



Premise

CAERLEON MUDGE PTY LIMITED

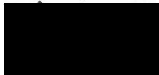
Caerleon Mudgee Subdivision – Stage 14

BIODIVERSITY DEVELOPMENT ASSESSMENT REPORT

Report No: 319171_BDAR_001



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22 March 2022

BAM CERTIFICATION
This report was prepared using Version 50 of BAM Credit Calculator 2020 and adhering to the requirements of the Biodiversity Assessment Method 2020.
This BDAR comprises BAM-C analyses; vegetation clearance covered by BAM-C case number 00031895/BAAS21027/22/00031896 (Revision 0), finalised 22/3/22.
Certified by: Sally Kirby (Assessor No: BAAS21027)
Signed: 
Date: 22/3/22

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EXECUTIVE SUMMARY

The Caerleon Stage 14 Subdivision

The Caerleon Stage 14 subdivision is located in the Mid-Western Regional Council Local Government Area (LGA), 2 km north-west of the township of Mudgee in the Central Tablelands of New South Wales (NSW). Caerleon Mudgee Pty Ltd is the owner of the Caerleon Stage 14 subdivision.

The proposed subdivision will result in the loss of 30.70 ha of agricultural land including 0.93 ha PCT 266 Woodland (Good Quality), 2.64 ha PCT 266 DNG (Good Quality), 5.29 ha PCT 266 DNG (Poor Quality), 0.64 ha PCT 281 Woodland (Moderate Quality), 20.39 ha of PCT 281 Exotic Grassland and 0.81 ha of non-vegetated land (farm dams and tracks).

The main elements proposed for the Stage 14 Caerleon subdivision include the following:

- Subdividing the land into 238 residential lots, 1 development lot (town centre), 3 water basin lots and 1 channel lot;
- Constructing access roads along the northern extent based on the adjacent approved development; and
- Supplying essential services (electricity, gas, water, sewerage) through the adjacent approved development.

Premise Australia Pty Ltd (Premise) have prepared this Biodiversity Development Assessment Report (BDAR) to assess the impact of the Stage 14 subdivision on biodiversity values, threatened species, threatened ecological communities and their habitats under the NSW *Biodiversity Conservation Act 2016* (BC Act) and the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act).

This BDAR has been prepared using Version 50 of the Biodiversity Assessment Method (BAM) 2020 under the *BC Act 2016*.

Subject Land

The Subject Land (30.70 ha) is dominated by exotic pasture associated with historical agricultural land use and four farm dams occur on the site. Native vegetation consists of woodland and areas dominated by native grasses derived from the original grassy woodland that would have occurred on the site pre-European settlement.

The Subject Land lies within Interim Biogeographic Regionalisation for Australia (IBRA) Bioregion: NSW South West Slopes Bioregion (Inland Slopes sub-region).

Methods

The BAM outlines the methodology that underpins the NSW Biodiversity Offset Scheme established under Part 6 of the BC Act. The BAM requires the use of an online program (the BAM Credit Calculator) to assess the biodiversity impacts and determine the biodiversity offset requirements for those impacts. Stage 1 summarises the biodiversity values of the Subject Land, and Stage 2 assesses potential impacts on biodiversity, describes impact avoidance and mitigation measures and determines offset requirements.

Native vegetation surveys were undertaken by Premise between 30 November to 2 December 2021 and 25 January 2022. Twelve BAM quadrats were undertaken to provide floristic and structural data, assess the conservation value of grasslands and calculate the Vegetation Integrity (VI) scores of each vegetation zone.

Native Vegetation

Remnants of two Plant Community Types (PCTs) occur on the Subject Land, namely:

- PCT266 – *White Box grassy woodland in the upper slopes sub-region of the NSW South Western Slopes Bioregion.*
- PCT 281 – *Rough-Barked Apple - red gum - Yellow Box woodland on alluvial clay to loam soils on valley flats in the northern NSW South Western Slopes Bioregion and Brigalow Belt South Bioregion.*

Native vegetation to be removed has been classified into five vegetation zones:

- White Box Woodland (PCT 266) in good condition – three patches (0.93 ha)
- Derived Native Grassland (PCT 266) in good condition – two patches (2.64 ha)
- Derived Native Grassland (PCT 266) in poor condition – one patch (5.29 ha)
- Rough-barked Apple Woodland (PCT 281) in moderate condition – one patch (0.64 ha)
- Exotic Grassland (PCT 281) in poor condition – one patch (20.39 ha)

The derived native grassland was assigned to PCT 266 as it is adjacent to remnant trees consistent with that vegetation community. The remnant woodland patches were assigned to either PCT 266 or PCT 281 based on species composition, landscape position and site characteristics. Exotic Grassland was also assigned to PCT 281 due to proximity to remnant trees characteristic with that vegetation community.

Sixteen trees were identified on the Subject Land, measured and assessed for habitat value, i.e. presence or absence of hollows.

There is 0.81 ha of non native vegetation on the site including tracks, four farm dams and one rack of solar panels.

Weeds

Nine introduced flora species recorded on the Subject Land are considered High Threat Exotics weed species by the DPIE (2018b); Browntown Bent (*Agrostis capillaris*), Greater Beggar's Ticks (*Bidens subalternans*), Saffron Thistle (*Carthamus lanatus*), Kikuyu Grass (*Cenchrus clandestinus*), St John's Wort (*Hypericum perforatum*), African Boxthorn (*Lycium ferocissimum*), Paspalum (*Paspalum dilatatum*), Ragwort (*Senecio jacobaea*) and Bathurst Burr (*Xanthium spinosum*). Two of these species (St John's Wort and African Boxthorn) are listed as Priority Weeds for Mid-Western Regional Council LGA under the NSW Biosecurity Act 2015 (DPI, 2021). African Boxthorn is also listed as Weed of National Significance as listed by the Australian Weeds Committee of the Australian Government (2021)

Fauna

Fauna surveys were undertaken by Premise using a combination of desktop searches and targeted surveys. Targeted fauna surveys were conducted between 30 November and 2 December 2021 according to State and Commonwealth Guidelines (i.e. timing and duration of surveys, methods to locate species and potential habitat).

Thirteen birds and one frog species were recorded during the fauna surveys. No threatened species were identified during fauna surveys.

Threatened Species

Database searches for threatened species identified a total of 12 threatened flora and 58 threatened fauna species that could potentially occur on the Subject Land. Of these, five flora and 24 fauna species are considered likely to occur based on habitat constraints and distribution.

The BAM Credit Calculator considers two categories of threatened species:

- Ecosystem Credit Species (predicted to be present based on the PCTs present).
- Species Credit Species (cannot be reliably predicted based on PCT owing to specific habitat requirements).

Forty-four ecosystem credit species were identified in association with PCTs 266 and 281. Thirty-eight potentially occurring Species Credit Species were identified; 37 were found to be absent and one (Regent Honeyeater) was assumed present as 0.17 ha of the Subject Land is mapped as an Important Area for this species.

The only threatened fauna species assessed in the BAM Credit Calculator was the Regent Honeyeater.

PCT 266 forms part of the *White Box - Yellow Box – Blakely's Red Gum Grassy Woodland and Derived Native Grassland* Critically Endangered Ecological Community, commonly known as Box-Gum Woodland. Box-Gum Woodland is listed under both the BC Act and the EPBC Act, however the woodland on the Subject Land does not meet the criteria for listing under the EPBC Act (DEH, 2006).

Serious and Irreversible Impacts

One candidate threatened entity (the Critically Endangered Regent Honeyeater) and one critically endangered ecological community (Box-Gum Woodland) were considered to potentially be at risk of SAI. Required information is provided to assist the decision-maker to determine whether the Stage 14 subdivision would constitute a SAI. The proposed activity will require the removal of 0.17 ha of Important Area for the Regent Honeyeater as mapped by the Biodiversity, Conservation and Science Directorate (DPIE, 2020c). It will also require the removal of 1.57 ha of Box-Gum Woodland CEEC. It is considered that the proposed activity would not contribute significantly to the risk of the Critically Endangered Regent Honeyeater or CEEC becoming locally or regionally extinct and it is concluded that Serious and Irreversible Impacts on the species and CEEC would not occur.

Matters of National Environmental Significance (MNES)

One fauna species, the Regent Honeyeater, listed as Critically Endangered under the EPBC Act is considered to have a low probability of utilising the site and would not be significantly impacted by the Stage 14 subdivision. Similarly, remnants on the Subject Land of the Commonwealth listed Box-Gum Woodland CEEC do not meet the criteria for protection under the EPBC Act. Consequently, referral of the Stage 14 subdivision to the Commonwealth is not considered necessary.

Koalas

The Subject Land is zoned R1 General Residential. The site occurs in Mudgee within the Mid-Western Regional Council LGA which is considered part of a Koala management area as regulated by the State Environmental Planning Policy (Koala Habitat Protection) 2021. Fifteen trees identified as Koala feed tree species listed in SEPP44 occur on the Subject Land, species include White Box (*Eucalyptus albens*), Yellow Box (*Eucalyptus melliodora*) and Blakely's Red Gum (*Eucalyptus blakelyi*). This area is considered as potential Koala habitat. Koala surveys conducted by Premise did not locate any Koalas or Koala signs. There are five records of Koalas within a 5 km radius of the Subject Land, however the Subject Land is not considered Core Koala Habitat as evidence of a resident population (including breeding females) was absent during targeted searches and the site is considered unsuitable habitat due to historical clearing (ALA, 2021). No Koala Management Plan is necessary for the Caerleon Stage 14 subdivision.

Measures to Avoid and Minimise Impacts

The Caerleon Stage 14 subdivision Subject Land cannot be relocated, as proposed construction works are associated with the existing and proposed subdivision layouts in the surrounding area. Nevertheless, opportunities to avoid and minimise impacts were considered during the planning stage of the Stage 14 subdivision. The Subject Land has been designed to occur on land which is lacking biodiversity values due to a lack of vegetation from a long history of clearing, livestock grazing, cropping and other agricultural practices. Exotic grassland in poor condition occurs across most of the Subject Land with higher quality derived native grassland occurring across the hillslopes along the central and south-western extents. The proposed subdivision avoids good quality native vegetation within the larger remnant woodland directly north of the site, as well as good quality derived native grassland south-west of the site.

Prescribed Biodiversity Impacts

One prescribed impact (loss of non-native vegetation) has been identified as relevant for threatened species on the Subject Land. This includes the removal of 3.32 ha of exotic grassland (PCT 281). Assessment of the significance of the Caerleon Stage 13 subdivision impacts on candidate species concluded that the loss of this potential foraging habitat for threatened Powerful Owl and Masked Owl are unlikely to be significant.

There are no identified wildlife corridors or migratory flight paths traversing the Subject Land. The Stage 14 subdivision will not impact movement of threatened species that maintains their lifecycle, nor will it impact water quality, water bodies or hydrological processes that sustain threatened species or threatened ecological communities. There will be no impact of wind turbines or material potential for increased vehicle strikes.

Direct Impacts

The Stage 13 subdivision will result in the loss of 5.79 ha of native vegetation and habitat on the Subject Land, including the removal of five paddock trees: two Yellow Box (*Eucalyptus melliodora*), two Blakely's Red Gum (*E. blakelyi*) and one White Box (*E. albens*) tree.

Indirect Impacts

Indirect impacts of the Caerleon Stage 13 subdivision would include the temporary disruption to adjacent habitat during construction associated with noise, dust and light. There is also a risk of increased pressure on food and shelter resources in adjacent habitat areas as wildlife are displaced when vegetation is removed from the Subject Land. Logs and felled trees from the Subject Land will be relocated to adjacent woodland areas as supplement habitat to minimise this indirect impact.

Offset Obligation

Caerleon Mudgees Pty Ltd is committed to satisfying the biodiversity credit requirements using offset mechanisms allowed by the NSW Biodiversity Offsets Scheme (i.e. contribution to the Biodiversity Trust Fund administered by the NSW Biodiversity Conservation Trust, purchase of existing credits on the market, funding of a biodiversity conservation action, retirement of biodiversity credits and/or mine site ecological rehabilitation).

1. INTRODUCTION TO THE PROPOSAL AND ASSESSMENT TEAM

Premise Australia (Premise) were engaged by Caerleon Mudgee Pty Ltd in November 2021 to assess the potential environmental impact associated with the Stage 14 development of a 238 lot residential subdivision on Lot 418 DP1272614. The Stage 14 subdivision is approximately 2 kilometres (km) north-west of Mudgee, in the Central Tablelands of New South Wales (NSW). Caerleon Mudgee Pty Ltd is the owner of the Caerleon Stage 14 subdivision.

The proposed subdivision will result in the loss of 30.70 ha of agricultural land including 0.93 ha PCT 266 Woodland (Good Quality), 2.64 ha PCT 266 DNG (Good Quality), 5.29 ha PCT 266 DNG (Poor Quality), 0.64 ha PCT 281 Woodland (Moderate Quality), 20.39 ha of PCT 281 Exotic Grassland and 0.81 ha of non-vegetated land (farm dams and tracks). The clearing of 30.70 ha exceeds the maximum clearing threshold (0.25 ha) for land containing a minimum lot size of 450m². Therefore, the Biodiversity Offset Scheme (BOS) applies to the Caerleon Stage 14 subdivision and a Biodiversity Development Assessment Report (BDAR) must be prepared by an accredited assessor using the Biodiversity Assessment Method (BAM) to assess the impact of the proposal on biodiversity values.

Premise Australia Pty Ltd (Premise) have prepared this BDAR to assess the impact of the Stage 14 subdivision on biodiversity values, threatened species, threatened ecological communities and their habitats under the *Biodiversity Conservation Act 2016* (BC Act) and the Commonwealth *Environmental Protection and Biodiversity Conservation Act 2000* (EPBC Act).

Accredited assessor Sally Kirby (BAAS21027) supervised preparation of this BDAR using Version 50 of the BAM Credit Calculator (DPIE, 2020b).

1.1 Brief description of the proposal

The main elements proposed for the Stage 14 Caerleon subdivision include the following:

- Subdividing the land into 238 residential lots, 1 development lot (town centre), 1 aged care facility lot, 3 water basin lots and 1 channel lot;
- Constructing access roads along the northern extent based on the adjacent approved development; and
- Supplying essential services (electricity, gas, water, sewerage) through the adjacent approved development.

1.2 Subject Land

The Caerleon Stage 14 subdivision is located in the Mid-Western Regional Council Local Government Area (LGA), 2 km north-west of the township of Mudgee (Figure 1. Regional Location **Figure 1**). The development footprint (Subject Land) for the subdivision is shown in **Figure 2**. The Subject Land is part of Lot 418 DP1272614.

1.3 General Description of Subject Land

The Subject Land (30.70 ha) is dominated by exotic pasture associated with historical agricultural land use and four farm dams occur on the site. Native vegetation consists of woodland and areas dominated by native grasses derived from the original grassy woodland that would have occurred on the site pre-European settlement.

Figure 1. Regional Location

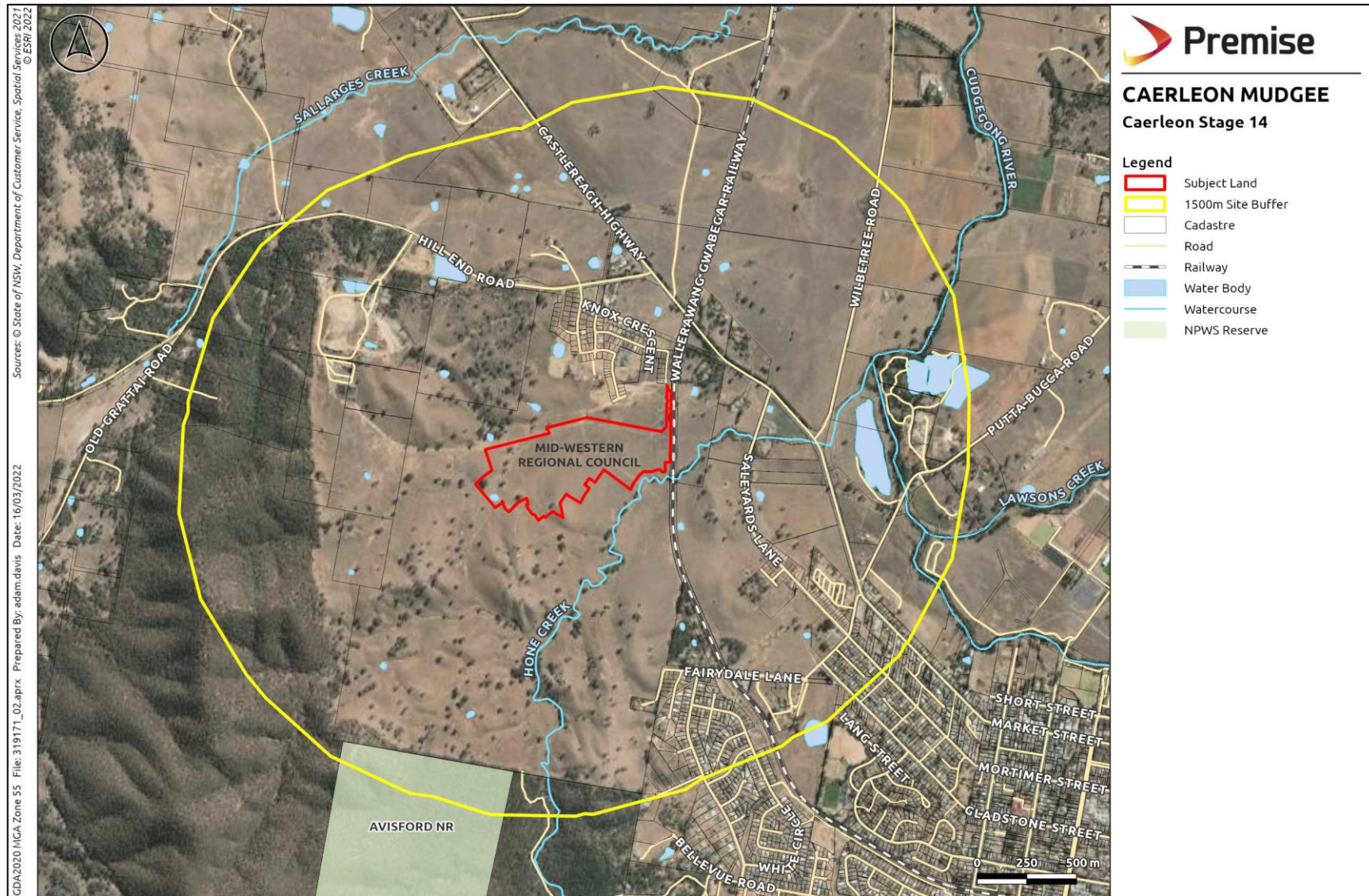
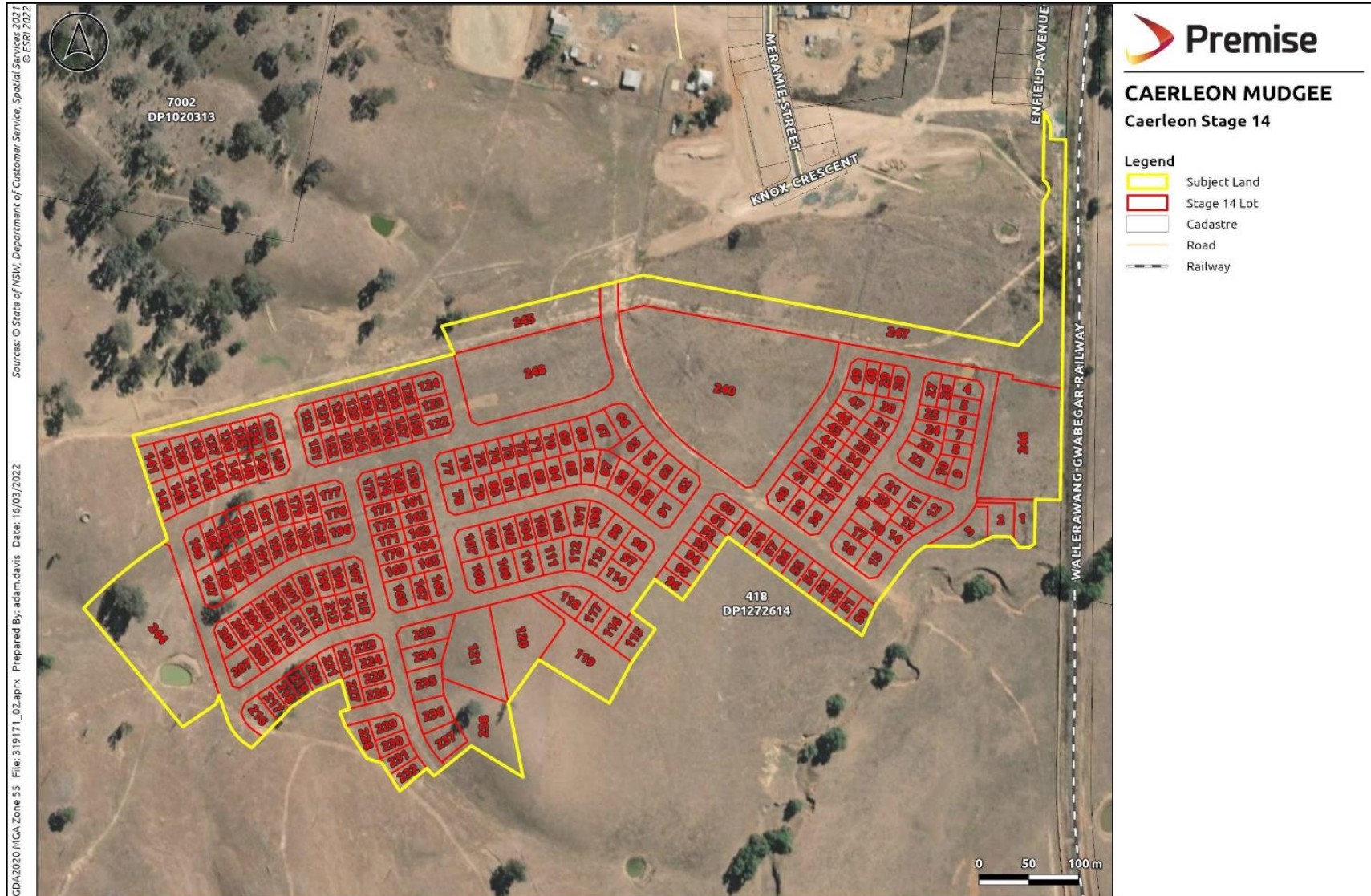


Figure 2. Subject Land and Proposed Subdivision Layout



1.4 BDAR Structure

This Biodiversity Development Assessment Report (BDAR) has been prepared in accordance with BAM 2020 and comprises two stages:

Stage 1 – assessment of the biodiversity values of the Subject Land; and

Stage 2 – impact assessment (biodiversity and prescribed impacts).

The Structure of the BDAR is summarised in **Table 1**.

Table 1. Report Structure

Section Reference	BAM Section	Description
1, 1.1, 1.2, 1.3	2	Stage 1: Introduction, planning pathway, description of proposal, subject land boundary and construction footprint.
2, 3.1, 3.2	3	Site context, landscape features, native vegetation cover
3.2	4	Assessing native vegetation, threatened ecological communities and vegetation integrity
3.2, 3.3, 3.4	5	Assessing habitat suitability for threatened species, ecosystem credit species, species credit species and dual credit species
3.5	6	Prescribed additional biodiversity impacts
4.1, 4.2	7	Stage 2: Impact assessment (biodiversity values and prescribed impacts) avoiding or minimising direct and indirect, prescribed impacts
4.2, 4.3	8	Assessing direct and indirect, prescribed impacts, mitigation and management of impacts, adaptive management for uncertain biodiversity impacts, biodiversity credits to mitigate or offset indirect or prescribed impacts
4.4	9	Serious and irreversible impacts, offset requirements, impacts that do not need further assessment
4.5	10	Offset requirements for direct impacts, ecosystem and species credits.

1.5 Project personnel

The BDAR was prepared by appropriately qualified and experienced professionals (**Table 2**).

Table 2. Premise Project Team

Name	Position	CV details	Role in this ecology report and experience
Dr Colin Bower BSc, PhD,	Principal Ecologist	40 years experience in biodiversity survey and assessment. BAM accredited, recognised expert in native flora identification, published numerous scientific papers and contributed	Role: Oversee process, peer review, professional advice.

Name	Position	CV details	Role in this ecology report and experience
Accredited BAM assessor No: BAAS18048		to development of NSW Vegetation Classification System.	
Sally Kirby BSc M. Env Studies Accredited BAM Assessor No: BAAS21027	Senior Ecologist	20 years experience in natural resource management, impact assessment and community engagement. Skills in terrestrial and aquatic habitat survey and assessment.	Role: Oversee BAM project inputs, BAM calculations, Project manager.
Isobel Colson BSc MSc	Senior Ecologist	6 years experience in natural resource management, extension and project management. Skills in GIS, vegetation identification and fungi.	Role: Vegetation surveys, reporting.
Michelle Lindsay BSc Biodiversity and Conservation	Ecologist	Graduate ecologist with one year experience with Premise collecting and collating data, database searches and report preparation.	Role: Vegetation surveys, data management, input, collation, database searches, reporting.
Adam Davis	Spatial Analyst	Civil designer with 14 years experience consulting in multidisciplinary organisations. Skills in spatial data management, Geographic Information Systems, mapping, constraints analysis.	Role: Spatial data management, produce figures, calculations for the BDAR.

1.6 Sources of Information used in Assessment

Datasets used to prepare this BDAR are referenced in **Table 3** and **Table 4**.

1.6.1 SPATIAL DATASETS AND WEBSITES

Table 3. Spatial Data used in this report

GIS layer name	Reference
IBRA bioregions and Subregions	https://www.seed.nsw.gov.au/
NSW landscape regions	https://www.seed.nsw.gov.au/
Rivers and streams	https://www.industry.nsw.gov.au/water/licensing-trade/hydroline-spatial-data
Wetlands	https://pmst.awe.gov.au/
Waterways	https://www.dpi.nsw.gov.au/about-us/research-development/spatial-data-portal
Key Fish Habitat	https://maps.six.nsw.gov.au/

Connectivity of different areas of habitat	https://www.seed.nsw.gov.au/
Native Vegetation Extent	https://www.seed.nsw.gov.au/

Table 4. Websites and links to documents used in this report

Title	Web address
Biodiversity	
Biodiversity Assessment Methodology (OEH, 2020)	https://www.environment.nsw.gov.au/-/media/OEH/Corporate-Site/Documents/Animals-and-plants/Biodiversity/biodiversity-assessment-method-2020-200438.pdf
BAM Credit Calculator	https://www.lmbc.nsw.gov.au/bamcalc
Threatened Biodiversity Survey and Assessment Guidelines for Developments and Activities – Working Draft (DEC, 2004)	https://www.environment.nsw.gov.au/-/media/OEH/Corporate-Site/Documents/Animals-and-plants/Threatened-species/draft-threatened-biodiversity-survey-guide.pdf
Surveying threatened plants and their habitats NSW Survey Guide for the BAM (DPIE, 2020)	https://www.environment.nsw.gov.au/-/media/OEH/Corporate-Site/Documents/Animals-and-plants/Biodiversity/surveying-threatened-plants-and-habitats-nsw-survey-guide-biodiversity-assessment-method-200146.pdf
Threatened Biodiversity profile search (OEH)	https://www.environment.nsw.gov.au/threatenedspeciesapp/
NSW BioNet Atlas	https://www.environment.nsw.gov.au/atlaspublicapp/UI_Modules/ATLAS / AtlasSearch.aspx
Vegetation Classification System (requires login)	https://www.environment.nsw.gov.au/NSWVCA20PRapp/LoginPR.aspx
Threatened Biodiversity Profile Data Collection (requires login)	https://www.environment.nsw.gov.au/AtlasApp/UI_Modules/TSM /Default.aspx?a=1
PlantNET	https://plantnet.rbgsyd.nsw.gov.au/floraonline.htm
Threatened Species Test of Significance Guidelines (OEH, 2018)	https://www.environment.nsw.gov.au/-/media/OEH/Corporate-Site/Documents/Animals-and-plants/Threatened-species/threatened-species-test-significance-guidelines-170634.pdf
Significant Impact Guidelines 1.1 – Matters of National Environmental Significance (Australian Government, 2013).	https://www.environment.gov.au/system/files/resources/42f84df4-720b-4dcf-b262-48679a3aba58/files/nes-guidelines_1.pdf
Guidance to assist a decision maker to determine a serious and irreversible impact (DPIE, 2019)	https://www.environment.nsw.gov.au/-/media/OEH/Corporate-Site/Documents/Animals-and-plants/Biodiversity/guidance-decision-makers-determine-serious-irreversible-impact-190511.pdf

2. LAND CATEGORIES ON THE SUBJECT LAND

Native vegetation on rural land in NSW is managed under the Land Management Framework according to categories determined by Section 60H of the *Local Land Services Act, 2013* (LLS Act). Where the LLS Act applies, land can be classified as:

- Category 1 – exempt land, land that is devoid of native vegetation, or is native vegetation that has regenerated on land that was lawfully cleared prior to 1990;
- Category 2 – regulated land, native vegetation that may be cleared with authorisation from Local Land Services;
- Category 2 – vulnerable regulated land, applies to steep or erodible land, riparian areas or special category land; or
- Category 2 – sensitive regulated land, for environmentally sensitive areas.

The Subject Land is 33.70 ha and zoned as land excluded from the *Local Land Services Act 2013* (LLS Act). Therefore, the LLS Act does not apply (OEH, 2017).

3. STAGE 1 – BIODIVERSITY ASSESSMENT

Stage 1 of the biodiversity assessment summarises the biodiversity values of the Subject Land that are inputs into the BAM Credit Calculator.

3.1 The Biodiversity Assessment Method

The assessment of impacts on biodiversity is conducted in accordance with the BAM (DPIE, 2020a) established under the BC Act. The BAM outlines the methods that underpin the NSW Biodiversity Offset Scheme (BOS) established under Part 6 of the BC Act.

The BAM (DPIE, 2020a) requires the use of an online program (calculator) to assess biodiversity impacts and determine the biodiversity offset requirements for those impacts. Version 1.4.0.00 BAM data last updated 24/11/2021 (version 50) of the Biodiversity Assessment Method Calculator (BAM-C or the Credit Calculator) was used for this assessment.

As specified by the BAM, two stages of assessment are outlined in this report:

- Stage 1 summarises the biodiversity values of the development footprint that are entered into the Credit Calculator (e.g. landscape features, native vegetation and threatened species); and
- Stage 2 assesses potential impacts on biodiversity, describe impact avoidance and mitigation measures and determine offset requirements.

3.1.1 REGIONAL SETTING

The Subject Land is located approximately 2 km north-west of Mudgee in Central Western NSW, within the following regions:

- Mid-Western Regional Council Local Government Area (LGA);
- Goonoo Slopes, Cudgegong Channels and Floodplains, and Gulgong Ranges BioNet NSW Landscapes (**Table 5** and **Figure 3**); and

- NSW South West Slopes Bioregion (Inland Slopes sub-region) of the Interim Biogeographic Regionalisation for Australia (IBRA) (Thackway and Cresswell, 1995).

Table 5. BioNet NSW Landscapes Located within the Subject Land

Landscape Name	Percentage Cleared Estimate¹	Area (ha)	Percentage (%) of Subject Land Covered by Landscape
Goonoo Slopes	66	7.89	26
Cudgegong Channels and Floodplains	97	13.40	44
Gulgong Ranges	81	9.40	30

1 Sourced from the 'Over-cleared Landscapes Database' within the BioNet Vegetation Classification Database (DPIE, 2021a).

