

KINGSWOOD BATTERY ENERGY STORAGE SYSTEM

Appendix F
Biodiversity Development Assessment Report

June 2024
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Kingswood Battery Energy Storage System

Biodiversity Development Assessment Report

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

As an accredited person (BAAS 20012) I certify that this report has been prepared on the basis of the requirements of (and information provided under) the Biodiversity Assessment Method and that this date is within 14 days of the date the report is so submitted.



Elvira Lanham

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Acronyms and Abbreviations

Term	Definition
AOBV	Areas of Outstanding Biodiversity Value
BAM	Biodiversity Assessment Method
BC Act	NSW <i>Biodiversity Conservation Act 2016</i>
BDAR	Biodiversity Development Assessment Report
BOS	Biodiversity Offset Scheme
Subject land	The area of land subject to the proposed development which was surveyed during field inspections
DCCEEW	Commonwealth Department of Climate Change, Energy, the Environment and Water
DPE	Former Department of Planning and Environment
DPHI	Department of Planning, Housing and Infrastructure, previously the Department of Planning and Environment
DPI	NSW Department of Primary Industries
DPiE (EES)	Former NSW Department of Planning, Industry and Environment (Environment, Energy and Science)
CEEC	Critically Endangered Ecological Community
EIS	Environmental Impact Statement
EP&A Act	<i>Environmental Planning and Assessment Act 1979</i>
EPBC Act	Commonwealth <i>Environment Protection and Biodiversity Conservation Act 1999</i>
FM Act	NSW <i>Fisheries Management Act 1994</i>
GDE	Groundwater Dependent Ecosystem
IBRA	Interim Biogeographically Regionalisation of Australia
MNES	Matters of National Environmental Significance
NSW DCCEEW	NSW Department of Climate Change, Energy, the Environment and Water previously part of the Department of Planning and Environment
OEH	Former NSW Office of Environment and Heritage
PCT	Plant Community Type
SAII	Serious and Irreversible Impact
SEARs	Secretary's Environmental Assessment Requirements
SEPP	State Environmental Planning Policy
SSD	State Significant Development
SSI	State Significant Infrastructure
TBDC	Threatened Biodiversity Data Collection
TEC	Threatened Ecological Community
Tmw	Tamworth – Keepit Slopes and Plains Mitchell Landscape
TSC Act	<i>Threatened Species Conservation Act 1995</i> (Superseded)
VIS	Vegetation Information System

Executive Summary

Iberdrola Australia Development Pty Limited (Iberdrola) (the Proponent) is seeking development consent for the construction, operation and maintenance of a large-scale Battery Energy Storage System (BESS) at 744 Burgmanns Lane, Kingswood, New South Wales (NSW) 2340 (Lot 43 DP1064582). The BESS will have a capacity of up to 270 Megawatts (MW) and up to 1080 Megawatt-hours (MWh) of battery storage capacity (the Project).

The Project is considered to meet the definition of State Significant Development (SSD) under Clause 2.6 of the *State Environmental Planning Policy (Planning Systems) 2021*. The Project would be for electricity generating works on land that is permitted with development consent under Clause 2.35 of the *State Environmental Planning Policy (Transport and Infrastructure) 2021* and will have a capital investment value greater than \$30 million. The Proponent is seeking SSD approval for the Project under Part 4, Division 4.7 of the *Environmental Planning and Assessment Act 1979* (EP&A Act).

Under Section 7.9 of the *Biodiversity Conservation Act 2016* (BC Act), the development triggers entry into the NSW Biodiversity Offset Scheme (BOS) and a Biodiversity Development Assessment Report (BDAR) has been prepared. This BDAR is based on research and field surveys undertaken in October 2023. The biodiversity impacts and offset requirements for the Project were calculated using the Biodiversity Assessment Method Calculator (BAM Calculator) in accordance with the Biodiversity Assessment Method (BAM) (DPIE, 2020a).

The vegetation within the subject land comprises one Plant Community Type (PCT) and one vegetation community of that is not equivalent to any PCT – Category 1 land. Vegetation zones within the subject land, their associated Plant Community Types and their calculated vegetation integrity scores are provided below.

Vegetation zones within the subject land

PCT	Vegetation zone	Composition condition score	Structure condition score	Function condition score	Vegetation integrity score
3396 Northwest Flats Box-Blakelys Red Gum Forest	3396_Low	6.8	19.5	28.3	15.5
n/a	Category 1 land	0.6	0.5	13.2	1.6

The areas of PCT 3396 within the subject land forms part of the White Box- Yellow Box- Blakely's Red Gum Grassy Woodland and Derived Native Grassland in the NSW North Coast, New England Tableland, Nandewar, Brigalow Belt South, Sydney Basin, South Eastern Highlands, NSW South Western Slopes, South East Corner and Riverina Bioregion Critically Endangered Ecological Community (CEEC) listed under the BC Act. It does not meet the minimum condition threshold for inclusion in the equivalent Threatened Ecological Community (TEC) under the *Environmental Protection and Biodiversity Conservation Act 1999* (EPBC Act).

No threatened species were recorded within the subject land during field survey. Significant impact criteria assessments under the EPBC Act were not required as no Matters of National Environmental Significance (MNES) were being impacted by the Project.

Where impacts cannot be avoided, mitigation measures are proposed that would reduce adverse impacts on ecological values. These include appropriate sediment and erosion controls, avoiding and minimising removal of vegetation where practicable, site inductions, exclusion fencing, pre-clearance surveys and appropriate weed and hygiene protocols.

The offsets required for the Project were calculated using the BAM Calculator. Two ecosystem credits for 3396 – Northwest Flats Box-Blakelys Red Gum Forest are required to offset the impacts of the Project.

1 Introduction

1.1 Project overview

Iberdrola Australia Development Pty Limited (Iberdrola) (the Proponent) is seeking development consent for the construction, operation and maintenance of a large-scale Battery Energy Storage System (BESS) at 744 Burgmanns Lane, Kingswood, New South Wales (NSW) 2340 (Lot 43 DP 1064582) (the Project Site). The BESS will have a capacity of up to 270 Megawatts (MW) and up to 1080 Megawatt-hours (MWh) of battery storage capacity (the Project).

The Project is considered to meet the definition of State Significant Development (SSD) under Clause 2.6 of the *State Environmental Planning Policy (Planning Systems) 2021*. The Project would be for electricity generating works on land that is permitted with development consent under Clause 2.35 of the *State Environmental Planning Policy (Transport and Infrastructure) 2021* and will have a capital investment value greater than \$30 million.

The Proponent is seeking SSD approval for the Project under Part 4, Division 4.7 of the *Environmental Planning and Assessment Act 1979* (EP&A Act).

The Project Site is within the Tamworth Regional Local Government Area (LGA), around six kilometres southeast of Tamworth and two kilometres west-south-west of Calala town centre and borders the suburb of Calala.

The Project will involve construction and operation of the following:

- BESS including battery enclosures, inverters, transformers, switch gear and control building
- Onsite 33/330 kV substation to convert electricity between the high voltage transmission network and medium voltage BESS
- High voltage transmission connection (above ground and/or below ground) between the BESS and the Tamworth substation
- Ancillary infrastructure and mitigative features including:
 - Site access to the BESS from Ascot-Calala Road
 - Internal site access road and parking
 - Permanent office and staff amenities
 - Operations and maintenance building
 - Stormwater management infrastructure
 - Services and utilities
 - Lighting, fencing and security devices
 - Noise acoustic barriers
 - Asset protection zone
 - Landscaping and screening vegetation.

The BESS would operate 24 hours a day, seven days a week and be monitored remotely, with infrastructure maintenance undertaken onsite.

1.2 Assessment framework and purpose

The assessment was prepared in accordance with the requirements of the NSW Department of Planning and Environment (DPE), now the Department of Planning, Housing and Infrastructure (DPHI), which are set out in the Secretary's Environmental Assessment Requirements (SEARs) (SSD 59325460) for the Project, issued on 30

October 2023. The SEARs identify matters which must be addressed in the Environmental Impact Statement (EIS). This Biodiversity Development Assessment Report (BDAR) responds to SEARs relating to biodiversity. Table 1-1 lists requirements for the Project relevant to this assessment and references where they are addressed in this report or in the EIS.

Table 1-1: SEARs for the assessment of biodiversity

Requirement	Reference
Biodiversity	
an assessment of the biodiversity values and the likely biodiversity impacts of the project in accordance with Section 7.9 of the Biodiversity Conservation Act 2016 (NSW) (BC Act), the Biodiversity Assessment Method (BAM) 2020 and documented in a Biodiversity Development Assessment Report (BDAR), including a detailed description of the proposed regime for avoiding, minimising, managing and reporting on the biodiversity impacts of the development over time, and a strategy to offset any residual impacts of the development in accordance with the BC Act, unless BCD and DPE determine the proposed development is not likely to have any significant impacts on biodiversity values;	This report has been prepared in accordance with the Biodiversity Assessment Method 2020 (the BAM) (DPIE, 2020a) by an assessor that has been accredited under the BC Act. This report has been prepared to describe the biodiversity values present within the subject land and consider the potential impacts of the Project in accordance with the relevant policy and legislation. This BDAR uses the streamlined assessment module for small area developments outlined in Appendix C of the BAM (DPIE, 2020a). The small area module may be used where the minimum lot size associated with the property is less than 1000 ha but not less than 40 ha and less than or equal to 3 ha of native vegetation will be cleared. For the proposed development, the minimum lot size is 40 ha, and the area of native vegetation to be cleared is 0.16 ha.
an assessment of the likely impacts on listed aquatic threatened species, populations or ecological communities, scheduled under the <i>Fisheries Management Act 1994</i> , and a description of the measures to minimise and rehabilitate impacts	Section 8.5
the BDAR must document the application of the avoid, minimise and offset framework in accordance with the BAM; and	Chapter 7
if an offset is required, details of the measures proposed to address the offset obligation	Chapter 10 Chapter 11

This streamlined BDAR has been prepared by Elvira Lanham, an Accredited Person (BAAS 20012) under the New South Wales (NSW) *Biodiversity Conservation Act 2016* (BC Act).

1.3 Personnel and qualifications

Table 1-1 below lists the personnel and their roles in preparation of this BDAR.

Table 1-2: Relevant personnel

Personnel	Qualifications	Experience/Role
Elvira Lanham	PhD Reptile Ecology and Evolutionary Biology Flinders University of South Australia 2001; BS Environmental Science, Life Sciences (Honours) University of Wollongong 1994; Member, Australasian Network of Ecology and Transportation, Accredited BAM Assessor (BAAS 20012).	Elvira is an Associate Technical Director and the National Technical and Market lead for Ecology at Arcadis and has been involved in environmental consultancy and research for more than 27 years. Elvira has extensive project experience across QLD, NSW, Victoria and South Australia. She has been the project manager and primary author on more than 500 reports ranging from Environmental Impact Assessments, Review of Environmental Factors (REFs) and various biodiversity assessment reports including BDARs and BSSARs.
Brendan Fletcher	Master of Environmental Management, Juris Doctor (Environmental Law)	Brendan is a Senior Ecologist with two years of ecological consulting experience and over 20 years' experience in environmental law and policy. He has prepared multiple Biodiversity Development Assessment Reports and Flora and Fauna Assessments and has carried out field work to support Biodiversity Stewardship Site Assessments, Threatened Ecological Community mapping, and weed management strategies.
Ed Cooper	Bachelor of Science (Honours, Environmental Biology) Accredited BAM Assessor (BAAS 18047)	Ed is a Technical Director with more than 12 years' experience working in conservation land management and ecological consulting in NSW. As Lead Ecologist on several large-scale linear infrastructure and development projects, Ed has experience designing and implementing field surveys in accordance with relevant guidelines and authoring complex assessment reports. Ed has a strong understanding of Commonwealth and State statutory requirements including the ongoing NSW reforms.
Lizzy Buckby	Bachelor of Science (Ecology and Zoology) University of Queensland. Bachelor of Science- Ecology (Honours). University of Queensland.	Lizzy is a Senior Ecologist with over 9 years' experience in ecological consulting and conservation.

1.4 Subject land and development footprint

Subject land is defined in the BAM (DPIE, 2020a) as land subject to a development, activity, clearing, biodiversity certification or a biodiversity stewardship proposal. The subject land for the Project encompasses 54.19 ha. The subject land includes all areas that are or may potentially be used for the Project. It encompasses all areas that have been assessed within this BDAR. The subject land supports patches of native vegetation interspersed with cleared pasture and contains scattered patches of remnant native vegetation. The subject land includes land on Lot 43 DP 1064582, Lot 6 DP 219993, Lot 4 DP 244399 and Lot 3 DP 244399.

The **development footprint** is defined in the BAM as the area of land that is directly impacted by a proposed development, including access roads and areas used to store construction materials. The term is also taken to include the clearing footprint. For this project the development footprint includes two main components, the BESS facility and the transmission easement connection between the BESS facility and the Tamworth substation in Lot 6 DP 219993. As described below, the number and location of the Project components are subject to refinement through detailed design. For the purpose of this assessment, an indicative development footprint has been delineated. The area of the development footprint is 21.68 ha.

The BESS facility will be located entirely within Lot 43 DP 1064582 south of Burgmanns Lane, in the southeast portion of that property. The BESS consists of the BESS, a substation for the BESS, ancillary infrastructure and the area of construction laydown, and following construction, a landscaped area. Although the design of the BESS facility components is subject to refinement, the location and area of the BESS facility will not change from that presented in this streamlined BDAR. All vegetation will be cleared within the BESS facility area. The area of the BESS facility is 16.47 ha.

The transmission easement connection comprises a 60 m corridor between the BESS facility and the Tamworth substation. The location of the corridor whether the transmission line between the facility and the substation is above or below ground may be refined through further detailed design, but it will remain within the subject land. Irrespective of location, the width of corridor will not exceed 60 m, and refinements to its length will be limited to those required by any realignment. Although all vegetation within the transmission easement connection may not be required to be cleared depending on the detailed design, for the purpose of this assessment it is assumed that all vegetation within the corridor will be cleared. The area of the transmission easement connection is 4.80 ha.

The subject land, development footprint, BESS facility and transmission easement corridor are shown on Figure 1-1.

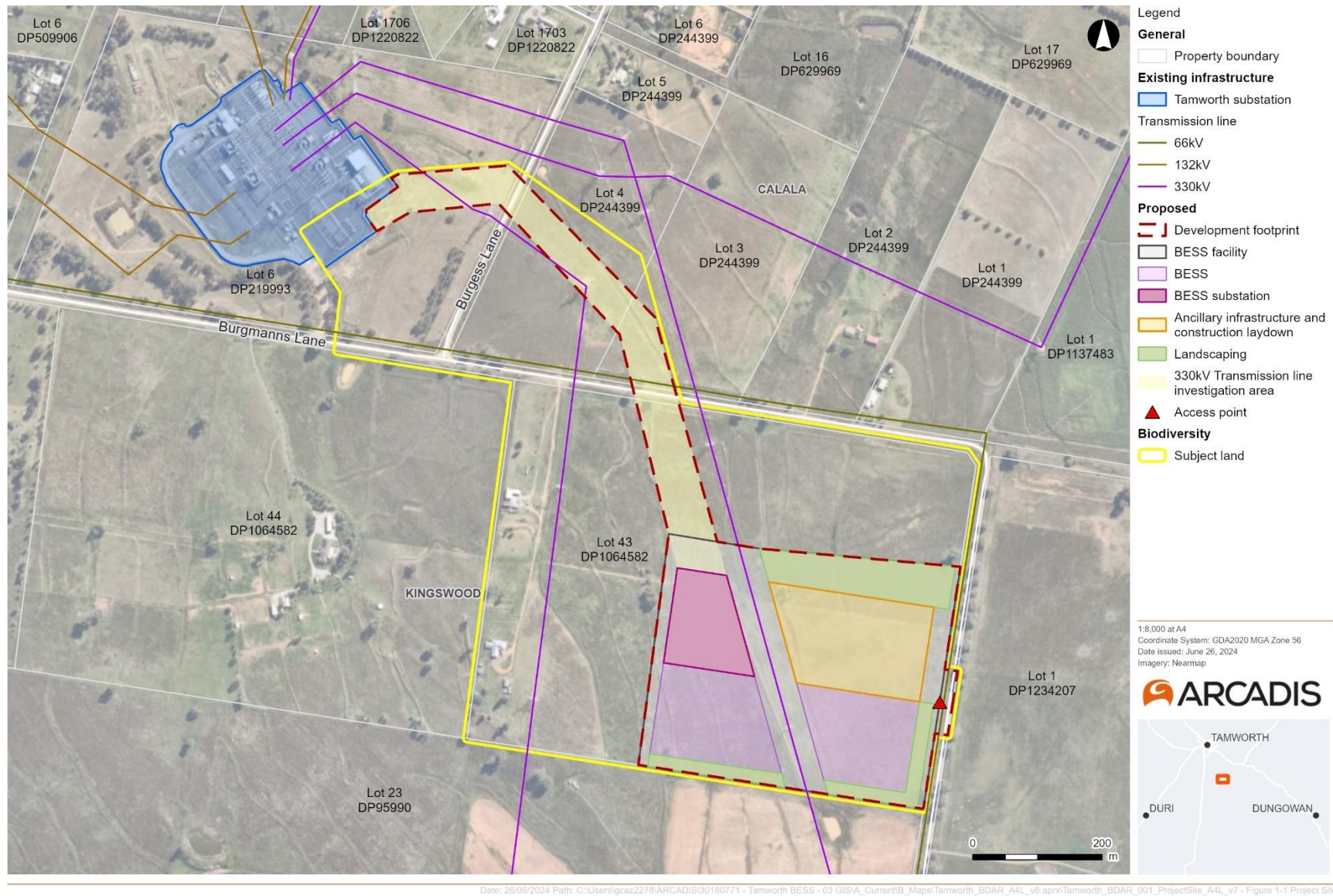


Figure 1-1: The Project

1.5 Sources of information used

Publicly available documents sourced and considered as part of this assessment include:

- Biodiversity Assessment Methodology Calculator (BAM Calculator) (DPE, 2023a)
- Biodiversity Assessment Methodology (BAM) (DPIE, 2020a)
- Biodiversity Assessment Method 2020 Operational Manual – Stage 1 (DPIE, 2020b)
- Biodiversity Assessment Method 2020 Operational Manual – Stage 2 (DPE, 2023b)
- Threatened Biodiversity Survey and Assessment: Guidelines for Developments and Activities working draft (DEC, 2004)
- Surveying threatened plants and their habitats; NSW survey guide for the Biodiversity Assessment Method (DPIE, 2020c)
- NSW State Vegetation Type Map (DPE, 2023e)
- NSW Soil and Land Information eSPADE (DPE, 2023d).

In addition, database searches were undertaken by Arcadis in October 2023 to identify State and Commonwealth records of threatened entities and Commonwealth Matters of National Environmental Significance (MNES) that occur or have the potential to occur within 10 kilometres of the subject land. Databases and reports interrogated for this purpose are listed below in Table 1-2.

