



456-474 Plumpton Road, Rowan, NSW

## Biodiversity Development Assessment Report

Draft 03 – February 2022

Prepared for Sunnyside Ventures Pty Ltd

## Document Information

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We acknowledge the Traditional Custodians of the land on which we work. We pay our respects to Elders past and present.

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# Table of Contents

<b>Executive Summary .....</b>	<b>1</b>
<b>1 Introduction .....</b>	<b>5</b>
1.1 Subject Land .....	5
1.2 Previous Studies .....	6
1.3 Proposed Development .....	6
1.4 Commonwealth and State Assessment and Approval Processes .....	7
1.4.1 Commonwealth Environment Protection and Biodiversity Conservation Act 1999 ...	7
1.4.2 NSW Biodiversity Conservation Act 2016 .....	8
1.4.3 NSW State Environmental Planning Policy (Koala Habitat Protection) 2021 .....	9
1.5 Biodiversity Development Assessment Report.....	11
1.5.1 Objectives and Format .....	12
1.5.2 Technical Resources and Qualifications.....	12
<b>2 Part 1 – Biodiversity Assessment (BAM Stage 1) .....</b>	<b>16</b>
2.1 Landscape Context.....	16
2.2 Native Vegetation, Threatened Ecological Communities and Vegetation Integrity .....	21
2.2.1 Native vegetation extent .....	21
2.2.2 Vegetation survey and mapping methods.....	22
2.2.3 BAM targeted survey methods .....	24
2.2.4 Vegetation survey and mapping results .....	26
2.2.5 Threatened Ecological Communities .....	34
2.2.6 High threat weeds.....	39
2.3 Habitat Suitability for Threatened Species .....	40
2.3.1 Fauna habitat .....	40
2.3.2 Threatened Biodiversity Databases .....	41
2.3.3 Habitat suitability for ecosystem credit species .....	43
2.3.4 Habitat suitability for species credit species.....	48
<b>3 Part 2 – Impact Assessment (BAM Stage 2) .....</b>	<b>58</b>
3.1 Avoidance and Minimisation of Impacts on Biodiversity Values .....	58
3.1.1 Location.....	58
3.1.2 Design.....	59
3.2 Residual Biodiversity Impacts of the Proposed Development.....	60
3.2.1 Direct impacts on native vegetation and habitat .....	60
3.2.2 Indirect impacts on native vegetation and habitat.....	61
3.2.3 Prescribed biodiversity impacts.....	62

3.3	Mitigation of Residual Impacts on Biodiversity Values.....	65
3.3.1	Construction.....	65
3.3.2	Occupation.....	66
3.3.3	Adaptive management for uncertain impacts .....	66
3.4	Serious and irreversible impacts .....	67
3.4.1	Box-Gum Woodland.....	67
3.5	Legislative Requirements .....	74
3.5.1	Commonwealth EPBC Act – Referral .....	74
3.5.2	NSW BC Act – Biodiversity Offset Requirements.....	74
3.5.3	NSW Koala SEPP – Koala Habitat Protection Requirements.....	77
<b>References.....</b>		<b>79</b>
<b>Appendices .....</b>		<b>81</b>
Appendix A. BAM Plot/Transect Scores.....		82
Appendix B. Flora Species Recorded by Plot and Percent Cover.....		83
Appendix C. Tree Habitat Assessment Results .....		86
Appendix D. Fauna Species Recorded .....		88
Appendix E. BAM Credit Summary Report .....		90

## List of Figures

Figure 1. Locality Plan .....	13
Figure 2. The Proposed Development .....	14
Figure 3. The Subject Land and Proposed Development on Aerial Imagery .....	15
Figure 4. Hydrology .....	19
Figure 5. Site Map .....	20
Figure 6. BAM Vegetation Mapping and Survey .....	32
Figure 7. BC Act Native Vegetation .....	33
Figure 8. NSW Wildlife Atlas Threatened Species Search.....	42
Figure 9. Tree Habitat Assessment, Fauna Nesting Survey, and Bird Survey Results.....	57
Figure 10. Residual Biodiversity Impacts of the Proposed Development.....	64
Figure 11. Box-Gum Woodland within 500m of the subject land .....	73

## List of Tables

Table 1. Landscape features. ....	16
Table 2. Vegetation survey dates and survey effort.....	22

Table 3. Flora and fauna survey dates and survey effort.....	24
Table 4. Survey weather conditions (Wagga Wagga, NSW). ....	24
Table 5. Nocturnal Survey Details. ....	26
Table 5. PCTs recorded in the subject land.....	26
Table 6. PCT277 Zone 1 results summary. ....	28
Table 7. PCT277 Zone 2 results summary. ....	29
Table 8. Vegetation integrity scores. ....	31
Table 9. Assessment against the listing criteria for the EPBC listed TEC – White Box – Yellow Box – Blakely's Red Gum Grassy Woodland and Derived Native Grassland. ....	35
Table 10. High threat weeds. ....	39
Table 11. Fauna habitat features. ....	40
Table 12. Predicted ecosystem credit species identified by the BAM as potentially occurring in the subject land. ....	43
Table 13. Candidate species credit species identified by the BAM as potentially occurring in the subject land. ....	48
Table 15. Ecosystem credit requirements. ....	75
Table 16. Species credit requirements. ....	75

## Executive Summary

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Sunnyside Ventures Pty Ltd (Sunnyside) is currently progressing the planning and approval process for the rezoning and subsequent subdivision and development of 456-474 Plumptre Road (Lots 23 and 25 DP757246), Rowan, NSW (the 'proposed development' of the 'subject land'). Capital Ecology Pty Ltd (Capital Ecology) has been commissioned by Sunnyside to complete the necessary biodiversity surveys and prepare this Biodiversity Development Assessment Report (BDAR) to identify and assess the significance of the impacts that the proposed development will have on the biodiversity values of the subject land.

### Scope

Although general biodiversity values are identified and considered, the primary purpose of this BDAR is to present the results of Capital Ecology's application of the NSW Biodiversity Assessment Method 2020 (BAM) to assess the significance of the impacts of the proposed development on biota listed as threatened under the NSW *Biodiversity Conservation Act 2016* (BC Act). This BDAR also includes assessment of the potential impacts of the proposed development on Matters of National Environmental Significance (MNES) listed pursuant to the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act).

The subject land for this BDAR (Lots 23 and 25 DP757246) encompasses an area of 110.48 ha and is zoned RU1 Primary Production with a minimum lot size of 200 ha. The 71.08 ha proposed development footprint encompasses all of the direct impacts associated with the proposed development of the subject land, including all roads and infrastructure required to service lots.

### Survey Overview

Vegetation and potential flora/fauna habitat were surveyed and mapped in accordance with the BAM. This involved the following ecological surveys performed by Capital Ecology on 24 May 2021 and 1 November 2021.

- Plant Community Type and Vegetation Zone assessment and mapping.
- BAM plots.
- A tree habitat assessment.
- Threatened flora surveys via opportunistic observations.
- Threatened bird surveys via area searches and opportunistic observations.
- Fauna nesting surveys via inspections of each tree for signs of fauna breeding in hollows or nests.
- A spotlight survey for nocturnal fauna.

## Results

### Native vegetation

The subject land supports one Plant Community Type (PCT).

- PCT277 – *Blakely's Red Gum - Yellow Box grassy tall woodland of the NSW South Western Slopes Bioregion*

Before European occupation, the entire subject land would have been characterised as a grassy woodland. However, the subject land has been substantially modified by its current and past land use, which has primarily been grazing and some cropping. While the subject land has retained multiple scattered remnant paddock trees, the past land use has led to extensive clearing of the native woody overstorey, midstorey, and shrubstorey across approximately 92% of the subject land. The majority of the cleared land has been cultivated and sown to crops or pasture. Patches of vegetation within the drainage lines have avoided cultivation and retain a more intact native overstorey with some regeneration.

The vegetation in the subject land is therefore characterised by an absent or low-density canopy of mature remnant eucalypts, an absent midstorey and shrubstorey, and a low diversity groundstorey dominated by exotic grasses and weeds. No part of the subject land retains a native dominant groundstorey. The subject land contains several significant weeds such as Blackberry *Rubus fruticosus* and Willow *Salix sp.*

### Threatened ecological communities

PCT277 is identified as the potential EPBC Act listed TEC *White Box – Yellow Box – Blakely's Red Gum Grassy Woodland and Derived Native Grassland*. However, PCT277 Zone 1 and Zone 2 do not meet the listing criteria. As such, the subject land does not support any of the EPBC Act listed threatened ecological communities with the potential to occur in the locality.

PCT277 is also identified as the potential BC Act listed TEC *White Box - Yellow Box - Blakely's Red Gum Grassy Woodland and Derived Native Grassland in the NSW North Coast, New England Tableland, Nandewar, Brigalow Belt South, Sydney Basin, South Eastern Highlands, NSW South Western Slopes, South East Corner and Riverina Bioregions*. Only PCT277 Zone 1 supports vegetation which meets the criteria for this TEC under the BC Act.

### Threatened species

#### Threatened flora

No threatened flora species were, or have previously been, recorded in the subject land. The historic activities which have occurred across the majority of the subject land have substantially degraded the habitat value for native flora. Therefore, the subject land is considered unlikely to support habitat for any of the threatened flora species credit species that have the potential to occur in the locality.

#### Threatened fauna

Fauna surveys in May 2021 recorded several threatened bird species in the subject land, including Superb Parrot *Polytelis swainsonii* (EPBC and BC Act Vulnerable), Little Eagle *Hieraaetus morphnoides* (BC Act Vulnerable), Flame Robin *Petroica phoenicea* (BC Act Vulnerable) and White-winged Triller (BC Act Vulnerable). An additional targeted survey on 1 November 2021 confirmed an active Little

Eagle nest in the subject land, but no evidence of Superb Parrot breeding. No threatened fauna were observed during the spotlight survey on 1 November 2021.

## Impacts

### Native vegetation

The proposed development will result in the following direct impacts:

- clearance of 2.39 ha of PCT277 Zone 1 – canopy, regeneration, exotic dominant understorey, low native forb diversity (BC Act Box-Gum Woodland);
- clearance of 2.43 ha of BC Act native vegetation, which includes 2.39 ha of PCT277 Zone 1 and 0.04 ha of planted native vegetation; and
- removal of up to 31 (TBC in final design) mature hollow-bearing remnant trees in both PCT277 Zones 1 and 2.

In total, the proposed development will result in the clearance of 2.43 ha of BC Act native vegetation, 2.39 ha of which meets the criteria of BC Act Box-Gum Woodland in a highly modified form.

BC Act Box-Gum Woodland is listed as a serious and irreversible impact (SAIL) entity, and therefore the proposed development could result in a SAIL on a BC Act listed entity. However, as detailed in this BDAR, with the incorporation of appropriate avoidance, minimisation, and mitigation measures, the proposed removal of 2.39 ha of highly modified BC Act Box-Gum Woodland is unlikely to constitute a SAIL.

The proposed development will not result in any other direct impacts on native vegetation and is unlikely to result in biodiversity impacts that are unforeseen or uncertain.

### Threatened species habitat (for species credit species)

The proposed development will clear 27.83 ha of Little Eagle breeding habitat.

## Assessment and Approval Requirements

### Commonwealth EPBC Act

The proposed development is unlikely to have a significant impact on an EPBC Act listed MNES given the subject land:

- does not support any EPBC Act listed ecological communities;
- does not support any EPBC Act listed flora species; or
- is unlikely to contain habitat of potential importance to EPBC Act listed threatened or migratory fauna species.

In light of the above, EPBC Act referral for the proposed development is considered unwarranted and is not recommended.

### NSW BC Act – Biodiversity offset credit calculations

PCT277 Zone 1 has a vegetation integrity score of 27.2 which is sufficient to require offsetting. The proposed clearance of 2.39 ha of PCT277 Zone 1 will generate an offset liability of 41 PCT277 ecosystem credits, as determined by the BAM Calculator on 10 February 2022.

The proposed development will clear 27.83 ha of Little Eagle breeding habitat. This impact will generate an offset liability of 96 *Hieraetus morphnoides* Little Eagle species credits, as determined by the BAM Calculator on 10 February 2022.

### NSW Koala SEPP – Koala Habitat Protection Requirements

The *State Environmental Planning Policy (Koala Habitat Protection) 2021* ('Koala Habitat Protection SEPP 2021') replaced the *State Environmental Planning Policy (Koala Habitat Protection) 2020* ('Koala Habitat Protection SEPP 2020') on 17 March 2021. However, the Koala Habitat Protection SEPP 2020 continues to apply for RU1, RU2, and RU3 zoned land outside of the Sydney Metropolitan Area and Central Coast. Regarding the application of the Koala Habitat Protection SEPP 2020 for the proposed development of the subject land, the following points are noted.

- The subject land is located within the City of Wagga Wagga Local Government Area (LGA), which is an LGA to which the Koala Habitat Protection SEPP 2020 applies as listed in Schedule 1.
- The subject land is zoned RU1 Primary Production.
- The subject land has an area of greater than 1 hectare.

As demonstrated by the above assessment, the development control provisions of the Koala Habitat Protection SEPP 2020 apply to the proposed development. However, it is noted that if the subject land is rezoned to urban residential, the Koala Habitat Protection SEPP 2021 will apply.

With regard to the above and with respect to the Koala Habitat Protection SEPP 2020, the subject land is considered unlikely to constitute important or occupied Koala habitat now or in the future. Therefore, Council can be satisfied that the subject land is not Koala habitat, and it is therefore not prevented, because of the Koala Habitat Protection SEPP 2020, from granting consent to a development application within the subject land.

# 1 Introduction

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Sunnyside Ventures Pty Ltd (Sunnyside) is currently progressing the planning and approval process for the rezoning and subsequent subdivision and development of 456-474 Plumpton Road (Lots 23 and 25 DP757246), Rowan, NSW (the 'proposed development' of the 'subject land'). Capital Ecology Pty Ltd (Capital Ecology) has been commissioned by Sunnyside to complete the necessary biodiversity surveys and prepare this Biodiversity Development Assessment Report (BDAR) to identify and assess the significance of the impacts that the proposed development will have on the biodiversity values of the subject land.

Although general biodiversity values are identified and considered, the primary purpose of this BDAR is to present the results of Capital Ecology's application of the NSW Biodiversity Assessment Method (BAM) (NSW Government 2020a<sup>1</sup>) to assess the significance of the impacts of the proposed development on biota listed as threatened under the NSW *Biodiversity Conservation Act 2016* (BC Act). This BDAR also includes assessment of the potential impacts of the proposed development on Matters of National Environmental Significance (MNES) listed pursuant to the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act).

## 1.1 Subject Land

The 'subject land' for this BDAR is 110.48 ha and is located at 456-474 Plumpton Road (Lots 23 and 25 DP757246), Rowan, NSW (Figure 1, Figure 2, and Figure 3).

As shown in Figure 1 and Figure 3, the subject land is bordered by:

- large lot residential properties to the north;
- Plumpton Road to the east; and
- partially cleared agricultural land to the south, east and west.