Figure 3. Landscape Features (Map 1 of 2)

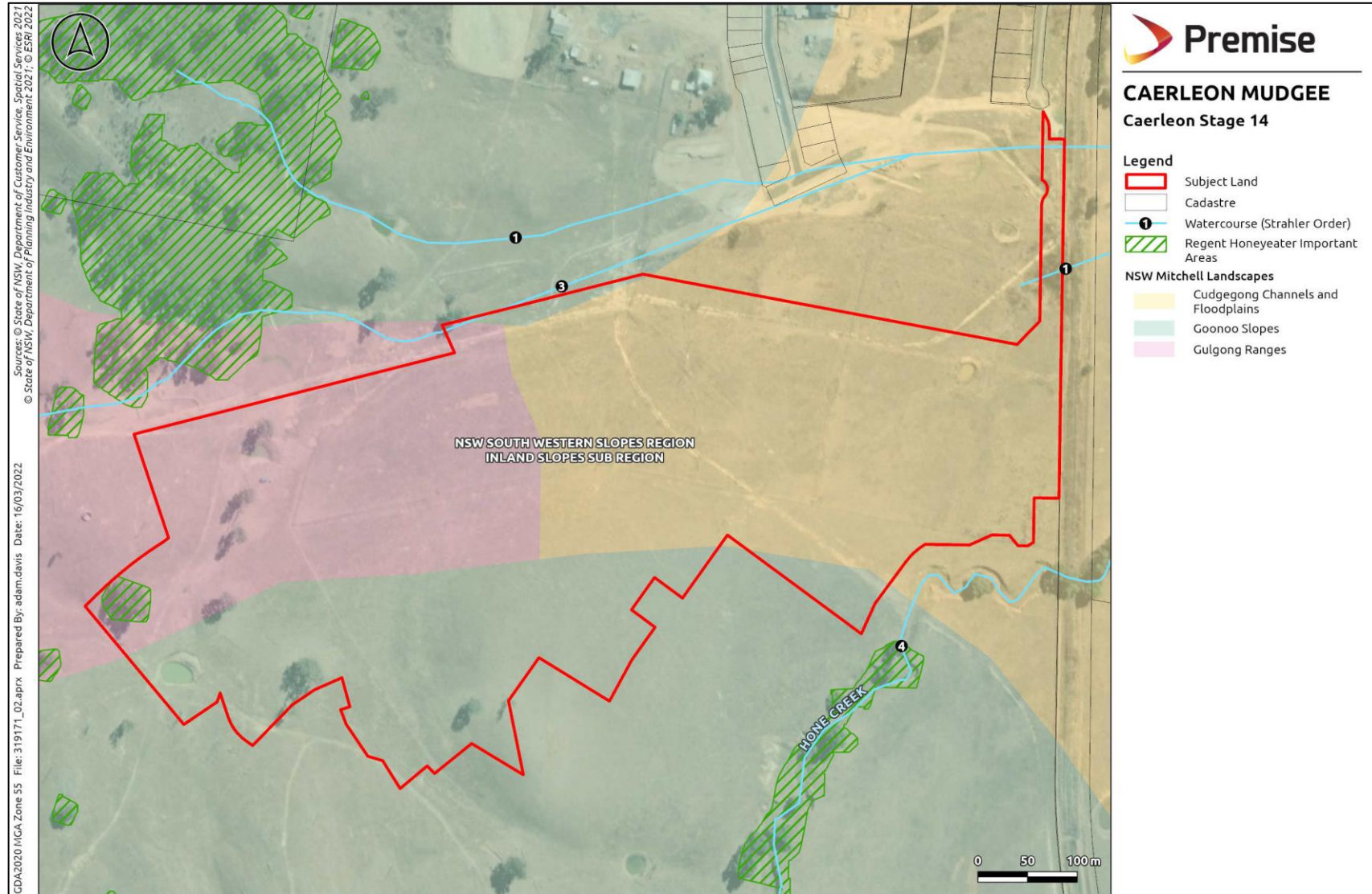
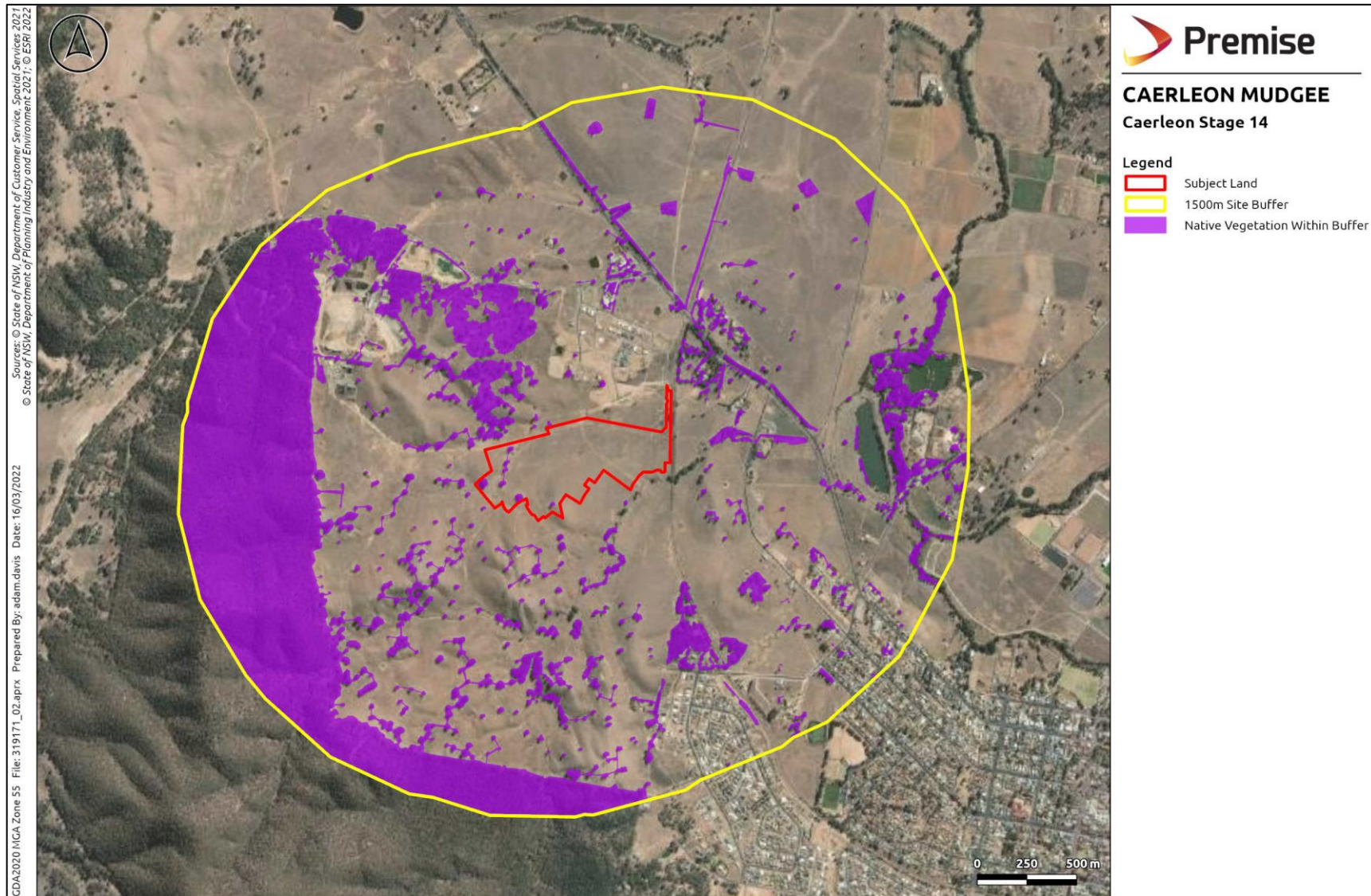


Figure 4. Landscape Features (Map 2 of 2)



3.1.2 LANDSCAPE FEATURES

3.1.2.1 Geology and Soils

The Subject Land is generally undulating with flat areas across the northern and eastern extents. The site is almost equally divided between the Mullamuddy Creek Soil Landscape in the west and the Craigmores Soil Landscape in the east (DPIE, 2021e). Soils in the Mullamuddy Creek Soil Landscape are derived from felspathic arkose, shale, greywacke conglomerate, tuff, conglomerate, sandstone and limestone parent rock. Soils are generally low to moderate fertility and occur on undulating low hills and steeper footslopes. Non-calci Brown Soils occur on upper slopes, while Yellow Podzolic Soils occur on mid to lower slopes. Non-calci Brown Soils are dull reddish-brown fine clay loams with reddish-brown light-medium clay subsoils. These soils are hardsetting, moderately well-drained, slightly acidic to neutral (pH 6.5-7) with moderate fertility, low erodibility and low salinity. In contrast, Yellow Podzolic Soils in the A1 horizon are hardsetting, dark brown loam fine sands, while the A2 horizon contains greyish-yellow brown gritty sandy loams. Subsoils in this landscape are dull yellowish-orange light medium clays. These soils are hardsetting, imperfectly drained, slightly acidic to neutral (pH 7) with low fertility, low-moderate erodibility and low salinity. Comparatively, the Craigmores Soil Landscape is derived from metasediments of the Capertee Rise and include quaternary alluvium and eluvium, sand, silt, clay and gravel as parent material. This soil landscape also includes Non-Calci Brown Soils, as well as Red Earths. Non-calci brown soils are dark, reddish-brown fine sandy loams occurring on alluvial terraces to a depth of 25 cm. They are hardsetting, moderately well drained, slightly acidic soils (pH 6.5) with moderate to high fertility, low erodibility and salinity. Red Earths are brown loams and fine sands with reddish-brown sandy clay loam subsoil. These soils also occur on alluvial terraces, are hardsetting, moderately well drained and slightly acidic with moderate to high water holding capacity, and low erodibility and salinity.

3.1.2.2 Climate and Elevation

The Subject Land ranges from 456 metres (m) Australian Height Datum (AHD) at the most northerly extent of the site (access road) to 470 m AHD in the south-eastern corner of the Subject Land.

The closest Bureau of Meteorology (BOM) station with long term climate data is the Mudgee (George Street) (062021) weather station (MWS) with data since 1870 (BOM, 2021). It should be noted that the elevation of the OAI weather station is 454 m, slightly lower than the Subject Land. Average annual rainfall at MWS is high by Australian standards at 669.5 millimetres (mm). Mean monthly rainfall is spread throughout the year with peaks during summer storms, reaching maximum rainfall in January (67.7 mm) and minimum rainfall in April (43.8 mm). Temperatures are generally mild with cold winters ranging between 1.3-14.4 degree lows, to maximum 15.5-31 degrees in summer.

3.1.2.3 Rivers and Streams, karst, caves, crevices, rocks and other geological features

Four farm dams occur on the Subject Land. Hone Creek (a tributary of Cudgegong River) occurs outside the Subject Land along the south-eastern extent of the site, while the Cudgegong River is approximately 1 km east of the Subject Land.

Karst, caves and crevices are absent from the Subject Land and surrounding landscape. While surface rocks and partially-buried rocks occur in low quantities in two locations across the southern extent of the Subject Land. These areas include the main southern central hill (PCT 266 DNG Good) and derived grassland (PCT 266 DNG Moderate)

3.1.2.4 Native Vegetation Extent and Habitat Connectivity

The Subject Land is located in a highly cleared agricultural region. Native vegetation remnants exist in the landscape around the Subject Land as scattered isolated paddock trees and corridors along Castlereagh Highway, Hone Creek and the Cudgegong River. The Subject Land is also 1 km east of a large, mountainous woodland patch which includes Mount Misery and Avisford Nature Reserve. Connectivity between this large patch and the Subject Land occurs through scattered paddock trees.

The remnant patches of native vegetation on the Subject Land vary in size and are isolated from each other. The Subject Land is bordered by agricultural land with residential land bordering the north-east and Hone Creek bordering the south-easterly extent. Native vegetation remnants on the Subject Land generally lack connectivity in the landscape as they are >50 m from the closest scattered tree.

The 1.5 km buffer zone around the Subject Land encompasses 1,138.95 ha, of which 283.9 ha, or 25 per cent (%) is considered native vegetation, including approximately 261 ha of remnant native woodland and 23 ha of smaller remnant woodland patches and isolated paddock trees. The remainder of the buffer zone is made up of urban areas (105 ha or approximately 9 %) and mixed grassland (750 ha or approximately 67 %), of which a large proportion is likely to be modified pastures due to the locality in an agricultural landscape (**Figure 4**).

3.1.2.5 Areas of Outstanding Biodiversity Value

There are no Areas of Outstanding Biodiversity Values on the Subject Land. Biodiversity values such as protected riparian land are shown on **Figure 3** and **Figure 4**.

3.1.2.6 History of Disturbance

The Caerleon Stage 14 subdivision occurs on land which is the ancestral country of the Wiradjuri nation. The land was used for agricultural purposes prior to the development of vineyards in the 1850s. Mudgee has since become the third largest grape-producing region in NSW with over 40 vineyards. The Subject Land is surrounded by agricultural land, predominantly sheep and cattle grazing. The original vegetation on the Subject Land would have been grassy woodlands, most of which was originally cleared for grazing and cropping, and later vineyards.

3.2 Native vegetation

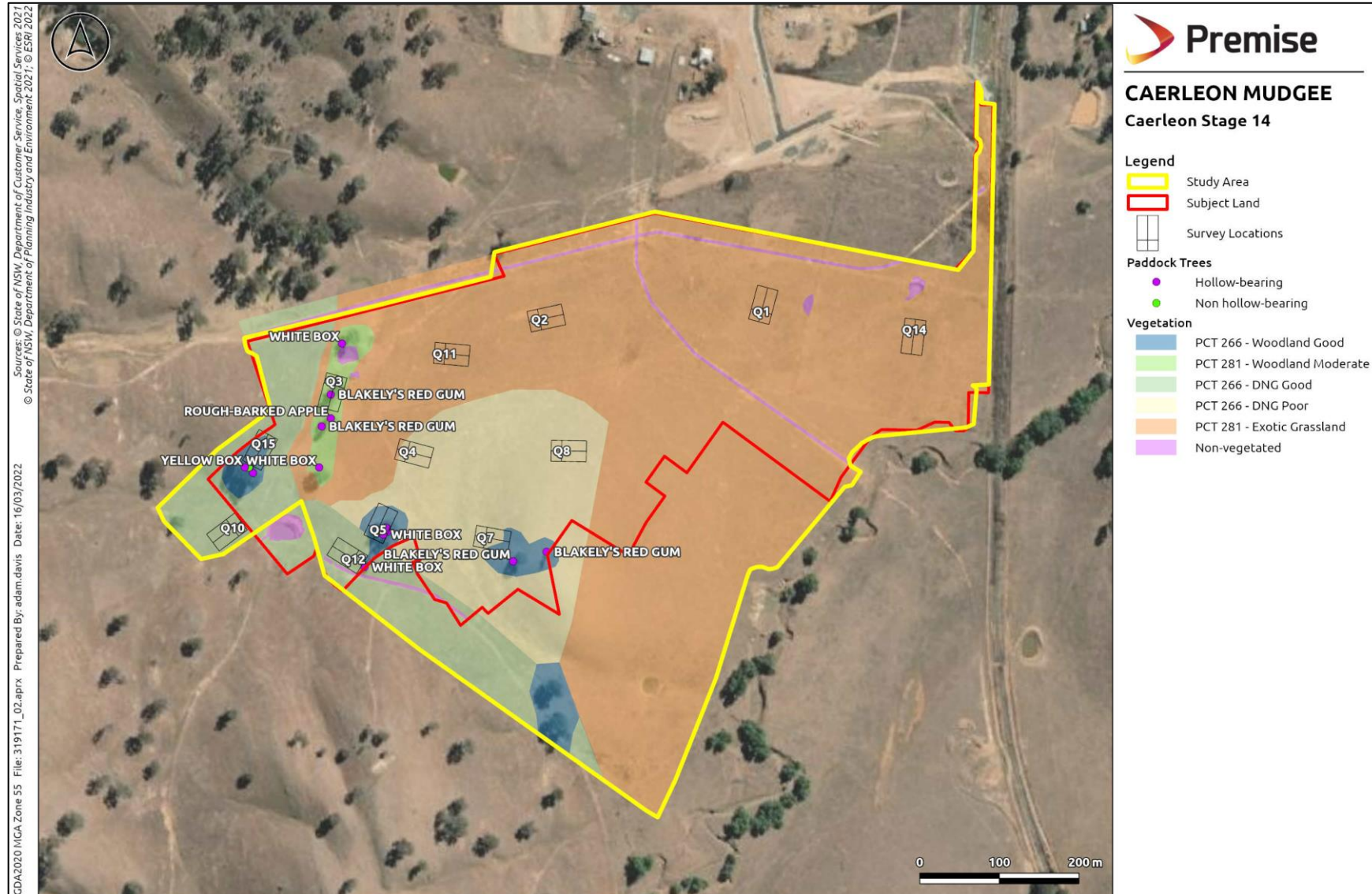
Native vegetation considered in this assessment includes remnant native woodland and derived native grassland. (**Table 6**).

Vegetation surveys were carried out on 30 November to 2 December 2021 and 25 January 2022. Vegetation sampling included:

- Twelve BAM compliant quadrats carried out; nine between 30 November to 2 December 2021, and four on 25 January 2022 (**Figure 5**).
- Scattered tree assessments carried out on 30 November to 2 December 2021 and 25 January 2022.

BAM Quadrats were undertaken in native vegetation remnants to provide floristic and structural data, as well as to calculate the Vegetation Integrity (VI) score at each location. A full species list from each sampling location is included as **Appendix A**.

Figure 5. Native Vegetation Survey Locations



3.2.1 PLANT COMMUNITY TYPES

The original pre-European tree cover on the Subject Land would have comprised Box-Gum Woodland and associated native grasslands. State Vegetation Type Map: Central Tablelands Region Version 0.1. VIS_ID 4778 mapped the vast majority of the Subject Land as non-native with the north-westerly corner mapped as PCT 796 Derived Grassland of the NSW South Western Slopes. During flora surveys it was determined that most native derived grassland on the Subject Land is attributed to PCT 281, with areas on hillslopes attributed to PCT 266. Remnant woodland patches were also attributed to either PCT 281 or PCT 266 by comparing vegetation identified on the Subject Land to the vegetation community details and scientific descriptions for the relevant PCTs using the BioNet Vegetation Classification System (DPIE, 2021b). PCTs identified as present on the Subject Land are listed in **Table 6** and justification for the identification of each PCTs is provided in sections 3.2.2.1 and 3.2.2.2. The distribution of patches of connected native vegetation associated with each PCT is shown on **Figure 5**.

Table 6. Plant Community Types and Vegetation Mapping on the Subject Land

Plant Community Types		Condition	Comments	Area (ha)
Number	Common Name			
266	White Box Woodland	Good	Remnant woodland dominated by White Box (<i>Eucalyptus albens</i>) and Yellow Box (<i>E. melliodora</i>) with a mixed understorey.	0.93
266	Derived Native Grassland	Good	Native grassland near White Box and Yellow Box trees dominated by Wheatgrass (<i>Anthosachne scabra</i>), Western Rat-tail Grass (<i>Sporobolus creber</i>) and Speargrass (<i>Austrostipa puberula</i>).	2.64
266	Derived Native Grassland	Poor	Mixed grassland near White Box trees dominated by the native grasses Western Rat-tail Grass (<i>Sporobolus creber</i>), Weeping Lovegrass (<i>Eragrostis parviflora</i>), Brown's Lovegrass (<i>Eragrostis brownii</i>) and Common Couch (<i>Cynodon dactylon</i>). The area also contains a high exotic component dominated by Wimmera Ryegrass (<i>Lolium rigidum</i>) and Soft Brome (<i>Bromus hordeaceus</i>).	5.29
281	Rough-Barked Apple - red gum - Yellow Box woodland	Moderate	Remnant woodland containing White Box (<i>Eucalyptus albens</i>), Blakely's Red Gum (<i>E. blakelyi</i>) and Rough-barked Apple (<i>Angophora floribunda</i>) with a predominantly exotic understorey.	0.64
281	Exotic Grassland	Poor	Mixed native and exotic grassland including the natives Common Couch (<i>Cynodon dactylon</i>) and Windmill Grass (<i>Chloris truncata</i>), and the exotics Wimmera Ryegrass (<i>Lolium rigidum</i>) and Soft Brome (<i>Bromus hordeaceus</i>).	20.39

3.2.2 VEGETATION COMMUNITY DESCRIPTIONS

Sections 3.2.2.1 and 3.2.2.2 provide descriptions of the PCTs on the Subject Land based on field sampling. The descriptions also include justification for the selection of PCTs for the vegetation on the Subject Land.

3.2.2.1 PCT 266 – White Box Woodland (Good)

Description:	Small remnant patches of White Box, Yellow Box and Blakely's Red Gum on hillslopes with exotic-dominated groundcover.
Samples:	Q5 and Q15
Trees:	The dominant species is White Box (<i>Eucalyptus albens</i>) with the most westerly patch containing Yellow Box (<i>E. melliodora</i>)
Shrubs:	Shrubs are absent from the vegetation community
Vines / Creepers:	Vines / creeper are absent from the vegetation community
Ground Covers:	The ground layer is heavily dominated by exotic grasses and forbs such as Blue Couch (<i>Cynodon incompletes</i>), Kikuyu Grass (<i>Cenchrus calcitrapa</i>) and Praire Grass (<i>Bothriochloa macra</i>) (Appendix A). Native grass species are rare and include grazing-tolerant species such as Weeping Grass (<i>Microlaena stipoides</i>), Windmill Grass (<i>Chloris truncata</i>), and Red Grass (<i>Bothriochloa macra</i>), while native forbs include Grassland Wood-sorrel (<i>Oxalis perennans</i>), Swamp Dock (<i>Rumex brownii</i>) and Small St John's Wort (<i>Hypericum gramineum</i>).
PCTs considered:	BioNet Vegetation Classification System was used to identify the most likely PCT for this vegetation community. The BioNet Vegetation Classification database was searched for PCTs with White Box and NSW South Western Slopes IBRA Region. PCT 266 was identified as the most likely PCT.
Justification of PCT 266:	PCT 266 is considered most likely to occur in portions of the Subject Land dominated by White Box, usually in monospecific stands with the occasional patch of Yellow Box and Blakely's Red Gum. The Subject Land lies within the known distribution of this PCT, which includes the NSW South West Slopes Bioregion. Owing to a long history of intensive agricultural use, the shrub layer is absent on the Subject Land and surrounds. The ground cover is similarly depauperate on the Subject Land, but the few species present (Appendix A) are known to occur in PCT 266 (DPIE, 2021b).
Equivalent NSW Threatened Ecological Community (TEC):	<i>White Box - Yellow Box - Blakely's Red Gum Grassy Woodland and Derived Native Grassland Critically Endangered Ecological Community</i>
Equivalent Commonwealth TEC:	<i>White Box - Yellow Box - Blakely's Red Gum Grassy Woodland and Derived Native Grassland Critically Endangered Ecological Community</i>
Photos of PCT 266 on Subject Land	



3.2.2.2 PCT 266 – White Box Grassy Woodland derived native grassland (Good)

Description:	Grassland areas near remnant White Box and Yellow Box trees considered as derived native grassland of the original vegetation community. Highly diverse areas containing a mixture of native and exotic grasses and forbs.
Samples:	Q10 and Q12
Trees:	Trees are absent from this vegetation community
Shrubs:	Shrubs are absent from the vegetation community.
Vines / Creepers:	Vines / creeper are absent from this vegetation community.
Ground Covers:	The ground layer is a mix of native and exotic grasses and forbs. Dominant characteristic native grasses include Red Grass (<i>Bothriochloa macra</i>) and Weeping Grass (<i>Microlaena stipoides</i>), with lower covers of Windmill Grass (<i>Chloris truncata</i>). Ringed Wallaby Grass (<i>Rytidosperma caespitosum</i>), Hairy Panic (<i>Panicum effusum</i>) and Purple Wiregrass (<i>Aristida ramosa</i>). Exotic grasses are less diverse and include Wimmera Ryegrass (<i>Lolium rigidum</i>) and Goose Grass (<i>Eleusine tristachya</i>). Other native groundcover species include the forbs Grassland Wood-sorrel (<i>Oxalis perennans</i>), Swamp Dock (<i>Rumex brownii</i>), Small St John's Wort (<i>Hypericum gramineum</i>), Fuzzweed (<i>Vittadinia cuneata</i>) and Yellow Autumn-lily (<i>Tricoryne elatior</i>), and the fern Rock Fern (<i>Cheilanthes sieberi</i>).
PCTs considered:	BioNet Vegetation Classification System was used to identify the most likely PCT for this vegetation community. The BioNet Vegetation Classification database was searched for PCTs with White Box in the title, the Grassy Woodland Vegetation Formation, the NSW South Western Slopes IBRA Region and the Inland Slopes Subregion. Thirteen possible PCTs were identified: 266, 267, 268, 272, 274, 275, 282, 347, 426, 434, 483, 1383 and 1609.
Justification of PCT 266:	PCT 266 is considered the most likely to occur in portions of the Subject Land dominated by White Box, usually in monospecific stands. The Subject Land lies within the known distribution of this PCT, which includes the NSW South West Slopes Bioregion. Owing to a long history of intensive agricultural use, the shrub layer is absent on the Subject Land, however the groundcover contains a high diversity and abundance of native species known to occur in PCT 266

	(DPIE, 2021b). Other PCTs were discounted based on having co-dominant species that do not occur on the Subject Land or surrounds.
Equivalent NSW Threatened Ecological Community (TEC):	<i>White Box – Yellow Box – Blakely’s Red Gum Grassy Woodland and Derived Native Grassland Critically Endangered Ecological Community</i>
Equivalent Commonwealth TEC:	<i>White Box – Yellow Box – Blakely’s Red Gum Grassy Woodland and Derived Native Grassland Critically Endangered Ecological Community</i>

Photos of PCT 266 DNG on Subject Land



3.2.2.3 PCT 266 – White Box Grassy Woodland derived native grassland (Poor)

Description:	Grassland areas near remnant White Box and Yellow Box trees considered as derived native grassland of the original vegetation community. Areas containing a mixture of native and exotic grasses and forbs.
Samples:	Q4, Q7, Q8
Trees:	Trees are absent from this vegetation community
Shrubs:	Shrubs are absent from the vegetation community.
Vines / Creepers:	Vines / creeper are absent from this vegetation community.
Ground Covers:	The ground layer is a mix of native and exotic grasses and forbs. Areas on the lower slopes are dominated by the exotic grasses Wimmera Ryegrass (<i>Lolium rigidum</i>) and Soft Brome (<i>Bromus hordeaceus</i>), while upper slopes are dominated by the natives Slender Rat's Tail Grass (<i>Sporobolus creber</i>), Common Couch (<i>Cynodon dactylon</i>) and Brown's Lovegrass (<i>Eragrostis brownii</i>). Characteristic native grasses include Windmill Grass (<i>Chloris truncata</i>), Purple Wiregrass (<i>Aristida ramosa</i>), Red Grass (<i>Bothriochloa macra</i>), Weeping Grass (<i>Microlaena stipoides</i>), Hairy Panic (<i>Panicum effusum</i>) and Ringed Wallaby Grass (<i>Rytidosperma caespitosum</i>). Other native groundcover species include the forbs Grassland Wood-sorrel (<i>Oxalis perennans</i>) and Yellow Autumn-lily (<i>Tricoryne elatior</i>), and the fern Rock Fern (<i>Cheilanthes seiberi</i>).
PCTs considered:	BioNet Vegetation Classification System was used to identify the most likely PCT for this vegetation community. The BioNet Vegetation Classification database was searched for PCTs with White Box in the title, the Grassy Woodland Vegetation Formation, the NSW South Western Slopes IBRA Region and the Inland Slopes Subregion. Thirteen possible PCTs were identified: 266, 267, 268, 272, 274, 275, 282, 347, 426, 434, 483, 1383 and 1609.
Justification of 277:	PCT 266 is considered the most likely to occur in portions of the Subject Land dominated by White Box, usually in monospecific stands. The Subject Land lies within the known distribution of this PCT, which includes the NSW South West Slopes Bioregion. Owing to a long history of intensive agricultural use, the shrub layer is absent on the Subject Land, however native groundcover species known to occur in PCT 266 are present in low abundances (DPIE, 2021b). Other PCTs were discounted based on having co-dominant species that do not occur on the Subject Land or surrounds.
Equivalent NSW Threatened Ecological Community (TEC):	<i>White Box – Yellow Box – Blakely's Red Gum Grassy Woodland and Derived Native Grassland Critically Endangered Ecological Community</i>
Equivalent Commonwealth TEC:	<i>White Box – Yellow Box – Blakely's Red Gum Grassy Woodland and Derived Native Grassland Critically Endangered Ecological Community</i>
Photos of PCT 277 on Subject Land	



3.2.2.4 PCT 281 – Rough-barked Apple Woodland (Moderate)

Description:	Remnant woodland in a drainage line containing Rough-barked Apple, Blakely's Red Gum and White Box trees. The groundcover is exotic-dominated.
Sample:	Q3
Trees:	Dominant tree species is Blakely's Red Gum (<i>Eucalyptus blakelyi</i>)
Shrubs:	Shrubs are absent from the vegetation community
Vines / Creepers:	The twiner Slender Tick-trefoil (<i>Grona varians</i>) occurs in low abundances.
Ground Covers:	Groundcover is dominated by exotic species including the grasses Wimmera Ryegrass (<i>Lolium rigidum</i>), Praire Grass (<i>Bromus catharticus</i>), Goose Grass (<i>Eleusine tristachya</i>), Barley Grass (<i>Hordeum leporinum</i>) and the forb Subterranean Clover (<i>Trifolium subterraneum</i>). Characteristic grasses and forbs occur in low abundances and include the grasses <i>Juncus</i> spp. and <i>Carex</i> spp., while native forbs include Grassland Wood-sorrel (<i>Oxalis perennans</i>).
PCTs considered:	BioNet Vegetation Classification System was used to identify the most likely PCT for this vegetation community. The BioNet Vegetation Classification database was searched for PCTs with Rough-barked Apple in the title and the NSW South Western Slopes IBRA Bioregion. Ten possible PCTs were identified: 274, 281, 381, 420, 481, 703, 1607, 1693, 1696 and 1767.
Justification of 281:	PCT 281 is considered the most likely to occur in portions of the Subject Land containing Rough-barked Apple, Blakely's Red Gum and White Box. The Subject Land lies within the known distribution of this PCT, which includes the NSW South West Slopes Bioregion. Owing to a long history of intensive agricultural use, the shrub layer is absent on the Subject Land. The ground cover is similarly depauperate on the Subject Land, but the few species present (Appendix A) are known to occur in PCT 281 (DPIE, 2021b). Other PCTs were discounted based on having co-dominant species that do not occur on the Subject Land or surrounds.
Equivalent NSW Threatened Ecological Community (TEC):	<i>White Box - Yellow Box - Blakely's Red Gum Grassy Woodland and Derived Native Grassland Critically Endangered Ecological Community</i>

Equivalent Commonwealth TEC:	<i>White Box - Yellow Box - Blakely's Red Gum Grassy Woodland and Derived Native Grassland Critically Endangered Ecological Community</i>
Photos of PCT 281 DNG on Subject Land	
	

3.2.2.5 PCT 281 – Exotic Grassland (Poor)

Description:	Grassland in proximity to Rough-barked Apple, Blakely's Red Gum and White Box, containing a mix of native and exotic ground cover species.
Samples:	Q1, Q2, Q11 and Q14
Trees:	Tree species are absent from the vegetation community
Shrubs:	Shrub species are absent from the vegetation community
Vines / Creepers:	Vines/creepers are absent from the vegetation community
Ground Covers:	The ground layer is generally dominated by exotics such as Wimmera Ryegrass (<i>Lolium rigidum</i>), Soft Brome (<i>Bromus hordeaceus</i>), Kikuyu Grass (<i>Cenchrus clandestinus</i>) and Goose Grass (<i>Eleusine tristachya</i>). Characteristic native grasses were rare and include Wheatgrass (<i>Anthosachne scabra</i>), Weeping Grass (<i>Microlaena stipoides</i>), Red Grass (<i>Bothriochloa macra</i>), <i>Juncus</i> spp. and Wallaby Grass (<i>Rytidosperma racemosum</i>). Other characteristic groundcover species include the forb Grassland Wood-sorrel (<i>Oxalis perennans</i>) and the fern Rock Fern (<i>Cheilanthes sieberi</i>).
PCTs considered:	BioNet Vegetation Classification System was used to identify the most likely PCT for this vegetation community. The BioNet Vegetation Classification database was searched for a combination of Rough-Barked Apple, the Grassy Woodland Vegetation Formation and the NSW South Western Slopes IBRA Bioregion. six potential PCTs were identified: 274, 281, 703, 1693, 1696 and 1767.
Justification of 281:	PCT 218 is considered the most likely to occur in portions of the Subject Land dominated by Rough-barked Apple, Blakely's Red Gum and White Box. The Subject Land lies within the known distribution of this PCT, which includes the NSW South West Slopes Bioregion. Owing to a long history of intensive agricultural use, the shrub layer is absent on the Subject Land. The groundcover is similarly depauperate on the site, but the few species present (Appendix A) are known to occur in PCT 281 (DPIE, 2021b). Other PCTs were

	discounted based on having co-dominant species that do not occur on the Subject Land or surrounds.
Equivalent NSW Threatened Ecological Community (TEC):	<i>White Box – Yellow Box – Blakely’s Red Gum Grassy Woodland and Derived Native Grassland Critically Endangered Ecological Community</i>
Equivalent Commonwealth TEC:	<i>White Box – Yellow Box – Blakely’s Red Gum Grassy Woodland and Derived Native Grassland Critically Endangered Ecological Community</i>

Photos of PCT 281 Exotic Grassland on Subject Land



3.2.3 ENDANGERED ECOLOGICAL COMMUNITIES

Threatened Ecological Communities (TEC) associated with each PCT are identified in the BioNet Vegetation Classification System (DPIE, 2021b). Conformance of the vegetation on the Subject Land with a TEC identified through BioNet was verified by reference to the relevant Final Determination of the NSW Scientific Committee (2019).

PCT 266 and PCT 281 are part of the *White Box – Yellow Box – Blakely’s Red Gum Grassy Woodland and Derived Native Grassland Critically Endangered Ecological Community* listed under both the NSW BC Act (DPIE, 2021c) and the Commonwealth EPBC Act. This community is commonly known as Box-Gum Woodland.

3.2.4 VEGETATION ZONES

Native vegetation to be removed has been classified into five vegetation zones:

- White Box Woodland (PCT 266) in good condition – three patches (0.93 ha)
- Derived Native Grassland (PCT 266) in good condition – two patches (2.64 ha)
- Derived Native Grassland (PCT 266) in poor condition – one patch (5.29 ha)
- Rough-barked Apple Woodland (PCT 281) in moderate condition – one patch (0.64 ha)
- Exotic Grassland (PCT 281) in poor condition – one patch (20.39 ha)

Vegetation zones are based on PCT and tree density, which varies between the remnant woodland and derived native grassland patches on the Subject Land. Due to the consistency in groundcover within zones, it was not possible to differentiate and map relatively small differences in ground cover variation within patches in the field. Rather, it is considered that the variation in groundcover has been captured in the quadrats which provide an accurate representation of the variation encountered in the field.

Figure 5 shows the vegetation zones, individual scattered trees and sample locations.

3.2.5 HIGH THREAT, PRIORITY AND NATIONALLY SIGNIFICANT WEEDS

Nine introduced flora species recorded on the Subject Land are considered High Threat Exotics weed species by the DPIE (2018b); Browntown Bent (*Agrostis capillaris*), Greater Beggar's Ticks (*Bidens subalternans*), Saffron Thistle (*Carthamus lanatus*), Kikuyu Grass (*Cenchrus clandestinus*), St John's Wort (*Hypericum perforatum*), African Boxthorn (*Lycium ferocissimum*), Paspalum (*Paspalum dilatatum*), Ragwort (*Senecio jacobaea*) and Bathurst Burr (*Xanthium spinosum*). Two of these species (St John's Wort and African Boxthorn) are listed as Priority Weeds for Mid-Western Regional Council LGA under the NSW Biosecurity Act 2015 (DPI, 2021). African Boxthorn is also listed as Weed of National Significance as listed by the Australian Weeds Committee of the Australian Government (2021).

