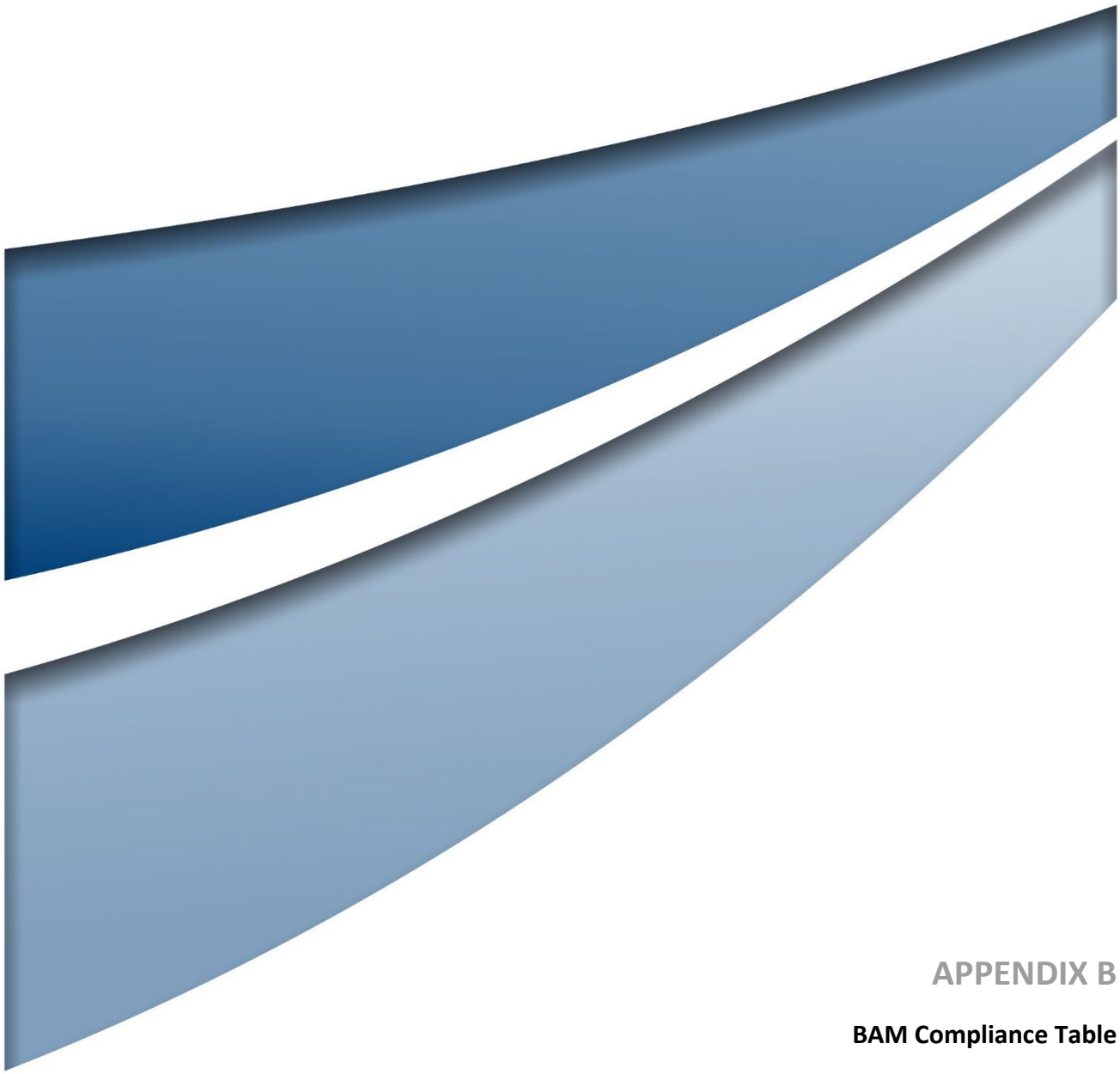
Description of Threatened Species/ Community listed under EPBC Act	Description of PCTs associated with the ecosystem cred species/ ecological community (if applicable)	Area of Predicted Direct Impact (ha)	Credits Required	Offsetting Approach	Page References
brown treecreeper (southern-eastern)	Ancillary facilities common to the BESS and Solar Projects • PCT 3376: Southern Tableland Grassy Box Woodland (good/moderate) • PCT 4063: Central and Southern Tableland River Oak Forest (moderate/degraded).	Removal of 2.38 ha of potential habitat	115 ecosystem credits	Direct impacts will be offset through ecosystem credits	MNES Assessment Appendix 3, Section 4,2 (AoS) BDAR Section 10.1.1 (Ecosystem Credits)
	Transmission line Option 1 • PCT 3374: Goulburn Tableland Peppermint Grassy Forest (good/moderate) • PCT 3374: Goulburn Tableland Peppermint Grassy Forest (moderate/good).	Removal of 1.85 h of potential habitat	52 ecosystem credits		
	Transmission line Option 2 • PCT 3374: Goulburn Tableland Peppermint Grassy Forest (good/moderate) • PCT 3374: Goulburn Tableland Peppermint Grassy Forest (moderate/degraded) • PCT 3376: Southern Tableland Grassy Box Woodland (good/moderate) • PCT 4063: Central and Southern Tableland River Oak Forest (moderate/degraded).	Removal of 4.13 ha of potential habitat	96 ecosystem credits		
Narrow-leaved black peppermint	N/A	-	-	N/A - no direct or residual impacts predicted to this species	MNES Assessment Appendix 3, Section4.3 (AoS)

Description of Threatened Species/ Community listed under EPBC Act	Description of PCTs associated with the ecosystem cred species/ ecological community (if applicable)	Area of Predicted Direct Impact (ha)	Credits Required	Offsetting Approach	Page References
Painted honeyeater	Ancillary facilities common to the BESS and Solar Projects • PCT 3376: Southern Tableland Grassy Box Woodland (good/moderate) • PCT 4063: Central and Southern Tableland River Oak Forest (moderate/degraded).	Removal of 2.38 ha of potential habitat	115 ecosystem credits	Direct impacts will be offset through ecosystem credits	MNES Assessment Appendix 3, Section 4.4 (AoS)
	Transmission line Option 1 • PCT 3374: Goulburn Tableland Peppermint Grassy Forest (good/moderate) • PCT 3374: Goulburn Tableland Peppermint Grassy Forest (moderate/good).	Removal of 1.85 h of potential habitat	52 ecosystem credits		
	Transmission line Option 2 • PCT 3374: Goulburn Tableland Peppermint Grassy Forest (good/moderate) • PCT 3374: Goulburn Tableland Peppermint Grassy Forest (moderate/degraded) • PCT 3376: Southern Tableland Grassy Box Woodland (good/moderate) • PCT 4063: Central and Southern Tableland River Oak Forest (moderate/degraded).	Removal of 4.13 ha of potential habitat	96 ecosystem credits		

Description of Threatened Species/ Community listed under EPBC Act	Description of PCTs associated with the ecosystem cred species/ ecological community (if applicable)	Area of Predicted Direct Impact (ha)	Credits Required	Offsetting Approach	Page References
Yellow-bellied glider	Ancillary facilities common to the BESS and Solar Projects • PCT 3376: Southern Tableland Grassy Box Woodland (good/moderate) • PCT 4063: Central and Southern Tableland River Oak Forest (moderate/degraded).	Removal of 2.38 ha of potential habitat	115 ecosystem credits	Direct impacts will be offset through ecosystem credits	MNES Assessment Appendix 3, Section 4.5 (AoS) BDAR Section 10.1.1 (Ecosystem Credits)
	Transmission line Option 1 • PCT 3374: Goulburn Tableland Peppermint Grassy Forest (good/moderate) • PCT 3374: Goulburn Tableland Peppermint Grassy Forest (moderate/good).	Removal of 1.85 h of potential habitat	52 ecosystem credits		
	Transmission line Option 2 • PCT 3374: Goulburn Tableland Peppermint Grassy Forest (good/moderate) • PCT 3374: Goulburn Tableland Peppermint Grassy Forest (moderate/degraded) • PCT 3376: Southern Tableland Grassy Box Woodland (good/moderate) • PCT 4063: Central and Southern Tableland River Oak Forest (moderate/degraded).	Removal of 4.13 ha of potential habitat	96 ecosystem credits		

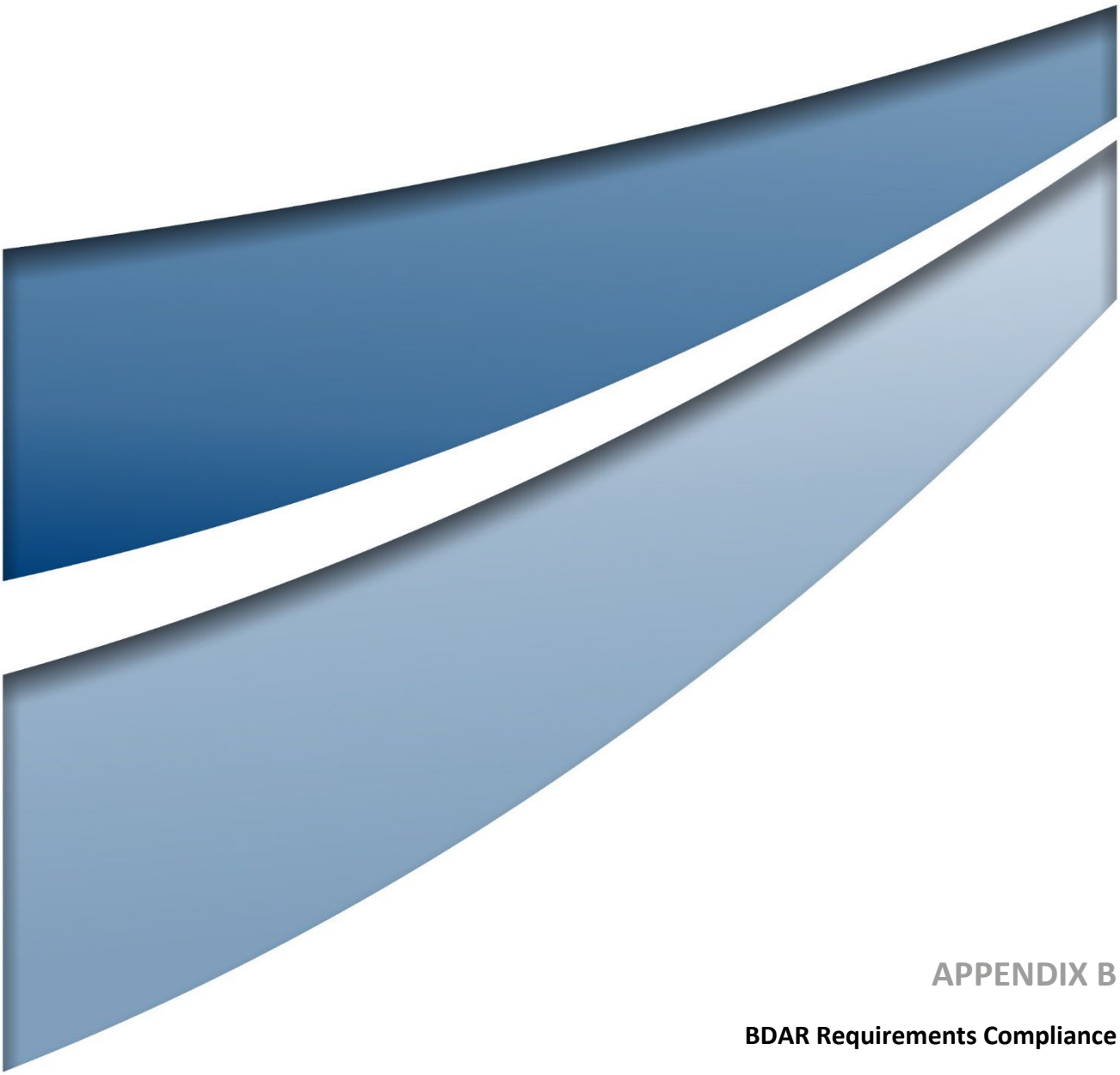
Description of Threatened Species/ Community listed under EPBC Act	Description of PCTs associated with the ecosystem cred species/ ecological community (if applicable)	Area of Predicted Direct Impact (ha)	Credits Required	Offsetting Approach	Page References
Diamond firetail	Ancillary facilities common to the BESS and Solar Projects • PCT 3376: Southern Tableland Grassy Box Woodland (good/moderate) • PCT 4063: Central and Southern Tableland River Oak Forest (moderate/degraded).	Removal of 2.38 ha of potential habitat	115 ecosystem credits	Direct impacts will be offset through ecosystem credits	MNES Assessment Appendix 3, Section 4.6 (AoS) BDAR Section 10.1.1 (Ecosystem Credits)
	Transmission line Option 1 • PCT 3374: Goulburn Tableland Peppermint Grassy Forest (good/moderate) • PCT 3374: Goulburn Tableland Peppermint Grassy Forest (moderate/good).	Removal of 1.85 h of potential habitat	52 ecosystem credits		
	Transmission line Option 2 • PCT 3374: Goulburn Tableland Peppermint Grassy Forest (good/moderate) • PCT 3374: Goulburn Tableland Peppermint Grassy Forest (moderate/degraded) • PCT 3376: Southern Tableland Grassy Box Woodland (good/moderate) • PCT 4063: Central and Southern Tableland River Oak Forest (moderate/degraded).	Removal of 4.13 ha of potential habitat	96 ecosystem credits		

Description of Threatened Species/ Community listed under EPBC Act	Description of PCTs associated with the ecosystem cred species/ ecological community (if applicable)	Area of Predicted Direct Impact (ha)	Credits Required	Offsetting Approach	Page References
Grey-headed flying-fox	Ancillary facilities common to the BESS and Solar Projects • PCT 3376: Southern Tableland Grassy Box Woodland (good/moderate) • PCT 4063: Central and Southern Tableland River Oak Forest (moderate/degraded).	Removal of 2.38 ha of potential habitat	115 ecosystem credits	Direct impacts will be offset through ecosystem credits	MNES Assessment Appendix 3, Section 4.7 (AoS) BDAR Section 10.1.1 (Ecosystem Credits)
	Transmission line Option 1 • PCT 3374: Goulburn Tableland Peppermint Grassy Forest (good/moderate) • PCT 3374: Goulburn Tableland Peppermint Grassy Forest (moderate/good).	Removal of 1.85 h of potential habitat	52 ecosystem credits		
	Transmission line Option 2 • PCT 3374: Goulburn Tableland Peppermint Grassy Forest (good/moderate) • PCT 3374: Goulburn Tableland Peppermint Grassy Forest (moderate/degraded) • PCT 3376: Southern Tableland Grassy Box Woodland (good/moderate) • PCT 4063: Central and Southern Tableland River Oak Forest (moderate/degraded).	Removal of 4.13 ha of potential habitat	96 ecosystem credits		
pink-tailed worm-lizard	N/A	Negligible	No offsets required	N/A	MNES Assessment Appendix A3, Section 4.8 (AoS)



APPENDIX B

BAM Compliance Table



APPENDIX B

BDAR Requirements Compliance

1.0 BDAR Requirement Compliance

1.1 BDAR Requirements Compliance Details

Compliance with the BDAR minimum information requirements of the BAM is documented in **Table B.1.**

Table B.1 Assessment of Compliance with BDAR Minimum Information Requirements

BDAR Section	BAM Ref.	BAM Requirement	Reference(s) in the BDAR
Introduction	**Chapters 2 and 3**	**Information**	
		Introduction to the biodiversity assessment including:	–
		☒ brief description of the proposal	Section 1.4
		☒ identification of subject land boundary, including: ☒ operational footprint ☒ construction footprint indicating clearing associated with temporary/ancillary construction facilities and infrastructure	Section 1.4.2 and Figure 1.1, Figure 1.2 and Figure 1.3
		☒ general description of the subject land	Section 1.4.2
		☒ sources of information used in the assessment, including reports and spatial data	Section 1.9. Also referenced in text and listed in the References Section.
		☒ identification and justification for entering the BOS	Section 1.6
		Maps and tables	
		☒ 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	Figure 1.1 and Figure 1.3
Landscape	**Section 3.1 and Section 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	Section 3.4, Section 3.5, Section 3.6, Section 3.8
		☒ per cent native vegetation cover in the assessment area (as described in BAM Section 3.2)	Section 3.10 and Figure 1.2
		☒ IBRA bioregions and subregions (as described in BAM Subsection 3.1.3(2.))	Section 3.3 and Figure 1.1 and Figure 1.2

BDAR Section	BAM Ref.	BAM Requirement	Reference(s) in the BDAR
		☒ rivers and streams classified according to stream order (as described in BAM Subsection 3.1.3(3.) and Appendix E)	Section 3.4 and Figure 1.1 and Figure 1.2
		☒ wetlands within, adjacent to and downstream of the site (as described in BAM Subsection 3.1.3(3.))	Section 3.4
		☒ connectivity of different areas of habitat (as described in BAM Subsection 3.1.3(5–6.))	Section 3.6
		☒ 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(7.) and 3.1.3(12.))	Section 3.7
		☒ areas of outstanding biodiversity value occurring on the subject land and assessment area (as described in BAM Subsection 3.1.3(8–9.))	Section 3.8
		☒ any additional landscape features identified in any SEARs for the proposal	Section 3.10
		☒ NSW (Mitchell) landscape on which the subject land occurs	Section 3.9
		☒ details of field reconnaissance undertaken to confirm the extent and condition of landscape features and native vegetation cover (as described in Operational Manual Stage 1 Section 2.4)	Section 2.1 and Section 2.2
		Maps and tables	
		☒ Site Map ☒ Property boundary ☒ Boundary of subject land ☒ Cadastre of subject land (including labelling of Lot and DP or section plan if relevant) ☒ Landscape features identified in BAM Subsection 3.1.3.	Figure 1.1

BDAR Section	BAM Ref.	BAM Requirement	Reference(s) in the BDAR
		☒ 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	Figure 1.2
		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	Figure 1.1 and Figure 1.2
		Data	
		☒ All report maps as separate jpeg files	–
		Individual digital shape files of:	–
		☒ subject land boundary	–
		☒ assessment area (i.e. subject land and 1500 m buffer area) boundary	–

BDAR Section	BAM Ref.	BAM Requirement	Reference(s) in the BDAR
		☒ cadastral boundary of subject land	–
		☒ areas of native vegetation cover	–
		☒ landscape features	–
Native vegetation	**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(1–3.) and Subsection 4.1.1)	Section 4.1 and Figure 4.1
		☒ Provide justification for all parts of the subject land that do not contain native vegetation (as described in BAM Subsection 4.1.2)	Section 4.1.2 and the Land Categorisation Report (Umwelt 2020a)
		☒ 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(3.) and Subsection 4.1.1)	Section 2.2.1
		☒ Describe the systematic field-based floristic vegetation survey undertaken in accordance with BAM Section 4.2	Section 2.2.2, Section 2.2.3, Section 2.2.4
		☒ 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)	Not applicable
		For each PCT within the subject land, describe:	–
		☒ PCT name and ID	Section 4.2
		☒ vegetation class	Section 4.2
		☒ extent (ha) within subject land	Section 4.2
		☒ evidence used to identify a PCT including any analyses undertaken, references/sources, existing vegetation maps (BAM Section 4.2(1–3.))	Section 4.2
		☒ plant species relied upon for identification of the PCT and relative abundance of each species	Section 4.2

BDAR Section	BAM Ref.	BAM Requirement	Reference(s) in the BDAR
		☒ if relevant, TEC status including evidence used to determine vegetation is the TEC (BAM Subsection 4.2.2(1–2.))	Section 4.2.2 and Section 4.3
		☒ estimate of per cent cleared value of PCT (BAM Subsection 4.2.1(5.))	Section 4.2
		Describe the vegetation integrity assessment of the subject land, including:	–
		☒ identification and mapping of vegetation zones (as described in BAM Subsection 4.3.1)	Method provided in Section 2.2.2, Results provided in Table 4.7, Figure 4.2
		☒ description of vegetation zones within the subject land (as described in Operational Manual Stage 1 Table 2 and Subsection 3.3.2)	Section 4.2
		☒ area (ha) of each vegetation zone	Table 4.7
		☒ assessment of patch size (as described in BAM Subsection 4.3.2)	Table 3.2
		☒ survey effort (i.e. number of vegetation integrity survey plots) as described in BAM Subsection 4.3.4(1–2.)	Table 2.1 and Table 4.7
		☒ use of relevant benchmark data from BioNet Vegetation Classification (as described in BAM Subsection 4.3.3(5.))	Section 4.5.2
		Where use of more appropriate local benchmark data is proposed (as described in BAM Subsection 1.4.2, BAM Subsection 4.3.3(5.) and BAM Appendix A):	Not applicable
		☐ identify the PCT or vegetation class for which local benchmark data will be applied ☐ identify published sources of local benchmark data (if benchmarks obtained from published sources) ☐ describe methods of local benchmark data collection (if reference plots used to determine local benchmark data)	Not applicable
		☐ provide justification for use of local data rather than BioNet Vegetation Classification benchmark values	Not applicable

BDAR Section	BAM Ref.	BAM Requirement	Reference(s) in the BDAR
		☐ provide written confirmation from the decision-maker that they support the use of local benchmark data	Not applicable
		Maps and tables	
		☒ Map of native vegetation extent within the subject land at scale not greater than 1:10,000 including identification of all areas of native vegetation including areas that are ground cover only, 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)	Figure 4.1
		☒ Map of PCTs within the subject land (as described in BAM Section 4.2(1.))	Figure 4.2
		☒ Map of vegetation zones within the subject land (as described in BAM Subsection 4.3.1)	Figure 4.2
		☒ Map the location of floristic vegetation survey plots and vegetation integrity survey plots relative to PCT boundaries	Figure 2.1
		☒ Map of TEC distribution on the subject land and table of TEC listing, status and area (ha)	Figure 4.3
		☒ Map of patch size locations for each native vegetation zone and table of patch size areas (as described in BAM Subsection 4.3.2)	Patch size not mapped and exceeds 100 ha for all vegetation condition zones, as listed in Table 4.2
		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	Table 4.8
		Data	
		☒ All report maps as separate jpeg files	–
		☒ Plot field data (MS Excel format)	

BDAR Section	BAM Ref.	BAM Requirement	Reference(s) in the BDAR
		☒ Plot field datasheets	Appendix C
		Digital shape files of:	–
		☒ PCT boundaries within subject land	–
		☒ TEC boundaries within subject land	–
		☒ vegetation zone boundaries within subject land	–
		☒ floristic vegetation survey and vegetation integrity plot locations	–
Threatened species	**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(1.))	Table 5.1
		☒ 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)	Table 5.1
		☒ justification for addition of any ecosystem credit species to the list	Table 5.1 / Justification for inclusion of additional BioNet Atlas species documented in Section 2.3 and Section 2.4
		Identify species credit species likely to occur on the subject land, including:	–
		☒ list of species credit species derived from the BAM-C (as described in BAM Subsection 5.1.1)	Table 5.2 and Table 5.3
		☒ 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)	Table 5.2 and Table 5.3
		☒ 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)	Table 5.2 and Table 5.3

BDAR Section	BAM Ref.	BAM Requirement	Reference(s) in the BDAR
		☒ justification for addition of any species credit species to the list	Table 5.2 and Table 5.3 / Justification for inclusion of additional Bionet Atlas species documented in Section 2.3 and Section 2.4
		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 (BAM Subsection 5.2.4(2.b.)) ☒ species for which an expert report is to be used to determine species presence (BAM Subsection 5.2.4(2.c.))	Table 5.4 and Table 5.5
		Present the outcomes of species credit species assessments from:	–
		☒ threatened species survey (as described in BAM Section 5.2.4)	Section 5.4 and Table 5.6 and Table 5.7
		☐ expert reports (if relevant) including justification for presence of the species and information used to make this determination (as described in BAM Subsection 5.2.4, Section 5.3, Box 3)	Not applicable
		Where survey has been undertaken include detailed information on:	–
		☒ survey method and effort (as described in BAM Section 5.3)	Section 5.3 and Section 5.4
		☒ 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	Section 5.3 and Section 5.4
		☒ 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	Section 5.3 and Section 5.4
		☒ survey personnel and relevant experience	Section 1.3 and Table 1.2.