Table 1-3: Database searches carried out by Arcadis in October 2023

Database	Purpose of search	Date of database search
NSW BioNet Wildlife Atlas (DPE, 2023b) <i>Managed by the NSW Department of Climate Change, Energy, the Environment and Water (NSW DCCEEW)</i>	Used to compile a list of threatened species records listed under the BC Act to within 10 km of the subject land (Appendix D, Appendix E).	23 October 2023
Protected Matters Search Tool (DCCEEW, 2023a) <i>Managed by the Commonwealth Department of Climate Change, Energy, the Environment and Water (DCCEEW)</i>	Used to compile a list of potentially occurring MNES listed under the EPBC Act to within 10 km of the subject land (Appendix C).	23 October 2023
NSW BioNet Vegetation Information System (VIS) Classification database (DPE, 2023c) <i>Managed by NSW DCCEEW</i>	Provides information on Plant Community Types (PCTs) and their relationship to a vegetation formation and vegetation class (managed and maintained in the Vegetation Information Systems (VIS) Classification database).	Referenced throughout
NSW BioNet Threatened Species Data Collection (DPE, 2023f) <i>Managed by NSW DCCEEW</i>	Contains information for all listed threatened species, populations, and communities.	Referenced throughout

Database	Purpose of search	Date of database search
NSW Weedwise (DPI, 2023c) <i>Managed by NSW Department of Primary Industries (DPI)</i>	Identifies species listed as priority weeds LGA and their control requirements.	10 November 2023

1.6 Legislative context

Field surveys and the preparation of this assessment have been undertaken in accordance with, or with reference to, the legislative acts and guidelines listed within this section. All work was carried out under the appropriate licenses, including scientific licenses as required under Section 2 of the BC Act (license number SL100646) and in accordance with the Animal Ethics Committee (AEC) (licence number 19/2586).

1.6.1 Environment Protection and Biodiversity Conservation Act 1999

The Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) provides a legal framework to protect and manage nationally and internationally important flora, fauna, ecological communities, and heritage places, defined in the EPBC Act as Matters of National Environmental Significance (MNES). MNES identified in the Act include:

- World heritage properties,
- National heritage places,
- Wetlands of international importance (listed under the Ramsar Convention),
- Threatened species and communities,
- Migratory species protected under international agreements,
- Commonwealth marine areas,
- The Great Barrier Reef Marine Park, and
- Nuclear actions (including uranium mines).

In accordance with Sections 67 and 67A of the EPBC Act, any works that have the potential to result in an impact on any MNES or on Commonwealth land are considered 'controlled actions' and require a referral to the Federal Minister for the Environment for approval. Consideration of the potential for the proposed Kingswood BESS development to result in a significant impact to MNES has been addressed in Section 5 of this report.

1.6.2 Biodiversity Conservation Act 2016

The purpose of the BC Act is to maintain a healthy, productive, and resilient environment for the greatest well-being of the community, now and into the future, consistent with the principles of ecologically sustainable development.

The BC Act seeks to establish a framework for assessment and offsetting of development impacts as well as investment in biodiversity conservation, specifically:

- The NSW BOS (established under Part 6 of the BC Act)
- The BAM (established under Section 6.7 of the BC Act)
- The biodiversity assessment and approvals requirements under the EP&A Act (Part 7).

Entry to the NSW BOS is triggered by developments, projects and activities that meet one or more of the following thresholds for significant impacts:

- Local development assessed under Part 4 of the NSW EP&A Act that triggers the BOS threshold or is likely to significantly affect threatened species based on the 'Test of significance' outlined in Section 7.3 of the BC Act.
- State Significant Development (SSD) and State Significant Infrastructure (SSI) projects, unless the Secretary of the DPHI and the environment agency head determine that the project is not likely to have a significant impact.
- Biodiversity certification proposals.
- Clearing of native vegetation in urban areas and areas zoned for environmental conservation that exceeds the BOS threshold and does not require development consent.
- Clearing of native vegetation that requires approval by the Native Vegetation Panel under the *Local Land Services Act 2013*.
- Activities assessed and determined under Part 5 of the EP&A Act (generally, proposals by government entities) if proponents choose to 'opt in' to the Scheme.

Under the NSW BOS, an accredited assessor must apply the BAM in assessing the proposed impacts of the development. The purpose of the BAM is to assess certain impacts on threatened species and Threatened Ecological Communities (TECs), their habitats, and the impact on biodiversity values, where required under the BC Act.

The Project is considered to meet the definition of State Significant Development under Clause 2.6 of the *State Environmental Planning Policy (Planning Systems) 2021*. Development consent for the Project is therefore being sought in accordance with Part 4, Division 4.7 of the *Environmental Planning and Assessment Act 1979* (EP&A Act). Under Section 7.9 BC Act, the development triggers entry into the NSW Biodiversity Offset Scheme (BOS) and on this basis, a Biodiversity Development Assessment Report (BDAR) has been prepared in accordance with the requirements of the BAM as outlined in the corresponding sub-section below.

1.6.3 Biosecurity Act 2015

The primary objective of the *Biosecurity Act 2015* 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. Division 2 of the *Biosecurity Act 2015* defines local control authorities for weeds. Schedule 1 of the *Biosecurity Act 2015* outlines special provisions relating to weeds, including the duty of land occupiers to control and manage weeds.

Section 3.9 of this report outlines weeds of significance recorded within the subject land.

1.6.4 Biodiversity Assessment Method requirements

The BAM (DPIE, 2020a) is the assessment methodology that outlines how an accredited person assesses impacts on biodiversity within the subject land. The BAM provides:

- A consistent method for the assessment of biodiversity on a proposed development or major project, or clearing site,
- Guidance on how a proponent can avoid and minimise potential biodiversity impacts, and
- The number and class of biodiversity credits that need to be offset to achieve a standard of 'no net loss' to biodiversity.

An accredited assessor must document the results of the BAM in a BDAR. The BDAR identifies measures taken to avoid and minimise impacts, any potential impact that could be characterised as serious and irreversible (according to specified principles) and the offset obligation required to offset the likely biodiversity impacts of the development or clearing proposal, expressed in biodiversity credits.

In specific circumstances it may be suitable to prepare a streamlined BDAR using the small area module. The small area module can be used when the area native vegetation clearing is less than the limits listed in Table 1-3 (replicated from Appendix L (Table 27) of the BAM). A streamlined BDAR can be applied if the clearing limit thresholds outlined in Table 1-3 below are adhered to. As the minimum lot size for all lots within the subject land is 40 ha, a streamlined BDAR can be used if less than 3 ha of native vegetation is to be cleared.

Table 1-4: Minimum clearing limit thresholds

Minimum lot size associated with the property	Maximum area clearing limit for application of the small area development module
Less than 1 ha ≤ 1 ha	≤ 1 ha
Less than 40 ha but not less than 1 ha ≤ 2 ha	≤ 2 ha
Less than 1000 ha but not less than 40 ha	≤ 3 ha
1000 ha or more	≤ 5 ha

Table 1-4 below identifies where each requirement has been met within this report.

Table 1-5: Minimum information requirements for a streamlined BDAR (small area) (DPIE, 2020a)

Biodiversity Assessment Method Requirement		Where addressed in this BDAR
Section	Information to be included	
Introduction	Introduction to the biodiversity assessment including: - Brief description of proposed development - Identification of the subject land boundary, including: - Operational footprint - Construction footprint indicating clearing associated with temporary construction facilities and infrastructure.	Sections 1.1 and 1.2
	General description of the subject land.	Section 1.2
	Sources of information used in the assessment, including reports and spatial data.	Section 1.6

Biodiversity Assessment Method Requirement		Where addressed in this BDAR
Section	Information to be included	
Landscape features	Identification of site context components and landscape features, including: • general description of subject land topographic and hydrological setting, geology and soils • percent native vegetation cover in the assessment area • IBRA bioregions and subregions • rivers and streams classified according to stream order • wetlands within, adjacent to and downstream of the site • connectivity of different areas of habitat • karst, caves, crevices, cliffs, rocks and other geological features of significance and for vegetation clearing proposals, 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	Section 2
Native vegetation	Identify native vegetation extent within the subject land, including cleared areas and evidence to support differences between mapped vegetation extent and aerial imagery.	Section 3.4
	Provide justification for all parts of the subject land that do not contain native vegetation	Section 3.7
	Review of existing information on native vegetation including references to previous vegetation maps of the subject land and assessment area	Section 3.1
	Describe the systematic field-based floristic vegetation survey undertaken in accordance with BAM Section 4.2	Section 3.2.3
	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	n/a
	Describe PCTs within the subject land	Section 3.4
	Perform a vegetation integrity assessment of the subject land.	Section 3.5
Threatened species	Identify ecosystem credit species associated with PCTs on the subject land.	Section 4.2.1
	Identify species credit species on the subject land.	Section 4.2.2
	From the list of candidate species credit species, identify: • species assumed present within the subject land (if relevant) • species present within the subject land on the basis of being identified on an important habitat map for a species • species for which targeted surveys are to be completed to determine species presence • species for which an expert report is to be used to determine species presence	Section 3.9
	Present the outcomes of species credit species assessments from: • threatened species survey • expert reports (if relevant)	Section 4.3
	Where survey has been undertaken include detailed information on survey method, effort and timing and justification of this method, effort and timing in relation to the requirements in the TBDC or the Department's taxa-specific survey guides. Information on survey personnel, relevant experience and any limitations on the surveys must also be provided.	Section 4.3.2

Biodiversity Assessment Method Requirement		Where addressed in this BDAR
Section	Information to be included	
	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).	n/a
	Identify the biodiversity risk weighting for each species credit species identified as present within the subject land	n/a
Prescribed impacts	Identify potential prescribed biodiversity impacts on threatened entities.	Section 6
Avoid and minimise impacts	Demonstration of efforts to avoid and minimise impact on biodiversity values.	Section 7
	Describe efforts to avoid and minimise impacts (including prescribed impacts) to biodiversity values through proposal design.	Section 7
	Identification of any other site constraints that the proponent has considered in determining the location and design of the proposal.	Section 7
Assessment of impacts	Determine the impacts on native vegetation and threatened species habitat.	Section 8.1
	Assessment of indirect impacts on vegetation and threatened species and their habitat.	Section 8.2
	Assessment of prescribed biodiversity impacts.	Section 8.3
Mitigation and management of impacts	Identification of measures to mitigate or manage impacts.	Section 9
Impact summary	Identification and assessment of impacts on TECs and threatened species that are at risk of a serious and irreversible impacts.	Section 7.1
	Identification of impacts requiring offsets.	Section 10.1
	Identification of impacts not requiring offsets.	Section 10.2
	Identification of areas not requiring further assessment.	Section 10.4
	Ecosystem credits and species credits that measure the impact of the development on biodiversity values.	Sections 4.2 and 10.1
Biodiversity credit report	Description of credit classes for ecosystem credits and species credits at the development or clearing site.	Section 11

1.6.5 Fisheries Management Act 1994

The NSW Fisheries Management Act 1994 (FM Act) provides for the protection, conservation, and recovery of threatened species defined under the Act. It also makes provision for the management of threats to threatened species, populations, and ecological communities, as well as the general protection of fish and fish habitat.

The Project would not involve dredging or reclamation works, nor are any works proposed in waterways or waterfront land. As such, the FM Act does not apply to the Project.

2 Landscape context

2.1 Landscape features

In accordance with the BAM, a number of features must be assessed within and surrounding the subject land and a 1,500m landscape assessment area around the subject land. These landscape features are used to identify biodiversity values that are important for the subject land and inform the habitat suitability of the subject land for threatened species. Other features, such as rivers, streams, estuaries and wetlands, habitat connectivity, karst areas or areas of outstanding biodiversity value are considered, where appropriate.

2.1.1 IBRA bioregions and subregions

The Nandewar Interim Biogeographic Regionalisation for Australia (IBRA) bioregion and the Peel IBRA subregion cover the entire extent of the subject land and the surrounding 1500 m landscape.

2.1.2 NSW Landscape regions

The subject land is located within the Tamworth – Keepit Slopes and Plains Mitchell Landscape (Figure 2-1). This Mitchell Landscape is characterised by undulating to rolling slopes and plains, with low ranges and low hills that form the western side of the New England plateau.

Rock types of the Tamworth – Keepit Slopes landscape include slate, Silurian-Devonian chert, schist and Carboniferous conglomerate, sandstone, mudstone, andesite and small areas of limestone. In general, elevation is between 500 and 800 metres, with a local relief of 250 metres and peaks reaching 1,100 metres. Subsoils are prone to gully development on lower slopes, with shallow stony soils present on ridges (DECC, 2002).

Lower slopes generally comprise White Box (*Eucalyptus albens*) grassy woodlands, with the following species: Blakely's Red Gum (*Eucalyptus blakelyi*), Yellow Box (*Eucalyptus melliodora*), Cooba (*Acacia salicina*) and Lightwood (*Acacia implexa*). River Oak (*Casuarina cunninghamiana*) is present along major streams and Rough Barked Apple (*Angophora floribunda*) and Yellow Box (*Eucalyptus melliodora*) are present on flats. Along steeper slopes in the east, patches of Red Ironbark (*Eucalyptus sideroxylon*) and Red stringybark (*Eucalyptus macrorhyncha*) are present (DECC, 2002).

Within the 1,500 m assessment area, the Peel Channels and Floodplain landscape occurs along Goonang Creek to the west.

2.1.3 Rivers and streams

There are no rivers or streams present in the subject land (Figure 2-1). The subject land is located within the Namoi River Catchment, which spans 42,000 square kilometres and stretches from Nundo in the east to Walgett in the west.

Within the 1,500 m assessment area, Calala Creek is located approximately 800 metres north east and Goonoo Creek/Goonang Creek are located approximately 1.3 kilometres to the west.

2.1.4 Wetlands

The subject land does not support any wetlands, including important wetlands listed in the Directory of Important Wetlands in Australia (DIWA) or wetlands of international importance (Ramsar).

2.1.5 Aquatic habitat

The subject land does not support any aquatic habitat, including human-made dams. The nearest natural aquatic habitats are Calala Creek, Goonang Creek and Goonoo Goonoo Creek.

2.1.6 Groundwater dependent ecosystems

Groundwater dependent ecosystems (GDEs) are ecological communities that are dependent, either entirely or in part, on the presence of groundwater for their health or survival.

As part of this assessment, The Bureau of Meteorology's GDE Atlas was reviewed to determine the occurrence of potential groundwater dependent ecosystems within and surrounding the subject land (BoM, 2023b). The results of that review show that there are no potential terrestrial or subterranean GDEs within the subject land. There are two high potential terrestrial GDEs within close proximity of the subject land, located 635 metres east of the northeastern corner, and 790 metres west. There are also two high potential aquatic GDEs with proximity of the subject land; Calala Creek, 800 metres north east, and Goonoo Goonoo Creek, 1.3 kilometres west.

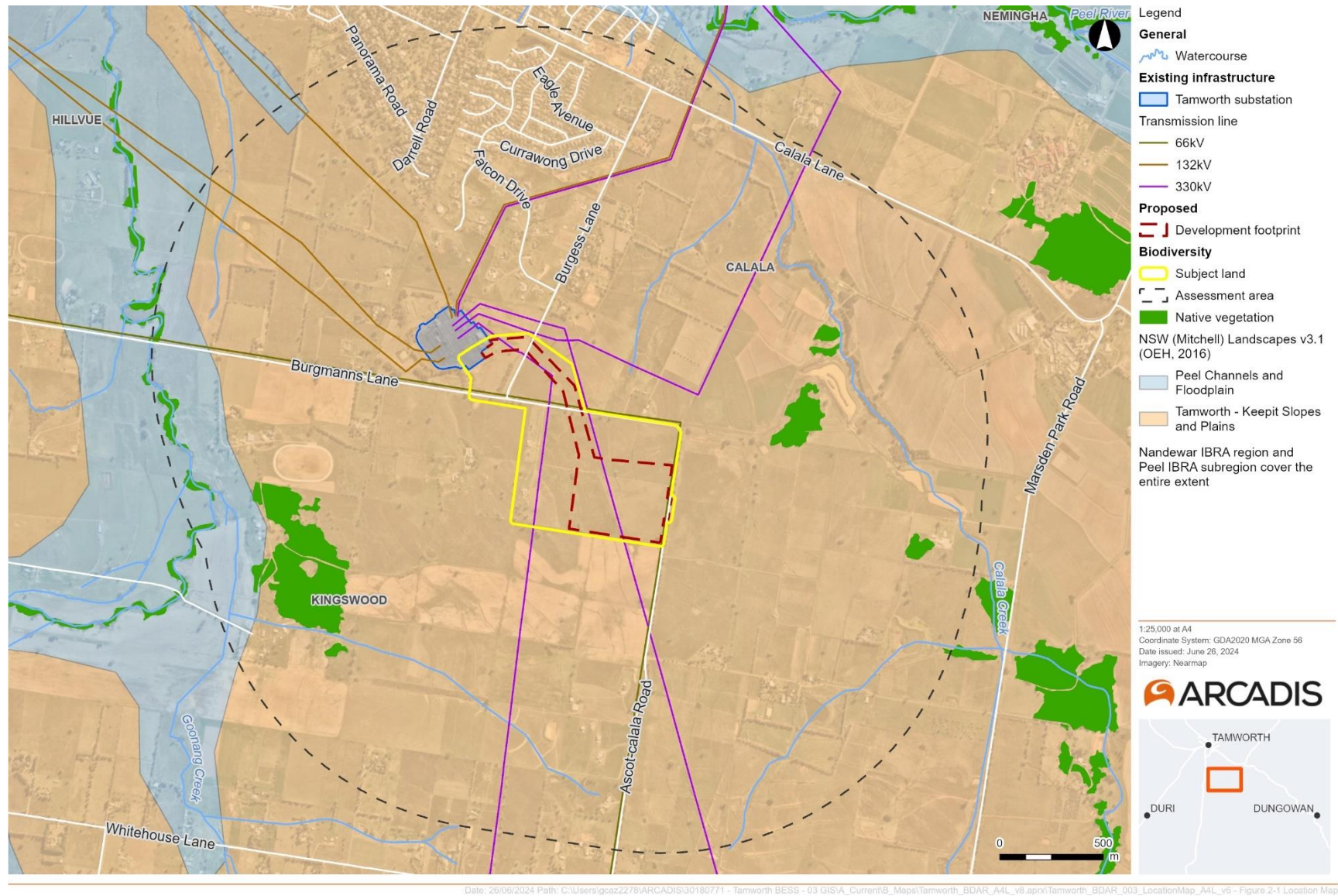


Figure 2-1: NSW Landscape region

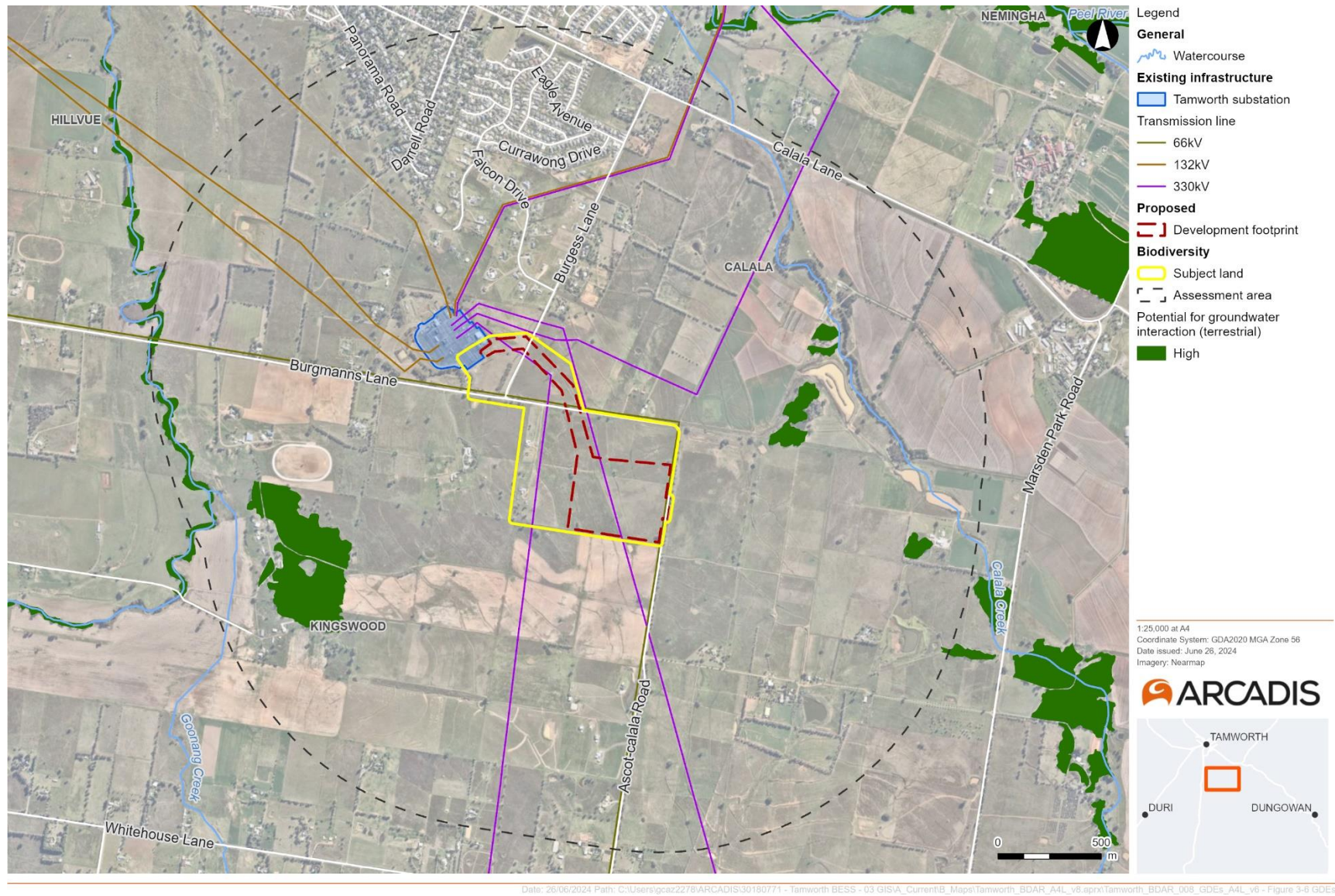


Figure 2-2: Potential groundwater dependent ecosystems

2.1.7 Connectivity features

The BAM (DPIE, 2020a) defines connectivity as a *measure of the degree to which an area(s) of native vegetation is linked with other areas of vegetation*.