3.3 TARGETED FLORA SURVEY

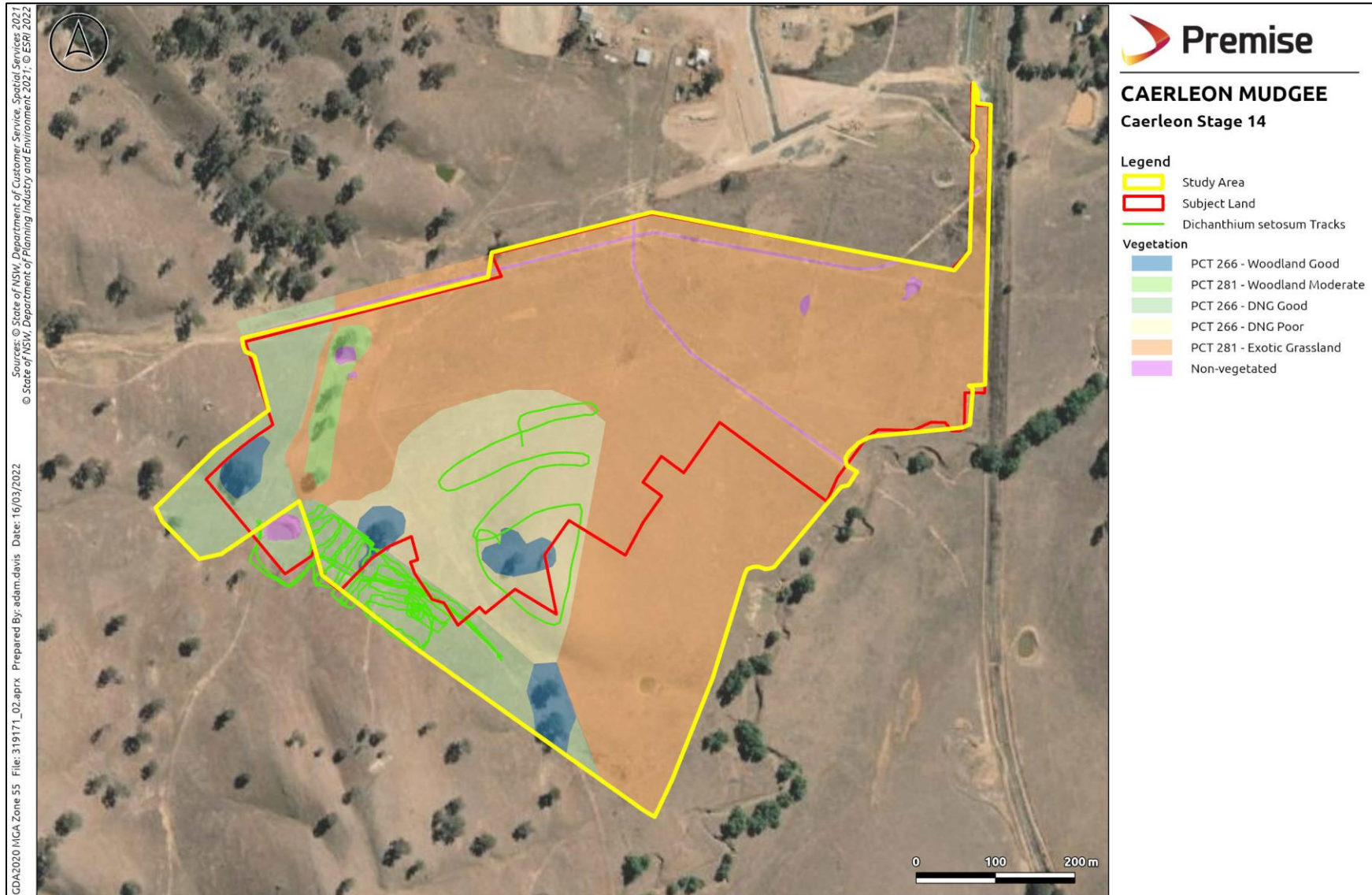
Targeted flora surveys were undertaken by Premise on the Subject Land on 30 November to 2 December 2021 and 25 January 2022. The flora investigations included:

- Desktop review of threatened species potentially occurring on the Subject Land to inform targeted surveys in accordance with the BAM.
- Targeted flora surveys for suitable species involved two Premise Ecologists meandering 10 m apart in derived native grassland areas across the central and southern extents of the Subject Land. A hand held GPS unit was used to record tracks where targeted searches were conducted.
- Describe and map habitat features for threatened flora species (PCTs) that could potentially occur on the Subject Land.

Targeted threatened flora species included Ausfeld's Wattle, Yass Daisy, Bluegrass, Capertee Stringybark, *Euphrasia arguta*, Tumut Grevillea, Hoary Sunray, *Ozothamnus tessellatus*, Tarengo Leek Orchid, *Prasophyllum sp. Wybong*, Silky Swainson-pea and Small Purple-pea. Survey efforts are highlighted in **Figure 6**.

Survey effort was concentrated in grassland habitat suitable for the targeted species. Survey timing and seasonal conditions were optimal for detection of all of the species targeted. Above average rainfall had been experienced in the region and flowering parts would have been evident if these species were present. Premise personnel are experienced in plant identification and all species were identified to species level. For a full species list see **Appendix A**.

Figure 6. Targeted Flora Survey Locations



3.4 FAUNA SURVEY

Fauna surveys were undertaken by Premise targeting threatened species on the Subject Land and assessing habitat potentially on the site. The fauna investigations included:

- Desktop review of potential threatened species to identify which would require targeted surveys in accordance with the BAM.
- Targeted fauna surveys for suitable species on 30 November to 2 December 2021 in accordance with State and Commonwealth Guidelines (i.e. timing and duration of surveys, methods to locate species and methods to identify potential habitat).
- Described and mapped habitat features for threatened fauna species that could potentially occur on the Subject Land.

A full list of fauna sightings is recorded in Appendix B.

3.4.1 FAUNA SURVEY METHODS

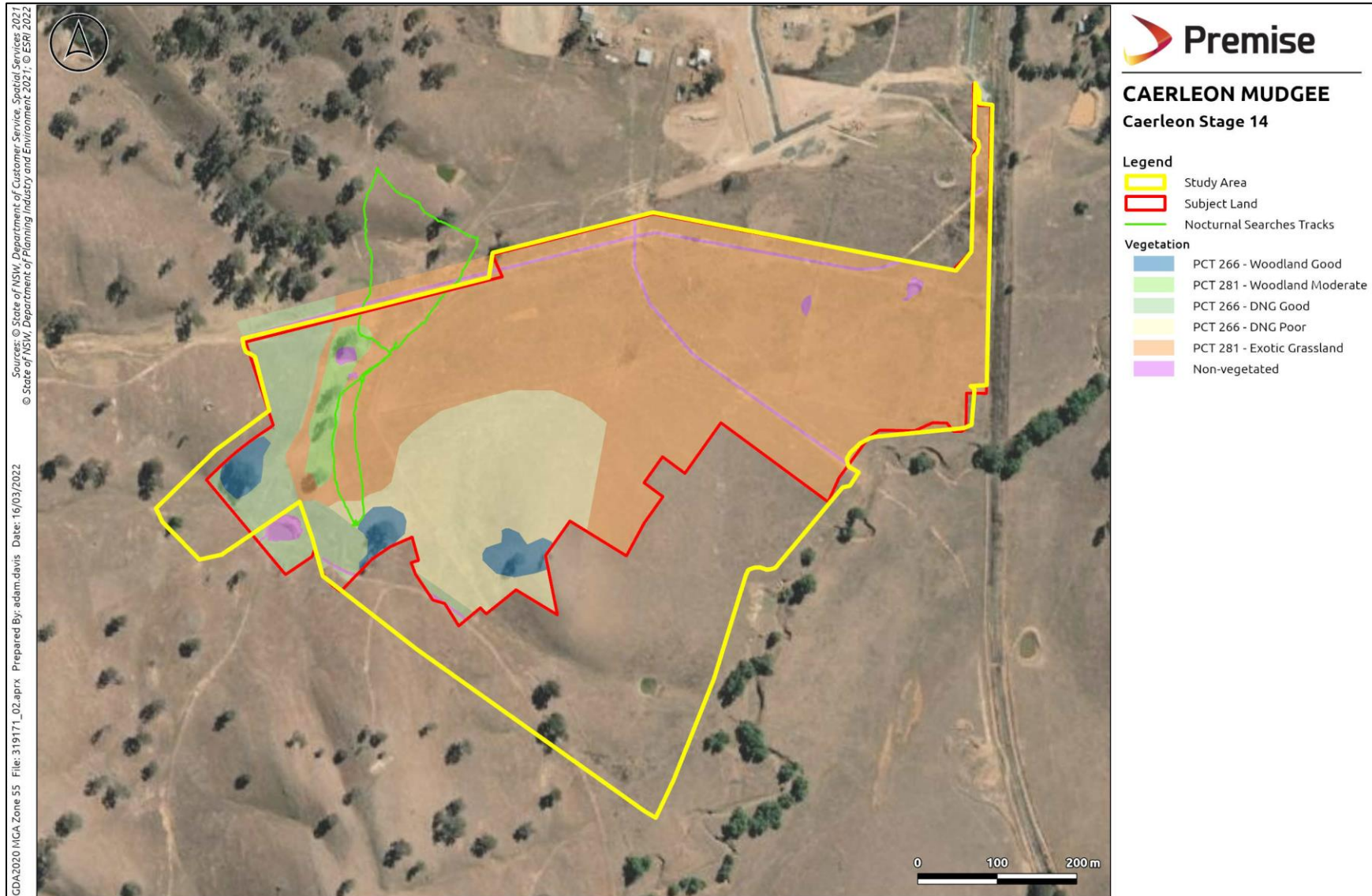
Fauna survey methods on the Subject Land included habitat assessment, targeted bird surveys, spotlighting, call playback and Koala SAT survey.

Survey effort is summarised in **Table 7** and **Figure 7**.

Table 7. Total Fauna Survey Effort

Survey technique	No. surveys (1/12/2021)	No. surveys (2/12/2021)
Diurnal Bird Survey	1 (60 min)	1 (60 min)
Call Playback	3 (30 min total)	3 (30 min total)
Hand Spotlighting	1 (680 m total)	1 (680 m total)
SAT survey	1 (30 min)	1 (30 min)

Figure 7. Targeted Fauna Survey Locations



Survey methods are described below:

- **Diurnal Birds:** Bird surveys included standard diurnal 60 min observations at selected sites, spotlighting for nocturnal species, searches for nest sites, and observations around water bodies. Targeted species included the Brown Treecreeper (*Climacteris picumnus victoriae*), Gang-gang Cockatoo (*Callocephalon fimbriatum*), Spotted Harrier (*Circus assimilis*), Black Falcon (*Falco subniger*), White-bellied Sea-Eagle (*Haliaeetus leucogaster*), Little Eagle (*Hieraetus morphnoides*), White-throated Needletail (*Hirundapus caudacutus*), Square-tailed Kite (*Lophoictinia isura*), Little Lorikeet (*Glossopsitta pusilla*), Major Mitchell's Cockatoo (*Lophochroa leadbeateri*), Turquoise Parrot (*Neophema pulchella*), Barking Owl (*Ninox connivens*), Superb Parrot (*Polytelis swainsonii*), Scarlet Robin (*Petroica boodang*), Flame Robin (*Petroica phoenicea*), Regent Honeyeater (*Anthochaera phrygia*) and Grey-crowned Babbler (*Pomatostomus temporalis temporalis*). Call playbacks were conducted for the Barking Owl (*Ninox connivens*). According to the Biodiversity and Conservation Division (BCD) within DPIE, the Subject Land is within a mapped important area for the Regent Honeyeater.
- **Arboreal Mammals:** Spot-lighting sessions were carried out on foot and searches for tree hollows, trunk scratches and scats were undertaken as part of the overall habitat assessment. Targeted species included Squirrel Glider (*Petaurus norfolcensis*) and Koala (*Phascolarctos cinereus*).
- **Terrestrial Mammals:** Terrestrial animals were targeted during spotlighting and scat searches.
- **Bats:** Habitat constraints for Grey-headed Flying-fox (*Pteropus poliocephalus*), Little Pied Bat (*Chalinolobus picatus*) and Yellow-bellied Sheath-tail-bat (*Saccolaimus flaviventris*) were assessed.
- **Reptiles:** Partially buried rocks and surface rocks were overturned in the native derived grassland across the western extent of the Subject Land, as well as the southern hillslopes (PCT 266 Woodland). Targeted species included Pink-tailed Legless Lizard (*Aprasia parapulchella*) and Striped Legless Lizard (*Delma impar*).

3.4.2 FAUNA HABITAT

General habitat features recorded on the Subject Land that apply to the potential credit species include:

- Live trees in remnant patches with up to 207 cm DBH;
- Dead trees (stags);
- Fallen timber;
- Flowering eucalypts (*Eucalyptus albens*, *Eucalyptus blakelyi*, *Eucalyptus melliodora*);
- Koala feed species (*Eucalyptus albens*, *E. melliodora* and *E. blakelyi*) – all considered feed species in the Central Tablelands Koala Management Area under Appendix A of the NSW *State Environmental Planning Policy (Koala Habitat Protection) 2019* (Koala Habitat Protection SEPP) (DPIE, 2018a; 2020d);
- Trees with hollows ranging from 3 cm - 70 cm in diameter, greater than 1 m above the ground; and
- Four farm dams and one large waterbody (Hone Creek) which runs along the south-eastern boundary of the site, approximately 60 m away.

3.4.3 FAUNA SPECIES

Thirteen birds and one frog species were recorded during the fauna surveys conducted 1st-2nd December 2021 as shown in **Table 8**. No threatened bird or frog species were recorded

Table 8. Total Fauna Survey Effort

Scientific Name	Common Name	1/12/2021	2/12/2021
<i>Litoria peronii</i>	Peron's Tree Frog	✓	
<i>Alisterus scapularis</i>	Australian King Parrot		✓
<i>Chenonetta jubata</i>	Australian Wood Duck	✓	
<i>Coracina novaehollandiae</i>	Black-faced Cuckoo-shrike	✓	
<i>Corvus bennetti</i>	Little Crow		✓
<i>Eolophus roseicapilla</i>	Galah	✓	✓
<i>Falco berigora</i>	Brown Falcon		✓
<i>Grallina cyanoleuca</i>	Magpie-lark	✓	
<i>Gymnorhina tibicen</i>	Australian Magpie	✓	✓
<i>Megalurus mathewsi</i>	Rufous Songlark		✓
<i>Platycercus eximius</i>	Eastern Rosella	✓	✓
<i>Psephotus haematonotus</i>	Red-rumped Parrot	✓	✓
<i>Rhipidura leucophrys</i>	Willie Wagtail	✓	
<i>Sturnus vulgaris</i>	Common Starling	✓	✓

3.5 THREATENED SPECIES

The BAM recognises two categories of threatened species (DPIE, 2020a):

- ecosystem credit species (i.e. species predicted to be present based on the PCTs present on the Subject Land); and/or
- species credit species (i.e. species that cannot be reliably predicted by PCTs).

Threatened species that are ecosystem credit species and/or species credit species are pre-determined in the BAM Credit Calculator and BioNet Threatened Biodiversity Data Collection (TBDC) (DPIE, 2021c).

3.5.1 DATA SOURCES

Four data sources were used to compile lists of threatened flora and fauna that may potentially occur on the Subject Land (**Table 9** and **Table 10**):

- BAM Credit Calculator – Lists of ecosystem credit species and species credit species generated by the BAM Credit Calculator using inputs on IBRA subregion, site location and vegetation integrity (DPIE, 2021c).
- The NSW BioNet Threatened Biodiversity Data Collection (TBDC) (DPIE, 2021c) – Provides data on PCTs, habitats and habitat constraints for threatened species.
- BioNet website – Searches of the NSW Atlas of Wildlife (DPIE, 2021d), NSW State Forests, Australian Museum and Royal Botanic Gardens Sydney databases. The search area comprised a 20 × 20 km square centred on the Subject Land. This search returned a list of threatened species known to occur within the search area.
- Commonwealth Department of Agriculture, Water and the Environment (DoAWE) website – Protected Matters Search Tool (PMST) (DAWE, 2021a). The search area comprised the same 20 × 20 km square as for the BioNet search. The PMST uses actual records and habitat modelling to return a list of 'protected matters' that are known or predicted to occur in the search area, including threatened

species, migratory species, ecological communities, wetlands of international significance, and national and world heritage properties.

The BAM Credit Calculator returned 37 ecosystem credit species; and 32 species credit species (**Table 9** and **Table 10**). Fourteen of the fauna species are dual ecosystem species (both ecosystem and species credit species). All species returned by the BAM Credit Calculator require assessment of habitat suitability and targeted searches on the Subject Land.

The BioNet database search returned records of two flora species, Capertee Stringybark (*Eucalyptus cannonii*), Hoary Sunray (*Leucochrysum albicans* var. *tricolor*), and two fauna species, Brolga (*Grus rubicunda*) and Major Mitchell's Cockatoo (*Lophochroa leadbeateri*), that were not identified by the BAM Credit Calculator. The PMST search returned records of one flora species, *Ozothamnus tessellatus*, and eight fauna species, Striped Legless Lizard (*Delma impar*), Malleefowl (*Leipoa ocellata*), Australasian Bittern (*Botaurus poiciloptilus*), Australian Painted Snipe (*Rostratula australis*), Curlew Sandpiper (*Calidris ferruginea*), Eastern Curlew (*Numenius madagascariensis*), Grey Falcon (*Falco hypoleucos*) and Greater Glider (*Petauroides volans*) that were not identified by the BAM Credit Calculator. Potential habitat for these species on the Subject Land has been assessed in **Table 9** and **Table 10**.

The PMST search returned two flora species and eight fauna species potentially occurring in the vicinity of the Subject Land. Assessment of these species is required to determine whether there is any obligation to further consider matters under the EPBC Act (e.g. referral to the Commonwealth DoAWE).

A total of 12 threatened flora and 58 threatened fauna species have been identified via database and literature searches as potentially occurring on the Subject Land (**Table 9** and **Table 10**).

Table 9. Threatened Flora Species Returned by Database and Literature Searches of the Surrounding Region

Scientific Name	Common Name	Data Source				Sensitivity to Loss ²	BRW ^{2,5}	Conservation Status		Likelihood to be on Subject Land ⁷	Assessment of Likelihood
		BAMC ¹	TBDC ²	BioNet ³	PMST ⁴			BC Act	EPBC Act		
<i>Acacia ausfeldii</i>	Ausfeld's Wattle	Sp	Sp	✓	-	Moderate	2.00	V	-	Nil	Erect or spreading shrub known from the Mudgee-Ulan-Gulgong area of the NSW South Western Slopes bioregion (DPIE, 2021c). Species is associated with White Box (<i>Eucalyptus albens</i>) and Blakely's Red Gum (<i>Eucalyptus blakelyi</i>), and areas dominated by <i>Cassinia</i> spp. Ausfeld's Wattle is typically found on footslopes and low rises on sandstone which is absent from the Subject Land (DPIE, 2021e). Species is regularly recorded in Mudgee but was not found on the Subject Land during targeted threatened species searches, nor is it likely to occur due to the site's grazing history.
<i>Ammobium craspedioides</i>	Yass Daisy	Sp	Sp	-	-	Moderate	2.00	V	V	Nil	Species is distributed near Crookwell on the Southern Tablelands to near Wagga Wagga on the South Western Slopes (DPIE, 2021c). It occurs in moist or dry forest communities, Box-Gum Woodland and derived grasslands. Species is associated with Blakely's Red Gum (<i>Eucalyptus blakelyi</i>) and Yellow Box (<i>E. melliodora</i>), both of which occur on the Subject Land in low quantities. Species was not found during targeted searches and, although it is tolerant of light grazing, is unlikely to occur on the Subject Land due to moderate grazing regimes.
<i>Eucalyptus cannonii</i>	Capertee Stringybark	Sp	Sp	✓	-	Moderate	1.50	V	-	Low	Species is restricted to the Central Tablelands and Slopes between the Golden Highway and Mitchell Highway, with scattered records occurring north-west to Mudgee (DPIE, 2021d). Capertee Stringybark occurs at elevations between 450-1050m and is associated with Blakely's Red Gum (<i>Eucalyptus blakelyi</i>) and Yellow Box (<i>Eucalyptus melliodora</i>). Although suitable elevation and associated species occur on the Subject Land, this species was not found during threatened species searches.
<i>Euphrasia arguta</i>	Sp	Sp	Sp	-	✓	Very High	3.00	CE	CE	Nil	Semi-parasitic, erect annual herb that was recently rediscovered in the NSW North Western Slopes and Tablelands, after previously occurring only between Sydney, Bathurst and Walcha (DPIE, 2021c). Species occurs in open

Scientific Name	Common Name	Data Source				Sensitivity to Loss ²	BRW ^{2.5}	Conservation Status		Likelihood to be on Subject Land ⁷	Assessment of Likelihood
		BAMC ¹	TBDC ²	BioNet ³	PMST ⁴			BC Act	EPBC Act		
											forest with mixed grass and shrub understorey. This species has been recorded once in Mudgee, it is unlikely to occur on the Subject Land due to historical grazing and clearing practices, and was not found during targeted searches (ALA, 2021).
<i>Dichanthium setosum</i>	Bluegrass	Sp	Sp	✓	✓	Moderate	2.00	V	V	Low	Within NSW, Bluegrass occurs on the New England Tablelands, North West Slopes and Plains and the Central Western Slopes predominantly on private property (DPIE, 2021c). Species is often associated with heavy basaltic black soils and red-brown loams with clay subsoil which is consistent with the red brown earths on the Subject Land. Species is also associated with White Box (<i>Eucalyptus albens</i>) and Yellow Box (<i>Eucalyptus melliodora</i>) which occur on the Subject Land. Species was not found during targeted searches.
<i>Grevillea wilkinsonii</i>	Tumut Grevillea	Sp	Sp	-	-	Very High	3.00	CE	E	Nil	Large spreading shrub with a highly restricted distribution in the NSW South West Slopes region, predominantly occurring along a 6 km stretch of the Goobarragandra River, each of Tumut (DPIE, 2021c). Species occurs between 310 and 340 m elevation along waterways in open sunny areas in association with Blakely's Red gum (<i>Eucalyptus blakelyi</i>), White Box (<i>E. albens</i>) and Yellow Box (<i>Eucalyptus melliodora</i>). Species is highly unlikely to occur on Subject Land due to restricted distribution, absence of remnant shrub communities and grazing pressures.
<i>Leucochrysum albicans</i> var. <i>tricolor</i>	Hoary Sunray	Sp	Sp	✓	-	High	2.00	-	E	Low	A plant principally of grasslands and grassy woodlands on relatively fertile soils, often clays or clay-loams derived from basalt or dolerite, or at higher altitudes, from sedimentary parent material. Species has been recorded multiple times south of Mudgee (ALA, 2021). Most of the Subject Land contains fertile soils, however, most habitats on the site are considered too disturbed to support this species. Species was not found during targeted searches.
<i>Ozothamnus tessellatus</i>	-	Sp	Sp	-	✓	Moderate	1.50	V	V	Nil	Dense shrub restricted to a few locations in an east-west zone south of Bunnan and between west Bylong and east Ravensworth, with scattered records occurring in Avisford

Scientific Name	Common Name	Data Source				Sensitivity to Loss ²	BRW ^{2.5}	Conservation Status		Likelihood to be on Subject Land ⁷	Assessment of Likelihood
		BAMC ¹	TBDC ²	BioNet ³	PMST ⁴			BC Act	EPBC Act		
											Nature Reserve near Mount Misery west of the Subject Land (ALA, 2021; DPIE, 2021d). Species grows in eucalypt woodland and is sensitive to habitat degradation, clearing and grazing. Species was not found during threatened species searches and is unlikely to occur on the Subject Land due to disturbance from grazing.
<i>Prasophyllum petilum</i>	Tarango Leek Orchid	Sp	Sp	-	✓	High	2.00	E	E	Nil	Species is restricted to five sites in NSW within natural temperate grassland and grassy woodland near Boorowa, Queanbeyan, Ilford, Delegate and Muswellbrook (DPIE, 2021c). It is highly susceptible to grazing and, as a result, is unlikely to occur on the Subject Land. Species was also not found during threatened species searches and has not been recorded near Mudgee (ALA, 2021).
<i>Prasophyllum sp. Wybong</i>	A Leek-orchid	Sp	Sp	-	✓	Very High	3.00	-	CE	Nil	Species is restricted to Ilford, Premer, Muswellbrook, Wybong, Yeoval, Inverell, Tenterfield, Currabubula and the Piliga area in open woodland and grassland (DPIE, 2021c). Highly susceptible to grazing, being retained only at low-grazed travelling stock reserves and in cemeteries (DPIE, 2021c). The habitat on the Subject Land may be too disturbed for this species and closest recorded sightings are near Muswellbrook (ALA, 2021).
<i>Swainsona recta</i>	Small Purple-pea	Sp	Sp	✓	✓	High	2.00	E	E	Low	Small Purple-pea occurs mainly in the grassy understorey of Box Gum Woodlands and open forests in association with understorey dominants including Kangaroo Grass (<i>Themeda triandra</i>), poa tussocks (<i>Poa</i> spp.) and spear grasses (<i>Austrostipa</i> spp.) (DPIE, 2021c). The native understorey normally associated with this species has been severely disrupted on the Subject Land with small <i>Austrostipa</i> dominated areas remaining at the southern extent of the site. Species has been recorded many times west of Mudgee in Avisford Nature Reserve near Mount Misery (ALA, 2021).
<i>Swainsona sericea</i>	Silky Swainson-pea	Sp	Sp	✓	-	Moderate	2.00	V	-	Low	Species is distributed between the Northern and Southern Tablelands in Natural Temperate Grassland, Snow Gum Woodland or Box-Gum Woodland (DPIE, 2021c). It has been recorded multiple times west of the Mudgee in Avisford

Scientific Name	Common Name	Data Source				Sensitivity to Loss ²	BRW ^{2,5}	Conservation Status		Likelihood to be on Subject Land ⁷	Assessment of Likelihood
		BAMC ¹	TBDC ²	BioNet ³	PMST ⁴			BC Act	EPBC Act		
											Nature Reserve near Mount Misery but is unlikely to occur on the Subject Land due to its sensitivity to weed invasion, grazing and degradation (ALA, 2021). Species was also not sighted during threatened species searches.

¹ Threatened Biodiversity Assessment Method online Credit Calculator (DPIE, 2021d)

⁴ Protected Matters Search Tool (DoAWE, 2019a)

² Threatened Biodiversity Data Collection (DPIE, 2021c)

⁵ Biodiversity Risk Weighting

³ NSW Atlas of Wildlife (DPIE, 2021d)

⁶ Sp = Species Credit Species E = Endangered, CE = Critically Endangered, V = Vulnerable

Table 10. Threatened Fauna Species Returned by Database and Literature Searches of the Surrounding Region

Scientific Name	Common Name	Data Source				Sensitivity to Loss ²	BRW ^{2,5}	Conservation Status		Likelihood to be on Subject Land	Assessment of Likelihood
		BAMC ¹	TBDC ²	BioNet ³	PMST ⁴			BC Act	EPBC Act		
<i>Synemon plana</i>	Golden Sun Moth	Sp	Sp	-	-	Very High	3.00	E	CE	Nil	Species is distributed between Queanbeyan, Gunning, Young and Tumut, occurring in grassy Box-Gum Woodlands and grasslands dominated by Wallaby Grass (<i>Rytidosperma</i> spp.) which the species relies on for foraging (DPIE, 2021c). Wallaby Grass rarely occurs on the western extent of the Subject Land. Therefore, the species is unlikely to utilise the Subject Land. Species has also not been recorded near Mudgee (ALA, 2021).
<i>Galaxias rostratus</i> ⁶	Flathead Galaxias	-	-	-	✓	-	-	-	CE	Nil	These fish species occur in large permanent rivers with deep waterholes (DAWE, 2021b). No suitable permanent watercourses occur on the Subject Land. The closest suitable habitat occurs in Hone Creek 60m south-east of the site.
<i>Maccullochella peeli</i>	Murray Cod	-	-	-	✓	-	-	-	V	Nil	
<i>Macquaria australasica</i> ⁶	Macquarie Perch	-	-	-	✓	-	-	-	E	Nil	
<i>Maccullochella macquariensis</i>	Trout Cod	-	-	-	✓	-	-	-	E	Nil	

Scientific Name	Common Name	Data Source				Sensitivity to Loss ²	BRW ^{2,5}	Conservation Status		Likelihood to be on Subject Land	Assessment of Likelihood
		BAMC ¹	TBDC ²	BioNet ³	PMST ⁴			BC Act	EPBC Act		
<i>Litoria booroolongensis</i>	Booroolong Frog	Sp	Sp	-	-	High	2.00	E	E	Nil	Medium-sized tree frog restricted to NSW and north-eastern Victoria along western-flowing streams of the Great Dividing Range (DPIE, 2021c). Species inhabits permanent, cobble bedded streams with fringing vegetation and rock crevices. Suitable habitat is absent from the Subject Land which contains four farm dam. Species has also not been recorded near Mudgee (ALA, 2021).
<i>Aprasia parapulchella</i>	Pink-tailed Legless Lizard	Sp	Sp	-	✓	Moderate	2.00	V	V	Low	The Pink-tailed Legless Lizard inhabits sloping, open woodland areas with high native grass covers, particularly those dominated by Kangaroo Grass (<i>Themeda triandra</i>). Sites are typically well-drained, with rocky outcrops or scattered, partially-buried rocks (DPIE, 2021c). Two suitable areas with scattered surface and partially-buried rocks were identified on the Subject Land across the south-western extent of the site on hillslopes. The species was not found during targeted searches but may utilise the Subject Land.
<i>Delma impar</i>	Striped Legless Lizard	Sp	Sp	-	✓	Moderate	1.50	V	V	Low	Found mainly on the Southern Tablelands and South West Slopes in Natural Temperate Grassland dominated by Kangaroo Grass (<i>Themeda triandra</i>), Spear Grass (<i>Austrostipa</i> spp.) and Poa (<i>Poa</i> spp.) tussocks, but may also occur in grasslands with a high exotic component (DPIE, 2021c). Species relies on logs and rocks for shelter which both occur along the western <i>Austrostipa</i> dominated extent of the Subject Land. Species was not found during targeted searches but may utilise the Subject Land which contains suitable habitat.
<i>Varanus rosenbergi</i>	Rosenberg's Goanna	Ec	Ec	-	-	Moderate	-	V	-	Nil	Within NSW this species occurs on the Sydney Sandstone between Wollemi National Park, Goulburn and Cooma in heath, open forest and woodland (DPIE, 2021c). Species is associated with termites, as termite mounds are considered a critical habitat component. Rosenberg's Goanna also relies on hollow logs, rock crevices and burrows for shelter. Species has not been recorded near Mudgee and is unlikely to utilise the Subject Land due to

Scientific Name	Common Name	Data Source				Sensitivity to Loss ²	BRW ^{2,5}	Conservation Status		Likelihood to be on Subject Land	Assessment of Likelihood
		BAMC ¹	TBDC ²	BioNet ³	PMST ⁴			BC Act	EPBC Act		
											the absence of termite mounds, suitable logs and rock crevices (ALA, 2021)
<i>Leipoa ocellata</i>	Malleefowl	-	Ec	-	✓	High	-	E	V	Nil	Malleefowl are found in semi-arid to arid shrublands and low woodlands dominated by mallee or acacias. A sandy substrate and abundance of leaf litter are required for breeding (Benshemesh, 2007). Suitable habitat is absent from the Subject Land and species has not been recorded near Mudgee (ALA, 2021).
<i>Burhinus grallarius</i>	Bush Stone-curlew	Sp	Sp	-	-	High	2.00	E	-	Nil	Bush Stone-curlews are found throughout Australia excluding the central southern coast and inland, the far south-east corner and Tasmania, however are only considered common in northern Australia (DPIE, 2021c). Species inhabits open forests and woodlands with a sparse grassy groundcover and abundant logs. Species has not been recorded near Mudgee and is unlikely to utilise the Subject Land which is dominated by dense exotic grass tussocks and lacks suitable logs.
<i>Botaurus poiciloptilus</i>	Australasian Bittern	-	Ec	-	✓	High	-	E	E	Nil	Australasian Bitterns are widespread but uncommon over south-eastern Australia. In NSW they occur over most of the state except for the far north-west (DPIE, 2021c). They favour permanent freshwater wetlands with tall, dense vegetation, particularly bulrushes (<i>Typha</i> spp.) and spikerushes (<i>Eleocharis</i> spp.). Suitable habitat is absent from the Subject Land which contains four farm dams lacking emergent and overhanging vegetation.
<i>Falco hypoleucos</i>	Grey Falcon	Ec	Ec	-	✓	High	-	V	E	Low	The Grey Falcon is sparsely distributed in arid and semi-arid regions of NSW throughout the Murray-Darling Basin in shrubland, grassland and wooded watercourses (DPIE, 2021c). Species utilises open spaces for hunting and is often found within 100m of water (DPIE, 2021d). Few sightings have been recorded in the Mudgee area (ALA, 2021). However, the Grey Falcon may utilise the Subject Land for hunting as it occurs in proximity to Hone Creek and the Cudgegong River. Species is considered vagrant in the Inland Slopes sub-region.