Located in the Wagga Wagga Local Government Area (LGA), pursuant to the *Wagga Wagga Local Environment Plan 2010* (LEP), the subject land is zoned<sup>2</sup> 'RU1 Primary Production' with minimum lot size<sup>3</sup> of 'AE = 200 ha'.

The topography across the subject land is generally flat, with the elevation ranging from 215 m Australian Height Datum (AHD) in the north-eastern corner to 230 m AHD towards the south-western corner of the subject land.

The entire subject land as well as the surrounding 5-10 km is identified on the Wagga Wagga LEP Terrestrial Biodiversity Map<sup>4</sup>. Stringybark Creek which flows through the south of the subject land and subsequently into Lake Albert approximately 2 km to the north-east (Figure 4), is identified on the NSW Government Biodiversity Values Map<sup>5</sup>. The section of Stringybark Creek running through the subject land supports patches of low condition riparian vegetation. A smaller drainage line runs through the middle of the subject land and joins Stringybark Creek approximately 150 m to the east of the subject land. This drainage line has a large dam at the eastern end and is fringed by a mix of

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<sup>1</sup> NSW Government (2020a). *Biodiversity Assessment Method*. NSW Department of Planning, Industry and Environment. Published October 2020

<sup>2</sup> Wagga Wagga Local Environment Plan 2010. *Land Zoning Map - Sheet LZN\_004E*.

<sup>3</sup> Wagga Wagga Local Environment Plan 2010. *Lot Size Map - Sheet LSZ\_004E*.

<sup>4</sup> Wagga Wagga Local Environment Plan 2010. *Terrestrial Biodiversity Map - Sheet BIO\_004*.

<sup>5</sup> <https://www.lmbc.nsw.gov.au/Maps/index.html?viewer=BOSETMap>

native and exotic aquatic vegetation. The subject land also contains two smaller dams. At the time of survey, the creek and tributary held a small amount of water but were not flowing; they are only likely to support flows following substantial rain events.

Before European occupation, the entire subject land would have been characterised as a grassy woodland. However, the subject land has been substantially modified by its current and past land use, which has primarily been grazing (sheep and cattle) and some cropping. This has led to extensive clearing of the native woody overstorey, midstorey, and shrubstorey across approximately 92% of the subject land, leaving scattered remnant paddock trees. The majority of the cleared land within the subject land has been cultivated and sown to crops or pasture.

While Stringybark Creek and several small patches of vegetation have retained a woody overstorey, they have still been substantially modified by historic agricultural activities and in general lack a midstorey, shrubstorey, and native groundstorey. The groundcover across these areas is dominated by exotic species, with a low diversity of native grasses and forbs.

The existing built infrastructure is mostly clustered in the north-eastern part of the subject land, and includes a main residence, sheds, woolshed, and a derelict workers cottage. This area also contains patches of planted native and exotic trees such as Kurrajong *Brachichiton populneus* and Peppercorn *Shinus mole* var. *areira*.

## 1.2 Previous Studies

NGH Consulting (2020<sup>6</sup>) previously investigated the biodiversity values of the subject land, including desktop and on-ground surveys. The findings of that report are summarised below.

- One plant community type (PCT) was identified in the subject land, PCT277 – *Blakely's Red Gum – Yellow Box Grassy Tall Woodland of the NSW south western slopes bioregion*. This community conforms with a Threatened Ecological Community (TEC) under the BC Act, *White Box Yellow Box Blakely's Red Gum Woodland* (Box-Gum Woodland).
- The subject land does not contain any EPBC Act listed TECs.
- No EPBC or BC Act threatened species were recorded in the subject land during the survey. Eight EPBC Act listed flora species and seven BC Act listed flora species were identified as having the potential to occur in the subject land. Ten EPBC Act listed fauna species and 43 BC Act listed fauna species were identified as having the potential to occur or utilise habitat in the subject land.
- Fauna habitat features included juvenile non-hollow bearing trees, mature hollow- and non-hollow bearing trees, shrubs, and open exotic grassland for foraging. Waterbodies were present in the form of two dams with some fringing vegetation. Stringybark Creek and drainage lines contained minimal water but were assessed as providing potential additional aquatic habitat with riparian vegetation. Fallen timber was present in many of the PCT277 patches. There were some small areas of partially embedded rocks.

## 1.3 Proposed Development

As shown in Figure 2 and Figure 3, following rezoning the proposed development aims to subdivide the subject land into residential lots. The 71.08 ha development footprint encompasses all of the

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<sup>6</sup> NGH Consulting (2020). *Preliminary Assessment Report for Intended Planning Proposal, 456-474 Plumpton Road, Rowan*. Project Number: 20-008. Prepared by S. Anderson.

direct impacts associated with the proposed development, including all roads and infrastructure required to service lots.

The proposed development includes a number of measures which aim to avoid and minimise impacts and enhance the ecological values of the subject land. As a result, the proposed development will retain the existing watercourses and the majority of mature and hollow-bearing trees in open space areas and large residential blocks (refer to Figure 2 and Figure 10).

## **1.4 Commonwealth and State Assessment and Approval Processes**

### **1.4.1 Commonwealth Environment Protection and Biodiversity Conservation Act 1999**

The EPBC Act is the key Commonwealth Government legislation for the protection and conservation of Australia's environment and biodiversity. The EPBC Act provides the legislative framework for the assessment and approval mechanism requiring that proposed 'actions' to be assessed in terms of their potential to impact upon 'Matters of National Environmental Significance' (MNES). MNES currently listed under the EPBC Act are:

- world heritage properties;
- national heritage places;
- wetlands of international importance (listed under the Ramsar Convention);
- threatened species and ecological communities;
- migratory species (protected under international agreements);
- Commonwealth marine areas;
- the Great Barrier Reef Marine Park;
- nuclear actions (including uranium mining); and
- a water resource, in relation to coal seam gas development and large coal mining development.

Where a potential impact on a MNES may occur as a result of a proposed action, the significance of that impact must be assessed. Guidelines for determining whether an impact is significant are provided by the Department of the Agriculture, Water and the Environment (Commonwealth of Australia 2013a<sup>7</sup>). If it is determined that a proposed action will, or is likely to, have a significant impact on a MNES, the action must be referred to the Commonwealth Minister for the Environment. The Department will then consider the referred action and the Minister (or their Delegate) will make a determination regarding whether the action requires approval under the EPBC Act and associated conditions and controls.

The following website provides further information regarding the EPBC Act referral and approval process: <http://www.environment.gov.au/epbc/index.html>

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<sup>7</sup> Commonwealth of Australia (2013a). *Matters of National Environmental Significance - Significant Impact Guidelines 1.1. Environment Protection and Biodiversity Conservation Act 1999*. Commonwealth Department of the Environment.

### 1.4.2 NSW Biodiversity Conservation Act 2016

The NSW *Biodiversity Conservation Act 2016* (BC Act) commenced on 25 August 2017, the purpose of which is “to maintain a healthy, productive and resilient environment for the greatest well-being of the community, now and into the future, consistent with the principles of ecologically sustainable development” (BC Act Part 1, Section 1.3). The BC Act outlines the NSW framework for addressing impacts on biodiversity from development and clearing. Supported by the NSW *Biodiversity Conservation Regulation 2017* (BC Regulation), the BC Act establishes a framework to avoid, minimise and offset impacts on biodiversity from development through the Biodiversity Offsets Scheme (BOS).

#### 1.4.2.1 NSW Biodiversity Offset Scheme

The BOS creates a transparent, consistent, and scientifically based approach to biodiversity assessment and offsetting for all types of development that are likely to have a significant impact on biodiversity. The BOS aims to ensure a no-net-loss outcome for biodiversity by applying a framework which requires that impacts are first avoided and minimised, and where this cannot be fully achieved, residual impacts must be offset. The BOS also establishes Biodiversity Stewardship Agreements (BSAs), which are voluntary in-perpetuity agreements entered into by landholders, to secure and manage offset sites for biodiversity conservation. The two key elements of the BOS are as follows.

1. A developer, landholder etc. who undertakes an activity (i.e. development, clearing, other impact) which generates a credit obligation must retire the necessary credits to offset their activity.
2. A landholder who establishes a biodiversity stewardship site on their land generates credits which may be sold to developers or landholders who require those credits to offset their credit obligation.

Under the BC Act, the BOS is triggered for proposed development or clearing which:

- will involve clearance of native vegetation (including trees, understorey plants, groundcover plants, and wetland plants) or a prescribed impact (as set out in clause 6.1 of the BC Regulation) on land identified on the Biodiversity Values Map; and/or
- will exceed the native vegetation clearance threshold for the smallest minimum lot size associated with the subject land; and/or
- may significantly impact one or more BC Act listed entities (i.e. threatened species or ecological communities).

#### 1.4.2.2 NSW Biodiversity Assessment Method

The NSW Biodiversity Assessment Method (BAM) is the assessment manual that outlines how an accredited person (i.e. a BAM Assessor) assesses impacts on biodiversity at development sites or assesses the biodiversity values of stewardship sites. The BAM is a scientific document that provides:

- a consistent (standard) method for the assessment of the biodiversity values of a proposed development site, major project site, or vegetation clearing site, or stewardship site;
- guidance on how a proponent (i.e. developer, landholder) can avoid and/or minimise potential biodiversity impacts, or assessment of the management requirements at a

proposed biodiversity stewardship site and the likely improvement in biodiversity values that are predicted to occur over time; and

- the number and class of biodiversity credits that need to be offset to achieve a standard of 'no net loss' of biodiversity values for a development site, or the number and class of biodiversity credits to be generated by a proposed stewardship site.

The BAM is supported by the online BAM Calculator, into which a BAM Assessor enters the data from desktop and field investigations to determine the number and class of biodiversity credits generated:

- as an obligation for development/clearance, this obligation must be addressed by the proponent to secure approval for the development/clearance; or
- by the establishment and management of a biodiversity stewardship site, these credits being a commodity that may be sold.

The BAM determines the following two types of credits on both development/clearance sites and stewardship sites.

- Ecosystem credits, these are credits generated for impacts on, or conservation of:
  - threatened ecological communities; and
  - threatened species habitat for species that can be reliably predicted to occur within a given plant community type (PCT) (referred to in the BAM as 'ecosystem credit species').
- Species credits, these are credits generated for impacts on, or conservation of, individuals and/or the habitat of threatened species which cannot be reliably predicted to occur in a given PCT (referred to in the BAM as 'species credit species').

The BAM Assessor documents the results of the biodiversity assessment in a Biodiversity Assessment Report (BAR), of which there are the following three types.

- Biodiversity Development Assessment Report (BDAR). A BDAR is developed to assess the likely biodiversity impacts of a development or vegetation clearing proposal.
- Biodiversity Certification Assessment Report (BCAR). A BCAR is developed to assess the likely biodiversity impacts of conferring biodiversity certification over a specific area of land.
- Biodiversity Stewardship Site Assessment Report (BSSAR). A BSSAR is developed to assess the likely biodiversity conservation gain of establishing a specific area of land as a biodiversity stewardship site under a formal Biodiversity Stewardship Agreement.

#### **1.4.3 NSW State Environmental Planning Policy (Koala Habitat Protection) 2021**

State Environmental Planning Policies (SEPPs) outline policy objectives relevant to state-wide issues. The *State Environmental Planning Policy (Koala Habitat Protection) 2021* ('Koala Habitat Protection SEPP 2021') replaced the *State Environmental Planning Policy (Koala Habitat Protection) 2020* ('Koala Habitat Protection SEPP 2020') on 17 March 2021. The associated Frequently Asked

Questions<sup>8</sup> aim to guide consent authorities, professionals, and the community to understand and implement the requirements of the Koala Habitat Protection SEPP 2021. As an interim measure, the Koala Habitat Protection SEPP 2020 will continue to apply in NSW core rural zones RU1, RU2 and RU3, in most NSW local government areas (LGAs) except in the Blue Mountains, Campbelltown, Central Coast, Hawkesbury, Hornsby, Ku-Ring-Gai, Liverpool, Northern Beaches, and Wollondilly where Koala SEPP 2021 will apply across all zones.

As the subject land is currently zoned 'RU1 Primary Production' and located in the Wagga Wagga LGA, the Koala Habitat Protection SEPP 2020 applies to the proposed development.

The Koala Habitat Protection SEPP 2020 –

*Aims to encourage the proper conservation and management of areas of natural vegetation that provide habitat for koalas to ensure a permanent free-living population over their present range and reverse the current trend of koala population decline:*

- (a) by requiring the preparation of plans of management before development consent can be granted in relation to areas of core koala habitat, and*
- (b) by encouraging the identification of areas of core koala habitat, and*
- (c) by encouraging the inclusion of areas of core koala habitat in environment protection zones.*

As detailed in the Koala Habitat Protection SEPP 2020 Frequently Asked Questions –

*As was the case under SEPP 44, the Koala SEPP 2020 applies to development applications on land over 1 hectare (alone, or together with adjoining land in the same ownership) in the local government areas listed in the SEPP. If there is a strategic koala plan of management applying to the land, development applications must be consistent with that plan.*

*If there is no strategic plan, the SEPP requires proponents and councils to undertake a two-step process to determine if the land is core koala habitat. This requires the input of a suitably qualified person and involves surveying for potential koala habitat and then core koala habitat.*

*If the suitably qualified person finds the land contains core koala habitat based on the definition in the SEPP, then a koala plan of management must be prepared for the land by a suitably qualified person. Council can only grant consent to development on that land if it is consistent with the approved plan.*

The Koala Habitat Protection SEPP 2020 applies in addition to any assessments required under the EPBC Act or the BC Act (i.e. BAM assessment).

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<sup>8</sup> Available at <https://www.planning.nsw.gov.au/-/media/Files/DPE/Factsheets-and-faqs/Policy-and-legislation/Frequently-Asked-Question--State-Environmental-Planning-Policy-Koala-Habitat-Protection-2021.pdf?la=en>

## 1.5 Biodiversity Development Assessment Report

As prescribed under Part 6, Division 3, Section 6.12 of the BC Act, a BDAR is –

*“a report prepared by an accredited person in relation to proposed development or activity that would be authorised by a planning approval, or proposed clearing that would be authorised by a vegetation clearing approval, that:*

*(a) assesses in accordance with the biodiversity assessment method the biodiversity values of the land subject to the proposed development, activity or clearing, and*

*(b) assesses in accordance with that method the impact of proposed development, activity or clearing on the biodiversity values of that land, and*

*(c) sets out the measures that the proponent of the proposed development, activity or clearing proposes to take to avoid or minimise the impact of the proposed development, activity or clearing, and*

*(d) specifies in accordance with that method the number and class of biodiversity credits that are required to be retired to offset the residual impacts on biodiversity values of the actions to which the biodiversity offsets scheme applies.”*

A BDAR prepared applying the BAM by an accredited BAM Assessor must accompany any development application for which the BOS is triggered. As detailed previously, the BOS is triggered for a proposed development which:

- will involve clearance of native vegetation (including trees, understorey plants, groundcover plants, and wetland plants) or a prescribed impact (as set out in clause 6.1 of the BC Regulation) on land identified on the Biodiversity Values Map; and/or
- will exceed the native vegetation clearance threshold for the smallest minimum lot size associated with the subject land; and/or
- may significantly impact one or more BC Act listed entities (i.e. threatened species or ecological communities).