BDAR Section	BAM Ref.	BAM Requirement	Reference(s) in the BDAR
		☒ describe any limitations to surveys and how these were addressed/overcome	Section 2.7
		Where an expert report has been used in place of survey (as described in BAM Section 5.3, Box 3), include:	–
		☒ justification of the use of an expert report ☒ identify the expert, provide evidence of their expert credentials and departmental approval of expert status ☒ all requirements of Box 3 have been addressed in the expert report	Not applicable
		Where use of local data is proposed (BAM Subsection 1.4.2):	–
		☐ identify relevant species ☐ identify data to be amended ☐ identify source of information for local data, e.g. published literature, additional survey data, etc. ☐ justify use of local data in preference to VIS Classification or TBDC data	Not applicable
		☐ provide written confirmation from the decision-maker that they support the use of local data	Not applicable
		Species polygon completed for species credit species present within the subject land (assumed present or determined on the basis of survey, expert report or important habitat map) ensuring that:	–
		☒ the unit of measure for each species is documented	Section 5.4.2
		for species assessed by area:	–
		☒ the polygon includes the extent of suitable habitat for the target species within the subject land (as described in BAM Subsection 5.2.5)	Section 5.4.2
		☒ a description of, and evidence-based justification for, the habitat constraints, features or microhabitats used to map the species polygon including reference to information in the TBDC for that species and any buffers applied	Section 5.4.2
		for species assessed by counts of individuals:	–
		☐ the number of individual plants present on the subject land (as described in BAM Subsection 5.2.5(3.))	Not applicable

BDAR Section	BAM Ref.	BAM Requirement	Reference(s) in the BDAR
		☐ the method used to derive this number (i.e. threatened species survey or expert report) and evidence-based justification for the approach taken	Not applicable
		☐ the polygon includes all individuals located on the subject land with a buffer of 30 m around the individuals or groups of individuals on the subject land	Not applicable
		☒ Identify the biodiversity risk weighting for each species credit species identified as present within the subject land (as described in BAM Section 5.4)	Table 5.8, Table 5.9 and Table 5.10
		Maps and tables	
		☒ Table showing ecosystem credit species in accordance with BAM Subsection 5.1.1, and identifying:	Table 5.1
		☒ the ecosystem credit species removed from the list	Table 5.1
		☒ the sensitivity to gain class of each species	Table 5.1
		☒ Table detailing species credit species in accordance with BAM Section 5.2 and identifying:	Table 5.2 and Table 5.3
		☒ the species credit species removed from the list of species because the species is considered vagrant, out of geographic range or the habitat or microhabitat features are not present	Table 5.2 and Table 5.3
		☒ the candidate species credit species not recorded on the subject land as determined by targeted survey, expert report or important habitat map	Table 5.4 and Table 5.5
		☒ 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)	Table 10.3
		☒ 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)	Figure 5.1
		Data	
		☒ Digital shape files of suitable habitat identified for survey for each candidate species credit species	–
		☒ Survey locations including GPS coordinates of any plots, transects, grids	

BDAR Section	BAM Ref.	BAM Requirement	Reference(s) in the BDAR
		☒ Digital shape files of each species polygon including GPS coordinates of located individuals	–
		☒ Species polygon map in jpeg format	–
		☒ Expert reports and any supporting data used to support conclusions of the expert report	-
		☒ Field datasheets detailing survey information including prevailing conditions, date, time, equipment used, etc.	Field data captured digitally
Prescribed impacts	**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) ☒ waterbodies or any hydrological processes that sustain threatened entities (as described in BAM Subsection 6.1.4)	Table 6.1
		☐ 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)	Not applicable
		☒ 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)	Table 6.1
		☒ Identify a list of threatened entities that may be dependent upon or may use habitat features associated with any of the prescribed impacts	Table 6.1
		☒ 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)	Table 6.1
		Where the proposed development is for a wind farm:	–

BDAR Section	BAM Ref.	BAM Requirement	Reference(s) in the BDAR
		☐ identify a candidate list of protected animals that may use the development site as a flyway or migration route, including: resident threatened aerial species, resident raptor species and nomadic and migratory species that are likely to fly over the proposal area (as described in BAM Subsection 6.1.5)	Not applicable
		☐ provide details of targeted survey for candidate species of wind farm developments undertaken in accordance with BAM Subsection 6.1.5(2–3.)	Not applicable
		☐ predict the habitual flight paths for nomadic and migratory species likely to fly over the subject land and map the likely habitat for resident threatened aerial and raptor species (BAM Subsection 6.1.5(4.))	Not applicable
		Where the proposal may result in vehicle strike:	–
		☒ identify a list of threatened fauna or protected fauna species that are part of a TEC and at risk of vehicle strike due to the proposal	Table 6.1
		Maps and tables	
		☒ Map showing location of any prescribed impact features (i.e. karst, caves, crevices, cliffs, rocks, human-made structures, etc.)	Figure 6.1
		☒ Map showing location of potential vehicle strike locations	
		☐ 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)	Not applicable
		Data	
		☒ Digital shape files of prescribed impact feature locations	–
		☒ Prescribed impact features map in jpeg format	–
Avoid and minimise impacts	**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	Section 7.1

BDAR Section	BAM Ref.	BAM Requirement	Reference(s) in the BDAR
		☒ routes that would avoid or minimise impacts on biodiversity values and justification for selecting the proposed route	Section 7.1
		☒ alternative locations that would avoid or minimise impacts on biodiversity values and justification for selecting the proposed location	Section 7.1
		☒ 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	Section 7.1
		☒ 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)	Section 7.1 and Section 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 Subsection 7.2.1(3.))	Section 7.1
		☒ Detail measures or options considered but not implemented because they are not feasible and/or practical (e.g. due to site constraints)	Section 7.3
		Maps and tables	
		☒ Table of measures to be implemented to avoid and minimise the impacts of the proposal, including action, outcome, timing and responsibility	Table 7.1
		☒ Map of alternative footprints considered to avoid or minimise impacts on biodiversity values; and of the final proposal footprint, including construction and operation	Figure 7.1
		☒ Maps demonstrating indirect impact zones where applicable	Not applicable
		Data	
		Digital shape files of:	–
		☒ alternative and final proposal footprint	–
		☒ direct and indirect impact zones	–
		☒ Maps in jpeg format	–

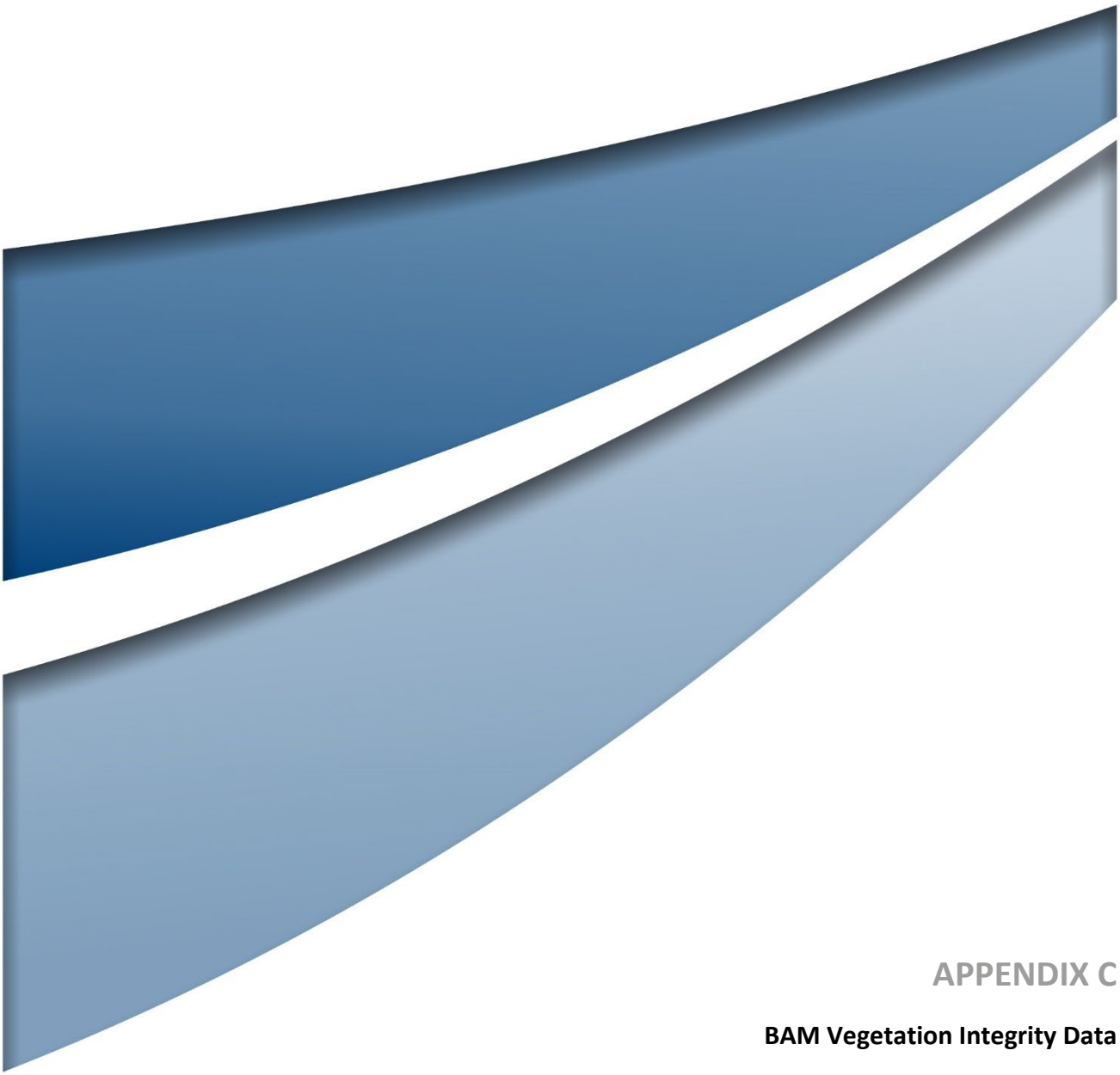
BDAR Section	BAM Ref.	BAM Requirement	Reference(s) in the BDAR
Assessment of impacts	**Chapter 8, Sections 8.1 and 8.2**	**Information**	
		☒ Determine the impacts on native vegetation and threatened species habitat, including a description of direct impacts of clearing of native vegetation, threatened ecological communities and threatened species habitat (as described in BAM Section 8.1)	Section 8.1
		Assessment of indirect impacts on vegetation and threatened species and their habitat including (as described in BAM Section 8.2):	–
		☒ description of the nature, extent, frequency, duration and timing of indirect impacts of the proposal	Section 8.2, Table 8.3
		☒ documenting the consequences to vegetation and threatened species and their habitat including evidence-based justifications	Section 8.2, Table 8.3
		☒ reporting any limitations or assumptions, etc. made during the assessment	Section 8.2, Table 8.3
		☒ identification of the threatened entities and their habitat likely to be affected	Section 8.2, Table 8.3
		Assessment of prescribed biodiversity impacts (as described in BAM Section 8.3) including:	–
		assessment of the nature, extent frequency, duration and timing of impacts on the habitat of threatened species or ecological communities associated with:	–
		☒ karst, caves, crevices, cliffs, rocks and other features of geological significance	Section 8.3
		☒ human-made structures	Section 8.3
		☒ non-native vegetation	Section 8.3
		☒ connectivity of different areas of habitat of threatened species that facilitates the movement of those species across their range	Section 8.3
		☒ movement of threatened species that maintains their life cycle	Section 8.3
		☒ water quality, waterbodies and hydrological processes that sustain threatened species and threatened ecological communities	Section 8.3
		☐ assessment of the impacts of wind turbine strikes on protected animals	Not applicable

BDAR Section	BAM Ref.	BAM Requirement	Reference(s) in the BDAR
		☒ assessment of the impacts of vehicle strikes on threatened species of animals or on animals that are part of a TEC	Section 8.3
		☒ evaluate the consequences of prescribed impacts	Section 8.3
		☒ describe impacts that are uncertain	Section 8.6
		☒ document limitations to data, assumptions and predictions	Section 8.3
		Maps and tables	
		☒ Table showing change in vegetation integrity score for each vegetation zone as a result of identified impacts	Table 10.2
		Data	
		N/A	–
Mitigation and management of impacts	**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	Table 8.8, Table 8.7
		☒ document any adaptive management strategy proposed	Table 8.7
		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)	Section 8.5
		☒ Details of the adaptive management strategy proposed to monitor and respond to impacts on biodiversity values that are uncertain (BAM Section 8.5)	Table 8.7

BDAR Section	BAM Ref.	BAM Requirement	Reference(s) in the BDAR
		Maps and tables	
		☒ Table of measures to be implemented before, during and after construction to mitigate and manage impacts of the proposal, including action, outcome, timing and responsibility	Table 8.4
		Data	
		N/A	–
Impact summary	**Chapter 9**	**Information**	
		Identification and assessment of impacts on TECs and threatened species that are at risk of a 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	Section 9.1
		☒ for each TEC, report the extent of the TEC in NSW	Section 9.1
		☒ addressing all criteria in Subsection 9.1.2 for each threatened species at risk of an SAII present on the subject land	Section 9.1
		☐ for each threatened species, report the population size in NSW	Not applicable
		☒ 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	Section 9.1
		☒ Identification of impacts requiring offset in accordance with BAM Section 9.2	Section 10.1 and Table 10.2, Section 10.3
		☒ Identification of impacts not requiring offset in accordance with BAM Subsection 9.2.1(3.)	Section 10.2
		☒ Identification of areas not requiring assessment in accordance with BAM Section 9.3	Section 10.2
		Maps and tables	
		☒ Map showing the extent of TECs at risk of an SAII within the subject land	Figure 9.1
		☒ Map showing location of threatened species at risk of an SAII within the subject land	Figure 9.1

BDAR Section	BAM Ref.	BAM Requirement	Reference(s) in the BDAR
		Map showing location of:	–
		☒ impacts requiring offset	Figure 10.1
		☒ impacts not requiring offset	Figure 10.1
		☒ areas not requiring assessment	Figure 10.1
		Data	
		Digital shape files of:	–
		☒ extent of TECs at risk of an SAII within the subject land	-
		☒ location of threatened species at risk of an SAII within the subject land	-
		☒ boundary of impacts requiring offset	–
		☒ boundary of impacts not requiring offset	-
		☒ boundary of areas not requiring assessment	-
		☒ Maps in jpeg format	–
Impact summary	**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 10.1.2)	Table 10.2
		☒ biodiversity risk weighting for each	Table 10.2, Table 10.3
		☒ number of required species credits for each candidate threatened species that is directly impacted on by the proposal (BAM Subsection 10.1.3)	Table 10.3

BDAR Section	BAM Ref.	BAM Requirement	Reference(s) in the BDAR
		Maps and tables	
		☒ Table of PCTs requiring offset and the number of ecosystem credits required	Table 10.2
		☒ Table of threatened species requiring offset and the number of species credits required	Table 10.3
		Data	
		☒ Submitted proposal in the BAM Calculator	–
Biodiversity credit report	**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)	Table 11.1, Table 11.2
		☒ BAM credit report in pdf format	Appendix D
		Maps and tables	
		☒ Table of credit class and matching credit profile	Table 11.1
		Data	
		☒ BAM credit report in pdf format	Appendix D



APPENDIX C

BAM Vegetation Integrity Data

Appendix C – BAM Plot Data

Table C.1 Flora Species List

Scientific Name	Exotic	Common Name	Family	High Threat Weed	BAM Growth Form Group
Acacia baileyana		Cootamundra Wattle	Fabaceae (Mimosoideae)		Shrub (SG)
Acacia binervia		Coast Myall	Fabaceae (Mimosoideae)		Tree (TG)
Acacia dealbata		Silver Wattle	Fabaceae (Mimosoideae)		Tree (TG)
Acacia decurrens		Black Wattle	Fabaceae (Mimosoideae)		Tree (TG)
Acacia implexa		Hickory Wattle	Fabaceae (Mimosoideae)		Shrub (SG)
Acacia mearnsii		Black Wattle	Fabaceae (Mimosoideae)		Shrub (SG)
Acacia myrtifolia		Red-stemmed Wattle	Fabaceae (Mimosoideae)		Shrub (SG)
Acacia parramattensis		Parramatta Wattle	Fabaceae (Mimosoideae)		Tree (TG)
Acacia pravissima		Wedge-leaved Wattle	Fabaceae (Mimosoideae)		Shrub (SG)
Acacia spp.		Wattle	Fabaceae (Mimosoideae)		Shrub (SG)
Acacia terminalis		Sunshine Wattle	Fabaceae (Mimosoideae)		Shrub (SG)
Acaena echinata		Sheep's Burr	Rosaceae		Forb (FG)
Acaena spp.		Sheep's Burr	Rosaceae		Forb (FG)
Acetosella vulgaris	*	Sheep Sorrel	Polygonaceae	HTW - not manageable	
Acrotriche serrulata		Honeypots	Ericaceae		Shrub (SG)
Aira caryophyllea	*	Silvery Hairgrass	Poaceae		
Aira cupaniana	*	Silvery Hairgrass	Poaceae		
Allocasuarina littoralis		Black She-Oak	Casuarinaceae		Tree (TG)
Allocasuarina spp.			Casuarinaceae		Tree (TG)
Alternanthera denticulata		Lesser Joyweed	Amaranthaceae		Forb (FG)
Arctotheca calendula	*	Capeweed	Asteraceae		
Aristida benthamii		Three-awned spear grass	Poaceae		Grass & grasslike (GG)

Scientific Name	Exotic	Common Name	Family	High Threat Weed	BAM Growth Form Group
Aristida ramosa		Purple Wiregrass	Poaceae		Grass & grasslike (GG)
Aristida vagans		Threeawn Speargrass	Poaceae		Grass & grasslike (GG)
Aristida warburgii			Poaceae		Grass & grasslike (GG)
Asperula conferta		Common Woodruff	Rubiaceae		Forb (FG)
Asphodelus fistulosus	*	Onion Weed	Asphodelaceae		
Aster subulatus	*	Wild Aster	Asteraceae		
Astroloma humifusum		Native Cranberry	Ericaceae		Shrub (SG)
Astroloma pinifolium		Pine Heath	Ericaceae		Shrub (SG)
Austrostipa densiflora		Foxtail Speargrass	Poaceae		Grass & grasslike (GG)
Austrostipa pubescens			Poaceae		Grass & grasslike (GG)
Austrostipa ramosissima		Stout Bamboo Grass	Poaceae		Grass & grasslike (GG)
Austrostipa scabra		Speargrass	Poaceae		Grass & grasslike (GG)
Austrostipa spp.			Poaceae		Grass & grasslike (GG)
Avena barbata	*	Bearded Oats	Poaceae		
Billardiera scandens		Hairy Apple Berry	Pittosporaceae		Other (OG)
Bossiaea buxifolia			Fabaceae (Faboideae)		Shrub (SG)
Bothriochloa macra		Red Grass	Poaceae		Grass & grasslike (GG)
Brachyloma daphnoides		Daphne Heath	Ericaceae		Shrub (SG)
Brassica napus	*	Canola	Brassicaceae		
Brassica spp.	*	Brassica	Brassicaceae		
Brassicaceae indeterminate	*	Mustards	Brassicaceae		
Briza minor	*	Shivery Grass	Poaceae		

Scientific Name	Exotic	Common Name	Family	High Threat Weed	BAM Growth Form Group
Bromus brevis	*		Poaceae		
Bromus catharticus	*	Praire Grass	Poaceae		
Bromus hordeaceus	*	Soft Brome	Poaceae		
Brunoniella australis		Blue Trumpet	Acanthaceae		Forb (FG)
Bulbine bulbosa		Bulbine Lily	Asphodelaceae		Forb (FG)
Callistemon spp.			Myrtaceae		Shrub (SG)
Calochilus robertsonii		Purplish Beard Orchid	Orchidaceae		Forb (FG)
Calotis cuneata		Mountain Burr-Daisy	Asteraceae		Forb (FG)
Carex appressa		Tall Sedge	Cyperaceae		Grass & grasslike (GG)
Carex gaudichaudiana			Cyperaceae		Grass & grasslike (GG)
Carex inversa		Knob Sedge	Cyperaceae		Grass & grasslike (GG)
Carex spp.			Cyperaceae		Grass & grasslike (GG)
Carthamus lanatus	*	Saffron Thistle	Asteraceae	HTW - not manageable	
Cassinia aculeata		Dolly Bush	Asteraceae		Shrub (SG)
Casuarina cunninghamiana		River Oak	Casuarinaceae		Tree (TG)
Centrolepis spp.			Centrolepidaceae		Grass & grasslike (GG)
Cerastium glomeratum	*	Mouse-ear Chickweed	Caryophyllaceae		
Cheilanthes sieberi		Rock Fern	Pteridaceae		Fern (EG)
Chrysocephalum apiculatum		Common Everlasting	Asteraceae		Forb (FG)
Cirsium vulgare	*	Spear Thistle	Asteraceae		
Convolvulus erubescens		Pink Bindweed	Convolvulaceae		Other (OG)
Conyza bonariensis	*	Flaxleaf Fleabane	Asteraceae		
Conyza sumatrensis	*	Tall fleabane	Asteraceae		
Cotula australis		Common Cotula	Asteraceae		Forb (FG)
Crassula ericoides	*		Crassulaceae		

Scientific Name	Exotic	Common Name	Family	High Threat Weed	BAM Growth Form Group
Crassula helmsii		Swamp Stonecrop	Crassulaceae		Forb (FG)
Crassula sieberiana		Australian Stonecrop	Crassulaceae		Forb (FG)
Crassula spathulata	*		Crassulaceae		
Crataegus monogyna	*	Hawthorn	Malaceae	HTW - manageable	
Cyclospermum leptophyllum	*	Slender Celery	Apiaceae		
Cymbonotus preissianus		Austral Bear's Ear	Asteraceae		Forb (FG)
Cynodon dactylon		Common Couch	Poaceae		Grass & grasslike (GG)
Cyperus eragrostis	*	Umbrella Sedge	Cyperaceae	HTW - not manageable	
Cyperus gracilis		Slender Flat-sedge	Cyperaceae		Grass & grasslike (GG)
Cyperus imbecillis			Cyperaceae		Grass & grasslike (GG)
Cyperus polystachyos			Cyperaceae		Grass & grasslike (GG)
Cyperus spp.			Cyperaceae		Grass & grasslike (GG)
Dactylis glomerata	*	Cocksfoot	Poaceae		
Dichanthium setosum		Bluegrass	Poaceae		Grass & grasslike (GG)
Dichelachne micrantha		Shorthair Plumegrass	Poaceae		Grass & grasslike (GG)
Dichondra repens		Kidney Weed	Convolvulaceae		Forb (FG)
Digitaria diffusa		Open Summer-grass	Poaceae		Grass & grasslike (GG)
Digitaria spp.			Poaceae		Grass & grasslike (GG)
Diuris dendrobioides			Orchidaceae		Forb (FG)
Diuris sulphurea		Tiger Orchid	Orchidaceae		Forb (FG)
Dodonaea viscosa		Sticky Hop-bush	Sapindaceae		Shrub (SG)

