

Rowan Village - Draft Biodiversity Development Assessment Report (BDAR)

Prepared for DevCore Developments Pty Ltd

DOCUMENT TRACKING

Project Name	Rowan Village - Draft Biodiversity Development Assessment Report (BDAR)
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Accredited Assessor Certification	<p>This BDAR was prepared by Nigel Cotsell no. BAAS18026 in accordance with the <i>Biodiversity Conservation Act 2016</i> & Biodiversity Assessment Method (2020) (BAM) in 2022. Due to the BDAR being required in to support a planning proposal in certain locations the report does not meet the requirements of the BAM. In these locations it is clearly stated.</p> <p>S. 6.15(1) of the <i>Biodiversity Conservation Act 2016</i> states that: A biodiversity assessment report cannot be submitted in connection with a relevant application unless the accredited person certifies in the report that the report has been prepared on the basis of the requirements of (and information provided under) the biodiversity assessment method as at a specified date and that date is within 14 days of the date the report is so submitted. This section is not relevant as the BDAR has been requested to support a planning proposal.</p> <p>This BDAR is yet to be finalised and will be finalised in accordance with the requirements of (and information provided under) BAM 2020. The BAM calculations or outputs from the calculator (BAM-C) pertaining to the proposal have not been finalised as this BDAR is required to support a planning proposal.</p> <p>No actual, perceived, or potential conflict of interest exists between it or between any one or more of the author's employees, consultants or agents and the project client, or is likely to arise in relation to the report that is submitted for this project. Nigel Cotsell (BAAS #18026)</p>
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Template 2.8.1

Executive Summary

The proposed development footprint is approximately 230.9 ha in size. This is defined as 7066 Holbrook Road, Rowan and 16 Lloyds Road, Rowan, New South Wales. The development footprint is located on land that has been subject to considerable disturbance as a result of historical development and agricultural uses. The development footprint currently comprises of agricultural pastures, scattered remnant vegetation, planted vegetation, a riparian corridor, drainage line, three dams and one dwelling located at 16 Lloyds Road.

Biodiversity Development Assessment Reports (BDAR) are required to support development applications under Part 4 of the *Environmental Planning and Assessment Act 1979* (EP&A Act) that trigger the Biodiversity Offset Scheme (BOS) under Part 7 of the *Biodiversity Conservation Act 2016* (BC Act). This Draft BDAR has been requested by Wagga Wagga City Council (Council) to support the planning proposal. The preparation of this BDAR has been discussed with Council, and it was determined that some aspect of assessment in accordance with the Biodiversity Assessment Method (BAM) will be deferred to the development assessment stage, primarily targeted surveys two fauna species, and finalisation of credit calculations.

As discussed above, further survey effort is required to meet the minimum survey standards of the BAM for some threatened flora and fauna. Further survey work will occur leading up to the submission of a Development Application. In the interim and for the purposes of this draft BDAR, threatened species surveys have either been completed, some are in progress while others are awaiting 'survey windows' to complete survey for these species. We have adopted the Precautionary Principle with Ecosystem and Species credits by either assuming presence for some species or have made assumptions around presence based on survey effort to date and our ecological knowledge of the subject land. Further clarity and accuracy will be achieved following additional survey effort leading up to the submission of a final BDAR as part of a Development Application.

One PCT was identified within the development footprint:

- PCT 277 – *Blakely's Red Gum - Yellow Box grassy tall woodland of the NSW South Western Slopes Bioregion*

PCT 277 was present on the subject land in moderate, moderate to low, low and scattered trees condition. PCT 277 corresponds with the threatened ecological community *White Box - Yellow Box - Blakely's Red Gum Grassy Woodland and Derived Native Grassland and White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland* listed as a critically endangered ecological community under the BC Act. PCT 277 did not meet the *Environmental Protection Biodiversity Conservation Act 1999* (EPBC Act) definition for *White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland* due to the overall patch not containing at least 50% native groundcover species. The estimated native groundcover throughout the patch was <10%.

Given the nature of the landscape being highly modified by cropping and grazing two separate pathways have been used for this assessment. Where there are remnant patches of native vegetation, these areas have been assigned a PCT and assessment undertaken consistent with the BAM. Large areas of the subject land have been rotationally cropped and grazed over a long period which has removed all lower

and mid-storey native vegetation. What remains is isolated and scattered trees with a diameter at breast height > 50. The groundcover is dominated by wheat or barley crops. For this reason, these trees have been assessed under the Streamlined Assessment Module - Scattered Trees. The canopy assessed as scattered trees was mapped as PCT 277.

The highest condition areas of native plant community types were avoided, however, 1.42 ha of PCT 227 in a moderate condition, 0.28 ha of low to moderate condition and 15.3 ha of low condition will be impacted. The impacts are a worst-case scenario assessment, and it should be noted there are opportunities to retain some of the scattered trees during the detailed design stage prior to submission of the development application. The planning proposal will enable future development that has the potential to require the retirement of 80 ecosystem credit.

Serious and Irreversible Impacts (SII) values have been considered as part of this assessment. *White Box - Yellow Box - Blakely's Red Gum Grassy Woodland and Derived Native Grassland and White Box - Yellow Box - Blakely's Red Gum Grassy Woodland and Derived Native Grassland* listed (represented by PCT 277) is a SII candidate entity.

Target surveys were completed for some species credit species. *Petaurus norfolcensis* (Squirrel Glider) was identified during targeted surveys within PCT 277 (Moderate). The following species were outside of the survey window when targeted surveys were undertaken and have been assumed present for the purpose of this assessment:

- *Phascogale tapoatafa* (Brush-tailed Phascogale)
- *Tyto novaehollandiae* (Masked Owl).

This is a worst-case scenario assessment. Individual credit requirements may decrease once targeted survey is completed and species polygons have been defined (if required). Mitigation measures have been proposed to address impacts to retained native vegetation at the development footprint before, during and after construction.

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Abbreviations

Abbreviation	Description
BAM	Biodiversity Assessment Method
BAMC	Biodiversity Assessment Method Credit Calculator
BC Act	<i>NSW Biodiversity Conservation Act 2016</i>
BDAR	Biodiversity Development Assessment Report
BSSAR	Biodiversity Stewardship Site Assessment Report
CEEC	Critically Endangered Ecological Community
DNG	Derived Native Grassland
DCCEEW	Department of Climate Change, Energy, the Environment and Water
DPE	NSW Department of Planning and Environment
EEC	Endangered Ecological Community
ELA	Eco Logical Australia Pty Ltd
EP&A Act	<i>NSW Environmental Planning and Assessment Act 1979</i>
EPBC Act	<i>Commonwealth Environment Protection and Biodiversity Conservation Act 1999</i>
FM Act	<i>NSW Fisheries Management Act 1994</i>
GIS	Geographic Information System
GPS	Global Positioning System
IBRA	Interim Biogeographic Regionalisation for Australia
LGA	Local Government Area
LLS	Local Land Service
NSW	New South Wales
NOW	NSW Office of Water
OEH	NSW Office of Environment and Heritage
PCT	Plant Community Type
SEPP	State Environmental Planning Policy

Abbreviation	Description
TEC	Threatened Ecological Community
TEF	The Environmental Factor
VIS	Vegetation Information System
WM Act	NSW <i>Water Management Act 2000</i>

1. Introduction

DevCore Developments Pty Ltd (DevCore) is currently progressing a planning proposal for the rezoning and subsequent subdivision and development of 7066 Holbrook Road, Rowan and 16 Lloyds Road, Rowan, NSW. Eco Logical Australia (ELA) has been commissioned by DevCore to complete the necessary biodiversity surveys and prepare a Draft Biodiversity Development Assessment Report (BDAR) to identify and assess the potential impacts of the planning proposal on the biodiversity values of the subject land.

Biodiversity Development Assessment Reports (BDAR) are required to support development applications under Part 4 of the *Environmental Planning and Assessment Act 1979* (EP&A Act) that trigger the Biodiversity Offset Scheme (BOS) under Part 7 of the *Biodiversity Conservation Act 2016* (BC Act). This Draft BDAR has been requested by Wagga Wagga City Council (Council) to support the planning proposal. The preparation of this BDAR has been discussed with Council, and it was determined that some aspects of assessment in accordance with the Biodiversity Assessment Method (BAM) will be deferred to the development assessment stage. This is primarily in relation to section 5.3 as certain candidate species survey windows were not open when the report was being prepared.

This Draft BDAR will indicate in specific locations where further study is required or where assessment is not in accordance with BAM.

This BDAR has been prepared by Nigel Cotsell (Accredited BAM Assessor) and Emily Belton. The report has been peer reviewed by Alex Gorey (BAAS 22003) an Accredited Person to apply the BAM under the BC Act.

It is worth noting the key terms **subject land** and **development footprint**. The **subject land** is the entirety of lots subject to the proposal and was the entire area assessed during field survey. The **development footprint** is the proposed rezoning and reclassification of lands within the subject land that will be subject to future development.

1.1. General description of the subject land

The subject land is located at 7066 Holbrook Road, Rowan and 16 Lloyds Road, Rowan. It has a total area of 230.9 hectares and is located approximately 8 km south of central Wagga Wagga (Figure 1). The subject land is primarily used for agricultural purposes with some remnant vegetation, planted vegetation, a riparian corridor, drainage lines and three dams.

The subject land has frontage to Holbrook Road to the west and has another connection to Lloyd Road to the north; the remaining Lloyd Road frontage is large lot residential. To the east of the subject land is 456 and 474 Plumpton Road, Rowan, a large parcel of land that is currently in the Planning Proposal phase and is known as "Sunny Side". The land to the south of the subject land is predominantly used for agricultural purposes. The subject land contains remnant native vegetation, planted native and exotic vegetation, a riparian corridor, four farm dams, and ephemeral drainage lines. The assessment area, including a 1.5 km buffer has a total area of 1,953 ha and contains 186.4 ha of vegetation or 10%.

1.2. Brief description of the proposal

The proponent is initiating an amendment of *Wagga Wagga Local Environmental Plan 2010* (WWLEP), to rezone the entire subject land. The planning proposal seeks to enable the development of a new amenity-led neighbourhood that will provide an opportunity for a variety of housing options through a range of residential lot sizes, supported by sustainable infrastructure delivery in the southern part of Wagga Wagga in a highly accessible location close to various regional connecting roads such as Sturt Highway and Olympic Highway.

The planning proposal seeks to achieve this vision by amending the planning controls that apply to the site under the WWLEP as follows:

- Rezone the site from RU1 Primary Production and R5 Large Lot Residential to the following mix of land use zones:
 - R1 General Residential
 - R5 Large Lot Residential
 - B2 Local Centre
 - RE1 Public Recreation
- Amend the minimum lot size from 200 hectares and 2 hectares, to remove the minimum lot size from the R1 Residential zone and apply a minimum lot size of 4,000m² for the proposed R5 Large Lot Residential zone.
- Amend the Urban Release Area Map to include the subject land

The proposal is consistent with the zoning changes identified in the *Local Strategic Planning Statement Planning for the future: Wagga Wagga 2040* (Wagga Wagga LSPS) (Wagga City Council, 2021). Furthermore, the proposal is aligned to the *Riverina Murray Regional Plan 2036* (DPIE, 2016) as it is providing growth in regional cities and increasing housing diversity and choice.

1.3. Sources of information used

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

- BioNet (Atlas of NSW Wildlife) database search (5 km) threatened species, populations and ecological communities listed under the BC Act (accessed February 2022).
- EPBC Act Protected Matters Search Tool (5 km) for threatened and migratory species, populations and ecological communities listed under the Commonwealth EPBC Act (Department of Climate Change, Energy, Environment and Water (DCCEEW) 2022)
- Biodiversity Values Map (DPE) 2022 - 8/11/2022)
- State Vegetation Type Map; Riverina Region Version 1.2 – VIS_ID 4469 (DPIE)
- Transitional Native Vegetation Regulatory Map Viewer (DPIE 2022)
- *Wagga Wagga Local Environmental Plan 2010*
- Soil Landscapes (Hazelton 1990)
- *Water Management (General) Regulation 2018* hydroline spatial data.

DRAFT

Figure 1: Location Map¹

¹ Please note that the Native Vegetation Extent will be updated at the development assessment stage and based on the latest aerial imagery



Figure 2: Indicative Layout Plan.

1.4. Legislative context

Table 1 below provides a description of the relevant legislative context for the ecological assessment. Approvals and/or legislative consideration will be required for the development of the subject land. This report addresses the objectives and requirements of the legislation as it relates to biodiversity and ecological values.