With regard to the above, the minimum lot size designation for the subject land is ‘AE = 200 ha’ (Wagga Wagga LEP 2010 - *Lot Size Map - Sheet LSZ\_004E*). Therefore, in accordance with Part 7, Clause 7.2 of the BC Regulation, if the BC Act ‘native vegetation’ (defined in Part 5A of the *Local Land Services Act 2013* as plant species indigenous to NSW) clearance exceeds 10,000 m<sup>2</sup> (1 ha) in total, then the BOS is triggered.

The proposed development will involve the clearance of approximately 2.43 ha of BC Act ‘native vegetation’, has the potential to significantly impact a BC Act listed entity (i.e. BC Act Box-Gum Woodland), and has the potential to impact an area mapped on the Biodiversity Values Map. Accordingly, the BOS is triggered and a BDAR is required to assess the impacts of the proposed development.

The BAM provides a standard method for assessing the impacts of a development/clearance proposal. This theme should carry over to the resulting BDAR such that it is as concise as possible whilst still addressing all of the relevant elements of the BAM in order to provide a complete assessment of the proposed development.

### 1.5.1 Objectives and Format

Developed to reflect the format of the BAM, this BDAR comprises the following two broad parts.

- Part 1 – Biodiversity Assessment (BAM Stage 1), includes assessment of the:
  - landscape context;
  - native vegetation, threatened ecological communities (TECs), vegetation integrity; and
  - habitat suitability for threatened species.
- Part 2 – Impact Assessment (BAM Stage 2), details the:
  - proposed measures to avoid, minimise and mitigate biodiversity impacts;
  - residual impacts (direct and indirect) of the proposed development; and
  - offset requirements relevant to the proposed development.

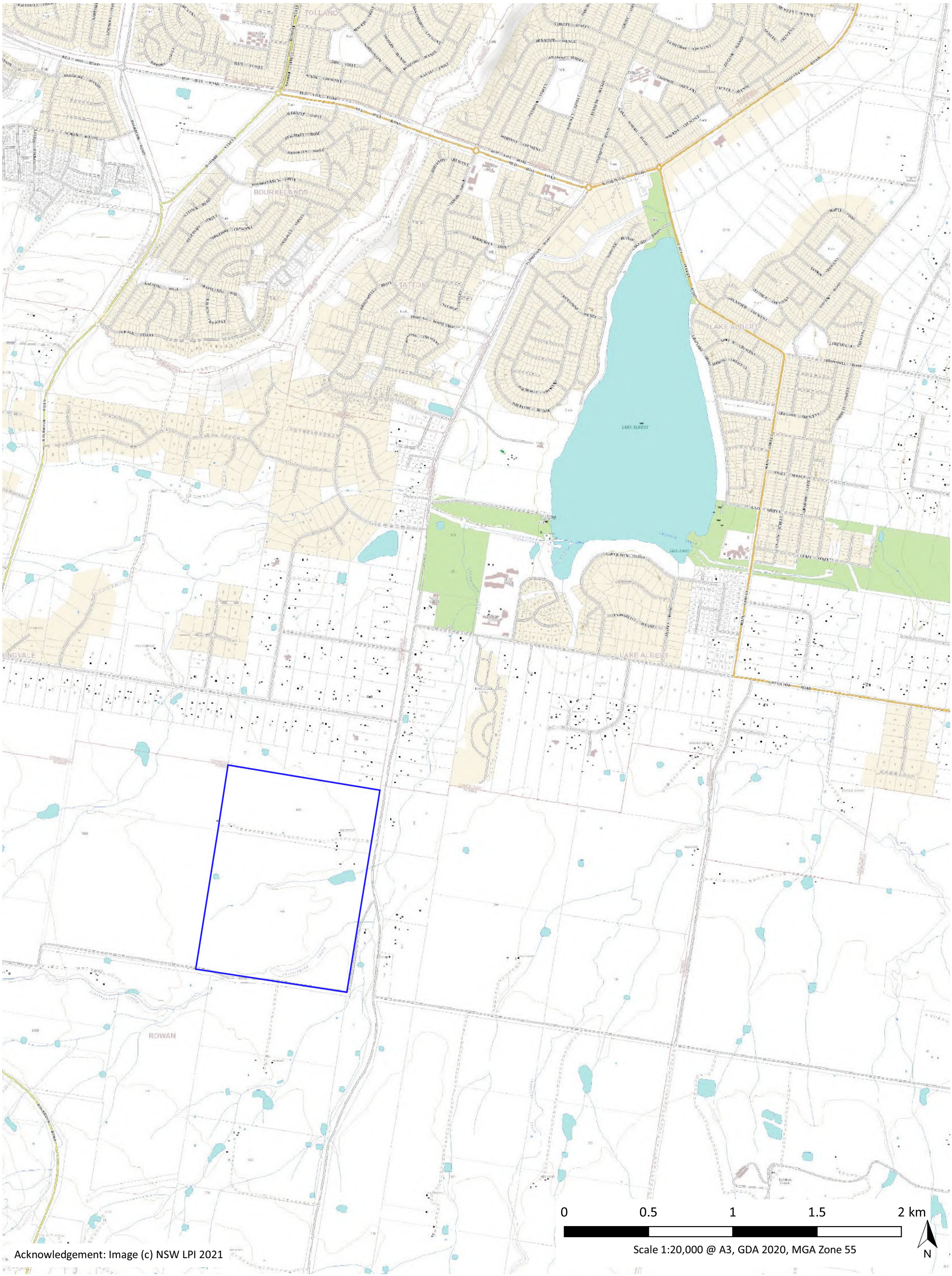
### 1.5.2 Technical Resources and Qualifications

This BDAR has been prepared by the following technical personnel:

- Robert Speirs – Director / Principal Ecologist  
BAppSc (Ecology), DipPM, MEIANZ, CEnvP-E, Accredited BAM Assessor (No: BAAS17089)  
Robert was project manager for this assessment and completed or closely supervised all field surveys, data entry, GIS mapping, BAM credit calculations, and report preparation.
- Dr Catherine Ross – Consultant Ecologist  
BSc (Hons), PhD, MEIANZ  
Catherine undertook field surveys, GIS mapping, BAM credit calculations, and report preparation.
- Dr Sam Reid – Senior Ecologist  
BSc (Hons), PhD, MEIANZ, Accredited BAM Assessor (No: BAAS20006)  
Sam undertook field surveys and report preparation.
- Shannon Thompson – Ecologist  
BSc  
Shannon undertook field surveys, data entry, GIS mapping and report preparation.

All surveys for this assessment were undertaken in accordance with the following.

- Capital Ecology's (Robert Speirs – Principal Investigator) Animal Research Authority (ARA) granted under the NSW *Animal Research Act 1985* by the NSW Department of Primary Industries Secretary's Animal Care and Ethics Committee (CSB 15/2046).
- Capital Ecology's NSW Scientific Licence issued by the NSW Office of Environment and Heritage under s 132 C of the NSW *National Parks and Wildlife Act 1974* (SL101623).



Acknowledgement: Image (c) NSW LPI 2021

Scale 1:20,000 @ A3, GDA 2020, MGA Zone 55

Figure 1. Locality Plan

Capital Ecology Project No: 3030  
Drawn by: C. Ross  
Date: 9 July 2021

Legend

Subject Land - Lots 23+25 DP757246

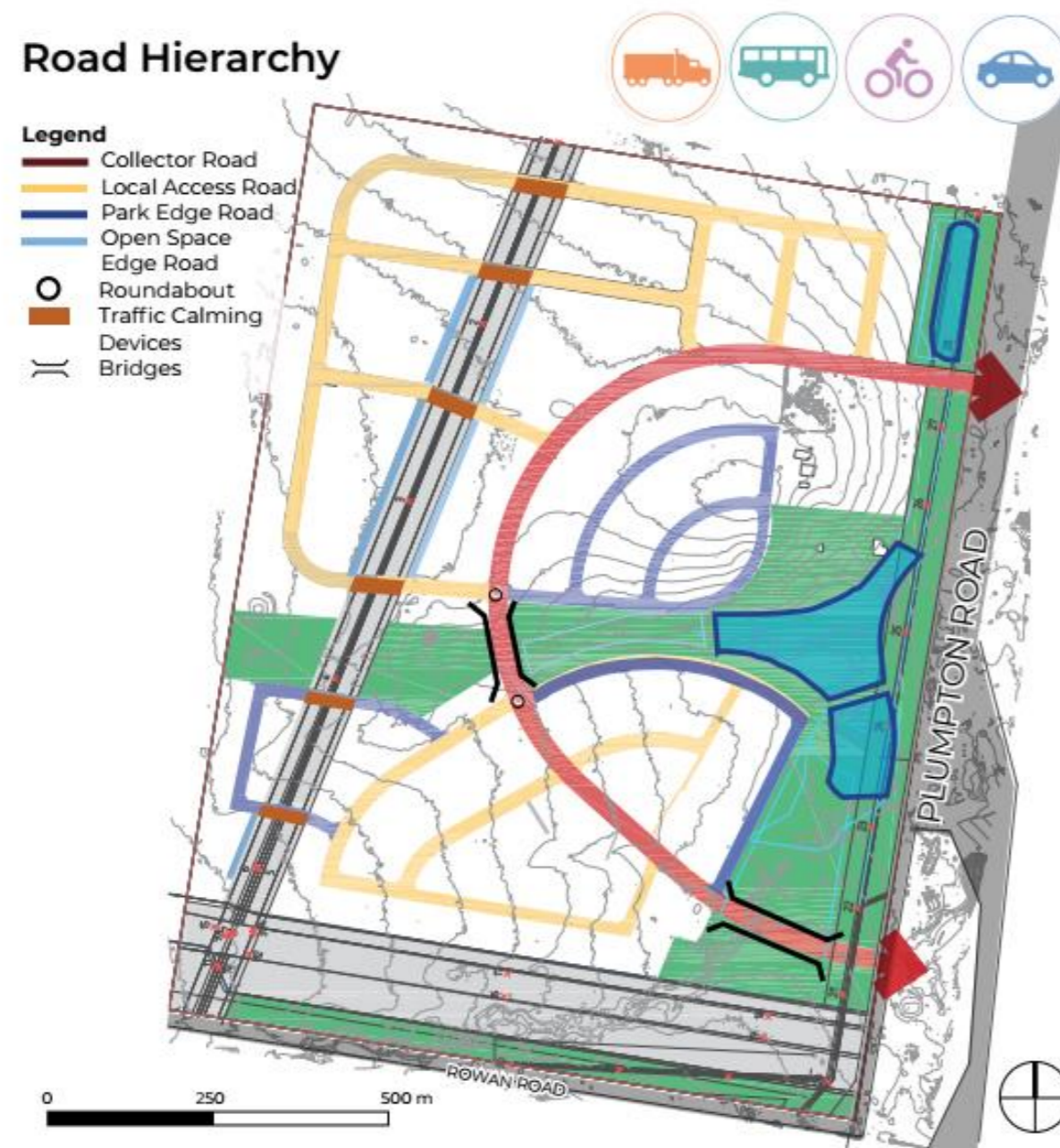


Figure 2. The Proposed Development

## 04 The Master Plan.

Sunnyside Estate - Urban Design Report

### Design Principle : Transportation and Connectivity



The road hierarchy has been developed to address the movement of vehicles including buses, garbage trucks, service and emergency vehicles, passenger cars and on road push bikes. The collector roads will be used for public transport - buses and will be graded appropriately. Local access roads will serve the subdivision lots and will have adequate infrastructure in the street domain.

There are park edge facing roads with homes only on one side and recreational paths on the park side with constant interaction with the open space. The final order of open space edge roads are generally intimate in character, adjacent the easement corridor and blend with the open space.

Street elements proposed such as kerbs, castellated kerbs, rain gardens, speed calming devices, streetlights and street trees all form part of the overall street environment and experience.

In addition to vehicular connectivity, pedestrian networks are proposed for both on road and off road scenarios to link the community. The highest order of road, the collector road consists of a shared path on one side and a standard footpath on the other side. The lower order of streets such as local access roads will have paths on both sides of the road. The park edge street will have a path on the development side of the road as will the easement open space edge roads. A series of off road recreational shared paths have been planned to connect the open spaces in the entire estate. These paths link with the residential road path system and form an interwoven network. Essential infrastructure such as bridges both vehicular and pedestrian have been planned to address crossing points for watercourses and sensitive riparian areas.



Figure 3. The Subject Land and Proposed Development on Aerial Imagery

## 2 Part 1 – Biodiversity Assessment (BAM Stage 1)

Part 1 of this BDAR provides an assessment of the biodiversity values of the subject land as set out in Stage 1 of the BAM.

### 2.1 Landscape Context

As detailed in Chapter 4 of the BAM, a range of landscape features must be identified where they occur in the subject land or within the assessment area surrounding the subject land. These features may contain/support biodiversity values that are important for the site context of the subject land, or for informing the likely habitat suitability of the subject land. Table 1 outlines the landscape features and overall landscape context of relevance to the subject land.

As stated in Section 1.3, the ‘development footprint’ only relates to the portions of the ‘subject land’ which will be impacted by the proposed development (Figure 2 and Figure 3).