Scientific Name	Common Name	Data Source				Sensitivity to Loss ²	BRW ^{2,5}	Conservation Status		Likelihood to be on Subject Land	Assessment of Likelihood
		BAMC ¹	TBDC ²	BioNet ³	PMST ⁴			BC Act	EPBC Act		
<i>Falco subniger</i>	Black Falcon	Ec	Ec	-	-	Moderate	-	V	-	Low	The Black Falcon is a highly mobile species that is widely, but sparsely, distributed in NSW, primarily occurring in inland regions along tree-lined watercourses and in isolated woodlands, mainly in arid and semi-arid areas (Birdlife 2021; DPIE, 2021c). Paddock trees are considered important breeding habitat and species utilises abandoned stick nests high in the tree. Foraging occurs across open areas. Species has been recorded once in Mudgee along the Cudgegong River and may utilise paddock trees on the Subject Land for foraging due to its proximity to a large remnant woodland patch directly west of the site which may be utilised for nesting (ALA, 2021)
<i>Lophoictinia isura</i>	Square-tailed Kite	Ec/Sp	Ec/Sp	-	-	Moderate	1.50	V	-	Low	Within NSW, this species predominantly occurs in the north and north-east regions, as well as along major west-flowing river systems (DPIE, 2021c). Species occurs in dry woodland and open forests, preferring timbered watercourses. Foraging occurs in the tree canopies of open remnant woodland or over open areas. Species has been recorded multiple times in the Mudgee surrounds and, although species was not found during targeted searches, it is likely to utilise the Subject Land for foraging.
<i>Rostratula australis</i>	Australian Painted Snipe	Ec	Ec	-	✓	High	-	E	E	Nil	Australian Painted Snipe inhabits freshwater swamps and marshes (Blakers <i>et al.</i> , 1984). Suitable habitat is absent from the Subject Land.
<i>Calidris ferruginea</i>	Curlew Sandpiper	-	Ec/Sp	-	✓	Very High	3.00	E	CE	Nil	Forages mainly on coastal estuarine mudflats, but also in inland lakes and lagoons with extensive shallows (DPIE, 2021c). Suitable habitat is absent from the Subject Land.
<i>Numenius madagascariensis</i>	Eastern Curlew	Ec/Sp	Ec/Sp	-	✓	Very High	3.00	-	CE	Nil	The Eastern Curlew has a primarily coastal distribution on mudflats in estuaries (DAWE, 2021b). Species is rarely recorded in inland wetlands, which are absent in the immediate Subject Land.
<i>Glossopsitta pusilla</i>	Little Lorikeet	Ec	Ec	✓	-	Moderate	-	V	-	Moderate	NSW provides a large portion of the Little Lorikeet's core habitat, occurring as far west as Dubbo (DPIE, 2021c). This highly mobile, nomadic species forages on flowering eucalypts, Angophora and Melaleuca, and nests in small tree hollows (entrance 3cm, 2-15m above ground).

Scientific Name	Common Name	Data Source				Sensitivity to Loss ²	BRW ^{2,5}	Conservation Status		Likelihood to be on Subject Land	Assessment of Likelihood
		BAMC ¹	TBDC ²	BioNet ³	PMST ⁴			BC Act	EPBC Act		
											Species has been recorded multiple times in Mudgee including west of the Mudgee in Avisford Nature Reserve near Mount Misery (ALA, 2021). More than 20 suitable hollows occur on the Subject Land which may be utilised for nesting.
<i>Glossopsitta porphyrocephala</i>	Purple-crowned Lorikeet	Ec	Ec	-	-	Moderate	-	V	-	Nil	Species is distributed across the southern extent of Australia between Victoria and south-west WA. It is considered rare in NSW, with scattered records across the Riverina and South-west Slopes (DPIE, 2021c). Species occurs in box-ironbark woodlands, River Red Gum forests and mallee with flowering eucalypts. Breeding occurs away from foraging areas, utilising small tree hollows. Species has been recorded once south-east of Mudgee but this is considered a vagrant sighting due to the species southerly distribution (ALA, 2021).
<i>Polytelis swainsonii</i>	Superb Parrot	Ec/Sp	Ec/Sp	✓	✓	Moderate	2.00	V	V	Low	The Superb Parrot is found throughout eastern inland NSW in tall grassy Box-Gum Woodlands and forests west of the Tablelands (Blakers <i>et al.</i> , 1984). Nesting occurs in living and dead Blakely's Red Gum (<i>Eucalyptus blakelyi</i>), Yellow Box (<i>Eucalyptus melliodora</i>) and White Box (<i>Eucalyptus albens</i>) tree hollows (DPIE, 2021c). Species has been recorded once at Mudgee and may utilise the Subject Land which contains suitable hollows and tree species (ALA, 2021).
<i>Lathamus discolor</i>	Swift Parrot	Ec/Sp	Ec/Sp	-	✓	Very High	3.00	E	CE	Nil	The Swift Parrot is a migratory species that breeds in Tasmania and winters on the mainland, where it feeds on flowering eucalypts (DPIE, 2021c). There is one recorded sighting of this species at Mudgee, however sightings are rare in the surrounding area (ALA, 2021). It requires winter-flowering eucalypts, which include White Box (<i>Eucalyptus albens</i>) that is present on the Subject Land. Species is unlikely to utilise the Subject Land due to low habitat connectivity as a result of clearing. Species is also rare in the Mudgee surrounds.
<i>Neophema pulchella</i>	Turquoise Parrot	Ec	Ec	-	-	Moderate	-	V	-	Low	Species' range extends from southern QLD through to northern Victoria, from the coastal plains to the western slopes of the Great Dividing Range (DPIE, 2021c). The

Scientific Name	Common Name	Data Source				Sensitivity to Loss ²	BRW ^{2,5}	Conservation Status		Likelihood to be on Subject Land	Assessment of Likelihood
		BAMC ¹	TBDC ²	BioNet ³	PMST ⁴			BC Act	EPBC Act		
											Turquoise Parrot inhabits eucalyptus woodland adjoining clearings, timbered ridges and creeks in farmland. Species is tolerant of disturbance and forages on the ground, while nesting occurs in tree hollows, logs or posts. Numerous sightings occur in Mudgee and surround and species is likely to utilise the Subject Land for foraging due to its proximity to a large western remnant woodland patch and the presence of farm dams on the site.
<i>Anthochaera phrygia</i>	Regent Honeyeater	Ec/Sp	Ec/Sp	✓	✓	Very High	3.00	E	CE	Low	A nomadic/migratory nectar-dependent species found in flowering eucalypts, which has rarely been recorded in the region around the Subject Land (DPIE, 2021c). Species inhabits dry open forest and woodland, including Box-Ironbark woodland and River Sheoak riparian forest (DPIE, 2021c). Species is generally found in woodland containing large numbers of mature trees, high canopy cover, abundant mistletoes and high bird species richness (DPIE, 2021c). Four native trees on the western extent of the Subject Land have been mapped as Important Areas for this species, therefore survey effort is not required and the species is assumed present (DPIE, 2020c).
<i>Grantiella picta</i>	Painted Honeyeater	Ec	Ec	-	✓	Moderate	-	V	V	Nil	Inhabits Boree/Weeping Myall (<i>Acacia pendula</i>), Brigalow (<i>A. harpophylla</i>), Box-Gum Woodlands and Box-Ironbark Forests (DPIE, 2021c). A specialist feeder on the fruits of mistletoes growing on woodland eucalypts and acacias. Suitable habitat includes >5 mistletoes per hectare (DPIE, 2021d). Mistletoe is absent from the Subject Land and species has not been recorded near Mudgee (ALA, 2021).
<i>Melithreptus gularis gularis</i>	Black-chinned Honeyeater	Ec	Ec	-	-	Moderate	-	V	-	Nil	The Black-chinned Honeyeater occurs between central QLD, through NSW and Victoria to south-eastern SA, occurring in a widespread distribution through the NSW tablelands and western slopes of the Great Dividing Range (DPIE, 2021c). Species occupies upper levels of dry open forests and woodlands dominated by box and ironbark eucalypts including White Box (<i>Eucalyptus albens</i>), Yellow Box (<i>E. melliodora</i>) and Blakely's Red Gum (<i>E. blakelyi</i>). Black-chinned Honeyeaters forage over the largest woodland patches in the landscape, while nesting occurs

Scientific Name	Common Name	Data Source				Sensitivity to Loss ²	BRW ^{2,5}	Conservation Status		Likelihood to be on Subject Land	Assessment of Likelihood
		BAMC ¹	TBDC ²	BioNet ³	PMST ⁴			BC Act	EPBC Act		
											in the tree crown. Subject Land is considered too degraded for this species which relies on large remnant woodland habitat. Species has been recorded south-west and south-east of the site within Waterworks Gully and along the Cudgegong River (ALA, 2021).
<i>Circus assimilis</i>	Spotted Harrier	Ec	Ec	✓	-	Moderate	-	V	-	Low	Species occurs throughout the Australian mainland, except in densely forested or wooded habitats of the coast, escarpment and ranges. Occurs in grassy open woodland including Acacia and mallee remnants, inland riparian woodland, grassland and shrub steppe (DPIE, 2021c). It is commonly found in native grassland, but also occurs in agricultural land, foraging over open habitats including edges of inland wetlands. Due to the open condition of the Subject Land and its proximity to the Cudgegong River and Hone Creek, this species may utilise the site for foraging. Species has been recorded in Mudgee and surrounds (ALA, 2021).
<i>Hirundapus caudacutus</i>	White-throated Needletail	Ec	Ec	✓	✓	Moderate	-	-	V	Low	Migratory bird occurring in large gregarious flocks when in Australia. Breeds in Asia and moves through Australia, mostly in coastal regions of NSW and Queensland, extending inland to the western slopes of the Great Divide and occasionally on the adjacent inland plains (Birdlife Australia, 2020). The habitat is almost exclusively aerial, from 1-1,000 m above the ground. Species travels 20-30 km after dark to reach their roosts in tree canopies on the edge of forests or on cliffs (DPIE, 2021c). While they prefer foraging over large forests, dune scrubs or woodlands, they have also been observed foraging over scattered trees, over which wind spirals can occur that the birds can use to lift and feed, as well as bare ground (DPIE, 2021c). Species has been recorded multiple times in Mudgee and surrounds and is likely to utilise the Subject Land for foraging due to its proximity to large, forested areas (Mount Misery and Avisford Nature Reserve) (ALA, 2021).
<i>Hieraaetus morphnoides</i>	Little Eagle	Ec/Sp	Ec/Sp	✓	-	Moderate	1.50	V	-	Low	This medium-sized bird of prey is found throughout mainland Australia, excluding densely forested areas of the Great Dividing Range, and has regularly been

Scientific Name	Common Name	Data Source				Sensitivity to Loss ²	BRW ^{2,5}	Conservation Status		Likelihood to be on Subject Land	Assessment of Likelihood
		BAMC ¹	TBDC ²	BioNet ³	PMST ⁴			BC Act	EPBC Act		
											recorded in the Mudgee surrounds, especially along Cudgegong River (ALA, 2021; DPIE, 2021d). It inhabits open eucalypt forest and riparian woodland, utilising large mature trees for nesting in remnant patches. Species has been observed soaring over open country seeking prey and paddock trees have been identified as potential breeding habitat (Blakers et al. 1984; DPIE, 2021c). Due to the presence of numerous paddock trees, proximity to the Cudgegong River and the open condition of the site, this species is likely to utilise the Subject Land for foraging. Species is unlikely to utilise the Subject Land for nesting due to the absence of stick nests.
<i>Haliaeetus leucogaster</i>	White-bellied Sea-Eagle	Ec/Sp	Ec/Sp	-	-	Moderate	2.00	V	-	Low	Species is distributed along the Australian coastline and along major rivers within the Murray Darling Basin (DPIE, 2021c). Breeding typically occurs in large emergent eucalyptus within tall open forest and woodland. Suitable breeding habitat includes live large old trees within 1 km of waterbodies such as rivers, creeks or large farm dams. Species predominantly forages on fish and freshwater turtles, but also reptiles, mammals and waterbirds (DPIE, 2021c). Species has been recorded three times in Mudgee in proximity to Cudgegong River and may rarely utilise the Subject Land for foraging as the site is within 1 km of waterbodies.
<i>Grus rubicunda</i>	Brolga	-	Ec	✓	-	Moderate	-	V	-	Nil	The Brolga was formerly found across Australia, except for the south-east corner, Tasmania and the south-western third of the country (DPIE, 2021c). Species forages in wetland, dry grassland or ploughed paddocks and nests on an island or in the water. Species has been recorded twice between Mudgee and Gulgong, however, these appear to be vagrant sightings as sightings are rare east of Dubbo (ALA, 2021). Suitable habitat features are absent from the Subject Land.
<i>Calyptorhynchus lathami</i>	Glossy Black-Cockatoo	Ec/Sp	Ec/Sp	✓	-	Moderate	2.00	V	-	Nil	The Glossy Black-Cockatoo is uncommon but widespread between central QLD and East Gippsland in Victoria, occurring as far inland as the Southern Tablelands and Central Western Plains of NSW (DPIE, 2021c). Species

Scientific Name	Common Name	Data Source				Sensitivity to Loss ²	BRW ^{2,5}	Conservation Status		Likelihood to be on Subject Land	Assessment of Likelihood
		BAMC ¹	TBDC ²	BioNet ³	PMST ⁴			BC Act	EPBC Act		
											inhabits open forest and woodlands containing Black Sheoak (<i>Allocasuarina littoralis</i>) and Forest Sheoak (<i>Allocasuarina torulosa</i>) which are key foraging trees. Nesting occurs in living or dead tree hollows >15cm diameter and >8m above ground (DPIE, 2021d). Although suitable hollows for nesting occur on the Subject Land these are <8m above ground. The site also lacks Casuarina and Allocasuarina species for foraging.
<i>Callocephalon fimbriatum</i>	Gang-gang Cockatoo	Ec/Sp	Ec/Sp	-	-	Moderate	2.00	V	-	Low	The Gang-gang Cockatoo is distributed from southern Victoria through south- and central-eastern NSW where it is distributed from the south-east coast to the Hunter region, and inland to the Central Tablelands and South-west Slopes (DPIE, 2021c). Species utilises tall mountain forests and woodlands, heavily timbered and mature wet sclerophyll forests in spring and summer, and dry open eucalypt woodlands (Box-Gum and Box-Ironbark assemblages) in autumn and winter. Nesting and roosting occurs in old growth forests within >9cm hollows. Although numerous suitable hollows occur on the Subject Land, this species is unlikely to occur on the site as Mudgee is at the extent of its distribution and the site contains scattered trees.
<i>Lophochroa leadbeateri</i>	Major Mitchell's Cockatoo	Ec/Sp	Ec/Sp	✓	-	Moderate	2.00	V	-	Low	Species is distributed across arid and semi-arid inland Australia, regularly occurring as far east as Bourke and Griffith (DPIE, 2021c). Major Mitchell's Cockatoo inhabits treed and treeless areas in proximity to water. Foraging occurs on the ground for the seeds of melons, saltbush, wattles and cypress pines, while nesting occurs in living or dead tree >10 cm diameter hollows, including paddock trees (DPIE, 2021d). Species has been recorded once at Mudgee (ALA, 20221). Suitable hollows occur on the Subject Land, however species is rarely recorded east of Dubbo and is unlikely to utilise the Subject Land due to the absence of suitable food sources.
<i>Ninox connivens</i>	Barking Owl	Ec/Sp	Ec/Sp	✓	-	Moderate	2.00	V	-	Low	Medium-sized owl found throughout Australia except for the central arid regions, with core populations occurring on the Western Slopes and Plains (DPIE, 2021c). Species

Scientific Name	Common Name	Data Source				Sensitivity to Loss ²	BRW ^{2,5}	Conservation Status		Likelihood to be on Subject Land	Assessment of Likelihood
		BAMC ¹	TBDC ²	BioNet ³	PMST ⁴			BC Act	EPBC Act		
											inhabits woodland and open forest, including fragmented remnants and partly cleared farmland. Roosting occurs in tall mid-storey trees with dense foliage (<i>Acacia</i> and <i>Casuarina</i> species), while nesting occurs in tree hollows (20cm diameter, 4m above the ground) and foraging for arboreal mammals, birds, terrestrial mammals and invertebrates occurs over open areas (DPIE, 2021c). Numerous suitable hollows exist on the Subject Land which also contains suitable foraging habitat. Species has been recorded four times in Mudgee (ALA, 2021).
<i>Ninox strenua</i>	Powerful Owl	Ec/Sp	Ec/Sp	✓	-	Moderate	2.00	V	-	Low	The Powerful Owl is endemic to eastern Australia, predominantly occurring east of the Great Dividing Range (DPIE, 2021c). Within NSW, this species is widely distributed throughout woodland, open sclerophyll forest, tall open wet forest and rainforest. Species requires large areas of woodland habitat with high connectivity, hunting in woodland and sclerophyll forest for arboreal mammals. Open habitats are also occasionally utilised for hunting. Roosting occurs in trees such as Rough-barked Apple (<i>Angophora floribunda</i>) and nesting occurs in large tree hollows (0.5m deep, >20cm diameter, 80-240cm DBH) (DPIE, 2021d). Both of which occur on the Subject Land. Species is regularly recorded in the Mudgee area, particularly near Mount Misery (ALA, 2021).
<i>Tyto novaehollandiae</i>	Masked Owl	Ec/Sp	Ec/Sp	-	-	Moderate	2.00	V	-	Low	Medium-sized owl occurs throughout most of NSW, excluding the most arid north-western corner, occupying dry eucalypt forests and woodlands between sea level to 1100m elevation (DPIE, 2021c). Roosting and breeding occurs in moist eucalypt forested gullies, utilising large tree hollows or caves for nesting. Species has been known to occupy small patches (<5 ha), and suitable hollows and foraging habitat occur on the Subject Land. Species has not been recorded near Mudgee (ALA, 2021).
<i>Climacteris picumnus victoriae</i>	Brown Treecreeper (eastern subspecies)	Ec	Ec	✓	-	Moderate	-	V	-	Nil	Endemic to eastern Australia, the Brown Treecreeper occurs in eucalypt forests and woodlands on the inland slopes and plains of the Great Dividing Range (DPIE, 2021c). It inhabits grassy Box-Gum woodland with rough-

Scientific Name	Common Name	Data Source				Sensitivity to Loss ²	BRW ^{2,5}	Conservation Status		Likelihood to be on Subject Land	Assessment of Likelihood
		BAMC ¹	TBDC ²	BioNet ³	PMST ⁴			BC Act	EPBC Act		
											barked trees at close to natural densities, sparse shrub cover and fallen timber on the ground (DPIE, 2021c). Species has been recorded numerous times in the Mudgee area, especially near Mount Misery, however the Subject Land is likely too degraded for this species (ALA, 2021).
<i>Pomatostomus temporalis temporalis</i>	Grey-crowned Babbler (eastern subspecies)	Ec	Ec	✓	-	Moderate	-	V	-	Low	Within NSW, the eastern subspecies occurs on the western slopes of the Great Dividing Range and on the western plains as far as Louth and Balranald (DPIE, 2021c). Species inhabits open Box-Gum Woodland and Box-Cypress-pine. Foraging occurs on eucalypt trunks and branches or on the ground amongst litter and tussock grasses, while nesting occurs in shrubs and eucalypt saplings. Paddock trees can be important for this species as they can link remnant foraging habitat (DPIE, 2021d). This species may utilise the Subject Land due to the proximity to Mount Misery and Avisford Nature Reserve, and the presence of suitable open, tussock-dominated foraging habitat.
<i>Petroica boodang</i>	Scarlet Robin	Ec	Ec	✓	-	Moderate	-	V	-	Low	Within NSW, the Scarlet Robin occurs from the coast to the inland slopes, dispersing to the lower valleys and plains of the tablelands and slopes after breeding (DPIE, 2021c). This species inhabits dry eucalypt forests and woodlands with abundant logs and fallen timber. Foraging occurs from low perches, fence-posts, logs, tree trunks or the ground, while nesting occurs in tree forks >2m above the ground (DPIE, 2021d). Paddock trees are used for roosting and foraging (DPIE, 2021d). Species is regularly recorded in Mudgee and suitable foraging habitat occurs along the south-western extent of the Subject Land which contains abundant fallen timber in remnant woodland patches.
<i>Melanodryas cucullata cucullata</i>	Hooded Robin	Ec	Ec	-	-	Moderate	-	V	-	Nil	A sedentary species that occurs throughout most of Australia except for desert and wetter coastal areas (DPIE, 2021c). Species prefers lightly wooded country including open eucalypt woodland, acacia scrub and mallee, often in or near clearings and open areas. Paddock trees, such as those on the Subject Land, are considered important

Scientific Name	Common Name	Data Source				Sensitivity to Loss ²	BRW ^{2,5}	Conservation Status		Likelihood to be on Subject Land	Assessment of Likelihood
		BAMC ¹	TBDC ²	BioNet ³	PMST ⁴			BC Act	EPBC Act		
											habitat components if they connect adjacent remnant woodland patches. The Subject Land is likely too degraded for this species which requires complex habitat structures with eucalypt saplings, shrubs and moderately tall native grasses.
<i>Petroica phoenicea</i>	Flame Robin	Ec	Ec	-	-	Moderate	-	V	-	Low	Species is endemic to south-eastern Australia, breeding in upland areas containing tall moist eucalypt forests and woodland along ridges and slopes, and wintering on the inland slopes and plains (DPIE, 2021c). The Flame Robin prefers clearings and areas with open understoreys dominated by native grasses. Paddock trees are considered important foraging and nesting components. Species may utilise woodland patches on the western extent of the Subject Land for foraging as they occur on the edge of a larger remnant woodland patch and open habitat.
<i>Daphoenositta chrysoptera</i>	Varied Sittella	Ec	Ec	✓	-	Moderate	-	V	-	Nil	Birds of tall woodlands and open forests, usually with rough-barked eucalypts (DPIE, 2021c). Recorded sparsely in the surrounding region (DPIE, 2021d). It is considered highly unlikely to occur on the Subject Land which is too open owing to past clearing for livestock grazing. Species was not found during threatened species searches.
<i>Artamus cyanopterus cyanopterus</i>	Dusky Woodswallow	Ec	Ec	✓	-	Moderate	-	V	-	Nil	Dusky Woodswallows are widespread across eastern and south Australia, occurring more sparsely in the upper western region of NSW with breeding occurring on the western slopes of the Great Dividing Range (DPIE, 2021c). Species is found in larger blocks of woodland and dry sclerophyll forests, usually dominated by eucalypts with an open understorey containing eucalyptus saplings, acacias and other shrubs (Scientific Committee, 2016). Species has been regularly recorded near Mudgee, however the Subject Land is likely too disturbed and open for this species (ALA, 2021). Species was not found during threatened species searches.
<i>Chthonicola sagittata</i>	Speckled Warbler	Ec	Ec	-	-	Moderate	-	V	-	Nil	Species occurs across the eastern extent of NSW, frequently reported from the hills and tablelands of the Great Dividing Range and rarely along the coast (DPIE,

Scientific Name	Common Name	Data Source				Sensitivity to Loss ²	BRW ^{2,5}	Conservation Status		Likelihood to be on Subject Land	Assessment of Likelihood
		BAMC ¹	TBDC ²	BioNet ³	PMST ⁴			BC Act	EPBC Act		
											2021c). It inhabits Eucalyptus-dominated communities with grassy understoreys, often on rocky ridges and gullies. Nesting occurs in slight hollows in the ground or the base of a low dense plant, protected by other branches and litter. Foraging occurs on the ground among tussocks. Species has been regularly recorded near Mudgee but is unlikely to occur on the Subject Land due to the absence of rocky ridges and gullies.
<i>Stagonopleura guttata</i>	Diamond Firetail	Ec	Ec	-	-	Moderate	-	V	-	Nil	Within NSW, the Diamond Firetail occurs within the Northern, Central and Southern Tablelands, the Northern, Central and South Western Slopes, the North West Plains and Riverina. It is known to inhabit grassy eucalypt woodlands, including Box-Gum Woodlands, and Natural Temperate Grassland. Species relies on an intact shrub mid-storey for nesting and native grasses and forbs for foraging. Although this species has been recorded numerous times in Mudgee, the Subject Land is considered too degraded for this species (ALA, 2021).
<i>Dasyurus maculatus</i>	Spotted-tailed Quoll	Ec	Ec	✓	✓	High	-	V	E	Nil	Generally confined to extensive areas of native forest and woodland where it nests in rock caves or hollow logs (Edgar, 1983). Species has been recorded using small remnant woodland patches and highly fragmented landscapes, depending on paddock trees for den sites in cleared landscapes (DPIE, 2021e). Species has been recorded twice in Mudgee but is unlikely to utilise the Subject Land which is considered too disturbed to be suitable for this species.
<i>Phascolarctos cinereus</i>	Koala	Ec/Sp	Ec/Sp	✓	✓	Moderate	2.00	V	V	Low	Koalas occur across a widespread but fragmented distribution throughout eastern NSW, inhabiting eucalypt woodland and forests (DPIE, 2021c). Multiple recorded sightings occur near Mudgee, including near Mount Misery and Avisford Nature Reserve (ALA, 2021). Although Koalas are highly unlikely to utilise the Subject Land due to the low connectivity and abundance of suitable trees including White Box (<i>Eucalyptus albens</i>), Yellow Box (<i>E. melliodora</i>) and Blakely's Red Gum (<i>E. blakelyi</i>), they are likely to utilise the surrounding woodland remnants.

Scientific Name	Common Name	Data Source				Sensitivity to Loss ²	BRW ^{2,5}	Conservation Status		Likelihood to be on Subject Land	Assessment of Likelihood
		BAMC ¹	TBDC ²	BioNet ³	PMST ⁴			BC Act	EPBC Act		
											Species was not found during threatened species searches.
<i>Petauroides volans</i>	Greater Glider	Sp	Sp	-	✓	Moderate	2.00	-	V	Nil	Within NSW, this species occurs west of the Great Dividing Range in tall, montane, moist eucalypt forests with relatively old trees and abundant hollows (DAWE, 2021b). The Greater Glider favours forests with a diversity of eucalypt species. The Subject Land does not support potential habitat for this species.
<i>Petaurus norfolcensis</i>	Squirrel Glider	Sp	Sp	-	-	Moderate	2.00	V	-	Nil	Species is sparsely distributed across eastern Australia inhabiting mature Box, Box-Ironbark woodlands and River Red Gum forests west of the Great Dividing Range (DPIE, 2021c). Mixed communities are favoured, especially those containing a shrub mid-storey. Relies on large mature trees with hollows for nesting and breeding, however these trees must be >50 m apart. Suitable habitat is predominantly absent from the Subject Land due to historical clearing.
<i>Petrogale penicillata</i>	Brush-tailed Rock Wallaby	Sp	Sp	✓	✓	High	3.00	E	V	Nil	Occurs in the eastern third of NSW on rocky escarpments, outcrops and cliffs with a preference for complex structures with fissures, caves and ledges, often facing north. Browse on vegetation in and adjacent to rocky areas eating grasses and forbs as well as the foliage and fruits of shrubs and trees (DPIE, 2021c). Although the Subject Land contains areas with surface rocks and partially-buried rocks, it is unlikely this species utilises the Subject Land due to habitat degradation and disturbance. Species has been recorded once south of Mudgee in Avisford Nature Reserve but is rarely recorded west of the Blue Mountains National Park (ALA, 2021).
<i>Phascogale tapoatafa</i>	Brush-tailed Phascogale	Sp	Sp	-	-	Moderate	2.00	V	-	Nil	The Brush-tailed Phascogale has a patchy distribution around the coast of Australia, occurring east of the Great Dividing Range within NSW (DPIE, 2021c). Species prefers dry sclerophyll open forest with sparse groundcovers and rough barked trees of >25 cm DBH. Nesting hollows have entrances 2.5-4 cm wide. Subject Land is considered too degraded for this species which is rarely recorded west of Muswellbrook (ALA, 2021).

Scientific Name	Common Name	Data Source				Sensitivity to Loss ²	BRW ^{2,5}	Conservation Status		Likelihood to be on Subject Land	Assessment of Likelihood
		BAMC ¹	TBDC ²	BioNet ³	PMST ⁴			BC Act	EPBC Act		
<i>Pteropus poliocephalus</i>	Grey-headed Flying-fox	Ec/Sp	Ec/Sp	✓	✓	Moderate	2.00	V	V	Low	The Grey-headed Flying Fox mostly occurs on the eastern side of the Great Dividing Range but may establish temporary roosts west of the divide when food supplies are abundant (DPIE, 2021c). This species forages on eucalypt nectar and succulent fruits, and roosts within 20 km of a regular food source, commonly in gullies close to water with dense canopies. Species is regularly recorded in Mudgee and may rarely utilise remnant woodland patches on the Subject Land for foraging (ALA, 2021). Breeding camps were not found during threatened species searches (DPIE, 2021c)
<i>Nyctophilus corbeni</i>	Corben's Long-eared Bat	Ec	Ec	-	✓	Moderate	-	V	V	Nil	Distributed in the Murray Darling Basin with the Pilliga Scrub region being a stronghold for this species. Inhabits mallee, bullock and box eucalypt communities, but it is more common in box/ironbark/cypress pine vegetation that occurs on the western slopes and plains (DPIE, 2021c). Roosting occurs in tree hollows, crevices and under loose bark, while foraging occurs in the understorey for non-flying prey (DPIE, 2021c). Species has not been recorded near Mudgee and the Subject Land is considered too degraded for this species (ALA, 2021).
<i>Chalinolobus dwyeri</i>	Large-eared Pied Bat	Sp	Sp	-	✓	Moderate	3.00	V	V	Nil	The Large-eared Pied Bat has a very patchy distribution in NSW with scattered records in the New England Tablelands and North West Slopes (DPIE, 2021c). It is found within 2 km of rocky areas containing caves, overhangs, escarpments, outcrops/crevices, or old mines/tunnels (DPIE, 2021c). Roosting occurs caves, mine tunnels and abandoned Fairy Martin's nests, while foraging occurs over areas of continuous forest habitat. Rocky areas, old mines and tunnels are absent from the surrounds and the species is unlikely to utilise the Subject Land due to habitat degradation. Species is not known to occur in the Mudgee surrounds.
<i>Chalinolobus picatus</i>	Little Pied Bat	Ec	Ec	-	-	Moderate	-	V	-	Low	Species occurs across inland QLD and NSW within a variety of habitats including dry open forest/woodland, mulga woodlands, chenopod shrublands and mallee (DPIE, 2021c). Roosting occurs in caves, rock outcrops,

Scientific Name	Common Name	Data Source				Sensitivity to Loss ²	BRW ^{2,5}	Conservation Status		Likelihood to be on Subject Land	Assessment of Likelihood
		BAMC ¹	TBDC ²	BioNet ³	PMST ⁴			BC Act	EPBC Act		
											mine shafts, tunnels, tree hollows and buildings. Paddock trees are considered as potential foraging areas in cleared landscapes. Species has not been recorded near Mudgee, however may rarely utilise the Subject Land for foraging.
<i>Miniopterus oriana oceanensis</i>	Large Bent-winged Bat	Ec/Sp	Ec/Sp	-	-	Moderate	3.00	V	-	Nil	The Large Bent-winged Bat is distributed across the east and north-west coasts of Australia. Roosting habitat includes caves, stormwater tunnels and other man-made structures, while foraging for flying insects occurs in forested areas (DPIE, 2021c). Suitable roosting habitat is absent from the Subject Land and the species has not been recorded in the Mudgee surrounds (ALA, 2021).
<i>Saccolaimus flaviventris</i>	Yellow-bellied Sheath-tail-bat	Ec	Ec	-	-	Moderate	-	V	-	Low	The Yellow-bellied Sheath-tail-bat is a wide-ranging species found across northern and eastern Australia. Roosting occurs in tree hollows and buildings, while foraging occurs in treed and treeless habitats, flying high and fast over the forest canopy or low in open country. Species has not been recorded near Mudgee and is but may rarely utilise the Subject Land for foraging and/or roosting due to the presence of numerous suitable hollows.

¹ Threatened Biodiversity Assessment Method online Credit Calculator (DPIE, 2021b): Ec = Ecosystem credit species; Sp = Species credit species.

² Threatened Biodiversity Data Collection (DPIE, 2021c)

³ NSW Atlas of Wildlife (DPIE, 2021d)

⁴ Protected Matters Search Tool (DAWE, 2021a)

⁵ Species with two likelihoods recorded are dual ecosystem credit and species credit species. The first likelihood refers to ecosystem credits and the second to species credits.

⁶ NSW *Fisheries Management Act 1994*.

⁷ Foraging/Breeding likelihood for dual species (both Ecosystem and Species Credit Species).

E = Endangered; CE = Critically Endangered; V = Vulnerable; M = Migratory

3.5.2 LIKELIHOOD OF THREATENED SPECIES OCCURRENCE ON THE SUBJECT LAND

The BAM Credit Calculator allows the assessor to include or exclude candidate threatened species selected by the BAM Credit Calculator if the species:

1. has habitat constraints listed in the TBDC and none of these constraints are present on the Subject Land;
2. is vagrant in the area (taken as the record being well outside the species range or natural distribution);
and
3. is unable to use the habitat constraints listed in the TBDC or known microhabitats that the species requires to persist on or use because the habitat constraints are degraded to the point where the species will no longer be present.

The likelihood of occurrence of each candidate species has been assessed in **Table 9** and **Table 10** based on distribution records in the NSW Atlas of Wildlife (DPIE, 2021d), and information in both the TBDC (DPIE, 2021c) and referenced scientific publications.

Five threatened flora species and twenty-four threatened fauna species were identified in **Table 9** and **Table 10** respectively to have potentially suitable habitat on the Subject Land. These species were added to the BAM Credit Calculator for further consideration: Grey Falcon (ecosystem credit), Striped Legless Lizard (species credit), Greater Glider (species credit) and Major Mitchell’s Cockatoo (dual credit), Capertee Stringybark (species credit), Hoary Sunray (species credit) and *Ozothamnus tessellatus* (species credit).