Table 1: Legislative context

Name	Relevance to the project
Commonwealth	
<i>Environment Protection and Biodiversity Conservation Act 1999</i> (EPBC Act)	<p>Matters of National Environmental Significance (MNES) have been identified as having a potential to occur within the locality. An action that has a significant impact on MNES will be a Controlled Action and require approval from the Minister for the Environment.</p> <p>Whilst a Planning Proposal is not an 'action' under the EPBC Act, this report, describes the potential presence entities that are considered MNES in the subject land.</p> <p>PCT277 is identified as the potential EPBC Act listed TEC <i>White Box – Yellow Box – Blakely's Red Gum Grassy Woodland and Derived Native Grassland</i>. However, PCT277 within the subject land did not meet the listing criteria, See Section 3.3.2. As such, the subject land does not support any of the EPBC Act listed threatened ecological communities with the potential to occur in the locality.</p> <p>No other MNES are considered likely to occur within the subject land.</p>
State	
<i>Environmental Planning and Assessment Act 1979</i> (EP&A Act)	<p>The EP&A Act is the principal planning legislation for NSW. It provides a framework for the overall environmental planning and assessment of development proposals.</p> <p>The planning proposal is seeking an amendment to the WWLEP and is to be assessed under Part 3 of the EP&A Act.</p>
<i>Biodiversity Conservation Act 2016</i> (BC Act)	<p>Section 7.3 of the BC Act outlines the assessment requirements to determine whether the proposed development or activity is likely to significantly affect threatened species or ecological communities, or their habitats. The Biodiversity Assessment Method (BAM) is established under section 6.7 of the BC Act. The BC Act, together with the <i>Biodiversity Conservation Regulation 2017</i> provides the framework for the Biodiversity Offsets Scheme (BOS). Whilst Planning Proposals (i.e. rezoning land) do not trigger the BOS, the consent authority has requested that a draft BDAR is submitted with the Planning Proposal.</p>
<i>Biodiversity Conservation Regulation 2017</i> (BC Regulation)	<p>The BC Regulation provides the framework for the Biodiversity Offsets Scheme. The NSW Government Biodiversity Values Map (BV Map) identifies land with high biodiversity value, as defined by the BC Regulation. The subject land does not contain land identified on the Biodiversity Values Map (accessed 8/11/2022).</p>
<i>Biosecurity Act 2015</i>	<p>Under this Act, priority weeds have been identified for local government areas and assigned strategies to contain, remove or manage. Occupiers of land (this includes owners of land) have responsibility for taking appropriate action for priority weeds on the land they occupy. The subject land contains one weed listed as a priority weed for the central west; <i>Rubus fruticosus</i> spp. aggregate (Blackberry).</p>
<i>Local Land Services Act 2013</i> (LLS Act)	<p>The LLS Act is responsible for administering controls on clearing of native vegetation in rural areas. Under Section 600 of the LLS Act clearing of native vegetation is authorised if it is authorised under a development consent under part 4 of the EP&A Act.</p>

Name	Relevance to the project
<i>Fisheries Management Act 1994 (FM Act)</i>	<p>The FM Act provides for the protection, conservation and recovery of threatened species defined under the FM Act. It also makes provisions for the management of threats to threatened species, populations and ecological communities defined under the Act, as well as the protection of fish and fish habitat in general.</p> <p>A portion of the 2nd order and 3rd order watercourse within the subject land is mapped as Key Fish Habitat (KFH) by Department of Primary Industries (DPI) Fisheries, therefore a permit under Part 7 of the FM Act may be required for works to the watercourse within the subject land.</p>
<i>Water Management Act 2000 (WM Act)</i>	<p>The WM Act aims to provide for the sustainable and integrated management of water resources for NSW. The Act requires developments on waterfront land to be ecologically sustainable and recognises the benefits of aquatic ecosystems to agriculture, fisheries, and recreation.</p> <p>The WM Act is administered by the Natural Resources Access Regulator (NRAR) and establishes an approval regime for activities within waterfront land, defined as the land 40 m from the highest bank of a river, lake or estuary.</p> <p>Whilst the WM Act does not contain any provisions for Planning Proposals, it is prudent to consider the objectives of the Act when preparing a Planning Proposal. It should be noted that planning proposal has been designed in a manner that enables the revegetation of the riparian zone in accordance with the NRAR <i>Guidelines for controlled activities on waterfront land Riparian corridors</i> (NRAR, 2018)</p>
Planning Instruments	
<i>State Environmental Planning Policy (Biodiversity and Conservation) 2021 (Biodiversity & Conservation SEPP)</i>	<p>The aim of the Biodiversity and Conservation SEPP was to repeal a range of SEPP's relating to biodiversity and conservation, and then reinstate them in a concise document. One of the SEPP was the <i>State Environmental Planning Policy (Koala Habitat Protection) 2021</i> (Koala SEPP). The planning instrument is intended to help reverse the decline of koala populations by ensuring koala habitat is properly considered during the development assessment process. The Koala SEPP only applies to development applications and is not relevant to the Planning Proposal, however the presence of potential Koala Habitat is discussed. Consideration of the Koala SEPP will be required at the DA stage.</p>
<i>Wagga Wagga Local Environmental Plan 2010</i>	<p>The subject land contains land zoned as zoned RU1 – Primary Production and R5 – Large Lot Residential. The Proposal is seeking to rezone the land within the subject land for the purpose of facilitating residential and commercial development in the area. The LEP planning controls do not direct any further ecological assessment in regard to a planning proposal, however in this case a Draft BDAR has been requested to accompany the Planning Proposal.</p>

2. Landscape features

The subject land is in the Southern Western Slopes IBRA Region and the Inland Slopes sub-region. The subject land contains remnant native vegetation, planted native and exotic vegetation, a riparian corridor, four farm dams, and ephemeral drainage lines. The site-based method was applied for this assessment, therefore the assessment area is the 1,500 m buffer surrounding the outside edge of the boundary of the subject land.

The landscape features considered for this assessment are outlined in Table 2.

Table 2: Landscape features.

Landscape feature	Subject land	Assessment Area	Data source
IBRA Region(s)	South Western Slopes	South Western Slopes	Interim Biogeographic Regionalisation for Australia, Version 7
IBRA subregion(s)	Inland Slopes	Inland Slopes	Interim Biogeographic Regionalisation for Australia, Version 7
NSW (Mitchell) Landscapes	Murrumbidgee – Tarcutta Channels and Floodplains	Murrumbidgee – Tarcutta Channels and Floodplains Coffin Rock Granite Hills Wonga Hills and Ranges	NSW (Mitchell) Landscapes - version 3.1 (DPIE 2016)
Rivers and streams	The subject land contains four 1 st order (Strahler stream order) watercourses, two 2 nd order watercourses and one 3 rd order watercourse. All first order watercourse within the subject land have been significantly modified to provide drainage to agricultural land and four farm dams have been created.	Stringybark Creek and Crooked Creek are both upstream of Lake Albert to the northeast of the subject land. Lake Albert feeds into the Murrumbidgee River to the north.	NSW LPI Waterway mapping
Estuaries and wetlands	-	The assessment area does not contain estuaries, Ramsar Wetlands or Nationally Important Wetlands.	NSW directory of important wetlands

Landscape feature	Subject land	Assessment Area	Data source
Connectivity of different areas of habitat	Connectivity across the majority of the subject land is poor due to the high level of degradation and past clearing of vegetation. Vegetation and habitat connectivity is limited to the riparian corridor that runs through the development footprint and scattered paddock trees.	<p>Much of the native overstorey within the assessment area has been cleared, however there are substantial patches of remnant vegetation within the area.</p> <p>The majority of the cleared land has been used for agricultural purposes and contains scattered paddocks trees and riparian corridors that provide some connectivity and stepping-stone habitat for highly mobile species.</p>	Aerial imagery
Geological features of significance and soil hazard features	The subject land does not contain any geological features of significance, including karst, caves, crevices or cliffs. There are no soil hazard features.	The assessment area does not contain any geological features of significance, including karst, caves, crevices or cliffs.	Field Survey Aerial imagery eSPADE v2.1
Areas of Outstanding Biodiversity Value	The subject land does not contain any Areas of Outstanding Biodiversity Value.	- The assessment area does not contain any Areas of Outstanding Biodiversity Value.	Register of Declared Areas of Outstanding Biodiversity Value (DPIE 2020)
Percent (%) native vegetation extent	The development footprint is approximately 197.95 ha and contains approximately 18.05 ha of native vegetation.	<p>There are differences between the mapped vegetation extent and the aerial imagery. These will be defined at the DA stage.</p> <p>The assessment area is 1953ha and contains approximately 186.4ha of native vegetation (10 %).</p>	Calculated using aerial imagery and ArcGIS software

3. Native vegetation

3.1. Survey effort

Vegetation survey was undertaken within the subject land by Nigel Cotseil and Emily Belton on 10 October – 14 October 2022 and Alex Gorey and Tim Maher on 2 – 3 March 2022. An additional vegetation survey of 16 Lloyd Road, Springvale was undertaken by The Environmental Factor (TEF) on 6 October 2022 (TEF, 2006).

A total of 8 full-floristic vegetation plots were surveyed to identify Plant Community Types (PCTs) and Threatened Ecological Communities (TECs) within the subject land (Table 3 and Table 4).

Table 3: Full-floristic PCT identification plots

PCT ID	PCT Name	Number of plots surveyed
277	<i>Blakely's Red Gum - Yellow Box grassy tall woodland of the NSW South Western Slopes Bioregion</i>	8

Table 4: Vegetation integrity plots

Veg Zone	PCT ID	PCT Name	Condition	Area (ha)	Plots surveyed
1	277	<i>Blakely's Red Gum - Yellow Box grassy tall woodland of the NSW South Western Slopes Bioregion</i>	Moderate	5.19	1
2	277	<i>Blakely's Red Gum - Yellow Box grassy tall woodland of the NSW South Western Slopes Bioregion</i>	Low -Mod	9.41	3
3	277	<i>Blakely's Red Gum - Yellow Box grassy tall woodland of the NSW South Western Slopes Bioregion</i>	Low	15.99	4
4	277	<i>Blakely's Red Gum - Yellow Box grassy tall woodland of the NSW South Western Slopes Bioregion</i> Assessed as scattered trees streamlined assessment module	Scattered trees	1.14 ha (26 trees)	0
Total				31.73 ha	8

3.2. Plant Community Types present

One PCT was identified within the subject land, PCT 277. It was found in four conditions and separated into four vegetation zones accordingly. Descriptions of these vegetation zones is provide in Table 5 Table 6 and Table 7. Justification for the selection of this PCT occurring within the subject land is based on a quantitative analysis of full-floristic plot data and is provided in Appendix B:.

Vegetation zone 4 is associated to the scattered trees within exotic pasture. The assessment of these trees was undertaken using the Streamlined Assessment Module - Scattered Tree Assessment module,

necessitating the project to be divided into two separate assessment pathways. Streamlined Assessment Module - Scattered Tree is provide in Section 3.4. A description of this vegetation zone is provided in Table 8.

Table 5 Vegetation Description Zone 1

PCT 277: Blakely's Red Gum - Yellow Box grassy tall woodland of the NSW South Western Slopes Bioregion – Moderate			
Vegetation formation / class	Grassy Woodlands / Western Slopes Grassy Woodlands		
Condition	Moderate		
Conservation status	BC Act - <i>White Box - Yellow Box - Blakely's Red Gum Grassy Woodland and Derived Native Grassland</i>		
	EPBC Act - N/A – did not meet the EPBC Act definition of the community.		
Vegetation Description	PCT 277 was present in the central portion of the study area and formed a patch located close to the zone associated with riparian vegetation. The zone contained native midstorey and groundcover, with weed plumes in the groundcover.		
Characteristic canopy	<i>Eucalyptus melliodora</i>		
Characteristic midstorey	<i>Acacia baileyana</i> , <i>Bursaria spinosa</i> subsp. <i>spinosa</i> , <i>Melaleuca</i> sp.		
Characteristic groundcover	<i>Chloris truncata</i> , <i>Cynodon dactylon</i> , <i>Dysphania pumilio</i> , <i>Eragrostis brownii</i> , <i>Paspalidium distans</i> , <i>Rumex brownii</i> ,		
Mean native richness	9		
Exotic species / HTW cover	<i>Avena barbata</i> , <i>Chenopodium album</i> , <i>Ehrharta longiflora</i> , <i>Lolium perenne</i> , <i>Phalaris</i> sp.		
Variation and disturbance	The canopy was comprised of a mix of mature and juvenile trees. Historic disturbance from cattle grazing and cropping evident.		
No. of sites sampled	1		
Threatened flora species	Nil		
Fauna habitat	Squirrel Glider habitat		
Composition	Structure	Function	Vegetation Integrity Score
37.2	79.2	49.3	52.6

Table 6 Vegetation Description Zone 2

PCT 277: Blakely's Red Gum - Yellow Box grassy tall woodland of the NSW South Western Slopes Bioregion – Moderate			
Vegetation formation / class	Grassy Woodlands / Western Slopes Grassy Woodlands		
Condition	Low - Moderate		
Conservation status	BC Act - <i>White Box - Yellow Box - Blakely's Red Gum Grassy Woodland and Derived Native Grassland</i>		
	EPBC Act - N/A – did not meet the EPBC Act definition of the community.		
Vegetation Description	PCT 277 was present in the central portion of the study area and formed a band running west to east. The zone contained native midstorey and groundcover, with weed plumes in the groundcover.		
Characteristic canopy	<i>Eucalyptus melliodora</i> , <i>Eucalyptus blakelyi</i> and <i>Eucalyptus microcarpa</i> .		
Characteristic midstorey	<i>Acacia baileyana</i> , <i>Bursaria spinosa</i> subsp. <i>spinosa</i> , <i>Melaleuca</i> sp.		
Characteristic groundcover	<i>Chloris truncata</i> , <i>Paspalidium distans</i> , <i>Rumex brownii</i> , <i>Rytidosperma</i> sp, <i>Austrostipa aristiglumis</i> , <i>Brunoniella australis</i>		
Mean native richness	12		
Exotic species / HTW cover	<i>Avena barbata</i> , <i>Chenopodium album</i> , <i>Ehrharta longiflora</i> , <i>Lolium perenne</i> , <i>Phalaris</i> sp.		
Variation and disturbance	It is likely that some native midstorey was planted as part of revegetation. The canopy was comprised of a mix of mature and juvenile trees. Historic disturbance from cattle grazing and cropping evident.		
No. of sites sampled	3		
Threatened flora species	Nil		
Fauna habitat	Squirrel Glider habitat		
Composition	Structure	Function	Vegetation Integrity Score
37.4	35.2	53.3	41.2