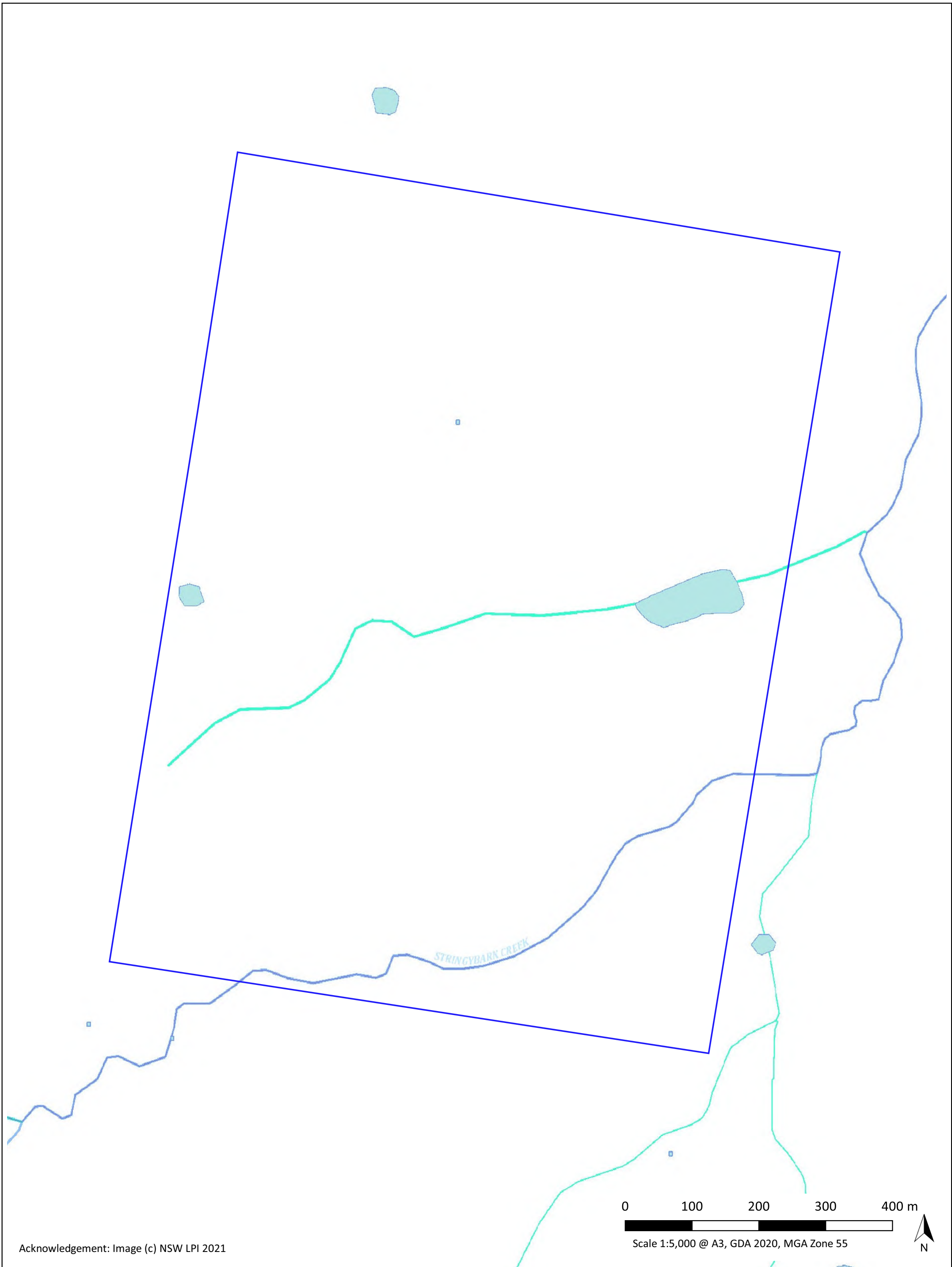
**Table 1. Landscape features.**

Landscape Feature	Description	Figure Reference
IBRA bioregion	The subject land occurs in the <b>NSW South Western Slopes</b> IBRA bioregion.	-
IBRA subregion	The subject land occurs in the <b>Inland Slopes</b> IBRA subregion.	-
BioNet NSW landscapes (Mitchell landscapes)	The subject land contains one Mitchell Landscape: <b>Murrumbidgee - Tarcutta Channels and Floodplains</b> .	-
Rivers, streams and estuaries (Strahler <sup>9</sup> stream order)	<p>Stringybark Creek is a 4<sup>th</sup> order stream (defined based on the NSW DPIE Hydro Line spatial data and as per Appendix 3 of the BAM) where it passes through the south of the subject land, and subsequently flows into Lake Albert approximately 2 km to the north-east. A 1<sup>st</sup> order drainage line runs through the middle of the subject land and joins Stringybark Creek around 150 m to the east of the subject land.</p> <p>The creek and drainage line supported only small patches of riparian vegetation at the time of survey, were mostly dry, and are only likely to convey water following substantial rain events. The lack of permanent water and riparian vegetation indicates that the creek and drainage line are unlikely to provide habitat of significance to aquatic/riparian flora or fauna.</p> <p>There is one moderately sized dam along the eastern boundary of the subject land, and two smaller dams. The larger dam supports a mix of native and exotic aquatic fringing vegetation and is likely to provide habitat to common water birds, reptiles and amphibians which occur in the locality.</p>	Figure 4 Figure 6
Wetlands (important wetlands)	The subject land does not contain any important wetlands as listed in the Directory of Important Wetlands in Australia (DIWA) or coastal wetlands protected under <i>State Environmental Planning Policy No 14</i> .	-

<sup>9</sup> Strahler, AN (1952). *Hypsometric (area-altitude) analysis of erosional topology*. Geological Society of America Bulletin 63 (11): 1117–1142.

Landscape Feature	Description	Figure Reference
Connectivity	<p>Before European occupation, the entire subject land would have been characterised by a grassy woodland. However, the subject land has been substantially modified by its current and past land use, which has primarily been grazing (sheep and cattle) and some cropping. This has led to extensive clearing of the native woody overstorey, midstorey, and shrubstorey across approximately 92% of the subject land, leaving scattered remnant paddock trees. The majority of the cleared land has been cultivated and sown to crops or pasture. The scattered paddock trees may provide 'stepping-stones' for birds and other species to travel between patches of intact vegetation.</p> <p>While Stringybark Creek and several small patches of vegetation have retained a woody overstorey, they have still been substantially modified by historic agricultural activities and in general lack a midstorey, shrubstorey, and native groundstorey. The groundcover across these areas is dominated by exotic species, with a low diversity of native grasses and forbs. Stringybark Creek and its associated woody vegetation provides a corridor extending along the creek until it reaches Lake Albert approximately 2 km to the north.</p> <p>Finally, the subject land is bordered by the outskirts of Wagga Wagga to the north and by partially cleared agricultural land to the east, south and west. While much of the native overstorey has been removed throughout the locality, substantial patches of remnant vegetation occur within 2 km to 5 km of the subject land.</p> <p>In light of the above, while the patches of remnant trees and native and exotic pasture in the subject land are likely to be of some habitat value to a variety of native fauna, the subject land is unlikely to constitute or comprise part of an important biodiversity corridor or other notable habitat connectivity feature.</p>	Figure 5 Figure 6
Areas of geological significance and soil hazard	The subject land does not contain/support any karst, caves, crevices, cliffs, or other areas/features of geological significance. There are no hazard soil features.	-
Areas of outstanding biodiversity value	The subject land does not support or occur near any declared area of outstanding biodiversity value (AOBV).	-
Percent native vegetation cover (buffer area)	<p>A 1,500 m buffer was applied to the subject land resulting in an overall buffer area of 1,447 ha. This buffer area contains only woody PCTs (i.e. woodland, dry sclerophyll forest). Accordingly, the following two categories of native vegetation were defined to identify the total area of native vegetation in the buffer.</p> <ol style="list-style-type: none"> <li>1. Woody vegetation – The areas which have a woody PCT and retain remnant woody vegetation or woody regrowth.</li> <li>2. Non-woody vegetation – The areas which have a woody PCT from which the woody vegetation has been cleared, yet at least a substantial proportionate cover (i.e. &gt; 35%) of native groundstorey species remains (often referred to as derived or secondary grassland).</li> </ol> <p>Native vegetation cover was first identified and mapped via interpretation of the available aerial imagery (NSW LPI and Google Satellite). The presence of remnant canopy trees, cultivation patterns in paddocks, unnaturally green and/or uniform groundstorey vegetation</p>	Figure 5

Landscape Feature	Description	Figure Reference
	<p>etc., were important factors considered during aerial interpretation. Field reconnaissance was then undertaken to ground truth and refine the mapping where possible. This field reconnaissance involved driving the publicly accessible roads within the buffer area and making observations across paddocks etc. from the roadside.</p> <ol style="list-style-type: none"> <li>1. Woody vegetation cover – 242 ha (17%) of the buffer area was determined to support native woody vegetation cover.</li> <li>2. Non-woody vegetation cover – 0 ha (0%) of the buffer area was determined to support native non-woody vegetation cover.</li> </ol> <p style="text-align: center;">↓</p> <p>Total native vegetation cover – the total area of native vegetation cover in the buffer area is 242 ha (17%). This falls into the &gt;11-30% cover class in the BAM Calculator.</p>	



Acknowledgement: Image (c) NSW LPI 2021

Figure 4. Hydrology

Capital Ecology Project No: 3030  
Drawn by: C. Ross  
Date: 2 July 2021

Legend  
Subject Land - Lots 23+25 DP757246



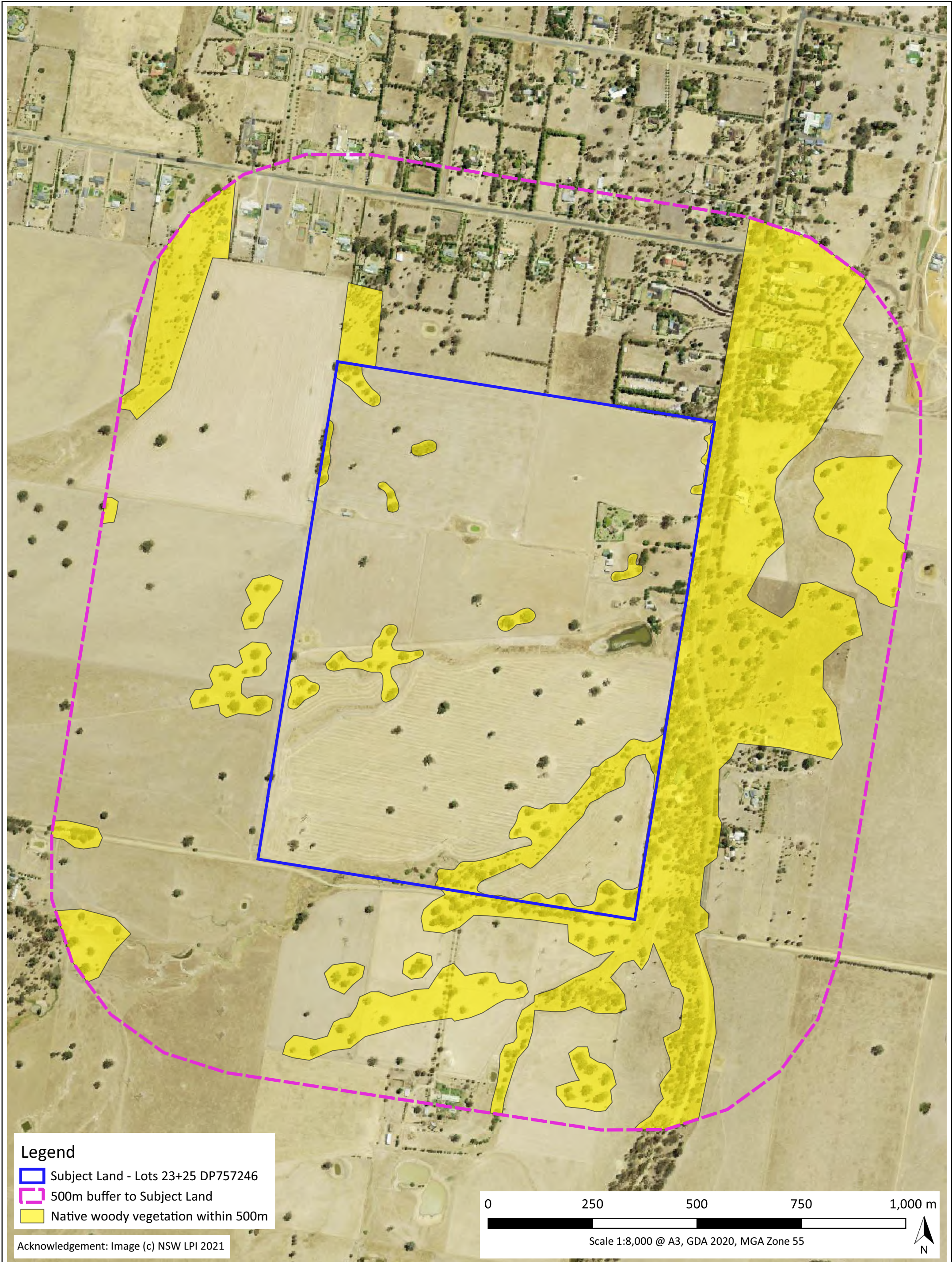


Figure 5. Site Map

Capital Ecology Project No: 3030  
Drawn by: C. Ross  
Date: 9 February 2022

## 2.2 Native Vegetation, Threatened Ecological Communities and Vegetation Integrity

### 2.2.1 Native vegetation extent

As per the BC Act, native vegetation is defined according to Part 5A of the *Local Land Services Act 2013* (LLS Act), which states:

*“(1) For the purposes of this Part, native vegetation means any of the following types of plants native to New South Wales:*

- (a) trees (including any sapling or shrub or any scrub),*
- (b) understorey plants,*
- (c) groundcover (being any type of herbaceous vegetation),*
- (d) plants occurring in a wetland.*

*(2) A plant is native to New South Wales if it was established in New South Wales before European settlement. The regulations may authorise conclusive presumptions to be made of the species of plants native to New South Wales by adopting any relevant classification in an official database of plants that is publicly accessible.”*

As per this definition, planted vegetation which comprises plant species native to NSW, regardless of whether or not the species are indigenous to the specific region and/or PCT of the subject land, is classified as native vegetation.

The Commonwealth Government<sup>10,11</sup>, ACT Government<sup>12</sup>, and previous NSW Government<sup>13</sup> assessment guidelines for the temperate grassland and woodland PCTs of the NSW/ACT Southern Tablelands region each declare vegetation as native dominant if 50% or more of the perennial groundlayer is comprised of native species. However, no such threshold is defined by the BAM, and advice from the Department of Planning, Industry and the Environment (DPIE) has been that the criteria for use in determining native vs. exotic dominance must be more stringent than the previously applied 50/50 rule. It is understood that this is due to the potential for seasonal variation and/or assessor disparity to substantially alter the BAM mapping result. For example, a patch of vegetation that is classified as 55% native in one season may be classified as 45% native in another.

With regard to the above, for the purposes of this BDAR (and the supporting BAM assessment):

1. ‘Native vegetation’ is defined as any plant, naturally occurring or planted, which is native to NSW.
2. Exotic vegetation is defined as any plant which is not native to NSW.

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<sup>10</sup> Commonwealth of Australia (2006). *Policy Statement 3.5: White Box – Yellow Box – Blakely’s Red Gum grassy woodlands and derived native grasslands*. Commonwealth Department of Environment and Heritage.

<sup>11</sup> Commonwealth of Australia (2016). *Approved conservation advice for the Natural Temperate Grassland of the South Eastern Highlands (NTG–SEH) ecological community*.

<sup>12</sup> ACT Government (2010). *Survey guidelines for determining lowland vegetation classification and condition in the ACT*. Environment and Sustainable Development Directorate – Conservation Planning and Research.

<sup>13</sup> NSW Government (2014). *BioBanking Assessment Methodology 2014*. NSW Government Office of Environment and Heritage.

3. A polygon of vegetation is 'native vegetation' if:
  - a. 35% (i.e. approximately one-third) or more of the perennial groundlayer comprises species native to NSW; and/or
  - b. species native to NSW are present in one or more of the other strata.

## 2.2.2 Vegetation survey and mapping methods

The vegetation throughout the entirety of the subject land was surveyed and mapped in accordance with the BAM. Vegetation survey dates and survey effort are detailed in Table 2. The methodology involved the following.

- Mapping of the on-ground boundaries of the Plant Community Types (PCTs).
- Stratification of each PCT into vegetation zones reflecting the broad condition state of vegetation.
- The completion of a series of surveys to measure the composition, structure, and function attributes of the vegetation.

These steps are described in more detail below. The full BAM and supplementary resources are available online via the DPIE website <https://www.environment.nsw.gov.au/topics/animals-and-plants/biodiversity-offsets-scheme/accredited-assessors/biodiversity-assessment-method-2020>.