Targeted threatened flora searches were conducted in November and December 2021 for the five threatened flora species identified in **Table 9** as having a low potential to occur on the Subject Land. None were detected and all were excluded from the BAM-C. Justification is provided in **Table 11**.

It should be noted that the Subject Land is predominantly highly modified pasture. In most areas native groundcover species have been replaced with exotic pastures dominated by Wimmera Ryegrass (*Lolium rigidum*). This reflects the relatively low native groundcover diversity in the flora species lists for most BAM quadrats in Appendix A. The exception to this general native groundcover diversity pattern is the southern and western footslopes which appear to have been excluded from recent pasture-improvement practices as the area is dominated by Tall Speargrass (*Austrostipa pubescens*), Wheatgrass (*Anthoschne scabra*), Red Grass (*Bothriochloa macra*) and Shotgrass (*Paspalidium distans*). Although this area occurs in good condition due to the dominance of these native grass, some areas still have high covers and abundances of exotic grasses such as Wimmera Ryegrass (*Lolium rigidum*), Goose Grass (*Eleusine tristachya*) and Kikuyu Grass (*Cenchrus clandestinus*). Except for this derived native grassland along the western extent of the Subject Land, the site is considered too degraded to support any threatened shrub or groundcover species which are generally sensitive to grazing and pasture improvement and only survive where soil disturbance, herbicides and heavy grazing are absent or moderate. Therefore, the Subject Land is considered too degraded to support any of these potentially occurring threatened flora species.

Table 11. Justification for Exclusion of Twelve Flora Species from Consideration.

Threatened Flora Species	Habitat Constraints	Require further consideration?
Ausfeld’s Wattle	Ausfeld’s Wattle is known to occur on footslopes and low rises on sandstone throughout the NSW South-Western Slopes in the area between Lue, Ulan, Spring Ridge and Mudgee (DPIE, 2021c). Although the Subject Land supports Box-Gum Woodland which is considered habitat for this species, this community exists as isolated patches. This community	No

	also contains a degraded groundcover layer and removed mid-storey, attributed to its long history of grazing. Therefore, suitable habitat for this species no longer exists on the Subject Land and species was not found during targeted searches.	
Yass Daisy	The Yass Daisy grows in moist or dry forests, Box-Gum Woodland and derived grasslands. The latter two occurring on the Subject Land in poor condition due to grazing pressure. This species has a restricted distribution within the South Western Slopes and is only known to occur within the Inland Slopes sub-region south of Cowra. Although this species is resilient to light grazing, it is highly unlikely to unlikely to utilise the Subject Land as potentially suitable habitat constraints have been degraded via moderate-heavy grazing. Species was not found during targeted searches.	No
Bluegrass	Bluegrass is known to occur in the Inland slopes sub-region within which the Subject Land lies (DPIE, 2021c). Suitable habitat for this species includes Box-Gum Woodlands on red-brown earths which are present on the Subject Land. This species is sensitive to heavy grazing and pasture improvement. However, it is likely to occur on the derived grassland at the western and southern extent of the Subject Land which is dominated by Tall Speargrass (<i>Austrostipa pubescens</i>) and Western Rat-tail Grass (<i>Sporobolus creber</i>). Species was not found during targeted searches.	No
Capertee Stringybark	Capertee Stringybark occurs at elevations between 450-1050m and is associated with Blakely's Red Gum (<i>Eucalyptus blakelyi</i>) and Yellow Box (<i>Eucalyptus melliodora</i>). Species was not found during targeted searches.	No
<i>Euphrasia arguta</i>	<i>Euphrasia arguta</i> appears to be confined to higher altitude areas in moist grassy forests and grasslands in the Central and Northern Tablelands. This species is also predicted to occur in the Inland Slopes sub-region, however the Subject Land is considered too degraded for this species due to grazing (DPIE, 2021c). The Subject Land supports Box-Gum Woodland which do not appear to be habitat for this species. Species was not found during targeted searches.	No
Tumut Grevillea	The Tumut Grevillea has a highly restricted distribution in the Inland Slopes sub-region (DPIE, 2021c). Although this species is associated with Box-Gum Woodland, elevation of the Subject Land is considered too high to support this species which occurs between 310-340 m elevation. The shrub mid-storey which would have originally occurred on the Subject Land has also been cleared through agricultural development, resulting in the absence of suitable habitat conditions required to support this species. Species was not found during targeted searches.	No
Hoary Sunray	Species grows in grasslands and grassy woodlands on relatively fertile soils similar to those on the Subject Land. Species is highly dependent on bare ground for germination and is sensitive to grazing and weed invasion which occur on the Subject Land. Species was not found during targeted searches.	No
<i>Ozothamnus tessellatus</i>	Species grows in eucalypt woodland and is sensitive to habitat degradation, clearing and grazing. Species was not found during threatened species searches and is unlikely to occur on the Subject Land due to disturbance from grazing.	No
Tarengo Leek Orchid	Grows in moist open sites in natural temperate grassland, grassy woodland and in grassy Box-Gum Woodland. Highly susceptible to grazing, being	No

	retained only at little-grazed travelling stock reserves and in cemeteries (DPIE, 2021c). Orchids are very sensitive to changes in their habitats and all, except a couple of weedy species, do not persist on heavily grazed lands. Suitable habitat for this species no longer occurs on the Subject Land owing to pasture improvement and a long history of grazing, even though it may once have occurred. The species is also considered vagrant in the NSW South Western Slopes Upper Slopes sub-region.	
<i>Prasophyllum sp. Wybong</i>	This species occurs in a restricted distribution within open woodland and grassland and is predicted to occur within the Inland Slopes sub-region (DPIE, 2021c). <i>Prasophyllum sp. Wybong</i> is highly susceptible to grazing, being retained only at low-grazed travelling stock reserves and in cemeteries (DPIE, 2021c). Due to this, suitable habitat which may have once occurred on the Subject Land is considered too degraded for this species due to its long history of grazing.	No
Silky Swainson-pea and Small Purple-pea	The Silky Swainson-pea and Small Purple-pea were formerly widespread, common species in Box-Gum Woodlands and likely to have been common in the Mudgee surrounds district (DPIE, 2021c). Both are very sensitive to grazing and it is highly unlikely either have survived the long grazing history and pasture improvement on the Subject Land. Surviving populations are mostly found on roadsides, railway easements, cemeteries, reserves and lightly grazed situations including some crown leases and State Forests. The Small Purple-pea is also considered vagrant within the South Western Slopes Upper Slopes sub-region. Neither species was found during targeted searches.	No

Twenty-two threatened fauna species were highlighted as potentially occurring on the Subject Land based on habitat assessment and recorded sightings on the BioNet database (**Table 10**). Targeted fauna surveys and analysis of habitat requirements and features identified on the Subject Land were considered in detail for **two reptiles (Table 12)**, Pink-tailed Legless Lizard and Striped Legless Lizard; **one frog (Table 13)**, Booroolong Frog; **one insect (Table 14)**, Golden Sun Moth; **thirteen birds (Table 15)**, Barking Owl, Bush Stone-curlew, Gang-gang Cockatoo, Glossy Black-cockatoo, Little Eagle, Major Mitchell’s Cockatoo, Masked Owl, Powerful Owl, Regent Honeyeater, Square-tailed Kite, Superb Parrot, Swift Parrot and White-bellied Sea-eagle, and **eight mammals (Table 16)**, Brush-tailed Rock Wallaby, Brush-tailed Phascogale, Greater Glider, Koala, Squirrel Glider, Grey-headed Flying Fox, Large Bent-winged Bat, Large-eared Pied Bat.

Table 12. Reptile Species with Potential Habitat within the Subject Land

Threatened reptile species with habitat potential on-site	Results of Premise Fauna Surveys	Require consideration or further survey effort
Pink-tailed Legless Lizard	Suitable habitat including rocky outcrops, partially-buried and surface rocks are present on the Subject Land across the south-western and central hillslopes. Species was not found during targeted searches but is likely to utilise the site.	Nil
Striped Legless Lizard	Suitable habitat occurs across the southern extent of the Subject Land in the Speargrass (<i>Austrostipa</i> spp.) dominated derived native grassland. Species was not found during targeted searches and is considered vagrant in the South Western Slopes Upper Slopes sub-region.	Nil

Table 13. Frog Species with Potential Habitat within the Subject Land

Threatened frog species with habitat potential on-site	Results of Premise Fauna Surveys	Require consideration or further survey effort
Booroolong Frog	The Booroolong Frog requires permanent, cobble bedded streams with fringing vegetation. Such habitat constraints as absent from the Subject Land which contains four farm dams.	Nil

Table 14. Insect Species with Potential Habitat within the Subject Land

Threatened insect species with habitat potential on-site	Results of Premise Fauna Surveys	Require consideration or further survey effort
Golden Sun Moth	The Golden Sun Moth is associated with Natural Temperature Grasslands and grassy Box-Gum Woodlands dominated by Wallaby Grass (<i>Rytidosperma</i> spp.). Although these habitat constraints occur on the Subject Land, they are considered too degraded to support this species because Wallaby Grasses only occur in low quantities across the central extent of the Subject Land. This species is also considered vagrant in the NSW South Western Slopes Upper Slopes sub-region.	Nil

Table 15. Bird Species with Potential Habitat within the Subject Land

Threatened bird species with habitat potential on-site	Results of Premise Fauna Surveys	Require consideration or further survey effort
Barking Owl	Twenty suitable hollows (>20cm diameter and >4m above the ground) are present on the Subject Land. Species was not identified during targeted survey including spotlighting and call playback in November and December 2021 over two nights of survey.	Assessed as ecosystem species.
Bush Stone-curlew	This species requires fallen/standing dead timber which have been mostly removed from the Subject Land. Suitable logs only occur in	Nil

	low quantities in the western remnant woodland patches of the site. However, these areas are considered too exposed for this species as they are dominated by exotic grasses and forbs. The Subject Land are considered too degraded for this species.	
Gang-gang Cockatoo	The Subject Land contains thirty-three >9 cm diameter hollows, however these trees occur within small remnant woodland patches, rather than in old growth forests as this species prefers. Species was not found during targeted searches.	Nil
Glossy Black-Cockatoo	The Glossy Black-Cockatoo relies on hollows >15 cm diameter and >8 m above the ground for nesting and the presence of <i>Allocasuarina</i> and <i>Casuarina</i> species for foraging. Suitable foraging tree species are absent from the Subject Land and suitable nesting hollows are rare (one 30cm hollow >8m above the ground). Targeted surveys were not conducted as site visits fell outside the recommended survey time.	Nil
Little Eagle	Suitable habitat 300 m around potential nest trees (live or dead) within associated PCTs and scattered trees were assessed but no nests were found.	Assessed as ecosystem credit species
Major Mitchell's Cockatoo	Major Mitchell's Cockatoo inhabits treed and treeless areas in proximity to water. Species is known to occur within the Inland Slopes sub-region with nesting occurring in hollows >10 cm in living or dead trees. Paddock trees have been identified as a key habitat constraint for nesting. Species has only been recorded once in Mudgee (2007) and is considered vagrant as it is rarely recorded east of Dubbo (ALA, 2021).	Nil
Masked Owl	The species is known to occur within the Inland Slopes sub-region. Potentially suitable nesting habitat for the Masked Owl and denning habitat for some of its major prey species occurs on the Subject Land in the form of several >100 cm DBH old-growth White Box and Yellow Box trees providing twenty-three observed hollows with >20 cm diameter entrances. However, use of the site for breeding by the Masked Owl is considered most unlikely, based on consultation with expert David Milledge. The isolated nature of the hollow-bearing trees in a highly cleared landscape and consequent likely low density of suitable prey species, particularly arboreal species for the Masked Owl indicates that the site would be unsuitable for breeding. Targeted surveys were not conducted as site visits fell outside the recommended survey period, although spotlighting was conducted but with nil result.	Assessed as ecosystem credit species
Powerful Owl	As for the Masked Owl, suitable habitat for the Powerful Owl occurs on the Subject Land in the form of the >100 cm diameter old-growth White Box and Yellow Box trees supporting twenty-three observed hollows with >20 cm diameter entrances. The species is known to occur in the Inland Slopes sub-region, but use of the site for breeding is considered highly unlikely, based on consultation with expert David Milledge. The isolated nature of the old-growth hollow-bearing trees within the surrounding highly cleared landscape does not appear to represent suitable breeding habitat for the Powerful Owl and appears unlikely to provide the required density of arboreal prey species to support breeding. Targeted surveys were not conducted as site visits fell outside the recommended survey period, although spotlighting was conducted but with nil result.	Assessed as ecosystem credit species

Regent Honeyeater	Species is known to occur in the Inland Slopes sub-region and four native trees on the western extent of the Subject Land are mapped as Important Areas for this species (DPIE, 2020c). As part of the Subject Land (0.17 ha) is mapped as Important Areas, no survey effort is required and the species is assumed present.	Assumed present. Assessed as a dual credit species
Square-tailed Kite	Species is known to occur in the Inland Slopes sub-region. Potential nest trees were investigated during targeted searches, but no raptor nests were observed. Species was not found during targeted searches.	Assessed as ecosystem credit species
Superb Parrot	Habitat constraints for the Superb Parrot present on the Subject Land include hollow bearing trees, living or dead Blakley's Red Gum (<i>Eucalyptus blakelyi</i>), White Box (<i>Eucalyptus albens</i>) and Yellow Box (<i>Eucalyptus melliodora</i>), as well as hollows >4 m above ground or trees with >30 cm DBH. Seventeen trees on the Subject Land contain suitable habitat. Targeted searches occurred over 2 days (4 days recommended) were conducted at the end of the recommended survey period (November) and outside the survey period (December). However, due to the cooler and wetter spring/summer and the continued presence of breeding individuals in nearby Orange, it was assumed any individuals present on the site would have been present well into December, if there at all.	Assessed as ecosystem credit species
Swift Parrot	Important habitat not present (DPIE, 2020c). Species was not observed during threatened species searches.	Nil
White-bellied Sea Eagle	Potential nesting habitat identified on the Subject Land was investigated during targeted searches and no large stick nests were identified. Habitat constraints for the White-bellied Sea Eagle include living or dead mature trees within suitable vegetation within 1 km of a river, large dams or creeks which are all present on the Subject Land and surrounds. Species was not found during targeted searches in November and December 2021.	Assessed as ecosystem credit species.

Table 16. Mammal Species with Potential Habitat within the Subject Land

Threatened mammal species with habitat potential on-site	Results of Premise Fauna Surveys	Require consideration or further survey effort
Brush-tailed Rock Wallaby	This species is known to occur in the Inland Slopes sub-region however suitable habitat constraints are absent from the Subject Land. These include land within 1 km of rocky escarpments, gorges, steep slopes, boulder piles, rock outcrops or cliff lines.	Nil
Brush-tailed Phascogale	The Brush-tailed Phascogale has a patchy distribution around the more humid parts of the Australian coastline and ranges, and is predicted to occur in the Inland Slopes sub-region. The Subject Land is also considered too degraded for this species due to the long history of grazing practices on the site.	Nil
Greater Glider	Within NSW, this species occurs west of the Great Dividing Range in tall, montane, moist eucalypt forests with relatively old trees and abundant hollows. The Greater Glider favours forests with a diversity of eucalypt species. It is not known to be a Box-Gum Woodland species and was not found during targeted searches. Species is unlikely to occur on the Subject Land due to habitat degradation	Nil

Threatened mammal species with habitat potential on-site	Results of Premise Fauna Surveys	Require consideration or further survey effort
Koala	Spot Assessment Technique (SAT) surveys, evidence searches (scats, tree scratches, nests and potential hollows) suggested absence of koalas from site.	Assessed as ecosystem credit species.
Squirrel Glider	The Squirrel Glider is known to occur in the Inland Slopes sub-region within mature or old growth Box, Box-Ironbark Woodlands and River Red Gum forests with intact shrubby mid-storeys. The Subject Land is considered too degraded for this species as the mid-storey has been removed. This is attributed to past clearing and the Subject Land's long history of grazing which has resulted in a lack of connectivity between scattered trees	Nil
Grey-headed Flying-fox	Species is known to occur in the Inland Slopes sub-region, however no breeding camps were identified on the Subject Land during targeted surveys. Therefore, species is considered absent from the site.	Assessed as ecosystem credit species.
Large Bent-winged Bat	Suitable habitat including caves, man-made structures with potential microhabitat is absent from the Subject Land. Potential maternity roosts in the surrounding area are not likely to be impacted by the proposal. Suitable foraging habitat in the form of forested areas are also absent from the Subject Land.	Nil
Large-eared Pied Bat	Species known to occur in the Inland Slopes IBRA sub-region. Despite this, habitat constraints are absent from the Subject Land which does not occur within 2 km of rocky areas containing caves, overhangs, escarpments, outcrops, crevices, old mines or tunnels. Therefore, species is considered absent from the site.	Nil

3.5.3 DERIVATION OF SPECIES CREDITS BASED ON SPECIES POLYGONS

The Regent Honeyeater is the only species credit species to be considered in the BAM Credit Calculator. Geoprocessing was used to calculate the total area of threatened species habitat within each native vegetation zone on the Subject Land. **Figure 8** identifies Regent Honeyeater habitat on the Subject Land and **Table 17** documents the areas of each vegetation zone and condition to be input into the BAM Credit Calculator.

Table 17. Habitat Areas (ha) Impacted by the Caerleon Stage 14 Subdivision for Candidate Threatened Species

Confirmed candidate threatened species	PCT 266 Woodland_Good (ha)	PCT 266 DNG_Good (ha)	PCT 266 DNG_Poor (ha)	PCT 281 Woodland_Moderate (ha)	PCT 281 Exotic Grassland (ha)	Total Area (ha)
Regent Honeyeater	0.16	0.01	-	-	-	0.17

Figure 8. Suitable Regent Honeyeater Habitat on the Subject Land



3.5.4 ECOSYSTEM CREDIT SPECIES

Twenty of the 44 ecosystem credit species identified in association with PCTs 266 and 281 in **Table 11-16** Table 16 were retained in the BAM Credit Calculator.

3.5.5 SPECIES CREDIT SPECIES

Of the 38 species credit species identified in association with PCTs 266 and 281:

- 37 species were eliminated through habitat assessment and targeted fauna surveys; and
- One species (Regent Honeyeater) is assumed present as the Subject Land contains four trees mapped within the Important Mapped Area for this species.

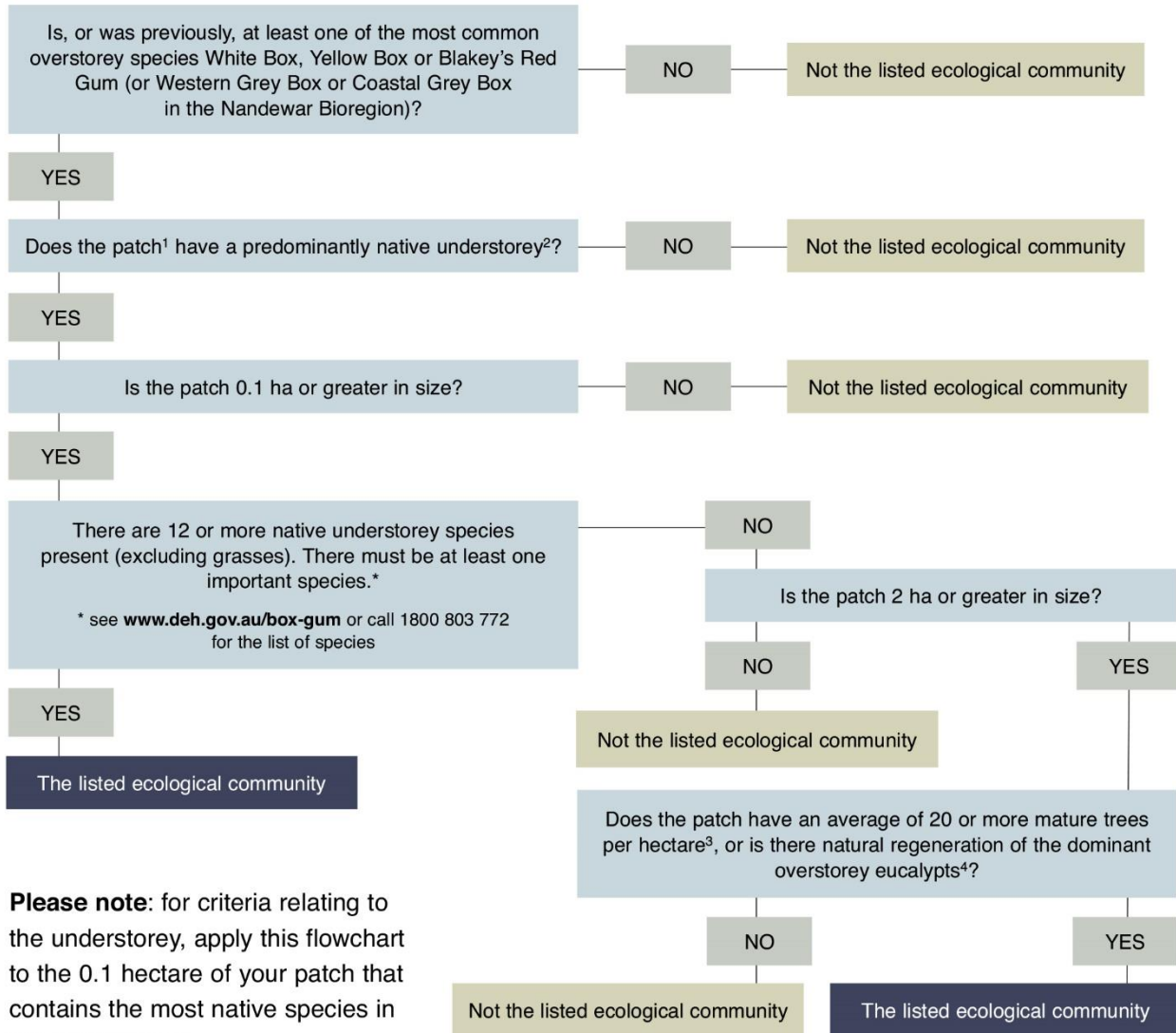
3.5.6 THREATENED SPECIES LISTED UNDER THE EPBC ACT

One fauna species listed as Critically Endangered under the EPBC Act is considered to have a low probability of utilising the site: Regent Honeyeater (**Table 10**). The western extent of the Subject Land (0.17 ha) including four Yellow Box (*Eucalyptus melliodora*) trees within PCT 266 Woodland (Good Quality) is mapped as an Important Area by the Biodiversity, Conservation and Science Directorate (DPIE, 2020c). The Regent Honeyeater is a nomadic species that is only likely to use the Subject Land occasionally, if at all. The Mudgee-Wollar Regent Honeyeater Priority Management Site has been identified as a breeding area by the Department of Agriculture, Water and Environment (DAWE) (DE, 2016). The Regent Honeyeater is also well known between Mudgee and Merriwa with abundant sightings occurring in Goulburn River National Park and Munghorn Gap Nature Reserve, although sightings are less common directly surrounding Mudgee (ALA, 2021). For this reason, it is reasonable to assume Regent Honeyeaters are active in the surrounding area which may include remnant woodland patches north and west of the Subject Land which connect to Avisford Nature Reserve via paddock trees. Although the Yellow Box trees mapped as an Important Area occur within a remnant woodland patch, they are considered isolated in the surrounding landscape as the closest trees are 65 m south-west and 70 m west of the patch. Due to this, they are not considered potential nesting trees as the Regent Honeyeater's breeding territory (nest tree and surrounding foraging trees) extend 5-40 m from the nest tree (Higgins et al., 2001). Yellow Box trees are key tree species and are considered potential foraging trees as the Regent Honeyeater which prefers tall, mature eucalyptus species with large DBH measurements (Yellow Box trees are 62, 113, 148 and 164 DBH). Only three of the four Yellow Box trees are considered potential foraging trees based on their DBH measurements, however they are highly unlikely to be utilised for foraging due to the absence of mistletoe (habitat constraint) and their lack of connectivity with surrounding remnant woodland. The removal of these four trees is also considered highly unlikely to result in a significant adverse impact on the Regent Honeyeater due to the ongoing presence of individuals further east and the existence of more suitable habitat in the surrounding area. The Subject Land also occurs towards the southern extent of the mapped Important Area which is mainly concentrated east of Mudgee. A Matters of National Environmental Significance assessment has been conducted for the Regent Honeyeater and referral of the Caerleon Stage 14 subdivision to the DoAWE is not required as the removal of four potential habitat trees is considered highly unlikely to have a significant impact on a Matters of National Environmental Significance or the environment in general as more suitable habitat exists in the surrounding area in higher quality. The loss of four trees will also not increase habitat fragmentation in the landscape as they occur as an isolated remnant woodland patch, bordering cleared agricultural land.

Box-Gum Woodland is listed as a Critically Endangered Ecological Community under the EPBC Act. A decision matrix for consideration of Box-Gum Woodland under the EPBC Act is reproduced in **Figure 9**.

Figure 9. EPBC Act Decision Matrix for the Box-Gum Woodland CEEC.

Determining if your land has an area of the listed ecological community



Please note: for criteria relating to the understorey, apply this flowchart to the 0.1 hectare of your patch that contains the most native species in the ground layer.

(DEH, 2006)

Table 18 and **Table 19** present the groundcover and patch size parameters required to progress through the decision matrix. These data demonstrate that neither of the three Box-Gum Woodland 50 x 20 m quadrat sites had sufficient native non-grass groundcover species to qualify for the Commonwealth CEEC. In addition, no Box-Gum Woodland patches exceeded 2 ha in size and neither patch supported more than the required 20 trees per hectare. Furthermore, tree regeneration was absent in all patches. None of the Box-Gum Woodland patches on the Subject Land meet the Commonwealth criteria for protection under the EPBC Act and referral of the Stage 14 subdivision to the Commonwealth DoAWE is not required.

Table 18. Conformance of Remnant Box-Gum Woodlands on the Subject Land to EPBC Act Ground Cover Criteria for the Box-Gum Woodland CEEC.

Quadrat	Predominantly Native Ground Cover	Greater than 12 native ground cover species other than grasses in 0.01 ha (no.)	Presence of one or more important species (no.)	Conforms to EPBC CEEC?
Q3	No	7	0	No
Q5	No	2	0	No
Q15	No	8	1	No

Table 19. Conformance of Remnant Box-Gum Woodland Patches on the Subject Land to EPBC Act Patch Criteria for the Box-Gum Woodland CEEC.

Patch	Patch size (ha)	Patch size > 2 ha?	Greater than 20 trees per ha?	Regeneration present?	Conforms to EPBC CEEC?
PCT 266 Woodland_Good (Q5)	0.29	No	No	No	No
PCT 266 Woodland_Good (Q15)	0.30	No	No	No	No
PCT 281 Woodland_Moderate (Q3)	0.65	No	No	No	No

3.5.7 STATE ENVIRONMENTAL PLANNING POLICY (KOALA HABITAT PROTECTION) 2021

The NSW *State Environmental Planning Policy (Koala Habitat Protection) 2021* (Koala Habitat Protection SEPP) repealed the provisions of the Koala Habitat Protection SEPP 2020.

The Koala is known to occur on the NSW South Western Slopes and Brigalow Belt South, mainly in forested habitats (DPIE, 2018a). Fifteen of the sixteen individual eucalypt trees identified on the Subject Land are recognised as Koala feed trees (DPIE, 2018a), namely White Box, Yellow Box and Blakely's Red Gum.

Premise conducted Koala surveys on the Subject Land via a combination of SAT survey and spotlighting over two nights between 30 November and 1 December 2020. This was considered sufficient survey effort given the low quality of the habitat. No koalas were sighted or heard during any of the diurnal or nocturnal surveys over those periods and no scats or characteristic scratches on trees were observed during habitat assessment and SAT survey.

Accordingly, the Subject Land is not considered Core Koala Habitat under the Koala Habitat Protection SEPP, since koala populations are absent, and there is no requirement for a Koala Management Plan.

3.6 Prescribed biodiversity impacts on threatened species

Prescribed biodiversity impacts identified in section 6.7 of the BAM have been illustrated on **Figure 10** and are discussed below.

3.6.1 KARST, CAVES, CREVICES, CLIFFS, ROCKS AND OTHER GEOLOGICAL FEATURES OF SIGNIFICANCE

Karst, caves, crevices, cliffs and other geological features are absent from the Subject Land. Scattered surface and partially buried rocks occur in low concentrations across the western extent of the site on hillslopes within

the derived native grassland. This may provide habitat for reptile species including the Pink-tailed Legless Lizard and Striped Legless Lizard. However, these species are considered unlikely to occur on the Subject Land and were not observed during targeted searches of these rocky areas. Therefore, the removal of scattered surface or partially buried rocks is considered highly unlikely to adversely impact reptile species as similar, more suitable and in-tact habitat occurs in the surrounding landscape.

3.6.2 HUMAN MADE STRUCTURES AND NON-NATIVE VEGETATION

Human made structures (0.81 ha) occur on the Subject Land as established farm tracks and four farm dams. The loss of these dams is unlikely to impact the Regent Honeyeater due to the presence of numerous farm dams in the surrounding agricultural region and the proximity of the Subject Land to Hone Creek and the Cudgegong River. Non-native vegetation occurs in the form of PCT 281 Exotic Grassland (20.39 ha). The loss of this non-native vegetation is considered highly unlikely to cause adverse impacts on the Regent Honeyeater which relies on habitat connectivity and the presence of trees for dispersal in the wider landscape, Non-native vegetation will not be considered further.

3.6.3 HABITAT CONNECTIVITY

The Subject Land contains four remnant woodland patches all >50 m away from another. PCT 281 Woodland (moderate) is approximately 60 m south of a larger patch of remnant woodland to the north which eventually connects to the Avisford Nature Reserve south of the Subject Land. Similarly, PCT 266 Woodland (good) is approximately 70 m east of a smaller remnant woodland patch which also connects to Avisford Nature Reserve via paddock trees. As a result of this, the Subject Land is considered predominantly isolated within the greater landscape and the removal of sixteen paddock trees is considered unlikely to impact the Regent Honeyeater which is more likely to utilise the surrounding large remnant woodland patches for both nesting and foraging.

3.6.4 WATER BODIES, WATER QUALITY AND HYDROLOGICAL PROCESSES

No underground sources of water or aquifers feeding streams or wetlands occur on the Subject Land that would likely be affected by the Stage 14 subdivision. Above ground sources of water include four farm dams. These water bodies are all small and unlikely to be important for candidate threatened species as larger waterbodies, including Hone Creek and Cudgegong River, occur in the surrounding area.

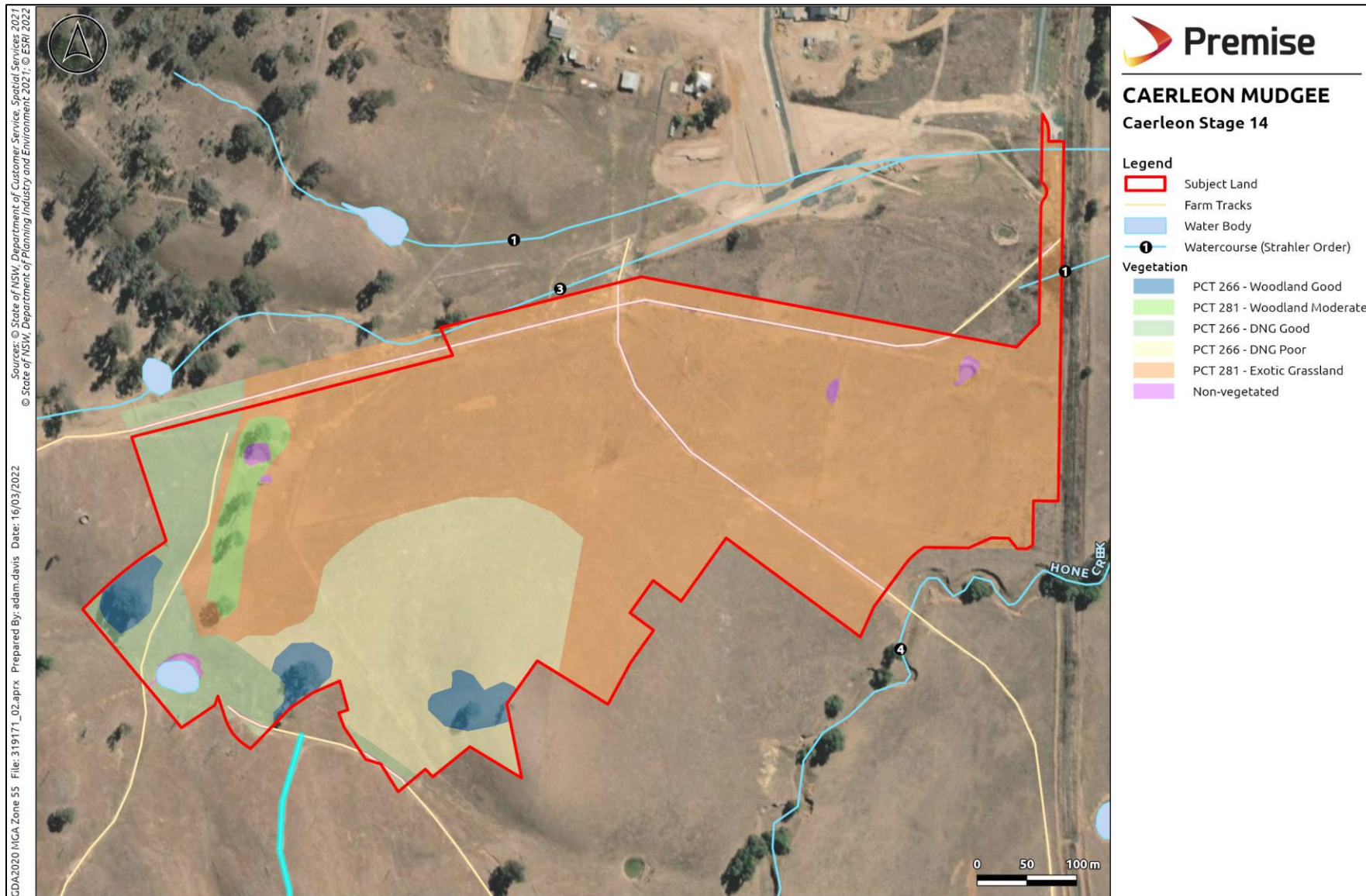
3.6.5 WIND FARM DEVELOPMENTS

The proposed development is not a wind farm and impacts on species that may fly, soar, move or migrate over the Subject Land do not require assessment.