Table 7 Vegetation Description Zone 3

PCT 277: Blakely's Red Gum - Yellow Box grassy tall woodland of the NSW South Western Slopes Bioregion – Low			
Vegetation formation / class	Grassy Woodlands / Western Slopes Grassy Woodlands		
Condition	Low		
Conservation status	BC Act - <i>White Box - Yellow Box - Blakely's Red Gum Grassy Woodland and Derived Native Grassland</i>		
	EPBC Act - N/A – did not meet the EPBC Act definition of the community.		
Vegetation Description	PCT 277 was present across a majority of the subject land. The zone was degraded, with historic disturbance to the midstorey and groundcover resulting in the midstorey being mostly absent and the groundcover dominated by exotic species. Where native species were present, their abundance was low and distribution scattered. The canopy was mature however there was no evidence of regenerating stems in the groundcover.		
Characteristic canopy	The canopy was dominated by <i>Eucalyptus melliodora</i> (Yellow Box), <i>Eucalyptus blakelyi</i> (Blakely's Red Gum), and <i>Eucalyptus microcarpa</i> (Grey Box).		
Characteristic midstorey	Absent.		
Characteristic groundcover	<i>Chloris truncata</i> , <i>Paspalidium distans</i> , <i>Rumex brownii</i>		
Mean native richness	8		
Exotic species / HTW cover	<i>Panicum capillare</i> var. <i>capillare</i> , <i>Solanum nigrum</i> , <i>Echium plantagineum</i> , <i>Cynodon dactylon</i> / 0 – 0.5%		
Variation and disturbance	Historic cropping and cattle grazing		
No. of sites sampled	3		
Threatened flora species	Nil		
Fauna habitat	Potential Squirrel Glider habitat		
Composition	Structure	Function	Vegetation Integrity Score
3.4	32.7	27.8	14.6

Table 8 Vegetation Description Zone 4

PCT 277: Blakely's Red Gum - Yellow Box grassy tall woodland of the NSW South Western Slopes Bioregion – scattered trees			
Vegetation formation / class	Grassy Woodlands / Western Slopes Grassy Woodlands		
Condition	Scattered trees		
Conservation status	BC Act - White Box - Yellow Box - Blakely's Red Gum Grassy Woodland and Derived Native Grassland		
	EPBC Act - N/A – did not meet the EPBC Act definition of the community.		
Vegetation Description	This zone was present as remnant scattered trees in areas previously cropped.		
Characteristic canopy	<i>Eucalyptus melliodora</i> , <i>Eucalyptus blakelyi</i> and <i>Eucalyptus microcarpa</i> .		
Characteristic midstorey	Absent		
Characteristic groundcover	Absent		
Mean native richness	2		
Exotic species / HTW cover	<i>Panicum capillare</i> var. <i>capillare</i> , <i>Solanum nigrum</i> , <i>Echium plantagineum</i> , <i>Cynodon dactylon</i> , <i>Triticum</i> sp, <i>Lolium perenne</i> , <i>Phalaris</i> sp. / 0 – 0.5%		
Variation and disturbance	Historic clearing, cropping and cattle grazing		
No. of sites sampled	2		
Threatened flora species	Absent		
Fauna habitat	Nil.		
Composition	Structure	Function	Vegetation Integrity Score
N/A	N/A	N/A	N/A

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3.2.1. Plant Community Type selection justification

In determining the PCT within the subject land, various attributes were considered in combination to assign vegetation to the best fit PCT. Attributes included dominant species in each stratum and relative abundance, community composition, soils and landscape position. Reference was made to the PCT descriptions in the BioNet Vegetation Classification and the final scientific determinations for TECs. Justification for the PCT selection is provided in Table 9.

Table 9: PCT selection justification

PCT ID	PCT Name	Justification for PCT selection
277	<i>PCT 277 Blakely's Red Gum - Yellow Box grassy tall woodland of the NSW South Western Slopes Bioregion</i>	<p>IBRA sub-region: Inland Slopes and Lower Slopes.</p> <p>Landform element: Gentle slopes and flats.</p> <p>Dominant canopy species included the characteristic <i>Eucalyptus melliodora</i> (Yellow Box), <i>Eucalyptus blakelyi</i> (Blakely's Red Gum), and <i>Eucalyptus albens</i> (Grey Box).</p> <p>Ground cover</p>

3.3. Threatened Ecological Communities

The subject land contained one PCT that formed part of a Threatened Ecological Community (TEC). PCT 277 can form part of *White Box Yellow Box Blakely's Red Gum Grassy Woodland and Derived Native Grassland* TEC listed under the BC Act and *White Box Yellow Box Blakely's Red Gum Grassy Woodland and Derived Native Grassland* under the EPBC Act. development footprint

PCT 227 surveyed within the subject land was found to conform to the listing under the BC Act but not to the EPBC Act listing. TEC justification is outlined in Section 3.3.1 and 3.3.2 below.

This extent of the vegetation which conforms to a TEC is present in Table 10 and shown in Figure 5.

3.3.1. White Box Yellow Box Blakely's Red Gum Grassy Woodland and Derived Native Grassland (BC Act)

PCT 277 is classified as 'wholly a subset' of *White Box - Yellow Box - Blakely's Red Gum Grassy Woodland and Derived Native Grassland* and *White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland* (VIS DPE 2022).

PCT 277 in scattered trees, low and moderate condition in the subject land met the BC Act definition of the threatened ecological community due to:

- Geographic location (located within the correct IBRA region and subregion)
- Landscape position (lower slopes to flats)
- Species composition (see above description).

3.3.2. White Box Yellow Box Blakely's Red Gum Grassy Woodland and Derived Native Grassland (EPBC Act)

PCT 277 did not meet the EPBC Act definition of the community because the groundcover layer did not contain at least 12 native non-grass species (Listing and conservation advice 2006). The policy statement for this community also includes criteria that can be used to determine whether a patch of vegetation conforms to the EPBC Act listed *White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland*. The EPBC Act policy statement requires assessment of most common overstorey species, percentage and number of native species in the groundcover layer and the patch size. The

policy statement requires the groundcover to contain at least 50% native groundcover species (Commonwealth of Australia 2006). The patch did not contain at least 50% native groundcover species. The estimated native groundcover throughout the patch was <10%.

Table 10: Threatened Ecological Communities

PCT ID	BC Act						EPBC Act			
	Listing status	Name				Area (ha)	Listing status	Name		Area (ha)
277	Critically Endangered Ecological Community	White	Box	Yellow	Box	31.73	Critically Endangered Ecological Community	White Box Yellow Box	0.00	
		Blakely's	Red	Gum	Grassy			Box Blakely's Red		
		Woodland	and	Derived				Gum Grassy		
		Native Grassland						Woodland and Derived Native Grassland		

3.4. Streamlined Assessment Module - Scattered trees assessment

3.4.1. Consistency with Section B.1 of Appendix B

The justification for using the Scattered Tree Assessment Module was in accordance with B1 Scattered trees in Appendix B of the BAM 2020. The trees subject to this assessment met the definition in criterion b.:

“b. have a DBH of greater than or equal to 5 cm and are located more than 50 m away from any living tree that is greater than or equal to 5 cm DBH, and the land between the scattered trees is comprised of vegetation that are all ground cover species on the widely cultivated native species list, or exotic species or human-made surfaces or bare ground”

The subject land contained 199.2 ha of exotic vegetation. Surveys were completed in March and in October to capture potential variation in the composition of the groundcover layer. Some paddocks were recently cropped *Triticum aestivum*. Some areas showed signs of historic cropping and pasture improvement to support cattle grazing. In these areas, *Triticum aestivum*, *Lolium perenne*, *Panicum capillare* var. *capillare* and *Phalaris* sp. were dominant. Some areas of the exotic grassland contained sporadic occurrences of native species, including *Chloris truncata* and *Rytidosperma* sp. These species were not dominant across the pasture and would have formed < 5% of the groundcover. The field surveys completed were sufficient to determine the likely extent of native species in the groundcover. The exotic cover was not mapped to a PCT.

3.4.2. Scattered tree vegetation zone, assessment class and mapping

Throughout this highly modified landscape there are 26 scattered paddock trees represented by *Eucalyptus albens* (20), *Eucalyptus melliodora* (4) and *Eucalyptus blakelyi* (2) with a DBH of > 50 (Figure 3).

All trees were assigned to Class 3 i.e trees that are greater than or equal to the large tree benchmark for the most likely plant community type. Based on the surrounding vegetation the most likely PCT was PCT277 which has a large tree benchmark ≥50 DBH. None of the trees are considered threatened species but they all contained hollows. The Squirrel Glider was recorded from the subject land during camera

trap surveys, however, this species was associated with PCT 277 (Low – Mod condition) and not trees linked to the scattered tree assessment.

The number of ecosystem credits required was determined by calculating the number of scattered trees in class 3 (26 trees) and the number of ecosystem credits required per tree based on the class of scattered tree and the extent of native vegetation remaining on the property in accordance with Appendix B (B.5) of BAM 2020.

3.4.3. Assessment of entities at risk of a serious or irreversible impact

An assessment of potential SAIL entities likely to utilise the scattered trees has been completed. SAIL candidate entities predicted as likely to occur in the BAM-C include:

- *Prasophyllum* sp. Wybong
- *Miniopterus orianae oceanensis* (Little Bent-wing Bat)
- *Lathamus discolor* (Swift Parrot)
- *Anthochaera phrygia* (Regent Honeyeater).

Prasophyllum sp. Wybong is known to occur near Ilford, Premer, Muswellbrook, Wybong, Yeoval, Inverell, Tenterfield, Currabubula and the Pilliga area. The geographic extent for this species does not overlap with the subject land. The species was considered highly unlikely to occur. The Little Bent-wing Bat relies on caves, tunnels, mine shafts or abandoned buildings for roosting and breeding. The subject land, or any land within a 100 m radius, did not contain these habitat features. The scattered trees would not provide roosting or breeding habitat for this species.

Both the Swift Parrot and Regent Honeyeater are candidate SAIL when land is mapped on the important area habitat maps. The subject land is not mapped on the important area habitat maps (checked 8 November 2022).

In addition, survey for candidate species has been completed and no SAIL species have been identified in the subject land. Therefore, the scattered trees are not currently known to support any species at risk of SAIL.

3.5. Vegetation integrity assessment

A vegetation integrity assessment using the Credit Calculator (BAMC) was undertaken and the results are outlined in Table 11.

Table 11: Vegetation integrity

Veg Zone	PCT ID	Condition	Area (ha)	Composition Condition Score	Structure Condition Score	Function Condition Score	Current vegetation integrity score
1	277	Moderate	9.41	20.9	32.4	24	25.3
2	277	Low	22.31	2.5	32.7	37.3	14.5
3	277	Scattered trees	1.14 ha	N/A	N/A	N/A	N/A

3.5.1. Use of local data

The use of local data is not proposed.

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Figure 3 Plant Community Types and native vegetation extent

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Figure 4 Survey Effort

DRAFT

Figure 5 Threatened Ecological Communities

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Figure 6 Strahler Stream Order

3.6. Threatened species

3.6.1. Ecosystem credit species

Ecosystem credit species predicted to occur within the subject land are generated by the BAMC following the input of vegetation integrity data and the PCTs identified within Chapter 3. Ecosystem credit species predicted to occur within the subject land, their associated habitat constraints, geographic limitations and sensitivity to gain class is included in Table 12.

Table 12: Predicted ecosystem credit species included in the assessment.

Species	Common Name	Habitat Constraints	Sensitivity to gain class	BC listing status	Act	EPBC Listing status	Act
<i>Anthochaera phrygia</i>	Regent Honeyeater (Foraging)		High	Critically Endangered		Critically Endangered	
<i>Artams cyanopterus</i>	Dusky Woodswallow		Moderate	Vulnerable		-	
<i>Callocephalon fimbriatum</i>	Gang-gang Cockatoo (Foraging)		Moderate	Vulnerable		Endangered	
<i>Chthonicola sagittata</i>	Speckled Warbler		High	Vulnerable		-	
<i>Circus assimilis</i>	Spotted Harrier		Moderate	Vulnerable		-	
<i>Climacteris picumnus victoriae</i>	Brown Treecreeper (eastern sub species)		High	Vulnerable		-	
<i>Daphoenositta chrysoptera</i>	Varied Sittella		Moderate	Vulnerable		-	
<i>Dasyurus maculatus</i>	Spotted-tailed Quoll		High	Vulnerable		Endangered	
<i>Falco subniger</i>	Black Falcon		Moderate	Vulnerable		-	
<i>Glossopsitta pusilla</i>	Little Lorikeet		High	Vulnerable		-	
<i>Grantiella picta</i>	Painted Honeyeater	Mistletoes present at a density of greater than five mistletoes per hectare	Moderate	Vulnerable		Vulnerable	
<i>Haliaeetus leucogaster</i>	White-bellied Sea-eagle	Within 1km of a river, lakes, large dams or creeks, wetlands and coastlines	High	Vulnerable		-	
<i>Hieraaetus morphnoides</i>	Little Eagle (Foraging)		Moderate	Vulnerable		-	

Species	Common Name	Habitat Constraints	Sensitivity to gain class	BC listing status	Act	EPBC Listing status	Act
<i>Hirundapus caudacutus</i>	White-throated Needletail		High	-		Vulnerable	
<i>Lathamus discolor</i>	Swift Parrot (Foraging)		Moderate	Endangered		Critically Endangered	
<i>Lophoictinia isura</i>	Square-tailed Kite		Moderate	Vulnerable		-	
<i>Melanodryas cucullata</i>	Hooded Robin (south-eastern form)		Moderate	Vulnerable		-	
<i>Melithreptus gularis gularis</i>	Black-chinned Honeyeater (eastern subspecies)		Moderate	Vulnerable		-	
<i>Miniopterus orianae oceanensis</i>	Large Bent-winged Bat (Foraging)		High	Vulnerable		-	
<i>Neophema pulchella</i>	Turquoise Parrot		High	Vulnerable		-	
<i>Ninox connivens</i>	Barking Owl (Foraging)		High	Vulnerable		-	
<i>Petroica boodang</i>	Scarlet Robin		Moderate	Vulnerable		-	
<i>Petroica phoenicea</i>	Flame Robin		Moderate	Vulnerable		-	
<i>Polytelis swainsonii</i>	Superb Parrot (Foraging)		Moderate	Vulnerable		Vulnerable	
<i>Pomatostomus temporalis</i>	Grey-crowned Babbler (eastern subspecies)		Moderate	Vulnerable		-	
<i>Pteropus poliocephalus</i>	Grey-headed Flying-fox (Foraging)		High	Vulnerable		Vulnerable	
<i>Saccolaimus flaviventris</i>	Yellow-bellied Sheathtail-bat		High	Vulnerable		-	
<i>Stagonopleura guttata</i>	Diamond Firetail		Moderate	Vulnerable		-	
<i>Tyto novaehollandiae</i>	Masked Owl (Foraging)		High	Vulnerable		-	

Ecosystem credit species which have been excluded from the assessment and relevant justification is included in Table 13.