It is important to note that the information and data collected during vegetation survey and mapping (Section 2.2.2.1 to 2.2.2.4) were also used to assess the subject land for the presence/absence of habitat constraints and/or microhabitats EPBC Act only listed species (Section 2.3.3), ecosystem credits species (Section 2.3.3), and species credit species (Section 2.3.4).

**Table 2. Vegetation survey dates and survey effort.**

Task	Method	Date	Personnel	Survey effort
PCT and Zone mapping	Random meander	24/05/2021	2 people	2 hours
Vegetation assessment	BAM plot	24/05/2021	2 people	4 hours
Tree habitat assessment	Tree survey	24/05/2021	2 people	6 hours

### 2.2.2.1 Plant Community Type (PCT) mapping

The on-ground boundaries of each of the Plant Community Types (PCTs) present in the subject land were mapped by marking boundaries directly onto high resolution orthorectified aerial photograph field maps. The PCTs and their characteristics are provided in the NSW Vegetation Information System (VIS) <https://www.environment.nsw.gov.au/research/Vegetationinformationsystem.htm>.

The PCTs were identified, and their boundaries defined, based on the:

- presence, species, growth form and density of remnant canopy trees and/or stags or stumps of these;
- presence and species of midstorey shrubs and trees;
- floristic composition of the groundstorey; and
- the landscape position and other geographical features (elevation, aspect, soils, apparent hydrology).

### 2.2.2.2 Vegetation zone definition and mapping

The mapped PCTs were further divided into vegetation zones based on the structure, floristic composition and overall condition ('condition state') of the vegetation. The vegetation zones were mapped in the field and then digitised using GIS which provided accurate calculations of the total area of each vegetation zone in the subject land.

### 2.2.2.3 Survey Plots/Transects

A series of a BAM plots (i.e. vegetation assessment survey plot/transect sets) were completed to adequately sample each vegetation zone. As illustrated in Figure 9 from NSW Government (2020b<sup>14</sup>), each BAM Plot involved:

- a. one 20 x 20 m (400 m<sup>2</sup>) plot, used to assess the composition and structure attributes;
- b. one 20 x 50 m plot (1,000 m<sup>2</sup>) plot, used to assess the function attributes; and
- c. five 1 m<sup>2</sup> sub-plots, used to assess average little cover (and other optional groundcover components) for the plot.

All BAM plot locations were selected randomly within the vegetation zone, by marking on a map and walking to the location. BAM plot locations were spread throughout the entire subject land (refer to Figure 6). The information collected during this process was subsequently used to determine the condition of the vegetation present in the subject land.

The number of BAM plots completed in each BC Act native vegetation zone of the subject land was determined as per the minimum required plot numbers specified in Table 3 of the BAM. As stated in Section 5.1.1.5 of the BAM:

*areas that are not native vegetation (i.e. land not included in native vegetation extent) do not require further assessment in the BAM except where:*

- (a) they are proposed for restoration as part of an offset (refer to Stage 3)*
- (b) they are assessed as habitat for threatened species according to Section 6.4.*

With respect to this BDAR, only PCT277 Zone 1 meets the definition of BC Act 'native vegetation'. However, three plots were completed in the zone which did not meet the definition of BC Act 'native vegetation' (i.e. PCT277 Zone 2, Figure 6 and Figure 7). As shown in Figure 6, a total of 6 plots were therefore completed across the two vegetation zones. Surveying all zones ensured that the vegetation composition (including an accurate determination of BC Act native vegetation presence/absence) and potential threatened species habitat were accurately assessed across all of the vegetation condition types present in the subject land.

It is important to highlight that only those zones which occur in the subject land and which are classified as BC Act native vegetation and/or threatened species habitat are subsequently used to determine the impact of the proposed development (refer to Section 2.2.4.5 and Section 3.2).

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<sup>14</sup> NSW Government (2020b). *Biodiversity Assessment Method Operational Manual – Stage 1*. State of New South Wales and Department of Planning, Industry and Environment.

#### 2.2.2.4 Tree habitat assessment

All of the mature remnant trees (i.e. >20 cm DBH) present in the subject land were assessed for the presence of functional hollows and/or large stick nests. If either a functional hollow or large stick nest were observed, the tree was identified to species level and assessed for its value to native fauna. Particular attention was given to observations on fauna nesting in the hollows or in large stick nests. The location of any tree containing a functional hollow and/or large stick nest was recorded via hand-held GPS and the following data was taken:

- tree number;
- tree species;
- approximate diameter at breast height DBH (cm);
- approximate height (m); and
- characteristics of hollows and other habitat values such as nests, mistletoe etc.

The data collected during this process was used to determine the number of hollow bearing trees in each vegetation zone.

#### 2.2.3 BAM targeted survey methods

A number of threatened flora and fauna species were identified by the BAM as potentially occurring in the subject land (referred to as 'species credit species', see Section 2.3.4). Some of these species were excluded from further consideration based on factors such as habitat constraints, degraded habitat, geographical limitations, or the absence of required microhabitat features (refer to Table 14). Survey dates and survey effort for the remaining species credit species considered to have the potential to occur in the subject land are detailed in Table 3. Weather conditions for survey dates are detailed in Table 4. In total, the survey effort for this assessment totalled 27.5 person-hours.

**Table 3. Flora and fauna survey dates and survey effort.**

Task	Method	Date	Personnel	Survey effort
Threatened flora survey	Opportunistic observations <sup>15</sup>	24/05/2021	2 people	6 hours
	Opportunistic observations <sup>16</sup>	1/11/2021	1 person	2 hours
Threatened bird survey	Fauna nesting survey	24/05/2021	2 people	6 hours
	Opportunistic observations <sup>17</sup>	24/05/2021	4 people	6 hours
	Fauna nesting survey	1/11/2021	1 person	2 hours
Nocturnal fauna survey	Spotlight survey - random meander	1/11/2021	1 person	1.5 hours

**Table 4. Survey weather conditions (Wagga Wagga, NSW).**

Date	Temperature Min-Max	Wind @ 9am	Cloud (8 <sup>th</sup> )	Rain
24/05/2021	5.7 – 20.8°C	20 km/h	4/8	0 mm
1/11/2021	5.2 – 26.8°C	13 km/h	1/8	0 mm

<sup>15</sup> During PCT and Zone mapping and BAM plots.

<sup>16</sup> During Fauna nesting survey.

<sup>17</sup> During PCT and Zone mapping, BAM plots, and tree habitat assessment.

### 2.2.3.1 Threatened flora survey

Based on habitat requirements and site context, no threatened flora species were determined to require targeted surveys. Using opportunistic observations, an inventory of all species identified in the subject land was compiled across all of the surveys undertaken on 24 May 2021 and 1 November 2021. This inventory is presented in Appendix B (flora). Maintaining an inventory in this manner ensures that the maximum possible diversity of species is recorded, and if present, any significant species are flagged. If detected, all significant species identified are recorded via a GPS waypoint and, if possible, the population size is counted or estimated.

### 2.2.3.2 Threatened bird survey

Based on the location and the ecological communities present, the subject land was assessed as having the potential to support EPBC Act and/or BC Act listed threatened bird species. Some threatened bird species are identified by the BAM as a species credit species (refer to Section 2.3.4). Accordingly, targeted surveys are required to determine the species credit value of the subject land for these species. Therefore, targeted threatened bird surveys were conducted across the portions of the subject land identified as potentially supporting threatened bird habitat, these being areas with a moderate to high canopy cover (i.e. PCT277 Zone 1). As described in Section 5 of DEC (2004<sup>18</sup>), these surveys involved 'area searches' (Loyn 1986<sup>19</sup>) to identify and record the terrestrial birds occurring in the subject land. If detected, significant species identified were recorded via a GPS waypoint and notes were taken on any nesting/breeding activity.

In addition, as mentioned in Section 2.2.2.4, all of the mature remnant trees (i.e. >20 cm DBH) present in the subject land were assessed for fauna habitat features on 24 May 2021 (Figure 9). At that time, these trees were also inspected for signs of fauna nesting in hollows and/or on large stick nests (e.g. individuals in hollows, scratch/chew marks, birds flying off nests, birds 'on station'). A second nesting survey was carried out on 1 November 2021 during the main breeding season.

An inventory of all fauna species identified in the subject land was compiled across all of the surveys undertaken on 24 May 2021 and 1 November 2021. This inventory is presented in Appendix C (fauna). Maintaining an inventory in this manner ensures that the maximum possible diversity of species is recorded, and if present, any significant species are flagged. If detected, all significant species identified are recorded via a GPS waypoint and, if possible, the population size is counted or estimated.

### 2.2.3.3 Nocturnal Fauna Survey

A spotlight survey was carried out on 1 November 2021 (Table 5). Three fauna species were recorded: Common Brushtail Possum *Trichosurus vulpecula*, Barn Owl *Tyto alba*, and at least one species of microbat (see Appendix A).

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<sup>18</sup> DEC (2004). *Threatened Species Survey and Assessment: Guidelines for developments and activities (working draft)*. New South Wales Department of Environment and Conservation, Hurstville, NSW.

<sup>19</sup> Loyn, R.H. (1986). 'Birds in fragmented forests in Gippsland, Victoria'. In Keast, A., Recher, H.F., Ford, H. and Saunders, D. (eds.). In *Birds of Eucalypt Forests and Woodlands; Ecology, Conservation Management*, RAOU; and Surrey Beatty and Sons.

**Table 5. Nocturnal Survey Details.**

Date: 1/11/2021					Observer/s: RS
Survey Site: Sunnyside					
Time	Air Temp.	Wind	Cloud cover	Moon phase	Other weather information
Start: 20:30	17.5-	Calm	2/8	Waning crescent	Still, warm, perfect survey conditions
Finish: 22:00	16.5°C				
General site notes: Common Brushtail Possum, Barn Owl, lots of microbats					

## 2.2.4 Vegetation survey and mapping results

### 2.2.4.1 Plant Community Type (PCT) mapping

Before European occupation, the entire subject land would have been characterised as a grassy woodland. However, the subject land has been substantially modified by its current and past land use, which has primarily been grazing and some cropping. While the subject land has retained multiple scattered remnant paddock trees, the past land use has led to extensive clearing of the native woody overstorey, midstorey, and shrubstorey across approximately 92% of the subject land. The majority of the cleared land has been cultivated and sown to crops or pasture. Patches of vegetation within the drainage lines have avoided cultivation and retain a more intact native overstorey with some regeneration.

The vegetation in the subject land is therefore characterised by an absent or low-density canopy of mature remnant eucalypts, an absent midstorey and shrubstorey, and a low diversity groundstorey dominated by exotic grasses and weeds. No substantial part of the subject land retains a native dominant groundstorey. The subject land contains several significant weeds such as Blackberry *Rubus fruticosus* and Willow *Salix sp.*

The dominant overstorey species are Yellow Box *Eucalyptus melliodora* and Blakely's Red Gum *E. blakelyi*, with White Box *E. albens* and Grey Box *E. macrocarpa* occurring in the subject land as sub-dominant or associate species. As such, the PCT allocated to the subject land is PCT277 – *Blakely's Red Gum - Yellow Box grassy tall woodland of the NSW South Western Slopes Bioregion* (Table 6, Figure 6).

**Table 6. PCTs recorded in the subject land**

PCT	PCT name	PCT description	Occurrence in subject land	TEC status Commonwealth / NSW	PCT % cleared
277	Blakely's Red Gum - Yellow Box grassy tall woodland of the NSW South Western Slopes Bioregion	Tall woodland to about 20 m high dominated by Blakely's Red Gum ( <i>Eucalyptus blakelyi</i> ) and Yellow Box ( <i>Eucalyptus melliodora</i> ). Occurs on flats, footslopes and hillslopes mainly in the upper slopes sub-region of the NSW South-western Slopes Bioregion mainly east of Wagga Wagga.	This PCT was mapped across the entire subject land.	Critically Endangered (Commonwealth and NSW) when occurring in a condition consistent with the listing criteria of the TEC.	95%

#### 2.2.4.2 Vegetation zones

As detailed in Table 7 to Table 8 and shown in Figure 6, PCT277 was determined to comprise the following two discernible vegetation zones.

- PCT277 Zone 1 – Canopy, regeneration, exotic dominant groundstorey, low native forb diversity.
- PCT277 Zone 2 – No canopy, exotic dominant groundstorey sown to pasture, low native forb diversity.

Only PCT277 Zone 1 meets the definition of BC Act 'native vegetation'. PCT277 Zone 2 does not meet the definition of BC Act 'native vegetation' as it has a groundstorey clearly dominated by exotic grasses and forbs (i.e. > 65% perennial exotic) and does not contain an intact native canopy and/or shrubs. As per Chapter 5 of the BAM, PCT277 Zone 2 does not require assessment to determine a vegetation integrity score unless it is determined to be threatened species habitat. However, all zones were surveyed to ensure that the vegetation composition and potential threatened species habitat were accurately assessed across all of the vegetation condition types present in the subject land.

#### 2.2.4.3 Hollow bearing remnant trees

The subject land supports 59 mature hollow bearing remnant trees (Figure 9, Appendix C). Two trees were observed to contain large stick nests, one of which was confirmed to be used by a Little Eagle in spring 2021, and several others had small stick nests. At least three trees had hollows that were clearly occupied at the time of the survey, two by Galahs *Eolophus roseicapilla* and one by Red-rumped Parrots *Psephotus haematonotus*.

**Table 7. PCT277 Zone 1 results summary.**

	PCT277 Zone 1
Description	<u>Southern Tableland Grassy Woodland – Exotic Groundstorey</u> Thinned canopy with some regeneration. The midstorey and shrubstorey are absent. Low diversity exotic groundlayer dominated by a variety of exotic grasses and weeds (e.g. Witchgrass <i>Panicum capillare</i> , Ryegrass <i>Lolium perenne</i> , Patterson's Curse <i>Echium plantagineum</i> ). Low density of significant weed species. Moderately grazed by stock and Eastern Grey Kangaroos.
Area – subject land	8.64 ha
Area – development footprint	2.39 ha.
BAM plots assessed	3.
Overstorey Species	Co-dominant = Yellow Box and Blakely's Red Gum. Associate = White Box and Grey Box.
Overstorey Cover	5% - 20%.
Overstorey Regeneration	Yes.
Perennial Groundlayer	11-28% native, with 1-3 native non-grass understorey species.
Significant Weeds	Bathurst Burr <i>Xanthium spinosum</i> , Blackberry, Patterson's Curse.
EPBC Act and/or BC Act listed TEC	Yes (BC Act only).
BC Act Native Vegetation	Yes.



**Table 8. PCT277 Zone 2 results summary.**

	PCT277 Zone 2
Description	<p><u>Low Diversity Exotic Pasture</u></p> <p>Overstorey largely cleared, with scattered remnant paddock trees. Midstorey and shrubstorey are entirely absent. Low diversity exotic groundlayer dominated by exotic perennial grasses and weeds (e.g. Lucerne <i>Medicago sativa</i>, Witchgrass, Stinkgrass <i>Eragrostis cilianensis</i>). Evidence of cultivation and pasture improvement. Low density of significant weed species. Moderately grazed by stock and Eastern Grey Kangaroo.</p>
Area – subject land	101.84 ha.
Area – development footprint	68.70 ha, which includes 0.04 ha of planted native vegetation.
BAM plots assessed	3.
Overstorey Species	Scattered Yellow Box, Blakely's Red Gum, White Box, Grey Box
Overstorey Cover	<5%.
Overstorey Regeneration	No.
Perennial Groundlayer	9%-63% native, with 2-5 native non-grass understorey species.
Significant Weeds	Sheep's Sorrel <i>Acetosella vulgaris</i> and Willow.
EPBC Act and/or BC Act listed TEC	No.
BC Act Native Vegetation	No, apart from 1.10 ha of planted native vegetation.