Scientific Name	Exotic	Common Name	Family	High Threat Weed	BAM Growth Form Group
Drosera auriculata			Droseraceae		Forb (FG)
Drosera peltata			Droseraceae		Forb (FG)
Echinopogon caespitosus		Bushy Hedgehog-grass	Poaceae		Grass & grasslike (GG)
Echinopogon ovatus		Forest Hedgehog Grass	Poaceae		Grass & grasslike (GG)
Einadia nutans		Climbing Saltbush	Chenopodiaceae		Forb (FG)
Einadia nutans subsp. nutans		Climbing Saltbush	Chenopodiaceae		Forb (FG)
Einadia trigonos		Fishweed	Chenopodiaceae		Forb (FG)
Entolasia stricta		Wiry Panic	Poaceae		Grass & grasslike (GG)
Eragrostis brownii		Brown's Lovegrass	Poaceae		Grass & grasslike (GG)
Eragrostis cilianensis	*	Stinkgrass	Poaceae		
Eragrostis curvula	*	African Lovegrass	Poaceae	HTW - not manageable	
Eragrostis lacunaria		Purple Lovegrass	Poaceae		Grass & grasslike (GG)
Eragrostis leptostachya		Paddock Lovegrass	Poaceae		Grass & grasslike (GG)
Eragrostis spp.			Poaceae		Grass & grasslike (GG)
Eriochloa pseudoacrotricha		Early Spring Grass	Poaceae		Grass & grasslike (GG)
Erodium cicutarium	*	Common Crowfoot	Geraniaceae		
Erodium crinitum		Blue Crowfoot	Geraniaceae		Forb (FG)
Eucalyptus agglomerata		Blue-leaved Stringybark	Myrtaceae		Tree (TG)
Eucalyptus amplifolia		Cabbage Gum	Myrtaceae		Tree (TG)
Eucalyptus blakelyi		Blakely's Red Gum	Myrtaceae		Tree (TG)
Eucalyptus caliginosa		Broad-leaved Stringybark	Myrtaceae		Tree (TG)
Eucalyptus cinerea		Argyle Apple	Myrtaceae		Tree (TG)

Scientific Name	Exotic	Common Name	Family	High Threat Weed	BAM Growth Form Group
Eucalyptus dives		Broad-leaved Peppermint	Myrtaceae		Tree (TG)
Eucalyptus eugenioides		Thin-leaved Stringybark	Myrtaceae		Tree (TG)
Eucalyptus globoidea		White Stringybark	Myrtaceae		Tree (TG)
Eucalyptus macrorhyncha		Red Stringybark	Myrtaceae		Tree (TG)
Eucalyptus mannifera		Brittle Gum	Myrtaceae		Tree (TG)
Eucalyptus melliodora		Yellow Box	Myrtaceae		Tree (TG)
Eucalyptus radiata		Narrow-leaved Peppermint	Myrtaceae		Tree (TG)
Eucalyptus rossii		Inland Scribbly Gum	Myrtaceae		Tree (TG)
Eucalyptus stellulata		Black Sally	Myrtaceae		Tree (TG)
Eucalyptus viminalis		Ribbon Gum	Myrtaceae		Tree (TG)
Euchiton involucratus		Star Cudweed	Asteraceae		Forb (FG)
Euchiton japonicus			Asteraceae		Forb (FG)
Euchiton sphaericus		Star Cudweed	Asteraceae		Forb (FG)
Euphorbia spp.			Euphorbiaceae		Forb (FG)
Euphorbiaceae indeterminate	*	Spurges	Euphorbiaceae		
Fimbristylis dichotoma		Common Fringe-sedge	Cyperaceae		Grass & grasslike (GG)
Fumaria indica	*		Fumariaceae		
Galium aparine	*	Goosegrass	Rubiaceae		
Galium gaudichaudii		Rough Bedstraw	Rubiaceae		Forb (FG)
Gamochaeta americana	*	Purple Cudweed	Asteraceae		
Gamochaeta calviceps	*	Cudweed	Asteraceae		
Gamochaeta spp.	*		Asteraceae		
Geranium homeanum			Geraniaceae		Forb (FG)
Geranium retrorsum		Cranesbill Geranium	Geraniaceae		Forb (FG)
Geranium solanderi		Native Geranium	Geraniaceae		Forb (FG)
Geranium spp.			Geraniaceae		Forb (FG)
Glycine clandestina		Twining glycine	Fabaceae (Faboideae)		Other (OG)
Glycine clandestina (broad leaf form)		Scott's Head Broad-Leaved Glycine	Fabaceae (Faboideae)		Other (OG)

Scientific Name	Exotic	Common Name	Family	High Threat Weed	BAM Growth Form Group
Glycine tabacina		Variable Glycine	Fabaceae (Faboideae)		Other (OG)
Gnaphalium indutum		Tiny Cudweed	Asteraceae		Forb (FG)
Gonocarpus humilis			Haloragaceae		Forb (FG)
Gonocarpus tetragynus		Poverty Raspwort	Haloragaceae		Forb (FG)
Gonocarpus teucrioides		Germander Raspwort	Haloragaceae		Forb (FG)
Goodenia bellidifolia			Goodeniaceae		Forb (FG)
Goodenia hederacea		Ivy Goodenia	Goodeniaceae		Forb (FG)
Goodenia heterophylla			Goodeniaceae		Forb (FG)
Goodenia paniculata			Goodeniaceae		Forb (FG)
Haloragis heterophylla		Variable Raspwort	Haloragaceae		Forb (FG)
Hardenbergia violacea		False Sarsaparilla	Fabaceae (Faboideae)		Other (OG)
Hibbertia aspera		Rough Guinea Flower	Dilleniaceae		Shrub (SG)
Hibbertia obtusifolia		Hoary Guinea Flower	Dilleniaceae		Shrub (SG)
Holcus lanatus	*	Yorkshire Fog	Poaceae		
Hordeum vulgare	*	Barley	Poaceae		
Hovea linearis			Fabaceae (Faboideae)		Forb (FG)
Hydrocotyle laxiflora		Stinking Pennywort	Apiaceae		Forb (FG)
Hypericum gramineum		Small St John's Wort	Clusiaceae		Forb (FG)
Hypericum japonicum			Clusiaceae		Forb (FG)
Hypericum perforatum	*	St. Johns Wort	Clusiaceae	HTW - not manageable	
Hypochaeris radicata	*	Catsear	Asteraceae		
Hypoxis hygrometrica		Golden Weather-grass	Hypoxidaceae		Forb (FG)
Indigofera australis		Australian Indigo	Fabaceae (Faboideae)		Shrub (SG)
Isolepis spp.		Club-rush	Cyperaceae		Grass & grasslike (GG)
Juncus acutus	*	Sharp Rush	Juncaceae	HTW - not manageable	
Juncus acutus subsp. acutus	*	Sharp Rush	Juncaceae	HTW - not manageable	

Scientific Name	Exotic	Common Name	Family	High Threat Weed	BAM Growth Form Group
Juncus continuus			Juncaceae		Grass & grasslike (GG)
Juncus filicaulis			Juncaceae		Grass & grasslike (GG)
Juncus kraussii		Sea Rush	Juncaceae		Grass & grasslike (GG)
Juncus spp.			Juncaceae		Grass & grasslike (GG)
Juncus subsecundus		Finger Rush	Juncaceae		Grass & grasslike (GG)
Juncus usitatus			Juncaceae		Grass & grasslike (GG)
Lachnagrostis filiformis			Poaceae		Grass & grasslike (GG)
Laxmannia gracilis		Slender Wire Lily	Anthericaceae		Forb (FG)
Lepidium africanum	*	Common Peppercress	Brassicaceae		
Leptospermum trinervium		Slender Tea-tree	Myrtaceae		Shrub (SG)
Leucopogon appressus			Ericaceae		Shrub (SG)
Linaria pelisseriana	*	Pelisser's Toadflax	Plantaginaceae		
Lolium perenne	*	Perennial Ryegrass	Poaceae		
Lolium rigidum	*	Wimmera Ryegrass	Poaceae		
Lomandra filiformis		Wattle Matt-rush	Lomandraceae		Grass & grasslike (GG)
Lomandra filiformis subsp. filiformis			Lomandraceae		Grass & grasslike (GG)
Lomandra glauca		Pale Mat-rush	Lomandraceae		Grass & grasslike (GG)
Lomandra multiflora		Many-flowered Mat-rush	Lomandraceae		Grass & grasslike (GG)
Lomandra multiflora subsp. multiflora		Many-flowered Mat-rush	Lomandraceae		Grass & grasslike (GG)

Scientific Name	Exotic	Common Name	Family	High Threat Weed	BAM Growth Form Group
Lomandra obliqua			Lomandraceae		Grass & grasslike (GG)
Luzula densiflora		Woodrush	Juncaceae		Grass & grasslike (GG)
Luzula flaccida		Woodrush	Juncaceae		Grass & grasslike (GG)
Lysimachia arvensis	*	Scarlet Pimpernel	Primulaceae		
Malva parviflora	*	Small-flowered Mallow	Malvaceae		
Marrubium vulgare	*	White Horehound	Lamiaceae		
Medicago polymorpha	*	Burr Medic	Fabaceae (Faboideae)		
Melaleuca armillaris		Bracelet Honey-myrtle	Myrtaceae		Shrub (SG)
Melaleuca ericifolia		Swamp Paperbark	Myrtaceae		Shrub (SG)
Melichrus procumbens		Jam Tarts	Ericaceae		Shrub (SG)
Melichrus urceolatus		Urn Heath	Ericaceae		Shrub (SG)
Microlaena stipoides		Weeping Grass	Poaceae		Grass & grasslike (GG)
Microlaena stipoides var. breviseta			Poaceae		Grass & grasslike (GG)
Modiola caroliniana	*	Red-flowered Mallow	Malvaceae		
Myoporum spp.		Boobialla	Scrophulariaceae		Shrub (SG)
Nassella neesiana	*	Chilean Needle Grass	Poaceae	HTW - not manageable	
Nassella trichotoma	*	Serrated Tussock	Poaceae	HTW - not manageable	
Nothoscordum borbonicum	*	Onion Weed	Alliaceae		
Olearia viscidula		Wallaby Weed	Asteraceae		Shrub (SG)
Opercularia aspera		Coarse Stinkweed	Rubiaceae		Forb (FG)
Opercularia diphylla		Stinkweed	Rubiaceae		Forb (FG)
Oxalis chnoodes			Oxalidaceae		Forb (FG)
Oxalis corniculata	*	Creeping Oxalis	Oxalidaceae		
Oxalis exilis			Oxalidaceae		Forb (FG)

Scientific Name	Exotic	Common Name	Family	High Threat Weed	BAM Growth Form Group
Oxalis perennans			Oxalidaceae		Forb (FG)
Ozothamnus diosmifolius		White Dogwood	Asteraceae		Shrub (SG)
Panicum effusum		Hairy Panic	Poaceae		Grass & grasslike (GG)
Panicum simile		Two-colour Panic	Poaceae		Grass & grasslike (GG)
Paspalidium distans			Poaceae		Grass & grasslike (GG)
Paspalum dilatatum	*	Paspalum	Poaceae	HTW - not manageable	
Persicaria decipiens		Slender Knotweed	Polygonaceae		Forb (FG)
Petrorhagia dubia	*		Caryophyllaceae		
Petrorhagia nanteuilii	*	Proliferous Pink	Caryophyllaceae		
Phalaris canariensis	*	Canary Grass	Poaceae		
Phytolacca octandra	*	Inkweed	Phytolaccaceae		
Pimelea curviflora		Rice Flower	Thymelaeaceae		Shrub (SG)
Pimelea linifolia		Slender Rice Flower	Thymelaeaceae		Shrub (SG)
Plantago lanceolata	*	Lamb's Tongues	Plantaginaceae		
Poa affinis			Poaceae		Grass & grasslike (GG)
Poa annua	*	Winter Grass	Poaceae		
Poa labillardierei		Tussock	Poaceae		Grass & grasslike (GG)
Poa sieberiana		Snowgrass	Poaceae		Grass & grasslike (GG)
Poa sieberiana var. cyanophylla			Poaceae		Grass & grasslike (GG)
Poa spp.			Poaceae		Grass & grasslike (GG)
Poaceae indeterminate	*	Grasses, reeds and bamboos	Poaceae		
Podolepis muelleri		Small Copper-wire Daisy	Asteraceae		Forb (FG)

Scientific Name	Exotic	Common Name	Family	High Threat Weed	BAM Growth Form Group
Pomax umbellata		Pomax	Rubiaceae		Forb (FG)
Poranthera microphylla		Small Poranthera	Phyllanthaceae		Forb (FG)
Portulaca oleracea		Pigweed	Portulacaceae		Forb (FG)
Pseudognaphalium luteoalbum		Jersey Cudweed	Asteraceae		Forb (FG)
Pteridium esculentum		Bracken	Dennstaedtiaceae		Fern (EG)
Romulea minutiflora	*	Small-flowered Onion Grass	Iridaceae		
Romulea rosea	*	Onion Grass	Iridaceae	HTW - not manageable	
Rosa rubiginosa	*	Sweet Briar	Rosaceae	HTW - not manageable	
Rubus fruticosus	*	Blackberry complex	Rosaceae	HTW - not manageable	
Rubus fruticosus sp. agg.	*	Blackberry complex	Rosaceae	HTW - not manageable	
Rumex brownii		Swamp Dock	Polygonaceae		Forb (FG)
Rytidosperma bipartitum		Wallaby Grass	Poaceae		Grass & grasslike (GG)
Rytidosperma longifolium		Long-leaved Wallaby Grass	Poaceae		Grass & grasslike (GG)
Rytidosperma pallidum		Redanther Wallaby Grass; Silvertop Wallaby Grass	Poaceae		Grass & grasslike (GG)
Rytidosperma racemosum		Wallaby Grass	Poaceae		Grass & grasslike (GG)
Rytidosperma spp.			Poaceae		Grass & grasslike (GG)
Schoenus apogon		Fluke Bogrush	Cyperaceae		Grass & grasslike (GG)
Schoenus spp.			Cyperaceae		Grass & grasslike (GG)
Senecio linearifolius		Fireweed Groundsel	Asteraceae		Forb (FG)
Senecio madagascariensis	*	Fireweed	Asteraceae	HTW - not manageable	
Senecio spp.		Groundsel, Fireweed	Asteraceae		Forb (FG)

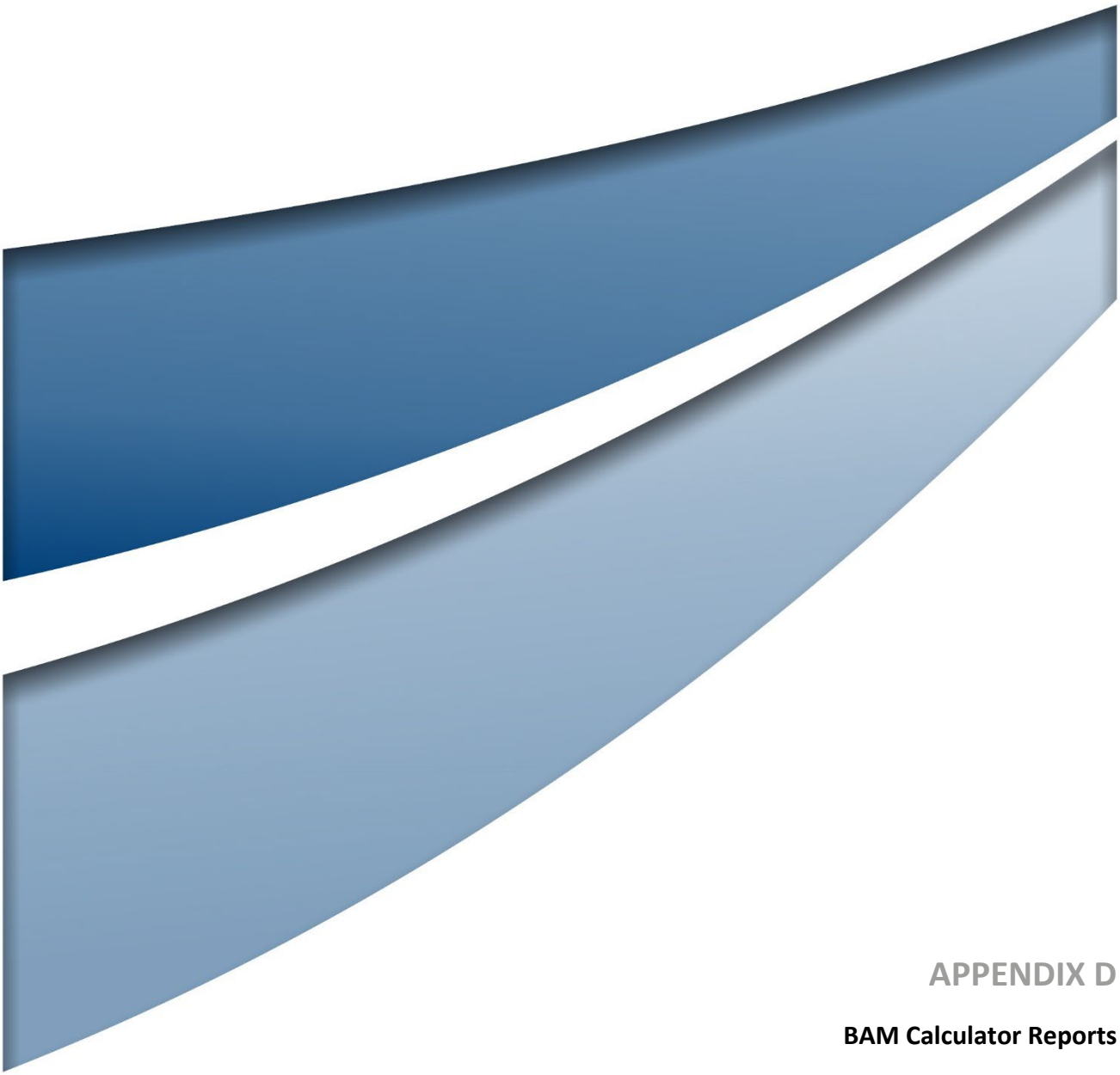
Scientific Name	Exotic	Common Name	Family	High Threat Weed	BAM Growth Form Group
Setaria parviflora	*		Poaceae		
Setaria sphacelata	*	South African Pigeon Grass	Poaceae		
Silybum marianum	*	Variegated Thistle	Asteraceae		
Solanum chenopodioides	*	Whitetip Nightshade	Solanaceae		
Solanum linearifolium		Mountain Kangaroo Apple	Solanaceae		Shrub (SG)
Solanum nigrum	*	Black-berry Nightshade	Solanaceae		
Solanum sisymbriifolium	*		Solanaceae		
Solanum spp.			Solanaceae		Forb (FG)
Soliva sessilis	*	Bindyi	Asteraceae		
Sonchus asper	*	Prickly Sowthistle	Asteraceae		
Sonchus oleraceus	*	Common Sowthistle	Asteraceae		
Sporobolus caroli		Fairy Grass	Poaceae		Grass & grasslike (GG)
Sporobolus creber		Slender Rat's Tail Grass	Poaceae		Grass & grasslike (GG)
Sporobolus indicus	*	Parramatta Grass	Poaceae		
Sporobolus spp.		Rat's Tail Couch	Poaceae		Grass & grasslike (GG)
Stellaria media	*	Common Chickweed	Caryophyllaceae		
Stellaria spp.		Prickly Starwort	Caryophyllaceae		Forb (FG)
Stypandra glauca		Nodding Blue Lily	Phormiaceae		Forb (FG)
Taraxacum officinale	*	Dandelion	Asteraceae		
Thelymitra pauciflora		Slender Sun Orchid	Orchidaceae		Forb (FG)
Thelymitra spp.			Orchidaceae		Forb (FG)
Themeda australis			Poaceae		Grass & grasslike (GG)
Themeda triandra			Poaceae		Grass & grasslike (GG)
Tricoryne elatior		Yellow Autumn-lily	Anthericaceae		Forb (FG)
Trifolium angustifolium	*	Narrow-leaved Clover	Fabaceae (Faboideae)		

Scientific Name	Exotic	Common Name	Family	High Threat Weed	BAM Growth Form Group
Trifolium arvense	*	Haresfoot Clover	Fabaceae (Faboideae)		
Trifolium campestre	*	Hop Clover	Fabaceae (Faboideae)		
Trifolium repens	*	White Clover	Fabaceae (Faboideae)		
Tripogon loliiformis		Fiveminute Grass	Poaceae		Grass & grasslike (GG)
Urtica incisa		Stinging Nettle	Urticaceae		Forb (FG)
Verbascum thapsus subsp. thapsus	*	Great Mullein	Scrophulariaceae		
Verbascum virgatum	*	Twiggy Mullein	Scrophulariaceae		
Verbena bonariensis	*	Purpletop	Verbenaceae		
Veronica plebeia		Trailing Speedwell	Plantaginaceae		Forb (FG)
Vittadinia cuneata			Asteraceae		Forb (FG)
Vulpia bromoides	*	Squirrel Tail Fesque	Poaceae		
Vulpia ciliata	*		Poaceae		
Vulpia fasciculata	*		Poaceae		
Vulpia muralis	*	Wall Fescue	Poaceae		
Wahlenbergia ceracea		Waxy Bluebell	Campanulaceae		Forb (FG)
Wahlenbergia communis		Tufted Bluebell	Campanulaceae		Forb (FG)
Wahlenbergia gracilis		Sprawling Bluebell	Campanulaceae		Forb (FG)
Wahlenbergia multicaulis		Tadgell's Bluebell	Campanulaceae		Forb (FG)
Wahlenbergia spp.		Bluebell	Campanulaceae		Forb (FG)
Wahlenbergia stricta		Tall Bluebell	Campanulaceae		Forb (FG)
Xerochrysum bracteatum		Golden Everlasting	Asteraceae		Forb (FG)
Xylomelum pyriforme		Woody Pear	Proteaceae		Shrub (SG)