Table 13: Justification for exclusion of predicted ecosystem credit species.

Species	Common Name	BC Act listing status	EPBC Act listing status	Justification for exclusion of species
<i>Grantiella picta</i>	Painted Honeyeater	Vulnerable	Vulnerable	Density of mistletoes at very low density per hectare

3.7. Species credit species

Species credit species predicted to occur at the development footprint (i.e. candidate species), their associated habitat constraints, geographic limitations and sensitivity to gain class is included in Table 14.

Table 14: Candidate species credit species

Species	Common Name	Habitat Constraints	Geographic limitations	Sensitivity to gain class	BC listing status	Act Listing status	EPBC Listing status
<i>Acacia audfeldii</i>	Ausfeld's Wattle	Footslopes and low rises on sandstone		High	Vulnerable	-	
<i>Ammobium craspedioides</i>	Yass Daisy		South of Cowra	High	Vulnerable	Vulnerable	
<i>Anthochaera phrygia</i>	Regent Honeyeater			High	Critically Endangered	Critically Endangered	
<i>Aprasia parapulchella</i>	Pink-tailed Legless Lizard	Rock areas or within 50 m of rocky areas		High	Vulnerable	Vulnerable	
<i>Burhinus grallarius</i>	Bush Stone-curlew	Fallen/standing dead timber including logs		High	Endangered	-	
<i>Callocephalon fimbriatum</i>	Gang-gang cockatoo (breeding)	Eucalypt tree species with hollows great then 9 cm diameter		High	Vulnerable	Endangered	
<i>Cercartetus nanus</i>	Eastern Pygmy-possum			High	Vulnerable	-	
<i>Chalinolobus dwyeri</i>	Large-eared Pied Bat	Within 2 km of rocky areas containing caves, overhangs, escarpment, outcrop or crevices		High	Vulnerable	Vulnerable	
<i>Cullen parvum</i>	Small Scurf-pea			High	Endangered	-	
<i>Delma impar</i>	Striped Legless Lizard			Moderate	Vulnerable	Vulnerable	
<i>Euphrasia arguta</i>	Euphrasia arguta			High	Critically Endangered	Critically Endangered	
<i>Haliaeetus leucogaster</i>	White-bellied Sea-eagle	Living or dead mature tree within suitable vegetation within 1 km of rivers, lakes, large dams or creeks		High	Vulnerable	-	
<i>Hieraaetus morphnoides</i>	Little Eagle	Nest trees – live (occasionally dead)		Moderate	Vulnerable	-	

Species	Common Name	Habitat Constraints	Geographic limitations	Sensitivity to gain class	BC listing status	Act	EPBC Listing status	Act
		large old trees within vegetation.						
<i>Keyacris scurra</i>	Key's Matchstick Grasshopper			High	Endangered		-	
<i>Lathamus discolor</i>	Swift Parrot	Important Habitat Map		Moderate	Endangered		-	
<i>Litoria booroolongensis</i>	Booroolong Frog			High	Endangered		Endangered	
<i>Lophoictinia isura</i>	Square-tailed Kite	Nest trees			Vulnerable		-	
<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 in BioNet with microhabitat code 'IC – in cave' - Observation type code 'E nest-roost' with numbers of individuals >500		Very High	Vulnerable		-	
<i>Ninox connivens</i>	Barking Owl (Breeding)	Living or dead trees with hollows >20 cm diameter and >4 m above the ground		High	Vulnerable		-	
<i>Petaurus norfolcensis</i>	Squirrel Glider			High	Vulnerable		-	
<i>Petaurus norfolcensis</i>	Squirrel Glider in the Wagga Wagga LGA		Wagga Wagga LGA	High	Endangered Population		-	
<i>Petrogale penicillata</i>	Brush-tailed Rock-wallaby	Land within 1 m of rocky escarpments, gorges, steep slopes, boulder piles, rock outcrops or clifflines		Very High	Endangered		Vulnerable	
<i>Phascogale tapoatafa</i>	Brush-tailed Phascogale			High	Vulnerable		-	
<i>Phascolarctos cinereus</i>	Koala	Presence of koala use trees		High	Endangered		Endangered	
<i>Polytelis swainsonii</i>	Superb Parrot	Living or dead <i>E. blakelyi</i> , <i>E. melliodora</i> , <i>E. camaldulensis</i> , <i>E.</i>		High	Vulnerable		Vulnerable	

Species	Common Name	Habitat Constraints	Geographic limitations	Sensitivity to gain class	BC listing status	Act	EPBC Listing status	Act
		<i>macrocarpa</i> , <i>polyantemos</i>	<i>E.</i>					
<i>Prasophyllum petilum</i>	Tarengo Leek Orchid		East of Binalong, south and east of Boorowa	High	Endangered		Endangered	
<i>Prasophyllum</i> sp. Wybong	Prasophyllum sp. Wybong			Moderate	-		Critically Endangered	
<i>Pteropus poliocephalus</i>	Grey-headed Flying-fox	Breeding camps		High	Vulnerable		Vulnerable	
<i>Swainsona recta</i>	Small Purple-pea			Moderate	Endangered		Endangered	
<i>Swainsona sericea</i>	Silky Swainson-pea			High	Vulnerable		-	
<i>Synemon plana</i>	Golden Moth	Sun Wallaby grass (<i>Rytidosperma</i> sp), Speargrass (<i>Austrostipa</i> sp)			Vulnerable		Vulnerable	
<i>Tyto novaehollandiae</i>	Masked Owl	Living or dead trees within hollows >20 cm diameter		High	Vulnerable		-	

Table 15: Species credit species removed from the assessment and justification.

Species	Common Name	Justification
<i>Anthochaera phrygia</i>	Regent Honeyeater (breeding)	The development footprint does not contain Regent Honeyeater mapped important areas (DPIE BAM – Important Areas – Accessed 1/09/22)
<i>Aprasia parapulchella</i>	Pink-tailed Legless Lizard	No habitat recorded within the subject land. The subject land does not support rocky areas and is not within 50 m of rocky areas primarily due to the agricultural uses. Furthermore, the groundcover across the whole of the subject land is clearly dominated by exotic grasses
<i>Chalinolobus dwyeri</i>	Large-eared Pied Bat	No cliffs, caves, tunnels or mines with 2 km of the subject land
<i>Cullen parvum</i>	Small Scurf-pea	Habitat degraded. The majority of the subject land has been used for agricultural purposes for an extended period of time. As a result, the groundcover across the subject land supports a low cover and very low diversity of disturbance tolerant native species. In addition, the species has not been recorded in the locality.
<i>Delma impar</i>	Striped Legless Lizard	No habitat recorded within the subject land. The subject land does not support rocky areas and is not within 50 m of rocky areas primarily due to the agricultural uses. Furthermore, the

Species	Common Name	Justification
		groundcover across the whole of the subject land is clearly dominated by exotic grasses
<i>Euphrasia arguta</i>	Euphrasia arguta	Habitat degraded. The majority of the subject land has been used for agricultural purposes for an extended period of time. As a result, the groundcover across the subject land supports a low cover and very low diversity of disturbance tolerant native species. In addition, the species has not been recorded in the locality.
<i>Keyacris scurra</i>	Keys Matchstick Grasshopper	Habitat degraded consisting almost exclusively of cropped land within the subject land
<i>Lathamus discolor</i>	Swift Parrot (Breeding)	The development footprint does not contain Swift Parrot mapped important areas (DPIE BAM – Important Areas – Accessed 1/09/22)
<i>Litoria booroolongensis</i>	Booroolong Frog	No habitat recorded within the subject land. While there is a lower order stream it is very degraded with high turbidity and runoff from the surrounding cropped lands
<i>Petrogale penicillata</i>	Brush-tailed Rock-wallaby	No cliff lines or associated rocky areas within the subject land

3.7.1. Targeted surveys

Targeted surveys for species credit species were undertaken at the development footprint on the dates outlined in Table 16. The location of targeted surveys are shown on Figure 4, this includes tracks, camera locations and koala SATs. Survey effort to date is outlined in Table 18. Further survey work will be required for some threatened species to ensure the minimum survey effort required under the BAM has been achieved.

Surveys to date have identified one candidate species the Squirrel Glider. The species polygon is yet to be defined for the species, for the purposes of the assessment the credit requirements related to this species have been calculated from the impacts to PCT 277.

Table 16: Targeted surveys

Date	Method	Target species	Personnel / recorders	Survey effort
10/10/2022	Flora transects	<i>Acacia ausfeldii</i> <i>Prasophyllum</i> sp. <i>Wybong</i> <i>Swainsona sericea</i> <i>Swainsona recta</i> <i>Prasophyllum petilum</i> <i>Ammobium craspedioides</i>	Nigel Cotsell Emily Belton	34 person hours
10/10/2022	Spotlight and call-playback	Barking Owl Bush Stone-curlew Koala	Nigel Cotsell Emily Belton	6 person hours
11/10/2022	Camera traps	Eastern Pygmy Possum Squirrel Glider Koala	Nigel Cotsell Emily Belton	148 trap nights
11/10/2022	Koala SAT	Koala	Nigel Cotsell	1 person hour

Date	Method	Target species	Personnel / recorders	Survey effort
			Emily Belton	
10/10/2022	Opportunistic surveys and searches	diurnal habitat Gang-gang Cockatoo Little Eagle Square-tailed Kite Superb Parrot White-bellied Sea-eagle	Nigel Cotsell Emily Belton	34 person hours

Weather conditions during the targeted surveys are outlined in Table 17.

Table 17: Weather conditions

Date	Rainfall (mm)	Minimum temperature °C	Maximum temperature °C
10 October 2022	0	2.5	18.2
11 October 2022	0	8.9	21.5
12 October 2022	0	11.2	20.1
13 October 2022	28.4	14.2	19.0

Following completion of targeted surveys, the species credit species included in the assessment are outlined in Table 18.

Table 18: Species credit species included in the assessment

Species	Common Name	Species presence	Geographic limitations	Number of individuals / Habitat (ha)	Biodiversity Risk Weighting
<i>Acacia ausfeldii</i>	Ausfeld's Wattle	No (surveyed)	Nil	0	High
<i>Ammobium craspedioides</i>	Yass Daisy	No (surveyed)	Nil	0	High
<i>Burhinus grallarius</i>	Bush Stone-curlew	No (surveyed)	Nil	0	High
<i>Callocephalon fimbriatum</i>	Gang-gang Cockatoo	No (surveyed)	Nil	0	High
<i>Cercartetus nanus</i>	Eastern Pygmy-possum	No (surveyed)	Nil	0	High
<i>Euphrasia arguta</i>	Euphrasia arguta	No (surveyed)	Nil	0	Very High
<i>Haliaeetus leucogaster</i>	White-bellied Sea-Eagle	No (surveyed)	Nil	0	High
<i>Hieraaetus morphnoides</i>	Little Eagle	No (surveyed)	Nil	0	Moderate
<i>Lophoictinia isura</i>	Square-tailed Kite	No (surveyed)	Nil	0	Moderate
<i>Ninox connivens</i>	Barking Owl	Yes (assumed present)	Nil	0	High

Species	Common Name	Species presence	Geographic limitations	Number of individuals / Habitat (ha)	Biodiversity Risk Weighting
<i>Petaurus norfolcensis</i>	Squirrel Glider	Yes (surveyed)	Nil	2	High
<i>Petaurus norfolcensis endangered population</i>	Squirrel Glider in the Wagga Wagga Local Government Area	Yes (surveyed)	Wagga Wagga Local Government Area	2	High
<i>Phascogale tapoatafa</i>	Brush-tailed Phascogale	Yes (assumed present)	Nil	0	High
<i>Phascolarctos cinereus</i>	Koala	Yes (surveyed)	Nil	0	High
<i>Polytelis swainsonii</i>	Superb Parrot	Yes (surveyed)	Important Areas Map	0	High
<i>Prasophyllum petilum</i>	Tarengo Leek Orchid	Yes (surveyed)	Nil	0	High
<i>Prasophyllum sp. Wybong</i>	Prasophyllum sp. Wybong	Yes (surveyed)	Nil	0	Very High
<i>Swainsona recta</i>	Small Purple-pea	Yes (surveyed)	Nil	0	High
<i>Swainsona sericea</i>	Silky Swainson-pea	Yes (surveyed)	Nil	0	High
<i>Tyto novaehollandiae</i>	Masked Owl	Yes (assumed present)	Nil	0	High

Table 19: Justification for exclusion of candidate species credit species

Species	Common Name	NSW listing status	EPBC Listing status	Justification for exclusion of species
<i>Anthochaera phrygia</i>	Regent Honeyeater	Critically Endangered	Critically Endangered	Outside Important Habitat Map
<i>Chalinolobus dwyeri</i>	Large-eared Pied Bat	Vulnerable	Vulnerable	No rocky areas, cliffs, overhangs old mines, tunnels within 2 km of the subject land
<i>Delmar impar</i>	Striped Legless Lizard		Vulnerable	Vulnerable
<i>Keyacris scurra</i>	Key's Matchstick Grasshopper	Endangered	Not Listed	Habitat degraded as the area is almost exclusively cropped of severely degraded
<i>Lathamus discolor</i>	Swift Parrot	Endangered	Critically Endangered	Study site not associated with Important Habitat Map
<i>Litoria booroolongensis</i>	Booroolong Frog	Endangered	Endangered	The only creek that bisects the subject site is highly degraded, turbid from agricultural runoff and does not contain the structural elements required by this frog

Species	Common Name	NSW listing status	EPBC Listing status	Justification for exclusion of species
<i>Miniopterus orianae oceanensis</i>	Large Bent-winged Bat (Breeding)	Vulnerable	Not listed	No caves, tunnels, culverts or other structures present or species records with microhabitat code IC – in cave
<i>Petrogale penicillate</i>	Brush-tailed Rock-wallaby	Endangered	Vulnerable	No rocky escarpments, gorges, steep slopes, boulder piles or rock outcrops of cliffines associated with the site
<i>Pteropus poliocephalus</i>	Grey-headed Flying-fox (Breeding)	Vulnerable	Vulnerable	There are no breeding camps associated with the site
<i>Synemon plana</i>	Golden Sun Moth	Endangered	Critically Endangered	The site is predominately cropped with an absence of native grasses associated with this moth

3.7.2. Expert reports

There have been no expert reports prepared for this assessment. Where threatened entities have not been surveyed for because they have fallen outside the 'survey period' they have assumed to be present for the purposes of this draft BDAR.