Native vegetation within the subject land is highly limited and exists in scattered paddock trees with a narrow line of vegetation on the eastern side of Ascot-Calala Road (adjacent to the eastern boundary), scattered trees along Burgmanns Land, a strip of planted native vegetation to the southeast of the Tamworth substation and scattered paddock trees within the southern portion of the subject land. None of this vegetation is sufficiently connected to adjacent vegetation, or sufficiently substantial in its own right, to provide or contribute to connectivity within the area. Additionally, the subject land lies within a highly fragmented and cleared landscape comprising rural and residential development, both of which represent significant barriers to habitat connectivity and likely restrict movement to more mobile fauna (e.g., birds and bats).

2.1.8 Areas of geological significance and soil hazard features

The subject land does not contain any areas of geological significance, including crevices, cliffs, karst, or caves. The nearest areas of geological significance lie approximately 7 kilometres to the north of the site, on the Moonbi Range that adjoins the Northern Tablelands.

The subject land is situated on soil landscape types 'Duri' and 'Fullwoods Hill' (DPE, 2023c). Table 2-2 below summarises landscape, soil, and hazard features of the Duri soil landscape type within the subject land.

Table 2-1: Summary of the soil landscape type within the subject land and its associated description.

Soil landscape type	Landscape	Soils	Hazards
Duri	The landscape consists of complex folded Carboniferous and Devonian sedimentary rocks of the Tamworth Fold Belt. It consists of rolling to undulating hills with local relief to 100m. Slopes <10%. Elevation approximately 360-540 m. Vegetation primarily consists of open-woodland and closed-grassland largely cleared for agriculture.	Highly variable, due to high variability of the underlying geology. Mostly dominated by duplex soils – moderately deep, moderately well-drained Red and Brown Chromosols with minor occurrence of Rudosols around rocky outcrops.	Localised engineering hazard; gully erosion risk, localised high structural decline hazard, localised hardsetting surfaces.
Fullwoods Hill	The landscape consists of complex folded Carboniferous and Devonian sedimentary rocks of the Duri Hills. It consists of rocky crests and steeper (>10%) side slopes of rolling hills and low hills. Vegetation primarily consists of woodland and open-woodland largely cleared for grazing with dense pine regrowth in some areas.	Highly variable over tens of metres or homogenous depending on variability in underlying geology. Generally, crests are dominated by moderately deep, moderately well-drained Red and Brown Chromosols. Side slopes are dominated by shallow, moderately well-drained Vertic Red Chromosols (Red-brown Earths).	Localised engineering hazard; localised rock outcrop, sheet erosion risk, hardsetting surfaces.

2.1.9 Areas of outstanding biodiversity value (AOBVs)

Areas of Outstanding Biodiversity Value (AOBVs), as defined under the BC Act, are currently limited to areas previously declared as critical habitat under the superseded *Threatened Species Conservation Act 1995* (TSC Act). No AOBVs occur within or surrounding the subject land. The closest AOBV to the subject land is the Wollemi Pine declared area (critical habitat of the critically endangered Wollemi Pine in Wollemi National Park), approximately 180 kilometres south of the subject land.

2.2 Native vegetation cover

State vegetation mapping (DPE, 2023e) has been used for the purposes of mapping native vegetation within the 1,500m landscape assessment area (Figure 2-1). The area of native vegetation cover within the 1,500m landscape assessment area is outlined below in Table 2-1.

Table 2-2: Native vegetation within the 1500m landscape assessment area

Location	Extent (ha)	Native vegetation extent (ha)	Per cent native vegetation cover
1500m landscape assessment area	1,264.83	28.08	2.22%

2.3 Patch size

Section 4.3.2 of the BAM defines patch size as "*an area of native vegetation that:*

- a) *occurs on the development site or biodiversity stewardship site, and*
- b) *includes native vegetation that has a gap of less than 100 m from the next area of moderate to good condition native vegetation (or ≤30 m for non-woody ecosystems).*

Patch size may extend onto adjoining land that is not part of the development site or biodiversity stewardship site."

Under the BAM, patch size is required to be assessed as one of four classes per vegetation zone mapped, being <5 ha, 5-24 ha, 25-100 ha or >100 ha. Patch size was calculated for the vegetation within the subject land using the field validated map of vegetation types and the updated native vegetation extent data based on the mapping of DPE (2023e).

The patch size is confined to the subject land; therefore the patch size fell within the <5 ha category. This was entered into the BAM Calculator for all vegetation zones.

3 Native vegetation

3.1 State vegetation mapping

The NSW State Vegetation Type Map (DPE 2022) mapping does not identify any Plant Community Types (PCTs) as being present within the subject land, instead classifying all areas as non-native. Within 1.5 km of the subject land three PCTs have been mapped. These include:

- River Oak- Rough-barked Apple- red gum- box riparian tall woodland (wetland) of the Brigalow Belt South Bioregion and Nandewar Bioregion (PCT 84)
- Blakelys Red Gum- Yellow Box grassy tall woodland on flats and hills in the Brigalow Belt South Bioregion and Nandewar Bioregion (PCT 599)
- White Box- White Cypress Pine- Silver leaved Ironbark grassy woodland on mainly clay loam soils on hills mainly in the Nandewar Bioregion (PCT 589).

State Vegetation Type mapping of the subject land and 1,500 m assessment area is shown in Figure 3-1.

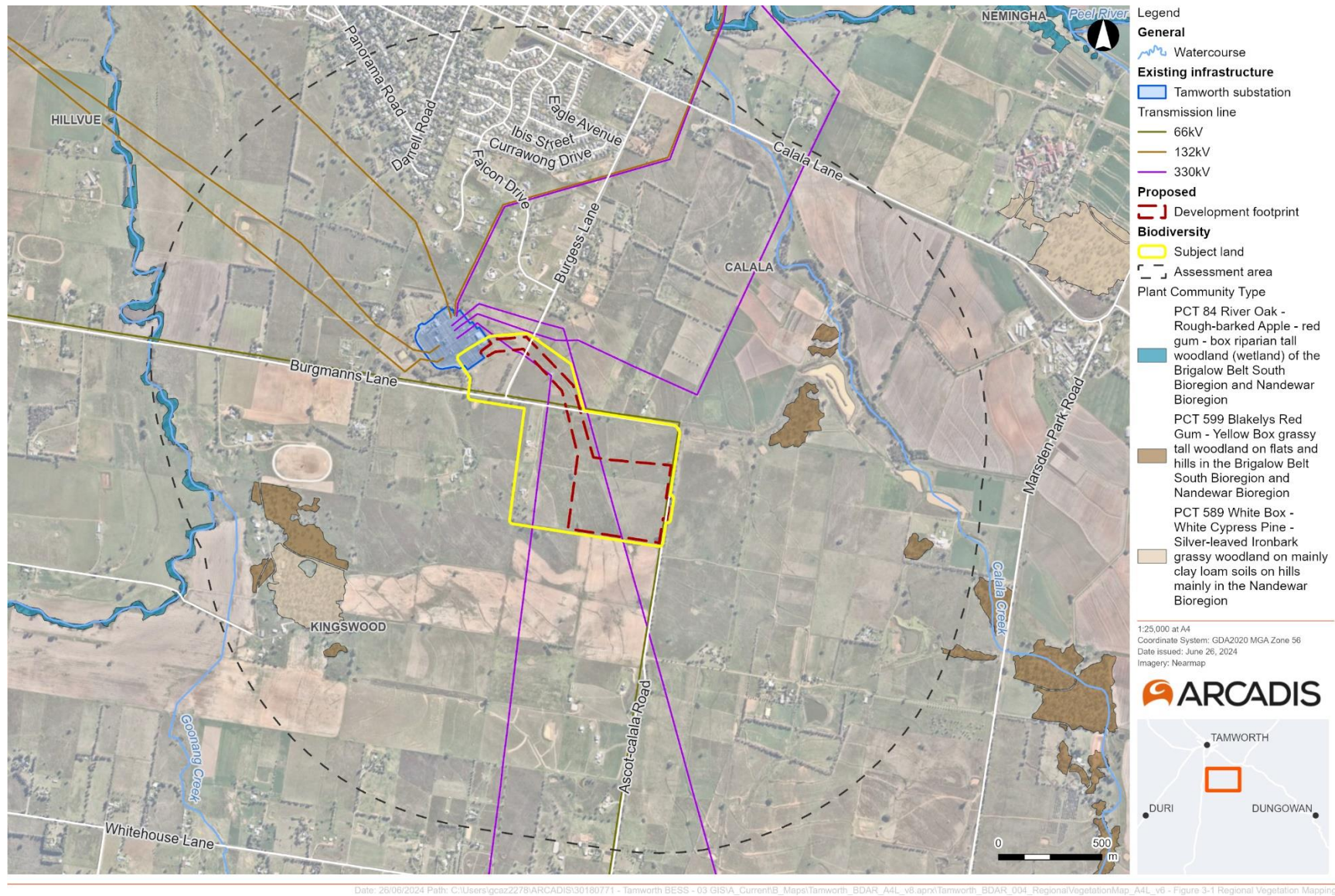


Figure 3-1: Regional vegetation mapping (DPIE, 2017)

3.2 Survey method

3.2.1 Survey timing

Field surveys of the subject land were carried out by Arcadis ecologists Dr Elvira Lanham and Brendan Fletcher from 2pm Tuesday 25 October to 12pm Wednesday 26th October 2023. The subject land was surveyed for approximately 16 person hours over those two days.

Weather conditions were warm and mostly clear throughout the survey period with no rainfall prior to surveys or at the time of survey.

Weather data for the survey dates was recorded from Tamworth weather station (station 055325), located approximately 9 kilometres from the subject land and are detailed below in Table 3-1.

Table 3-1: Weather conditions during survey periods (BoM, 2023a)

Date	Temperature		Rain	Accumulated rainfall one week prior to date	Maximum wind gust	
	Min (°C)	Max (°C)	(mm)	(mm)	Direction	Speed (km/h)
25 October 2023	7.6	36.8	0	0	NW	63
26 October 2023	13.4	24.9	0	0	SW	50

3.2.2 Vegetation mapping and PCT identification

Vegetation was classified and mapped during surveys with reference to regional vegetation mapping of the area (DPE, 2023e).

During this assessment, the vegetation was initially stratified based on the composition of the canopy and vegetation structure (key elements in PCT assignment). It was then compared to recognised and accepted PCTs, as described in the BioNet Vegetation Information System (VIS) Classification database (DPE, 2023c). The identification of PCTs and vegetation types in the subject land was predominantly based on:

- Structure and species composition consistent with descriptions in the VIS Classification database and other published references
- Characteristic tree species present
- Previous regional mapping as an equivalent vegetation type
- Landscape position.

3.2.3 BAM vegetation integrity plots

Three vegetation integrity plots were used to sample the vegetation of the subject land. This quantitative site survey was conducted in accordance with the methodology described in the BAM as summarised in Table 3-2 below. Figure 3-2 illustrates the plot layout of nested 20 metres by 50 metres, 20 metres by 20 metres and 1 metre by 1 metre sub-quadrats used for the assessment of condition attributes at the plot site.

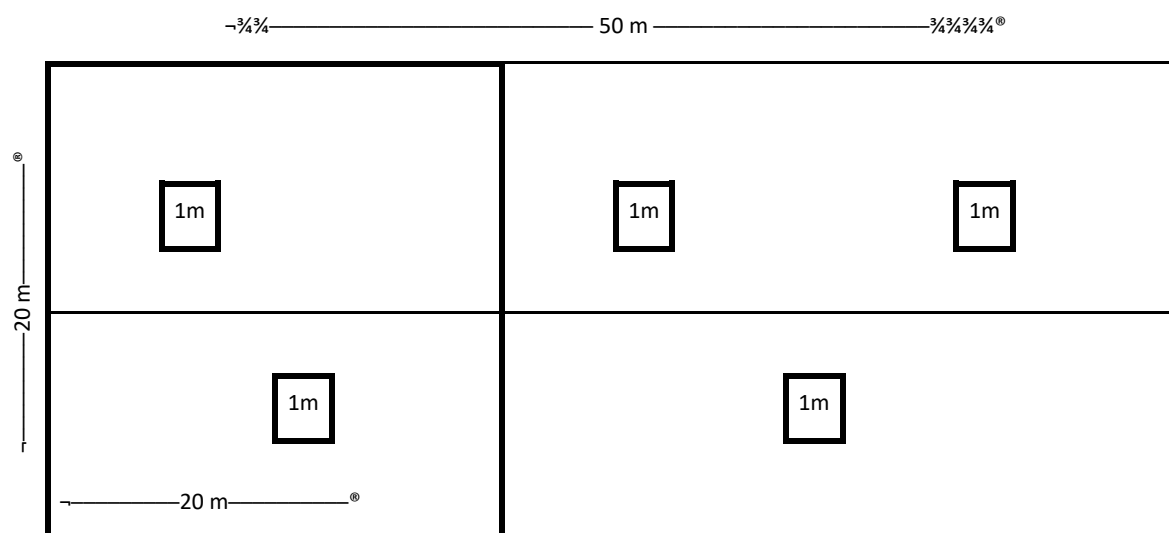


Figure 3-2: Schematic diagram illustrating the vegetation plot layout

Flora species identified in the vegetation plot are listed in the flora species inventory provided in Table 3-2. The locations of the vegetation plots are shown in Figure 3-3.

Table 3-2: Data collected from vegetation integrity plots

Attribute	Data collected
Location	Geographic co-ordinates (easting and northing; grid type MGA 94, Zone 56) – collected using GPS
Native and exotic species richness and cover	All plant species identified within the 20-metre x 20-metre nested quadrat were recorded. The cover (percentage of area of quadrat covered) and abundance of each species present was estimated. The growth form, stratum/layer and whether each species was native, exotic, or a high threat weed was recorded.
Number of trees with hollows	The number of living and dead trees with hollows within the 50-metre x 20-metre quadrat was recorded. A hollow was only recorded if: (a) the entrance could be seen; (b) the estimated entrance width was at least five centimetres; (c) the hollow appeared to have depth; (d) the hollow was at least one metre above the ground; and the (e) the centre of the tree was located within the sampled quadrat.
Tree stem size diversity and number of large trees	Tree stem size diversity was recorded by measuring the diameter at breast height (dbh) (i.e. 1.3 metres from the ground) of living trees (greater than five centimetres dbh) within each 50-metre x 20-metre quadrat. For multi-stemmed living trees, only the largest stem was included in the count. The number of large trees was determined by counting all trees with a dbh greater than the specified dbh of large trees for each vegetation formation, as noted in the VIS Classification Database (DPIE, 2021b).
Evaluation of regeneration:	Presence/absence of overstorey species present at the site that were regenerating (defined as seedlings or saplings with a dbh less than or equal to five centimetres).
Total length of fallen logs	Cumulative total of logs within each 50-metre x 20-metre quadrat with a diameter of at least 10 centimetres and a length of at least 0.5 metres.

Attribute	Data collected
Litter cover	Estimation of the average percentage groundcover of litter (i.e. leaves, seeds, twigs, branchlets and branches with a diameter less than 10 centimetres which is detached from a living plant) from within five sub-plots that measured one metre x one metre square spaced evenly on either side of the 50 metre central transect.

3.3 Survey effort

Native vegetation within the subject land was classified into PCTs and then separated into vegetation zones based on broad condition classes. The size of each vegetation zone within the impact area (development footprint) determines the sampling effort required, as outlined in Table 3.1 of the BAM. Table 3-3 below provides a summary of the vegetation zones present within the subject land and the sampling effort that was applied. A total of three BAM plots were completed.