3.6.6 VEHICLE STRIKES

Vehicle strikes could potentially occur during construction or with increased traffic with a growing population. The only threatened species identified as having any likelihood of occurring on the Subject Land is the Regent Honeyeater, a highly mobile bird which is sensitive to noise and unlikely to suffer from a collision with a vehicle.

Figure 10. Prescribed Impacts on the Subject Land



4. STAGE 2 – IMPACT ASSESSMENT

Stage 2 involves assessing the potential direct and indirect impacts on biodiversity, describing impact avoidance and mitigation measures and determining the offset requirements.

4.1 Measures to Avoid and Minimise Impacts

Measures to avoid and minimise impacts can include locating and/or designing the proposal to avoid or minimise direct or indirect impacts, and prescribed impacts.

4.1.1 AVOID AND MINIMISE DIRECT AND INDIRECT IMPACTS DURING STAGE 13 PLANNING

The Stage 14 subdivision Subject Land cannot be relocated, as proposed constructions works are associated with the existing subdivision layouts to the north and proposed layouts to the south.

Nevertheless, opportunities to avoid and minimise impacts were considered during the planning stage of the Stage 14 subdivision. The Subject Land has been designed to occur on land which is lacking biodiversity values due to historical clearing and current grazing, cropping and other agricultural practices. Exotic grassland in poor condition occurs across most of the Subject Land with higher quality derived native grassland on the hillslopes along the central and south-western extents of the site. The proposed subdivision deliberately avoids good quality native vegetation within the larger remnant woodland directly north of the site. Caerleon Mudgee Pty Ltd removed 3.01 ha of PCT 266 DNG (good), 1.03 ha of PCT 266 DNG (poor) and 0.50 ha PCT 266 Woodland (good) in the southern extent to minimise impacts (**Figure 5**).

Measures to avoid and minimise impacts on biodiversity are summarised in Section 4.1.2, 4.3 and **Table 25**.

4.1.2 AVOID AND MINIMISE PRESCRIBED BIODIVERSITY IMPACTS DURING STAGE 14 PLANNING

There are no prescribed biodiversity impacts relating to the Caerleon Stage 14 subdivision. Loss of habitat connectivity is not considered a prescribed biodiversity impact as all remnant woodland patches are > 50 m from the nearest tree in a predominantly cleared agricultural landscape. The removal of sixteen trees within four distinct remnant woodland patches is unlikely to impact the Regent Honeyeater as they are considered insufficient vesicles for dispersal, nesting and foraging due to their isolation.

4.2 ASSESSMENT OF IMPACTS

4.2.1 DIRECT IMPACTS ON NATIVE VEGETATION AND HABITAT

The Stage 13 subdivision will result in the loss of 30.70 ha of native vegetation and habitat on the Subject Land, including the removal of sixteen trees including seven White Box (*Eucalyptus albens*), four Blakely's Red Gum (*Eucalyptus blakelyi*), four Yellow Box (*Eucalyptus melliodora*) and one Rough-barked Apple (*Angophora floribunda*). Of these two White Box, two Blakely's Red Gum and one Rough-barked Apple are associated with PCT 281 Woodland (moderate) (0.64 ha); and the remaining eleven trees (five White Box, four Yellow Box and two Blakely's Red Gum) are associated with PCT 266 Woodland (good) (0.93 ha). The remainder of the site is PCT 266 DNG (good) (2.64 ha), PCT 266 DNG (poor) (5.29 ha), PCT 281 Exotic Grassland (poor) (20.39 ha) and non-vegetated (0.81 ha).

4.2.1.1 INPUTS TO THE BAM CREDIT CALCULATOR

Vegetation zones, areas impacted and number of quadrats required by the BAM and undertaken on the Subject Land are summarised in **Table 20**. Floristic data for input into the BAM Credit Calculator is summarised in **Table 21** for PCT 266 and **Table 22** for PCT 281. PCT 281 Exotic Grassland and PCT 266 DNG (poor) do not generate any ecosystem credits as the VI scores are less than the threshold of 15 (**Table 23**).

Table 20. Vegetation Zones on the Subject Land

Zone No.	Zone Name	Vegetation		Area	No. of Quadrants (required/done)
		Formation	Class		
1	PCT 266 Woodland (good)	Grassy Woodlands	Western Slopes	0.93	2/1
2	PCT 266 DNG (good)		Grassy	2.64	2/2
3	PCT 266 DNG (poor)		Woodlands	5.29	3/3
4	PCT 281 Woodland (moderate)			0.64	1/1
5	PCT 281 Exotic Grassland (poor)			20.39	4/4

Table 21. Inputs to the BAM Credit Calculator for PCT 266

BAM attribute (400m ²)	266 Woodland (good) (Q5)		266 Woodland (good) (Q15)		266 DNG (good) (Q10)		266 DNG (good) (Q12)		266 DNG (poor) (Q4)		266 DNG (poor) (Q7)		266 DNG (poor) (Q8)	
	No. sp.	Cover (%)	No. sp.	Cover (%)	No. sp.	Cover (%)	No. sp.	Cover (%)	No. sp.	Cover (%)	No. sp.	Cover (%)	No. sp.	Cover (%)
<i>Trees</i>	1	40.0	1	40.0	0	0	0	0	0	0	0	0	0	0
<i>Shrubs</i>	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<i>Grasses / grass-like</i>	2	0.2	10	6.4	13	79.5	15	69.8	4	1.7	14	94.9	17	111.0
<i>Forbs</i>	2	0.2	8	0.8	7	0.8	13	4.2	3	0.3	8	0.8	7	0.7
<i>Ferns</i>	0	0	0	0	0	0	1	0.1	0	0	1	0.1	1	0.1
<i>Other</i>	0	0	0	0	0	0	0	0	1	0.1	0	0	0	0
<i>High Threat Exotics</i>	3	2.3	6	41.4	4	0.8	2	0.2	1	0.2	3	0.6	3	0.3
<i>Litter cover (1000m²)</i>	6.8		13.0		15.0		22.0		4.0		1.8		0	
<i>Length of logs (1000m²)</i>	12.0		24.0		0		0		0		0		0	
<i>Patch Size (category <5, 5-24, 25-100, >100)</i>	>100		>100		>100		>100		>100		>100		>100	

Table 22 – Inputs to the BAM Credit Calculator for PCT 281

BAM attribute (400m ²)	281 Woodland (moderate) (Q3)		281 Exotic Grassland (poor) (Q1)		281 Exotic Grassland (poor) (Q2)		281 Exotic Grassland (poor) (Q11)		281 Exotic Grassland (poor) (Q14)	
	No. sp.	Cover (%)	No. sp.	Cover (%)	No. sp.	Cover (%)	No. sp.	Cover (%)	No. sp.	Cover (%)
<i>Trees</i>	1	10.0	0	0	0	0	0	0	0	0
<i>Shrubs</i>	0	0	0	0	0	0	0	0	0	0
<i>Grasses / grass-like</i>	2	0.2	6	53.3	4	10.3	5	11.5	6	21.9
<i>Forbs</i>	6	0.7	3	0.3	2	0.3	1	0.2	4	0.8
<i>Ferns</i>	0	0	1	0.1	0	0	0	0	0	0
<i>Other</i>	1	0.1	0	0	0	0	0	0	0	0
<i>High Threat Exotics</i>	2	0.6	3	2.2	3	12.1	2	5.1	3	20.1
<i>Litter cover (1000m²)</i>	8.8		13.4		14.0		9.0		17.0	
<i>Length of logs (1000m²)</i>	40.5		0		0		0		0	
<i>Patch Size (category <5, 5-24, 25-100, >100)</i>	>100		>100		>100		>100		>100	

4.2.1.2 VEGETATION INTEGRITY SCORES

The VI score was calculated using the BAM Credit Calculator for each vegetation zone (**Table 23**). PCT 266 Woodland (good), PCT 266 DNG (good) and PCT 281 Woodland (moderate) require offsetting under the Biodiversity Offset Scheme as the VI score exceeds the threshold of 15.

PCT 266 DNG (poor) and PCT 281 Exotic Grassland (poor) have VI scores below 15 (3.9 and 14.9) and do not require offsetting.

Table 23. Vegetation Integrity Statistics from the BAM Credit Calculator

Zone and Patch	Area	Composition	Structure	Function	Vegetation Integrity
PCT 266 Woodland (good)	0.93	54.3	33.9	42.7	42.9
PCT 266 DNG (good)	2.64	67.7	59.3	4.1	25.4
PCT 266 DNG (poor)	5.29	64.2	54.7	0	3.9
PCT 281 Woodland (moderate)	0.64	39.7	22.8	55.0	36.8
PCT 281 Exotic Grassland (poor)	20.39	32.5	52.1	2.0	14.9

4.2.2 INDIRECT IMPACTS ON NATIVE VEGETATION, ECOLOGICAL COMMUNITIES AND HABITATS

The potential indirect impacts of the proposed subdivision include changes associated with human population including noise and traffic. Construction impacts will be managed on a site by site basis when dwellings are constructed. Potential impacts of developments beyond the proposed project boundary are identified in Section 8.2 of the BAM. The relevance of each of these factors to the Subject Land is assessed below.

4.2.2.1 Inadvertent impacts on adjacent habitat or vegetation

There is very little potential for inadvertent disturbance to adjacent habitat due to the largely cleared Subject Land. Distances of 60 and 70 m from adjacent woodland areas make it very unlikely that adjacent vegetation will be damaged during construction.

4.2.2.2 Reduced viability of adjacent habitat due to edge effects

The Subject Land is bordered by agricultural land in all directions, excluding the north-eastern corner of the site which is bordered by residential land. The Stage 14 subdivision development is not considered likely to reduce the viability of adjacent habitat as the site contains very little habitat value to be lost. The removal of sixteen trees and associated derived native grassland is considered unlikely to create edge effects or reduce the viability of the adjacent habitat.

4.2.2.3 Reduced viability of adjacent habitat due to noise, dust and light spill

There may be temporary disruption to adjacent habitat areas during construction associated with noise, dust and light spill, however as the Subject Land is in proximity to residential areas, the additional impact is considered negligible. Dust has the potential to drift onto adjacent vegetation.

4.2.2.4 Transport of weeds and pathogens from the site to adjacent vegetation

The risk of transporting weeds and pathogens from the Subject Land to surrounding vegetation is considered low since the area is already highly disturbed through agricultural practices and likely supports all the weed and pathogen species potentially introduced on machinery.

4.2.2.5 Increased Risk of Starvation, Exposure and Loss of Shelter

The Subject Land is a mostly cleared and exposed landscape with four remnant woodland patches > 50 m apart. The habitat is unlikely to support any viable populations, rather, it is likely to provide foraging habitat for mobile and transient birds.

4.2.2.6 Loss of Breeding Habitats

The removal of vegetation in the Subject Land will not impact breeding habitat in adjacent areas, however it will reduce the total number of hollow-bearing trees in the local area, increasing the demand for the hollows in adjacent habitat. The associated increased competition for hollows would adversely affect some species. Similar habitats are widespread in the region and the loss is considered unlikely to threaten the persistence of any threatened species locally, particularly the Regent Honeyeater which is concentrated between Mudgee and Merriwa in the surrounding area (ALA, 2021).

4.2.2.7 Trampling of threatened flora species

Threatened flora species have not been identified on the site and are considered highly unlikely to occur in the surrounds owing to habitat degradation from past agricultural practices.

4.2.2.8 Inhibition of nitrogen fixation and increased soil salinity

Not applicable.

4.2.2.9 Fertiliser and chemical drift

Fertiliser drift is more likely to occur with the current land use than the intended future use. Chemicals have been used in the agricultural system on the Subject Land with inadvertent spray drift into adjacent areas, however this impact is likely to be reduced as a result of the proposed subdivision as the land will no longer be used for agricultural production.

4.2.2.10 Rubbish dumping

Rubbish dumping is not currently a problem in the locality and is not expected to be promoted by the subdivision.

4.2.2.11 Wood collection

Felled trees and fallen logs would be relocated from the disturbance area to adjacent secure areas for habitat enhancement. There would be no public access that would allow wood collection.

4.2.2.12 Bush rock removal and disturbance

Any bush rock removed as part of the Stage 14 subdivision would be relocated to adjacent secure areas for habitat enhancement. There would be no public access that would allow bush rock removal.

4.2.2.13 Increase in predatory species populations

The relocation of felled timber, rocks and logs to adjacent woodland areas will provide additional refuge for species occurring in the wider landscape. The proposed subdivision will not create additional habitat for predatory species, however domestic animals are known to prey on native wildlife in adjacent areas.

4.2.2.14 Increase in pest species populations

The proposed subdivision is in a predominantly cleared landscape surrounded by other semi urban developments. Pest species habitat will be reduced with the higher visitation of humans.

4.2.2.15 Increased Risk of Fire

There is a small chance that increased human activity on the Subject Land may heighten the risk of fire, however education and human occupation will likely reduce the likelihood of this occurring.

4.2.2.16 Disturbance to specialist breeding and foraging habitat

The Stage 14 subdivision will have no impact on any specialist breeding and foraging habitat adjacent to the Subject Land. The principal habitat features on the Subject Land and the immediate surrounds are mature eucalypts, many with hollows suitable for a variety of wildlife. Trees outside the Subject Land would not be indirectly affected by the development and are expected to persist. Felled hollow-bearing trees and fallen logs on the Subject Land will be relocated to adjacent areas to enhance habitat to mitigate the disturbance.

4.2.3 PRESCRIBED BIODIVERSITY IMPACTS ON THREATENED ENTITIES AND ECOLOGICAL COMMUNITIES

4.2.3.1 Karst, caves, crevices, cliffs, rocks and other geological features of significance

Karst, caves, crevices, cliffs and other geological features are absent from the Subject Land. Scattered surface and partially-buried rocks occur in moderation across the western extent of the site on hillslopes within the derived native grassland (PCT 266 DNG_good and PCT 266 DNG_poor). The removal of surface and partially-buried rocks is considered unlikely to adversely impact any reptile species including the Pink-tailed Legless Lizard and Striped Legless Lizard as these species are unlikely to occur on the Subject Land. Surface and partially-buried rocks will be relocated to suitable adjacent areas where they will be scattered for habitat enhancement.

4.2.3.2 Human-made structures or non-native vegetation

Human made structures (0.81 ha) occur on the Subject Land, including established farm tracks, four farm dams and a solar array. There is also 20.39 ha of exotic grassland (PCT 281). The removal of human made structures and non-native vegetation is unlikely to adversely impact the ecosystem species or species credit species potentially occurring on the Subject Land due its lack of connectivity, the presence of more suitable habitat in the surrounding remnant woodlands and the prominence of Hone Creek and the Cudgegong River in the immediate surrounds.

4.2.3.3 Habitat connectivity

The proposed subdivision will result in the removal of sixteen trees from the Subject Land which will be relocated to adjacent areas to enhance habitat. Any species utilising these paddock trees are likely to disperse into the surrounding landscape which contains a higher abundance of trees with suitable hollows

and higher quality groundcover. The Subject Land contains isolated fragments, not connected to adjacent woodland.

The Regent Honeyeater inhabits temperate woodlands and open forests of the inland slopes of south-east Australia. The distribution of this highly mobile species is considered extremely patchy with few known breeding sites (DE 2016). This species is threatened by habitat fragmentation and loss of connectivity through the ongoing clearing of woodlands and scattered trees which limit dispersal (DE, 2016). The removal of sixteen trees (including four trees mapped as Important Area for the Regent Honeyeater) on the edge of a predominantly cleared landscape is unlikely to significantly reduce habitat connectivity for this candidate species as much more suitable habitat occurs west of the Subject Land and east of Mudgee.

4.2.3.4 Water bodies, water quality and hydrological processes

The Stage 14 subdivision will predominantly involve surface works, with piping, electrical, and structure and road foundations occurring underground. This is considered unlikely to impact the quantity or quality of water in underground aquifers. Groundwater levels are generally greater than 3 m below the surface (BOM, 2022) and are therefore unlikely to be impacted by works associated with the proposed subdivision.

Above ground waterbodies on the Subject Land include four farm dams. Two farm dams occur within PCT 281 Exotic Grassland on the north-eastern side of the Subject Land. The remaining two dams occur in PCT 281 Woodland (moderate) and PCT 266 DNG (good) on the western extent of the site. None of these water bodies are considered important for the Regent Honeyeater due to the availability of water resources in the wider landscape and the lack of suitable habitat on the Subject Land for the Regent Honeyeater to reside or rely on.

4.2.3.5 Wind turbine strikes

Not applicable.

4.2.3.6 Vehicle strikes

Speed limits and traffic control measures will be implemented on the Subject Land during the construction phase. The increase in traffic movements on the site during construction may increase the potential for vehicle strikes, however it is considered a low risk with low vehicle speeds. The risk of vehicle strikes impacting the Regent Honeyeater is highly unlikely given the species is highly mobile and very unlikely to be present.

4.2.4 CUMULATIVE IMPACTS

The cumulative impact of native vegetation loss in an already highly cleared landscape has been considered. **Table 24** shows that the additional clearance would be in the order of 0.0692 %. This loss would be offset in accordance with the Biodiversity Offset Scheme and the Caerleon Mudgee Pty Ltd would ensure that native vegetation and threatened species habitat is enhanced wherever possible.

Table 24. Cumulative Losses of Native Vegetation in Affected BioNet NSW Landscapes

BioNet NSW Landscape	Area of Landscape (ha)	Percent Cleared	Subdivision Clearance (ha)	Additional Clearance (%)
Goonoo Slopes	599,003.55	66	7.87	0.0013
Cudgong Channels and Floodplains	21317.24	97	13.36	0.0627
Gulgong Ranges	182,353.06	81	9.43	0.0052

Note: Sourced from the 'Over-cleared Landscapes Database' within the BioNet Vegetation Classification Database (DPIE, 2021b)

4.3 MITIGATION OF IMPACTS

4.3.1 MITIGATING IMPACTS ON BIODIVERSITY VALUES

Measures to mitigate and manage impacts are outlined below according to Section 8.4 of the BAM.

4.3.1.1 Vegetation Removal Strategy

Native vegetation immediately adjoining the Subject Land would be marked to avoid accidental damage during construction. Prior to the removal of any trees, an Ecologist or suitably qualified individual must be on site to identify species inhabiting tree hollows and relocate them to the western remnant woodland area. This would minimise harm to wildlife, particularly any hollow-nesting bird life or microbats. Note that:

1. Tree removal would be undertaken with consideration of seasonal factors (wherever practicable, vegetation clearance would be undertaken during late summer/autumn to avoid species critical life cycle events).
2. Felled trees would be inspected for the presence of fauna. Injured fauna would be captured using recommended techniques prescribed by WIRES and WIRES would be contacted for first aid and temporary care of the animal, if needed.
3. Uninjured fauna would be allowed to disperse into surrounding woodland.
4. Felled trees and fallen timber would be relocated to enhance habitat values in surrounding areas.

4.3.1.2 Weed Management Strategy

Significant weed species identified on the Subject Land should be controlled prior to construction to avoid translocation to other areas. Nine High Threat Exotic weed species present include: Browntown Bent (*Agrostis capillaris*), Greater Beggar's Ticks (*Bidens subalternans*), Saffron Thistle (*Carthamus lanatus*), Kikuyu Grass (*Cenchrus clandestinus*), St John's Wort (*Hypericum perforatum*), African Boxthorn (*Lycium ferocissimum*), Paspalum (*Paspalum dilatatum*), Ragwort (*Senecio jacobaea*) and Bathurst Burr (*Xanthium spinosum*). Topsoil should be stockpiled and treated for weeds before replacing on site for landscaping. Ongoing weed management would be the responsibility of individual landholders.

4.3.1.3 Animal Pest Management and Monitoring

Pest management will be the responsibility of individual landholders.

Table 25 summarises avoidance and mitigation actions with expected outcomes, timing and management responsibility, in accordance with section 2.5 of the BAM Operational Manual Stage 2.

4.3.2 MITIGATING INDIRECT IMPACTS ON NATIVE VEGETATION AND HABITAT

Potential impacts of the development beyond the Subject Land are identified in section 9.1.4 of the BAM and indirect impacts relevant to the proposed subdivision are identified in section 3.2.5. Mitigation measures for these impacts are discussed below and summarised in **Table 25**.

4.3.2.1 Inadvertent impacts on adjacent habitat or vegetation

It is not anticipated that there will be any inadvertent impacts on adjacent habitat or vegetation.

4.3.2.2 Reduced viability of adjacent habitat due to noise, dust and light spill

Construction activities will occur during daylight hours minimising light spill disturbance. Noise impacts would be temporary, limited to the construction period. Standard dust control measures are to be employed during and after construction.

4.3.2.3 Transport of weeds and pathogens from the site to adjacent vegetation

High Threat Exotic (HTE) weed management and controls are to be implemented (section 4.3.1.2) to reduce the likelihood of weed and pathogen transmission from the site to adjacent vegetation. The transport of weeds and pathogens into adjacent vegetation is considered low risk due to the presence of cleared agricultural land and residential areas surrounding the site.

4.3.2.4 Increased Risk of Starvation, Exposure and Loss of Shelter

It is very unlikely that the habitat loss on the Subject Land will increase risk of starvation, exposure or loss of shelter, however to mitigate any impacts, all felled trees and logs will be relocated into adjacent areas to supplement habitat in adjacent woodland. Any impact is considered to be short term in duration, with local populations establishing a new but slightly lower equilibrium population size after the disturbance. Any increased risk of starvation, exposure and loss of shelter is considered negligible as more suitable habitat with high connectivity occurs in the surrounding area in the form of numerous paddock trees and small remnant patches connecting to the large remnant woodland patch west of the Subject Land.

4.3.2.5 Chemical drift

Spraying is only to be applied to HTE weed species under suitable weather conditions. During the application process, weather conditions including wind speed and direction are to be monitored to reduce chemical drift.

4.3.2.6 Increase in pest species populations

The construction and operation of the proposed subdivision is likely to reduce the occurrence of pest animals on the Subject Land, and potentially increase the population in surrounding areas as they are displaced. Community members should be encouraged to support pest animal control activities as they occur to reduce the impact of these species in the surrounding landscape.

4.3.2.7 Increased Risk of Fire

There is a small chance that increased human activity on the Subject Land may heighten the risk of fire, however the presence of people on site will minimise the opportunity for fire to spread to surrounding woodland areas.

Table 25. Avoidance and Mitigation Measures, Responsibility and Timing

Action	Impacts Mitigated	Type of Impact Addressed	Outcome	Timing	Responsibility	Performance Criteria	Method
Pre-construction							
Planning the timing of site clearance to avoid the nesting season of threatened, migratory and resident species.	Displacement of resident fauna. Regent Honeyeater avoidance	Direct	Harm to breeding wildlife minimised.	Avoid construction activities in spring or when White Box Trees flowering.	Project management	No disruption to wildlife breeding	Project planning meetings.
Undertake pre-clearing surveys to determine the presence of species that may be breeding in trees or utilising tree hollows.	Displacement of resident fauna.	Direct	Harm to tree dwelling and hollow-dwelling wildlife minimised.	Prior to clearing	Environmental specialists.	No disruption to wildlife breeding	Project planning meetings.
Planning for relocation of habitat features, such as surface rocks, fallen logs and tree trunks.	Displacement of resident fauna. Creation of more habitat opportunities in adjacent areas.	Direct Indirect	Relocation of any bush rocks, logs and felled timber into adjacent habitat areas.	Prior to clearing	Project management.	Habitat features established in remnant woodland west of the Subject Land	Project planning meetings.
Weed control	Reduce likelihood of spreading High Threat Weeds off site	Direct Indirect	Minimise weed burden in adjacent areas	Prior to clearing	Certified weed control contractor.	Weeds controlled prior to clearing	Project planning meeting. Chemical application.
During Construction							

Action	Impacts Mitigated	Type of Impact Addressed	Outcome	Timing	Responsibility	Performance Criteria	Method
Implement traffic control measures and signage to reduce wildlife vehicle strike	Wildlife strike	Indirect impact	No wildlife injured or killed	During construction	Construction Team	Signs erected	Pre-construction management plan
Construction activities to occur during daylight hours	Light spill into adjacent areas	Indirect impact	Reduce impact on nocturnal wildlife activity	During construction	Construction Team	Operation hours limited to daylight	Pre-construction management plan
Inspection of felled trees for the presence of fauna by trained ecologists or licensed wildlife handlers.	Displacement of resident fauna. Creation of more habitat opportunities in adjacent areas.	Direct	Harm to hollow-dwelling wildlife minimised. Injured wildlife cared for and recovered by WIRES. Displaced wildlife released into appropriate habitat nearby.	During clearing operations.	Environmental Specialist.	All tree felling supervised. Habitat creation in adjacent areas maximised.	Experienced tree pusher supervised by experienced wildlife handler.
Relocate fallen timber to adjacent woodland areas	Displacement of resident fauna.	Direct	Felled timber to be relocated into adjacent habitat areas.	After clearing operations.	Site Manager.	All suitable timber relocated.	Fallen trees trimmed and trunks gathered and transported.
Relocate bush rocks.	Displacement of resident fauna. Loss of rock habitat.	Direct, Prescribed	Relocation of any bush rocks into adjacent secure habitat areas.	After clearing operations.	Environmental Specialist or trained staff member.	Surface rocks relocated.	Surface rock gathered and transported.

Action	Impacts Mitigated	Type of Impact Addressed	Outcome	Timing	Responsibility	Performance Criteria	Method
Post Construction							
Weed management.	Prevent spread of any Priority or High Threat Weeds, chemical drift	Indirect	Priority and high threat weeds controlled, chemical drift minimised.	Control as required.	Residents	Selected High Threat Exotic and Priority Weeds maintained at negligible levels, responsible chemical use.	Certified weed control contractor.
Pest animal management.	Increase in predation by feral predators; degradation of native vegetation by feral herbivores.	Indirect	Pest animals controlled, especially feral pigs, foxes, rabbits, wild dogs, feral cats and brown hares.	Control as required.	Resident	All pest animal species maintained at negligible levels.	Baiting, destruction of harbour and exclusion (e.g. fencing). Experienced contractor.

4.3.3 MITIGATING PRESCRIBED IMPACTS

There are no prescribed impacts relating to the proposed subdivision (section 4.2.5).

4.3.4 ADAPTIVE MANAGEMENT FOR UNCERTAIN BIODIVERSITY IMPACTS

With respect to section 9.3.1.2 of the BAM, it is considered that all potential impacts of the proposed subdivision on threatened biodiversity have been identified. The development outcomes are finite and the impacts are well-defined. It is considered that a comprehensive set of mitigation measures has been developed and that they are feasible standard approaches, that have a high probability of successful implementation. Overall, it is considered there are no uncertain impacts for which the risks of the development are unpredictable. In particular, none of the impacts identified in section 9.4 of the BAM as being uncertain apply to this development, i.e. the development does not involve disturbance to subsidence due to underground mining, wind turbine strikes, vehicle strikes, or the like. Accordingly, it is not considered necessary to develop an adaptive management strategy for uncertain impacts.

4.4 SERIOUS AND IRREVERSIBLE IMPACTS

4.4.1 BOX-GUM WOODLAND

As a critically endangered entity, *White Box - Yellow Box – Blakely's Red Gum Grassy Woodland and Derived Native Grassland* CEEC (Box-Gum Woodland) is considered at risk of Serious and Irreversible Impacts (SAII), and additional information must be considered by assessors when determining the impact of a development or activity (DPIE, 2019b). All areas of PCT 266 Woodland (good) and PCT 281 Woodland (moderate) proposed for removal on the Subject Land, totally 1.57 ha, have been determined to be part of the Box-Gum Woodland CEEC under the *BC Act 2016*. There is no specific criteria or decision matrix for determination of the community under NSW legislation, however PCT 281 and PCT 266 identified on the site are associated with the CEEC (DPIE, 2021a) and four characteristic overstorey species are present on the Subject Land: White Box (*Eucalyptus albens*), Yellow Box (*Eucalyptus melliodora*), Blakely's Red Gum (*Eucalyptus blakelyi*) and Rough-barked Apple (*Angophora floribunda*). The CEEC on the Subject Land is in good to moderate condition. PCT 266 Woodland (good) (0.93 ha) has a VI score of 42.9 and includes four Yellow Box, five White Box and two Blakely's Red Gum trees, while PCT 281 Woodland (moderate) (0.64 ha) has a VI score of 36.8 and contains two White Box, two Blakely's Red Gum and one Rough-barked Apple.

The area of CEEC on the Subject Land does not fit the description of a high-quality occurrence of the CEEC due to its degraded condition in which trees are much more widely spaced than natural densities, patches are fragmented and overstorey species occur as scattered trees with no regeneration, the shrub layer has been removed and the ground cover is a mix of native and exotic species (TSSC, 2020). The native groundcover of this CEEC on the Subject Land is depauperate. PCT 266 Woodland (good) along the southern extent of the site contains 3.23% average cover of native groundcover species and PCT 281 Woodland (moderate) contains 0.89% cover. This low native groundcover is attributed to intense grazing pressure which has contributed to low litter cover and the presence of grazing-tolerant groundcover species such as the native grasses Common Couch (*Cynodon dactylon*), Slender Rat's Tail Grass (*Sporobolus creber*), Speargrass (*Austrostipa scabra*) and Weeping Grass (*Microlaena stipoides*). Habitat values of the CEEC present on the Subject Land are the presence of sixteen trees (15 hollow-bearing), native seeding grasses and winter-flowering eucalypt species (White Box) which provide potential habitat for wildlife, including potential foraging habitat for one Critically Endangered species (Regent Honeyeater).

The NSW Threatened Species Scientific Committee (2020) indicates that less than 10% of the original cover of Box Gum Woodland CEEC remains. However, there are no accurate published estimates of the amount

remaining or its precise distribution within its very wide former range on the NSW Tablelands and Slopes. Plant Community Types associated with the CEEC have been mapped through the State Vegetation Type Mapping (SVTM) program, which can be queried to provide estimates of the areas remaining within IBRA regions and subregions.

It is considered that remnants of the CEEC are likely to be responsive to management and that the losses from the Caerleon Stage 14 subdivision can be successfully offset through the improvement of remnants elsewhere via the relocation of fallen timber and felled trees to adjacent habitat.

Additional information to be considered in the assessment of the CEEC (BAM section 9.1.1) is given in **Table 26, Figure 11** and **Figure 12**.

Table 26. Assessment of the Box-Gum Woodland CEEC on the Subject Land as an SAI

Topic	Additional Information
Avoidance measures	The Stage 14 subdivision will result in the loss of 1.57 ha identified as the CEEC Box-Gum Woodland. Due to the subdivision layout, this area cannot be avoided.
Area of CEEC impacted	1.57 ha
Condition of the CEEC	The CEEC is in moderate to good condition: PCT 266 Woodland (good) has a VI score of 42.9 and PCT 281 Woodland (moderate) has a VI score of 36.8.
Exceedance of threshold	No threshold has been set for the CEEC in the TBDC (2020) to assess SAI status.
Extent and condition of the community in the surrounds	<p>The Subject Land is situated in an agricultural region where properties have similar characteristics. CEEC remnants on these properties are in similar condition to those on the Subject Land. The exception to this is the large remnant woodland patch (approximately 30,000 ha) which includes Avisford Nature Reserve, 800 m west of the Subject Land. This intact patch has avoided clearing and is likely to contain areas of Box-Gum Woodland due to the presence of White Box in the reserve and its location at a suitable elevation (500-900 m ASL) (NPWS, 2008).</p> <p>It is estimated that less than 10% of the original extent of Box-Gum Woodland remains (TSSC 2020). This is the result of extensive clearing throughout its ranges with remnants considered to be in poor condition, existing as small, isolated, highly fragmented patches with highly modified understories due to clearing and grazing pressures (TSSC 2020). Although the extent of Box-Gum Woodland in the area surrounding the Subject Land cannot be determined, the current extent of PCT 266 in the surrounds can be estimated using the BioNet Vegetation Classification (DPIE, 2021a). It is estimated prior to European settlement, the extent of PCT 266 was 800,000 ha. The current extent is estimated at 50,000 ha with 94% of the PCT cleared. The loss of 0.92 ha of PCT 266 Woodland on the Subject Land is considered to account for an additional loss of 0.002% of the remaining extent.</p> <p>GIS mapping, based on SVTM mapping and Stage 14 field survey, was used to estimate the extent areas of the CEEC as follows:</p> <p>Within 500 m around the Subject Land – 100.11 ha. Loss due to the Caerleon Stage 13 subdivision is 3.03 ha (3%) (Figure 12).</p>
Extent in IBRA sub-region	No specific information is available for the extent of the CEEC in the Inland Slopes sub-region.