4. Stage 2: Impact assessment (biodiversity values)

4.1. Avoiding impacts

4.1.1. Locating a project to avoid and minimise impacts on vegetation and habitat

The development has been located in a way which avoids and minimises impacts as outlined in Table 20 and presented in Figure 7.

Table 20: Locating a project to avoid and minimise impacts on vegetation and habitat

Approach	How addressed	Justification
locating the project in areas where there are no biodiversity values	The development footprint is primarily located on the cleared sections of land which has been subject to decades of intensive agricultural use.	Vegetation with the highest vegetation integrity score (VIS) is protected within a riparian buffer that bisects the site.
locating the project in areas where the native vegetation or threatened species habitat is in the poorest condition	The development footprint is primarily located on the cleared sections of land which has been subject to decades of intensive agricultural use.	The proposal has avoided the highest quality sections of PCT 277. The majority of impacts to native vegetation are in relation to patches with lower VIS or scattered trees. Some of the large hollow bearing trees provide suitable habitat for a range of arboreal mammals. There is further potential during the detailed design stage to retain these trees within reserves and proposed lots.
locating the project in areas that avoid habitat for species and vegetation in high threat categories (e.g. an EEC or CEEC), indicated by the biodiversity risk weighting for a species	All of the native vegetation associated with the site is associated with the Critically Endangered White Box Yellow Box, Blakelys Red Gum Grassy Woodland TEC – PCT 277. 21.18 ha of this vegetation community fall below the benchmark VIS score of 15 for offsetting of a TEC.	0.28 ha of moderate to low condition PCT277 is impacted and 9.13 ha will be retained. 16.71 ha of low condition PCT will be impacted and 4.47 will be retained.
locating the project such that connectivity enabling movement of species and genetic material between areas of adjacent or nearby habitat is maintained	The proposals identifies a major north-south corridor focused on the riparian environs which links remnant vegetation beyond the bounds of the subject land	The proposed riparian corridor will be further enhanced through rehabilitation and re-vegetation. It is anticipated a vegetation management plan (VMP) will be prepared in accordance with the <i>NRAR Guidelines for controlled activities on waterfront land Riparian corridors</i> . While there will be some loss of more isolated patches and individual paddock trees, but a net gain delivered through the protection and enhancement of the corridor.

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Figure 7 Development Footprint

4.1.2. Designing a project to avoid and minimise impacts on vegetation and habitat

The development has been designed in a way which avoids and minimises impacts as outlined in Table 21. It is anticipated that further design initiatives will be implemented during the detailed design process, prior to submission of the development application, to further avoid impact to vegetation and habitat.

Table 21: Designing a project to avoid and minimise impacts on vegetation and habitat

Approach	How addressed	Justification
reducing the clearing footprint of the project	Native vegetation with the highest VI score has been avoided and integrated into riparian corridor that runs north-south through the centre of the site.	Establishes a linking habitat through the riparian corridor
locating ancillary facilities in areas where there are no biodiversity values	A majority of the development footprint has been concentrated in areas where there are no biodiversity values. Where there are biodiversity values, the VI Score was <15	During the detailed design process there will be opportunities to retain large habitat trees with cleared areas.
locating ancillary facilities in areas where the native vegetation or threatened species habitat is in the poorest condition (i.e. areas that have a lower vegetation integrity score)	As above	As above
locating ancillary facilities in areas that avoid habitat for species and vegetation in high threat status categories (e.g. an EEC or CEEC)	The benchmark VIS score for offsetting of a TEC is 15. Majority of the vegetation with a VIS ≥ 15 ancillary facilities have been located away from these zones. There is potential to avoid individual paddock trees during the detailed design.	Most of the PCT with a VIS ≥ 15 is to be retained as it is located within the riparian corridor.
providing structures to enable species and genetic material to move across barriers or hostile gaps	The detail of the road crossing through the riparian corridor will be developed during the detailed design phase. This will be in accordance with relevant planning instruments.	Design to be developed prior to submission of Development Application.
making provision for the demarcation, ecological restoration, rehabilitation and/or ongoing maintenance of retained native vegetation habitat on the development footprint.	Ecological restoration is planned for the central riparian corridor. It is anticipated a vegetation management plan (VMP) will be prepared in accordance with the <i>NRAR Guidelines for controlled activities on waterfront land Riparian corridors</i> .	This will maintain and improve corridor linkages through the subject land
Efforts to avoid and minimise impacts through design must be documented and justified	The design has gone through multiple iterations with early ecology field work informing the design and retaining a larger proportion of the moderate to low condition PCT 277.	Further information will be provided in the final BDAR at the Development Application stage.

4.1.3. Prescribed biodiversity impacts

The development footprint has been located in a way which avoids and minimises impacts to prescribed biodiversity impacts as outlined in Table 22.

Table 22: Prescribed biodiversity impacts

Prescribed biodiversity impact	Description in relation to the development footprint	Threatened species or ecological communities effected
impacts of development on the connectivity of different areas of habitat of threatened species that facilitates the movement of those species across their range	There will be some loss of scattered paddock trees which provide a range of nesting and roosting opportunities. Their isolation within a 'sea' of cropped land limits their habitat connectivity. The retention of and likely revegetation of the riparian corridor will consolidate habitat connectivity through the central area of the site which has the potential to connect to adjacent land.	Primarily arboreal mammals and birds. The squirrel glider was the only confirmed threatened mammal utilising the subject land.
impacts of development on movement of threatened species that maintains their lifecycle	The retention of and likely revegetation of the riparian corridor will consolidate habitat connectivity through the central area of the site which has the potential to connect to adjacent land.	Primarily arboreal mammals and birds. The squirrel glider was confirmed to utilise the subject land. Removal of hollow bearing trees could potential impact breeding of species on the subject land.
impacts of development on water quality, water bodies and hydrological processes that sustain threatened species and threatened ecological communities (including from subsidence or upsidence resulting from underground mining)	Water quality currently associated with the site is anticipated to be poor as a result of fertilizer and herbicide inputs associated with cropping and grazing. The shift to a more urban setting is likely to significantly improve the quality of water entering water ways through improved bio-filtration related to rehabilitation of the riparian corridor.	As the riparian corridor is to be retained and improved it is anticipated to improve habitat for most terrestrial and arboreal species.
impacts of vehicle strikes on threatened species or on animals that are part of a TEC.	There will be significantly more traffic associated with the development with multiple new roads and access points.	Most threatened terrestrial and some arboreal species will be more susceptible to vehicle strike.

4.2. Assessment of Impacts

4.2.1. Direct impacts

The direct impacts of the development on:

- native vegetation is outlined in Table 23
- threatened ecological communities are outlined in Table 24
- threatened species and threatened species habitat is outlined in Table 25
- prescribed biodiversity impacts is outlined in Section 4.2.4

Direct impacts including the final project footprint (construction and operation) are shown on Figure 7.

Table 23: Direct impacts to native vegetation

PCT ID	PCT Name	Vegetation Class	Vegetation Formation	Direct impact (ha)
277 (Moderate)	Blakely's Red Gum - Yellow Box grassy tall woodland of the NSW South Western Slopes Bioregion	Western Slopes Grassy Woodlands	Grassy Woodlands	1.44
277 (Low – Mod)	Blakely's Red Gum - Yellow Box grassy tall woodland of the NSW South Western Slopes Bioregion	Western Slopes Grassy Woodlands	Grassy Woodlands	0.28
277 (Low)	Blakely's Red Gum - Yellow Box grassy tall woodland of the NSW South Western Slopes Bioregion	Western Slopes Grassy Woodlands	Grassy Woodlands	15.26
NA	PCT not assigned. Assessed as scattered trees streamlined assessment module	NA		1.07 ha (26 trees)
Total				18.05 ha

Table 24: Direct impacts on threatened ecological communities

PCT ID	BC Act		Direct impact (ha)	EPBC Act		
	Listing status	Name		Listing status	Name	Direct impact (ha)
277	Critically Endangered Ecological Community	Blakely's Red Gum - Yellow Box grassy tall woodland of the NSW South Western Slopes Bioregion	18.05	Not Listed	N/A	N/A

Table 25: Direct impacts on threatened species and threatened species habitat

Species	Common Name	Direct impact number of individuals / habitat (ha)	NSW listing status	EPBC Listing status	Notes
<i>Petaurus norfolcensis</i>	Squirrel Glider	16.98	Vulnerable	Not Listed	Two individuals identified during targeted surveys
<i>Petaurus norfolcensis</i> - endangered population	Squirrel Glider in the Wagga Wagga Local Government Area	16.98	Endangered Population	Not listed	Two individuals identified during targeted surveys
<i>Phascogale tapoatafa</i>	Brush-tailed Phascogale	16.98	Vulnerable	Not Listed	Assumed presence - Species not surveyed for as outside of survey window
<i>Tyto novaehollandiae</i>	Masked Owl	16.98	Vulnerable	Not Listed	Assumed presence - Species not surveyed for as outside of survey window - Species polygon to be refined in final BDAR

Surveys to date have identified one candidate species the Squirrel Glider. The species polygon for the Masked Owl is yet to be defined and will be refined after the targeted survey has been completed.

4.2.2. Change in vegetation integrity

The change in vegetation integrity as a result of the development is outlined in Table 26.

Table 26: Change in vegetation integrity

Veg Zone	PCT ID	Condition	Area (ha)	Current vegetation integrity score	Future vegetation integrity score	Change in vegetation integrity
1	277	Moderate	1.44	52.6	0	-52.6
2	277	Low-Mod	0.28	41.2	0	-41.2
3	277	Poor	15.26	14.6	0	-14.6

It is anticipated that a vegetation management plan (VMP) will be prepared in accordance with the NRAR *Guidelines for controlled activities on waterfront land - Riparian corridors* for the riparian corridor that transects the site. This is assumed to be required at a later stage of the development process and has the potential to improve the VIS for a

4.2.3. Indirect impacts

The indirect impacts of the development are outlined in Table 27

Table 27: Indirect impacts

Indirect impact	Description (nature, extent and frequency)	Biodiversity affected	Duration/ Timing	Consequence
inadvertent impacts on adjacent habitat or vegetation	Damage to existing vegetation marked for retention during clearing and demolition works. Minor extent as vegetation at risk is in poor condition.	Damage to adjacent vegetation – predominantly exotic cover.	Clearing and demolition phase.	Low. Accidental vegetation damage or removal.
Reduced viability of adjacent habitat due to edge effects	Vegetation removal will create a new edge along existing vegetation with edge effects penetrating further into intact vegetation. Central riparian corridor. During and post works.	Remnant vegetation through the central area of the site	Ongoing	Low. Accidental vegetation damage or removal. There is potential that removal of vegetation in these areas could be beneficial as it is currently heavily dominated by weeds.
Reduced viability of adjacent habitat due to noise, dust or light spill	Noise and dust from machinery movement. Dust, noise and light effects moderate – likely to carry beyond development footprint. Intermittently during demolition, clearing and construction.	Remnant vegetation through the central area of the site	Ongoing	Low. Temporary noise, light and dust pollution that may affect resident fauna, particularly arboreal mammals that may be using the subject land for roosting or breeding.
transport of weeds and pathogens from the site to adjacent vegetation	Spread of weeds from adjacent areas Minor extent, as vegetation in adjacent areas already contain high levels of exotic species. Daily during clearing and movement of vehicles.	Remnant vegetation through the central area of the site	During clearing.	Low. The native vegetation within the subject land is already dominated by weed species.
loss of breeding habitat	Damage to adjacent retained habitat. Minor extent, as vegetation in adjacent areas has poor breeding habitat. Daily during clearing and movement of vehicles.	Remnant vegetation through the central area of the site	During clearing.	Low. Breeding habitat within central riparian corridor could be impact by accidental vegetation damage or removal.
trampling of threatened flora species	N/A – as no threatened flora is likely to occur within the development footprint ²	None	During clearing.	Low. No threatened flora species were recorded within the development footprint.

² Targeted flora surveys for *Cullen parvum* (Small Scurf-pea) and *Euphrasia arguta* (Euphrasia arguta) are yet to be completed and this assessment will be refined once these surveys have been completed.