Table 3-3: Comparison of number of transects/plots required and completed per Vegetation Zone

Vegetation Zone	Vegetation zone area subject land (ha)	Vegetation zone area development footprint (ha)	BAM plot requirements	Number of plots completed
3396_Low	0.93	0.16	1	1
Category 1 land	51.58	21.36	N/A	2
Roads/buildings	1.90	0.16	N/A	0
Total	54.41	21.68		3

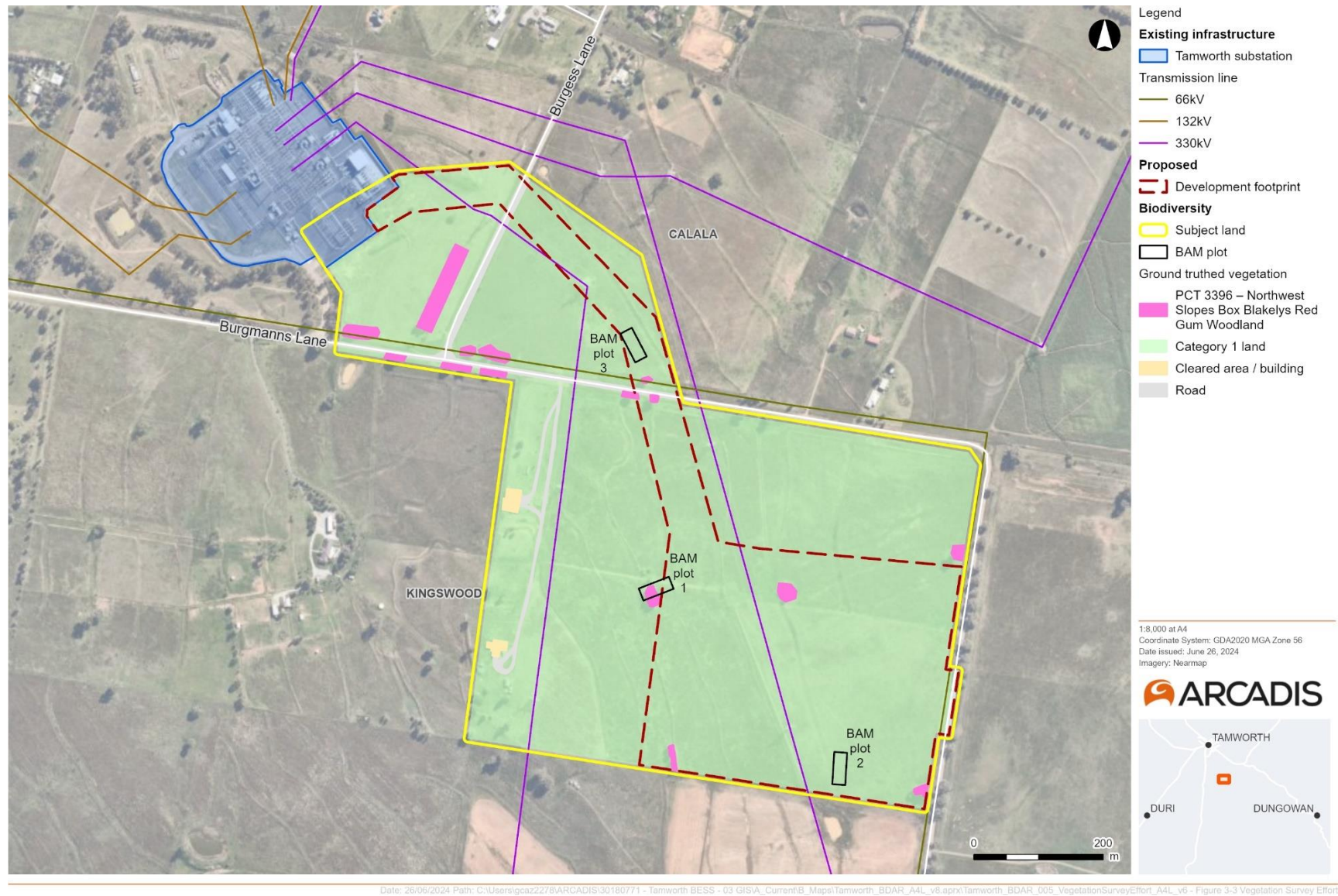


Figure 3-3: Vegetation survey effort and ground-truthed vegetation

3.4 Ground-truthed vegetation

Following the vegetation surveys, it was identified that one PCT occurs within the subject land. The location of this PCT is shown in the ground-truthed vegetation mapping (Figure 3-3), and its extent within the subject land and development footprint is listed in Table 3-4.

Table 3-4: Vegetation communities within the subject land from ground-truthed vegetation mapping

PCT No.	PCT Name	Area within subject land (ha)	Area within the development footprint (ha)
3396	Northwest Slopes Box-Blakelys Red Gum Forest	0.93	0.16
n/a	Category 1 land	51.58	21.36

3.4.1 Northwest Slopes Box-Blakelys Red Gum Forest (PCT 3396)

Table 3-5: Attribute information for PCT 3396 in the subject land

Attribute	PCT 3396 in the subject land
Vegetation formation	Grassy Woodlands
Vegetation class	Western Slopes Grassy Woodlands
PCT Name	Northwest Slopes Box-Blakelys Red Gum Forest
PCT	3396
Associated TECs	BC Act, CE: 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 EPBC Act, CE: White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland
Estimate of percent cleared	81 %
Condition	Low
Extent in the development footprint (ha)	0.16 ha
Quadrats completed in vegetation zones	One (BAM01)
Species relied upon for PCT identification	<i>Eucalyptus blakelyi</i> , <i>Eucalyptus melliodora</i> , <i>Eucalyptus albens</i>

Western Slopes Grassy Woodlands (PCT 3396) is recognised as a tall sclerophyll open forest with a mid-dense, grassy ground cover. It occurs on flats and lower slopes in the Hunter Valley, North West Slopes and the western margin of the New England Tableland (DPE, 2023c).

The canopy typically comprises *Eucalyptus melliodora* (Yellow Box), *Eucalyptus albens* (White Box) or *Eucalyptus moluccana* (Grey Box), and is commonly associated with *Eucalyptus blakelyi* (Blakely's Red Gum) and occasionally *Angophora floribunda* (Rough-barked Apple). The mid-stratum is typically sparse, occasionally absent, and is generally comprised of *Acacia implexa* (Hickory Wattle), and *Notelaea microcarpa* (Velvet Mock Olive) or *Bursaria spinosa* (Native Blackthorn) to a lesser extent. The ground layer is usually mid-dense and

dominated by grass species *Aristida ramosa* (Purple Wiregras), *Microlaena stipoides* (Weeping Grass), *Glycine tabacina* (Variable Glycine), *Dichondra repens* (Kidney Weed) and *Geranium solanderi* (Native Geranium) (DPE, 2023c).

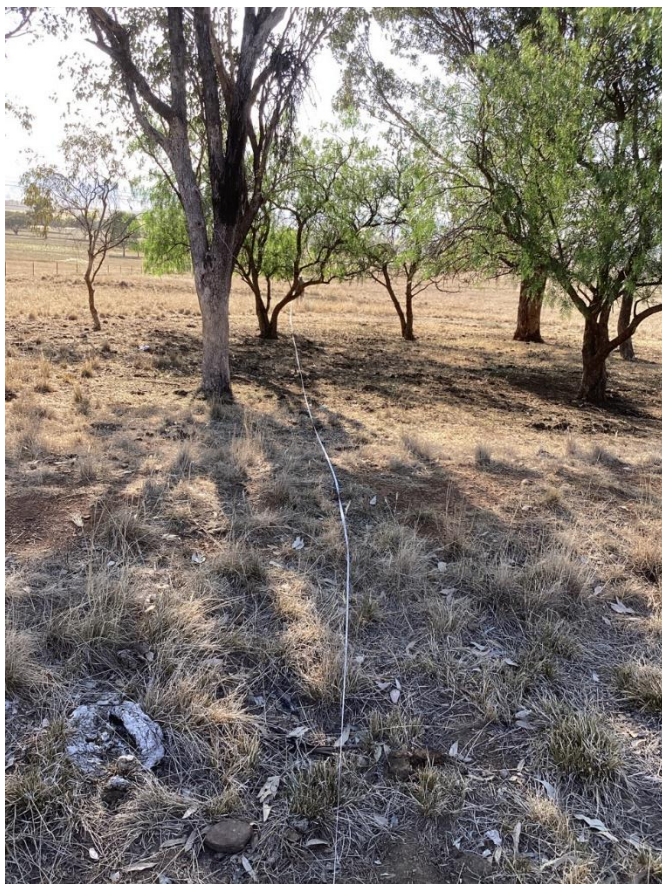
Within the subject land, PCT 3396 is found in small patches in a highly degraded condition, consisting of trees native to the PCT with an almost entirely exotic understorey (Photograph 3-4, 3-5) (Figure 3-4). PCT 3396 occupies a total of 0.93 ha within the subject land and 0.16 ha within the development footprint.

In the southeastern corner of the subject land, to the north of a small soak, there is a stand of moderately sized *Eucalyptus blakelyi* (Blakely's Red Gum) and *Eucalyptus melliodora* (Yellow Box). Directly to the west of this patch on the southern boundary of the subject land, there is a line of *E. melliodora* that are likely planted, with a *Grevillea robusta* (Silky Oak), a species not native to the PCT, intermixed. To the north and slightly to the west of this line of trees is a patch of *E. melliodora* and *Eucalyptus albens* (White Box) in the location where BAM Plot 1 was carried out. An exotic *Schinus molle* (Peppercorn tree) is also within this stand. There are isolated *E. melliodora* on either side of Burgmanns Lane on the northern boundary.

There is no native shrub layer beneath any of these patches of trees. Groundcover generally consists of exotic species, consisting of common pasture species such as *Vulpia* sp. (Rat's-tail Fescue), *Anthoxanthum odoratum* (Sweet Vernal Grass), *Malva parviflora* (Small-flowered Mallow), *Lolium perenne* (Perennial Ryegrass) and *Centaurea solstitialis* (St. Barnaby's Thistle).

PCT 3396 within the subject land forms one vegetation zone; 3396_low. While the canopy of 3396_low contains native Eucalyptus species, the groundcover for this vegetation class has a high cover of exotic species.

Justification: This vegetation has been identified as PCT 3396 due to the associated characteristic species and landscape position. The dominant canopy species present are strongly associated with PCT 3396, particularly *Eucalyptus blakelyi*, *Eucalyptus melliodora* and *Eucalyptus albens*. PCT 3396 is also associated with flats and lower slopes, within the North West Slopes and the western margin of the New England Tableland, both of which apply to the subject land's location. This vegetation has therefore been identified as PCT 3396.



Photograph 3-4: 3396_Low. Area is highly degraded with patches of native vegetation.



Photograph 3-5: 3396_Low, highly degraded landscape with small patches of native trees.

3.5 Vegetation integrity assessment

The vegetation integrity score is a measure of the condition of native vegetation and is assessed for each vegetation zone by calculating the scores for the composition, structure and function attributes collected in plots within the vegetation zone against the benchmark values for the associated PCT.

The vegetation plot data was entered into the BAM credit calculator to generate vegetation integrity scores. The results of the BAM credit calculator and composition, structure, function and vegetation integrity scores for each vegetation zone is shown in Table 3-6.

According to section 9.2.1 of the BAM (DPIE, 2020a) the assessor must determine an offset for all impacts of proposals on PCTs that are associated with a vegetation zone that has a vegetation integrity score of:

- ≥ 15 , where the PCT is representative of an EEC or a CEEC
- ≥ 17 , where the PCT is associated with threatened species habitat (as represented by ecosystem credits) or represents a vulnerable ecological community
- ≥ 20 , where the PCT does not represent a TEC and is not associated with threatened species habitat.

All native vegetation has an integrity score above 15 and therefore requires offsets to be calculated where impacts occur. The low condition mixed native/exotic pasture was also subject to assessment under the BAM, however Table 3-8 demonstrates its poor vegetation integrity, meaning it does not meet the criteria as a PCT for the purpose of this assessment.

Table 3-6: Vegetation integrity scores for vegetation zones within the subject land

PCT	Vegetation zone	Composition condition score	Structure condition score	Function condition score	Vegetation integrity score
3396	3396_Low	6.8	19.5	28.3	15.5
3366	3396_poor (Category 1 land)	0.6	0.5	13.2	1.6

3.6 Threatened Ecological Community assessment

A search of the PMST identified four TECs that are predicted to have the potential to occur within 1 kilometre of the subject land:

- *Natural grasslands on basalt and fine-textured alluvial plains of northern New South Wales and southern Queensland*- critically endangered under the EPBC Act.
- *New England Peppermint (Eucalyptus nova- anglica) Grassy Woodlands*- critically endangered under the EPBC Act.
- *Weeping Myall Woodlands* – endangered under the EPBC Act.
- *White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland* – critically endangered under the EPBC Act.

The single PCT identified within the subject land, PCT 3396 – Northwest Flats Box-Blakely's Red Gum Forest, is associated with the threatened ecological communities (TECs) shown in Table 3-7.

Table 3-7: TECs within the subject land and subject land

Plant Community Type	BC Act TEC	EPBC Act TEC
PCT 3396 – Northwest Flats Box-Blakely's Red Gum Forest	White Box- Yellow Box- Blakely's Red Gum Grassy Woodland and Derived Native Grassland in the NSW North Coast, New England Tableland, Nandewar, Brigalow Belt South, Sydney Basin, South Eastern Highlands, NSW South Western Slopes, South East Corner and Riverina Bioregions. Critically Endangered (BC Act)	White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland. Critically Endangered (EPBC Act).

The BC Act includes all occurrences of any vegetation community that is within the listed community as described in the final determination; accordingly, the native vegetation within the subject land falls within the listed community.

Under the EPBC Act, vegetation communities must meet certain condition thresholds to be considered part of the listed community. The native vegetation within the subject land does not meet the required thresholds, as detailed in Table 3-8. Therefore, the native vegetation within the subject land is not considered to be part of the EPBC-listed community.

Table 3-8: Minimum condition thresholds for White Box – Yellow Box – Blakely's Red Gum Grassy Woodland and Derived Native Grassland under the EPBC Act (DCCEEW, 2023b)

Condition class	Patch size	Condition features	Assemblage of PCT 3396 within the subject land
Class A Good quality understorey and mature overstorey both present	≥ 0.1 ha	The ground layer is predominantly comprised of native species AND Ground cover richness ≥ 12 native species per sample plot AND At least one understorey species should be recognised as 'important' (e.g. grazing-sensitive, regionally significant, listed threatened or uncommon species) AND ≥ 10 large trees (DBH ≥ 125cm) per ha	NOT CONSISTENT The assemblages of PCT 3396 within the subject land do not contain ≥ 50% native understorey
Class B Good quality understorey present. Characteristic trees may be absent	≥ 0.1 ha	The ground layer is predominantly comprised of native species AND Ground cover richness ≥ 12 native species per sample plot AND At least one understorey species should be recognised as 'important' (e.g. grazing-sensitive, regionally significant, listed threatened or uncommon species)	NOT CONSISTENT The assemblages of PCT 3396 within the subject land do not contain ≥ 50% native understorey
Class C Allows for lower understorey diversity in regenerating areas	≥ 2 ha	The ground layer is predominantly comprised of native species AND ≥ 20 large trees (DBH ≥ 125cm) per ha AND/OR Patch contains natural regeneration of dominant overstorey eucalypts	NOT CONSISTENT The assemblages of PCT 3396 within the subject land do not meet the minimum patch size ≥ 2 ha.

3.7 Other vegetation types – Category 1 land

One other vegetation type that does not conform to the definition of any PCTs was also identified within the subject land. A large portion of the subject land contains vegetation in the form of pasture made up of mixed exotic and native grasses, and dominated by exotic grasses (Figure 3-5). This mixed native/exotic pasture covers a total of 51.58 hectares across the subject land. These areas have been historically cleared and are highly disturbed. A canopy and shrub layer are absent within this vegetation zone. The ground layer of this vegetation zone is dominated by exotic species (Photograph 3-6).

The majority of mixed native/exotic pasture within the subject land is categorised as Category 1 land under the draft Native Vegetation Regulatory (NVR) Map. This includes nearly all land within the development footprint within Lot 43 DP 1064582 where the BESS facility will be located, with the exception of a small patch of trees mapped as Category 2, and which has been mapped in this streamlined BDAR as PCT 3396. Vegetation along Burgmanns Lane, and in parts of Lots 3 and 4, DP 244399 and Lot 6, DP 219993 to the north of Burgmanns Land where the transmission easement corridor will be located, is classified as Category 2 regulated land under the draft NVR Map.

Assessment of biodiversity impacts of clearing of native vegetation and loss of habitat on land that are Category 1 – exempt land within the meaning of Part 5A of the *Local Land Services Act 2013* is excluded under section 6.8(3) of the BC Act. Although large areas of the subject land may be considered Category 1 land, and have been mapped as such in the draft NVR, because there are also Category 2 lands within the subject land, all pasturelands were assessed as precautionary measure. Two BAM plots were carried out, one north of Burgmanns Land and one south of Burgmanns Lane in the area mapped in the draft NVR Map as Category 1 land. Those BAM plots, which were entered into the BAM calculator against benchmarks for PCT 3396, resulted in an averaged score of 1.6, below the threshold for offsetting. Therefore, the area of cleared pasture has not been considered as a PCT and has been mapped as Category 1 land.

Exotic species present in the Category 1 land include *Vulpia* species (Rat's-tail Fescue) which is the most common grass, with substantial coverage of *Anthoxanthum odoratum* (Sweet Vernal Grass) as well. Other, less common grasses include *Chloris virgata* (Feathertop Rhodes Grass), *Cenchrus clandestinus* (Kikuyus), *Lolium perenne* (Perennial Ryegrass) and *Avena fatua* (Wild Oats). Other species include common pasture weeds such as *Cirsium vulgare* (Spear Thistle), *Verbena bonariensis* (Purpletop), *Trifolium campestre* (Hop Clover), *Sida rhombifolia* (Paddy's Lucerne) and *Echium plantagineum* (Patterson's Curse). To the north of Burgmanns Lane there is an infestation of *Hypericum perforatum* (St. John's Wort). Although native groundcover was sparse at the time of survey, grasses and other native groundcover recorded included *Dichanthium sericeum* (Queensland Bluegrass), *Chloris truncata* (Windmill Grass), *Rytidosperma* sp. (Wallaby Grass), *Geranium solanderia* (Native Geranium) and *Wahlenbergia communis* (Bluebell).

Areas of cleared land are not currently displaying signs of native regrowth of tree species associated with PCT 3396. This is due to the already well-established pasture vegetation and ongoing land use and maintenance activities, such as slashing and mowing, which prevent the regeneration of trees and shrubs in these cleared and disturbed areas.



Photograph 3-6: Exotic pasture within the subject land

3.8 Weeds

Of the 23 exotic species recorded in the study area, two are listed as Priority Weeds (DPIE, 2021f) under the NSW *Biosecurity Act 2015* for the North West region, which includes the Tamworth Regional LGA. Of these species, one is also listed as Weeds of National Significance (WoNS) (DPI, 2023c) (see below Table 3-9).

In addition, five species recorded within the study area are recognised as High Threat Weeds (HTW) (Table 3-9). High Threat Weeds are exotic species which are likely to have a significantly detrimental effect on native vegetation and are used when determining vegetation condition. Weed species were located in all vegetation zones across the study area, with particularly high abundance in non-PCT vegetation zones.

Table 3-9: Exotic plant species recorded in the study area.

Scientific name	Common name	Listed as a WoNS?	Listed as a HTW?	Priority Weed category
<i>Alternanthera pungens</i>	Khaki Weed	No	Yes	N/A
<i>Anthoxanthum odoratum</i>	Sweet Vernal Grass	No	No	N/A
<i>Avena fatua</i>	Wild Oats	No	No	N/A
<i>Cenchrus clandestinus</i>	Kikuyu Grass	No	Yes	N/A
<i>Centaurea solstitialis</i>	St Barnabys Thistle	No	No	N/A
<i>Centaureum erythraea</i>	Common Centaury	No	No	N/A
<i>Cestrum parqui</i>	Green Cestrum	No	Yes	N/A
<i>Chloris virgata</i>	Feathertop Rhodes Grass	No	No	N/A
<i>Cirsium vulgare</i>	Spear Thistle	No	No	N/A
<i>Echium plantagineum</i>	Patterson's Curse	No	No	N/A
<i>Hordeum leporinum</i>	Barley Grass	No	No	N/A
<i>Hypericum perforatum</i>	St. Johns Wort	No	Yes	Containment
<i>Lolium perenne</i>	Perennial Ryegrass	No	No	N/A
<i>Lycium ferocissimum</i>	African Boxthorn	Yes	Yes	Asset protection
<i>Malva parviflora</i>	Small-flowered Mallow	No	No	N/A
<i>Medicago polymorpha</i>	Burr Medic	No	No	N/A
<i>Plantago lanceolata</i>	Lamb's Tongues	No	No	N/A
<i>Schinus molle</i>	Pepper Tree	No	No	N/A
<i>Sida rhombifolia</i>	Paddy's Lucerne	No	No	N/A
<i>Taraxacum officinale</i>	Dandelion	No	No	N/A
<i>Trifolium campestre</i>	Hop Clover	No	No	N/A
<i>Verbena bonariensis</i>	Purpletop	No	No	N/A
<i>Vulpia myuros</i>	Rat's Tail Fescue	No	No	N/A

4 Threatened species

Under the BAM, threatened species are separated into two classes, ecosystem and species credit species. Those threatened species where the likelihood of occurrence of a species or elements of the species' habitat can be predicted by vegetation surrogates and landscape features, or for which a targeted survey has a low probability of detection, are identified as ecosystem credit species. Targeted surveys are not required for ecosystem species and potential impacts to these species are assessed in conjunction with impacts to PCTs.