Extent in the reserve system	No accurate published information is available on the extent of the CEEC within the reserve system in the South West Slopes Bioregion or the Inland Slopes Sub-region. Very small areas of the CEEC are known to occur in some reserves, most of which protect mainly PCTs on soils and landscapes that are not suitable for agriculture. Very small remnants of the CEEC may occur along valleys and creeks that run up into the drier hills of some reserves, and on small patches of favourable terrain land-locked within some reserves. Within the Mudgee district remnants occur in the Avisford Nature Reserve.
Other impacts	<p>The principal impact of the Caerleon Stage 14 subdivision is the loss of 1.57 ha of Box-Gum Woodland CEEC and the habitats that support it. However, due to the fixed location of the subdivision, this direct impact cannot be avoided. Accordingly, the proposal would not impact abiotic factors of importance to the CEEC, e.g.:</p> <ul style="list-style-type: none"> • The CEEC is not considered to be ground-water dependent. In any event, the proposal would not affect sub-surface aquifers and no natural groundwater reaches the surface within the Study Area or nearby. • It is conceivable, but highly unlikely, that the Caerleon Stage 14 subdivision may result in very localised changes to surface water flows that may impact individual trees belonging to the CEEC close to the disturbance area (i.e. the remnant woodland patch immediately west of the site). However, tree loss is more likely to occur due to natural dieback. • The Caerleon Stage 14 subdivision would not lead to any change in existing practices on the surrounding farm lands supporting the CEEC. Changes to the CEEC caused by farming are mainly historical, e.g. thinning/clearing of the overstorey, removal of the shrub layer and loss of most of the ground layer diversity through pasture improvement. • Invasion by weeds, pathogens and pests, which would normally be considered likely edge effects on intact ecosystems, has already occurred on a landscape-wide scale in the region, owing to historical agricultural land use. No other significant edge effects are likely to occur. • Similarly, the Stage 14 subdivision would not lead to an increase in invasive flora or fauna as any invasive flora or fauna present on the Subject Land is also considered likely to be present in the surrounding landscape due to agricultural land use.
Fragmentation	<p>All CEEC remnant woodland patches on the Subject Land are > 50 m apart and > 60 m away from the nearest tree in adjacent areas. These patches occur within a predominantly cleared agricultural area and are highly unlikely to contribute to habitat fragmentation in the surrounding landscape due to their lack of connectivity.</p> <p>There are no identified wildlife corridors or migratory flight paths traversing the Subject Land.</p>
Recovery measures	The Save Our Species Program has an extensive focus on protection of high-quality Box-Gum Woodland remnants and on the recovery of others (DPIE, 2021d). There are nine Priority Management Sites in the South West Slopes Bioregion, most of which are in the Inland Slopes Sub-region. These sites are in the area between Cowra and the Victorian border. The CEEC remnants on the Study Area are in far too degraded a condition to qualify for similar recovery actions from the Save Our Species program.

Conclusion

The Caerleon Stage 14 subdivision will require the permanent removal of 1.57 ha of Box-Gum Woodland CEEC which is not considered likely to contribute significantly to the risk of the CEEC becoming extinct. It is concluded that the Stage 14 subdivision does not represent a serious and irreversible impact on the Box Gum Woodland CEEC.

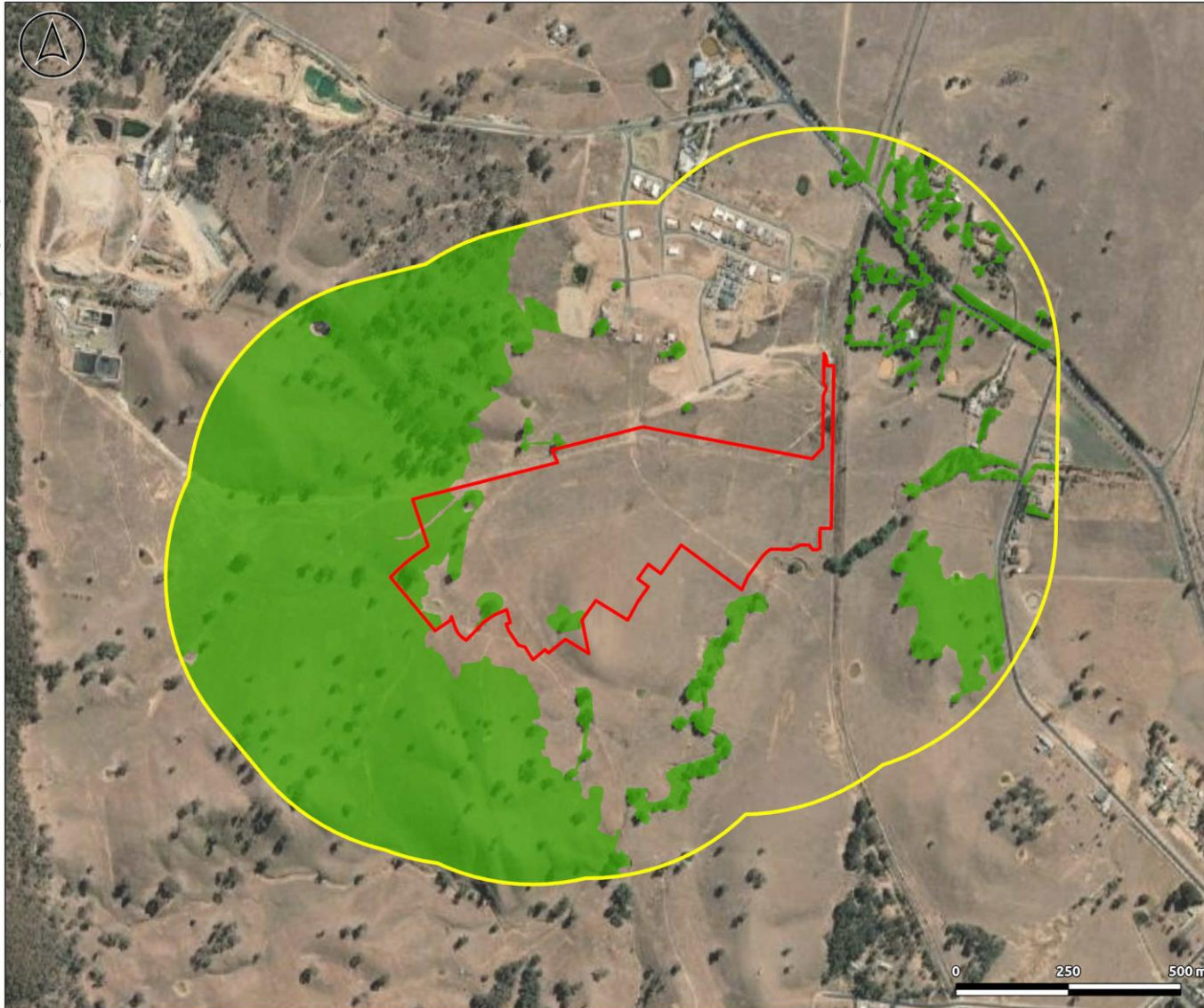
Figure 11. Box-Gum Woodland SAII on the Subject Land






Figure 12. Box-Gum Woodland SAII on the Subject Land and Surrounds

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Legend

-  Subject Land
-  500m Buffer
-  Box Gum Woodland CEEC Within 500m Buffer

4.4.2 REGENT HONEYEATER

The Threatened Species Data Collection (DPIE, 2021b) and SAII Guidance (DPIE, 2019b) have been consulted and one candidate threatened entity (Regent Honeyeater) on the Subject Land is considered to potentially be at risk of SAII. A small remnant woodland patch (0.17 ha) on the west of the Subject Land (including four Yellow Box trees) has been mapped as part of an Important Area for the Regent Honeyeater. Vegetation in this area (PCT 266 Woodland) was found to be in good condition with a VI score of 42.9 VI. As PCT 266 is above the threshold VI for a CEEC (VI 15), offsetting is required.

According to the Save Our Species Program, Mudgee is recognised as a Priority Management Site (217,328.55 ha) for the Regent Honeyeater. The Subject Land itself lies outside the boundary of this recognised area (DPIE, n.d.). On the Subject Land, the identified Important Area for this species (PCT 266 Woodland) contains four hollow bearing trees that are potential habitat for this species, however the habitat is considered to be highly degraded and unsuitable for nesting as it contains no shrubs and the groundcover is dominated by exotics species (3 % average native groundcover) with moderate quantities of Common Couch (*Cynodon dactylon*). The trees in this patch are not considered likely for nesting, foraging or as vectors for movement pathways through the landscape due to isolation, and lack of connection to the wider landscape (> 60 m from nearest tree).

Additional information to be considered in the assessment of the Regent Honeyeater (BAM section 10.2.2) is given in **Table 27** and **Figure 13**.

Table 27. Assessment of the Regent Honeyeater on the Subject Land as an SAII

Topic	Additional Information
Avoidance measures	The Stage 14 subdivision will result in the loss of 0.17 ha identified as part of an Important Area for the Regent Honeyeater. Due to the subdivision layout, this area cannot be avoided.
Size of local population	350-400 mature individuals (Garnett et al., 2011).
Exceedance of threshold	No threshold has been set for the Regent Honeyeater in the TBDC (2020) to assess SAII status.
Likely impact on habitat	<p><u>Estimate of the change in habitat available to the local population as a result of the proposed development:</u></p> <p>0.17 ha of mapped Important Areas for the Regent Honeyeater will be lost as a result of the proposed development. This loss is not anticipated to change habitat availability for this threatened species which is more common east of Mudgee in association with more suitable nesting, foraging and known breeding habitat. Therefore, the removal of four Yellow Box trees in a small remnant woodland patch adjoining cleared agricultural land is unlikely to significantly change habitat availability. This is because the loss of 0.17 ha only accounts for 0.00007% of the overall Regent Honeyeater Important Area within the Mudgee Priority Management Site (217,328.55 ha).</p> <p><u>The proposed loss, modification, destruction, or isolation of the available habitat used by the local population:</u></p> <p>The Stage 14 subdivision will result in the loss of four potential habitat trees (Yellow Box). This is unlikely to significantly impact the Regent Honeyeater as more suitable habitat trees are abundant in the surrounding area directly west and further east of the Subject Land.</p>

	<p><u>Modification of habitat required for the maintenance of processes important to the species' life cycle, genetic diversity and long-term evolutionary development:</u></p> <p>The removal of four potential habitat trees is unlikely to impact the species' life cycle as Regent Honeyeaters were not observed during targeted threatened species searches and are only likely to utilise the Subject Land when the White Box tree is flowering profusely. At such times, many other White Box trees would be flowering in the high quality habitat existing in the surrounding landscape. For this reason, the removal of four habitat trees is also unlikely to reduce genetic diversity and long-term evolutionary development because the species' geographical range will not be greatly reduced, dispersal pathways will not be significantly impacted, and their population size is unlikely to decrease as a result of this proposed development.</p>
<p>Likely impact on the ecology of the local population</p>	<p><u>Breeding:</u></p> <p>Breeding coincides with the flowering of eucalypt and mistletoe species and generally occurs during spring and summer (Franklin et al., 1989). This species commonly maintains one nesting site throughout their eight-year lifespan, however pairs have been recorded changing breeding sites between seasons (DE, 2016). Breeding territories (nest tree and surrounding foraging areas) may extend 5-40m from the nest tree (Higgins et al., 2001). The Mudgee-Wollar Priority Management Site has been mapped as a breeding area by the DAWE (DE, 2016). The Regent Honeyeater forms cup-shaped nests in the canopy of rough-barked, mature trees including Ironbarks (<i>Eucalyptus</i> spp.), Sheoaks (<i>Casuarina</i> spp.) and Rough-barked Apple (<i>Angophora floribunda</i>). Although Yellow Box are considered a key tree species, the Regent Honeyeater is highly unlikely to utilise these trees for breeding as they are > 60 m from the potential foraging trees (DE, 2016). The Subject Land is also considered too degraded and exposed to support this species which is more likely to inhabit the surrounding area which contains more suitable and protected nest trees (DE, 2016).</p> <p><u>Foraging:</u></p> <p>The Regent Honeyeater primarily feeds on <i>Eucalyptus</i> and mistletoe nectar, as well as invertebrates and fruit (DE, 2016). They prefer tall, mature eucalypt species with large DBH measurements. Three of the four Yellow Box trees mapped as an Important Area contain suitable DBH measurements and may be potential foraging trees. However, this is considered unlikely due to their isolation and the variety of foraging trees in the surrounding area. Due to this, the loss of four Yellow Box trees are not expected to impact the Regent Honeyeater's foraging capabilities. No mistletoe is present on the Subject Land.</p> <p><u>Roosting:</u></p> <p>The Regent Honeyeater roosts communally in small groups or large flocks in mature trees and saplings, however only in trees with dense foliage. Due to this, the Yellow Box trees on the Subject Land are considered unsuitable roosting trees due to their moderate canopy cover and isolation in the wider landscape.</p> <p><u>Dispersal or movement pathways:</u></p> <p>Mature scattered trees are considered vital for the movement of Regent Honeyeaters throughout agricultural areas, however the Yellow Box trees are > 70 m from the small remnant woodland patch west of the Subject Land. This small patch forms connects via paddock trees to the larger woodland patch further west which extends into Avisford Nature Reserve. The removal of four Yellow Box trees on the Subject Land is unlikely to impact the dispersal or movement pathways of the Regent Honeyeaters in the</p>

	surrounding landscape due to their isolation from this small, western remnant woodland patch.
Fragmentation or isolation	The proposed development is unlikely to fragment or isolate the local Regent Honeyeater population due to the presence of more suitably connected habitat exists in the surrounding area. The species is also well known in the Mudgee surrounds between Mudgee and Merriwa (ALA, 2021).
Relationship of local population to other populations of the species	Not applicable. The Regent Honeyeater is considered one population (TSSC, 2015)
Increased threats (invasive flora and fauna) and indirect impacts	<p>According to Ford et al (1993), Regent Honeyeaters nest together in aggregations to exclude larger honeyeaters from accessing a nectar source. As the population is in decline, aggregation such as these are rare, resulting in increased competition from aggressive honeyeaters (Noisy Miner), reducing the reproductive output of individual pairs. The removal of four potential habitat trees is unlikely to contribute to this issue as aggregations would not have been possible on the Subject Land due to its isolation from other foraging trees. Noisy Miners were also not recorded on the Subject Land during targeted surveys and are, therefore, unlikely to contribute additional pressure to breeding pairs in the surrounding area via dispersal.</p> <p>Australian Magpies were recorded on the Subject Land during targeted searches and according to the DAWE (2016), have been observed predated on Regent Honeyeater adults and eggs. The removal of four Yellow Box trees may increase predation in the surrounding landscape through the displacement of Magpies, however, this is considered unlikely to occur as it is likely any Magpie individuals present on the Subject Land also frequent the surrounds. Therefore, the displacement of Magpies on the Subject Land is unlikely to reduce the viability of the population.</p>
Estimate of the area or number of populations and size of populations	<p>The extent of occurrence for the Regent Honeyeater is 600,000 km², whereas the area of occupancy is 300 km² (TSSC, 2015). Both are considered to be declining.</p> <p>Estimate of area and size of populations is not available for within the Reserve System, IBRA regions and sub-regions.</p>
Measures to aid the recovery of the species in the IBRA subregion	The Regent Honeyeater is known to breed at Mudgee Priority Management Site, east of the Subject Land. This area is an active management site which benefits from habitat protection methods, fire planning, pest/weed control, restorative ecology and ongoing measures to assess threat status (DPIE, n.d.2)

Conclusion

The proposed activity will require the permanent removal of 0.17 ha of Important Area for the Regent Honeyeater which is not considered likely to contribute significantly to the risk of the species becoming extinct. It is concluded that the Stage 14 subdivision development does not represent a serious and irreversible impact on the Critically Endangered Regent Honeyeater.

Figure 13. Regent Honeyeater SAII on the Subject Land and Surrounds



4.5 MATTERS OF NATIONAL ENVIRONMENTAL SIGNIFICANCE

Matters of National Environmental Significance (DE, 2013) applies to the Critically Endangered Regent Honeyeater. A small remnant woodland patch (0.17 ha) on the west of the Subject Land (including four Yellow Box trees within PCT 266 Woodland Good) has been mapped as an Important Area for the Regent Honeyeater. The Caerleon Stage 14 subdivision will result in the loss of this mapped Important Area. Despite this, it is considered highly unlikely to have significant adverse effects on the Regent Honeyeater for the reasons outlined in **Table 27**.

The development is unlikely to lead to a long-term decrease in population size for the Regent Honeyeater which was not found during targeted searches. None of the four trees within the remnant woodland patch mapped as part of an Important Area for the Regent Honeyeater are considered suitable foraging or nesting trees due to their isolation and lack of connectivity to the surrounding landscape. Due to this, the removal of these trees is highly unlikely to reduce the population size, as it is not considered habitat critical to the survival of this species. More favourable habitat occurs in adjacent woodland areas with greater connectivity to the surrounding area. Yellow Box trees are not ideal nest trees, and no nests were identified during the site visits, therefore the removal of the four trees is highly unlikely to disrupt breeding. Given the absence of the Regent Honeyeater from the Subject Land, it is unlikely that the area of occupancy for this species will be affected by the subdivision. The loss of very low quality habitat for the proposed subdivision will not result in increased competition for suitable nesting or foraging habitat in surrounding areas as it is highly unlikely that the Subject Land being used at all by the species. The removal of habitat on the site may increase the prevalence of invasive species (aggressive honeyeaters and Australian Magpies) in the surrounds as they are displaced from the Subject Land. However the impact is unlikely to increase in severity as any individuals present on the Subject Land are also likely to already frequent the surrounding areas.

4.6 BIODIVERSITY OFFSETS

4.6.1 PREDICTED CREDITS FOR REMOVAL OF NATIVE VEGETATION

The proposed Caerleon Stage 14 subdivision will result in the permanent loss of 0.93 ha of PCT 266 Woodland (good), 2.64 ha of PCT 266 DNG (good), 5.29 ha of PCT 266 DNG (poor), 0.64 ha of PCT 281 Woodland (moderate) and 20.39 ha of PCT 281 Exotic Grassland (poor). The future VI score will be zero for all areas.

The BAM Credit Calculator valued the losses of:

- 0.93 ha of PCT 266 Woodland (good) at 25 credits
- 2.64 ha of PCT 266 DNG (good) at 42 credits
- 5.29 ha of PCT 266 DNG (poor) at 0 credits
- 0.64 ha of PCT 281 Woodland (moderate) at 15 credits
- 20.39 ha of PCT 281 Exotic Grassland (poor) at 0 credits

giving a total of 82 Ecosystem Credits.

4.6.2 CANDIDATE CREDITS FOR REMOVAL OF NATIVE VEGETATION

The impact of the proposed Caerleon Stage 14 subdivision on Species Credit Species is calculated as the loss of known habitat for the Regent Honeyeater. The credit liability is 5 Species Credits.

The biodiversity credit summary report is available in **Appendix C**.

4.6.3 VEGETATION CLEARANCE NOT REQUIRING OFFSETTING

Vegetation clearance not requiring offsetting includes 5.29 ha of PCT 266 DNG (poor) and 20.39 ha of PCT 281 Exotic Grassland.

4.7 CONCLUSIONS AND RECOMMENDATIONS

The proposed Caerleon Stage 14 residential subdivision will result in Ecosystem Credits and Species Credits for native vegetation removal as calculated by the BAM credit calculator. Caerleon Mudgee Pty Ltd is committed to satisfying the biodiversity credit requirements using offset mechanisms allowed by the NSW Biodiversity Offsets Scheme (i.e. contribution to the Biodiversity Trust Fund administered by the NSW Biodiversity Conservation Trust, purchase of existing credits on the market, funding of a biodiversity conservation action and retirement of biodiversity credits).

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APPENDIX A

PLANT SPECIES LIST

Quadrat	Scientific Name	Common Name	Native	Exotic	High Threat Weed (Manageable Yes/No)	BAM Growth Form Group	Cover	Abundance
Q1	<i>Cynodon dactylon</i>	Common Couch	YES			GG	30	500
Q1	<i>Chloris truncata</i>	Windmill Grass	YES			GG	20	1000
Q1	<i>Lolium rigidum</i>	Wimmera Ryegrass		YES			15	1000
Q1	<i>Eleusine tristachya</i>	Goose Grass		YES			10	300
Q1	<i>Eriochloa crebra</i>	Cup Grass, Tall Cupgrass	YES			GG	2	50
Q1	<i>Paspalum dilatatum</i>	Paspalum		YES	No		2	50
Q1	<i>Trifolium subterraneum</i>	Subterranean Clover		YES			2	500
Q1	<i>Rytidosperma caespitosum</i>	Ringed Wallaby Grass	YES			GG	1	30
Q1	<i>Bromus hordeaceus</i>	Soft Brome		YES			0.5	30
Q1	<i>Sporobolus creber</i>	Slender Rat's Tail Grass	YES			GG	0.2	100
Q1	<i>Alternanthera denticulata</i>	Lesser Joyweed	YES			FG	0.1	1
Q1	<i>Anthosachne scabra</i>	Wheatgrass	YES			GG	0.1	2
Q1	<i>Arctotheca calendula</i>	Capeweed		YES			0.1	1
Q1	<i>Avena barbata</i>	Bearded Oats		YES			0.1	1
Q1	<i>Bidens subalternans</i>	Greater Beggar's Ticks		YES	No		0.1	5
Q1	<i>Carthamus lanatus</i>	Saffron Thistle		YES	No		0.1	20
Q1	<i>Cheilanthes sieberi</i>	Rock Fern	YES			EG	0.1	1
Q1	<i>Conyza bonariensis</i>	Flaxleaf Fleabane		YES			0.1	1
Q1	<i>Gamochoeta calviceps</i>	Cudweed		YES			0.1	5
Q1	<i>Hypochaeris glabra</i>	Smooth Catsear		YES			0.1	10
Q1	<i>Hypochaeris radicata</i>	Catsear		YES			0.1	5
Q1	<i>Lepidium africanum</i>	Common Peppercross		YES			0.1	10
Q1	<i>Medicago polymorpha</i>	Burr Medic		YES			0.1	5
Q1	<i>Oxalis perennans</i>	Grassland Wood-sorrel	YES			FG	0.1	50
Q1	<i>Paronychia brasiliiana</i>	Chilean Whitlow Wort		YES			0.1	10
Q1	<i>Plantago lanceolata</i>	Lamb's Tongues		YES			0.1	1

Q1	<i>Polygonum aviculare</i>	Wireweed		YES			0.1	5
Q1	<i>Rumex brownii</i>	Swamp Dock	YES			FG	0.1	3
Q1	<i>Sonchus oleraceus</i>	Common Sowthistle		YES			0.1	2
Q1	<i>Vulpia muralis</i>	Wall Fescue		YES			0.1	20

Quadrat	Scientific Name	Common Name	Native	Exotic	High Threat Weed (Manageable Yes/No)	BAM Growth Form Group	Cover	Abundance
Q2	<i>Lolium rigidum</i>	Wimmera Ryegrass		YES			25	500
Q2	<i>Cynodon dactylon</i>	Common Couch	YES			GG	10	500
Q2	<i>Cenchrus clandestinus</i>	Kikuyu Grass		YES	No		10	50
Q2	<i>Paspalum dilatatum</i>	Paspalum		YES	No		2	50
Q2	<i>Trifolium subterraneum</i>	Subterranean Clover		YES			1	200
Q2	<i>Bromus hordeaceus</i>	Soft Brome		YES			1	30
Q2	<i>Hypochaeris radicata</i>	Catsear		YES			0.5	300
Q2	<i>Oxalis perennans</i>	Grassland Wood-sorrel	YES			FG	0.2	200
Q2	<i>Eleusine tristachya</i>	Goose Grass		YES			0.1	5
Q2	<i>Sporobolus creber</i>	Slender Rat's Tail Grass	YES			GG	0.1	1
Q2	<i>Carthamus lanatus</i>	Saffron Thistle		YES	No		0.1	2
Q2	<i>Conyza bonariensis</i>	Flaxleaf Fleabane		YES			0.1	2
Q2	<i>Hypochaeris glabra</i>	Smooth Catsear		YES			0.1	20
Q2	<i>Paronychia brasiliiana</i>	Chilean Whitlow Wort		YES			0.1	5
Q2	<i>Rumex brownii</i>	Swamp Dock	YES			FG	0.1	1
Q2	<i>Austrostipa scabra</i>	Speargrass	YES			GG	0.1	1
Q2	<i>Juncus subsecundus</i>	Finger Rush	YES			GG	0.1	2
Q2	<i>Modiola caroliniana</i>	Red-flowered Mallow		YES			0.1	6
Q2	<i>Vulpia myuros</i>	Rat's Tail Fescue		YES			0.1	10

Quadrat	Scientific Name	Common Name	Native	Exotic	High Threat Weed (Manageable Yes/No)	BAM Growth Form Group	Cover	Abundance
Q3	<i>Lolium rigidum</i>	Wimmera Ryegrass		YES			80	10000
Q3	<i>Eucalyptus blakelyi</i>	Blakely's Red Gum	YES			TG	10	1
Q3	<i>Trifolium subterraneum</i>	Subterranean Clover		YES			5	700
Q3	<i>Eleusine tristachya</i>	Goose Grass		YES			5	200
Q3	<i>Bromus catharticus</i>	Praire Grass		YES			5	30
Q3	<i>Hordeum leporinum</i>	Barley Grass		YES			2	100
Q3	<i>Bromus hordeaceus</i>	Soft Brome		YES			1.5	30
Q3	<i>Carthamus lanatus</i>	Saffron Thistle		YES	No		0.5	50
Q3	<i>Carduus pycnocephalus</i>	Slender Thistle		YES			0.5	100
Q3	<i>Modiola caroliniana</i>	Red-flowered Mallow		YES			0.2	100
Q3	<i>Dichondra repens</i>	Kidney Weed	YES			FG	0.2	100
Q3	<i>Hypochaeris radicata</i>	Catsear		YES			0.1	2
Q3	<i>Oxalis perennans</i>	Grassland Wood-sorrel	YES			FG	0.1	50
Q3	<i>Paronychia brasiliana</i>	Chilean Whitlow Wort		YES			0.1	20
Q3	<i>Rumex brownii</i>	Swamp Dock	YES			FG	0.1	3
Q3	<i>Juncus subsecundus</i>	Finger Rush	YES			GG	0.1	10
Q3	<i>Arctotheca calendula</i>	Capeweed		YES			0.1	1
Q3	<i>Bidens subalternans</i>	Greater Beggar's Ticks		YES	No		0.1	100
Q3	<i>Medicago polymorpha</i>	Burr Medic		YES			0.1	5
Q3	<i>Plantago lanceolata</i>	Lamb's Tongues		YES			0.1	20
Q3	<i>Polygonum aviculare</i>	Wireweed		YES			0.1	20
Q3	<i>Sonchus oleraceus</i>	Common Sowthistle		YES			0.1	5
Q3	<i>Vulpia muralis</i>	Wall Fescue		YES			0.1	2
Q3	<i>Capsella bursa-pastoris</i>	Shepherd's Purse		YES			0.1	2
Q3	<i>Carex inversa</i>	Knob Sedge	YES			GG	0.1	1
Q3	<i>Centaurea calcitrapa</i>	Star Thistle		YES			0.1	10
Q3	<i>Chenopodium album</i>	Fat Hen		YES			0.1	2

Q3	<i>Cotula australis</i>	Common Cotula	YES			FG	0.1	5
Q3	<i>Echium plantagineum</i>	Patterson's Curse		YES			0.1	20
Q3	<i>Erodium cicutarium</i>	Blue Crowfoot	YES			FG	0.1	10
Q3	<i>Foeniculum vulgare</i>	Fennel		YES			0.1	10
Q3	<i>Grona varians</i>	Slender Tick-trefoil	YES			OG	0.1	10
Q3	<i>Lepidium bonariense</i>	Argentine Peppergrass		YES			0.1	1
Q3	<i>Marrubium vulgare</i>	White Horehound		YES			0.1	2
Q3	<i>Silybum marianum</i>	Variiegated Thistle		YES			0.1	1
Q3	<i>Sisymbrium irio</i>	London Rocket		YES			0.1	20
Q3	<i>Taraxacum officinale</i>	Dandelion		YES			0.1	10
Q3	<i>Trifolium glomeratum</i>	Clustered Clover		YES			0.1	1
Q3	<i>Urtica urens</i>	Small Nettle		YES			0.1	20
Q3	<i>Verbena spp.</i>	A Verbena	YES			FG	0.1	1

Quadrat	Scientific Name	Common Name	Native	Exotic	High Threat Weed (Manageable Yes/No)	BAM Growth Form Group	Cover	Abundance
Q4	<i>Lolium rigidum</i>	Wimmera Ryegrass		YES			50	5000
Q4	<i>Bromus hordeaceus</i>	Soft Brome		YES			20	300
Q4	<i>Trifolium subterraneum</i>	Subterranean Clover		YES			5	300
Q4	<i>Microlaena stipoides</i>	Weeping Grass	YES			GG	1	100
Q4	<i>Juncus subsecundus</i>	Finger Rush	YES			GG	0.5	50
Q4	<i>Eleusine tristachya</i>	Goose Grass		YES			0.2	20
Q4	<i>Carthamus lanatus</i>	Saffron Thistle		YES	No		0.2	50
Q4	<i>Hypochaeris radicata</i>	Catsear		YES			0.1	20
Q4	<i>Oxalis perennans</i>	Grassland Wood-sorrel	YES			FG	0.1	200
Q4	<i>Paronychia brasiliana</i>	Chilean Whitlow Wort		YES			0.1	10
Q4	<i>Rumex brownii</i>	Swamp Dock	YES			FG	0.1	8
Q4	<i>Polygonum aviculare</i>	Wireweed		YES			0.1	20

Q4	<i>Echium plantagineum</i>	Patterson's Curse		YES			0.1	1
Q4	<i>Grona varians</i>	Slender Tick-trefoil	YES			OG	0.1	10
Q4	<i>Cynodon dactylon</i>	Common Couch	YES			GG	0.1	1
Q4	<i>Conyza bonariensis</i>	Flaxleaf Fleabane		YES			0.1	10
Q4	<i>Hypochaeris glabra</i>	Smooth Catsear		YES			0.1	2
Q4	<i>Chloris truncata</i>	Windmill Grass	YES			GG	0.1	1
Q4	<i>Briza minor</i>	Shivery Grass		YES			0.1	2
Q4	<i>Chondrilla juncea</i>	Skeleton Weed		YES			0.1	20
Q4	<i>Petrorhagia dubia</i>	Velvet Pink		YES			0.1	1
Q4	<i>Sida corrugata</i>	Corrugated Sida	YES			FG	0.1	5

Quadrat	Scientific Name	Common Name	Native	Exotic	High Threat Weed (Manageable Yes/No)	BAM Growth Form Group	Cover	Abundance
Q5	<i>Cynodon incompletus</i>	Blue Couch		YES			50	1000
Q5	<i>Eucalyptus albens</i>	White Box	YES			TG	40	2
Q5	<i>Bromus catharticus</i>	Praire Grass		YES			20	500
Q5	<i>Lolium rigidum</i>	Wimmera Ryegrass		YES			5	500
Q5	<i>Bromus hordeaceus</i>	Soft Brome		YES			2	50
Q5	<i>Lycium ferocissimum</i>	African Boxthorn		YES	Yes		2	2
Q5	<i>Hordeum leporinum</i>	Barley Grass		YES			1	50
Q5	<i>Sisymbrium irio</i>	London Rocket		YES			0.5	100
Q5	<i>Urtica urens</i>	Small Nettle		YES			0.5	50
Q5	<i>Carthamus lanatus</i>	Saffron Thistle		YES	No		0.2	20
Q5	<i>Polygonum aviculare</i>	Wireweed		YES			0.2	50
Q5	<i>Malva parviflora</i>	Small-flowered Mallow		YES			0.2	10
Q5	<i>Microlaena stipoides</i>	Weeping Grass	YES			GG	0.1	2
Q5	<i>Oxalis perennans</i>	Grassland Wood-sorrel	YES			FG	0.1	50
Q5	<i>Paronychia brasiliiana</i>	Chilean Whitlow Wort		YES			0.1	20

Q5	<i>Conyza bonariensis</i>	Flaxleaf Fleabane		YES			0.1	10
Q5	<i>Hypochaeris glabra</i>	Smooth Catsear		YES			0.1	10
Q5	<i>Modiola caroliniana</i>	Red-flowered Mallow		YES			0.1	5
Q5	<i>Bidens subalternans</i>	Greater Beggar's Ticks		YES	No		0.1	100
Q5	<i>Medicago polymorpha</i>	Burr Medic		YES			0.1	2
Q5	<i>Sonchus oleraceus</i>	Common Sowthistle		YES			0.1	1
Q5	<i>Capsella bursa-pastoris</i>	Shepherd's Purse		YES			0.1	30
Q5	<i>Centaurea calcitrapa</i>	Star Thistle		YES			0.1	1
Q5	<i>Chenopodium album</i>	Fat Hen		YES			0.1	3
Q5	<i>Lepidium bonariense</i>	Argentine Peppergrass		YES			0.1	20
Q5	<i>Trifolium glomeratum</i>	Clustered Clover		YES			0.1	30
Q5	<i>Austrostipa scabra</i>	Speargrass	YES			GG	0.1	2
Q5	<i>Gamochaeta calviceps</i>	Cudweed		YES			0.1	1
Q5	<i>Lepidium africanum</i>	Common Peppergrass		YES			0.1	5
Q5	<i>Euchiton sphaericus</i>	Star Cudweed	YES			FG	0.1	1
Q5	<i>Lolium perenne</i>	Perennial Ryegrass		YES			0.1	3