Indirect impact	Description (nature, extent and frequency)	Biodiversity affected	Duration/ Timing	Consequence
rubbish dumping	Rubbish dumping from construction workers, during demolition and from future residents Extent may be moderate. During and post construction.	Remnant vegetation through the central area of the site	Intermittently when contractors are on site and during occupation by residents	Low. Rubbish dumping has the potential to further degrade the condition of the vegetation patch along the through the central riparian corridor.
wood collection	Wood collection by future residents Extent may be moderate during operation phase	Remnant vegetation through the central area of the site	Ongoing	Low. There is a paucity of both standing and fallen timber within the existing vegetation.
removal and disturbance of rocks including bush rock	N/A – there is a small amount of rock imbedded in the soil and is unlikely to attract the attention of landscapers/gardeners given it is small sized and largely buried	No fauna is considered to rely on bush rock within the development footprint as habitat	Ongoing	Low. Bush rock collection is unlikely to occur during the operational phase.
increase in predators	Increase presence of exotic fauna species such as feral cats and fox. Moderate extent during the construction and operational phase	Native fauna (birds and arboreal mammals)	Ongoing	Low. Urbanised area likely already contains a population of foxes and cats that is unlikely to increase as a result of the proposed works.
increase in pest animal populations	Increase presence of exotic fauna species such as <i>Acridotheres tristis</i> (Common Myna). Moderate extent during construction and operation phase.	Competition with common native bird species.	Ongoing	Moderate. Urbanisation is anticipated to increase the presence of urban birds in the area increasing competition for hollows and foraging resources.
disturbance to specialist breeding and foraging habitat, e.g. beach nesting for shorebirds.	N/A – there are no areas of specialist breeding habitat within or near the development footprint that may be indirectly impacted	N/A	N/A	N/A
sedimentation and contaminated and/or nutrient rich run-off	Runoff during construction Minor. Confined to development footprint by sediment fencing and other containment measures.	Species inhabiting and foraging within adjacent vegetation.	Demolition and construction	Low. Smothering of vegetation causing death of native vegetation. .

4.2.4. Prescribed biodiversity impacts

The development footprint has the prescribed biodiversity impacts as outlined in Table 28.

Table 28: Direct impacts on prescribed biodiversity impacts

Prescribed biodiversity impact	Description (Nature, extent and frequency)	Consequences	Justification	Additional information
Karst, caves, crevices, cliffs, rocks and other geological features of significance	N/A	N/A	N/A	N/A
Human made structures or non-native vegetation	N/A	N/A	N/A	N/A
Habitat connectivity	There is a central riparian corridor that has interrupted links to the north and southwest of the subject land. There are scattered patches of vegetation and isolated paddock trees within the development footprint.	Removal of native vegetation outside of the riparian corridor, with marginal connectivity to the surrounding landscape. No anticipated fragmentation of the north – south riparian corridor.	Impacts are on the edge of the connected vegetation. While reducing the overall area of vegetation there will be minimal impacts to connectivity as works will be concentrated in areas of pasture, where the vegetation is fragmented.	No.
Water bodies, water quality and hydrological processes	There are four 1st order (Strahler stream order) watercourses, two 2nd order watercourses and one 3rd order watercourse located within the study area. A portion of one of the 2nd order watercourses and the 3rd order watercourse is mapped as KFH, see Figure 8 Water Courses. All mapped 1 st order water course are to be removed during construction. Sedimentation of water course may occur during construction.	Low. All 2 nd and 3 rd order water courses are to be retained. In addition, the riparian corridor surrounding these water courses is likely to improve with future implementation of a VMP.	The retention and anticipated revegetation of the 2 nd and 3 rd order stream in the central riparian corridor would increase native vegetation and stream function. The KFH within the subject land is to be retained and improved with the implementation of a VMP.	Observations during the field survey indicated that all first order watercourse within the subject land have been significantly modified to provide drainage to agricultural land. As such they are anticipated to not meet the definition of a water course under the WM Act (ELA, 2022).
Wind turbine strikes on protected animals	N/A	N/A	N/A	N/A
vehicle strikes	Post development vehicles strikes are anticipated to increase	Vehicle strikes can cause death and injury to native fauna	There are not many species present on the subject land which are considered likely to be struck by a vehicle.	N/A

Prescribed biodiversity impact	Description (Nature, extent and frequency)	Consequences	Justification	Additional information
			This includes kangaroos, wallabies, and wombats.	

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Figure 8 Water Courses

4.2.5. Mitigating and managing impacts

Measures proposed to mitigate and manage impacts at the development footprint before, during and after construction are outlined in Table 29. It is anticipated that these will be refined and expanded upon in the final BDAR.

Table 29: Measures proposed to mitigate and manage impacts

Measure	Risk before mitigation	Risk after mitigation	Action	Outcome	Timing	Responsibility
timing works to avoid critical life cycle events such as breeding or nursing	High	Low	Vegetation clearance should avoid spring/summer when breeding in nests and hollows is most common	Reducing impacts to breeding fauna	Pre-construction	Project Manager
instigating clearing protocols including pre-clearing surveys, daily surveys and staged clearing, the presence of a trained ecological or licensed wildlife handler during clearing events	High	Low	An experienced and qualified ecologist be present to supervise vegetation removal and care and relocate fauna (if present)	Ensuring animal welfare and protection	During vegetation removal	Project ecologist
installing artificial habitats for fauna in adjacent retained vegetation and habitat or human made structures to replace the habitat resources lost and encourage animals to move from the impacted site, e.g. nest boxes	N/A	N/A	Large-diameter scattered trees to be removed which are hollow bearing. Hollow resources to be moved to protected areas once fallen	Reduced impacts on hollow-dependent fauna	N/A	N/A
clearing protocols that identify vegetation to be retained, prevent inadvertent damage and reduce soil disturbance; for example, removal of native vegetation by	Medium	Low	Habitat to be retained directly adjacent to the development footprint shall be identified in the field and appropriate fencing installed, including sediment fencing to ensure its protection	Ensuring retained vegetation is not inadvertently damaged or cleared	Prior to vegetation removal	Project ecologist

Measure	Risk before mitigation	Risk after mitigation	Action	Outcome	Timing	Responsibility
chain-saw, rather than heavy machinery, is preferable in situations where partial clearing is proposed						
sediment barriers or sedimentation ponds to control the quality of water released from the site into the receiving environment	Moderate	Low	Standard sediment and erosion control (SEC) measures should be implemented	Contain sediments within the earthwork area/ development footprint	Establish SEC measures prior to works commencing	Site manager
noise barriers or daily/seasonal timing of construction and operational activities to reduce impacts of noise	Medium	Low	Only conduct clearing and operation of machinery inside of typical work hours (Monday - Friday 7 am - 5 pm and Saturday 8 am - 1 pm). No work to occur on Sundays	Reducing impacts to native fauna and quality of life for adjacent communities	During construction	Site manager
light shields or daily/seasonal timing of construction and operational activities to reduce impacts of light spill	Medium	Low	Conduct works during daylight hours	Reducing impacts to nocturnal native fauna	During construction	Site manager
adaptive dust monitoring programs to control air quality	Medium	Low	Monitor dust generation and air quality. Use a water truck to wet areas of bare ground. Conduct works outside of hot periods when rainfall is typically lower	Reducing impact of dust on neighbouring communities and native fauna	During construction	Site manager
programming construction activities to avoid impacts; for example, timing construction	High	Low	Tree felling outside of spring and summer (main breeding season for native birds and microbats) and undertake pre-	Reducing impacts to breeding fauna. No migratory species are	Pre-construction	Project Manager

Measure	Risk before mitigation	Risk after mitigation	Action	Outcome	Timing	Responsibility
activities for when migratory species are absent from the site, or when particular species known to or likely to use the habitat on the site are not breeding or nesting			clearance and clearance survey by suitably qualified ecologist. Timing construction activities for when migratory species are absent from the site.	likely to occur at the site.		
temporary fencing to protect significant environmental features such as riparian zones	High	Low	Remnant vegetation within in central riparian corridor to vegetation removal	Protection of remnant vegetation	Pre-clearing	Project manager
hygiene protocols to prevent the spread of weeds or pathogens between infected areas and uninfected areas	Moderate	Low	Come clean – go clean protocol for plant and equipment entering/exiting the site	Reduce the risk of introducing new weed species	During earthworks and construction of subdivision	Site manager
staff training and site briefing to communicate environmental features to be protected and measures to be implemented	Moderate	Low	Standard SEC measures and come clean – go clean protocol. Stop-work measures if fauna are observed within construction footprint	Reduce the risk of introducing new weed species and sedimentation run-off. Reduce the risk of harm to fauna	Prior and during clearing and demolition.	Site manager
development control measures to regulate activity in vegetation and habitat adjacent to residential development including controls on pet ownership, rubbish disposal, wood collection, fire management and disturbance to nests and other niche habitats	Moderate	Low	The owners and residents should be made aware that the remnant vegetation is subject to protections. Signage should be provided.	Reduce increased degradation of remnant vegetation.	Prior to construction commencing	Site manager

Measure	Risk before mitigation	Risk after mitigation	Action	Outcome	Timing	Responsibility
making provision for the ecological restoration, rehabilitation and/or ongoing maintenance of retained native vegetation habitat on or adjacent to the development footprint	Moderate	Low	Implementation of a VMP through the central riparian corridor.	Improved vegetation condition throughout the central riparian corridor.	During and post construction	Project manager and Site manager

4.2.6. Serious and Irreversible Impacts (SAIL)

The development has one candidate Serious and Irreversible Impact (SAIL) entity White Box Yellow Box Blakely's Red Gum Woodland.

An assessment against the SAIL principles in clause 6.7 of the BC Regulation and section 9.2.1 of BAM 2020 have been carried out. Detailed consideration of whether impacts on threatened entities are serious and irreversible is included in Table 30 and Table 31.

Table 30 Serious and Irreversible Impacts Summary

Species / Community	Principle	Direct impact (ha)	Threshold
White Box Yellow Box Blakely's Red Gum Woodland	1 & 2	18.05	Not published

Table 31 Evaluation of an impact on a TEC consistent with 9.1.1 of the BAM

Impact Assessment Provisions	Assessment
1. the action and measures taken to avoid the direct and indirect impact on the potential entity for an SAIL	A majority of the development footprint is contained in areas comprised of cleared land, pasture and exotic cover. About 98% of White Box Yellow Box Blakely's Red Gum Woodland - PCT 277 (Low-Mod) will be retained within the riparian corridor. Future planning could also avoid some of the large-diameter hollow bearing trees and incorporate them into parks or lots associated with the subdivision.
2a. evidence of reduction in geographic distribution (Principle 1, clause 6.7(2)(a) BC Regulation) as the current total geographic extent of the TEC in NSW AND the estimated reduction in geographic extent of the TEC since 1970 (not including impacts of the proposal)	<p>The majority of PCT 277 (moderate and moderate – low)) vegetation will be retained within the riparian corridor and linking edges. Overall, 18.05 ha of the community will be removed, comprised of 1.44 of PCT 277 (moderate), ha 0.28 ha (moderate - low), 15.26 ha (low) and 1.14 ha of scattered trees to enable the proposed development.</p> <p>Box-Gum Woodland is a geographically widespread but now highly fragmented ecological community, found along the slopes and tablelands of Queensland and NSW, through the ACT to Victoria. Prior to European settlement this ecological community formed an almost continuous band comprising several million hectares. However, its occurrence on moderate to high fertility soils has resulted in the preferential clearing of large areas of this ecological community for</p>

Impact Assessment Provisions	Assessment
	<p>cropping and/or its modification by pasture improvement and grazing. Current estimates indicate that only 405,000 ha of the ecological community in various condition states remain.</p> <p>In NSW it is found within the North Coast, New England Tablelands, Nandewar, Brigalow Belt South, Sydney Basin, South Eastern Highlands, South East Corner and South Western Slopes bioregions. In south-eastern NSW, the extent of Box Gum Woodland has been reduced to around 5% of its pre-1750 distribution, existing as remnants that have greater than 20% canopy cover and are 10 ha in size.</p> <p>Box-Gum Woodland is a geographically widespread but now highly fragmented ecological community, found along the slopes and tablelands of Queensland and NSW, through the ACT to Victoria. Prior to European settlement this ecological community formed an almost continuous band comprising several million hectares. However, its occurrence on moderate to high fertility soils has resulted in the preferential clearing of large areas of this ecological community for cropping and/or its modification by pasture improvement and grazing. Current estimates indicate that only 405,000 ha of the ecological community in various condition states remain.</p> <p>In NSW it is found within the North Coast, New England Tablelands, Nandewar, Brigalow Belt South, Sydney Basin, South Eastern Highlands, South East Corner and South Western Slopes bioregions. In south-eastern NSW, the extent of Box Gum Woodland has been reduced to around 5% of its pre-1750 distribution, existing as remnants that have greater than 20% canopy cover and are 10 ha in size or larger. Further, it is considered that only 0.05% of Box-Gum Woodland in NSW remains in near to original condition.</p> <p>Most of the clearing of Box-Gum Woodland across its range likely occurred prior to 1970 for agriculture. Continued expansion of agricultural practices, clearing for infrastructure (such as roads and powerline easements) and urban development have likely contributed to the reduction in extent and condition of Box-Gum Woodland post 1970. The quantification of the reduction of Box-Gum Woodland post 1970 is not well-documented and not available in the research; any figures would likely be rudimentary estimates, but could be as much as 25-50% of its overall decline (DECCW 2011 & NSW TSSC 2019).</p> <p>Available estimates on the reduction of this community are available for the pre-European extent but not since 1970. The community is estimated to have been reduced to <1% of its pre-European extent in the Lachlan area, <4% in the NSW South Western Slopes and Southern Tablelands and <7% remaining in the Holbrook area (TSSC 2019). The Conservation Advice for the community states that the decline was estimated to be 95% or more (DECCW 2011).</p>
<p>2b. extent of reduction in ecological function for the TEC using evidence that describes the degree of environmental degradation or disruption to biotic processes (Principle 2, clause 6.7(2)(b) BC Regulation) indicated by:</p> <p>i. change in community structure</p> <p>ii. change in species composition</p>	<p>Removal of White Box Yellow Box Blakely's Red Gum Woodland has been used as a surrogate for estimating environmental degradation or disruption to biological processes. Other considerations include the future land zoning across which the community occurs. In areas where land is proposed to be zoned for development, there is a higher risk of invasion and establishment of exotic species and degradation of habitat through permissible land uses which would affect the species composition and disrupt the ecological processes of the community.</p>