Threatened species that cannot be confidently predicted to occur by vegetation surrogates and landscape features are species credit species. A targeted survey or an expert report is required to confirm the presence or absence of these species on the subject land.

Some threatened species are identified as both ecosystem and species credit species, with different aspects of the habitat and life cycle representing different credit types. Commonly, threatened fauna species may have foraging habitat as an ecosystem credit, while their breeding habitat represents a species credit.

The following sections outline the process for determining the habitat suitability for threatened species within the subject land and the results of the targeted surveys for candidate threatened species.

4.1 Identifying threatened species for assessment

Appendix C of the BAM indicates that only candidate species credit species that are at a risk of an SAIL (serious and irreversible impact) must be assessed within a BDAR using the small area module. Candidate species credit species that are not at risk of an SAIL and are not incidentally recorded on the subject land do not require assessment.

Threatened species that require assessment are initially identified based upon the following criteria:

- the distribution of the species including the IBRA subregion in which the preliminary subject land occurs (Peel IBRA subregion),
- the species is associated with any of the PCTs identified within the preliminary subject land,
- the native vegetation cover within the assessment area including the 1,500 m assessment circle around the subject and is equal to or greater than the minimum required for the species,
- the patch size that each vegetation zone is part of is equal to or greater than the minimum required for that species,
- the species is identified as an ecosystem or species credit species in the Threatened Biodiversity Data Collection.

The process for identifying threatened species which meet the above criteria is completed through the BAM calculator. The PCTs identified within the preliminary subject land, patch size, and native vegetation cover, as outlined in Section 3 of BAM, were entered into the BAM calculator and a preliminary list of ecosystem and species credit species was tabulated. Some species identified by the BAM calculator require further assessment of habitat constraints and/or geographic limitations before being confirmed as an ecosystem credit species or candidate species for assessment.

In addition, database searches (BioNet, PMST) were undertaken in October 2023 to identify records (or potentially suitable habitat) threatened or migratory fauna species that have been recorded within a 10 kilometre radius of the subject land. These records were considered to determine whether any species should be assessed in addition to those identified by the BAM Calculator. The database searches identified one EPBC listed flora species with the potential to occur, which is further discussed in Section 5. The search did not

identify any threatened or migratory fauna species considered to be likely to occur within the subject land, other than those already identified by the BAM Calculator.

4.2 BAMC results and habitat suitability assessment

This section outlines the species returned by the BAMC including ecosystem credit species, species credit species, and dual credit species. An assessment of these species in accordance with Section 5.2 of the BAM has been undertaken where appropriate, to identify species for targeted surveys.

4.2.1 Ecosystem credit species

The BAM credit calculator initially predicted 18 ecosystem credit species to occur. Three predicted ecosystem credit species required further assessment of habitat constraints before being confirmed as an ecosystem credit species. After consideration of habitat constraints, all ecosystem credit species identified in the BAM Calculator, except for one, *Calyptorhynchus lathami lathami* (Glossy Black-cockatoo), were considered to have the potential to occur within the study area and have therefore been retained as predicted species within the BAM Calculator. The Glossy Black-cockatoo was excluded because its habitat constraints were not present within the subject land.

Confirmed ecosystem credit species, their associated habitat constraints, geographic limitations, and sensitivity to potential gain class are outlined below in Table 4-1. As outlined above, targeted surveys are not required for these ecosystem species and impacts to these species are assessed in conjunction with impacts to PCTs.

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Table 4-1: Ecosystem credit species, including ecosystem component of dual credit species, predicted to occur within the study area

Scientific name	Common name	Habitat constraints / geographic limitations	Sensitivity to gain class	BC Act Status	EPBC Act Status	Maintained
<i>Anthochaera phrygia</i>	Regent Honeyeater (Foraging)	-	High	CE	CE	Yes
<i>Artamus cyanopterus cyanopterus</i>	Dusky Woodswallow	-	Moderate	V	-	Yes
<i>Calyptorhynchus lathami</i>	Glossy Black-cockatoo (Foraging)	Presence of Allocasuarina and casuarina species	High	V	V	No. No Allocasuarina or casuarina species were recorded within the subject land.
<i>Chthonicola sagittata</i>	Speckled Warbler	-	High	V	-	Yes
<i>Climacteris picumnus victoriae</i>	Brown Treecreeper (eastern subspecies)	-	High	V	-	Yes
<i>Dasyurus maculatus</i>	Spotted-tailed Quoll	-	High	V	E	Yes
<i>Ephippiorhynchus asiaticus</i>	Black-necked Stork	Swamps; shallow, open freshwater or saline wetlands or shallow edges of deeper wetlands within 300 m of these swamps; waterbodies; shallow lakes, lake margins and estuaries within 300 n of these waterbodies	Moderate	E	-	Yes
<i>Falco subniger</i>	Black Falcon	-	Moderate	V	-	Yes
<i>Glossopsitta pusilla</i>	Little Lorikeet	-	High	V	-	Yes
<i>Haliaeetus leucogaster</i>	White-bellied Sea-eagle (Foraging)	Waterbodies; within 1 km of rivers, lakes, large dams or creeks, wetlands and coastlines	High	V	-	Yes

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Scientific name	Common name	Habitat constraints / geographic limitations	Sensitivity to gain class	BC Act Status	EPBC Act Status	Maintained
<i>Hamirostra melanosternon</i>	Black-breasted Buzzard (Foraging)	-	Moderate	V	-	Yes
<i>Hirundapus caudacutus</i>	White-throated Needletail	-	High	-	V	Yes
<i>Lathamus discolor</i>	Swift Parrot (Foraging)	-	Moderate	E	CE	Yes
<i>Miniopterus orianae oceanensis</i>	Large Bent-winged Bat (Foraging)	-	High	V	-	Yes
<i>Petroica boodang</i>	Scarlet Robin	-	Moderate	V	-	Yes
<i>Pomatostomus temporalis temporalis</i>	Grey-crowned Babbler (eastern subspecies)	-	Moderate	V	-	Yes
<i>Pteropus poliocephalus</i>	Grey-headed Flying-fox (Foraging)	-	High	V	V	Yes
<i>Stagonopleura guttata</i>	Diamond Firetail	-	Moderate	V	-	Yes

V = vulnerable E = endangered CE = critically endangered

4.2.2 Species credit species

Appendix C of the BAM indicates that only candidate species credit species that are at a risk of an SAI (serious and irreversible impact) must be assessed within a BDAR using the small area module. Candidate species credit species that are not at risk of an SAI and are not incidentally recorded on the subject land do not require assessment. The BAM credit calculator initially predicted five candidate species at risk of an SAI to occur on the subject land, four fauna species and one flora species.

Species credit species, like ecosystem credit species, may require further assessment of specified habitat constraints or geographic limitations before being confirmed as a species credit species. In addition, a predicted candidate species can be considered unlikely to occur within the preliminary study area (or specific vegetation zones) where habitat is substantially degraded such that the species is unlikely to use the area. If an assessor considers a predicted candidate species is unlikely to occur, the species can be removed from the candidate list and does not require further assessment on the preliminary study area (or specific vegetation zones). The reasons for determining that a predicted species credit species is unlikely to have suitable habitat on the preliminary study area (or specific vegetation zones) must be documented.

The vegetation within the subject land has been disturbed by past clearing (Section 3.4 and 3.7), resulting in a lack of habitat features required for the candidate threatened species. Based on the habitat constraints, absence of microhabitats and the disturbed nature of portions of the site, all five species credit species have been excluded from further assessment on the basis that they are unlikely to occur within the subject land.

Table 4-2 provides the full list of candidate species credit species returned by the BAM calculator, outlines their associated habitat constraints and the presence or absence of these habitat constraints within the subject land. Table 4-2 also provides the justification for excluding species considered unlikely to occur within the subject land, in accordance with BAM Section 5.2.

4.3 Targeted threatened species surveys

The BAM-C did not return any candidate threatened species requiring assessment. Therefore, no targeted surveys were required. However, native flora and fauna species were recorded during field surveys (Appendix A and Appendix B). No threatened species were recorded.

Table 4-2: Species credit species (including dual credit species) predicted to occur within the study area from the BAMC or from database searches

Species	Habitat constraint	Geographic limitations	Sensitivity to gain class	BC Act status	EPBC Act status	Survey undertaken and comments/justification
<i>Adelotus brevis</i> – endangered population Tusked Frog population in the Nandewar and New England Bioregions	-	-	Very High	Endangered population	-	No – The New England Tablelands and Nandewar population of Tusked Frog represents a distinct and disjunct high- elevation population at the western limit of the species' range in NSW. It has not been recorded in the Nandewar bioregion since 1976. The subject land is not at high elevation where the endangered population would occur. In any event, there is no suitable habitat for the species within the highly disturbed pastures of the subject land.
<i>Anthothaera phrygia</i> Regent Honeyeater (Breeding)	As per Important Habitat Map	-	High	CE	CE	No – Subject land not within Important Habitat Area Map

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Species	Habitat constraint	Geographic limitations	Sensitivity to gain class	BC Act status	EPBC Act status	Survey undertaken and comments/justification
<i>Lathamus discolor</i> Swift Parrot (Breeding)	As per Important Habitat Map	-	Moderate	E	CE	No – Subject land not within Important Habitat Area Map
<i>Miniopterus orianae oceanensis</i> Large Bent-winged Bat	Cave, tunnel, mine, culvert or other structure known or suspected to be used for breeding including species records with microhabitat code "IC - in cave;" observation type code "E nest- roost;" with numbers of individuals >500	-	Very High	V	-	No. No cliffs, rocky areas, old mines or tunnels within the subject land.
<i>Prasophyllum sp.</i> Wybong	-	-	Moderate	-	CE	No. No suitable habitat within subject land.

V = vulnerable E = endangered CE = critically endangered EP = endangered population

5 Matters of national environmental significance

Matters of National Environmental Significance (MNES) are environmental values that require approval from the Commonwealth Minister for the Environment if an action that may have a significant impact on one or more of these values is proposed. There are nine Matters of National Environmental Significance categories listed under the EPBC Act:

- World heritage properties
- National heritage places
- Wetlands of international importance (listed under the Ramsar Convention)
- Listed threatened species and ecological communities
- Migratory species protected under international agreements
- Commonwealth marine areas
- The Great Barrier Reef Marine Park
- Nuclear actions (including uranium mines)
- A water resource, in relation to coal seam gas development and large coal mining development.

The relevant Matters of National Environmental Significance to the Project are:

- Listed threatened species
- Migratory species
- Threatened ecological communities.

Other Matters of National Environmental Significance, including World heritage places, National heritages places and Wetlands of international importance (declared Ramsar wetlands) are not relevant to the Project. Furthermore, as outlined in Section 3.6, there are no TECs listed under the EPBC Act present within the subject land.

A search of the EPBC Protected Matters Search Tool was undertaken to identify any MNES within 10 km of the subject land. The search identified 4 TECs with potential to occur within the subject land, 44 threatened species and 10 migratory species.

Field survey identified one potential EPBC-listed TEC within the subject land, the White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland CEEC. This potential CEEC was assessed and determined not to meet condition thresholds for inclusion in the listed community (see Section 3.6).

Of the threatened and migratory species, no fauna species were considered to have potential to occur within the subject land.

One EPBC listed threatened flora species, *Dichanthium setosum*, was considered potential to occur within the subject land due to a record of the species within close proximity of the subject land. The species was not recorded during field survey, and given the disturbed nature of the site, it is considered unlikely that the species occurs within the subject land.

6 Prescribed biodiversity Impacts

Chapter 6 of the BAM (DPIE, 2020a) identifies the prescribed biodiversity impacts which must be assessed as part of the Biodiversity Offsets Scheme. These prescribed impacts and their relevance to the Project are described below in Table 6-1. An assessment of the prescribed impacts relevant to the Project is provided in Section 7.2 and Section 8.3.

Table 6-1: Prescribed impacts as identified in the BAM (DPIE, 2020a)

Prescribed impact	Relevance to the subject land
Impacts on the habitat of threatened entities including: Karst, caves, crevices, cliffs and other geological features of significance	Not applicable. There are no karst, caves, crevices, cliffs or other geological features of significance within the subject land.
Human-made structures	There were a number of human-made structures within the western portion of the subject land. These included stockpile areas, water tank, storage containers, stock yards and 2x HV transmission line cables and towers. None of these structures provide suitable habitat for any threatened species with the potential to occur in the subject land.
Non-native vegetation	Not applicable. No threatened species that would be associated with non-native vegetation and that have not been considered elsewhere in this report would occur within the subject land.
Impacts on areas connecting threatened species habitat, such as movement corridors	The subject land contains fragmented native vegetation with low connectivity value as outlined in Section 2.9. This prescribed impact is discussed further in Section 7.2.
Impacts that affect water quality, water bodies and hydrological processes that sustain threatened entities (including from subsidence or upsidence from underground mining)	Not applicable. The nearest waterbodies are Calala Creek, situated 800 metres north east, and Goonoo Goonoo Creek, 1.3 kilometres west of the subject land. The Project is unlikely to affect water quality in these creeks due to their distance from the subject land.
Impacts on threatened and protected animals from turbine strikes from a wind farm	Not applicable, no turbines are proposed within the subject land.
Impacts on threatened species or fauna that are part of a TEC from vehicle strikes	Not applicable. The subject land does not contain habitat for any threatened species as outlined in Section 4.3.2.

BAM (STAGE 2): IMPACT ASSESSMENT (BIODIVERSITY VALUES)



7 Avoid and minimise impacts

7.1 Measures to avoid and minimise impacts on native vegetation and habitat

The principles in Section 7.1 of the BAM (DPIE, 2020a) have been considered to avoid and minimise impacts on native vegetation and habitat, where possible, through the development process for the Project.

7.1.1 Locating the Project

As stated in Section 7.1.1 of the BAM (DPIE, 2020a), project location decisions should be informed by knowledge of biodiversity values. An initial desktop assessment of biodiversity values, as well as an initial site survey was undertaken for early consideration in planning the Project location.

The avoidance and minimisation steps implemented during the development of the Project are outlined below in Table 7-1.

Table 7-1: Avoidance and minimisation measures implemented during project location.

BAM principles	How addressed
(a) Locating the project in areas where there are no biodiversity values	Approximately 51.58 hectares of the subject land has been historically cleared of native vegetation for past land uses. This includes the cleared Category 1 grassland as well as the cleared areas section of the subject land.
(b) Locating the project in areas where the native vegetation or threatened species habitat is in the poorest condition (i.e. areas that have a low vegetation integrity score)	When selecting the Project Site, a macro sighting approach was utilised to select a site which contained minimal native vegetation. Most of the subject land consists of cleared pasture and cleared areas. The Project will result in the removal of 0.14 hectares of 3396_low with a very low vegetation integrity score of 15.5.
(c) Locating the project in areas that avoid habitat for species with a high biodiversity risk weighting or land mapped on the important habitat map, or native vegetation that is a TEC or a highly cleared PCT.	There are 0.16 hectares of Box-gum Woodland CEEC within the subject land that is assumed to be cleared as part of the Project. This TEC is highly degraded and contains very small, disconnected patches. The subject land does not contain habitat for any threatened species.
(d) Locating the project outside of the buffer area around breeding habitat features such as nest trees or caves.	No nest trees, caves or hollow bearing trees were recorded within the subject land.

The BAM (DPIE, 2020a) also states that when selecting a proposal's location, alternatives need to be considered. The consideration of these alternatives, and justification in determining the final location is outlined below in Table 7-2.

Table 7-2: Alternatives considered in determining the Projects location

BAM principles	How addressed
(a) alternative modes or technologies that would avoid or minimise impacts on biodiversity values	As an energy source technology, the BESS has minimal impacts to biodiversity values. Impacts to biodiversity are limited to minimal clearing of native vegetation. These impacts are minor compared to many alternative energy sources.
(b) alternative routes that would avoid or minimise impacts on biodiversity values	The site access has been designed to avoid vegetation located along the eastern verge of Ascot Calala Road and is located as close as possible to the BESS. The access minimises impacts on biodiversity values.
(c) alternative locations that would avoid or minimise impacts on biodiversity values	There were a number of land options assessed within close proximity to the TransGrid substation. This site was selected due to its limited native vegetation extent. As a result, minimal vegetation needs to be removed for the construction of the transmission line.
(d) alternative sites within a property on which the proposal is located that would avoid or minimise impacts on biodiversity values.	This Project Site was selected due to its minimal abundance of native vegetation, compared to other nearby sites. Most of the property in which the Project is located has low biodiversity value. The Project also utilises existing infrastructure such as access roads to minimise impacts to biodiversity values.

7.1.2 Designing the Project

As stated in Section 7.1.2 of the BAM (DPIE, 2020a), project design (including the location of temporary and permanent ancillary construction and maintenance facilities) should be designed to avoid and minimise clearing of native vegetation and threatened species habitat.

Table 7-3: Avoidance and minimisation measures implemented during project design.

BAM principles	How addressed
(a) Reducing the clearing footprint of the project by minimising the number and type of facilities	The number and type of facilities has been limited to what is required for the Project.
(b) Locating ancillary facilities in areas where there are no biodiversity values	Laydown areas, equipment and vehicle storage areas and earthworks stockpiling areas are largely located within the cleared pasture areas, outside of the mapped PCT areas, which have very low to no biodiversity value. However, this assessment has assumed that the mapped PCT areas will be cleared during construction works.
(c) locating ancillary facilities in areas where the native vegetation or threatened species habitat is in the poorest condition (i.e. areas with the lowest vegetation integrity scores)	As above. No ancillary facilities are located in areas with threatened species habitat.
(d) locating ancillary facilities in areas that avoid habitat for species and vegetation that has a high threat status (e.g. an endangered ecological community (EEC) or critically endangered ecological community (CEEC) or is an entity at risk of a serious and irreversible impact (SAII)	As above. No ancillary facilities are located in areas that are part of an EEC, CEEC, or habitat for an entity at risk of a SAII.

BAM principles	How addressed
(e) actions and activities that provide for rehabilitation, ecological restoration and/or ongoing maintenance of retained areas of native vegetation, threatened species, threatened ecological communities and their habitat on the subject land.	Protection and management of native vegetation will be outlined within the Environmental Management Strategy (EMS) for the Project. Opportunities to provide rehabilitation and ecological restoration would be investigated.

7.2 Measures to avoid and minimise prescribed biodiversity impacts

Prescribed biodiversity impacts and their relevance to the Project are outlined in Section 6. Measures to avoid and minimise the prescribed biodiversity impacts relevant to the Project are outlined in Table 7-4.

Table 7-4: Prescribed impacts

Prescribed impact	Measures to avoid and minimise impact
Impacts on areas connecting threatened species habitat, such as movement corridors	The subject land contains small patches of fragmented native vegetation with low connectivity value.
Impacts that affect water quality, water bodies and hydrological processes that sustain threatened entities (including from subsidence or upsidence from underground mining)	There are no water bodies within the subject land. Measures would be implemented to mitigate the risk of any aquatic impacts to surrounding creeks as a result of construction activities for the Project. These mitigation measures are listed in Section 9.

8 Assessment of impacts

The following sections assess the potential impacts of the Project. Activities to take place during the site preparation and construction phase of the Project include clearing of vegetation within the development footprint.

8.1 Direct impacts

8.1.1 Native vegetation

Clearing of native vegetation is required for the Project. The areas of PCT 3396 and other vegetation types to be cleared are listed in Table 8-1.

For the purpose of this assessment, the impact area comprises the development footprint. It is assumed that all vegetation within the proposal construction area would be removed.

The total development footprint covers 21.68 ha, of which 0.16 hectares has been mapped as native vegetation and 21.36 ha has been mapped as Category 1 land (vegetation not conforming to any PCTs and containing less than 5% native understorey composition) or roads and buildings. One BC CEEC associated with the mapped PCT was identified within the subject land which will be impacted by the Project.