Table C.2 Vegetation Integrity Plot Data

Plot	PCT	Patch Size	Condition Class	Zone	Easting	Northing	Bearing	Composition (Species Richness)						Structure (Percentage Cover)						Function										
								Tree	Shrub	Grass	Forbs	Ferns	Other	Tree	Shrub	Grass	Forbs	Ferns	Other	Large Trees	Hollow Trees	Litter Cover (%)	Length Fallen Logs (m)	Tree Stems (cm)					Tree Regen	High Threat Exotics
																								5 to 9	10 to 19	20 to 29	30 to 49	50 to 79		
35	3374	101	DNG_Mod_ Degraded	56	228645	6166111	265	0	1	7	4	0	1	0	0.2	16.3	0.9	0	0.1	0	0	11.9	4	0	0	0	0	0	0	5.2
40	3374	101	DNG_Mod_ Degraded	56	227859	6167149	267.44	0	1	8	4	0	0	0	0.1	5.9	2.4	0	0	0	0	23.8	0	0	0	0	0	0	0	1
26	3374	101	DNG_Mod_ Degraded	56	227838	6168072	16.45	0	2	5	2	0	0	0	0.4	65.2	0.3	0	0	0	0	16.4	0	0	0	0	0	0	25	17.3
32	3374	101	DNG_Mod_ Degraded	56	230382	6165759	263.25	0	0	3	3	1	0	0	0	92.1	0.3	0.1	0	0	0	42	2	0	0	0	0	0	0	1.7
33	3374	101	DNG_Mod_ Degraded	56	230602	6165835	253.76	0	0	2	2	0	0	0	0	65	0.2	0	0	0	0	1.8	0	0	0	0	0	0	0	24.1
55	3374	101	DNG_Mod_ Degraded	56	228105	6166212	265.65	0	6	5	4	1	0	0	5.4	40.7	4.2	0.1	0	0	0	1.6	0	0	0	0	0	0	0	10.5
60	3374	101	DNG_Mod_ Degraded	56	228218	6166621	322.4	0	3	8	4	1	0	0	0.4	76.2	3.6	0.2	0	0	0	3	6.3	0	0	0	0	0	0	3.3
24	3374	101	Good_Moderate	56	229984	6165796	68	3	3	9	11	0	1	20.1	7.1	45.3	16.2	0	0.1	4	5	23	78	15	10	8	6	4	60	3.1
29	3374	101	Good_Moderate	56	230026	6166252	313.04	5	1	5	7	0	0	32.2	0.3	15.1	1.7	0	0	1	3	80	63	7	8	14	17	1	23	25
36	3374	101	Moderate_ Degraded	56	228487	6166786	0	3	8	4	6	1	2	36	2.3	8.5	2.8	0.1	0.2	6	7	2	46	10	7	5	6	6	6	70.9
3	3374	101	Moderate_ Degraded	56	227368.2497	6170900.137	355	2	1	6	8	0	0	10	0.2	8.3	1.6	0	0	1	4	12.4	87	1	0	0	1	1	1	66.2
20	3374	101	Moderate_ Degraded	56	227776.6685	6168407.084	265	4	6	13	12	1	1	38.6	2.6	8.9	36.4	0.1	0.1	0	1	20	120	1	1	1	1	0	1	10
4	3374	101	DNG-Exotic	56	227415.7629	6171624.936	123	0	0	1	6	0	0	0	0	0.1	0.7	0	0	0	0	22	0	0	0	0	0	0	0	60
5	3374	101	DNG-Exotic	56	227745.3232	6172039.662	64	0	0	3	3	0	0	0	0	0.3	0.7	0	0	0	0	55	0	0	0	0	0	0	0	19.2
6	3374	101	DNG-Exotic	56	228524.332	6171838.696	64	0	0	0	3	0	0	0	0	0	0.5	0	0	0	0	30	0	0	0	0	0	0	0	0
7	3374	101	DNG-Exotic	56	228936.4432	6172577.968	31	0	0	0	5	0	0	0	0	0	0.9	0	0	0	0	0	0	0	0	0	0	0	0	13
9	3374	101	DNG-Exotic	56	230549.6922	6168925.704	80	0	0	2	1	0	0	0	0	0.4	0.1	0	0	0	0	30	0	0	0	0	0	0	0	25.3
13	3374	101	DNG-Exotic	56	227940.9785	6172500.176	170	0	0	0	0	0	0	0	0	0	0	0	0	0	0	13	0	0	0	0	0	0	0	5
14	3374	101	DNG-Exotic	56	229646.309	6174077.905	197	0	0	2	4	0	0	0	0	0.6	0.8	0	0	0	0	10	0	0	0	0	0	0	0	40.6
27	3374	101	DNG-Exotic	56	228095	6168400	98.01	0	0	3	0	1	0	0	0	2.3	0	0.1	0	0	0	3.4	4	0	0	0	0	0	0	79.1
53	3374	101	DNG-LowCondition	56	228150	6166988	95.72	0	1	3	3	1	0	0	0.1	11.1	0.3	0.1	0	0	0	3	5	0	0	0	0	0	0	51.7

Plot	PCT	Patch Size	Condition Class	Zone	Easting	Northing	Bearing	Composition (Species Richness)						Structure (Percentage Cover)						Function								
								Tree	Shrub	Grass	Forbs	Ferns	Other	Tree	Shrub	Grass	Forbs	Ferns	Other	Large Trees	Hollow Trees	Litter Cover (%)	Length Fallen Logs (m)	Tree Stems (cm)					Tree Regen	High Threat Exotics
																								5 to 9	10 to 19	20 to 29	30 to 49	50 to 79		
54	3374	101	DNG-LowCondition	56	228338	6166113	293.44	0	1	2	0	1	0	0	0.2	2	0	0.1	0	0	0	6.6	0	0	0	0	0	0	0	90.1
56	3374	101	DNG-LowCondition	56	228703	6167816	140.14	0	0	4	2	0	0	0	0	21.4	0.3	0	0	0	0	4	0	0	0	0	0	0	0	39.7
57	3374	101	DNG-LowCondition	56	228870	6167437	265.06	0	0	5	1	0	0	0	0	8	0.1	0	0	0	0	2.6	0	0	0	0	0	0	0	86.7
58	3374	101	DNG-LowCondition	56	228543	6167236	94.5	0	0	3	3	1	0	0	0	20	10.2	0.1	0	0	0	1.4	1.5	0	0	0	0	0	0	54
59	3374	101	DNG-LowCondition	56	228940	6165839	104.11	0	1	4	1	0	0	0	0.1	9.1	0.1	0	0	0	0	2.6	0	0	0	0	0	0	0	76.2
37	3376	101	DNG	56	226225	6171333	177.94	0	0	9	3	0	0	0	0	88.4	2.2	0	0	0	0	36	0	0	0	0	0	0	0	1.2
50	3376	101	Good_Moderate	56	230404	6165683	88.77	3	2	11	10	0	3	47	0.3	38.5	2.8	0	0.4	2	0	34	1	1	1	1	6	1	1	0.2
47	3376	101	Moderate_ Degraded	56	225796	6171443	81.14	3	0	6	4	0	0	25.3	0	21.7	1	0	0	1	0	10	2.3	1	0	1	2	1	1	27.5
42	4063	101	Moderate_ Degraded	56	229030	6167419	238.85	1	1	0	0	0	0	20	25	0	0	0	0	1	0	22	22.3	2	2	1	1	0	1	0
43	4063	101	Moderate_ Degraded	56	230439	6168287	7.5	2	1	4	5	0	0	25.2	0.2	42.4	10.7	0	0	3	2	13	3.8	0	0	0	0	1	1	28.2



APPENDIX D

BAM Calculator Reports

BAM Biodiversity Credit Report (Like for like)

Proposal Details

Assessment Id
00038889/BAAS19071/23/00038890

Proposal Name
Wattle Creek Solar Farm BESS

BAM data last updated *
28/10/2024

Assessor Name
Madeline Young

Assessor Number
BAAS19071

BAM Data version *
Current classification (live - default) (80)

Proponent Names

Report Created
17/03/2025

BAM Case Status
Finalised

Assessment Revision
6

Assessment Type
Major Projects

Date Finalised
17/03/2025

* 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
Nil		

Species
Nil

Additional Information for Approval

BAM Biodiversity Credit Report (Like for like)

PCT Outside Ibra Added

None added

PCTs With Customized Benchmarks

PCT
No Changes

Predicted Threatened Species Not On Site

Name
Calyptorhynchus lathami lathami / South-eastern Glossy Black-Cockatoo
Grantiella picta / Painted Honeyeater

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

Name of Plant Community Type/ID	Name of threatened ecological community	Area of impact	HBT Cr	No HBT Cr	Total credits to be retired
3374-Goulburn Tableland Peppermint Grassy Forest	Not a TEC	13.4	0	0	0

BAM Biodiversity Credit Report (Like for like)

3374-Goulburn Tableland Peppermint Grassy Forest

Like-for-like credit retirement options

Class	Trading group	Zone	HBT	Credits	IBRA region
Southern Tableland Grassy Woodlands This includes PCT's: 303, 312, 350, 654, 703, 705, 731, 1330, 3366, 3367, 3368, 3370, 3372, 3373, 3374, 3376, 3377	Southern Tableland Grassy Woodlands >=70% and <90%	3374_DNG-Exotic	No	0	Bungonia, Bateman, Burragorang, Crookwell, Ettrema, Kanangra, Kybeyan-Gourock, Monaro and South East Coastal Ranges. 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

BAM Biodiversity Credit Report (Variations)

Proposal Details

Assessment Id

00038889/BAAS19071/23/00038890

Proposal Name

Wattle Creek Solar Farm BESS

BAM data last updated *

28/10/2024

Assessor Name

Madeline Young

Assessor Number

BAAS19071

BAM Data version *

Current classification (live - default) (80)

Proponent Name(s)

Report Created

17/03/2025

BAM Case Status

Finalised

Assessment Revision

6

Assessment Type

Major Projects

Date Finalised

17/03/2025

* 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
Nil		
Species		
Nil		

Additional Information for Approval

PCT Outside Ibra Added

None added

BAM Biodiversity Credit Report (Variations)

PCTs With Customized Benchmarks

PCT
No Changes

Predicted Threatened Species Not On Site

Name
Calyptorhynchus lathami lathami / South-eastern Glossy Black-Cockatoo
Grantiella picta / Painted Honeyeater

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

Name of Plant Community Type/ID	Name of threatened ecological community	Area of impact	HBT Cr	No HBT Cr	Total credits to be retired
3374-Goulburn Tableland Peppermint Grassy Forest	Not a TEC	13.4	0	0	0.00

3374-Goulburn Tableland Peppermint Grassy Forest

Like-for-like credit retirement options

Class	Trading group	Zone	HBT	Credits	IBRA region
Southern Tableland Grassy Woodlands This includes PCT's: 303, 312, 350, 654, 703, 705, 731, 1330, 3366, 3367, 3368, 3370, 3372, 3373, 3374, 3376, 3377	Southern Tableland Grassy Woodlands >=70% and <90%	3374_DNG -Exotic	No	0	Bungonia,Bateman, Burragorang, Crookwell, Ettrema, Kanangra, Kybeyan-Gourock, Monaro and South East Coastal Ranges. or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.

Variation options

Formation	Trading group	Zone	HBT	Credits	IBRA region

	Grassy Woodlands	Tier 2 or higher threat status	3374_DNG -Exotic	No	0	IBRA Region: South Eastern Highlands, 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 options

BAM Biodiversity Credit Report (Like for like)

Proposal Details

Assessment Id
00038889/BAAS19071/24/00047985

Proposal Name
Wattle Creek Solar Farm BESS

BAM data last updated *
28/10/2024

Assessor Name
Madeline Young

Assessor Number
BAAS19071

BAM Data version *
Current classification (live - default) (80)

Proponent Names

Report Created
17/03/2025

BAM Case Status
Finalised

Assessment Revision
4

Assessment Type
Major Projects

Date Finalised
17/03/2025

* 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	3376-Southern Tableland Grassy Box Woodland

Species
Chalinolobus dwyeri / Large-eared Pied Bat

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
3374-Goulburn Tableland Peppermint Grassy Forest	Not a TEC	41.6	0	98	98
3376-Southern Tableland Grassy Box Woodland	White Box - Yellow Box - Blakely's Red Gum Grassy Woodland and Derived Native Grassland in the NSW North Coast, New England Tableland, Nandewar, Brigalow Belt South, Sydney Basin, South Eastern Highla	1.7	0	33	33
4063-Central and Southern Tableland River Oak Forest	Not a TEC	1.9	23	0	23

3374-Goulburn Tableland Peppermint Grassy Forest

Like-for-like credit retirement options

Class	Trading group	Zone	HBT	Credits	IBRA region
Southern Tableland Grassy Woodlands This includes PCT's: 303, 312, 350, 654, 703, 705, 731, 1330, 3366, 3367, 3368, 3370, 3372, 3373, 3374, 3376, 3377	Southern Tableland Grassy Woodlands >=70% and <90%	3374_DNG_Mod_Deg	No	98	Bungonia, Bateman, Burragorang, Crookwell, Ettrema, Kanangra, Kybeyan-Gourock, Monaro and South East Coastal Ranges. or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.

	Southern Tableland Grassy Woodlands This includes PCT's: 303, 312, 350, 654, 703, 705, 731, 1330, 3366, 3367, 3368, 3370, 3372, 3373, 3374, 3376, 3377	Southern Tableland Grassy Woodlands >=70% and <90%	3374_DNG-Low	No	0	Bungonia, Bateman, Burragorang, Crookwell, Ettrema, Kanangra, Kybeyan-Gourock, Monaro and South East Coastal Ranges. or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.
	Southern Tableland Grassy Woodlands This includes PCT's: 303, 312, 350, 654, 703, 705, 731, 1330, 3366, 3367, 3368, 3370, 3372, 3373, 3374, 3376, 3377	Southern Tableland Grassy Woodlands >=70% and <90%	3374_DNG-Exotic	No	0	Bungonia, Bateman, Burragorang, Crookwell, Ettrema, Kanangra, Kybeyan-Gourock, Monaro and South East Coastal Ranges. or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.
3376-Southern Tableland Grassy Box Woodland	**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	-	3376_DNG	No	16	Bungonia, Bateman, Burragorang, Crookwell, Ettrema, Kanangra, Kybeyan-Gourock, Monaro and South

	Derived Native Grassland in the NSW North Coast, New England Tableland, Nandewar, Brigalow Belt South, Sydney Basin, South Eastern Highla This includes PCT's: 74, 75, 83, 250, 266, 267, 268, 270, 274, 275, 276, 277, 278, 279, 280, 281, 282, 283, 284, 286, 298, 302, 312, 341, 342, 347, 350, 352, 356, 367, 381, 382, 395, 401, 403, 421, 433, 434, 435, 436, 437, 451, 483, 484, 488, 492, 496, 508, 509, 510, 511, 516, 528, 538, 544, 563, 567, 571, 589, 590, 597, 599, 618, 619, 622, 633, 654, 702, 703, 704, 705, 710, 711, 796, 797, 799, 847, 851, 921, 1099, 1303, 1304, 1307, 1324, 1329, 1330, 1332, 1383, 1606, 1608, 1611, 1691,					East Coastal Ranges. or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.

	1693, 1695, 1698, 3314, 3359, 3363, 3373, 3376, 3387, 3388, 3394, 3395, 3396, 3397, 3398, 3399, 3406, 3415, 3533, 4147, 4149, 4150					
	White Box - Yellow Box - Blakely's Red Gum Grassy Woodland and Derived Native Grassland in the NSW North Coast, New England Tableland, Nandewar, Brigalow Belt South, Sydney Basin, South Eastern Highla This includes PCT's: 74, 75, 83, 250, 266, 267, 268, 270, 274, 275, 276, 277, 278, 279, 280, 281, 282, 283, 284, 286, 298, 302, 312, 341, 342, 347, 350, 352, 356, 367, 381, 382, 395, 401, 403, 421, 433, 434, 435, 436, 437, 451, 483, 484, 488, 492, 496, 508, 509, 510, 511,	-	3376_Good_Moderate	No	17	Bungonia, Bateman, Burragorang, Crookwell, Ettrema, Kanangra, Kybeyan-Gourock, Monaro and South East Coastal Ranges. or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.

	516, 528, 538, 544, 563, 567, 571, 589, 590, 597, 599, 618, 619, 622, 633, 654, 702, 703, 704, 705, 710, 711, 796, 797, 799, 847, 851, 921, 1099, 1303, 1304, 1307, 1324, 1329, 1330, 1332, 1383, 1606, 1608, 1611, 1691, 1693, 1695, 1698, 3314, 3359, 3363, 3373, 3376, 3387, 3388, 3394, 3395, 3396, 3397, 3398, 3399, 3406, 3415, 3533, 4147, 4149, 4150					
4063-Central and Southern Tableland River Oak Forest	**Like-for-like credit retirement options**					
	Class	Trading group	Zone	HBT	Credits	IBRA region
	Eastern Riverine Forests This includes PCT's: 42, 85, 485, 1714, 3020, 4061, 4063, 4066, 4070, 4072, 4073, 4075, 4077, 4080, 4081, 4085	Eastern Riverine Forests >=50% and <70%	4063_Moderate_Degraded	Yes	23	Bungonia, Bateman, Burragorang, Crookwell, Ettrema, Kanangra, Kybeyan-Gourock, Monaro and South East Coastal Ranges. or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.

BAM Biodiversity Credit Report (Like for like)

4063-Central and Southern Tableland River Oak Forest

Species Credit Summary

Species	Vegetation Zone/s	Area / Count	Credits
Callocephalon fimbriatum / Gang-gang Cockatoo	**3376_Good_Moderate**	0.4	17.00
Calyptorhynchus lathami lathami / South-eastern Glossy Black-Cockatoo	**3376_Good_Moderate**	0.4	17.00
Chalinolobus dwyeri / Large-eared Pied Bat	**3376_Good_Moderate, 4063_Moderate_Degraded**	2.4	81.00
Petaurus norfolcensis / Squirrel Glider	**3376_Good_Moderate, 4063_Moderate_Degraded**	2.4	55.00

Credit Retirement Options

Like-for-like credit retirement options

Callocephalon fimbriatum / Gang-gang Cockatoo	Spp	IBRA subregion
	Callocephalon fimbriatum / Gang-gang Cockatoo	Any in NSW
Calyptorhynchus lathami lathami / South-eastern Glossy Black-Cockatoo	Spp	IBRA subregion
	Calyptorhynchus lathami lathami / South-eastern Glossy Black-Cockatoo	Any in NSW
Chalinolobus dwyeri / Large-eared Pied Bat	Spp	IBRA subregion
	Chalinolobus dwyeri / Large-eared Pied Bat	Any in NSW

Petaurus norfolcensis / Squirrel Glider	Spp	IBRA subregion
	Petaurus norfolcensis / Squirrel Glider	Any in NSW

BAM Biodiversity Credit Report (Variations)

Proposal Details

Assessment Id

00038889/BAAS19071/24/00047985

Proposal Name

Wattle Creek Solar Farm BESS

BAM data last updated *

28/10/2024

Assessor Name

Madeline Young

Assessor Number

BAAS19071

BAM Data version *

Current classification (live - default) (80)

Proponent Name(s)

Report Created

17/03/2025

BAM Case Status

Finalised

Assessment Revision

4

Assessment Type

Major Projects

Date Finalised

17/03/2025

* 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	3376-Southern Tableland Grassy Box Woodland
Species		
Chalinolobus dwyeri / Large-eared Pied Bat		

Additional Information for Approval

PCT Outside Ibra Added

None added

PCTs With Customized Benchmarks

PCT
No Changes

Predicted Threatened Species Not On Site

Name
No Changes

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

Name of Plant Community Type/ID	Name of threatened ecological community	Area of impact	HBT Cr	No HBT Cr	Total credits to be retired
3374-Goulburn Tableland Peppermint Grassy Forest	Not a TEC	41.6	0	98	98.00
3376-Southern Tableland Grassy Box Woodland	White Box - Yellow Box - Blakely's Red Gum Grassy Woodland and Derived Native Grassland in the NSW North Coast, New England Tableland, Nandewar, Brigalow Belt South, Sydney Basin, South Eastern Highla	1.7	0	33	33.00
4063-Central and Southern Tableland River Oak Forest	Not a TEC	1.9	23	0	23.00

3374-Goulburn Tableland Peppermint Grassy Forest

Like-for-like credit retirement options

Class	Trading group	Zone	HBT	Credits	IBRA region

Southern Tableland Grassy Woodlands This includes PCT's: 303, 312, 350, 654, 703, 705, 731, 1330, 3366, 3367, 3368, 3370, 3372, 3373, 3374, 3376, 3377	Southern Tableland Grassy Woodlands >=70% and <90%	3374_DNG_Mod_Deg	No	98	Bungonia,Bateman, Burragorang, Crookwell, Ettrema, Kanangra, Kybeyan-Gourock, Monaro and South East Coastal Ranges. or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.
Southern Tableland Grassy Woodlands This includes PCT's: 303, 312, 350, 654, 703, 705, 731, 1330, 3366, 3367, 3368, 3370, 3372, 3373, 3374, 3376, 3377	Southern Tableland Grassy Woodlands >=70% and <90%	3374_DNG-Low	No	0	Bungonia,Bateman, Burragorang, Crookwell, Ettrema, Kanangra, Kybeyan-Gourock, Monaro and South East Coastal Ranges. or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.
Southern Tableland Grassy Woodlands This includes PCT's: 303, 312, 350, 654, 703, 705, 731, 1330, 3366, 3367, 3368, 3370, 3372, 3373, 3374, 3376, 3377	Southern Tableland Grassy Woodlands >=70% and <90%	3374_DNG-Exotic	No	0	Bungonia,Bateman, Burragorang, Crookwell, Ettrema, Kanangra, Kybeyan-Gourock, Monaro and South East Coastal Ranges. or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.

Variation options

Formation	Trading group	Zone	HBT	Credits	IBRA region

	Grassy Woodlands	Tier 2 or higher threat status	3374_DNG_Mod_Deg	No	98	IBRA Region: South Eastern Highlands, or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.
	Grassy Woodlands	Tier 2 or higher threat status	3374_DNG-Low	No	0	IBRA Region: South Eastern Highlands, or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.
	Grassy Woodlands	Tier 2 or higher threat status	3374_DNG-Exotic	No	0	IBRA Region: South Eastern Highlands, or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.
3376-Southern Tableland Grassy Box Woodland	**Like-for-like credit retirement options**					
	Class	Trading group	Zone	HBT	Credits	IBRA region
	White Box - Yellow Box - Blakely's Red Gum Grassy Woodland and Derived Native Grassland in the NSW North Coast, New England Tableland, Nandewar, Brigalow Belt South, Sydney Basin, South Eastern Highla This includes PCT's: 74, 75, 83, 250, 266, 267, 268, 270, 274, 275, 276,	-	3376_DNG	No	16	Bungonia,Bateman, Burragorang, Crookwell, Ettrema, Kanangra, Kybeyan-Gourock, Monaro and South East Coastal Ranges. or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.

	277, 278, 279, 280, 281, 282, 283, 284, 286, 298, 302, 312, 341, 342, 347, 350, 352, 356, 367, 381, 382, 395, 401, 403, 421, 433, 434, 435, 436, 437, 451, 483, 484, 488, 492, 496, 508, 509, 510, 511, 516, 528, 538, 544, 563, 567, 571, 589, 590, 597, 599, 618, 619, 622, 633, 654, 702, 703, 704, 705, 710, 711, 796, 797, 799, 847, 851, 921, 1099, 1303, 1304, 1307, 1324, 1329, 1330, 1332, 1383, 1606, 1608, 1611, 1691, 1693, 1695, 1698, 3314, 3359, 3363, 3373, 3376, 3387, 3388, 3394, 3395, 3396, 3397, 3398, 3399, 3406, 3415, 3533, 4147, 4149, 4150					
	White Box - Yellow Box - Blakely's Red Gum Grassy Woodland and Derived Native Grassland in the NSW North Coast, New England Tableland, Nandewar, Brigalow Belt South, Sydney Basin,	-	3376_Good_Moderate	No	17	Bungonia,Bateman, Burragorang, Crookwell, Ettrema, Kanangra, Kybeyan-Gourock, Monaro and South East Coastal Ranges. or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.