Impact Assessment Provisions	Assessment
<p>iii. disruption of ecological processes</p> <p>iv. invasion and establishment of exotic species</p> <p>v. degradation of habitat, and</p> <p>vi. fragmentation of habitat</p>	<p>However, the area of White Box Yellow Box Blakely's Red Gum Woodland that could have been affected by such practices cannot be quantified. Generational intensive farming of the land has fundamentally altered this community including community structure and species composition. This has resulted in significant fragmentation and degradation of the woodland. Resulting in the very low VI scores returned from BAM plots.</p> <p>In some areas, historical disturbance and farming has affected the composition and structure of the community such that all structural layers are not present or there is heavy infestation of exotic species. This may have caused disturbance to the soil seed bank such that natural regeneration is unlikely to occur (DECCW 2011). In this case, there would be disruption to the ecological processes of the community. In other areas where the community remains intact with both structural and composition complexity, disruption to ecological processes would be negligible. These factors have also contributed to the degradation of the community and resulting invasion of exotic species.</p>
<p>2c. evidence of restricted geographic distribution (Principle 3, clause 6.7 (2) (c) BC Regulation), based on the TECs geographic range in NSW according to the:</p> <p>i. extent of occurrence</p> <p>ii. area of occupancy, and</p> <p>iii. number of threat-defined locations.</p>	<p>Principle 3 Not Applicable</p>
<p>2d. evidence that the TEC is unlikely to respond to management (Principle 4, clause 6.7 (2) (d) BC Regulation).</p>	<p>Principle 4 Not Applicable</p>
<p>3. Where the TBDC indicated that data is 'unknown' or 'data deficient' for a TEC for a criterion listed in subsection 9.1.1(2), the assessor must record this in the BDAR or BCAR.</p>	<p>Not Applicable</p>
<p>4a. the impact on the geographic extent of the TEC (Principles 1 and 3) by estimating the total area of the TEC to be impacted by the proposal:</p> <p>i. in hectares, and</p> <p>ii. as a percentage of the current geographic extent of the TEC in NSW.</p>	<p>White Box Yellow Box Blakely's Red Gum Woodland has been drastically reduced in area and highly fragmented because of clearance for cropping and pasture improvement. Austin et al. (2000) found the community had been reduced to less than 4% of its pre-European extent in the NSW southwestern slopes and Southern Tablelands. Gibbons and Boak (2000) found remnants of woodlands dominated by <i>Eucalyptus albens</i>, <i>E. melliodora</i> and <i>E. blakelyi</i> were severely fragmented. Further remnants of the community are degraded as a consequence of their disturbance history.</p> <p>Overall, 18.05 ha of the community will be removed, comprised of 1.44 of PCT 277 (moderate), ha 0.28 ha (moderate - low), 15.26 ha (low) and 1.14 ha of scattered trees to enable the proposed development.</p> <p>Therefore, the proposed development will affect 18.05 ha of White Box - Yellow Box - Blakely's Red Gum Grassy Woodland. The Critically Endangered Community extends across a large area of NSW not specified in the Scientific Determination and the exact proportion of the community proposed for removal cannot be accurately determined.</p>

Impact Assessment Provisions	Assessment
<p>4b. the extent that the proposed impacts are likely to contribute to further environmental degradation or the disruption of biotic processes (Principle 2) of the TEC by:</p> <p>i. estimating the size of any remaining, but now isolated, areas of the TEC; including areas of the TEC within 500 m of the development footprint or equivalent area for other types of proposals</p> <p>ii. describing the impacts on connectivity and fragmentation of the remaining areas of TEC measured by:</p> <ul style="list-style-type: none"> distance between isolated areas of the TEC, presented as the average distance if the remnant is retained AND the average distance if the remnant is removed as proposed, and estimated maximum dispersal distance for native flora species characteristic of the TEC, and other information relevant to describing the impact on connectivity and fragmentation, such as the area to perimeter ratio for remaining areas of the TEC as a result of the development <p>iii. describing the condition of the TEC according to the vegetation integrity score for the relevant vegetation zone(s) (Section 4.3). The assessor must also include the relevant composition, structure and function condition scores for each vegetation zone.</p>	<p>The condition of the area of White Box - Yellow Box - Blakely's Red Gum Grassy Woodland is described as severely degraded, with only scattered trees remaining within a complex of cropped and grazed land.</p> <p>The landscape is already highly modified from long-standing intensive agricultural practises including cropping and grazing across all of the subject land. The existing stream, which bisects the land, already receives a range of farm pollutants including nitrates and phosphates.</p> <p>The vast majority of native understorey species have been successional replaced with rotational cropping over decades of intensive farming.</p> <p>The majority of PCT 277 Moderate and moderate to low condition vegetation will be retained within the riparian corridor and linking edges. About 1.44 ha of the moderate will be removed out of 5.19 ha and 0.28 ha of the moderate to low is proposed to be removed out of a total of 9.41 ha. 15.26 ha of the low condition PCT 277 is proposed for removal. The VIS for the Zone 3 (low) vegetation, only reached 14.6, which is below the threshold considered to be a TEC under the BAM.</p> <p>The opportunities for native flora to disperse is negligible given the extent of cropping and weeds outside the fenced riparian area. The native seed bank would be completely depleted, and regeneration of native trees would only occur following the cessation of cropping and grazing for many years.</p> <p>Condition scores achieved for the two zones associated with the TEC are as follows:</p> <p>Zone 1 (Medium condition):</p> <ul style="list-style-type: none"> Composition score = 37.2 Structure score = 79.2 Function score = 49.3 <p>Zone 2 (Low -Medium)</p> <ul style="list-style-type: none"> Composition score = 37.4 Structure score = 35.2 Function score = 53.3 <p>Zone 3 (Low)</p> <ul style="list-style-type: none"> Composition score = 3.4 Structure score = 32.7 Function score = 27.8 <p>The relatively high function scores were achieved due to the presence of scattered trees in the largest tree class, which is at benchmark, and the presence of some logs.</p>

4.3. Impact summary

Following implementation of the BAM and the BAM Calculator (BAMC), the following impacts have been determined.

4.3.1. Serious and Irreversible Impacts (SAII)

The PCT 277 - *Blakely's Red Gum - Yellow Box grassy tall woodland of the NSW South Western Slopes Bioregion* is an SAI candidate species and the extent of impact to this species requiring offsets is shown in Table 32 and Figure 9.

4.3.2. Impacts requiring offsets

The impacts of the development requiring offset for native vegetation are outlined in Table 32 and shown on Figure 9.

Table 32: Impacts to native vegetation that require offsets

PCT ID	PCT Name	Vegetation Class	Vegetation Formation	Direct impact (ha)	Rationale
277 Moderate	Blakely's Red Gum - Yellow Box grassy tall woodland of the NSW South Western Slopes Bioregion	Western Slopes Grassy Woodlands	Grassy Woodlands	1.44	Part removal to accommodate subdivision
277 Low-Mod	Blakely's Red Gum - Yellow Box grassy tall woodland of the NSW South Western Slopes Bioregion	Western Slopes Grassy Woodlands	Grassy Woodlands	0.28	Complete removal to accommodate subdivision
277 (Scattered Tree Assessment)	Blakely's Red Gum - Yellow Box grassy tall woodland of the NSW South Western Slopes Bioregion	Western Slopes Grassy Woodlands	Grassy Woodlands	20 <i>Eucalyptus albens</i> >50cm with hollows 4 <i>Eucalyptus melliodora</i> >50cm with hollows 2 <i>Eucalyptus blakelyi</i> >50cm with hollows	Complete removal to accommodate subdivision
Total				1.72 ha + 26 trees	

4.3.3. Scattered tree assessment offset requirements

The offset requirement for the scattered trees was determined in accordance with Section B.5 of Appendix B of the BAM. Every tree was identified as Class 3 and contained a hollow. The following equation was applied:

$$\text{Number of ecosystem credits required} = \text{number of class 3 trees} \times \text{No. ecosystem credits required per tree (Table 11 of Appendix B)}$$

$26 \times 1 = 26$ ecosystem credits required.

The locations of scattered trees that have been assessed as requiring offsetting is shown in Figure 9. This is a worst-case scenario assessment, and it should be noted there are opportunities to retain some of these trees during the detailed design stage prior to submission of the development application.

The impacts of the development requiring offset for threatened species and threatened species habitat are outlined in Table 33 and present in Figure 10. **Error! Reference source not found..**

Table 33: Impacts on threatened species and threatened species habitat that require offsets

Species	Common Name	Direct impact habitat (ha)	NSW listing status	EPBC Listing status
<i>Cullen parvum</i>	Small Scurf-pea	0.28	Vulnerable	Not Listed
<i>Euphrasia arguta</i>	Euphrasia arguta	0.28	Critically Endangered	Critically Endangered
<i>Petaurus norfolcensis</i>	Squirrel Glider	18.08	Vulnerable	Not Listed
<i>Petaurus norfolcensis</i> - Endangered population	Squirrel Glider in the Wagga Wagga Local Government Area	18.08	Endangered Population	Not listed
<i>Phascogale tapoatafa</i>	Brush-tailed Phascogale	18.08	Vulnerable	Not Listed
<i>Tyto novaehollandiae</i>	Masked Owl	18.08	Vulnerable	Not Listed

4.3.4. Areas not requiring assessment

In accordance with Chapters 4 and 5 there are 1766.6 ha requiring no further assessment for ecosystem credits as it does not contain native vegetation in accordance with the BAM definition Figure 11.

4.3.5. Areas not requiring offsets

The impacts of the development not requiring offset for native vegetation are outlined in Table 34 and shown on Figure 12.

Table 34 Impacts not requiring offsets

Vegetation Zone	PCT ID	Name	Direct impact (ha)	Rationale
3	277	Blakely's Red Gum - Yellow Box grassy tall woodland of the NSW South Western Slopes Bioregion	15.26	The VIS for Zone 2 is <15 and as such does not require offsets.

4.3.6. Credit summary

The number of ecosystem credits required for the development are outlined in Table 35. The number of species credits required for the development are outlined in Table 36. A biodiversity credit report is included in Appendix A:.

Table 35: Ecosystem credits required

PCT ID	PCT Name	Vegetation Formation	VIS	Direct impact (ha)	Credits required
277	Blakely's Red Gum - Yellow Box grassy tall woodland of the NSW South Western Slopes Bioregion	Western Slopes Grassy Woodlands	52.6	1.42	47
277	Blakely's Red Gum - Yellow Box grassy tall woodland of the NSW South Western Slopes Bioregion	Western Slopes Grassy Woodlands	41.2	0.28	7
277	Blakely's Red Gum - Yellow Box grassy tall woodland of the NSW South Western Slopes Bioregion	Western Slopes Grassy Woodlands	14.6	16.71	0
277 (Scattered Trees)	Blakely's Red Gum - Yellow Box grassy tall woodland of the NSW South Western Slopes Bioregion	Western Slopes Grassy Woodlands	NA	26 trees	26
Total					80

Table 36: Species credit summary

Species	Common Name	Direct impact number of individuals / habitat (ha)	Credits required
<i>Petaurus norfolcensis</i>	Squirrel Glider	18.1	155
<i>Petaurus norfolcensis</i> Endangered population	Squirrel Glider in the Wagga Wagga Local Government Area	18.1	155
<i>Phascogale tapoatafa</i>	Brush-tailed Phascogale	18.1	155
<i>Tyto novaehollandiae</i>	Masked Owl	18.1	155
Total			620

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Figure 9 Impacts Requiring Offsets

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Figure 10 Fauna Species Polygon

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Figure 11 Impacts not requiring assessment

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Figure 12 Impacts Not Requiring Offsets

5. Conclusion

The proposed development footprint is approximately 230.9 ha in size. This is defined as 7066 Holbrook Road, Rowan and 16 Lloyds Road, Rowan, New South Wales. The development footprint is located on land that has been subject to considerable disturbance as a result of historical development and agricultural uses. The development footprint currently comprises of agricultural pastures, scattered remnant vegetation, planted vegetation, a riparian corridor, drainage line, three dams and one dwelling located at 16 Lloyds Road.

Biodiversity Development Assessment Reports (BDAR) are required to support development applications under Part 4 of the EP&A Act that trigger the BOS under Part 7 of the BC Act. This Draft BDAR has been requested by Council to support the planning proposal. The preparation of this BDAR has been discussed with Council, and it was discussed that some aspect of assessment in accordance with the BAM will be deferred to the development assessment stage. This Draft BAR will indicate in specific locations where further study is required or where assessment is not in accordance with BAM.

One PCT was identified within the development footprint:

- PCT 277 – *Blakely's Red Gum - Yellow Box grassy tall woodland of the NSW South Western Slopes Bioregion*

PCT 277 corresponds with the threatened ecological community *White Box - Yellow Box - Blakely's Red Gum Grassy Woodland and Derived Native Grassland and White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland* listed as a critically endangered ecological community under the BC Act. However, it does not meet the EPBC Act definition for *White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland* due to the overall patch not containing at least 50% native groundcover species. The estimated native groundcover throughout the patch was <10%.

The highest condition areas of native plant community types were avoided, however, 1.42 ha of PCT 227 in a moderate condition, 0.28 ha of low to moderate condition and 15.3 ha of low condition will be impacted. In addition, 26 scattered trees, throughout the agricultural pasture, that have habitat features are required to be removed. However, this is a worst-case scenario assessment and it should be noted there are opportunities to retain some of these trees during the detailed design stage prior to submission of the development application. The planning proposal will enable future development that has the potential to require the retirement of 80 ecosystem credits.

Serious and Irreversible Impacts (SAIL) values have been considered as part of this assessment. PCT 227 is a SAIL candidate entity.

The Squirrel gilder (*Petaurus norfolcensis*) was recorded during surveys associated with patches of remnant vegetation of PCT 277 in low – mod condition state. One individual each was captured at two camera trap locations. Two fauna species had survey windows outside of the time of survey. Both *Phascogale tapoatafa* (Brush-tailed Phascogale) and *Tyto novaehollandiae* (Masked Owl) were assumed present for the purpose of this assessment and will be the subject of field survey at a later time.

- *Phascogale tapoatafa* (Brush-tailed Phascogale)
- *Tyto novaehollandiae* (Masked Owl)

The planning proposal will enable future development that has the potential to require the retirement of 620 candidate species credits. This is a worst-case scenario assessment for ecosystem and species credits for the proposal. The number of credits required is anticipated to be far less when species polygons are defined, and additional targeted surveys are completed.