The direct impacts of the Project are presented in Table 8-1 for native vegetation.

Table 8-1: Direct impacts to native vegetation within the development footprint

PCT ID	PCT Name	Condition	Vegetation integrity score	Extent in the subject land (ha)	Extent in the development footprint (ha)
3396	Northwest Flats Box-Blakelys Red Gum Forest	3396_Low	15.5	0.93	0.16
Category 1 land		N/A	1.6	51.58	21.36
Roads/buildings		N/A	N/A	1.90	0.16
Total area native vegetation				0.93	0.16
Total area				54.41	21.68

8.1.2 Threatened flora and their habitat

No threatened flora or their habitat is being cleared as part of this project. The 21.36 hectares of Category 1 land and the 0.16 hectares of PCT 3396 are not considered to provide suitable habitat for any threatened flora species as the habitat is too degraded.

8.1.3 Threatened fauna and their habitat

No known threatened fauna habitat is being cleared as part of this project. The 21.36 hectares of Category 1 land and the 0.16 hectares of PCT 3396 are not considered to provide suitable habitat for any threatened fauna species credit species as the habitat is too degraded.

8.2 Indirect Impacts

The BAM (Section 8.2.2) identifies 16 potential indirect impacts that, as a minimum, must be considered as a part of a BDAR. The majority of these indirect impacts are not relevant to the Project and are therefore not considered further. Table 8-2 provides consideration of the indirect impacts of the Project on native vegetation, and TECs.

Table 8-2: Potential indirect impacts of the Project

Indirect impact type	Nature	Extent	Frequency	Duration	Timing
Impacts of the proposal on TECs/PCTs and/or threatened species and their habitat beyond the Construction area, including but not limited to: (a) Inadvertent impacts on adjacent habitat or vegetation	As with any construction project, there is always a risk of inadvertent impacts to adjacent habitat and vegetation through overstepping vegetation clearing boundaries. Areas of native vegetation which interface with the construction area are a small line of trees along Burgmanns Lane. This risk can be mitigated through good environmental management and strict controls for identifying and adhering to clearing boundaries. It is expected that through preparation and implementation of an Environmental Management Strategy (EMS), the risk of inadvertent impacts can be reduced to an acceptable level.	Adjacent vegetation	Ongoing during construction activities	Throughout the construction period	Potentially permanent
(b) Reduced viability of adjacent habitat due to edge effects	Habitat adjacent to the construction area is limited to a small line of native vegetation along Burgmanns Lane. This area of vegetation is already subject to high levels of edge effects and highly fragmented from other areas of native vegetation. Construction and operational activities as a result of the Project are not likely to exacerbate these edge effects and reduce the viability of these adjacent areas of habitat.	Adjacent vegetation	Ongoing during construction and operation	Throughout the construction period and during operation	Potentially permanent
(c) Reduced viability of adjacent habitat due to noise, dust or light spill	The Project would result in temporary standard construction impacts (including noise, dust and visual). The surrounding habitat is already subject to indirect noise, dust and light spill impacts as a result of surrounding developments. Therefore, any increases to noise, dust and light spill are expected to be negligible and would not reduce the viability of adjacent habitat in the context of existing land use practices.	Adjacent vegetation	Ongoing during construction and to a lesser extent, during operation	Throughout the construction period and potentially during operation	Potentially permanent
(d) Transport of weeds and pathogens from the site to adjacent vegetation	All areas of adjacent vegetation are currently contain an abundance of weeds. However, an increase in the movement of people, vehicles, machinery, vegetation waste and soil during and following construction may facilitate the introduction or spread of weeds and pathogens that currently occur within the subject land into adjacent vegetation. It is anticipated that the spread of weeds to adjacent vegetation can be managed as a part of an EMS.	Adjacent vegetation	Ongoing during construction	Throughout the construction period	Potentially permanent

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Indirect impact type	Nature	Extent	Frequency	Duration	Timing
(e) Increased risk of starvation, exposure and loss of shade or shelter	The Project is not expected to result in any indirect impacts resulting in an increased risk of starvation, exposure and loss of shade or shelter.	N/A	N/A	N/A	N/A
(f) Loss of breeding habitat	The Project is not expected to result in any indirect impacts resulting in the loss of breeding habitats.	N/A	N/A	N/A	N/A
(g) Trampling of threatened flora species	No threatened species were identified to occur within the subject lands. Adjacent native vegetation was not surveyed, but it is unlikely that threatened flora occurs in adjacent areas. In the unlikely event there is threatened flora adjacent to the subject land, it is expected that through preparation and implementation of an EMS that the risk of trampling of threatened flora species can be reduced to an acceptable level.	Adjacent vegetation	Ongoing during construction and operation	Throughout the construction period and during operation	Potentially permanent
(h) Inhibition of nitrogen fixation and increased soil salinity	The Project is not expected to result in any inhibition of nitrogen fixation.	N/A	N/A	N/A	N/A
(i) Fertiliser drift	The Project is not expected to result in any fertiliser drift.	N/A	N/A	N/A	N/A
(j) Rubbish dumping	The Project is not expected to result in any additional rubbish dumping.	N/A	N/A	N/A	N/A
(k) Wood collection	The Project is not expected to result in any wood collection.	N/A	N/A	N/A	N/A
(l) Removal and disturbance of rocks, including bush rock	The Project is not expected to result in any disturbance of rocks.	N/A	N/A	N/A	N/A
(m) Increase in predators	The Project is not expected to result in any increase in predatory species populations	N/A	N/A	N/A	N/A
(n) Increase in pest animal populations	The Project is not expected to result in any increase in pest animal populations.	N/A	N/A	N/A	N/A
(o) Changed fire regimes	The Project is not expected to result in any changed fire regimes.	N/A	N/A	N/A	N/A

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Indirect impact type	Nature	Extent	Frequency	Duration	Timing
(p) Disturbance to specialist breeding and foraging habitat, e.g. beach nesting for shorebirds.	The Project is not expected to result in any disturbance to specialist breeding and foraging habitat.	N/A	N/A	N/A	N/A
Other indirect impacts identified for the Project: Impacts to aquatic habitats.	As the subject area is over 1km from any known aquatic habitat, it is unlikely that the Project will result in any indirect impacts to these aquatic habitats.	N/A	N/A	N/A	N/A

8.3 Prescribed biodiversity impacts

With the measures described in Section 7.2 and Section 9 to avoid and minimise and reduce the risk of the Project resulting in prescribed biodiversity impacts, there is not expected to be any residual prescribed biodiversity impacts.

8.4 Matters of National Environmental Significance

Matters relating to impacts on flora and fauna which are not covered by the BC Act must also be addressed for the Proposal. There were no potential impacts on Matters of National Environmental Significance (MNES) in accordance with the EPBC Act as part of the proposed project. MNES relevant to the Project are discussed in Section 5. No significant impact assessment or offsets are required for MNES for this Project. As such the Project is not considered likely to require referral to the Australian Government Minister for the Environment for impacts to MNES.

8.5 Aquatic impacts

During the construction phase of the Project, there is the potential for water quality impacts including spills and sedimentation. Impacts are likely to be localised and minor as no works are occurring directly in these watercourses. No impacts to threatened fish or any other entities as listed under the FM Act are anticipated. No obstruction of fish passage would occur at these waterways. Impacts would be mitigated by the implementation of erosion and sediment controls and spill management, discussed further in Section 9.

8.6 Groundwater dependent ecosystems

No mapped potential GDEs would be removed as a result of the Project. There are two high potential terrestrial GDEs within close proximity of the subject land, located 635 metres east of the northeastern corner, and 790 metres west. There are also two high potential aquatic GDEs with proximity of the subject land; Calala Creek, 800 metres north east, and Goonoo Goonoo Creek, 1.3 kilometres west. These GDE's are not expected to be impacted as a result of the Project. This is because there would be no direct impacts to groundwater flows that would impact the potential GDEs. Excavation required for the Project, unless significant, is unlikely to encounter the water table. In the event there are any impacts to the water table this is anticipated to be minor, and would not impact upon the nearby GDEs.

9 Mitigation of impacts

It is assumed in this report that the mapped PCTs will be cleared as part of this Project. As such, the measures in Table 9-1 have been developed to mitigate these impacts during construction and operation. If these mapped PCTs can be avoided during detailed design and construction, the mitigation measures outlined in Table 9-1 will not be required.

Table 9-1: Measures to be implemented to minimise impacts on biodiversity

Mitigation measure	Outcome	Timing	Responsibility
Clearing of native vegetation will not occur until the Environment Management Strategy (EMS) is approved. The EMS will include flora and fauna management measures to be implemented.	Flora and fauna would be managed in accordance with the requirements of the EMS; prevention of over clearing of vegetation; prevention of weed establishment and invasion	Pre-construction and construction	Construction contractor
If native clearing occurs during spring nesting season, pre-clearing surveys will be undertaken. No breeding sites or active nests will be disrupted, as far as practical.	Minimise fauna mortality and injury	Pre-construction	Construction contractor Project ecologist
Native vegetation will be minimised as far as is practicable.	Minimise biodiversity loss	Pre-construction/ construction	Construction contractor
The limits of native vegetation clearing will be marked on plans and on site with signed fencing so that clearing activities are constrained to approved areas only.	Prevent accidental vegetation clearing	Pre-construction/ construction	Construction contractor
Where fauna species are identified in native vegetation to be cleared, animals will be removed and relocated to adjacent bushland prior to clearing. If this is not possible, the tree would be sectionally dismantled or soft felled under the supervision of an ecologist or wildlife carer, before relocating the animal.	Minimise fauna mortality and injury	Pre-construction	Construction contractor Project ecologist
Pits/trenches adjacent to native vegetation that will remain open overnight, will be securely covered, where possible. Alternatively, fauna ramps (logs or wooden planks) will be installed to provide an escape for trapped fauna.	Prevent fauna injury/starvation/mortality	Construction	Construction contractor Project ecologist
Appropriate sediment and erosion controls around the impact area will be installed prior to earthworks.	Protect adjacent native vegetation and nearby watercourses	Pre-construction/ construction	Construction contractor
Where possible, earthworks will be undertaken during dry weather conditions. No clearing of vegetation will occur during overland flow events.	Prevent erosion and downstream water quality impacts	Construction	Construction contractor

10 Impact summary and offsets

The following section summarises the impacts of the Project and outlines the offsets required in accordance with the BAM.

10.1 Impacts requiring offset

10.1.1 Impacts on native vegetation

The impacts of the Project on native vegetation that require offset (in accordance with Section 9.2 of the BAM and as determined using the BAMC) are outlined below in Table 10-1 and Figure 10-1. The full biodiversity offset credit reports are provided in Appendix F of this report.

Table 10-1: Impact summary for PCTs requiring offsets and the associated ecosystem credit requirements.

Vegetation Zone	PCT Name	TEC Name	Area to be impacted (ha)	Change in vegetation integrity score	Ecosystem credits required
3396_Low	Northwest Flats Box-Blakelys Red Gum Forest	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.	0.16	-15.5	2
Total			0.16		2

10.1.2 Impacts on threatened species

Impacts to species credit species as a result of the Project require offsetting in accordance with Section 10.1.1 of the BAM. No species credit species were identified within the subject land, and no offsets are required.

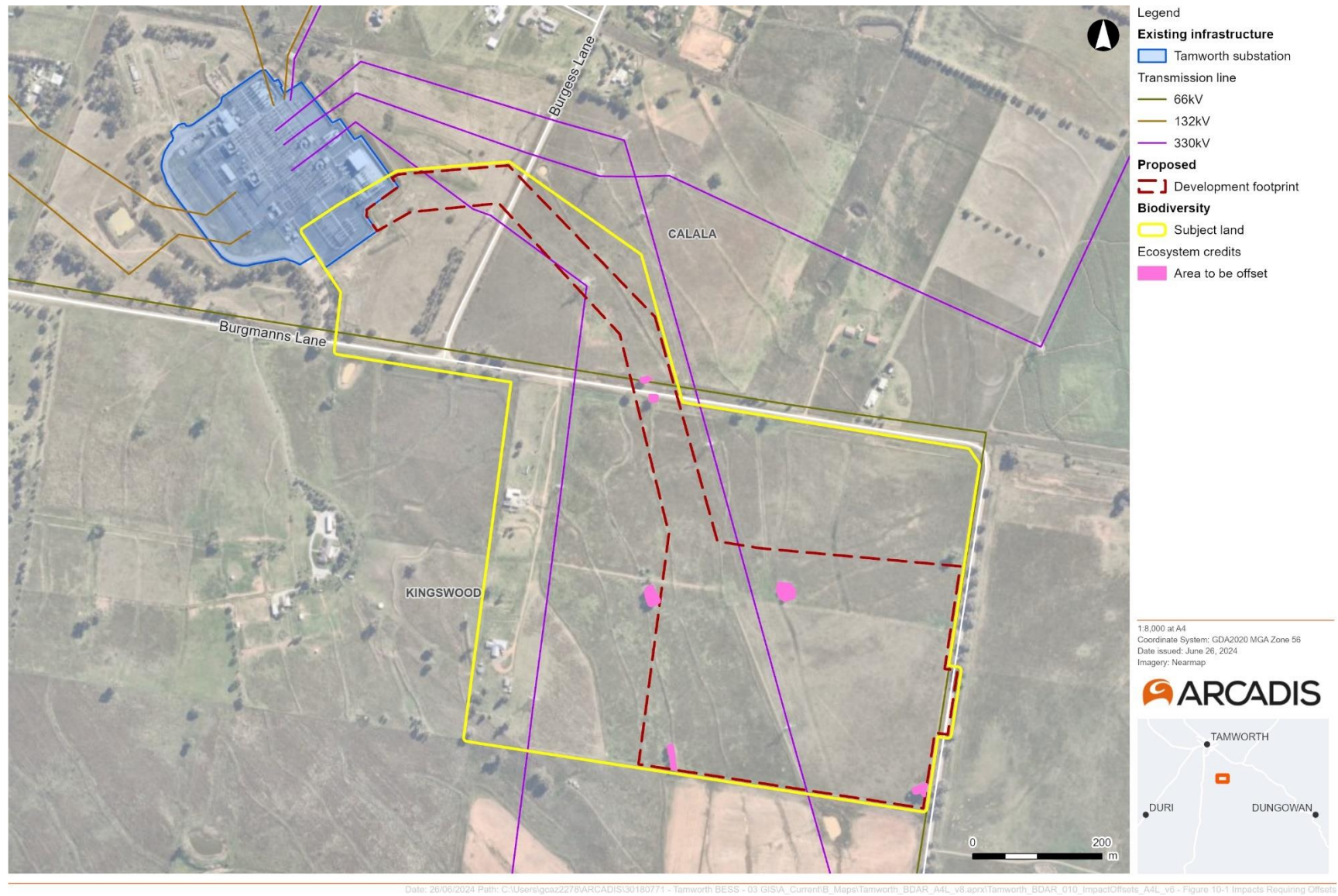


Figure 10-1: Impacts requiring offset.

10.2 Serious and irreversible impacts

Serious and irreversible impacts (SAIL) have been assessed according to Section 9.1 of the BAM and with the guidance of *Guidance to assist a decision-maker to determine a serious and irreversible impact* (DPIE 2019) (Appendix F). Box Gum Woodland TEC has been identified as potentially subject to SAIL and occurs in five small patches within the subject land. The SAIL assessment determined that the removal of these small patches of degraded box gum woodland (totalling 0.16 ha of box gum woodland, isolated from other patches of this TEC) would not constitute an SAIL for this TEC.

10.3 Impacts not requiring offset

All impacts on native vegetation as a result of the Project require offsetting in accordance with Section 9.2.1 of the BAM.

10.4 Areas not requiring assessment

One vegetation zones recorded within the subject land is dominated by exotic species and does not conform to the definition of an PCT listed in the VIS database. This area comprised exotic pasture as listed in Table 10-2 and do not require further assessment or offsetting in accordance with section 9.3 of the BAM.

Table 10-2: Areas not requiring assessment

Vegetation Zone	Area to be impacted (ha)
Category 1 land	21.36

11 Offset strategy

The impacts of the proposed development have been assessed in accordance with the BC Act and the BAM.

The available options for delivery of offsets under the Biodiversity Offsets Scheme are as follows:

- An appropriate number and class of like-for-like biodiversity credits may be retired.
- If all the required like-for-like biodiversity credits cannot be sourced, an appropriate number and class of variation biodiversity credits may be retired. The use of variation offset rules must be approved by the consent authority. The use of variation offset rules cannot be approved unless an applicant can demonstrate that they have taken reasonable steps to secure like-for-like biodiversity credits.
- Alternatively, the Offsets Payment Calculator may be used to determine the cost of all or part of the credit obligations, and a payment may be made to the Biodiversity Conservation Fund (BCF).

For the purpose of this BDAR, it has been assumed that a future offset requirement would be met through a contribution to the BCF. The BCF is administered by the Biodiversity Conservation Trust (BCT) who take on responsibility for sourcing the requisite land offsets from a proponent once the payment to the BCF has been made.

12 Conclusion

This BDAR has been prepared on behalf of Iberdrola Australia Development Pty Ltd to inform the construction, operation, and maintenance of a Battery Energy Storage System (BESS), that will be up to 270 MW and would provide up to 1080 MWh of battery storage capacity at Kingswood (the Project). This BDAR has been prepared by Elvira Lanham, an Accredited Person (BAAS 20012) under the New South Wales (NSW) *Biodiversity Conservation Act 2016* (BC Act). It is based on desktop research and field surveys, carried out by Arcadis in 2023.

One native vegetation community, PCT 3396 Northwest Flats Box-Blakely's Red Gum Forest, occurs within the subject land, occupying a total of 0.93 hectares, of which 0.16 occurs within the development footprint. The area of PCT 3396 within the subject land forms part of the White Box- Yellow Box- Blakely's Red Gum Grassy Woodland and Derived Native Grassland in the NSW North Coast, New England Tableland, Nandewar, Brigalow Belt South, Sydney Basin, South Eastern Highlands, NSW South Western Slopes, South East Corner and Riverina Bioregions CEEC listed under the BC Act.

Two threatened ecosystem credit fauna species were predicted to occur from the BAM calculator, Grey-crowned Babbler and Grey-headed Flying-fox. Following field surveys, it was determined that these species could occur within the subject land during flowering events. However, targeted surveys are not required for these ecosystem credit species under a streamlined BDAR.

No threatened species were recorded within the subject land or subject land during field survey.

There were no MNES being impacted by the Project, therefore a significant impact assessment under the EPBC Act was not required.

Where impacts cannot be avoided, mitigation measures are proposed that would reduce adverse impacts on ecological values. These include appropriate sediment and erosion controls, avoiding and minimising removal of vegetation where practicable, site inductions, exclusion fencing, pre-clearance surveys and appropriate weed and hygiene protocols.

The offsets required for the Project were calculated using the BAM Calculator. Two ecosystem credits are required to offset the impacts of the Project.