Quadrat	Scientific Name	Common Name	Native	Exotic	High Threat Weed (Manageable Yes/No)	BAM Growth Form Group	Cover	Abundance
Q7	<i>Sporobolus creber</i>	Slender Rat's Tail Grass	YES			GG	50	1000
Q7	<i>Eragrostis parviflora</i>	Weeping Lovegrass	YES			GG	25	500
Q7	<i>Cynodon dactylon</i>	Common Couch	YES			GG	10	500
Q7	<i>Chloris truncata</i>	Windmill Grass	YES			GG	3	100
Q7	<i>Bothriochloa macra</i>	Red Grass	YES			GG	3	500
Q7	<i>Juncus subsecundus</i>	Finger Rush	YES			GG	1	100
Q7	<i>Rytidosperma caespitosum</i>	Ringed Wallaby Grass	YES			GG	1	20
Q7	<i>Eragrostis leptostachya</i>	Paddock Lovegrass	YES			GG	1	50
Q7	<i>Hypericum perforatum</i>	St. Johns Wort		YES	No		0.3	20

Q7	<i>Carthamus lanatus</i>	Saffron Thistle		YES	No		0.2	50
Q7	<i>Conyza bonariensis</i>	Flaxleaf Fleabane		YES			0.2	500
Q7	<i>Digitaria divaricatissima</i>	Umbrella Grass	YES			GG	0.2	30
Q7	<i>Panicum effusum</i>	Hairy Panic	YES			GG	0.2	30
Q7	<i>Paspalidium distans</i>	Shotgrass	YES			GG	0.2	20
Q7	<i>Bromus hordeaceus</i>	Soft Brome		YES			0.1	1
Q7	<i>Polygonum aviculare</i>	Wireweed		YES			0.1	5
Q7	<i>Oxalis perennans</i>	Grassland Wood-sorrel	YES			FG	0.1	100
Q7	<i>Paronychia brasiliiana</i>	Chilean Whitlow Wort		YES			0.1	1
Q7	<i>Bidens subalternans</i>	Greater Beggar's Ticks		YES	No		0.1	1
Q7	<i>Lepidium bonariense</i>	Argentine Peppercross		YES			0.1	2
Q7	<i>Austrostipa scabra</i>	Speargrass	YES			GG	0.1	20
Q7	<i>Gamochoeta calviceps</i>	Cudweed		YES			0.1	1
Q7	<i>Euchiton sphaericus</i>	Star Cudweed	YES			FG	0.1	200
Q7	<i>Trifolium subterraneum</i>	Subterranean Clover		YES			0.1	30
Q7	<i>Eleusine tristachya</i>	Goose Grass		YES			0.1	10
Q7	<i>Hypochaeris radicata</i>	Catsear		YES			0.1	50
Q7	<i>Rumex brownii</i>	Swamp Dock	YES			FG	0.1	20
Q7	<i>Sida corrugata</i>	Corrugated Sida	YES			FG	0.1	1
Q7	<i>Dichondra repens</i>	Kidney Weed	YES			FG	0.1	2
Q7	<i>Vulpia myuros</i>	Rat's Tail Fescue		YES			0.1	3
Q7	<i>Alternanthera denticulata</i>	Lesser Joyweed	YES			FG	0.1	2
Q7	<i>Anthosachne scabra</i>	Wheatgrass	YES			GG	0.1	10
Q7	<i>Cheilanthes sieberi</i>	Rock Fern	YES			EG	0.1	20
Q7	<i>Dysphania pumilio</i>	Small Crumbweed	YES			FG	0.1	10
Q7	<i>Eragrostis brownii</i>	Brown's Lovegrass	YES			GG	0.1	10
Q7	<i>Poa annua</i>	Winter Grass		YES			0.1	10
Q7	<i>Spergularia rubra</i>	Sandspurry		YES			0.1	2

Q7	<i>Wahlenbergia gracilis</i>	Sprawling Bluebell	YES			FG	0.1	100
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Quadrat	Scientific Name	Common Name	Native	Exotic	High Threat Weed (Manageable Yes/No)	BAM Growth Form Group	Cover	Abundance
Q8	<i>Sporobolus creber</i>	Slender Rat's Tail Grass	YES			GG	60	1000
Q8	<i>Cynodon dactylon</i>	Common Couch	YES			GG	15	500
Q8	<i>Eragrostis brownii</i>	Brown's Lovegrass	YES			GG	15	1000
Q8	<i>Eragrostis parviflora</i>	Weeping Lovegrass	YES			GG	10	300
Q8	<i>Paspalidium distans</i>	Shotgrass	YES			GG	5	100
Q8	<i>Chloris truncata</i>	Windmill Grass	YES			GG	2	100
Q8	<i>Bothriochloa macra</i>	Red Grass	YES			GG	1	200
Q8	<i>Digitaria divaricatissima</i>	Umbrella Grass	YES			GG	1	100
Q8	<i>Conyza bonariensis</i>	Flaxleaf Fleabane		YES			0.5	500
Q8	<i>Aristida ramosa</i>	Purple Wiregrass	YES			GG	0.5	10
Q8	<i>Bolboschoenus caldwellii</i>	Marsh Club-rush	YES			GG	0.5	200
Q8	<i>Eragrostis leptostachya</i>	Paddock Lovegrass	YES			GG	0.2	30
Q8	<i>Panicum effusum</i>	Hairy Panic	YES			GG	0.2	20
Q8	<i>Austrostipa scabra</i>	Speargrass	YES			GG	0.2	20
Q8	<i>Juncus subsecundus</i>	Finger Rush	YES			GG	0.1	1
Q8	<i>Rytidosperma caespitosum</i>	Ringed Wallaby Grass	YES			GG	0.1	5
Q8	<i>Carthamus lanatus</i>	Saffron Thistle		YES	No		0.1	10
Q8	<i>Oxalis perennans</i>	Grassland Wood-sorrel	YES			FG	0.1	50
Q8	<i>Bidens subalternans</i>	Greater Beggar's Ticks		YES	No		0.1	2
Q8	<i>Gamochaeta calviceps</i>	Cudweed		YES			0.1	20
Q8	<i>Euchiton sphaericus</i>	Star Cudweed	YES			FG	0.1	50
Q8	<i>Hypochaeris radicata</i>	Catsear		YES			0.1	5
Q8	<i>Dichondra repens</i>	Kidney Weed	YES			FG	0.1	10
Q8	<i>Vulpia myuros</i>	Rat's Tail Fescue		YES			0.1	20

Q8	<i>Alternanthera denticulata</i>	Lesser Joyweed	YES			FG	0.1	2
Q8	<i>Anthosachne scabra</i>	Wheatgrass	YES			GG	0.1	5
Q8	<i>Cheilanthes sieberi</i>	Rock Fern	YES			EG	0.1	20
Q8	<i>Spergularia rubra</i>	Sandspurry		YES			0.1	1
Q8	<i>Wahlenbergia gracilis</i>	Sprawling Bluebell	YES			FG	0.1	50
Q8	<i>Trifolium glomeratum</i>	Clustered Clover		YES			0.1	1
Q8	<i>Eriochloa crebra</i>	Cup Grass, Tall Cupgrass	YES			GG	0.1	10
Q8	<i>Portulaca oleracea</i>	Pigweed	YES			FG	0.1	2
Q8	<i>Senecio jacobaea</i>	Ragwort		YES	No		0.1	5
Q8	<i>Tricoryne elatior</i>	Yellow Autumn-lily	YES			FG	0.1	2
Q8	<i>Verbena bonariensis</i>	Purpletop		YES			0.1	4

Quadrat	Scientific Name	Common Name	Native	Exotic	High Threat Weed (Manageable Yes/No)	BAM Growth Form Group	Cover	Abundance
Q10	<i>Sporobolus creber</i>	Slender Rat's Tail Grass	YES			GG	40	500
Q10	<i>Paspalidium distans</i>	Shotgrass	YES			GG	20	500
Q10	<i>Bothriochloa macra</i>	Red Grass	YES			GG	15	200
Q10	<i>Eleusine tristachya</i>	Goose Grass		YES			10	300
Q10	<i>Conyza bonariensis</i>	Flaxleaf Fleabane		YES			1	2000
Q10	<i>Eragrostis leptostachya</i>	Paddock Lovegrass	YES			GG	1	40
Q10	<i>Juncus subsecundus</i>	Finger Rush	YES			GG	1	50
Q10	<i>Microlaena stipoides</i>	Weeping Grass	YES			GG	1	100
Q10	<i>Anthosachne scabra</i>	Wheatgrass	YES			GG	0.5	30
Q10	<i>Bromus hordeaceus</i>	Soft Brome		YES			0.5	50
Q10	<i>Carex inversa</i>	Knob Sedge	YES			GG	0.5	40
Q10	<i>Paspalum dilatatum</i>	Paspalum		YES	No		0.5	20
Q10	<i>Oxalis perennans</i>	Grassland Wood-sorrel	YES			FG	0.2	300
Q10	<i>Trifolium subterraneum</i>	Subterranean Clover		YES			0.2	100

Q10	<i>Eragrostis parviflora</i>	Weeping Lovegrass	YES			GG	0.1	20
Q10	<i>Chloris truncata</i>	Windmill Grass	YES			GG	0.1	10
Q10	<i>Digitaria divaricatissima</i>	Umbrella Grass	YES			GG	0.1	1
Q10	<i>Rytidosperma caespitosum</i>	Ringed Wallaby Grass	YES			GG	0.1	5
Q10	<i>Carthamus lanatus</i>	Saffron Thistle		YES	No		0.1	50
Q10	<i>Bidens subalternans</i>	Greater Beggar's Ticks		YES	No		0.1	20
Q10	<i>Gamochaeta calviceps</i>	Cudweed		YES			0.1	20
Q10	<i>Euchiton sphaericus</i>	Star Cudweed	YES			FG	0.1	50
Q10	<i>Dichondra repens</i>	Kidney Weed	YES			FG	0.1	30
Q10	<i>Vulpia myuros</i>	Rat's Tail Fescue		YES			0.1	10
Q10	<i>Alternanthera denticulata</i>	Lesser Joyweed	YES			FG	0.1	5
Q10	<i>Verbena bonariensis</i>	Purpletop		YES			0.1	2
Q10	<i>Paronychia brasiliana</i>	Chilean Whitlow Wort		YES			0.1	2
Q10	<i>Lepidium bonariense</i>	Argentine Peppergrass		YES			0.1	1
Q10	<i>Rumex brownii</i>	Swamp Dock	YES			FG	0.1	10
Q10	<i>Modiola caroliniana</i>	Red-flowered Mallow		YES			0.1	20
Q10	<i>Lepidium africanum</i>	Common Peppergrass		YES			0.1	1
Q10	<i>Plantago lanceolata</i>	Lamb's Tongues		YES			0.1	3
Q10	<i>Carum carvi</i>	Caraway		YES			0.1	5
Q10	<i>Hypericum gramineum</i>	Small St John's Wort	YES			FG	0.1	10
Q10	<i>Juncus australis</i>	Austral Rush	YES			GG	0.1	1
Q10	<i>Lactuca serriola</i>	Prickly Lettuce		YES			0.1	1
Q10	<i>Lysimachia arvensis</i>	Scarlet Pimpernel		YES			0.1	1
Q10	<i>Mentha satuireioides</i>	Native Pennyroyal	YES			FG	0.1	30
Q10	<i>Petrorhagia nanteuilii</i>	Proliferous Pink		YES			0.1	5
Q10	<i>Trifolium campestre</i>	Hop Clover		YES			0.1	1
Q10	<i>Xanthium spinosum</i>	Bathurst Burr		YES	No		0.1	1

Quadrat	Scientific Name	Common Name	Native	Exotic	High Threat Weed (Manageable Yes/No)	BAM Growth Form Group	Cover	Abundance
Q11	<i>Bromus hordeaceus</i>	Soft Brome		YES			30	300
Q11	<i>Lolium rigidum</i>	Wimmera Ryegrass		YES			15	500
Q11	<i>Cynodon dactylon</i>	Common Couch	YES			GG	10	500
Q11	<i>Paspalum dilatatum</i>	Paspalum		YES	No		5	100
Q11	<i>Eleusine tristachya</i>	Goose Grass		YES			3	300
Q11	<i>Microlaena stipoides</i>	Weeping Grass	YES			GG	1	50
Q11	<i>Trifolium subterraneum</i>	Subterranean Clover		YES			1	500
Q11	<i>Vulpia myuros</i>	Rat's Tail Fescue		YES			0.5	20
Q11	<i>Juncus subsecundus</i>	Finger Rush	YES			GG	0.3	9
Q11	<i>Oxalis perennans</i>	Grassland Wood-sorrel	YES			FG	0.2	200
Q11	<i>Hypochaeris radicata</i>	Catsear		YES			0.2	100
Q11	<i>Sporobolus creber</i>	Slender Rat's Tail Grass	YES			GG	0.1	1
Q11	<i>Conyza bonariensis</i>	Flaxleaf Fleabane		YES			0.1	1
Q11	<i>Anthosachne scabra</i>	Wheatgrass	YES			GG	0.1	2
Q11	<i>Carthamus lanatus</i>	Saffron Thistle		YES	No		0.1	10
Q11	<i>Paronychia brasiliiana</i>	Chilean Whitlow Wort		YES			0.1	10
Q11	<i>Modiola caroliniana</i>	Red-flowered Mallow		YES			0.1	5
Q11	<i>Hypochaeris glabra</i>	Smooth Catsear		YES			0.1	50
Q11	<i>Verbena quadrangularis</i>	A Verbena		YES			0.1	5

Quadrat	Scientific Name	Common Name	Native	Exotic	High Threat Weed (Manageable Yes/No)	BAM Growth Form Group	Cover	Abundance
Q12	<i>Austrostipa pubescens</i>	Tall Speargrass	YES			GG	40	500
Q12	<i>Lolium rigidum</i>	Wimmera Ryegrass		YES			10	300
Q12	<i>Microlaena stipoides</i>	Weeping Grass	YES			GG	10	100
Q12	<i>Rytidosperma fulvum</i>	Wallaby Grass	YES			GG	10	200

Q12	<i>Juncus alexandri subsp. Melanobasis</i>	A Rush	YES			GG	5	50
Q12	<i>Euchiton sphaericus</i>	Star Cudweed	YES			FG	3	10000
Q12	<i>Anthosachne scabra</i>	Wheatgrass	YES			GG	2	50
Q12	<i>Vulpia myuros</i>	Rat's Tail Fescue		YES			1	100
Q12	<i>Rytidosperma caespitosum</i>	Ringed Wallaby Grass	YES			GG	1	200
Q12	<i>Gamochaeta calviceps</i>	Cudweed		YES			1	5000
Q12	<i>Trifolium subterraneum</i>	Subterranean Clover		YES			0.5	100
Q12	<i>Dichelachne micrantha</i>	Shorthair Plumegrass	YES			GG	0.5	10
Q12	<i>Rytidosperma carphoides</i>	Short Wallaby Grass	YES			GG	0.5	100
Q12	<i>Conyza bonariensis</i>	Flaxleaf Fleabane		YES			0.2	200
Q12	<i>Hypochaeris glabra</i>	Smooth Catsear		YES			0.2	50
Q12	<i>Rytidosperma racemosum</i>	Wallaby Grass	YES			GG	0.2	3
Q12	<i>Cynodon dactylon</i>	Common Couch	YES			GG	0.1	20
Q12	<i>Oxalis perennans</i>	Grassland Wood-sorrel	YES			FG	0.1	50
Q12	<i>Sporobolus creber</i>	Slender Rat's Tail Grass	YES			GG	0.1	20
Q12	<i>Carthamus lanatus</i>	Saffron Thistle		YES	No		0.1	50
Q12	<i>Paronychia brasiliiana</i>	Chilean Whitlow Wort		YES			0.1	2
Q12	<i>Verbena quadrangularis</i>	A Verbena		YES			0.1	1
Q12	<i>Carex inversa</i>	Knob Sedge	YES			GG	0.1	3
Q12	<i>Bidens subalternans</i>	Greater Beggar's Ticks		YES	No		0.1	10
Q12	<i>Rumex brownii</i>	Swamp Dock	YES			FG	0.1	1
Q12	<i>Hypericum gramineum</i>	Small St John's Wort	YES			FG	0.1	50
Q12	<i>Lactuca serriola</i>	Prickly Lettuce		YES			0.1	1
Q12	<i>Aristida ramosa</i>	Purple Wiregrass	YES			GG	0.1	1
Q12	<i>Cheilanthes sieberi</i>	Rock Fern	YES			EG	0.1	100
Q12	<i>Trifolium glomeratum</i>	Clustered Clover		YES			0.1	5
Q12	<i>Sonchus oleraceus</i>	Common Sowthistle		YES			0.1	2
Q12	<i>Briza minor</i>	Shivery Grass		YES			0.1	5

Q12	<i>Chondrilla juncea</i>	Skeleton Weed		YES			0.1	2
Q12	<i>Petrorhagia dubia</i>	Velvet Pink		YES			0.1	100
Q12	<i>Aira elegantissima</i>	Delicate Hairgrass		YES			0.1	100
Q12	<i>Arthropodium fimbriatum</i>	Nodding Chocolate Lily	YES			FG	0.1	10
Q12	<i>Bothriochloa decipiens</i>	Pitted Bluegrass	YES			GG	0.1	10
Q12	<i>Centaureum erythraea</i>	Common Centaury		YES			0.1	5
Q12	<i>Crassula sieberiana</i>	Australian Stonecrop	YES			FG	0.1	5
Q12	<i>Daucus glochidiatus</i>	Native Carrot	YES			FG	0.1	30
Q12	<i>Dichondra sp. Inglewood</i>	Silky Kidney-weed	YES			FG	0.1	30
Q12	<i>Einadia polygonoides</i>	Knotweed Goosefoot	YES			FG	0.1	10
Q12	<i>Linaria arvensis</i>	Corn Toadflax		YES			0.1	10
Q12	<i>Paspalidium gracile</i>	Slender Panic	YES			GG	0.1	2
Q12	<i>Pseudognaphalium luteoalbum</i>	Jersey Cudweed	YES			FG	0.1	1
Q12	<i>Setaria pumila</i>	Pale Pigeon Grass		YES			0.1	1
Q12	<i>Spergularia marina</i>	Lesser Sea-spurrey	YES			FG	0.1	2
Q12	<i>Trifolium arvense</i>	Haresfoot Clover		YES			0.1	10
Q12	<i>Triptilodiscus pygmaeus</i>	Common Sunray	YES			FG	0.1	5
Q12	<i>Wahlenbergia communis</i>	Tufted Bluebell	YES			FG	0.1	20

Quadrat	Scientific Name	Common Name	Native	Exotic	High Threat Weed (Manageable Yes/No)	BAM Growth Form Group	Cover	Abundance
Q14	<i>Lolium rigidum</i>	Wimmera Ryegrass		YES			50	5000
Q14	<i>Cynodon dactylon</i>	Common Couch	YES			GG	20	500
Q14	<i>Carthamus lanatus</i>	Saffron Thistle		YES	No		15	300
Q14	<i>Bromus hordeaceus</i>	Soft Brome		YES			5	100
Q14	<i>Paspalum dilatatum</i>	Paspalum		YES	No		5	100
Q14	<i>Sporobolus creber</i>	Slender Rat's Tail Grass	YES			GG	1	200

Q14	<i>Eleusine tristachya</i>	Goose Grass		YES			1	40
Q14	<i>Oxalis perennans</i>	Grassland Wood-sorrel	YES			FG	0.5	300
Q14	<i>Chloris truncata</i>	Windmill Grass	YES			GG	0.5	50
Q14	<i>Eriochloa crebra</i>	Cup Grass, Tall Cupgrass	YES			GG	0.2	30
Q14	<i>Vulpia muralis</i>	Wall Fescue		YES			0.2	30
Q14	<i>Euchiton sphaericus</i>	Star Cudweed	YES			FG	0.1	10
Q14	<i>Gamochaeta calviceps</i>	Cudweed		YES			0.1	20
Q14	<i>Conyza bonariensis</i>	Flaxleaf Fleabane		YES			0.1	10
Q14	<i>Hypochaeris glabra</i>	Smooth Catsear		YES			0.1	50
Q14	<i>Rytidosperma racemosum</i>	Wallaby Grass	YES			GG	0.1	5
Q14	<i>Paronychia brasiliiana</i>	Chilean Whitlow Wort		YES			0.1	5
Q14	<i>Bidens subalternans</i>	Greater Beggar's Ticks		YES	No		0.1	5
Q14	<i>Rumex brownii</i>	Swamp Dock	YES			FG	0.1	1
Q14	<i>Sonchus oleraceus</i>	Common Sowthistle		YES			0.1	1
Q14	<i>Trifolium arvense</i>	Haresfoot Clover		YES			0.1	1
Q14	<i>Wahlenbergia communis</i>	Tufted Bluebell	YES			FG	0.1	10
Q14	<i>Juncus subsecundus</i>	Finger Rush	YES			GG	0.1	1
Q14	<i>Hypochaeris radicata</i>	Catsear		YES			0.1	10
Q14	<i>Modiola caroliniana</i>	Red-flowered Mallow		YES			0.1	5
Q14	<i>Plantago lanceolata</i>	Lamb's Tongues		YES			0.1	1
Q14	<i>Polygonum aviculare</i>	Wireweed		YES			0.1	10
Q14	<i>Echium plantagineum</i>	Patterson's Curse		YES			0.1	2
Q14	<i>Arctotheca calendula</i>	Capeweed		YES			0.1	1

Quadrat	Scientific Name	Common Name	Native	Exotic	High Threat Weed (Manageable Yes/No)	BAM Growth Form Group	Cover	Abundance
Q15	<i>Cenchrus clandestinus</i>	Kikuyu Grass		YES	No		40	300
Q15	<i>Eucalyptus melliodora</i>	Yellow Box	YES			TG	40	2

Q15	<i>Bromus catharticus</i>	Praire Grass		YES			20	200
Q15	<i>Cynodon dactylon</i>	Common Couch	YES			GG	5	100
Q15	<i>Eleusine tristachya</i>	Goose Grass		YES			5	300
Q15	<i>Lycium ferocissimum</i>	African Boxthorn		YES	Yes		1	2
Q15	<i>Urtica urens</i>	Small Nettle		YES			1	500
Q15	<i>Sporobolus creber</i>	Slender Rat's Tail Grass	YES			GG	0.5	20
Q15	<i>Cirsium vulgare</i>	Spear Thistle		YES			0.3	1
Q15	<i>Juncus subsecundus</i>	Finger Rush	YES			GG	0.2	50
Q15	<i>Trifolium subterraneum</i>	Subterranean Clover		YES			0.2	100
Q15	<i>Marrubium vulgare</i>	White Horehound		YES			0.2	5
Q15	<i>Schinus molle</i>	Pepper Tree		YES			0.2	1
Q15	<i>Carthamus lanatus</i>	Saffron Thistle		YES	No		0.1	1
Q15	<i>Bromus hordeaceus</i>	Soft Brome		YES			0.1	2
Q15	<i>Paspalum dilatatum</i>	Paspalum		YES	No		0.1	3
Q15	<i>Chloris truncata</i>	Windmill Grass	YES			GG	0.1	20
Q15	<i>Eriochloa crebra</i>	Cup Grass, Tall Cupgrass	YES			GG	0.1	10
Q15	<i>Euchiton sphaericus</i>	Star Cudweed	YES			FG	0.1	1
Q15	<i>Gamochaeta calviceps</i>	Cudweed		YES			0.1	1
Q15	<i>Conyza bonariensis</i>	Flaxleaf Fleabane		YES			0.1	30
Q15	<i>Paronychia brasiliana</i>	Chilean Whitlow Wort		YES			0.1	2
Q15	<i>Rumex brownii</i>	Swamp Dock	YES			FG	0.1	15
Q15	<i>Sonchus oleraceus</i>	Common Sowthistle		YES			0.1	10
Q15	<i>Modiola caroliniana</i>	Red-flowered Mallow		YES			0.1	20
Q15	<i>Plantago lanceolata</i>	Lamb's Tongues		YES			0.1	50
Q15	<i>Polygonum aviculare</i>	Wireweed		YES			0.1	30
Q15	<i>Hypericum gramineum</i>	Small St John's Wort	YES			FG	0.1	10
Q15	<i>Trifolium glomeratum</i>	Clustered Clover		YES			0.1	30
Q15	<i>Paspalidium distans</i>	Shotgrass	YES			GG	0.1	2

Q15	<i>Bothriochloa macra</i>	Red Grass	YES			GG	0.1	2
Q15	<i>Eragrostis leptostachya</i>	Paddock Lovegrass	YES			GG	0.1	5
Q15	<i>Eragrostis parviflora</i>	Weeping Lovegrass	YES			GG	0.1	30
Q15	<i>Dichondra repens</i>	Kidney Weed	YES			FG	0.1	5
Q15	<i>Alternanthera denticulata</i>	Lesser Joyweed	YES			FG	0.1	2
Q15	<i>Lepidium bonariense</i>	Argentine Peppergrass		YES			0.1	2
Q15	<i>Lepidium africanum</i>	Common Peppergrass		YES			0.1	10
Q15	<i>Xanthium spinosum</i>	Bathurst Burr		YES	No		0.1	2
Q15	<i>Portulaca oleracea</i>	Pigweed	YES			FG	0.1	3
Q15	<i>Dysphania pumilio</i>	Small Crumbweed	YES			FG	0.1	30
Q15	<i>Malva parviflora</i>	Small-flowered Mallow		YES			0.1	1
Q15	<i>Chenopodium album</i>	Fat Hen		YES			0.1	10
Q15	<i>Cotula australis</i>	Common Cotula	YES			FG	0.1	1
Q15	<i>Taraxacum officinale</i>	Dandelion		YES			0.1	2
Q15	<i>Agrostis capillaris</i>	Browntop Bent		YES	No		0.1	10
Q15	<i>Hirschfeldia incana</i>	Buchan Weed		YES			0.1	25
Q15	<i>Juncus bufonius</i>	Toad Rush		YES			0.1	10
Q15	<i>Phytolacca icosandra</i>	Dyeberry		YES			0.1	3
Q15	<i>Schoenus apogon</i>	Fluke Bogrush	YES			GG	0.1	5
Q15	<i>Solanum nigrum</i>	Black-berry Nightshade		YES			0.1	1

Growth Form Groups: Tree (TG), Shrub (SG), Grass and Grass-like (GG), Forb (FG), Fern (EG), Other (OG)



APPENDIX B

FAUNA SPECIES LIST

Scientific Name	Common Name	1.12.2021	2.12.2021
<i>Alisterus scapularis</i>	Australian king parrot	-	✓
<i>Chenonetta jubata</i>	Australian wood duck	✓	-
<i>Corvus bennetti</i>	Little crow	-	✓
<i>Cygnus atratus</i>	Black swan	✓	-
<i>Eolophus roseicapilla</i>	Galah	✓	✓
<i>Falco berigora</i>	Brown falcon	-	✓
<i>Falco longipennis</i>	Australian hobby	✓	-
<i>Grallina cyanoleuca</i>	Magpie-lark	✓	-
<i>Gymnorhina tibicen</i>	Australian Magpie	-	✓
<i>Litoria peronii</i>	Peron's tree frog	✓	-
<i>Megalurus mathewsi</i>	Rufous songlark	-	✓
<i>Melithreptus lunatus</i>	White-naped honeyeater	✓	-
<i>Platycercus eximius</i>	Eastern rosella	-	✓
<i>Psephotus haematonotus</i>	Red-rumped parrot	-	✓
<i>Rhipidura leucophrys</i>	Willie wagtail	✓	-
<i>Sturnus vulgaris</i>	Common starling	✓	✓



APPENDIX C

CREDIT SUMMARY REPORT



BAM Credit Summary Report

Proposal Details

Assessment Id	Proposal Name	BAM data last updated *
00031895/BAAS21027/22/00031896	319171 Caerleon Stage 14 Subdivision	24/11/2021
Assessor Name	Report Created	BAM Data version *
Sally Kirby	22/03/2022	50
Assessor Number	BAM Case Status	Date Finalised
BAAS21027	Finalised	22/03/2022
Assessment Revision	Assessment Type	BOS entry trigger
0	Part 4 Developments (General)	BOS Threshold: Biodiversity Values Map and area clearing threshold

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

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

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

Rough-Barked Apple - red gum - Yellow Box woodland on alluvial clay to loam soils on valley flats in the northern NSW South Western Slopes Bioregion and Brigalow Belt South Bioregion												
1	281_Exotic Grassland	White Box - Yellow Box - Blakely's Red Gum Grassy Woodland and Derived Native Grassland in the NSW North Coast, New England Tableland, Nandewar, Brigalow Belt South, Sydney Basin, South Eastern Highla	14.9	14.9	20.4	PCT Cleared - 67%	High Sensitivity to Potential Gain	Critically Endangered Ecological Community	Critically Endangered	2.50	TRUE	0



BAM Credit Summary Report

2	281_Wood_MOD	White Box - Yellow Box - Blakely's Red Gum Grassy Woodland and Derived Native Grassland in the NSW North Coast, New England Tableland, Nandewar, Brigalow Belt South, Sydney Basin, South Eastern Highla	36.8	36.8	0.64	PCT Cleared - 67%	High Sensitivity to Potential Gain	Critically Endangered Ecological Community	Critically Endangered	2.50	TRUE	15
										Subtotal	15	



BAM Credit Summary Report

White Box grassy woodland in the upper slopes sub-region of the NSW South Western Slopes Bioregion												
3	266_DNG_POOR	White Box - Yellow Box - Blakely's Red Gum Grassy Woodland and Derived Native Grassland in the NSW North Coast, New England Tableland, Nandewar, Brigalow Belt South, Sydney Basin, South Eastern Highla	3.9	3.9	5.3	PCT Cleared - 94%	High Sensitivity to Potential Gain	Critically Endangered Ecological Community	Critically Endangered	2.50	TRUE	0



BAM Credit Summary Report

4	266_Wood_GOOD	White Box - Yellow Box - Blakely's Red Gum Grassy Woodland and Derived Native Grassland in the NSW North Coast, New England Tableland, Nandewar, Brigalow Belt South, Sydney Basin, South Eastern Highla	42.9	42.9	0.93	PCT Cleared - 94%	High Sensitivity to Potential Gain	Critically Endangered Ecological Community	Critically Endangered	2.50	TRUE	25
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BAM Credit Summary Report

5	266_DNG_GOOD	White Box - Yellow Box - Blakely's Red Gum Grassy Woodland and Derived Native Grassland in the NSW North Coast, New England Tableland, Nandewar, Brigalow Belt South, Sydney Basin, South Eastern Highla	25.4	25.4	2.6	PCT Cleared - 94%	High Sensitivity to Potential Gain	Critically Endangered Ecological Community	Critically Endangered	2.50	TRUE	42
										Subtotal	67	
										Total	82	

Species credits for threatened species

Vegetation zone name	Habitat condition (Vegetation Integrity)	Change in habitat condition	Area (ha)/Count (no. individuals)	Sensitivity to loss (Justification)	Sensitivity to gain (Justification)	BC Act Listing status	EPBC Act listing status	Potential SAIL	Species credits	
<i>Anthochaera phrygia</i> / Regent Honeyeater (Fauna)										
266_Wood_GOOD		42.9	42.9	0.17		Critically Endangered	Critically Endangered	True	5	
									Subtotal	5



BAM Credit Summary Report

Assessment Id

00031895/BAAS21027/22/00031896

Proposal Name

319171 Caerleon Stage 14 Subdivision

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APPENDIX D

PAYMENT SUMMARY REPORT



Biodiversity payment summary report

Assessment Id	Payment data version	Assessment Revision	Report created
00031895/BAAS21027/22/00031896		0	22/03/2022
Assessor Name	Assessor Number	Proposal Name	BAM Case Status
Sally Kirby	BAAS21027	319171 Caerleon Stage 14 Subdivision	Finalised
Assessment Type	Date Finalised	BOS entry trigger	
Part 4 Developments (General)	22/03/2022	BOS Threshold: Biodiversity Values Map and area clearing threshold	

PCT list

Price calculated	PCT common name	Credits
Yes	266 - White Box grassy woodland in the upper slopes sub-region of the NSW South Western Slopes Bioregion	67
Yes	281 - Rough-Barked Apple - red gum - Yellow Box woodland on alluvial clay to loam soils on valley flats in the northern NSW South Western Slopes Bioregion and Brigalow Belt South Bioregion	15

Species list

Price calculated	Species	Credits
Yes	<i>Anthochaera phrygia</i> (Regent Honeyeater)	5



Biodiversity payment summary report

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

IBRA sub region	PCT common name	Threat status	Offset trading group	Risk premium	Administrative cost	Methodology adjustment factor	Price per credit	No. of ecosystem credits	Final credits price
Inland Slopes	266 - White Box grassy woodland in the upper slopes sub-region of the NSW South Western Slopes Bioregion	Yes	White Box - Yellow Box - Blakely's Red Gum Grassy Woodland and Derived Native Grassland in the NSW North Coast, New England Tableland, Nandewar, Brigalow Belt South, Sydney Basin, South Eastern Highla	15.97%	\$284.50	2.1064	\$8,532.95	67	\$571,707.90



Biodiversity payment summary report

Inland Slopes	281 - Rough-Barked Apple - red gum - Yellow Box woodland on alluvial clay to loam soils on valley flats in the northern NSW South Western Slopes Bioregion and Brigalow Belt South Bioregion	Yes	White Box - Yellow Box - Blakely's Red Gum Grassy Woodland and Derived Native Grassland in the NSW North Coast, New England Tableland, Nandewar, Brigalow Belt South, Sydney Basin, South Eastern Highla	15.97%	\$284.50	2.1064	\$8,532.95	15	\$127,994.31
Subtotal (excl. GST)									\$699,702.21
GST									\$69,970.22
Total ecosystem credits (incl. GST)									\$769,672.43

Species credits for threatened species



Biodiversity payment summary report

Species profile ID	Species	Threat status	Price per credit	Risk premium	Administrative cost	No. of species credits	Final credits price
10841	<i>Anthochaera phrygia</i> (Regent Honeyeater)	Critically Endangered	\$432.54	20.6900%	\$80.00	5	\$3,010.16
Subtotal (excl. GST)							\$3,010.16
GST							\$301.02
Total species credits (incl. GST)							\$3,311.18
Grand total							\$772,983.61



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