	South Eastern Highla This includes PCT's: 74, 75, 83, 250, 266, 267, 268, 270, 274, 275, 276, 277, 278, 279, 280, 281, 282, 283, 284, 286, 298, 302, 312, 341, 342, 347, 350, 352, 356, 367, 381, 382, 395, 401, 403, 421, 433, 434, 435, 436, 437, 451, 483, 484, 488, 492, 496, 508, 509, 510, 511, 516, 528, 538, 544, 563, 567, 571, 589, 590, 597, 599, 618, 619, 622, 633, 654, 702, 703, 704, 705, 710, 711, 796, 797, 799, 847, 851, 921, 1099, 1303, 1304, 1307, 1324, 1329, 1330, 1332, 1383, 1606, 1608, 1611, 1691, 1693, 1695, 1698, 3314, 3359, 3363, 3373, 3376, 3387, 3388, 3394, 3395, 3396, 3397, 3398, 3399, 3406, 3415, 3533, 4147, 4149, 4150					
4063-Central and Southern Tableland River Oak Forest	**Like-for-like credit retirement options**					
	Class	Trading group	Zone	HBT	Credits	IBRA region

Eastern Riverine Forests This includes PCT's: 42, 85, 485, 1714, 3020, 4061, 4063, 4066, 4070, 4072, 4073, 4075, 4077, 4080, 4081, 4085	Eastern Riverine Forests >=50% and <70%	4063_Moderate_Degraded	Yes	23	Bungonia,Bateman, Burragorang, Crookwell, Ettrema, Kanangra, Kybeyan-Gourock, Monaro and South East Coastal Ranges. or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.

Variation options

Formation	Trading group	Zone	HBT	Credits	IBRA region
Forested Wetlands	Tier 3 or higher threat status	4063_Moderate_Degraded	Yes (including artificial)	23	IBRA Region: South Eastern Highlands, or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.

Species Credit Summary

Species	Vegetation Zone/s	Area / Count	Credits
Callocephalon fimbriatum / Gang-gang Cockatoo	**3376_Good_Moderate**	0.4	17.00
Calyptorhynchus lathami lathami / South-eastern Glossy Black-Cockatoo	**3376_Good_Moderate**	0.4	17.00
Chalinolobus dwyeri / Large-eared Pied Bat	**3376_Good_Moderate, 4063_Moderate_Degraded**	2.4	81.00
Petaurus norfolcensis / Squirrel Glider	**3376_Good_Moderate, 4063_Moderate_Degraded**	2.4	55.00

Credit Retirement Options

Like-for-like options

Callocephalon fimbriatum/ Gang-gang Cockatoo	Spp	IBRA region

	Callocephalon fimbriatum/Gang-gang Cockatoo	Any in NSW	
	Variation options		
	Kingdom	Any species with same or higher category of listing under Part 4 of the BC Act shown below	IBRA region
	Fauna	Endangered	Bungonia, Bateman, Burragorang, Crookwell, Ettrema, Kanangra, Kybeyan-Gourock, Monaro and South East Coastal Ranges. or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.
Calyptorhynchus lathami lathami/ South-eastern Glossy Black-Cockatoo	Spp	IBRA region	
	Calyptorhynchus lathami lathami/South-eastern Glossy Black-Cockatoo	Any in NSW	
	Variation options		
	Kingdom	Any species with same or higher category of listing under Part 4 of the BC Act shown below	IBRA region

	Fauna	Vulnerable	Bungonia, Bateman, Burragorang, Crookwell, Ettrema, Kanangra, Kybeyan-Gourock, Monaro and South East Coastal Ranges. or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.
Chalinolobus dwyeri/ Large-eared Pied Bat	Spp	IBRA region	
	Chalinolobus dwyeri/Large-eared Pied Bat	Any in NSW	
	Variation options		
	Kingdom	Any species with same or higher category of listing under Part 4 of the BC Act shown below	IBRA region
	Fauna	Endangered	Bungonia, Bateman, Burragorang, Crookwell, Ettrema, Kanangra, Kybeyan-Gourock, Monaro and South East Coastal Ranges. or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.
Petaurus norfolcensis/ Squirrel Glider	Spp	IBRA region	
	Petaurus norfolcensis/Squirrel Glider	Any in NSW	
	Variation options		

	Kingdom	Any species with same or higher category of listing under Part 4 of the BC Act shown below	IBRA region
	Fauna	Vulnerable	Bungonia, Bateman, Burragorang, Crookwell, Ettrema, Kanangra, Kybeyan-Gourock, Monaro and South East Coastal Ranges. or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.

BAM Biodiversity Credit Report (Like for like)

Proposal Details

Assessment Id
00038889/BAAS19071/24/00047986

Proposal Name
Wattle Creek Solar Farm BESS

BAM data last updated *
28/10/2024

Assessor Name
Madeline Young

Assessor Number
BAAS19071

BAM Data version *
Current classification (live - default) (80)

Proponent Names

Report Created
17/03/2025

BAM Case Status
Finalised

Assessment Revision
4

Assessment Type
Major Projects

Date Finalised
17/03/2025

* 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
Nil		

Species
Chalinolobus dwyeri / Large-eared Pied Bat

Additional Information for Approval

BAM Biodiversity Credit Report (Like for like)

PCT Outside Ibra Added

None added

PCTs With Customized Benchmarks

PCT
No Changes

Predicted Threatened Species Not On Site

Name
No Changes

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

Name of Plant Community Type/ID	Name of threatened ecological community	Area of impact	HBT Cr	No HBT Cr	Total credits to be retired
3374-Goulburn Tableland Peppermint Grassy Forest	Not a TEC	6.0	52	17	69

3374-Goulburn Tableland Peppermint Grassy Forest	**Like-for-like credit retirement options**					
	Class	Trading group	Zone	HBT	Credits	IBRA region

	Southern Tableland Grassy Woodlands This includes PCT's: 303, 312, 350, 654, 703, 705, 731, 1330, 3366, 3367, 3368, 3370, 3372, 3373, 3374, 3376, 3377	Southern Tableland Grassy Woodlands >=70% and <90%	3374_DNG_Mod_Deg	No	17	Bungonia, Bateman, Burragorang, Crookwell, Ettrema, Kanangra, Kybeyan-Gourock, Monaro and South East Coastal Ranges. or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.
	Southern Tableland Grassy Woodlands This includes PCT's: 303, 312, 350, 654, 703, 705, 731, 1330, 3366, 3367, 3368, 3370, 3372, 3373, 3374, 3376, 3377	Southern Tableland Grassy Woodlands >=70% and <90%	3374_Good_Moderate	Yes	40	Bungonia, Bateman, Burragorang, Crookwell, Ettrema, Kanangra, Kybeyan-Gourock, Monaro and South East Coastal Ranges. or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.
	Southern Tableland Grassy Woodlands This includes PCT's: 303, 312, 350, 654, 703, 705, 731, 1330, 3366, 3367, 3368, 3370, 3372, 3373, 3374, 3376, 3377	Southern Tableland Grassy Woodlands >=70% and <90%	3374_Moderate_Degraded	Yes	12	Bungonia, Bateman, Burragorang, Crookwell, Ettrema, Kanangra, Kybeyan-Gourock, Monaro and South East Coastal Ranges. or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.

	Southern Tableland Grassy Woodlands This includes PCT's: 303, 312, 350, 654, 703, 705, 731, 1330, 3366, 3367, 3368, 3370, 3372, 3373, 3374, 3376, 3377	Southern Tableland Grassy Woodlands >=70% and <90%	3374_DNG-Exotic	No	0	Bungonia, Bateman, Burragorang, Crookwell, Ettrema, Kanangra, Kybeyan-Gourock, Monaro and South East Coastal Ranges. or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.

Species Credit Summary

Species	Vegetation Zone/s	Area / Count	Credits
Callocephalon fimbriatum / Gang-gang Cockatoo	**3374_Good_Moderate, 3374_Moderate_Degraded**	1.9	69.00
Calyptorhynchus lathami lathami / South-eastern Glossy Black-Cockatoo	**3374_Good_Moderate, 3374_Moderate_Degraded**	1.9	69.00
Chalinolobus dwyeri / Large-eared Pied Bat	**3374_Good_Moderate, 3374_Moderate_Degraded**	1.9	103.00
Petaurus norfolcensis / Squirrel Glider	**3374_Good_Moderate, 3374_Moderate_Degraded**	1.9	69.00

Credit Retirement Options

Like-for-like credit retirement options

Callocephalon fimbriatum / Gang-gang Cockatoo	Spp	IBRA subregion
	Callocephalon fimbriatum / Gang-gang Cockatoo	Any in NSW
Calyptorhynchus lathami lathami / South-eastern Glossy Black-Cockatoo	Spp	IBRA subregion
	Calyptorhynchus lathami lathami / South-eastern Glossy Black-Cockatoo	Any in NSW
Chalinolobus dwyeri / Large-eared Pied Bat	Spp	IBRA subregion
	Chalinolobus dwyeri / Large-eared Pied Bat	Any in NSW
Petaurus norfolcensis / Squirrel Glider	Spp	IBRA subregion
	Petaurus norfolcensis / Squirrel Glider	Any in NSW

BAM Biodiversity Credit Report (Variations)

Proposal Details

Assessment Id

00038889/BAAS19071/24/00047986

Proposal Name

Wattle Creek Solar Farm BESS

BAM data last updated *

28/10/2024

Assessor Name

Madeline Young

Assessor Number

BAAS19071

BAM Data version *

Current classification (live - default) (80)

Proponent Name(s)

Report Created

17/03/2025

BAM Case Status

Finalised

Assessment Revision

4

Assessment Type

Major Projects

Date Finalised

17/03/2025

* 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
Nil		
Species		
Chalinolobus dwyeri / Large-eared Pied Bat		

Additional Information for Approval

PCT Outside Ibra Added

None added

PCTs With Customized Benchmarks

PCT
No Changes

Predicted Threatened Species Not On Site

Name
No Changes

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

Name of Plant Community Type/ID	Name of threatened ecological community	Area of impact	HBT Cr	No HBT Cr	Total credits to be retired
3374-Goulburn Tableland Peppermint Grassy Forest	Not a TEC	6.0	52	17	69.00

3374-Goulburn Tableland Peppermint Grassy Forest

Like-for-like credit retirement options

Class	Trading group	Zone	HBT	Credits	IBRA region
Southern Tableland Grassy Woodlands This includes PCT's: 303, 312, 350, 654, 703, 705, 731, 1330, 3366, 3367, 3368, 3370, 3372, 3373, 3374, 3376, 3377	Southern Tableland Grassy Woodlands >=70% and <90%	3374_DNG_Mod_Deg	No	17	Bungonia,Bateman, Burragorang, Crookwell, Ettrema, Kanangra, Kybeyan-Gourock, Monaro and South East Coastal Ranges. or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.

Southern Tableland Grassy Woodlands This includes PCT's: 303, 312, 350, 654, 703, 705, 731, 1330, 3366, 3367, 3368, 3370, 3372, 3373, 3374, 3376, 3377	Southern Tableland Grassy Woodlands >=70% and <90%	3374_Good_Moderate	Yes	40	Bungonia,Bateman, Burragorang, Crookwell, Ettrema, Kanangra, Kybeyan-Gourock, Monaro and South East Coastal Ranges. or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.
Southern Tableland Grassy Woodlands This includes PCT's: 303, 312, 350, 654, 703, 705, 731, 1330, 3366, 3367, 3368, 3370, 3372, 3373, 3374, 3376, 3377	Southern Tableland Grassy Woodlands >=70% and <90%	3374_Moderate_Degraded	Yes	12	Bungonia,Bateman, Burragorang, Crookwell, Ettrema, Kanangra, Kybeyan-Gourock, Monaro and South East Coastal Ranges. or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.
Southern Tableland Grassy Woodlands This includes PCT's: 303, 312, 350, 654, 703, 705, 731, 1330, 3366, 3367, 3368, 3370, 3372, 3373, 3374, 3376, 3377	Southern Tableland Grassy Woodlands >=70% and <90%	3374_DNG-Exotic	No	0	Bungonia,Bateman, Burragorang, Crookwell, Ettrema, Kanangra, Kybeyan-Gourock, Monaro and South East Coastal Ranges. or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.

Variation options

Formation	Trading group	Zone	HBT	Credits	IBRA region

	Grassy Woodlands	Tier 2 or higher threat status	3374_DNG_Mod_Deg	No	17	IBRA Region: South Eastern Highlands, or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.
	Grassy Woodlands	Tier 2 or higher threat status	3374_Good_Moderate	Yes (including artificial)	40	IBRA Region: South Eastern Highlands, or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.
	Grassy Woodlands	Tier 2 or higher threat status	3374_Moderate_Degraded	Yes (including artificial)	12	IBRA Region: South Eastern Highlands, or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.
	Grassy Woodlands	Tier 2 or higher threat status	3374_DNG-Exotic	No	0	IBRA Region: South Eastern Highlands, or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.

Species Credit Summary

Species	Vegetation Zone/s	Area / Count	Credits
Callocephalon fimbriatum / Gang-gang Cockatoo	**3374_Good_Moderate, 3374_Moderate_Degraded**	1.9	69.00
Calyptorhynchus lathami lathami / South-eastern Glossy Black-Cockatoo	**3374_Good_Moderate, 3374_Moderate_Degraded**	1.9	69.00
Chalinolobus dwyeri / Large-eared Pied Bat	**3374_Good_Moderate, 3374_Moderate_Degraded**	1.9	103.00

Petaurus norfolcensis / Squirrel Glider	**3374_Good_Moderate, 3374_Moderate_Degraded**	1.9	69.00

Credit Retirement Options

Like-for-like options

Callocephalon fimbriatum/ Gang-gang Cockatoo	Spp	IBRA region	
	Callocephalon fimbriatum/Gang-gang Cockatoo	Any in NSW	
	Variation options		
	Kingdom	Any species with same or higher category of listing under Part 4 of the BC Act shown below	IBRA region
	Fauna	Endangered	Bungonia, Bateman, Burragorang, Crookwell, Ettrema, Kanangra, Kybeyan-Gourock, Monaro and South East Coastal Ranges. or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.
Calyptorhynchus lathami lathami/ South-eastern Glossy Black-Cockatoo	Spp	IBRA region	
	Calyptorhynchus lathami lathami/South-eastern Glossy Black-Cockatoo	Any in NSW	
	Variation options		
	Kingdom	Any species with same or higher category of listing	IBRA region

		under Part 4 of the BC Act shown below	
	Fauna	Vulnerable	Bungonia, Bateman, Burragorang, Crookwell, Ettrema, Kanangra, Kybeyan-Gourock, Monaro and South East Coastal Ranges. or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.
Chalinolobus dwyeri/ Large-eared Pied Bat	Spp	IBRA region	
	Chalinolobus dwyeri/Large-eared Pied Bat	Any in NSW	
	Variation options		
	Kingdom	Any species with same or higher category of listing under Part 4 of the BC Act shown below	IBRA region
	Fauna	Endangered	Bungonia, Bateman, Burragorang, Crookwell, Ettrema, Kanangra, Kybeyan-Gourock, Monaro and South East Coastal Ranges. or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.
Petaurus norfolcensis/ Squirrel Glider	Spp	IBRA region	

	Petaurus norfolcensis/Squirrel Glider		Any in NSW
	Variation options		
	Kingdom	Any species with same or higher category of listing under Part 4 of the BC Act shown below	IBRA region
	Fauna	Vulnerable	Bungonia, Bateman, Burragorang, Crookwell, Ettrema, Kanangra, Kybeyan-Gourock, Monaro and South East Coastal Ranges. or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.

BAM Biodiversity Credit Report (Like for like)

Proposal Details

Assessment Id
00038889/BAAS19071/24/00047987

Proposal Name
Wattle Creek Solar Farm BESS

BAM data last updated *
28/10/2024

Assessor Name
Madeline Young

Assessor Number
BAAS19071

BAM Data version *
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Proponent Names

Report Created
17/03/2025

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Finalised

Assessment Revision
4

Assessment Type
Major Projects

Date Finalised
17/03/2025

* 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	3376-Southern Tableland Grassy Box Woodland

Species
Chalinolobus dwyeri / Large-eared Pied Bat

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
3374-Goulburn Tableland Peppermint Grassy Forest	Not a TEC	7.8	100	13	113
3376-Southern Tableland Grassy Box Woodland	White Box - Yellow Box - Blakely's Red Gum Grassy Woodland and Derived Native Grassland in the NSW North Coast, New England Tableland, Nandewar, Brigalow Belt South, Sydney Basin, South Eastern Highla	0.5	0	17	17
4063-Central and Southern Tableland River Oak Forest	Not a TEC	0.1	1	0	1

3374-Goulburn Tableland Peppermint Grassy Forest

Like-for-like credit retirement options

Class	Trading group	Zone	HBT	Credits	IBRA region
Southern Tableland Grassy Woodlands This includes PCT's: 303, 312, 350, 654, 703, 705, 731, 1330, 3366, 3367, 3368, 3370, 3372, 3373, 3374, 3376, 3377	Southern Tableland Grassy Woodlands >=70% and <90%	3374_DNG_Mod_Deg	No	13	Bungonia, Bateman, Burragorang, Crookwell, Ettrema, Kanangra, Kybeyan-Gourock, Monaro and South East Coastal Ranges. or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.

Southern Tableland Grassy Woodlands This includes PCT's: 303, 312, 350, 654, 703, 705, 731, 1330, 3366, 3367, 3368, 3370, 3372, 3373, 3374, 3376, 3377	Southern Tableland Grassy Woodlands >=70% and <90%	3374_Good_Moderate	Yes	78	Bungonia, Bateman, Burragorang, Crookwell, Ettrema, Kanangra, Kybeyan-Gourock, Monaro and South East Coastal Ranges. or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.
Southern Tableland Grassy Woodlands This includes PCT's: 303, 312, 350, 654, 703, 705, 731, 1330, 3366, 3367, 3368, 3370, 3372, 3373, 3374, 3376, 3377	Southern Tableland Grassy Woodlands >=70% and <90%	3374_Moderate_Degraded	Yes	22	Bungonia, Bateman, Burragorang, Crookwell, Ettrema, Kanangra, Kybeyan-Gourock, Monaro and South East Coastal Ranges. or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.
Southern Tableland Grassy Woodlands This includes PCT's: 303, 312, 350, 654, 703, 705, 731, 1330, 3366, 3367, 3368, 3370, 3372, 3373, 3374, 3376, 3377	Southern Tableland Grassy Woodlands >=70% and <90%	3374_DNG-Exotic	No	0	Bungonia, Bateman, Burragorang, Crookwell, Ettrema, Kanangra, Kybeyan-Gourock, Monaro and South East Coastal Ranges. or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.

3376-Southern Tableland Grassy Box Woodland	**Like-for-like credit retirement options**					
	Name of offset trading group	Trading group	Zone	HBT	Credits	IBRA region
	White Box - Yellow Box - Blakely's Red Gum Grassy Woodland and Derived Native Grassland in the NSW North Coast, New England Tableland, Nandewar, Brigalow Belt South, Sydney Basin, South Eastern Highla This includes PCT's: 74, 75, 83, 250, 266, 267, 268, 270, 274, 275, 276, 277, 278, 279, 280, 281, 282, 283, 284, 286, 298, 302, 312, 341, 342, 347, 350, 352, 356, 367, 381, 382, 395, 401, 403, 421, 433, 434, 435, 436, 437, 451, 483, 484, 488, 492, 496, 508, 509, 510, 511, 516, 528, 538, 544, 563, 567, 571, 589, 590, 597,	-	3376_Good_Moderate	No	17	Bungonia, Bateman, Burragorang, Crookwell, Ettrema, Kanangra, Kybeyan-Gourock, Monaro and South East Coastal Ranges. or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.

	599, 618, 619, 622, 633, 654, 702, 703, 704, 705, 710, 711, 796, 797, 799, 847, 851, 921, 1099, 1303, 1304, 1307, 1324, 1329, 1330, 1332, 1383, 1606, 1608, 1611, 1691, 1693, 1695, 1698, 3314, 3359, 3363, 3373, 3376, 3387, 3388, 3394, 3395, 3396, 3397, 3398, 3399, 3406, 3415, 3533, 4147, 4149, 4150					
4063-Central and Southern Tableland River Oak Forest	**Like-for-like credit retirement options**					
	Class	Trading group	Zone	HBT	Credits	IBRA region
	Eastern Riverine Forests This includes PCT's: 42, 85, 485, 1714, 3020, 4061, 4063, 4066, 4070, 4072, 4073, 4075, 4077, 4080, 4081, 4085	Eastern Riverine Forests >=50% and <70%	4063_Moderate_Degraded	Yes	1	Bungonia, Bateman, Burragorang, Crookwell, Ettrema, Kanangra, Kybeyan-Gourock, Monaro and South East Coastal Ranges. or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.

BAM Biodiversity Credit Report (Like for like)

4063-Central and Southern Tableland River Oak Forest

Species Credit Summary

Species	Vegetation Zone/s	Area / Count	Credits
Callocephalon fimbriatum / Gang-gang Cockatoo	**3374_Good_Moderate, 3374_Moderate_Degraded, 3376_Good_Moderate**	4.0	150.00
Calyptorhynchus lathami lathami / South-eastern Glossy Black-Cockatoo	**3374_Good_Moderate, 3374_Moderate_Degraded, 3376_Good_Moderate**	4.0	150.00
Chalinolobus dwyeri / Large-eared Pied Bat	**3374_Good_Moderate, 3374_Moderate_Degraded, 3376_Good_Moderate, 4063_Moderate_Degraded**	4.1	229.00
Petaurus norfolcensis / Squirrel Glider	**3374_Good_Moderate, 3374_Moderate_Degraded, 3376_Good_Moderate, 4063_Moderate_Degraded**	4.1	152.00

Credit Retirement Options

Like-for-like credit retirement options

	Spp	IBRA subregion
Callocephalon fimbriatum / Gang-gang Cockatoo	**Callocephalon fimbriatum /** Gang-gang Cockatoo	Any in NSW

Calyptorhynchus lathami lathami / South-eastern Glossy Black-Cockatoo	Spp	IBRA subregion
	Calyptorhynchus lathami lathami / South-eastern Glossy Black-Cockatoo	Any in NSW
Chalinolobus dwyeri / Large-eared Pied Bat	Spp	IBRA subregion
	Chalinolobus dwyeri / Large-eared Pied Bat	Any in NSW
Petaurus norfolcensis / Squirrel Glider	Spp	IBRA subregion
	Petaurus norfolcensis / Squirrel Glider	Any in NSW

BAM Biodiversity Credit Report (Variations)

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Species		
Chalinolobus dwyeri / Large-eared Pied Bat		

Additional Information for Approval

PCT Outside Ibra Added

None added

PCTs With Customized Benchmarks

PCT
No Changes

Predicted Threatened Species Not On Site

Name
No Changes

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

Name of Plant Community Type/ID	Name of threatened ecological community	Area of impact	HBT Cr	No HBT Cr	Total credits to be retired
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3376-Southern Tableland Grassy Box Woodland	White Box - Yellow Box - Blakely's Red Gum Grassy Woodland and Derived Native Grassland in the NSW North Coast, New England Tableland, Nandewar, Brigalow Belt South, Sydney Basin, South Eastern Highla	0.5	0	17	17.00
4063-Central and Southern Tableland River Oak Forest	Not a TEC	0.1	1	0	1.00

3374-Goulburn Tableland Peppermint Grassy Forest

Like-for-like credit retirement options

Class	Trading group	Zone	HBT	Credits	IBRA region

Southern Tableland Grassy Woodlands This includes PCT's: 303, 312, 350, 654, 703, 705, 731, 1330, 3366, 3367, 3368, 3370, 3372, 3373, 3374, 3376, 3377	Southern Tableland Grassy Woodlands >=70% and <90%	3374_DNG_Mod_Deg	No	13	Bungonia,Bateman, Burragorang, Crookwell, Ettrema, Kanangra, Kybeyan-Gourock, Monaro and South East Coastal Ranges. or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.
Southern Tableland Grassy Woodlands This includes PCT's: 303, 312, 350, 654, 703, 705, 731, 1330, 3366, 3367, 3368, 3370, 3372, 3373, 3374, 3376, 3377	Southern Tableland Grassy Woodlands >=70% and <90%	3374_Good_Moderate	Yes	78	Bungonia,Bateman, Burragorang, Crookwell, Ettrema, Kanangra, Kybeyan-Gourock, Monaro and South East Coastal Ranges. or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.
Southern Tableland Grassy Woodlands This includes PCT's: 303, 312, 350, 654, 703, 705, 731, 1330, 3366, 3367, 3368, 3370, 3372, 3373, 3374, 3376, 3377	Southern Tableland Grassy Woodlands >=70% and <90%	3374_Moderate_Degraded	Yes	22	Bungonia,Bateman, Burragorang, Crookwell, Ettrema, Kanangra, Kybeyan-Gourock, Monaro and South East Coastal Ranges. or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.