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APPENDIX A: FLORA RECORDED IN THE SUBJECT LAND (ARCADIS 2023)

Scientific Name	Common Name	Exotic (designated with *)
<i>Alternanthera pungens</i>	Khaki Weed	*
<i>Anthoxanthum odoratum</i>	Sweet Vernal Grass	*
<i>Avena fatua</i>	Wild Oats	*
<i>Bidens pilosa</i>	—	
<i>Brassica sp.</i>	—	
<i>Callitris glaucophylla</i>	—	
<i>Carthamus lanatus</i>	—	
<i>Cenchrus clandestinus</i>	Kikuyu Grass	*
<i>Centaurea solstitialis</i>	St Barnabys Thistle	*
<i>Centaureum erythraea</i>	Common Centaury	*
<i>Cestrum parqui</i>	Green Cestrum	*
<i>Chloris truncata</i>	Windmill Grass	
<i>Chloris virgata</i>	Feathertop Rhodes Grass	*
<i>Chloris gayana</i>	—	
<i>Cirsium vulgare</i>	Spear Thistle	*
<i>Convolvulus arvensis</i>	—	
<i>Conyza sp.</i>	—	
<i>Cynodon dactylon</i>	Common Couch	
<i>Dichanthium sericeum</i>	Queensland Bluegrass	
<i>Echium plantagineum</i>	Patterson's Curse	*
<i>Eucalyptus albens</i>	White Box	
<i>Eucalyptus blakelyi</i>	Blakely's Red Gum	
<i>Eucalyptus melliodora</i>	Yellow Box	
<i>Geranium solanderi</i>	Native Geranium	
<i>Holium sp.</i>	—	
<i>Hordeum leporinum</i>	Barley Grass	*
<i>Hypericum perforatum</i>	St. Johns Wort	*
<i>Juncus usitatus</i>	—	
<i>Lolium perenne</i>	Perennial Ryegrass	*
<i>Lycium ferocissimum</i>	African Boxthorn	*

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Scientific Name	Common Name	Exotic (designated with *)
<i>Lysimachia arvensis</i>	—	
<i>Malva parviflora</i>	Small-flowered Mallow	*
<i>Medicago polymorpha</i>	Burr Medic	*
<i>Melia azedarach</i>	White Cedar	
<i>Oxalis perennans</i>	—	
<i>Plantago lanceolata</i>	Lamb's Tongues	*
<i>Rumex sp.</i>	—	
<i>Rytidosperma sp.</i>	—	
<i>Schinus molle</i>	Pepper Tree	*
<i>Sida rhombifolia</i>	Paddy's Lucerne	*
<i>Taraxacum officinale</i>	Dandelion	*
<i>Trifolium campestre</i>	Hop Clover	*
<i>Verbena bonariensis</i>	Purpletop	*
<i>Verbena sp.</i>	—	
<i>Vulpia myuros</i>	Rat's Tail Fescue	*
<i>Wahlenbergia communis</i>	Tufted Bluebell	

APPENDIX B: FAUNA RECORDED IN THE STUDY AREA (ARCADIS 2023)

Common name	Scientific name	Status (BC Act)	Status (EPBC Act)	Introduced (Yes/No)
Australian Magpie	<i>Cracticus tibicen</i>	-	-	N
Australian Raven	<i>Corvus coronoides</i>	-	-	N
Australian White Ibis	<i>Threskiomis moluccus</i>	-	-	N
Common Myna	<i>Acridotheres tristis</i>	-	-	Y
Eastern Great Egret	<i>Ardea modesta</i>	-	-	N
Noisy Miner	<i>Manorina melanocephala</i>	-	-	N
Rainbow Lorikeet	<i>Trichoglossus moluccanus</i>	-	-	N
Welcome Swallow	<i>Hirundo neoxena</i>	-	-	N

APPENDIX C: PMST REPORT



Australian Government

Department of Climate Change, Energy,
the Environment and Water

EPBC Act Protected Matters Report

This report provides general guidance on matters of national environmental significance and other matters protected by the EPBC Act in the area you have selected. Please see the caveat for interpretation of information provided here.

Report created: 06-Dec-2023

[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	3
Great Barrier Reef Marine Park:	None
Commonwealth Marine Area:	None
Listed Threatened Ecological Communities:	4
Listed Threatened Species:	38
Listed Migratory Species:	10

Other Matters Protected by the EPBC Act

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

The EPBC Act protects the environment on Commonwealth land, the environment from the actions taken on Commonwealth land, and the environment from actions taken by Commonwealth agencies. As heritage values of a place are part of the 'environment', these aspects of the EPBC Act protect the Commonwealth Heritage values of a Commonwealth Heritage place. Information on the new heritage laws can be found at <https://www.dcceew.gov.au/parks-heritage/heritage>

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

Commonwealth Lands:	1
Commonwealth Heritage Places:	None
Listed Marine Species:	18
Whales and Other Cetaceans:	None
Critical Habitats:	None
Commonwealth Reserves Terrestrial:	None
Australian Marine Parks:	None
Habitat Critical to the Survival of Marine Turtles:	None

Extra Information

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

State and Territory Reserves:	None
Regional Forest Agreements:	None
Nationally Important Wetlands:	None
EPBC Act Referrals:	8
Key Ecological Features (Marine):	None
Biologically Important Areas:	None
Bioregional Assessments:	None
Geological and Bioregional Assessments:	None

Details

Matters of National Environmental Significance

Wetlands of International Importance (Ramsar Wetlands)		[Resource Information]
Ramsar Site Name	Proximity	Buffer Status
Banrock station wetland complex	1000 - 1100km upstream from Ramsar site	In feature area
Riverland	900 - 1000km upstream from Ramsar site	In feature area
The coorong, and lakes alexandrina and albert wetland	1100 - 1200km upstream from Ramsar site	In feature area

Listed Threatened Ecological Communities

[Resource Information]

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

Status of Vulnerable, Disallowed and Ineligible are not MNES under the EPBC Act.

Community Name	Threatened Category	Presence Text	Buffer Status
Natural grasslands on basalt and fine-textured alluvial plains of northern New South Wales and southern Queensland	Critically Endangered	Community likely to occur within area	In feature area
New England Peppermint (<i>Eucalyptus nova-anglica</i>) Grassy Woodlands	Critically Endangered	Community may occur within area	In feature area
Weeping Myall Woodlands	Endangered	Community may occur within area	In feature area
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			[<u>Resource Information</u>]
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			

Scientific Name	Threatened Category	Presence Text	Buffer Status
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 likely to occur within area	In feature area
Botaurus poiciloptilus Australasian Bittern [1001]	Endangered	Species or species habitat may occur within area	In feature area
Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	Species or species habitat may occur within area	In feature area
Calyptorhynchus lathami lathami South-eastern Glossy Black-Cockatoo [67036]	Vulnerable	Species or species habitat likely to occur within area	In feature area
Climacteris picumnus victoriae Brown Treecreeper (south-eastern) [67062]	Vulnerable	Species or species habitat likely 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
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 may occur within area	In feature area
Melanodryas cucullata cucullata South-eastern Hooded Robin, Hooded Robin (south-eastern) [67093]	Endangered	Species or species habitat likely 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
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 likely to occur within area	In feature area
FISH			
Maccullochella peelii Murray Cod [66633]	Vulnerable	Species or species habitat known to occur within area	In buffer area only
FROG			
Litoria booroolongensis Booroolong Frog [1844]	Endangered	Species or species habitat likely to occur within area	In feature area
MAMMAL			
Chalinolobus dwyeri Large-eared Pied Bat, Large Pied Bat [183]	Endangered	Species or species habitat may occur within area	In feature area
Dasyurus maculatus maculatus (SE mainland population) Spot-tailed Quoll, Spotted-tail Quoll, Tiger Quoll (southeastern mainland population) [75184]	Endangered	Species or species habitat likely to occur within area	In feature area
Nyctophilus corbeni Corben's Long-eared Bat, South-eastern Long-eared Bat [83395]	Vulnerable	Species or species habitat likely to occur within area	In feature area
Petaurus australis australis Yellow-bellied Glider (south-eastern) [87600]	Vulnerable	Species or species habitat may occur within area	In feature area

Scientific Name	Threatened Category	Presence Text	Buffer Status
Phascolarctos cinereus (combined populations of Qld, NSW and the ACT)			
Koala (combined populations of Queensland, New South Wales and the Australian Capital Territory) [85104]	Endangered	Species or species habitat known to occur within area	In feature area
Pteropus poliocephalus			
Grey-headed Flying-fox [186]	Vulnerable	Foraging, feeding or related behaviour known to occur within area	In feature area
PLANT			
Cadellia pentastylis			
Ooline [9828]	Vulnerable	Species or species habitat likely to occur within area	In feature area
Callistemon pungens			
[55581]	Vulnerable	Species or species habitat may occur within area	In feature area
Dichanthium setosum			
bluegrass [14159]	Vulnerable	Species or species habitat known to occur within area	In feature area
Eucalyptus nicholii			
Narrow-leaved Peppermint, Narrow-leaved Black Peppermint [20992]	Vulnerable	Species or species habitat may occur within area	In feature area
Euphrasia arguta			
[4325]	Critically Endangered	Species or species habitat likely to occur within area	In feature area
Lepidium aschersonii			
Spiny Peppercress [10976]	Vulnerable	Species or species habitat may occur within area	In feature area
Lepidium monoplocoides			
Winged Pepper-cress [9190]	Endangered	Species or species habitat may occur within area	In feature area
Prasophyllum sp. Wybong (C.Phelps ORG 5269)			
a leek-orchid [81964]	Critically Endangered	Species or species habitat may occur within area	In feature area
Swainsona murrayana			
Slender Darling-pea, Slender Swainson, Murray Swainson-pea [6765]	Vulnerable	Species or species habitat may occur within area	In feature area

Scientific Name	Threatened Category	Presence Text	Buffer Status
Thesium australe Austral Toadflax, Toadflax [15202]	Vulnerable	Species or species habitat likely to occur within area	In feature area
Vincetoxicum forsteri listed as Tylophora linearis [92384]	Endangered	Species or species habitat may occur within area	In feature area

REPTILE			
Anomalopus mackayi Five-clawed Worm-skink, Long-legged Worm-skink [25934]	Vulnerable	Species or species habitat may occur within area	In feature area
Aprasia parapulchella Pink-tailed Worm-lizard, Pink-tailed Legless Lizard [1665]	Vulnerable	Species or species habitat may occur within area	In feature area
Hemiaspis damelii Grey Snake [1179]	Endangered	Species or species habitat may occur within area	In feature area
Uvidicolus sphyrurus Border Thick-tailed Gecko, Granite Belt Thick-tailed Gecko [84578]	Vulnerable	Species or species habitat may occur within area	In feature area

Listed Migratory Species		[Resource Information]	
Scientific Name	Threatened Category	Presence Text	Buffer Status
Migratory Marine Birds			
Apus pacificus Fork-tailed Swift [678]		Species or species habitat likely to occur within area	In feature area

Migratory Terrestrial Species			
Hirundapus caudacutus White-throated Needletail [682]	Vulnerable	Species or species habitat known to occur within area	In feature area
Motacilla flava Yellow Wagtail [644]		Species or species habitat may occur within area	In feature area
Myiagra cyanoleuca Satin Flycatcher [612]		Species or species habitat likely to occur within area	In feature area

Scientific Name	Threatened Category	Presence Text	Buffer Status
Rhipidura rufifrons Rufous Fantail [592]		Species or species habitat may occur within area	In feature area
Migratory Wetlands Species			
Actitis hypoleucos Common Sandpiper [59309]		Species or species habitat may occur within area	In feature area
Calidris acuminata Sharp-tailed Sandpiper [874]		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]		Species or species habitat may occur within area	In feature area

Other Matters Protected by the EPBC Act

Commonwealth Lands [Resource Information]		
The Commonwealth area listed below may indicate the presence of Commonwealth land in this vicinity. Due to the unreliability of the data source, all proposals should be checked as to whether it impacts on a Commonwealth area, before making a definitive decision. Contact the State or Territory government land department for further information.		
Commonwealth Land Name	State	Buffer Status
Defence		
Commonwealth Land - Defence Service Homes Corporation [12951]	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

Scientific Name	Threatened Category	Presence Text	Buffer Status
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]		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
Gallinago hardwickii Latham's Snipe, Japanese Snipe [863]		Species or species habitat may occur within area overfly marine area	In feature area
Haliaeetus leucogaster White-bellied Sea-Eagle [943]		Species or species habitat likely to occur within area	In feature area
Hirundapus caudacutus White-throated Needletail [682]	Vulnerable	Species or species habitat known to occur within area overfly marine area	In feature area
Lathamus discolor Swift Parrot [744]	Critically Endangered	Species or species habitat may occur within area overfly marine area	In feature area

Scientific Name	Threatened Category	Presence Text	Buffer Status
Merops ornatus Rainbow Bee-eater [670]		Species or species habitat may occur within area overfly marine area	In feature area
Motacilla flava Yellow Wagtail [644]		Species or species habitat may occur within area overfly marine area	In feature area
Myiagra cyanoleuca Satin Flycatcher [612]		Species or species habitat likely to occur within area overfly marine area	In feature area
Neophema chrysostoma Blue-winged Parrot [726]	Vulnerable	Species or species habitat may occur within area overfly marine area	In feature area
Pterodroma cervicalis White-necked Petrel [59642]		Species or species habitat may occur within area	In feature area
Rhipidura rufifrons Rufous Fantail [592]		Species or species habitat may occur within area overfly marine area	In feature area
Rostratula australis as Rostratula benghalensis (sensu lato) Australian Painted Snipe [77037]	Endangered	Species or species habitat likely to occur within area overfly marine area	In feature area

Extra Information

EPBC Act Referrals				[Resource Information]
Title of referral	Reference	Referral Outcome	Assessment Status	Buffer Status
Chaffey Dam Pipeline Project	2022/09314		Completed	In buffer area only
Controlled action				
One Tree Hill Estate - Stage 13	2003/1142	Controlled Action	Post-Approval	In feature area

Title of referral	Reference	Referral Outcome	Assessment Status	Buffer Status
Controlled action				
Operation of Peel River Drought Protection Works	2019/8590	Controlled Action	Post-Approval	In buffer area only
Not controlled action				
Improving rabbit biocontrol: releasing another strain of RHDV, sthrn two thirds of Australia	2015/7522	Not Controlled Action	Completed	In feature area
Replacement Pipeline between Dungowan Village and Calala	2021/9091	Not Controlled Action	Completed	In buffer area only
Residential Development & Assoc Infrastructure 31 & 41 Panorama Road	2005/2115	Not Controlled Action	Completed	In feature area
Residential Subdivision, Warramunga Avenue	2005/2201	Not Controlled Action	Completed	In buffer area only
Not controlled action (particular manner)				
Aerial baiting for wild dog control	2006/2713	Not Controlled Action (Particular Manner)	Post-Approval	In feature area

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 D: FIELD DATA SHEETS

Arceuth

Hammonds place

ecoplanning

ecology | planning | offsets

BAM Plot – Field Survey Form

Site Sheet no: 1 of

Survey Name		Plot Identifier		Recorders	
Date	25/10/23	EL + BF	BAM 01	EL, BF	
Zone	Datum	IBRA region	Photo #	Zone ID	
Easting	Northing	Dimensions	Orientation of midline from the 0 m point.		90° magnetic
Vegetation Class		EEC: tick			Confidence: H M L
Plant Community Type					Confidence: H M L

Record easting and northing from the plot marker. If applicable, orient picket so that perforated rib points along direction of midline. Dimensions (Shape) of 0.04 ha base plot inside 0.1 ha FA plot should be identified, magnetic bearing taken along midline.

BAM Attribute (400 m ² plot)	Sum values
Trees	2
Shrubs	0
Grasses etc.	1
Forbs	0
Ferns	0
Other	0
Count of Native Richness	
Trees	20
Shrubs	1
Grasses etc.	1
Forbs	1
Ferns	1
Other	1
Sum of Cover of native vascular plants by growth form group	
Trees	20
Shrubs	1
Grasses etc.	1
Forbs	1
Ferns	1
Other	1
High Threat Weed cover	

BAM Attribute (20 x 50 m plot)		Stem Classes and Hollows			Record living eucalypt* (Euc*) and living native non-eucalypt (Non Euc) stems separately Data needed is presence only, unless a 'large tree' for that class. * includes all species of <i>Eucalyptus</i> , <i>Corymbia</i> , <i>Angophora</i> , <i>Lophostemon</i> and <i>Syncarpia</i> † Record stems by size class with hollows (including dead stems/trees)	
dbh		Euc*	Non Euc	Hollows†		20cm+
large trees for Euc* & Non Euc	80 + cm	Euc*	Non Euc	0		
	50 - 79 cm					
	30 - 49 cm	✓				
	20 - 29 cm	✓	✓			
	10 - 19 cm	✓	✓		n/a	
	5 - 9 cm	N/A	N/A	n/a		
	< 5 cm	N/A	N/A	This size class records tree regeneration		
Length of logs (m) (≥10 cm diameter, >50 cm in length)		0 Tally space			total 0	

Each size class is noted as present by the living tree stems only. Depending on the Vegetation Class, DBH values and counts may be needed for a class.

For a multi-stemmed tree, only the largest living stem is included in the count/estimate. For hollows count only the presence of a stem containing hollows, not the count of hollows in that stem. Only count as 1 stem per tree where tree is multi-stemmed. The hollow-bearing stem may be a dead stem.

BAM Attribute (1 x 1 m plots)	Litter cover (%)	Bare ground cover (%)	Cryptogam cover (%)	Rock cover (%)
Subplot score (% in each)	20 20 20 20 50	15 25 35 20 5	0 0 0 0 0	0 0 0 0 0
Average of the 5 subplots				

Litter cover is assessed as the average percentage ground cover of litter recorded from five 1 m x 1 m plots located on alternate sides and 5 m from the plot midline at the locations 5, 15, 25, 35, and 45 m along the midline. Litter cover includes leaves, seeds, twigs, branchlets and branches (less than 10 cm in diameter). Within these 1 m x 1 m plots assessors may also record the cover of rock, bare ground and cryptogam soil crusts. Collection of these data is optional - the data do not currently contribute to assessment scores, they hold potential value for future vegetation integrity assessment attributes and benchmarks, and for enhancing PCT description.

Physiography + site features that may help in determining PCT and Management Zone (optional)

Morphological Type	Landform Element	Landform Pattern	Microrelief
Lithology	Soil Surface Texture	Soil Colour	Soil Depth
Slope	Aspect	Site Drainage	Distance to nearest water and type

Plot Disturbance	Severity code	Age code
Clearing (inc. logging)		
Cultivation (inc. pasture)		
Soil erosion		
Firewood / CWD removal		
Grazing (identify native/stock)	3	R
Fire damage		
Storm damage		
Weediness		
Other		

Severity: 0=no evidence, 1=light, 2=moderate, 3=severe

Free Text Section for brief site description

Age: R=recent (<3yrs), NR=not recent (3-10yrs), O=old (>10yrs)

400 m² plot: Sheet _ of _

Survey Name

Plot Identifier

Recorders

Date

25/10/23

Kingswood

SAM 01

GF Code	Top 3 native species in each growth form group: Full species name mandatory All other native and exotic species: Full species name where practicable	N, E or HTE	Cover	Abund	stratum	voucher
1	<i>E. albens</i> N	15	20 7			
2	<i>E. mellodora</i>	N	5	2		
3	<i>Schinus molle</i>		5	2		
4	<i>Anthriscum odoratum</i>		15	100+		
5	<i>Juncus acutatus</i> N	1	5			✓
6	Grass <i>Vulpia myuros</i>		5	20+		✓
7	<i>Malva parviflora</i> X	1	20 10			✓
8						
9						
10						
11						
12						
13						
14						
15						
16						
17						
18						
19						
20						
21						
22						
23						
24						
25						
26						
27						
28						
29						
30						
31	Out of plot					
32						
33	<i>Lygium ferocissimum</i>					
34	Yellow star thistle					
35						
36						
37						
38						
39						
40						

GF Code: see Growth Form definitions in Appendix 1

N: native, E: exotic, HTE: high threat exotic

GF – circle code if 'top 3'.

Cover: 0.1, 0.2, 0.3, ..., 1, 2, 3, ..., 10, 15, 20, 25, ... 100% (foliage cover); **Note:** 0.1% cover represents an area of approximately 63 x 63 cm or a circle about 71 cm across, 0.5% cover represents an area of approximately 1.4 x 1.4 m, and 1% = 2.0 x 2.0 m, 5% = 4 x 5 m, 25% = 10 x 10 m

Abundance: 1, 2, 3, ..., 10, 20, 30, ... 100, 200, ..., 1000, ...