#### 2.2.4.4 Patch size

As defined in the BAM, patch size is -

*“an area of intact native vegetation that:*

*a) occurs on the development site or biodiversity stewardship site, and*

*b) includes native vegetation that has a gap of less than 100 m from the next area of native vegetation (or  $\leq 30\text{m}$  for non-woody ecosystems).*

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

With respect to the above, only the areas mapped as PCT277 Zone 1 and the 1.10 ha of planted native trees meet the definition of ‘native vegetation’ as per the BAM (refer to Figure 6 and Figure 7).

The native vegetation outside of the subject land extends along the road reserve to the east of the subject land. When native vegetation from adjoining land is considered, the patch size for PCT277 Zone 1 falls within the  $>100$  ha class as defined by the BAM.

#### 2.2.4.5 Vegetation integrity scores

As stated in Section 1.3, the ‘development footprint’ only relates to the portions of the ‘subject land’ which will be impacted by the proposed development (refer to Figure 3). Zones which meet the definition of BC Act ‘native vegetation’ and which occur in the subject land are used to determine vegetation integrity scores and the impacts associated with the proposed development (refer to Figure 7). Zones which do not meet the definition of BC Act native vegetation do not require further assessment in the BAM except where:

- (a) they are proposed for restoration as part of an offset; or
- (b) they are assessed as habitat for threatened species.

As detailed in Table 7, Table 8, and shown in Figure 7, only PCT277 Zone 1 meets the definition of BC Act ‘native vegetation’.

PCT277 Zone 2 does not meet the definition of BC Act ‘native vegetation’ as it has a groundstorey clearly dominated by exotic grasses and forbs (i.e.  $> 65\%$  perennial exotic) and does not contain a sufficient cover of native trees and/or shrubs. As per the BAM, PCT277 Zone 2 does not require assessment to determine a vegetation integrity score unless it is determined to be threatened species habitat. As detailed Section 2.3, PCT277 Zone 2 is considered unlikely to provide habitat for threatened species and it is therefore not necessary to determine a vegetation integrity score for this zone. As such, only PCT277 Zone 1 is assessed to determine a vegetation integrity score and the impact associated with the proposed development.

Table 9 presents the results of the BAM plot assessments and details the composition, structure, function, and resulting vegetation integrity score for PCT277 Zone 1.

**Table 9. Vegetation integrity scores.**

	<b>PCT277 Zone 1</b>	<b>PCT277 Zone 2</b>
Native Canopy	Yes	No (scattered paddock trees)
Groundstorey	Exotic	Exotic
Native Diversity	Low	Low
Patch size	> 100 ha	n/a
Area – subject land	8.64 ha	101.48
Area – development footprint	2.39 ha	68.70
BAM plots assessed in the subject land	3	3
Composition condition score	11.1	13.8
Structure condition score	41.3	27.3
Function condition score	44.2	0.2
<b>Current vegetation integrity score</b>	<b>27.2</b>	<b>n/a (however 4.3)</b>

Legend

Subject Land - Lots 23+25 DP757246

Vegetation Mapping

BAM Plots

BAM400m2 Plot

BAM1000m2 Plot

PCT's and Zones

PCT277 – Blakely's Red Gum - Yellow Box grassy tall woodland of the NSW South Western Slopes Bioregion

Zone 1 – Canopy, regeneration, exotic dom groundstorey, low native forb diversity

Zone 2 – No canopy, exotic dominant groundstorey sown to pasture, low native forb diversity

Planted Native Vegetation

Planted Exotic Vegetation



Acknowledgement: Image (c) NSW LPI 2021

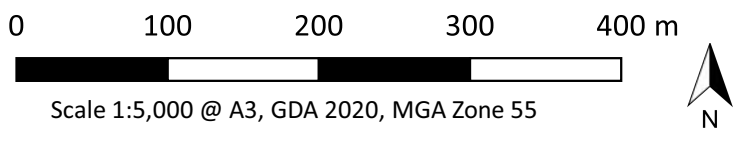


Figure 6. BAM Vegetation Mapping and Survey



Figure 7. BC Act Native Vegetation

Capital Ecology Project No: 3030  
Drawn by: C. Ross  
Date: 8 July 2021

## 2.2.5 Threatened Ecological Communities

### 2.2.5.1 Environment Protection and Biodiversity Conservation Act 1999 (Commonwealth)

The following three EPBC Act listed threatened ecological communities have the potential to occur in the locality: White Box – Yellow Box – Blakely's Red Gum Grassy Woodland and Derived Native Grassland (Box-Gum Woodland); Grey Box *Eucalyptus microcarpa* Grassy Woodlands and Derived Native Grasslands of South-eastern Australia; and Weeping Myall Woodlands.

#### **White Box – Yellow Box – Blakely's Red Gum Grassy Woodland and Derived Native Grassland – listed as critically endangered pursuant to the EPBC Act**

Description – The White Box – Yellow Box – Blakely's Red Gum Grassy Woodland and Derived Native Grassland TEC is characterised by a species-rich understorey of native tussock grasses, herbs and scattered shrubs (where shrub cover comprises less than 30% cover), and a dominance or prior dominance of White Box and/or Yellow Box and/or Blakely's Red Gum trees. This TEC occurs along the western slopes and tablelands of the Great Dividing Range from southern Queensland through New South Wales and the Australian Capital Territory to Victoria.

Presence in the subject land – Confirmed – The entire subject land would have once supported the climax community of this TEC.



Assessments of structure and floristic composition were undertaken in each of the two condition categories (vegetation zones) of PCT277 present in the subject land. The purpose of these assessments was to determine whether the patches of each vegetation zone support characteristics sufficient to meet the listing criteria for the EPBC Act listed TEC. The assessment process follows that provided in the Commonwealth EPBC Act Policy Statement 3.5 – White Box – Yellow Box – Blakely's Red Gum grassy woodlands and derived native grasslands (Commonwealth of Australia 2006). The results of this assessment are provided in Table 10. As detailed in Table 10, the areas mapped as PCT277 Zone 1 and Zone 2 do not meet the criteria for the EPBC Act listed TEC.

As such, the subject land does not support EPBC Act Box Gum Woodland.

**Table 10. Assessment against the listing criteria for the EPBC listed TEC – White Box – Yellow Box – Blakely's Red Gum Grassy Woodland and Derived Native Grassland.**

Criterion		Assessment results	
		PCT277 Zone 1	PCT277 Zone 2
1.	<i>Is, or was previously, at least one of the most common overstorey species White Box, Yellow Box or Blakely's Red Gum?</i>	Yes Zone 1 is co-dominated by Yellow Box and Blakely's Red Gum, with White Box as an associate species. These species would have been historically dominant throughout this zone.	Yes Zone 2 contains large remnant Yellow Box scattered throughout. White Box and Blakely's Red Gum also occur scattered throughout the zone. These species would have been historically dominant throughout this zone.
2.	<i>Does the patch have a predominantly native understorey?</i>	No The understorey was recorded as ranging from 11% to 28% native species cover, with an average of 22%.	No The understorey was recorded as ranging from 9% to 63% native species cover, with an average of 29%.
3.	<i>Is the patch 0.1 ha (1000 m<sup>2</sup>) or greater in size with 12 or more native understorey species present (excluding grasses)? There must be at least one important species.</i>	N/A Refer Criterion 2 results.	N/A Refer Criterion 2 results.
Or			
	<i>Is the patch 2 ha or greater in size with an average of 20 or more mature trees per hectare, or is there natural regeneration<sup>20</sup> of the dominant overstorey eucalypts?</i>	N/A Refer Criterion 2 results.	N/A Refer Criterion 2 results.
<b>Does the patch meet the criteria for the listed TEC?</b>		<b>No</b>	<b>No</b>

<sup>20</sup> Defined in Commonwealth of Australia (2006) as '*natural regeneration of the dominant overstorey eucalypts when there are mature trees [circumference of at least 125 cm at 130 cm above the ground] plus regenerating trees of at least 15 cm circumference at 130 cm above the ground.*'

**Grey Box *Eucalyptus microcarpa* Grassy Woodlands and Derived Native Grasslands of South-eastern Australia – listed as endangered pursuant to the EPBC Act**

Description – The below description is extracted from the Commonwealth Listing Advice on Grey Box *Eucalyptus microcarpa* Grassy Woodlands and Derived Native Grasslands of South-eastern Australia (Threatened Species Scientific Committee 2010<sup>21</sup>).

*The typical structure of the Grey Box (E. microcarpa) Grassy Woodlands and Derived Native Grasslands of South-Eastern Australia ecological community is a woodland to open forest with a canopy dominated by eucalypts and an understorey with a moderately dense to sparse shrub layer and a ground layer of perennial and annual native forbs and graminoids. Tussock grasses dominate the ground layer vegetation, though other graminoids or forbs may be common.*

*The key diagnostic characteristics are:*

- *The ecological community occurs on low slopes and plains from central NSW, through northern and central Victoria into South Australia. Disjunct occurrences are known from near Melbourne and in the Flinders-Lofty Block Bioregion of South Australia.*
- *The vegetation structure of the ecological community is typically a woodland to open forest.*
- *The tree canopy is dominated ( $\geq 50\%$  canopy crown cover) by *Eucalyptus macrocarpa* (Grey Box). Other tree species may be present in the canopy and, in certain circumstances, may be co-dominant with Grey Box but are never dominant on their own.*
- *The mid layer comprises shrubs of variable composition and cover, from absent to moderately dense. The mid layer usually has a crown cover of less than 30% with local patches up to 40% crown cover.*
- *The ground layer also is highly variable in development and composition, ranging from almost absent to mostly grassy to forb-rich. Ground layer flora commonly present include one or more of the graminoid genera: *Austrodanthonia*, *Austrostipa*, *Elymus*, *Enteropogon*, *Dianella* and *Lomandra*; and one or more of the chenopod genera: *Atriplex*, *Chenopodium*, *Einadia*, *Enchylaena*, *Maireana*, *Salsola* and *Sclerolaena*.*
- *Derived grasslands are a special state of the ecological community, whereby the canopy and mid layers have been mostly removed to  $<10\%$  crown cover but the native ground layer remains largely intact, with 50% or more of the total vegetation cover being native.*

To determine whether a patch meets the criteria for the community, the vegetation must meet the condition thresholds outlined in the Commonwealth listing advice. An assessment of the vegetation in the subject land regarding the condition thresholds is provided below.

- *A minimum patch size at least 0.5 ha; and*

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<sup>21</sup> Threatened Species Scientific Committee (2010). *Commonwealth Listing Advice on Grey Box (Eucalyptus microcarpa) Grassy Woodlands and Derived Native Grasslands of South-eastern Australia*. Department of the Environment, Water, Heritage and the Arts. Canberra, ACT: Department of the Environment, Water, Heritage and the Arts.

- The canopy layer contains Grey Box (*E. macrocarpa*) as the dominant or co-dominant tree species;
- The vegetative cover of non-grass weed species in the ground layer is less than 30% at any time of the year.

Presence in the subject land – Absent – While Grey Box *E. macrocarpa* is present as an associate species in the subject land, it is not dominant or co-dominant. As described above, the co-dominant species are Yellow Box and Blakely's Red Gum, and the entire subject land would once have supported White Box – Yellow Box – Blakely's Red Gum Grassy Woodland and Derived Native Grassland. As such, the subject land does not support this TEC.

### **Weeping Myall Woodlands– listed as endangered pursuant to the EPBC Act**

Description – The below description is extracted from the Commonwealth Listing Advice on Weeping Myall Open Woodland of the Riverina and NSW South-western Slopes Bioregion (Threatened Species Scientific Committee 2009<sup>22</sup>).

*The Weeping Myall Woodlands occurs on the inland alluvial plains west of the Great Dividing Range in NSW and Queensland, with one small outlying patch in northern Victoria. The ecological community occurs in a range from open woodlands to woodlands, generally 4-12 m high, in which Weeping Myall (*Acacia pendula*) trees are the sole or dominant overstorey species. The Weeping Myall Woodlands generally occur on flat areas, shallow depressions or gilgais on raised (relict) alluvial plains.*

To determine whether a patch meets the criteria for the community, the vegetation must meet the condition thresholds outlined in the Commonwealth listing advice. An assessment of the vegetation in the subject land regarding the condition thresholds is provided below.

- the tree canopy is dominated (at least 50% of trees present) by living, dead or defoliated Weeping Myall trees; and
- the overstorey must have at least 5% tree canopy cover or at least 25 dead or defoliated mature Weeping Myall trees/ha; and
- the area is at least 0.5 ha in size; and
- the patch has either:
  - more than two layers of regeneration of Weeping Myall present; or
  - the tallest layer of living, dead or defoliated Weeping Myall trees is at least 4 m tall and of the vegetative cover present, 50% is comprised of native species.

Presence in the subject land – Absent – Weeping Myall *Acacia pendula* is not present in the subject land. As such, the subject land does not support this TEC.

### **Conclusion**

The subject land does not support any of the EPBC Act listed threatened ecological communities with the potential to occur in the locality.

<sup>22</sup> Threatened Species Scientific Committee (2009). *Commonwealth Listing Advice on Weeping Myall Woodlands*. Department of the Environment, Water, Heritage and the Arts. Available from: <http://www.environment.gov.au/biodiversity/threatened/communities/pubs/98-listing-advice.pdf>

### 2.2.5.2 Biodiversity Conservation Act 2016 (NSW)

One BC Act listed ecological communities has the potential to occur in the subject land: White Box – Yellow Box – Blakely's Red Gum Woodland' (BC Act Box-Gum Woodland);

#### BC Act Box-Gum Woodland

This community, listed as critically endangered in NSW, is described below, together with an assessment of its presence and condition in the subject land.

The below description is extracted from the NSW *Final Determination: White Box – Yellow Box – Blakely's Red Gum Grassy Woodland and Derived Native Grassland* (NSW Threatened Species Scientific Committee 2020, gazetted 17 July 2020<sup>23</sup>).