Southern Tableland Grassy Woodlands This includes PCT's: 303, 312, 350, 654, 703, 705, 731, 1330, 3366, 3367, 3368, 3370, 3372, 3373, 3374, 3376, 3377	Southern Tableland Grassy Woodlands >=70% and <90%	3374_DNG-Exotic	No	0	Bungonia,Bateman, Burragorang, Crookwell, Ettrema, Kanangra, Kybeyan-Gourock, Monaro and South East Coastal Ranges. or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.

Variation options

Formation	Trading group	Zone	HBT	Credits	IBRA region
Grassy Woodlands	Tier 2 or higher threat status	3374_DNG_Mod_Deg	No	13	IBRA Region: South Eastern Highlands, or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.
Grassy Woodlands	Tier 2 or higher threat status	3374_Good_Moderate	Yes (including artificial)	78	IBRA Region: South Eastern Highlands, or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.
Grassy Woodlands	Tier 2 or higher threat status	3374_Moderate_Degraded	Yes (including artificial)	22	IBRA Region: South Eastern Highlands, or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.

	Grassy Woodlands	Tier 2 or higher threat status	3374_DNG-Exotic	No	0	IBRA Region: South Eastern Highlands, or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.
3376-Southern Tableland Grassy Box Woodland	**Like-for-like credit retirement options**					
	Class	Trading group	Zone	HBT	Credits	IBRA region
	White Box - Yellow Box - Blakely's Red Gum Grassy Woodland and Derived Native Grassland in the NSW North Coast, New England Tableland, Nandewar, Brigalow Belt South, Sydney Basin, South Eastern Highla This includes PCT's: 74, 75, 83, 250, 266, 267, 268, 270, 274, 275, 276, 277, 278, 279, 280, 281, 282, 283, 284, 286, 298, 302, 312, 341, 342, 347, 350, 352, 356, 367, 381, 382, 395, 401, 403, 421, 433, 434, 435, 436, 437, 451, 483, 484, 488, 492, 496, 508, 509, 510, 511, 516, 528, 538, 544, 563, 567, 571, 589, 590, 597, 599, 618, 619, 622, 633,	-	3376_Good_Moderate	No	17	Bungonia,Bateman, Burragorang, Crookwell, Ettrema, Kanangra, Kybeyan-Gourock, Monaro and South East Coastal Ranges. or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.

	654, 702, 703, 704, 705, 710, 711, 796, 797, 799, 847, 851, 921, 1099, 1303, 1304, 1307, 1324, 1329, 1330, 1332, 1383, 1606, 1608, 1611, 1691, 1693, 1695, 1698, 3314, 3359, 3363, 3373, 3376, 3387, 3388, 3394, 3395, 3396, 3397, 3398, 3399, 3406, 3415, 3533, 4147, 4149, 4150					
4063-Central and Southern Tableland River Oak Forest	**Like-for-like credit retirement options**					
	Class	Trading group	Zone	HBT	Credits	IBRA region
	Eastern Riverine Forests This includes PCT's: 42, 85, 485, 1714, 3020, 4061, 4063, 4066, 4070, 4072, 4073, 4075, 4077, 4080, 4081, 4085	Eastern Riverine Forests >=50% and <70%	4063_Moderate_Degraded	Yes	1	Bungonia,Bateman, Burragorang, Crookwell, Ettrema, Kanangra, Kybeyan-Gourock, Monaro and South East Coastal Ranges. or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.
	Variation options					
	Formation	Trading group	Zone	HBT	Credits	IBRA region
	Forested Wetlands	Tier 3 or higher threat status	4063_Moderate_Degraded	Yes (including artificial)	1	IBRA Region: South Eastern Highlands, or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.

BAM Biodiversity Credit Report (Variations)

Species Credit Summary

Species	Vegetation Zone/s	Area / Count	Credits
Callocephalon fimbriatum / Gang-gang Cockatoo	**3374_Good_Moderate, 3374_Moderate_Degraded, 3376_Good_Moderate**	4.0	150.00
Calyptorhynchus lathami lathami / South-eastern Glossy Black-Cockatoo	**3374_Good_Moderate, 3374_Moderate_Degraded, 3376_Good_Moderate**	4.0	150.00
Chalinolobus dwyeri / Large-eared Pied Bat	**3374_Good_Moderate, 3374_Moderate_Degraded, 3376_Good_Moderate, 4063_Moderate_Degraded**	4.1	229.00
Petaurus norfolcensis / Squirrel Glider	**3374_Good_Moderate, 3374_Moderate_Degraded, 3376_Good_Moderate, 4063_Moderate_Degraded**	4.1	152.00

Credit Retirement Options

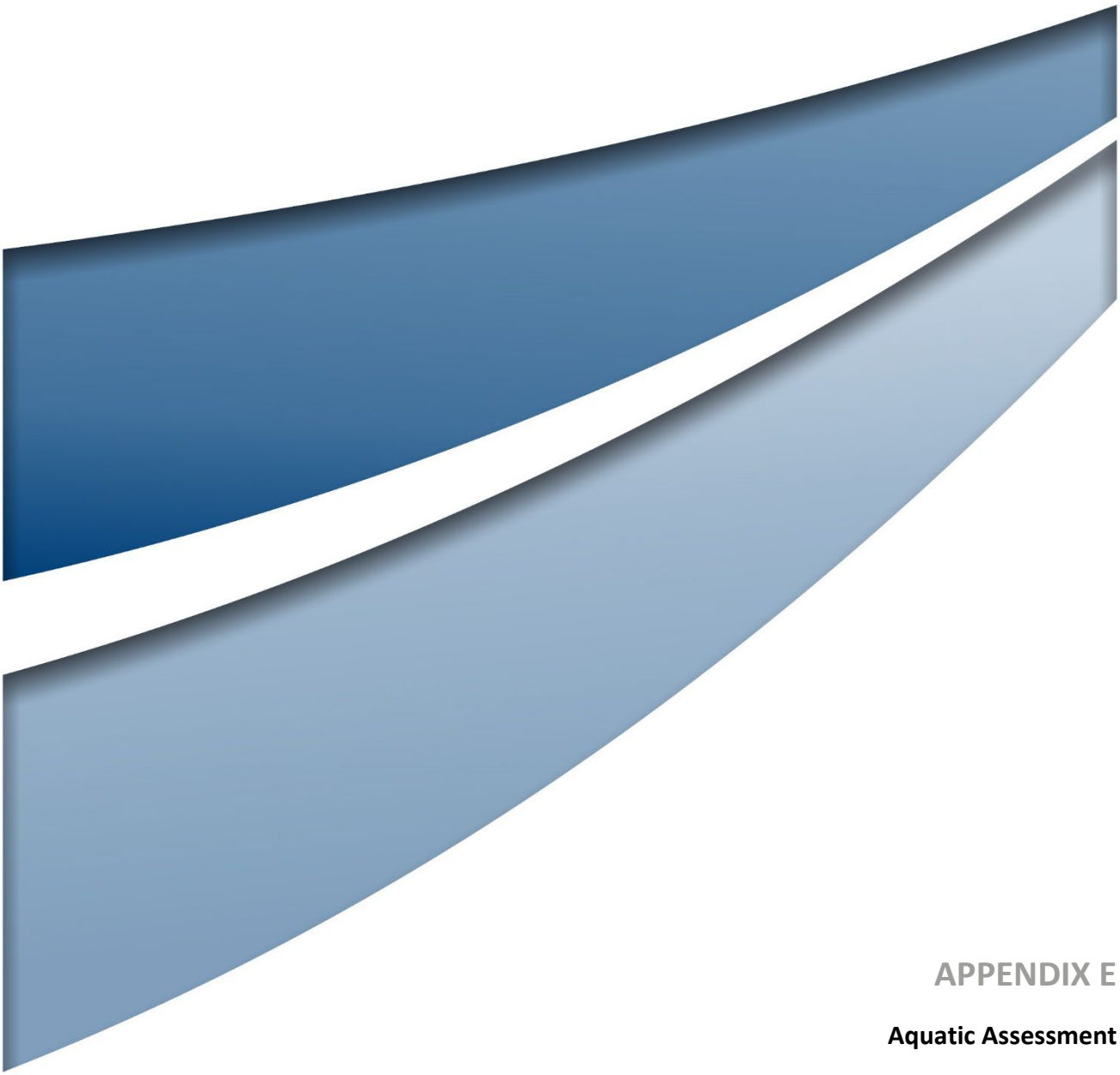
Like-for-like options

Callocephalon fimbriatum/ Gang-gang Cockatoo	Spp	IBRA region	
	Callocephalon fimbriatum/Gang-gang Cockatoo	Any in NSW	
	Variation options		
	Kingdom	Any species with same or higher category of listing under Part 4 of the BC Act shown below	IBRA region

	Fauna	Endangered	Bungonia, Bateman, Burragorang, Crookwell, Ettrema, Kanangra, Kybeyan-Gourock, Monaro and South East Coastal Ranges. or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.
Calyptorhynchus lathami lathami/ South-eastern Glossy Black-Cockatoo	Spp	IBRA region	
	Calyptorhynchus lathami lathami/South-eastern Glossy Black-Cockatoo	Any in NSW	
	Variation options		
	Kingdom	Any species with same or higher category of listing under Part 4 of the BC Act shown below	IBRA region
	Fauna	Vulnerable	Bungonia, Bateman, Burragorang, Crookwell, Ettrema, Kanangra, Kybeyan-Gourock, Monaro and South East Coastal Ranges. or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.
Chalinolobus dwyeri/ Large-eared Pied Bat	Spp	IBRA region	
	Chalinolobus dwyeri/Large-eared Pied Bat	Any in NSW	

Chalinolobus dwyeri/ Large-eared Pied Bat	**Variation options**		
	Kingdom	Any species with same or higher category of listing under Part 4 of the BC Act shown below	IBRA region
	Fauna	Endangered	Bungonia, Bateman, Burragorang, Crookwell, Ettrema, Kanangra, Kybeyan-Gourock, Monaro and South East Coastal Ranges. or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.
Petaurus norfolcensis/ Squirrel Glider	Spp	IBRA region	
	Petaurus norfolcensis/Squirrel Glider	Any in NSW	
	Variation options		
	Kingdom	Any species with same or higher category of listing under Part 4 of the BC Act shown below	IBRA region

	Fauna	Vulnerable	Bungonia, Bateman, Burragorang, Crookwell, Ettrema, Kanangra, Kybeyan-Gourock, Monaro and South East Coastal Ranges. or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.



APPENDIX E

Aquatic Assessment

umwelt
Environmental & Social Consultants

SPARK RENEWABLES

WATTLE CREEK SOLAR FARM AND BATTERY ENERGY STORAGE SYSTEM

Appendix E - Aquatic Assessment

FINAL

March 2025

WATTLE CREEK SOLAR FARM AND BATTERY ENERGY STORAGE SYSTEM

Appendix E - Aquatic Assessment

FINAL

Prepared by
Umwelt (Australia) Pty Limited
on behalf of
Spark Renewables Pty Limited

Project Director:	Paul Douglass
Project Manager:	Penelope Williams
Technical Director:	Naomi Buchhorn
Technical Manager:	Maddy Young
Report No.	R09
Date:	March 2025

umwelt
Environmental & Social Consultants

75 York Street
Teralba NSW 2284

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

Acknowledgement of Country

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

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Document Status

Rev No.	Reviewer		Approved for Issue	
	Name	Date	Name	Date
V1	Naomi Buchhorn	14 March 2025	Naomi Buchhorn	17 March 2025

Table of Contents

1.0 Introduction 1

1.1 Project Overview 1

1.2 Existing Environment and Hydrology 6

1.3 Purpose and Scope of this Report 8

1.4 Statutory Context, Policy and Guidelines 8

1.4.1 NSW *Environmental Planning and Assessment Act 1979* 8

1.4.2 NSW *Fisheries Management Act 1994* 8

1.4.3 Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* 9

1.4.4 Secretary's Environmental Assessment Requirements 9

2.0 Methods 11

2.1 Literature and Database Review 11

2.2 Aquatic Habitat Survey 11

2.3 Key Fish Habitat Classification 12

2.3.1 Habitat Sensitivity 12

2.3.2 Waterway Classification 14

3.0 Results 15

3.1 Literature and Database Review 15

3.2 Aquatic Habitat in the Development Footprint 15

3.2.1 Waterway Classification 15

3.2.2 Threatened Species, Populations and Ecological Communities 23

3.3 Groundwater Dependent Ecosystems 24

4.0 Impact Assessment 26

4.1 Threatened Species, Populations and Communities 26

4.2 Avoidance, Minimisation and Mitigation Measures 28

4.2.1 Impact Avoidance and Minimisation Measures 28

4.2.2 Impact Mitigation Measures 30

5.0 Conclusion 31

6.0 References 32

Figures

Figure 1.1	Site Map	4
Figure 1.2	Development Layout	5
Figure 1.3	Hydrological and Topographic Features	7

Photos

Photo 3.1	Wollondilly River at crossing point, looking upstream from the western bank	19
Photo 3.2	Rocky areas in Wollondilly River upstream of crossing point taken from the western bank	19
Photo 3.3	Still pool in Wollondilly River upstream of rocky areas at the crossing point taken from the western bank	20
Photo 3.4	Wollondilly River from the eastern bank, lower volumes of water	20
Photo 3.5	Existing crossing point on Island Creek	21
Photo 3.6	Photo at the western extent of the ephemeral unnamed watercourse north of the BESS, creek bed dry at the time of survey	21
Photo 3.7	Small isolated pools in the defined creek bed of the unnamed watercourse north of the BESS	22
Photo 3.8	Unnamed watercourse approximately 200 m west of the confluence of the Wollondilly River (outside the Development Footprint)	22
Photo 3.9	Existing creek crossing at Sandy Creek	23

Tables

Table 2.1	Key Fish Habitat and Associated Sensitivity Classification	13
Table 2.2	Classification of Waterways for Fish Passage (DPI 2013)	14
Table 3.1	Habitat Values and Waterway Classification of Third Order and Higher Waterways	17
Table 4.1	Assessment of Significance under the FM Act for the Macquarie Perch	27
Table 4.2	Watercourses Types, Classes and Buffers	30

1.0 Introduction

1.1 Project Overview

Umwelt (Australia) Pty Limited (Umwelt) was engaged by Spark Renewables Pty Ltd (Spark Renewables), the Proponent, to prepare Biodiversity Development Assessment Reports (BDARs) for the proposed Wattle Creek Solar Farm (SSD-63344210) and Wattle Creek Battery Energy Storage System (BESS) (SSD-63345458). Both Projects are located in the Arthursleigh Farm (Lot 3 DP 1120270) at Brayton and Big Hill, north of the township of Marulan, within the Upper Lachlan Shire and Goulburn Mulwaree Local Government Areas of NSW.

The Project Area encompasses the property known as Arthursleigh and the length of Canyonleigh Road between the Project Area access point and the Canyonleigh Road/Brayton Road intersection. The Arthursleigh property is bound to the south by the Wollondilly River and Canyonleigh Road, to the east by the Wollondilly River, to the north by Dead Mans Creek, and to the west by private property (refer to **Figure 1.1**).

The Wattle Creek BESS Project (SSD-63345458) will have a storage capacity of 350 MW. The Project includes construction, operation and decommissioning. The impacts of the Solar Farm Project on biodiversity values have been assessed in the Wattle Creek Solar Farm, BDAR (Umwelt 2025a).

The Wattle Creek Solar Farm Project comprises a large-scale solar photovoltaic (PV) generation facility with an installed generation capacity of 265 megawatts (MW) alternating current) and related infrastructure. The Project includes construction, operation and decommissioning. The Wattle Creek Solar Farm is a separate project (SSD-63344210) assessed in a separate BDAR prepared by Umwelt (2025a).

This report assesses the aquatic impacts of both the Solar Farm and BESS SDD Projects (the 'Project') including related infrastructure.

The BESS and Solar Farm SSD Projects include ancillary features common to both projects as well as two transmission line options. If both projects proceed, the BDARs will be revised to remove the duplication in the common ancillary facilities and to include only one final transmission line option.

The Solar Project comprises a large-scale solar PV generation facility supported by associated infrastructure. The Solar Project will have a generation capacity of up to approximately 265 MW(AC) and a storage capacity of 100 MW (approximately two hours) and include the following key components:

- Approximately 490,000 PV modules will be mounted on single-axis tracking systems within the development footprint. The solar farm will also include power conversion units (PCUs), a cable network and internal access tracks.
- A Solar Hybrid BESS with 100 MW capacity electrically isolated with its own transformers and metering infrastructure.
- On-site collector substation to connect the solar farm to the electricity transmission network via Marulan Substation. An 80 metre (m) communication mast is also included at the substation location.

- Two transmission line options are being investigated, to allow for optionality during the assessment process and greater flexibility in the connection design. Only one transmission line option will be constructed. The two options are assessed separately.

- Internal electrical reticulation network, i.e., electrical connections between the proposed panels and collector substation consisting of a combination of underground cables and overhead powerlines.

The separate Wattle Creek Battery Energy Storage System (BESS) Project (SSD-63345458) proposed within the Project Area, will have a storage capacity of up to 350 MW and will include approximately 415 lithium-iron phosphate battery containers, each with a capacity of approximately 3.85 MWh. The Project will be equipped with 248 inverters rated at 4,200 kVA, paired with medium voltage transformers, and will be integrated into the on-site substation with three 300 MVA high voltage transformers.

The key components of the BESS Project would include:

- Batteries – most likely a lithium-ion technology.

- Inverters – bi-directional inverters to convert DC current to AC current (when exporting electricity) and vice versa (when importing electricity).

- Transformers – skid-mounted transformers will be installed adjacent to each inverter to step up the voltage to the internal reticulation voltage of the plant.

- Substation and transmission connection – on-site collector substation and overhead powerlines to connect the Project to the electricity transmission network via Marulan Substation.

- A substation communication mast of up to 80 m in height is also included at the substation location.

- Electrical connections – a combination of underground cables and overhead powerlines connecting BESS facility to the on-site collector substation.

Components of the Project common to both the BESS SSD and Solar Farm SSD include:

- Operation and maintenance (O&M) facility – including a site office, O&M buildings, amenities, equipment sheds, storage, and parking areas.

- Other associated permanent infrastructure including hardstands, static water tanks or ancillary fire-fighting equipment.

- Site access points, Internal access tracks and targeted external road network upgrades are proposed to facilitate delivery of solar farm components to the Project Area as required including:

    - The existing primary access point off Canyonleigh Road will be subject to minor upgrade works and will include site entrance signage

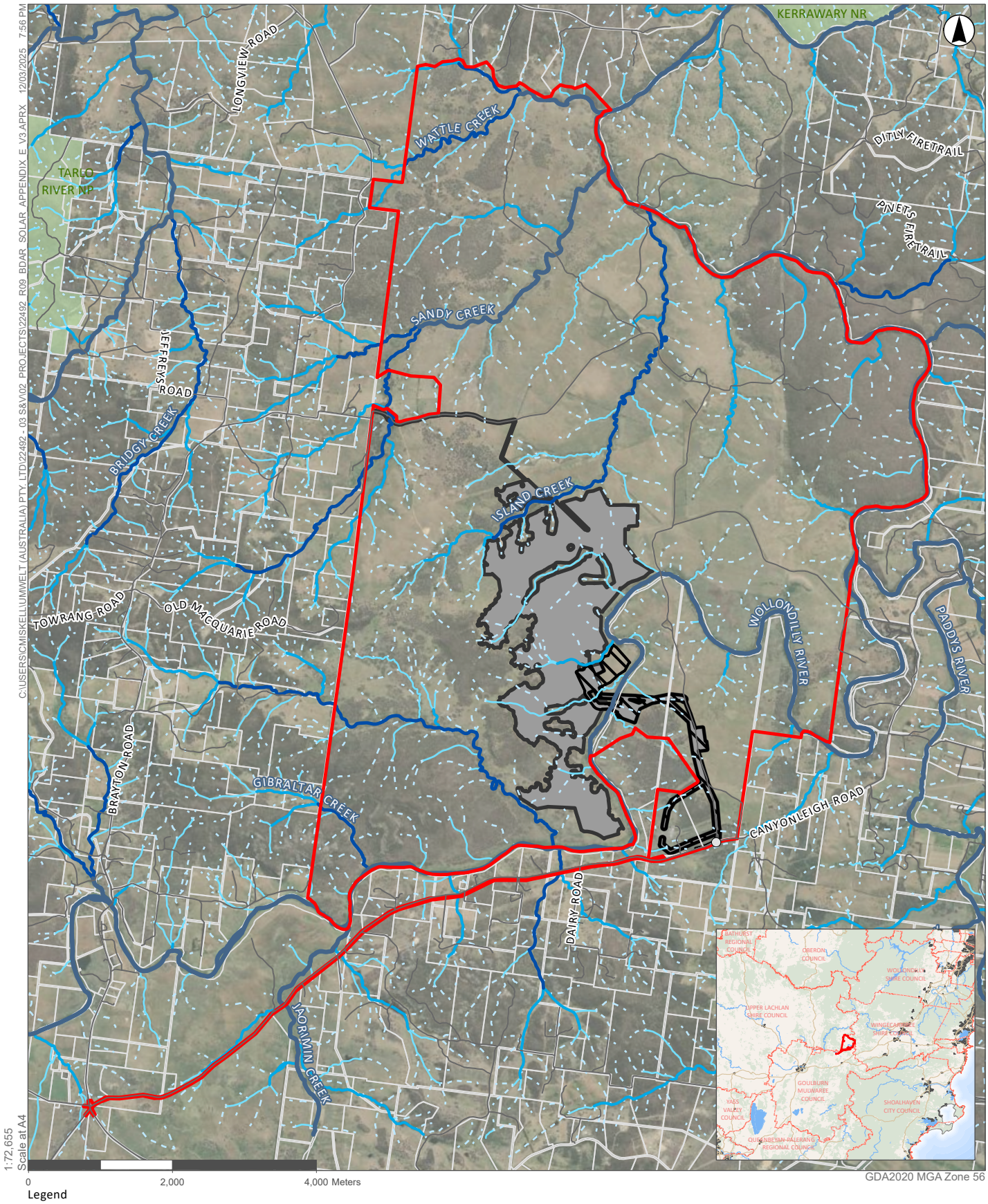
    - internal access tracks will be constructed to provide all weather access for servicing and maintaining Project infrastructure, as well as access and egress during emergencies

- Access to the Project Area via heavy vehicle will be via Red Hills Road, Ambrose Road, Brayton Road and Canyonleigh Road. Arthursleigh Road to the east of the Project Area will not be used during construction, except in the event the access route via Canyonleigh Road is not possible (i.e. in the event of flood or fire etc)
- Canyonleigh Road between the entrance to the Project Area and the Brayton Road/Canyonleigh Road intersection will be resurfaced as required prior to the Project construction phase
- Minor works will also be undertaken at the Brayton Road / Canyonleigh Road intersection to incorporate a basic right (BAR) turn treatment on the southern Brayton Road approach to the current configuration of the intersection. The proposed works will utilise the existing width provided by the wide shoulder on the western side of the southern Brayton Road approach to the intersection and detailed design will be subject to further consultation with Council.