Print more copies of this sheet to allow for higher species counts at a plot. All species at a plot need to be recorded.

Form version designed September 2017

Printed 18 June 2023

Survey Name		Plot Identifier		Recorders	
Date	25 10 23	Km 500	BAMO 2	EL, BF	
Zone	Datum	IBRA region	Photo #	Zone ID	
Easting	Northing	Dimensions	in	Orientation of midline from the 0 m point	Magnetic
Vegetation Class					Confidence: H M L
Plant Community Type					Confidence: H M L
					EEC: tick

Record easting and northing from the plot marker. If applicable, orient picket so that perforated rib points along direction of midline. Dimensions (Shape) of 0.04 ha base plot inside 0.1 ha FA plot should be identified, magnetic bearing taken along midline.

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

BAM Attribute (20 x 50 m plot)		Stem Classes and Hollows			
dbh	Euc*	Non Euc	Hollows†	20cm+	
large trees for Euc* & Non Euc	80 + cm	Euc*	Non Euc		
	50 – 79 cm				
	30 – 49 cm				
	20 – 29 cm	tick	tick		
	10 – 19 cm	tick	tick		n/a
	5 – 9 cm	tick	tick		n/a
	< 5 cm	tick	tick	This size class records tree regeneration	
Length of logs (m) (≥10 cm diameter, >50 cm in length)		Tally space			total

Record living eucalypt* (Euc*) and living native non-eucalypt (Non Euc) stems separately. Data needed is presence only, unless a 'large tree' for that class. * includes all species of Eucalyptus, Corymbia, Angophora, Lophostemon and Syncarpia. † Record stems by size class with hollows (including dead stems/trees).

Each size class is noted as present by the living tree stems only. Depending on the Vegetation Class, DBH values and counts may be needed for a class. For a multi-stemmed tree, only the largest living stem is included in the count/estimate. For hollows count only the presence of a stem containing hollows, not the count of hollows in that stem. Only count as 1 stem per tree where tree is multi-stemmed. The hollow-bearing stem may be a dead stem.

BAM Attribute (1 x 1 m plots)	Litter cover (%)	Bare ground cover (%)	Cryptogam cover (%)	Rock cover (%)
Subplot score (% in each)	10 20 15 25 20	0 0 0 0 0	0 0 0 0 0	0 0 0 0 0
Average of the 5 subplots				

Litter cover is assessed as the average percentage ground cover of litter recorded from five 1 m x 1 m plots located on alternate sides and 5 m from the plot midline at the locations 5, 15, 25, 35, and 45 m along the midline. Litter cover includes leaves, seeds, twigs, branchlets and branches (less than 10 cm in diameter). Within these 1 m x 1 m plots assessors may also record the cover of rock, bare ground and cryptogam soil crusts. Collection of these data is optional - the data do not currently contribute to assessment scores, they hold potential value for future vegetation integrity assessment attributes and benchmarks, and for enhancing PCT description.

Physiography + site features that may help in determining PCT and Management Zone (optional)

Morphological Type	Landform Element	Landform Pattern	Microrelief
Lithology	Soil Surface Texture	Soil Colour	Soil Depth
Slope	Aspect	Site Drainage	Distance to nearest water and type

Plot Disturbance	Severity code	Age code
Clearing (inc. logging)		
Cultivation (inc. pasture)		
Soil erosion		
Firewood / CWD removal		
Grazing (identify native/stock)	3	R
Fire damage		
Storm damage		
Weediness		
Other		

Free Text Section for brief site description

Severity: 0=no evidence, 1=light, 2=moderate, 3=severe

Age: R=recent (<3yrs), NR=not recent (3-10yrs), O=old (>10yrs)

400 m ² plot: Sheet _ of _		Survey Name	Plot Identifier	Recorders	
Date	25/10/23	Kingwood	SAH 22	EL	BT

GF Code	Top 3 native species in each growth form group: Full species name mandatory All other native and exotic species: Full species name where practicable	N, E or HTE	Cover	Abund	stratum	voucher
1	Grewia Vulpia myuros		35	100+		
2	Avena fatua		5	20+		
3	Medicago sp (prob polymorphic)		0.2	5		
4	Helium perennans		2	20		
5	Sida rhombifolia		2	20		
6	Anthoxanthum odoratum		30	100+		
7	Cirsium vulgare		0.5	1		
8	Trifolium campestre		0.2	5		
9	Malva parviflora		0.2	10		
10	Cenchrus clandestinus		0.5	5		
11	Rumex sp		0.1	1		
12	Conyza sp		0.2	5		
13	Verbena sp ?		0.1	1		✓
14	Verbena bonariensis		0.1	1		
15						
16						
17						
18						
19						
20						
21						
22						
23						
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35						
36						
37						
38						
39						
40						

GF Code: see Growth Form definitions in Appendix 1 N: native, E: exotic, HTE: high threat exotic GF – circle code if 'top 3'.

Cover: 0.1, 0.2, 0.3, ..., 1, 2, 3, ..., 10, 15, 20, 25, ...100% (foliage cover); **Note:** 0.1% cover represents an area of approximately 63 x 63 cm or a circle about 71 cm across, 0.5% cover represents an area of approximately 1.4 x 1.4 m, and 1% = 2.0 x 2.0 m, 5% = 4 x 5 m, 25% = 10 x 10 m

Abundance: 1, 2, 3, ..., 10, 20, 30, ... 100, 200, ..., 1000, ...

400 m ² plot: Sheet _ of _		Survey Name	Plot Identifier	Recorders
Date	25_10_23	Rapwood	BA403	EL, BF

GF Code	Top 3 native species in each growth form group: Full species name mandatory All other native and exotic species: Full species name where practicable	N, E or HTE	Cover	Abund	stratum	voucher
1	<i>Hypericum perforatum</i>		15	50		
2	<i>Sida rhombifolia</i>		1	5		
3	Yellow low plant <i>Medicago polymorpha</i>		35	50		✓
4	Yellow star plant <i>Centrosea asiatica</i>		2	20		
5	Cassia <i>Vulpia myuros</i>	40	35	100		✓
6	<i>Rikun</i>		2	10		
7	<i>Pittetson curse</i>		1	10		
8	<i>Ochlocha</i> sericam	N	5	20		✓
9	<i>Convolvulus arvensis</i>		0.2	5		✓
10	<i>Trifolium campestre</i>		0.5	20		
11	<i>Brassica</i> sp.		0.1	1		
12	<i>Taraxacum officinale</i>		0.1	1		
13	<i>Wahlenbergia communis</i>	N	0.1	1	Cl	
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GF Code: see Growth Form definitions in Appendix 1 N: native, E: exotic, HTE: high threat exotic GF -- circle code if 'top 3'.
Cover: 0.1, 0.2, 0.3, ..., 1, 2, 3, ..., 10, 15, 20, 25, ... 100% (foliage cover); Note: 0.1% cover represents an area of approximately 63 x 63 cm or a circle about 71 cm across, 0.5% cover represents an area of approximately 1.4 x 1.4 m, and 1% = 2.0 x 2.0 m, 5% = 4 x 5 m, 25% = 10 x 10 m
Abundance: 1, 2, 3, ..., 10, 20, 30, ... 100, 200, ..., 1000, ...

Incidentals

400 m² plot: Sheet of

Date	Survey Name	Plot Identifier	Recorders
25 10 23	Ringswood	transcribed line	Rapid EL BF

GF Code	Top 3 native species in each growth form group: Full species name mandatory All other native and exotic species: Full species name where practicable	N, E or HTE	Cover	Abund	stratum	voucher
1	<i>Hypericum perforatum</i>					
2	<i>Polygonum urtic</i>					
3	<i>Verbena bonariensis</i>					
4	<i>Centaurea erythraea</i>					
5	<i>Convolvulus arvensis</i>					✓
6	<i>Bressot Vulpia myuros</i>					✓
7	<i>Wahlgrenia communis</i>	N				
8	<i>Callitriche glaucocephala</i> (white)	N				✓
9	<i>Plantago lanceolata</i>					
10	<i>Malva altica sylvestris</i>					
11	<i>Cestrum parqui</i>					
12	<i>Guarania solanderi</i>	N				
13	<i>Dicardium sericeum</i>	N				
14						
15						
16						
17						
18	→ <i>Plantago lanceolata</i>					
19						
20						
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GF Code: see Growth Form definitions in Appendix 1 N: native, E: exotic, HTE: high threat exotic GF – circle code if 'top 3'.
 Cover: 0.1, 0.2, 0.3, ..., 1, 2, 3, ..., 10, 15, 20, 25, ... 100% (foliage cover); **Note:** 0.1% cover represents an area of approximately 63 x 63 cm or a circle about 71 cm across, 0.5% cover represents an area of approximately 1.4 x 1.4 m, and 1% = 2.0 x 2.0 m, 5% = 4 x 5 m, 25% = 10 x 10 m
 Abundance: 1, 2, 3, ..., 10, 20, 30, ... 100, 200, ..., 1000, ...

Incidental

400 m² plot: Sheet _ of _

Date	Survey Name	Plot Identifier	Recorders

GF Code	Top 3 native species in each growth form group: Full species name mandatory All other native and exotic species: Full species name where practicable	N, E or HTE	Cover	Abund	stratum	voucher
1	Site 1 - SE corner base					
2	E. blakelyi					
3	E. melliodora					
4	holium sp. (rigidum or perenne)					
5	Cynodon dactylon // K. Kuyper					
6	Rytidosperma sp. (prob. racemosa)	N				
7	Sida rhombifolia					
8	Dichelachne sericeum					
9						
10	Site 2 - transmission base					
11	Centauris solstitialis					
12	Centauris Wahlenbergia communis					
13	Trifolium campestre					
14	E. albens (by road)					
15	holium sp. perennans					
16	Avena fatua					
17	Anthoxanthum odoratum					
18	Verbena bonariensis					
19	Hordeum leporinum					
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37						
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39						
40						

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

Incidentals

400 m ² plot: Sheet _ of _		Survey Name	Plot Identifier	Recorders	
Date	25/10/23	Rugosa	transit road	EL	BP

GF Code	Top 3 native species in each growth form group: Full species name mandatory All other native and exotic species: Full species name where practicable	N, E or HTE	Cover	Abund	stratum	voucher
1	<i>E. melliodora</i>	N				
2	<i>E. albens</i>	N				
3	<i>Plantago lanceolata</i>					
4	Grass <i>Veronica myrica</i>					
5	<i>Salix perennans</i>					
6	<i>Medicago polymorpha</i>					
7	<i>Chloris pectinatus</i> (virgata)					
8	<i>Lycopodium arvensis</i>					
9	<i>Polygonum aviculare</i>					
10	<i>Verbena bonariensis</i>					
11	Yellow star <i>Centaurea solstitialis</i>					
12	<i>Avena fatua</i>					
13	<i>Anthoxanthum odoratum</i>					
14	<i>Juncus acutiflorus</i>	N				
15	<i>Carlina lanceolata</i>					
16	<i>Chloris gayana</i>					
17	<i>Cynodon dactylon</i> (not much)	N				
18	<i>Bidens pilosa</i>					
19	<i>Rikyu</i>					
20	<i>Helic aziderach</i>	N				
21	<i>Lycopodium</i>					
22	<i>Alternanthera pungens</i>					
23	<i>Chloris truncata</i> (uncommon)					
24	<i>Centaurium erythraea</i>					
25	Grass					
26						
27						
28						
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39						
40						

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

Print more copies of this sheet to allow for higher species counts at a plot. All species at a plot need to be recorded.

APPENDIX E: BAM CALCULATOR REPORTS

Proposal Details

Assessment Id	Proposal Name	BAM data last updated *
00044906/BAAS20012/24/00047266	Kingswood	14/03/2024
Assessor Name	Report Created	BAM Data version *
Elvira Jane Lanham	26/06/2024	67
Assessor Number	BAM Case Status	Date Finalised
BAAS20012	Finalised	26/06/2024
Assessment Revision	Assessment Type	BOS entry trigger
0	Part 4 Developments (Small Area)	Test of significance

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

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

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

Northwest Slopes Box-Blakelys Red Gum Woodland

1	3396_low	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	15.5	15.5	0.16	Population size	High Sensitivity to Gain	Critically Endangered Ecological Community	Not Listed	2.50	True	2
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BAM Credit Summary Report

2	3396_mixed_pasture	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	1.7	2	Population size	High Sensitivity to Gain	Critically Endangered Ecological Community	Not Listed	2.50	True	0
											Subtotal	2
											Total	2

Species credits for threatened species

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

APPENDIX F: SERIOUS AND IRREVERSIBLE IMPACTS (SAIL)

The Threatened Biodiversity Data Collection (TBDC) identifies that *White Box- Yellow Box- Blakely's Red Gum Grassy Woodland and Derived Native Grassland in the NSW North Coast, New England Tableland, Nandewar, Brigalow Belt South, Sydney Basin, South Eastern Highlands, NSW South Western Slopes, South East Corner and Riverina Bioregions* (Box-gum Woodland) is at risk of Serious and Irreversible Impact (SAIL).

The subject land contains a small area (0.93 ha) of PCT 3396 *Northwest Flats Box-Blakely's Red Gum Forest* that is consistent with the final determination for this CEEC, albeit in a degraded condition. The development footprint requires the removal of 0.16 ha.

The occurrence and distribution of *White Box Yellow Box Blakely's Red Gum Woodland* has been drastically reduced across eastern Australia because of clearing for cropping and pasture improvement. Estimates vary from less than 1% in some regions to around 7% in others, across NSW. Grazing and pasture modification has further degraded remaining areas of this community (TSSC 2011).

Under Section 9.1 of the BAM, a determination of a SAIL must be made by the decision-maker for the project, in accordance with three principles set out under the Biodiversity Conservation Regulation 2017 relating to TEC SAIL. In order to assist the decision-maker, *Guidance to assist a decision-maker to determine a serious and irreversible impact* (DPIE 2019) (the guidelines) is available. This section provides information on the identity and supporting information to assist the decision-maker in their evaluation. For *White Box Yellow Box Blakely's Red Gum Woodland* two principles apply to the risk of SAIL for this TEC. They are summarised in Section 3.2.2 of the guidelines as:

- Reduction in geographic extent (Principle 1)
- Environmental degradation or disruption of biotic processes (Principle 2)

Assessment against these principles and the additional requirements for impact assessment for TECs at risk of an SAIL (Section 9.1.1) is provided below:

a. The impact on the geographic extent of the TEC, by estimating the total area of the TEC to be impacted by the proposal.

The current area of PCT 3396 *Northwest Flats Box-Blakely's Red Gum Forest* to be impacted by the project is conservatively estimated to be 0.16 ha. This is because the design is subject to change during detailed design, therefore it is assumed that all vegetation within the development footprint will be removed. However, opportunities to retain the small stands of planted trees that comprise these areas of PCT vegetation will be considered during detailed design.

These areas are currently isolated from other patches of potential TEC (Figure 3-4), by more than 50 metres, however this TEC occurs throughout the locality (Figure 3-1), so this removal will not impact on the geographic extent of the TEC. A recent estimate of box-gum woodland remaining in eastern Australia was approximately 3.5 million hectares (NESP TSRH 2021). In the Nandewar bioregion, there is an estimated 9,045 ha of *White Box Yellow Box Blakely's Red Gum Woodland* remaining (TSSC 2020). The remove of 0.16 ha represents approximately 0.000018% of this extent.

b. The extent that the proposed impacts are likely to contribute to further environmental degradation or the disruption of biotic processes of the TEC by:

i. estimating the size of any remaining, but now isolated, areas of the TEC; including areas of the TEC within 500m of the development footprint or equivalent area for other types of proposals.

The current area of PCT 3396 *Northwest Flats Box-Blakely's Red Gum Forest* to be directly impacted by the project is conservatively estimated at 0.16 ha. The area of Box-gum Woodland within 500 metres of the subject land is estimated to be 0.24 ha, consisting of PCT 599: *Blakely's Red Gum – Yellow Box grassy tall woodland on flats and hills in the*

Brigalow Belt South Bioregion and Nandewar Bioregion only. The subject land is surrounded by agricultural land, largely cleared of vegetation (further detail can be found in Section 1.3 of the main report). It is a highly fragmented landscape, with small, isolated areas of native vegetation, including this TEC.

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**

At present, the average length between the patches of TEC present on the subject land is approximately 300 metres. If impacts to the PCTs can be avoided, this distance would be the same after the project is complete.

• **distance if the remnant is retained AND the average distance if the remnant is removed as proposed, and**

The above average distance would remain the same if the PCTs can be retained. There will be no native vegetation communities on the subject land if it is removed. The distribution of the TEC within the local vicinity is shown on Figure 3-1, assuming PCT 599 meets the criteria for this TEC. The potential areas of TEC (PCT 599 & PCT 589) in the surrounding area are separated by distances of at least one kilometre and are significantly fragmented. The small areas of PCT 3396 *Northwest Flats Box-Blakely's Red Gum Forest* that occur within the development footprint are minimal and would not be mapped at the regional scale (Figure 3-1). The clearing of these small patches would not change the average distance of remnant vegetation and connectivity within the vicinity of the subject land.

• **estimated maximum dispersal distance for native flora species characteristic of the TEC, and**

The current distribution of this TEC within the region (Figure 3-1), shows small patches of isolated vegetation, surrounded by cleared agricultural land. Patches are generally around one kilometre apart and wind and insect pollination are unlikely to be significant over these distances, meaning that patches are most likely genetically isolated. This regional isolation of patches will not be impacted by the project. Dispersal of eucalyptus seed has been well studied and is assumed to be very limited, averaging 1-2 metres per year (Booth 2017).

• **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**

At this stage, it is assumed that all native vegetation within the subject land will be cleared, and so no TEC will remain within the development footprint. If the areas of PCT are retained, no go zones will be erected around them during construction works to protect them from incursion from construction works. Given that the ground cover is already highly disturbed from grazing, it is likely that the reduction or prevention of grazing within the area as part of the project will facilitate growth of any native ground cover species within the seed bank and improve the quality of these small, planted stands of TEC.

iii. describing the condition of the TEC according to the vegetation integrity score for the relevant vegetation zone(s). The assessor must also include the relevant composition, structure and function condition scores for each vegetation zone.

The below table is replicated from Section 3.5 of the BDAR and summarises the vegetation integrity of the areas of PCT 3396. The PCT is in low condition, with mainly non-native grasses in the ground layer and no native shrub layer (further information can be found in Section 3.4.1 of the main report). Vegetation integrity is only marginally greater than the minimum offsetting threshold and the vegetation is most likely planted within the past 15 years.

PCT	Vegetation zone	Composition condition score	Structure condition score	Function condition score	Vegetation integrity score
3396	3396_Low	6.8	19.5	28.3	15.5

The action and measures taken to avoid the direct and indirect impact on the TEC at risk of an SAIL.

At a macro level, the site selected for the project was deliberately selected to reduce impacts on native vegetation. By selecting a largely cleared parcel with minimal vegetation to be cleared, this allows native vegetation within the region to be retained. At the micro siting level, a precautionary approach has been taken that assumes all areas of PCT will be removed as a result of the project, however where possible, these stands of trees will remain. If retained, indirect impacts would be minimised on these small stands of planted vegetation, and on vegetation in surrounding areas by confining activities to the construction area. In addition, an EMS would be developed to minimise impacts on surrounding areas from run off and to guide the disposal of vegetation and rubbish; stockpiling of soil and other environmental controls to minimise any adverse effects on surrounding vegetation. Further details are provided in Section 9 of the BDAR report.