*4.2. White Box – Yellow Box – Blakely's Red Gum Grassy Woodland and Derived Native Grassland is characterised by widely-spaced trees with canopies not touching and projected foliage cover generally less than 30% (Prober et al. 2017) ...Understorey shrubs are typically sparse or absent (Prober et al. 2017). The groundcover is dominated by perennial tussock grasses interspersed with a diverse range of forb species with the families Asteraceae and Fabaceae, and the orders Liliales and Asparagales well represented (Prober et al. 2017).*

*4.3. White Box – Yellow Box – Blakely's Red Gum Grassy Woodland and Derived Native Grassland is characteristically dominated by one or more of the species Eucalyptus albens (White Box), E. melliodora (Yellow Box) and E. blakelyi (Blakely's Red Gum) ...A number of understorey species are typically found throughout almost the entire range of the community, with the exception of the extreme north of its distribution and areas where they have been excluded by grazing.*

*4.10. The distribution of White Box – Yellow Box – Blakely's Red Gum Grassy Woodland and Derived Native Grassland spans a range in elevation from approximately 170 m ASL on the western slopes of the Great Dividing Range to approximately 1200 m on the Northern Tablelands of NSW (Beadle 1981), although occurrences on the ranges are typically at lower elevations (Prober et al. 2017). The topography on which the community occurs ranges from flat in the west of its range to hilly and undulating in the east (Prober and Thiele 2004).*

*4.12. ...For the purpose of establishing the risk of ecosystem/community collapse due to ongoing decline in distribution, it is not possible on the basis of available data, to specify thresholds in either tree cover or species diversity which are indicative of loss of function because: i) no single threshold is appropriate for the range of circumstances and pathways leading to different states of degradation (and hence the potential for recovery); ii) the point at which an ecological community has ceased to function in its original form is inherently uncertain, and the scientific basis upon which symptoms such as loss of tree cover and diversity can be related to ecological function is not established in this case; and iii) recovery may be dependent on active remediation, therefore thresholds can not be determined in absolute terms because they depend on social (collective will) and economic (cost of remediation) factors.*

*3.1.4. The condition of remnants ranges from relatively good to highly degraded, such as paddock remnants with weedy understoreys and only a few hardy natives left. Some remnants of the community may consist of only an intact overstorey or an intact understorey but may still have high conservation value due to the flora and fauna they support.*

<sup>23</sup> NSW Threatened Species Scientific Committee (2020a). *Final Determination: White Box – Yellow Box – Blakely's Red Gum Grassy Woodland and Derived Native Grassland*. Gazetted 17 July 2020.

The final determination does not provide specific listing criteria against which to assess a patch of vegetation. However, as described in the final determination, the definition for the BC Act Box-Gum Woodland TEC is extremely broad. In effect, any land for which the climax community is Box-Gum Woodland that has not been cleared and cultivated, become a stock camp, or otherwise been highly modified/degraded, is likely to meet the minimum definition of the BC Act listed TEC.

Presence in the subject land – Confirmed – The entire subject land would have once supported the climax community of this TEC. PCT277 Zone 1 is characterised by a native overstorey with a low diversity exotic understorey and PCT277 Zone 2 by no overstorey with a low diversity exotic understorey. Therefore, based on the description in the final determination, PCT277 Zone 1 supports vegetation which meets the definition for this TEC in low condition. PCT277 Zone 2 has been modified to the extent that it no longer supports vegetation which meets the criteria for this TEC.

As such, the portions of the subject land that support BC Act Box-Gum Woodland are defined by the extent of PCT277 Zone 1.

## 2.2.6 High threat weeds

Table 11 lists the five high threat weeds that occur in the subject land.

**Table 11. High threat weeds.**

Species Name	Common Name	Status
<b>Trees</b>		
<i>Salix</i> spp.	Willow	WoNS
<b>Shrubs</b>		
<i>Rubus fruticosus aggregate</i>	Blackberry	WoNS, LM
<b>Forbs</b>		
<i>Carthamus lanatus</i>	Saffron Thistle	-
<i>Echium plantagineum</i>	Patterson's Curse	-
<i>Xanthium spinosum</i>	Bathurst Burr	LM

**Table key.** Commonwealth Weed of National Significance = **WoNS**. Regional Priority Weed in the Riverina Local Land Services region under the NSW *Biosecurity Act 2015*: **P** = Prevention; **E** = Eradication; **C** = Containment; **AP** = Asset Protection; **LM** = Species subject to Local Management programs.

## 2.3 Habitat Suitability for Threatened Species

### 2.3.1 Fauna habitat

The habitat features in the subject land were identified during the field surveys and assessed regarding their potential value to native fauna species, both threatened and common. The fauna habitat features of the subject land are described in Table 12. It is important to note that the information presented in Table 12 is also used to assess the presence/absence of habitat constraints and/or microhabitats for EPBC Act only listed species (Section 2.3.3), ecosystem credits species (Section 2.3.3), and species credit species (Section 2.3.4).

**Table 12. Fauna habitat features.**

Habitat Feature	Description	Relevant Native Fauna Species/Assemblages
Remnant eucalypts	The subject land supports a many remnant eucalyptus, primarily in PCT277 Zone 1, but also occurring in PCT277 Zone 2 as isolated paddock trees (Figure 9, Appendix C). In total, 59 remnant trees support functional hollows. Several trees also contained large stick nests.	All live remnant trees are likely to provide a foraging resource for a variety of birds and marsupials when in flower, potentially including threatened species. The hollow-bearing remnant trees are likely to provide a nesting resource for birds, bats, and marsupials, potentially including threatened species (e.g. Little Eagle).
Other native vegetation (i.e. native shrubs, grasses and forbs)	The midstorey and shrubstorey are entirely absent throughout the subject land. The groundstorey supports a low diversity of native grasses and forbs.	The absent midstorey and shrubstorey and low diversity groundstorey are likely to limit the habitat value of the subject land for some of the region's threatened woodland birds and marsupials, which generally prefer to inhabit vegetation where such features are more intact.
Exotic pasture	The whole of the subject land supports a highly modified pasture groundstorey dominated by exotic grasses and forbs.	The exotic dominant pasture would provide a limited grazing resource for common birds, reptiles, and herbivorous mammals. Open areas are likely to provide a hunting resource for raptors and other predatory birds.
Creeks, streams, dams	The subject land contains a creek and smaller drainage line. The creek and drainage line supported little riparian vegetation at the time of survey, were mostly dry, and are only likely to convey water following substantial rain events.  There are three small to moderately sized dams in the subject land. All of the dams held water at the time of survey, and the larger dam supported mixed native and exotic fringing vegetation.	The lack of permanent water and riparian vegetation indicates that the creek and drainage line are unlikely to provide habitat of significance to aquatic/riparian flora or fauna. The dams may be of some value to common native water birds (e.g. Australian Wood Duck <i>Chenonetta jubata</i> ) amphibians, and reptiles (e.g. Eastern Long-necked Turtle <i>Chelodina longicollis</i> ). Rainbow bee-eaters <i>Merops ornatus</i> were observed nesting in the banks of the creek, and a White-faced Heron <i>Egretta novaehollandiae</i> nest was also recorded near the creek.

## 2.3.2 Threatened Biodiversity Databases

### 2.3.2.1 Definitions of conservation significance

The conservation significance of a species, population or community is determined by its current listing pursuant to Commonwealth and/or State legislation and associated policy, more specifically:

- National – Listed as threatened (critically endangered, endangered, vulnerable or conservation dependent) pursuant to the EPBC Act; and
- State (NSW) – Listed as threatened (endangered or vulnerable) pursuant to the BC Act.

Species listed as 'migratory' under the EPBC Act are also considered where relevant.

### 2.3.2.2 Database and literature review

Information regarding the suitability of the habitat in the subject land for threatened species was obtained from the Threatened Biodiversity Data Collection (TBDC), BioNet (e.g. the profile of a threatened species), the BAM Calculator, listing determinations, and/or recovery plans prepared for the species by the Commonwealth Government and NSW Government. This information is used to assess the presence/absence of habitat constraints and/or microhabitats for species identified by the Department of Agriculture, Water and the Environment's online EPBC Act Protected Matters Search Tool (PMST) (Section 2.3.3) or flagged by the BAM as ecosystem credits species (Section 2.3.3) and species credit species (Section 2.3.4).

In addition, a database search and literature review were completed to inform likelihood of occurrence assessments and provide useful background information for this assessment. This review included obtaining:

- a list of threatened species (flora and fauna), threatened populations and threatened ecological communities (TECs) listed pursuant to the EPBC Act with the potential to occur in the subject land obtained using the Department of the Environment's online EPBC Act Protected Matters Search Tool (PMST) on 16 June 2021; and
- ecological point data from the NSW Wildlife Atlas (BioNet), downloaded on 12 March 2021, providing a list of threatened species which have previously been recorded in the broad locality of the subject land (i.e. within 10 km) (refer to Figure 8).

Literature referred to during the conduct of the surveys for this study and/or during the preparation of this BDAR is listed under References.

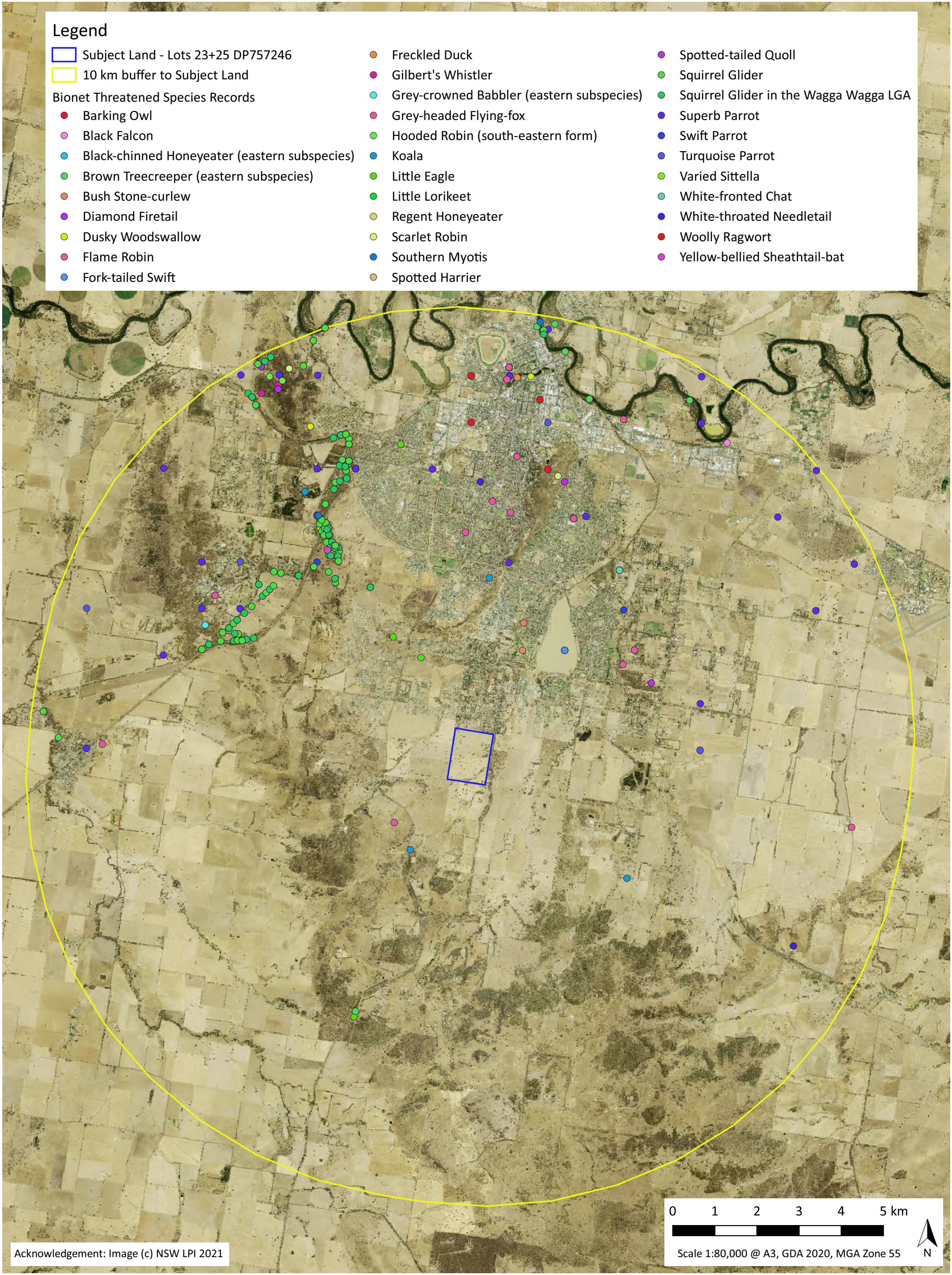


Figure 8. NSW Wildlife Atlas Threatened Species Search

### 2.3.3 Habitat suitability for ecosystem credit species

Threatened species classified as ecosystem credit species and identified by the BAM as potentially occurring in the subject land are listed in Table 13. The value of the habitat in the subject land for ecosystem credit species is determined based on the type and condition (i.e. vegetation integrity) of the vegetation present together with the landscape context (refer to Section 2.1). The likelihood of these species occurring in the subject land is determined based on the presence/absence of specific habitat constraints, geographic limitations, and vagrancy. Information regarding habitat constraints, geographic limitations, and vagrancy were obtained from the TBDC, BioNet (e.g. the profile of a threatened species), and through the BAM Calculator.

**Table 13. Predicted ecosystem credit species identified by the BAM as potentially occurring in the subject land.**

Species	NSW (BC Act) listing status	National (EPBC Act) listing status	Presence	Justification for exclusion
<i>Anthochaera phrygia</i> Regent Honeyeater (Foraging)	Critically Endangered	Critically Endangered	Yes – assumed	-
<i>Artamus cyanopterus</i> <i>cyanopterus</i> Dusky Woodswallow	Vulnerable	-	Yes – assumed	-
<i>Botaurus poiciloptilus</i> Australasian Bittern	Endangered	Endangered	Yes – assumed	-
<i>Callocephalon fimbriatum</i> Gang-gang Cockatoo (Foraging)	Vulnerable	-	Yes – assumed	-
<i>Chthonicola sagittata</i> Speckled Warbler	Vulnerable	-	Yes – assumed	-
<i>Circus assimilis</i> Spotted Harrier	Vulnerable	-	Yes – assumed	-
<i>Climacteris picumnus victoriae</i> Brown Treecreeper (eastern subspecies)	Vulnerable	-	Yes – assumed	-

Species	NSW (BC Act) listing status	National (EPBC Act) listing status	Presence	Justification for exclusion
<i>Daphoenositta chrysoptera</i> Varied Sittella	Vulnerable	-	Yes – assumed	-
<i>Dasyurus maculatus</i> Spotted-tailed Quoll	Vulnerable	Endangered	Yes – assumed	-
<i>Epthianura albifrons</i> White-fronted Chat	Vulnerable	-	Yes – assumed	-
<i>Falco hypoleucos</i> Grey Falcon	Endangered	-	Yes – assumed	-
<i>Falco subniger</i> Black Falcon	Vulnerable	-	Yes – assumed	-
<i>Glossopsitta pusilla</i> Little Lorikeet	Vulnerable	-	Yes – assumed	-
<i>Grantiella picta</i> Painted Honeyeater	Vulnerable	Vulnerable	No – habitat constraint	<p>The BAM Calculator and TBDC lists the following habitat constraint:</p> <ul style="list-style-type: none"> <li>Mistletoes present at a density of greater than five mistletoes per hectare.</li> </ul> <p>The trees in the subject land do not support mistletoe at a density greater than five per hectare. The absence of this habitat constraint removes this species as an ecosystem credit species.</p>
<i>Haliaeetus leucogaster</i> White-bellied Sea-eagle (Foraging)	Vulnerable	-	Yes – assumed	-
<i>Hieraaetus morphnoides</i> Little Eagle (Foraging)	Vulnerable	-	Yes - confirmed	-
<i>Hirundapus caudacutus</i> White-throated Needletail	Not listed	Vulnerable	Yes – assumed	-