- A research Test-Bed Facility – comprising of a 2 hectare (ha) hard standing area, demountable buildings, security fencing, parking, 200kVa power supply and 100kVA dummy load (simulated electrical load for testing purposes).
- Temporary construction facilities including:
  - Construction compound/s with site office building(s)
  - On-site concrete batching plants for use during the construction phase
  - Potential construction material areas such as borrow pits, quarry and rock crushing facilities
  - Laydown areas used for installation and storage of solar farm components.

The Solar Farm Development Footprint covers approximately 580.62 ha of land, while the BESS Development footprint spans 77.44 ha. Both BESS and Solar conceptual layouts include associated ancillary infrastructure (i.e. substations, the operations and maintenance facility, test bed and both transmission line corridors for optionality). The conceptual project layout is shown on **Figure 1.2.**

Two transmission line options are being investigated, to allow for optionality during the assessment process and greater flexibility in the connection design. Only one transmission option will be constructed. The two options are assessed separately. The two transmission options are shown on **Figure 1.2.**



Legend

- Project Area
- Solar Development Footprint
- BESS Development Footprint
- NSW National Parks
- Existing Roads and Tracks
- Property Boundaries
- Access Points

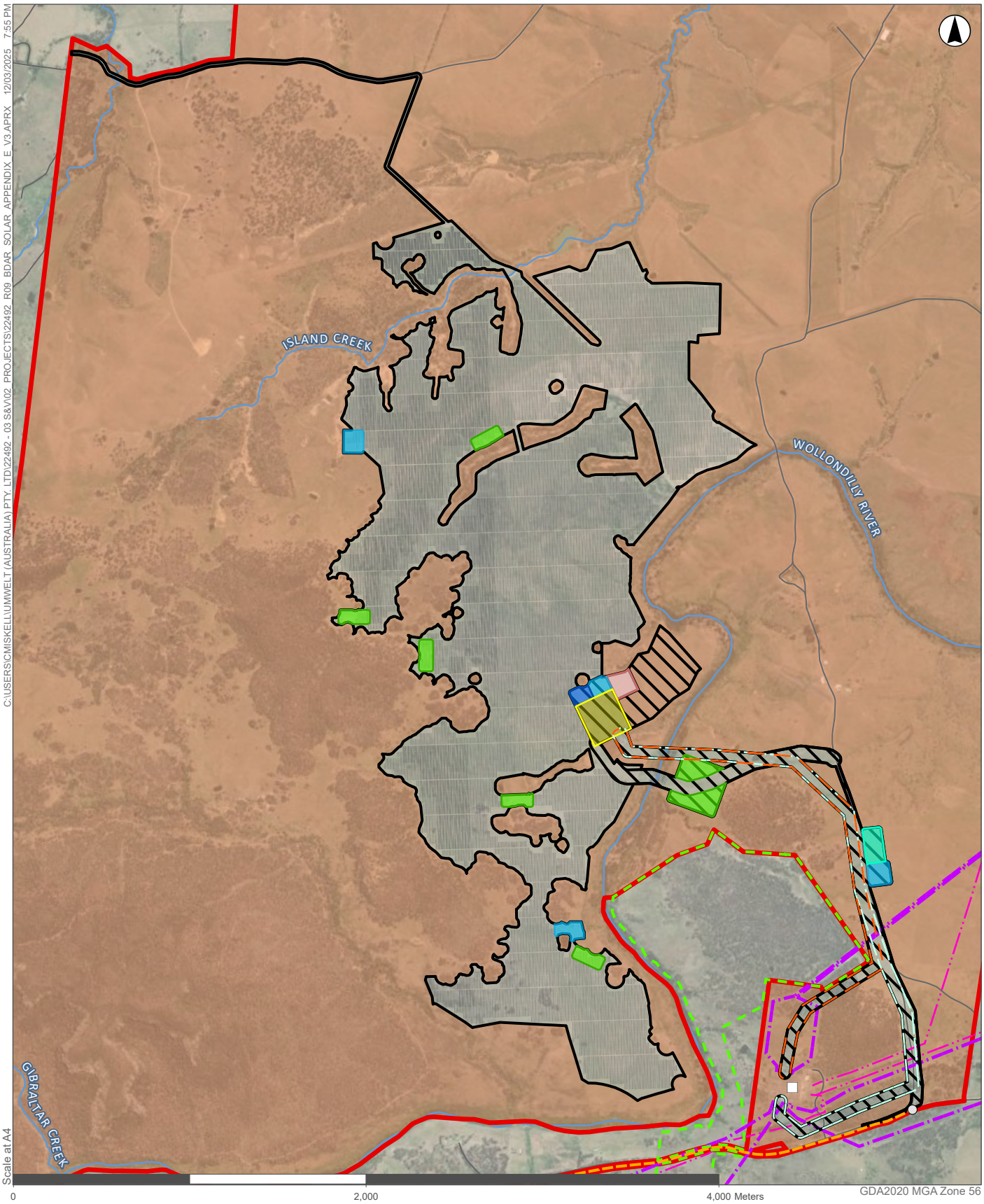
Stream Order

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

FIGURE 1.1

Site Map

Image Source: ESRI Basemap (2024) **Data source:** NSW LPI (2024), NSW DSFI (2024)



Legend

- Project Area
- Marulan Gas Fired Power Station Project Area
- Watercourse
- Existing Roads and Tracks
- Existing Substation

Existing Transmission Lines

- 330kV
- 132kV

- Solar Development Footprint
- BESS Development Footprint
- Retained / Impact Avoidance Areas
- Solar Array
- Proposed Transmission Line Option 1 Easement
- Proposed Transmission Line Option 2 Easement
- Access Road Works
- Access Points

- Solar Hybrid BESS
- Construction Compound
- Laydown Area
- O&M Facility
- Substation
- Test Bed

FIGURE 1.2

Development Layout

Image Source: ESRI Basemap (2024) **Data source:** NSW LPI (2024), NSW DSFI (2024)

1.2 Existing Environment and Hydrology

The Project Area is located within the headwaters of the Hawkesbury Nepean catchment, situated within the localised catchment of the Wollondilly River. The Project Area is located on undulating terrain, with the natural surface drainage generally from west to east across the Project Area through well-defined watercourses and drainage lines. Flow is conveyed towards the Wollondilly River, which flows along the southern, eastern and northeast boundary of the Project Area. The lowest elevation of the Project Area is along the north-eastern boundary, at approximately 520 m Australian Height Datum (AHD).

A ridgeline through the centre of the Project Area divides the northern region of the Project Area to discharge northeast to Wollondilly River, and the southern region of the Project Area to discharge south east to Wollondilly River. Mapped watercourses are well-defined within the Project Area and include (refer to **Figure 1.3**):

- Wollondilly River which flows from the south western corner to the eastern boundary of the Project Area.
- Dead Mans Creek along the northern Project Area boundary and Wattle Creek within the north-western region a tributary of Dead Mans Creek. Both waterways are north of the Development Footprint.
- Sandy Creek drains the north of the Project Area, a small portion of Sandy Creek crosses the Development Footprint for the north east access track.
- Island Creek flows north-east from the western boundary through the centre of the Project Area, a small area associated with a creek crossing occurs within the Development Footprint.
- There are a number of other unnamed watercourses all discharging into Wollondilly River in the south of the Project Area.

The topography across the Project Area includes valley floor, hillslopes, and ridges. The topography of the Project Area ranges from between 520 – 720 m AHD. The topography of the Development Footprint ranges from 580 m to 676 m AHD. The Tarlo River National Park is the closest national park which is nearby to the west of the Project Area and the Kerrawary Nature Reserve is also located to the north of the Project Area.

A number of ephemeral first and second order watercourses present within the Development Footprint will be impacted by the Project. Impacts to formalised and permanent watercourses have been avoided during the design process with the exception of river and creek crossings. One small farm dam will also be filled to facilitate the Project. Approximately 40 m portion of the Wollondilly River will be impacted directly and indirectly by the proposed works for upgrade of waterway crossing.

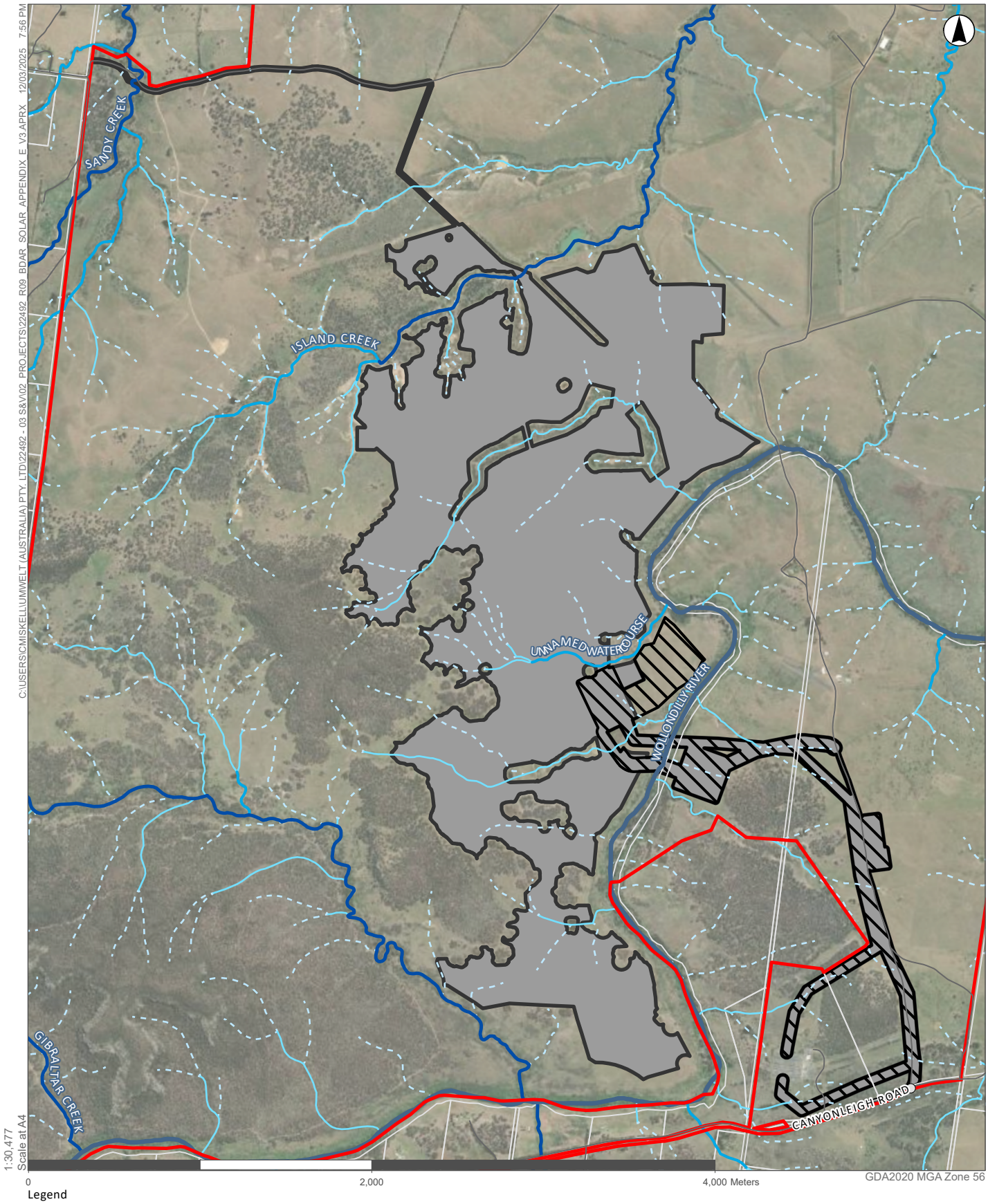


FIGURE 1.3

Hydrological and Topographic Features

Image Source: ESRI Basemap (2024) **Data source:** NSW LPI (2024), NSW DSFI (2024)

1.3 Purpose and Scope of this Report

This aquatic assessment has been prepared as part of the BDAR documentation for the Wattle Creek Solar Farm (SSD-63344210) and Wattle Creek Battery Energy Storage System (BESS) (SSD-63345458) to address the Secretary's Environmental Assessment Requirements (SEARs) in relation to Biodiversity. This report provides an assessment of the aquatic biodiversity values of the Project Area, documents the application of the avoid, minimise and offset framework and assesses the likely aquatic biodiversity impacts of the Project. Specifically, this assessment:

- describes the existing aquatic environment in terms of ecological values, including type and condition of aquatic habitats and groundwater dependent ecosystems (GDE)
- determines the presence or likelihood of occurrence of threatened species, populations and Endangered Ecological Communities (EECs) as listed under the *Fisheries Management Act 1994* (FM Act)
- determines the presence or likelihood of occurrence of Matters of National Environmental Significance (MNES) as listed under the *Environment Biodiversity and Conservation Act 1999* (EPBC Act), relevant to the aquatic environment
- identifies threatened fish species, populations and ecological communities within the Development Footprint that have the potential to be impacted by the Project
- assesses the impact of the Project on aquatic species and ecosystems
- provides measures to mitigate any direct or indirect impacts to the aquatic ecology of the Development Footprint and downstream environments.

1.4 Statutory Context, Policy and Guidelines

1.4.1 NSW *Environmental Planning and Assessment Act 1979*

The EP&A Act and the Environmental Planning and Assessment Regulation 2021 (the Regulation) provide the framework for development assessment in NSW. The EP&A Act and the Regulation include provisions to ensure that the potential environmental impacts of a development are considered in the decision-making process prior to proceeding to construction.

1.4.2 NSW *Fisheries Management Act 1994*

The FM Act provides for the conservation, protection and management of fisheries, aquatic systems and habitats in NSW. The FM Act establishes mechanisms for:

- the listing of threatened species, populations and ecological communities or key threatening processes
- the declaration of critical habitat
- consideration and assessment of threatened species impacts in the development assessment process.

Division 3 of the FM Act provides for the conservation of the biodiversity of fish and aquatic vegetation and protection of fish habitat though management of dredging and reclamation works. Upgrades of waterway structures such as bridges or culverts and the upgrade or construction of waterway crossings would require 'dredging' (excavation of water / land or removal of material from water / land) or 'reclamation' (using material to fill/reclaim or depositing material to construct anything other than water / land). **Section 3.2** of this report describes aquatic habitats and **Section 4.0** describes the impacts of the proposed works within the waterways.

1.4.3 Commonwealth *Environment Protection and Biodiversity Conservation Act 1999*

The EPBC Act is the primary piece of Federal legislation relating to the environment. Under the EPBC Act any 'action' that is, has, or is likely to have, a significant impact on a MNES requires approval from the Commonwealth Minister for the Environment. An 'action' is defined as a project, development, undertaking, activity (or series of activities), or alteration of any of these. These matters are:

- listed threatened species and communities
- migratory species protected under international agreements
- Ramsar wetlands of international importance
- the Commonwealth marine environment
- World Heritage properties
- National Heritage places
- Great Barrier Reef Marine Park
- nuclear actions
- a water resource, in relation to coal seam gas development and large coal mining development.

Both Projects were referred to the Commonwealth Department of Climate Change, Energy, the Environment and Water (DCCEEW) to determine whether it will be considered a Controlled Action and require approval under the EPBC Act. While both Projects were determined to be a controlled action (Wattle Creek Solar Farm (EPBC 2024/09969) and Wattle Creek BESS Project (EPBC 2024/09970)), the impacts to threatened fish species listed as MNES were not considered significant. Further information on MNES is provided in Section 8.3 and Appendix A of each BDAR.

1.4.4 Secretary's Environmental Assessment Requirements

The SEARs issued in September 2024 for the Solar Farm and BESS Project requests that the EIS includes:

- an assessment of the likely impacts on listed aquatic threatened species, populations or ecological communities, scheduled under the FM Act, and a description of the measures to minimise and rehabilitate impacts.

The NSW Department of Primary Industries and Regional Development (previously Department of Primary Industries (DPI) Fisheries) identified that the environmental assessment should specifically address impact on the aquatic ecology and controls to be established for permanent access tracks, temporary access tracks or powerlines in or adjacent to key fish habitats such as the Wollondilly River, Dead Mans' Creek, Wattle Creek, Sandy Creek and Island Creek.

The aquatic ecological assessment should cover assessment requirements as outlined in Chapter 3 of the Policy and Guidelines for Fish Habitat Conservation and Management (DPI 2013) including:

- Details of key fish habitats of the development site, waterway classification as defined in Tables 1 and 2 of the Policy and Guidelines for Fish Habitat Conservation and Management (DPI 2013).
- Location details of all temporary and permanent infrastructure and construction activities.
- Mapping of key fish habitat types.
- Description, quantification and mapping of all aquatic and riparian vegetation communities potentially impacted by the development. This should include an assessment of the extent and condition of aquatic and riparian vegetation and the presence of significant habitat features (e.g. gravel beds, snags, reed beds, rock bars etc).
- Mitigation measures during construction and operation:
    - Waterway crossing should be in accordance with DPI Fisheries the Policy and Guidelines for Fish Habitat Conservation and Management (DPI 2013) and the Policy and Guidelines for Fish Friendly Waterway Crossings (DPI 2003)
    - Appropriate terrestrial buffer zones to key fish habitats e.g. 100 m buffer zones for Type 1 Class 1 key fish habitats; 50 m for Type 2 Class 2–3 and 10 m to 50 m for Type 3 Class 3–4.

2.0 Methods

2.1 Literature and Database Review

The following ecological database searches were undertaken to determine whether threatened species or aquatic communities had been previously identified in the local area:

- a 10 km buffer search from the Commonwealth DCCEEW Protected Matters Search Tool (refer to Appendix A of the BDARs (Umwelt 2025a, Umwelt 2025b).
- DPI threatened species distribution maps (DPI 2024) Key Fish Habitat mapping as prepared by DPI
- a search of the groundwater dependent ecosystems atlas (BOM 2024)
- online publications and determinations for threatened fish, endangered populations and ecological communities as listed under the FM Act and the EPBC Act.

The information obtained was used to assist in the description of ecological context, assessment of potentially occurring threatened species, endangered populations (EPs) and Threatened Ecological Communities (TECs).

2.2 Aquatic Habitat Survey

Preliminary mapping of the broad scale aquatic habitats within the Development Footprint was undertaken using recent aerial photography in conjunction with topographic maps. Topographic maps were used to gain a broad understanding of catchment characteristics including adjacent land use, elevation, distance from source and location of barriers to fish passage, such as dams and weirs. A targeted survey of the aquatic habitat characteristics of watercourses within the Development Footprint was undertaken during field surveys, and indicators of stream condition were noted. Habitat features and stream condition indicators assessed included:

- characteristics of bed substrate
- presence of in-stream woody debris
- depth of water
- width of channel
- presence of pool, riffle and edge habitats
- height of bank and evidence of erosion
- colour and clarity of water, and any visual evidence of water quality
- characteristics of in-stream, riparian and floodplain vegetation.

Aquatic assessments surveys were undertaken at all third order and higher waterways at the proposed crossing points and an area immediately upstream and downstream.

2.3 Key Fish Habitat Classification

One of the key objectives of the FM Act is to conserve key fish habitat however the FM Act does not define key fish habitat. Chapter 3 of DPI Fisheries Policy and Guidelines for Fish Habitat Conservation and Management (DPI 2013) outlines an approach to define key fish habitat, habitat sensitivity and waterway classification. The approach is summarised below and has been used to identify and classify key fish habitat in the Development Footprint.

2.3.1 Habitat Sensitivity

Chapter 3 of DPI Fisheries Policy and Guidelines for Fish Habitat Conservation and Management (2013) provides a definition of the importance of habitat to the survival of fish or classification of fish habitat sensitivity to development. Definitions for habitats considered key fish habitats for the purposes of the FM Act and the Fisheries Policy and Guidelines for Fish Habitat Conservation and Management (2013) are provided in **Table 2.1.**

Table 2.1 Key Fish Habitat and Associated Sensitivity Classification

Type 1 Highly Sensitive Key Fish Habitat	Type 2 Moderately sensitive key fish habitat	Type 3 Minimal sensitive key fish habitat	Not key fish habitat
• *Posidonia australis* • *Zostera, Heterozostera, Halophila* and *Ruppia* species of seagrass beds >5 m^2 in area • Coastal saltmarsh >5 m^2 in area • Coral communities • Coastal lakes and lagoons that have a natural opening and closing regime (i.e. are not permanently open or artificially opened or are subject to one off unauthorised openings) • Marine park, an aquatic reserve or intertidal protected area • SEPP 14 coastal wetlands, wetlands recognised under international agreements (e.g. Ramsar, JAMBA, CAMBA, ROKAMBA wetlands), wetlands listed in the Directory of Important Wetlands of Australia • **Freshwater habitats that contain in-stream gravel beds, rocks greater than 500 mm in two dimensions, snags greater than 300 mm in diameter or 3 metres in length, or native aquatic plants** • **Any known or expected protected or threatened species habitat or area of declared 'critical habitat' under the FM Act** • Mound spring	• *Zostera, Heterozostera*, *Halophila* and *Ruppia* species of seagrass beds <5 m^2 in area • Mangroves • Coastal saltmarsh <5 m^2 in area • Marine macroalgae such as *Ecklonia* and *Sargassum* species • Estuarine and marine rocky reefs • Coastal lakes and lagoons that are permanently open or subject to artificial opening via agreed management arrangements (e.g. managed in line with an entrance management plan) • Aquatic habitat within 100 m of a marine park, an aquatic reserve or intertidal protected area • Stable intertidal sand/mud flats, coastal and estuarine sandy beaches with large populations of in-fauna • **Freshwater habitats and brackish wetlands, lakes and lagoons other than those defined in TYPE 1** • Weir pools and dams up to full supply level where the weir or dam is across a natural waterway	• Unstable or unvegetated sand or mud substrate, coastal and estuarine sandy beaches with minimal or no in-fauna • **Coastal and freshwater habitats not included in TYPES 1 or 2** • **Ephemeral aquatic habitat not supporting native aquatic or wetland vegetation**	• First and second order streams on gaining streams (based on the Strahler method of stream ordering) • Farm dams on first and second order streams or unmapped gullies • Agricultural and urban drains • Urban or other artificial ponds (e.g. evaporation basins, aquaculture ponds) • Sections of stream that have been concrete-lined or piped (not including a waterway crossing) • Canal estates

2.3.2 Waterway Classification

Waterway classification scheme describes the functionality of the waterway as key fish habitat based on hydraulic geometry, frequency of stream flows, presence of aquatic habitats, presence of threatened or protected fish and other native fish, and connectivity. The waterway classification is used to make recommendations to minimise impacts on fish habitats in particular avoiding and minimising blocking fish passage.