Mitigation measures have been proposed to address impacts to retained native vegetation at the development footprint before, during and after construction.

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The Environmental Factor (TEF) 2020, *Preliminary Advice on Ecological Attributes present at 16 Lloyd Rd, Springvale, NSW 2650.*

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Appendix A: Definitions

Terminology	Definition
Biodiversity credit report	The report produced by the Credit Calculator that sets out the number and class of biodiversity credits required to offset the remaining adverse impacts on biodiversity values at a development footprint, or on land to be biodiversity certified, or that sets out the number and class of biodiversity credits that are created at a biodiversity stewardship site.
BioNet Atlas	The BioNet Atlas (formerly known as the NSW Wildlife Atlas) is the OEH database of flora and fauna records. The Atlas contains records of plants, mammals, birds, reptiles, amphibians, some fungi, some invertebrates (such as insects and snails) and some fish
Broad condition state:	Areas of the same PCT that are in relatively homogenous condition. Broad condition is used for stratifying areas of the same PCT into a vegetation zone for the purpose of determining the vegetation integrity score.
Connectivity	The measure of the degree to which an area(s) of native vegetation is linked with other areas of vegetation.
Credit Calculator	The computer program that provides decision support to assessors and proponents by applying the BAM, and which calculates the number and class of biodiversity credits required to offset the impacts of a development or created at a biodiversity stewardship site.
Development	Has the same meaning as development at section 4 of the EP&A Act, or an activity in Part 5 of the EP&A Act. It also includes development as defined in section 115T of the EP&A Act.
Development footprint	The area of land that is directly impacted on by a proposed development, including access roads, and areas used to store construction materials.
Development footprint	An area of land that is subject to a proposed development that is under the EP&A Act.
Ecosystem credits	A measurement of the value of EECs, CEECs and threatened species habitat for species that can be reliably predicted to occur with a PCT. Ecosystem credits measure the loss in biodiversity values at a development footprint and the gain in biodiversity values at a biodiversity stewardship site.
High threat exotic plant cover	Plant cover composed of vascular plants not native to Australia that if not controlled will invade and outcompete native plant species.
Hollow bearing tree	A living or dead tree that has at least one hollow. A tree is considered to contain a hollow if: (a) the entrance can be seen; (b) the minimum entrance width is at least 5 cm; (c) the hollow appears to have depth (i.e. you cannot see solid wood beyond the entrance); (d) the hollow is at least 1 m above the ground. Trees must be examined from all angles.
Important wetland	A wetland that is listed in the Directory of Important Wetlands of Australia (DIWA) and SEPP 14 Coastal Wetlands
Linear shaped development	Development that is generally narrow in width and extends across the landscape for a distance greater than 3.5 kilometres in length
Local population	The population that occurs in the subject land. In cases where multiple populations occur in the subject land or a population occupies part of the subject land, impacts on each subpopulation must be assessed separately.
Local wetland	Any wetland that is not identified as an important wetland (refer to definition of Important wetland).
Mitchell landscape	Landscapes with relatively homogeneous geomorphology, soils and broad vegetation types, mapped at a scale of 1:250,000.

Terminology	Definition
Multiple fragmentation impact development	Developments such as wind farms and coal seam gas extraction that require multiple extraction points (wells) or turbines and a network of associated development including roads, tracks, gathering systems/flow lines, transmission lines
Operational Manual	The Operational Manual published from time to time by OEH, which is a guide to assist assessors when using the BAM
Patch size	An area of intact native vegetation that: a) occurs on the development footprint or biodiversity stewardship site, and b) includes native vegetation that has a gap of less than 100 m from the next area of native vegetation (or ≤ 30 m for non-woody ecosystems). Patch size may extend onto adjoining land that is not part of the development footprint or stewardship site..
Proponent	A person who intends to apply for consent to carry out development or for approval for an activity.
Reference sites	The relatively unmodified sites that are assessed to obtain local benchmark information when benchmarks in the Vegetation Benchmarks Database are too broad or otherwise incorrect for the PCT and/or local situation. Benchmarks can also be obtained from published sources.
Regeneration	The proportion of over-storey species characteristic of the PCT that are naturally regenerating and have a diameter at breast height < 5 cm within a vegetation zone.
Remaining impact	An impact on biodiversity values after all reasonable measures have been taken to avoid and minimise the impacts of development. Under the BAM, an offset requirement is calculated for the remaining impacts on biodiversity values.
Retirement of credits	The purchase and retirement of biodiversity credits from an already-established biobank site or a biodiversity stewardship site secured by a biodiversity stewardship agreement.
Riparian buffer	Riparian buffers applied to water bodies in accordance with the BAM
Sensitive biodiversity values land map	Development within an area identified on the map requires assessment using the BAM.
Site attributes	The matters assessed to determine vegetation integrity. They include: native plant species richness, native over-storey cover, native mid-storey cover, native ground cover (grasses), native ground cover (shrubs), native ground cover (other), exotic plant cover (as a percentage of total ground and mid-storey cover), number of trees with hollows, proportion of over-storey species occurring as regeneration, and total length of fallen logs.
Site-based development	a development other than a linear shaped development, or a multiple fragmentation impact development
Species credits	The class of biodiversity credits created or required for the impact on threatened species that cannot be reliably predicted to use an area of land based on habitat surrogates. Species that require species credits are listed in the Threatened Biodiversity Data Collection.
Subject land	Is land to which the BAM is applied in Stage 1 to assess the biodiversity values of the land. It includes land that may be a development footprint, clearing site, proposed for biodiversity certification or land that is proposed for a biodiversity stewardship agreement.
Threatened Biodiversity Data Collection	Part of the BioNet database, published by OEH and accessible from the BioNet website.
Threatened species	Critically Endangered, Endangered or Vulnerable threatened species as defined by Schedule 1 of the BC Act, or any additional threatened species listed under Part 13 of the EPBC Act as Critically Endangered, Endangered or Vulnerable.

Terminology	Definition
Vegetation Benchmarks Database	A database of benchmarks for vegetation classes and some PCTs. The Vegetation Benchmarks Database is published by OEH and is part of the BioNet Vegetation Classification.
Vegetation zone	A relatively homogenous area of native vegetation on a development footprint, land to be biodiversity certified or a biodiversity stewardship site that is the same PCT and broad condition state.
Wetland	An area of land that is wet by surface water or ground water, or both, for long enough periods that the plants and animals in it are adapted to, and depend on, moist conditions for at least part of their life cycle. Wetlands may exhibit wet and dry phases and may be wet permanently, cyclically or intermittently with fresh, brackish or saline water
Woody native vegetation	Native vegetation that contains an over-storey and/or mid-storey that predominantly consists of trees and/or shrubs

Appendix B: Vegetation plot data

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Species	Common name	Exotic	High Threat	Plot 1	Plot 2	Plot 3	Plot 4	Plot 5	Plot 6	Plot 7	Plot 8						
<i>Acacia decurrens</i>	Black Wattle					0.1	1										
<i>Acetosella vulgaris</i>	Sheep Sorrel	*	1			15	1000	2	20	0.5	200	1	20	0.1	5		
<i>Anthoxanthum odoratum</i>	Sweet Vernal Grass	*						0.2	100								
<i>Arctotheca calendula</i>	Capeweed	*						0.5	500	1	500	3	500	15	300	25	1000
<i>Austrostipa scabra</i> subsp. <i>scabra</i>	Rough Speargrass					3	50	0.5	200							0.2	20
<i>Avena barbata</i>	Bearded Oats	*			0.1	5											
<i>Avena</i> spp.	Oats	*		0.1	5					1	200						
<i>Bromus catharticus</i>	Praire Grass	*		0.1	10											5	300
<i>Bromus diandrus</i>	Great Brome	*	1													0.5	50
<i>Brunonia australis</i>	Blue Pincushion																
<i>Bursaria spinosa</i> subsp. <i>spinosa</i>	Native Blackthorn																
<i>Centaurea</i> spp.	Thistle	*			0.1	50											
<i>Cerastium glomeratum</i>	Mouse-ear Chickweed	*														0.2	30
<i>Chenopodium album</i>	Fat Hen	*			0.1	10											
<i>Chenopodium murale</i>	Nettle-leaf Goosefoot	*														0.2	10
<i>Chloris truncata</i>	Windmill Grass																
<i>Cirsium vulgare</i>	Spear Thistle	*		0.1	1												
<i>Conyza bonariensis</i>	Flaxleaf Fleabane	*										0.1	5				
<i>Cynodon dactylon</i>	Common Couch																

Species	Common name	Exotic	High Threat	Plot 1		Plot 2		Plot 3		Plot 4		Plot 5		Plot 6		Plot 7		Plot 8	
<i>Dysphania pumilio</i>	Small Crumbweed																		
<i>Echium plantagineum</i>	Patterson's Curse	*		0.1	5	0.2	100	1	200	0.1	2	0.2	20	1	20	0.2	15		
<i>Ehrharta erecta</i>	Panic Veldtgrass	*	1															8	300
<i>Ehrharta longiflora</i>	Annual Veldtgrass	*				1	100												
<i>Eleocharis acuta</i>																			
<i>Eleocharis</i> spp.	Spike-rush, Spike-sedge																	0.1	1
<i>Eleusine indica</i>	Crowsfoot Grass	*		0.1	10														
<i>Eragrostis brownii</i>	Brown's Lovegrass																		
<i>Erodium botrys</i>	Long Storksbill	*								0.1	20					2	50	1	50
<i>Eucalyptus albens</i>	White Box											30	1			10	4		
<i>Eucalyptus blakelyi</i>	Blakely's Gum	Red								15	1								
<i>Eucalyptus camaldulensis</i>	River Red Gum							15	2										
<i>Eucalyptus maidenii</i>	Maiden's Gum									2	1								
<i>Eucalyptus melliodora</i>	Yellow Box													30	2			10	4
<i>Euchiton</i> spp.	A Cudweed									0.1	5								
<i>Galium aparine</i>	Goosegrass	*						0.2	50										
<i>Gazania linearis</i>		*																0.1	10
<i>Heliotropium europaeum</i>	Potato Weed	*		0.1	5														

Species	Common name	Exotic	High Threat	Plot 1	Plot 2	Plot 3	Plot 4	Plot 5	Plot 6	Plot 7	Plot 8					
<i>Hordeum</i> spp.	A Barley Grass	*					15	2000	20	2000	10	1000	10	1000	30	1500
<i>Hypericum perforatum</i>	St. Johns Wort	*	1				0.1	20								
<i>Hypochaeris glabra</i>	Smooth Catsear	*					0.2	800								
<i>Hypochaeris radicata</i>	Catsear	*		0.1	10	0.1	2	0.2	30	0.1	6		1	50		
<i>Juncus</i> spp.	A Rush						0.1	1							0.1	4
<i>Lactuca serriola</i> f. <i>integrifolia</i>		*			0.1	10									0.1	3
<i>Lepidium africanum</i>	Common Peppergrass	*											0.1	15		
<i>Lolium perenne</i>	Perennial Ryegrass	*			0.1	5	0.1	20	2	500	5	1000	30	2000		
<i>Lolium rigidum</i>	Wimmera Ryegrass	*											2	150	0.5	100
<i>Malva parviflora</i>	Small-flowered Mallow	*		0.2	100		0.2	20	3	200	20	500			2	150
<i>Marrubium vulgare</i>	White Horehound	*		0.1	1											
<i>Melaleuca</i> spp.						2	1									
<i>Modiola caroliniana</i>	Red-flowered Mallow	*					0.1	20								
<i>Oxalis exilis</i>						0.1	1	0.1	20							
<i>Panicum capillare</i> var. <i>capillare</i>	Witchgrass	*		0.1	10	0.1	20									
<i>Paspalidium distans</i>																
<i>Paspalum urvillei</i>	Vasey Grass	*			0.1	5	4	200								

Species	Common name	Exotic	High Threat	Plot 1	Plot 2	Plot 3	Plot 4	Plot 5	Plot 6	Plot 7	Plot 8
<i>Phalaris</i> spp.		*			0.1	1					
<i>Poa annua</i>	Winter Grass	*								1	200
<i>Polygonum aviculare</i>	Wireweed	*		0.2	50	0.1	10				
<i>Portulaca oleracea</i>	Pigweed										
<i>Pseudognaphalium luteoalbum</i>	Jersey Cudweed									0.1	2
<i>Romulea</i> spp.		*				0.3	100	0.3	500	0.2	100
<i>Rumex brownii</i>	Swamp Dock					0.1	6	0.1	10	0.1	5
<i>Rytidosperma</i> spp.								0.1	20		
<i>Solanum nigrum</i>	Black-berry Nightshade	*		0.1	50	0.2	20			0.1	2
<i>Sonchus oleraceus</i>	Common Sowthistle	*				0.1	1				0.5
<i>Taraxacum</i> spp.	Dandelion					0.1	3				
<i>Trifolium arvense</i>	Haresfoot Clover	*					5	1000			
<i>Trifolium repens</i>	White Clover	*						0.1	10	0.1	100
<i>Trifolium</i> spp.	A Clover	*				0.1	20				
<i>Trifolium subterraneum</i>	Subterranean Clover	*								1	30
<i>Triticum</i> spp.		*				35	2000	2	200	25	2000
<i>Urtica urens</i>	Small Nettle	*								20	600
<i>Vittadinia cuneata</i> var. <i>cuneata</i>	A Fuzzweed										0.1
<i>Vittadinia gracilis</i>	Woolly New Holland Daisy					0.1	2	0.1	10		2

Species	Common name	Exotic	High Threat	Plot 1	Plot 2	Plot 3	Plot 4	Plot 5	Plot 6	Plot 7	Plot 8
<i>Vulpia bromoides</i>	Squirrel Fesque	Tail *									0.5 200
<i>Xanthium</i> spp.		*		0.1	2						

Appendix C: Biodiversity Credit Reports

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