Waterway classifications summarised in **Table 2.2** have been used to classify waterways in the Development Footprint.

Table 2.2 Classification of Waterways for Fish Passage (DPI 2013)

Classification	Characteristics of waterway
CLASS 1 – Major key fish habitat	Marine or estuarine waterway or permanently flowing or flooded freshwater waterway (e.g. river or major creek), habitat of a threatened or protected fish species or 'critical habitat'.
CLASS 2 – Moderate key fish habitat	Non-permanently flowing (intermittent) stream, creek or waterway (generally named) with clearly defined bed and banks with semi-permanent to permanent waters in pools or in connected wetland areas. Freshwater aquatic vegetation is present. TYPE 1 and 2 habitats present.
CLASS 3 – Minimal key fish habitat	Named or unnamed waterway with intermittent flow and sporadic refuge, breeding or feeding areas for aquatic fauna (e.g. fish, yabbies). Semi-permanent pools form within the waterway or adjacent wetlands after a rain event. Otherwise, any minor waterway that interconnects with wetlands or other CLASS 1–3 fish habitats.
CLASS 4 – Unlikely key fish habitat	Waterway (generally unnamed) with intermittent flow following rain events only, little or no defined drainage channel, little or no flow or free-standing water or pools post rain events (e.g. dry gullies or shallow floodplain depressions with no aquatic flora present).

3.0 Results

3.1 Literature and Database Review

A review of DPI Fisheries spatial portal identified that the following third order and higher watercourses in the Project Area have been mapped as key fish habitat as shown in **Figure 1.3**:

- Dead Mans Creek
- Wattle Creek
- Sandy Creek and third order and fourth order tributaries
- Island Creek
- Third order tributary of Wollondilly River near the solar array
- Third order tributaries of Wollondilly River in the south west of the Project Area.

A review of DPI Fisheries spatial portal threatened freshwater fish species predicted occurrence mapping identified that no threatened freshwater fish as listed under the FM Act occur in the key fish habitat in the Project Area. While the threatened fish Macquarie perch (*Macquaria australasica*) is predicted to occur in Wollondilly River potential habitat is over 25 km downstream of the Project Area boundary.

The Commonwealth PMST search for the Project (refer to Appendix A1 of the BDAR) identifies two threatened fish species:

- Macquarie perch, endangered fish species with habitat known to occur in the area.
- Australian grayling (*Prototroches maraena*) vulnerable species that may occur within the locality.

3.2 Aquatic Habitat in the Development Footprint

3.2.1 Waterway Classification

Rapid aquatic habitat assessments were conducted across the Development Footprint at third order and higher waterways where impacts are likely to occur for waterway crossing upgrades, to characterise the type and quality of aquatic habitats.

An assessment of the aquatic habitat at each of the survey sites was undertaken, and indicators of stream condition noted. Habitat features and stream condition indicators assessed include:

- topography
- water level (height of bank and evidence of erosion)
- shading of the river
- riparian vegetation (percent cover of upper, middle and lower stratum)

- stream width (minimum, maximum, mode)
- stream depth (minimum, maximum, mode)
- identification of macrophytes
- percent cover of aquatic vegetation (algae, moss, macrophytes)
- percent cover of detritus
- description of natural substrate (percent bedrock, boulder, cobble, clay etc)
- per cent of total macrophytes that are submerged, emergent or floating
- presence of drought and flood refuge areas
- presence of pool, riffle and edge habitats
- presence of natural or artificial barriers to fish passage upstream and downstream
- visual assessment of disturbance related to human activities for:
    - water quality
    - instream habitat
    - riparian zone
    - catchment assessment.
- visual assessments are ranked using the following categories:
    - no evidence of disturbance
    - little disturbance
    - moderate disturbance
    - high disturbance
    - extreme disturbance.

Table 3.1 Habitat Values and Waterway Classification of Third Order and Higher Waterways

Waterway	Stream order in Development Footprint	Riparian Vegetation	Habitat features in Development Footprint	Waterway classification	Waterway Type
Wollondilly River	5th order or higher	Fringed by mature river oak (*Casuarina cunninghamia*) on banks with mostly exotic understorey by exotic pasture grasses and agricultural weeds.	At crossing point there are two smaller channels converging into one. Defined banks with minimal vegetation (refer to **Photo 3.1**). Runs and riffles are present. Patches of rocky areas with small rapids upstream (refer to **Photo 3.2**) opening to a wide pool (up to 20 m wide) slow flowing pool with gravel bottom (refer to **Photo 3.3**). Woody debris from previous floods in stream (**Photo 3.1**). The Wollondilly River has been observed with varying degrees of water volumes, with the exiting crossing passable with a 4-wheel drive in dryer conditions. No macrophytes were observed during surveys. Existing weir approximately 3 km upstream.	Class 1	Type 1
Island Creek	4th order	Highly disturbed riparian vegetation dominated by blackberry and serrated tussock.	Defined wide channel with evidence of erosion. Ephemeral, shallow water not flowing at time of inspection (refer to **Photo 3.4**). Negligible aquatic habitat value. Farm dam downstream limits habitat value. No macrophytes were observed during surveys.	Class 4 unlikely key fish habitat	Type 3

Waterway	Stream order in Development Footprint	Riparian Vegetation	Habitat features in Development Footprint	Waterway classification	Waterway Type
Sandy Creek	4th order	Highly disturbed woodland riparian vegetation with patches of Box gum woodland, canopy species including E*ucalyptus amplifoila* and *Eucalyptus viminalis, understorey* dominated by exotic pasture grasses and agricultural weeds.	Defined wide channel with evidence of erosion. Existing creek crossing with areas of gravel. Some small areas of aquatic habitat upstream of existing crossing. No macrophytes were observed during surveys.	Class 4 unlikely key fish habitat	Type 3
Unnamed watercourse, tributary of Wollondilly River	3rd order	Highly disturbed riparian vegetation dominated by blackberry and serrated tussock. Patches of *Casuarina cunninghamia* occur in the eastern stretches of the watercourse within proximity to Wollondilly River as shown in **Photo 3.8.**	The defined banks of the unnamed watercourse stops to the east of the Development Footprint (i.e. the watercourse does not exist within the Development Footprint). Banks with evidence of erosion. In cleared grassland shown in **Photo 3.6.** Negligible aquatic habitat value. Farm dams instream. No macrophytes were observed during surveys.	Class 4 unlikely key fish habitat	Type 3



Photo 3.1 Wollondilly River at crossing point, looking upstream from the western bank



Photo 3.2 Rocky areas in Wollondilly River upstream of crossing point taken from the western bank



Photo 3.3 **Still pool in Wollondilly River upstream of rocky areas at the crossing point taken from the western bank**



Photo 3.4 **Wollondilly River from the eastern bank, lower volumes of water**



Photo 3.5 **Existing crossing point on Island Creek**



Photo 3.6 **Photo at the western extent of the ephemeral unnamed watercourse north of the BESS, creek bed dry at the time of survey**



Photo 3.7 **Small isolated pools in the defined creek bed of the unnamed watercourse north of the BESS**



Photo 3.8 **Unnamed watercourse approximately 200 m west of the confluence of the Wollondilly River (outside the Development Footprint)**



Photo 3.9 Existing creek crossing at Sandy Creek

With the exception of Wollondilly River, minimal key fish habitat occurs in the Development Footprint. There are small semi-permanent pools along Island Creek that may occasionally provide fish habitat after rainfall. With the exception of Wollondilly River, all waterways within the Development Footprint are ephemeral and habitats within these watercourses were considered marginal for locally occurring fish species.

Access to the Solar Farm and BESS requires upgrade of an existing shallow crossing of the Wollondilly River. The Wollondilly River is classified as a Type 1, Class 1 major key fish habitat permanently flowing waterway. While threatened fish species have not been predicted to occur in this reach of the river, the river provides habitat for protected fish species. It is classed as 'very poor habitat'.

3.2.2 Threatened Species, Populations and Ecological Communities

As discussed above, aquatic habitats in the Development Footprint are considered minimal key fish habitat except for the Wollondilly River. The outcome of the database searches returned two fish species that were deemed to have potential habitat within or in proximity to the Development Footprint – the Macquarie perch (*Macquaria australasica*) and the Australian grayling (*Prototroctes maraena*).

3.2.2.1 Macquarie Perch

The Macquarie perch (*Macquaria australasica*) and/or its habitat is reported in the PMST search as being known to occur within the Project Area. The species is also mapped as having potential to occur downstream of the Project Area by DPI (2024). This species is listed as endangered under the EPBC Act and the FM Act. The species is generally found in larger river systems of NSW such as the Macquarie, Murrumbidgee, Lachlan and Border Rivers (MDBA 2007).

While no targeted searches for this species were undertaken, habitat for this species is present in the Project Area only within the Wollondilly River. Potential habitat was identified in the form of slow-flowing, deeper sections of the river with rocks, cobbles and overhanging vegetation. While it is considered unlikely that the species would occur, as NSW DPI (2024) mapped the species as potentially occurring it cannot be ruled out in the absence of extensive survey.

An assessment of significance in accordance with the FM Act has been conducted as a precaution in **Section 4.1**.

3.2.2.2 Australian Grayling (*Protoroctes maraena*)

The Australian grayling (*Protoroctes maraena*) and/or its habitat is reported in the PMST search as being likely to occur within proximity to the Project Area. The species is also mapped as having potential to occur in the vicinity of the Development Footprint by DPI (2024). This species is listed as vulnerable under the EPBC Act and as endangered under the FM Act. The species is mapped as occurring in the Shoalhaven River, which will not be directly impacted by the Project.

While no targeted searches for this species were undertaken, habitat for this species is present within proximity to the Development Footprint. The lack of permanent water reduces the likelihood of the species occurring, however potential habitat was identified in the form of slow-flowing, deeper creeks with rocks, cobbles and overhanging vegetation. While it is considered unlikely that the species would occur, and considering it is generally found in larger river systems of NSW such as the Macquarie, Murrumbidgee, Lachlan and Border Rivers (MDBA 2007), as NSW DPI (2024) mapped the species as potentially occurring it cannot be ruled out in the absence of extensive survey.

While it is considered unlikely that this species would be present, an assessment of significance in accordance with the FM Act has been conducted as a precaution in **Section 4.1**.

3.3 Groundwater Dependent Ecosystems

A GDE is an ecosystem which is dependent on the availability of groundwater to maintain structure and function. Terrestrial (including riparian vegetation) GDEs are dependent on the subsurface presence of groundwater to a depth of 10 m BGL. Aquatic GDEs are dependent on surface water's interaction with groundwater. Ecosystems are classified as:

- High potential ecosystems which have a high (strong possibility) of groundwater interaction.
- Moderate potential ecosystems which have a moderate potential for groundwater interaction.
- Low potential ecosystems which have a low (unlikely) potential for groundwater interaction.

According to the Groundwater Dependent Ecosystem (GDE) Atlas (BOM, 2017), the Project Area is mapped as containing GDEs. Aquatic GDEs are mapped within Wollondilly River and recorded as high potential from a national assessment (DPE, 2012).

Aquatic GDEs are present within the watercourses that transverse the Project Area and along the Project Area boundary, where the boundary follows the surrounding watercourses. Within the Project Area, there is a high potential for aquatic GDEs along Island Creek, Sandy Creek, Dead Mans Creek and Wollondilly River. Portions of the Project Area are mapped as having moderate potential for GDEs within Wollondilly River, Sandy Creek, and Wattle Creek.

Terrestrial GDEs mapped within the southern region of the Project Area. Majority of the terrestrial GDEs are considered to have a low potential of occurrence in the south-west, south-east and central west regions of the Project Area. High and moderate potential GDEs are mapped within the south-west and south-east regions, as well as along the Wollondilly River.

Of the four Plant Community Types listed in Section 8.2 of the BDAR, none are considered to be GDEs, such that they would be placed at risk of extinction should water levels fluctuate within the creeks, tributaries and drainage lines in the Development Footprint.

No other aquatic matters of national environmental significance (MNES) are likely to occur, and no further assessment of EPBC Act listed threatened aquatic species or communities has been conducted within this report.

Groundwater Vulnerability

Groundwater vulnerability is described by the NSW Government (2023) as the vulnerability or risk of aquifers to contamination, relating to physical characteristics of the location, such as the depth to the water table and soil type. Mapping provided by the NSW Government was reviewed for groundwater vulnerability within and surrounding the Project Area. There are no groundwater vulnerability areas mapped for the Project Area (DPE, 2014).

In total there are no registered groundwater bores located within the Project Area (BoM, 2023). The drilled depth of water supply and stock and domestic bores is reported at the adjacent ranges between 36 m and 120 m.

The regional water table is relatively deep located at least 20 m below ground level (BGL). Localised perched groundwater systems are still possible. No salinity data was provided from the registered bores, so groundwater quality in the Project Area is unknown.

4.0 Impact Assessment

Potential impacts associated with the Project that could affect aquatic ecosystems include the following:

- construction of crossings over the Wollondilly River, Sandy Creek and Island Creek
- removal of riparian vegetation, potential removal of snags and in-stream vegetation
- potential for increased downstream sediment load
- risk of spills and pollution associated with construction equipment working in and in the vicinity of the watercourse
- changes to water quality downstream environments.

The direct impact of the Project on riparian vegetation has been assessed in the main body of the BDAR in accordance with the BAM. Further assessment of the loss of riparian vegetation is therefore not required in this report.

4.1 Threatened Species, Populations and Communities

The FM Act provides for the conservation, protection and management of fisheries, aquatic systems and habitats in NSW. The FM Act establishes mechanisms for:

- the listing of threatened species, populations and ecological communities or key threatening processes
- the declaration of critical habitat
- consideration and assessment of threatened species impacts in the development assessment process.

One FM Act listed threatened aquatic fauna species is known to occur within the Development Footprint (*Macquarie perch*) and potential habitat for this species was identified. As discussed below, the Project is predicted to result in a negligible impact to flow in local creeks and no water quality impacts are predicted. An Assessment of Significance in accordance with Section 221ZV of the FM Act is provided in **Table 4.1** which concludes that the Project is unlikely to result in a significant impact on the Macquarie perch.

Potential habitat for the Australian grayling was identified within proximity to the Project Area. However, as this occurs outside of the Development Footprint, the Project is unlikely to directly impact the species.

No additional threatened aquatic flora or fauna species, populations or EECs have potential to occur within the Development Footprint. The surface water and groundwater impacts associated with the Project are not expected to result in an adverse impact on threatened species, endangered populations or ecological communities listed under the FM Act.

Table 4.1 Assessment of Significance under the FM Act for the Macquarie Perch

Macquarie perch (*Macquaria australasica*) and Australian grayling (*Protoroctes maraena*)	
(a) in the case of a threatened species, whether the proposed development or activity is likely to have an adverse effect on the life cycle of the species such that a viable local population of the species is likely to be placed at risk of extinction	While the Project may disrupt suitable habitat for the Macquarie perch (*Macquaria australasica*) and Australian grayling (*Protoroctes maraena)* during construction, it is considered unlikely to cause substantial adverse impact to the species, such that a viable population would be placed at risk of extinction. The Project is likely to cause some short-term noise disruption, but this should only persist during construction. The proposed crossing over Wollondilly River will incorporate integrated culverts to allow water flow of the river and to allow fish passage.
(b) in the case of an endangered population, whether the proposed development or activity is likely to have an adverse effect on the life cycle of the species that constitutes the endangered population such that a viable local population of the species is likely to be placed at risk of extinction	Not applicable.
(c) in the case of an endangered ecological community or critically endangered ecological community, whether the proposed development or activity—	Not applicable.
(i) is likely to have an adverse effect on the extent of the ecological community such that its local occurrence is likely to be placed at risk of extinction, or	Not applicable.
(ii) is likely to substantially and adversely modify the composition of the ecological community such that its local occurrence is likely to be placed at risk of extinction	Not applicable.
(d) in relation to the habitat of a threatened species, population or ecological community—	-
(i) the extent to which habitat is likely to be removed or modified as a result of the proposed development or activity, and	A minor area of marginal potential habitat is likely to be impacted as a result of the Project, through the installation of a crossing over Wollondilly River. The alteration of habitat is not considered substantial such that it would place these species at risk of extinction.
(ii) whether an area of habitat is likely to become fragmented or isolated from other areas of habitat as a result of the proposed development or activity, and	No fragmentation will occur as a result of the Project in the long term. The integrated culverts of the crossing installation will facilitate reduced interruption to water flow and water quality is not predicted to be affected, allowing for continued dispersal both upstream and downstream.
(iii) the importance of the habitat to be removed, modified, fragmented or isolated to the long-term survival of the threatened species, population or ecological community in the locality	The habitat present is not considered to be important to this species, given that it typically occurs in large water bodies such as the Murrumbidgee, Macquarie, Lachlan and Border Rivers (MDBA 2007). The potential habitat identified is considered to be marginal due to the general lack of permanent, slow flowing pools and instream aquatic vegetation.

Macquarie perch (*Macquaria australasica*) and Australian grayling (*Protoroctes maraena*)	
(e) whether the proposed development or activity is likely to have an adverse effect on any critical habitat (either directly or indirectly)	Critical habitat for the Macquarie perch (*Macquaria australasica*) or the Australian grayling (*Protoroctes maraena*) is not present within the Development Footprint.
(f) whether the proposed development or activity is consistent with a Priorities Action Statement	The Project is consistent with a Priorities Action Statement.
(g) whether the proposed development constitutes or is part of a key threatening process or is likely to result in the operation of, or increase the impact of, a key threatening process.	The Project may result in, or increase the impact of the following: • degradation of riparian vegetation along NSW water courses • installation and operation of instream structures and other mechanisms that alter the flow regimes of rivers and streams. However, the operation of both of these key threatening process can be managed to minimise impacts to riparian vegetation through micrositing of waterway crossings to avoid direct or indirect impacts and design and installation of waterway crossings that minimise alteration of flow regimes.
Conclusion	Given the above, it is considered that the Project is unlikely to result in a significant impact on the Macquarie perch (*Macquaria australasica*) or the Australian grayling (*Protoroctes maraena*).

4.2 Avoidance, Minimisation and Mitigation Measures

4.2.1 Impact Avoidance and Minimisation Measures

The key impact avoidance and minimisation strategies implemented by Spark Renewables during the early stages of design development included the mapping of key constraints in order to establish a 'buildable area'. This was an area defined by Spark Renewables beyond which Project solar farm PV modules and ancillary infrastructure would not occur. It was established based on:

- General avoidance of vegetation onsite including significant vegetation areas on the north-east and south west of project Area with focusing on utilising Category 1 exempt land as far as practicable.
- A variable buffer to existing and proposed infrastructure and 500 m buffer to all Host landholder dwellings.
- 50 m buffer to Wollondilly River (except for the proposed road crossing).
- A 100 m buffer either side of the existing 330 kV / 132 kV transmission line alignments (600 m total).
- Avoidance of any land that is used for irrigation cropping.
- Application of a drone exclusion zone that is used for research and training activities by the UoS.

- PV panel locations located were selected to be compatible with existing land uses and topographic constraints.

The key strategies implemented by Spark Renewables during the Scoping stage to avoid and minimise impacts includes:

- Locating the Solar Farm and associated ancillary infrastructure within existing areas of cleared land to avoid native vegetation clearing as far as reasonably practicable.
- Maintaining a balance of functional agricultural land by utilising land which has lower productivity and avoiding higher value cropping areas (in addition, sheep grazing will also continue underneath solar panels).
- Locating the Solar Farm and associated ancillary infrastructure to avoid sensitive archaeological areas where possible and ensure an appropriate buffer is applied. This was based on the outcomes of the desk-based Heritage Constraints Assessment (refer to Appendix 6).
- Aligning the Development Footprint with existing roads to avoid areas of remnant vegetation.

DPI Fisheries Policy and Guidelines for Fish Habitat Conservation and Management (2013) recommends buffers to key fish habitat to avoid and minimise impacts to key fish habitat. Buffer zones fall into the following categories:

- TYPE 1, CLASS 1: 100 m buffer zone
- TYPE 2, CLASS 2-3: 50 m buffer zone
- TYPE 3, CLASS 3-4: 10–50 m buffer zone.

Buffer zones are measured from the highest astronomical tide level in tidal areas or from the top of the bank/drainage depression along CLASS 1-3 waterways. The recommended buffers to waterways in and near the Development Footprint are listed in **Table 4.2. Table 4.2** also identifies the buffer realised to the Project Development Footprint, excluding any waterway crossings.

Table 4.2 Watercourses Types, Classes and Buffers

Waterway	Type	Class	Recommended buffer (DPI 2013)	Buffer realised in Project
Wollondilly River	Type 1	Class 1	100 m	Mostly 100 m buffer, with some minor areas of encroachment. Compliant with the 'averaging rule' outlined in Controlled activities – Guidelines for riparian corridors on waterfront land (DPE 2012)
Island Creek	Type 3	Class 4	10–50 m	50 m–100 m
Sandy Creek	Type 3	Class 4	10–50 m	no buffer required, creek crossed at a perpendicular angle on one occasion
Unnamed watercourse, tributary of Wollondilly River	Type 3	Class 4	10–50 m	30–40 m

4.2.2 Impact Mitigation Measures

A range of general mitigation measures are proposed to be employed within the Development Footprint during the construction phase to minimise impacts to aquatic ecological values, including:

- All Project personnel will undertake an induction that will include environmental management requirements.
- The approved construction footprint will be clearly demarcated and identified during the construction stage with survey pegs and at some locations with flagging, bunting or similar. Environmental features to be retained within the construction footprint will be similarly demarcated and identified. Specific erosion and sediment control plans will be developed for each project component following completion of geotechnical studies. Erosion and sediment control plans will be prepared in accordance with the APGA Code.
- Water management measures consistent with the APGA Code of Environmental Practice (2017) will be employed during the construction of the Project.
- Any large woody debris or boulders located within the construction footprint of watercourses to be trenched are to be temporarily relocated during construction and returned to the watercourse during reinstatement, at locations where scour risk can be avoided.
- A Soil and Water Management Plan (SWMP) will be prepared and incorporated into the Project CEMP.

5.0 Conclusion

This aquatic ecological assessment for the Project has been prepared based on a combination of field investigations and a review of available aerial photographs, topographic maps, databases, literature, policies and guidelines. The Project crosses Wollondilly River, and several un-named watercourses. While the watercourses are between first and fourth order streams, they are characterised by ephemeral patterns of flow and water levels exacerbated by heavily cleared catchments and prevalence of agricultural land uses. Waterways were classified in accordance with the Policy and Guidelines for Fish Habitat Conservation and Management (DPI 2013) and un-named tributaries occurring within the Development Footprint have been classified as not sensitive and are not considered as a key watercourse for fish passage.

Habitat for two threatened species listed under the FM Act is identified as having potential to occur in ecosystems of the Development Footprint, the Macquarie perch and Australian grayling. Adverse surface water and groundwater impacts are not predicted to adversely affect potential habitat for these species. The assessment has considered the impact of the proposal on aquatic MNES as listed under the EPBC Act. No nationally listed threatened aquatic species, endangered populations, TECs or aquatic migratory species are expected to occur in the watercourses within or adjacent to the Development Footprint.

The Project is not expected to result in adverse surface water impacts or in the downstream environments of the Development Footprint. Therefore, the Project is not expected to have an adverse effect on downstream surface water resources such that aquatic biodiversity would be adversely impacted. Overall, no aquatic biodiversity is anticipated to be adversely impacted due to the Project.

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