Species	NSW (BC Act) listing status	National (EPBC Act) listing status	Presence	Justification for exclusion
<i>Lalage tricolor</i> White-winged Triller	Vulnerable	-	Yes – confirmed	-
<i>Lathamus discolor</i> Swift Parrot (Foraging)	Endangered	Critically Endangered	Yes – assumed	-
<i>Leipoa ocellata</i> Malleefowl	Endangered	Vulnerable	Yes – assumed	-
<i>Lophoictinia isura</i> Square-tailed Kite (Foraging)	Vulnerable	-	Yes – assumed	-
<i>Melanodryas cucullata cucullata</i> Hooded Robin (south-eastern form)	Vulnerable	-	Yes – assumed	-
<i>Melithreptus gularis gularis</i> Black-chinned Honeyeater	Vulnerable	-	Yes – assumed	-
<i>Miniopterus orianae oceanensis</i> Large Bent-winged Bat (Foraging)	Vulnerable	-	Yes – assumed	-
<i>Neophema pulchella</i> Turquoise Parrot	Vulnerable	-	Yes – assumed	-
<i>Ninox connivens</i> Barking Owl (Foraging)	Vulnerable	-	Yes – assumed	-
<i>Nyctophilus corbeni</i> Corben's Long-eared Bat	Vulnerable	Vulnerable	Yes – assumed	-
<i>Pachycephala inornata</i> Gilbert's Whistler	Vulnerable	-	Yes – assumed	-

Species	NSW (BC Act) listing status	National (EPBC Act) listing status	Presence	Justification for exclusion
<i>Petroica boodang</i> Scarlet Robin	Vulnerable	-	Yes – assumed	-
<i>Petroica phoenicea</i> Flame Robin	Vulnerable	-	Yes – confirmed	-
<i>Phascolarctos cinereus</i> Koala (Foraging)	Vulnerable	Vulnerable	Yes – assumed	-
<i>Polytelis swainsonii</i> Superb Parrot (Foraging)	Vulnerable	Vulnerable	Yes – confirmed	-
<i>Pomatostomus temporalis</i> <i>temporalis</i> Grey-crowned Babbler (eastern subspecies)	Vulnerable	-	Yes – assumed	-
<i>Pteropus poliocephalus</i> Grey-headed Flying-fox (Foraging)	Vulnerable	Vulnerable	Yes – assumed	-
<i>Rostratula australis</i> Australian Painted Snipe	Endangered	Endangered	Yes – assumed	-
<i>Saccolaimus flaviventris</i> Yellow-bellied Sheath-tail-bat	Vulnerable	-	Yes – assumed	-
<i>Stagonopleura guttata</i> Diamond Firetail	Vulnerable		Yes – assumed	-
<i>Stictonetta naevosa</i> Freckled Duck	Vulnerable	-	Yes – assumed	-

Species	NSW (BC Act) listing status	National (EPBC Act) listing status	Presence	Justification for exclusion
<i>Tyto novaehollandiae</i> Masked Owl (Foraging)	Vulnerable		Yes – assumed	-

### 2.3.4 Habitat suitability for species credit species

#### 2.3.4.1 Candidate species credit species

Threatened species classified as species credit species and identified by the BAM as potentially occurring in the subject land are listed in Table 14. The value of the habitat in the subject land for species credit species is determined based on the type and condition (i.e. vegetation integrity) of the vegetation present together with the landscape context (refer to Section 2.1). The likelihood of these species occurring in the subject land is determined based the presence/absence of specific habitat constraints, microhabitat requirements, geographic limitations, vagrancy, species records (BioNet and ecological reports), and/or the results of targeted surveys. Information regarding habitat constraints, microhabitat requirements, geographic limitations, and vagrancy were obtained from the TBDC, BioNet (e.g. the profile of a threatened species), and through the BAM Calculator. A summary of the findings from each targeted survey is given in Section 2.3.4.2.

**Table 14. Candidate species credit species identified by the BAM as potentially occurring in the subject land.**

Species	NSW (BC Act) listing status	National (EPBC Act) listing status	Habitat requirements	Presence	Justification for exclusion
<i>Acacia ausfeldii</i> Ausfeld's Wattle	Vulnerable	-	Ausfeld's Wattle is an erect or spreading shrub 2 - 4 m high. Found to the east of Dubbo in the Mudgee-Ulan-Gulgong area of the NSW South Western Slopes bioregion, with some records in the adjoining Brigalow Belt South, South Eastern Highlands and the Sydney Basin bioregions. Populations are recorded from Yarrobil National Park, Goodiman State Conservation Area and there is a 1963 record from Munghorn Gap Nature Reserve. A large population is also known from Tuckland State Forest to the northwest of Gulgong. Associated species include <i>Eucalyptus albens</i> , <i>E. blakelyi</i> and <i>Callitris</i> spp., with an understorey dominated by <i>Cassinia</i> spp. and grasses. The TBDC lists 'Footslopes and low rises on sandstone' as a habitat constraint for this species.	No – habitat degraded	No <i>Acacia</i> species were recorded during the field survey, and the species has not been recorded in the locality. In addition, the majority of the subject land has been historically cleared and does not support a midstorey or shrubstorey. <u>Conclusion – the species is considered unlikely to occur in the subject land.</u>
<i>Ammobium craspedioides</i> Yass Daisy	Vulnerable	Vulnerable	The Yass Daisy is a perennial herb that bears large yellow flowerheads, with each flowerhead supported by a 30-60 cm stem. It is found from Crookwell (north of Goulburn) to near Wagga Wagga, with most populations occurring in the Yass District. The Yass Daisy occurs in dry forest, Box-Gum Woodland and secondary derived grassland of these communities. It tolerates light grazing and areas that are irregularly mown or slashed. Flowering occurs from October to November. The BAM Calculator lists 'South of Cowra' as a geographic limitation for this species.	No – habitat degraded	The majority of the subject land has been pasture improved or tilled and cropped and grazed over an extended period of time. As a result, the groundstorey across the subject land supports a low cover and very low diversity of disturbance tolerant native species. <u>Conclusion – the habitat has been degraded to the extent that the species is considered unlikely to occur.</u>
<i>Anthochaera phrygia</i> Regent Honeyeater (Breeding)	Critically Endangered	Critically Endangered	This species inhabits dry open forest and woodland (particularly Box-Ironbark woodland and riparian forests of River Sheoak) that have significantly large numbers of mature trees, high canopy cover, and abundance of mistletoes. The species breeds in Box-Ironbark and other temperate woodlands, and in riparian gallery forest dominated by River Sheoak. The species usually nests in tall mature eucalypts, Sheoaks, or mistletoe haustoria. There are only three known key breeding regions: north-east Victoria (Chiltern-Albury) and NSW (Capertee Valley and the Bundarra-Barraba region). The TBDC lists 'as per mapped areas' as a breeding habitat constraint for this species.	No – habitat constraint	The subject land is not identified as an 'important area' for Regent Honeyeater on the 'BAM – Important Areas' map <sup>24</sup> . <u>Conclusion - the subject land lacks the breeding habitat constraints required for this species.</u>
<i>Aprasia parapulchella</i> Pink-tailed Legless Lizard	Vulnerable	Vulnerable	This species inhabits sloping, open woodland areas with predominantly native grassy ground layers, particularly those dominated by Kangaroo Grass. Sites are typically well-drained, with rocky outcrops or scattered, partially buried rocks. The TBDC lists 'rocky areas or within 50 m of rocky areas' as a habitat constraint for this species. Some of the main threats to this species listed in the TBDC are habitat loss through bush-rock removal and vegetation clearing for agricultural purposes (e.g. pasture improvement including slashing, ploughing, and sowing of non-native species), overgrazing by domestic stock, and invasion of habitat by weeds.	No – habitat constraint	The subject land does not support rocky areas and is not within 50 m of rocky areas. In addition, the groundstorey across the whole of the subject land is clearly dominated by exotic grasses and forbs. As such, the subject land lacks the habitat constraints and microhabitat features required to support this species. <u>Conclusion - the subject land lacks the habitat constraints required for this species.</u>

<sup>24</sup> [https://webmap.environment.nsw.gov.au/Html5Viewer291/index.html?viewer=BAM\\_ImportantAreas](https://webmap.environment.nsw.gov.au/Html5Viewer291/index.html?viewer=BAM_ImportantAreas)

Species	NSW (BC Act) listing status	National (EPBC Act) listing status	Habitat requirements	Presence	Justification for exclusion
<i>Burhinus grallarius</i> Bush Stone-curlew	Endangered	-	The Bush Stone-curlew is found throughout Australia except for the central southern coast and inland, the far south-east corner, and Tasmania. Only in northern Australia is it still common however and in the south-east it is either rare or extinct throughout its former range. The Bush Stone-curlew inhabits open forests and woodlands with a sparse grassy groundlayer and fallen timber. It is largely nocturnal, being especially active on moonlit nights. It nests on the ground in a scrape or small bare patch. The BAM Calculator lists <i>'fallen/standing dead timber including logs'</i> as a habitat constraint for this species.	No - surveyed	The species has been recorded within 3 km of the subject land, most recently in 2010. The subject land contains potential habitat (fallen/standing dead timber). The species was not recorded during targeted survey in the subject land. <u>Conclusion – while the species may occasionally visit the subject land to forage, it is unlikely to constitute important habitat for the species.</u>
<i>Calidris ferruginea</i> Curlew Sandpiper (breeding)	Endangered	Critically Endangered	The Curlew Sandpiper is distributed around most of the Australian coastline (including Tasmania). It occurs along the entire coast of NSW, particularly in the Hunter Estuary, and sometimes in freshwater wetlands in the Murray-Darling Basin. Inland records are probably mainly of birds pausing for a few days during migration. The Curlew Sandpiper breeds in Siberia and migrates to Australia (as well as Africa and Asia) for the non-breeding period, arriving in Australia between August and November, and departing between March and mid-April. It generally occupies littoral and estuarine habitats, and in New South Wales is mainly found in intertidal mudflats of sheltered coasts. It also occurs in non-tidal swamps, lakes, and lagoons on the coast and sometimes inland. It forages in or at the edge of shallow water, occasionally on exposed algal mats or waterweed, or on banks of beach-cast seagrass or seaweed.	No – microhabitat features	This species has been recorded in the locality (Lake Albert, 2 km from the subject land), but the most recent record is from 1977. The subject land does not contain suitable habitat for this species (i.e. large wetlands with mudflats). <u>Conclusion – the species is considered unlikely to occur in the subject land.</u>
<i>Callocephalon fimbriatum</i> Gang-gang Cockatoo (Breeding)	Vulnerable	-	In spring and summer, this species is generally found in tall mountain forests and woodlands, particularly in heavily timbered and mature wet sclerophyll forests. In autumn and winter, the species often moves to lower altitudes in drier more open eucalypt forests and woodlands, particularly box-gum and box-ironbark assemblages, or in dry forest in coastal areas and often found in urban areas. Gang-Gang Cockatoos favour old growth forest and woodland for nesting and roosting. Nests are located in hollows of eucalypts that are 10 cm in diameter or larger and at least 9 m above the ground in eucalypts. The TBDC lists <i>'Eucalypt tree species with hollows greater than 9 cm diameter'</i> as a breeding habitat constraint for this species.	No - surveyed	The species has not been recorded in the locality. While the subject land does contain potential breeding habitat (i.e. hollow bearing trees), the wider locality does not support tall mountain forests or woodlands, heavily timbered or mature wet sclerophyll forests, or old growth forest or woodland. In addition, the grassy woodland across the subject land is heavily degraded as much of the overstorey has been cleared and the midstorey and shrubstorey are almost entirely absent. Finally, targeted bird surveys were conducted across the subject land and remnant trees were assessed for the presence/absence of habitat features and for signs of fauna nesting in hollows (Figure 9). No Gang-gang Cockatoos were recorded in the subject land and no sign of Gang-gang Cockatoos nesting in tree hollows was detected. <u>Conclusion – the species is considered unlikely to breed in the subject land.</u>
<i>Cercartetus nanus</i> Eastern Pygmy-possum	Vulnerable	-	This species is found in a broad range of habitats, but in most areas woodlands and heath appear to be preferred. It feeds primarily on nectar and pollen collected from banksias, eucalypts, and bottlebrushes, but also feeds on insects throughout the year. The species shelters in tree hollows, rotten stumps, holes in the ground, abandoned bird-nests, Ringtail Possum dreys, or thickets of vegetation, (e.g. grass-tree skirts). Tree hollows are favoured for breeding. The TBDC lists <i>'declining shrub diversity in forests and woodlands due to overgrazing by stock and rabbits'</i> , <i>'predation from cats, dogs and foxes'</i> , and <i>'loss of nest sites due to removal of firewood'</i> as some of the key threats to the species.	No – microhabitat features, habitat degraded	Field surveys of the vegetation in the subject land did not record any banksias or bottlebrushes (Appendix B). The majority of the subject land has been historically cleared and does not support a midstorey or shrubstorey. As a result, there are few mature trees, fallen timber, or thickets of vegetation (refer Appendix A) which could be used by the species for shelter. A tree habitat assessment did not record any Ringtail Possum dreys (Appendix C). Finally, the species has not been recorded in the locality (Figure 8). As such, the subject land lacks the primary microhabitat features required for this species and has been degraded to the extent that the species is considered unlikely to occur. <u>Conclusion – the species is considered unlikely to occur in the subject land.</u>
<i>Chalinolobus dwyeri</i> Large-eared Pied Bat	Vulnerable	Vulnerable	This species is found mainly in area with extensive cliffs and caves and roosts in caves (near their entrances), crevices in cliffs, old mine workings and in the disused, bottle-shaped mud nests of the Fairy Martin <i>Petrochelidon ariel</i> , frequenting low to mid-elevation dry open forest and woodland close to these features. The species is often found in well-timbered areas containing gullies. The TBDC lists <i>'Within two kilometres of rocky areas containing caves, overhangs, escarpments, outcrops, or crevices, or within two kilometres of old mines or tunnels'</i> as a habitat constraint for this species.	No – habitat constraint	The subject land does support well-timbered areas containing gullies and does not occur within 2km of potential roosting habitat (cliffs, caves, old mine workings, etc.). <u>Conclusion – the subject land lacks the habitat constraints required for this species.</u>

Species	NSW (BC Act) listing status	National (EPBC Act) listing status	Habitat requirements	Presence	Justification for exclusion
<i>Crinia sloanei</i> Sloane's Froglet	Vulnerable	Endangered	Sloane's Froglet has been recorded from widely scattered sites in the floodplains of the Murray-Darling Basin, with the majority of records in the Darling Riverine Plains, NSW South Western Slopes and Riverina bioregions in New South Wales. It has not been recorded recently in the northern part of its range and has only been recorded infrequently in the southern part of its range in NSW. At a number of sites where records are verified by museum specimens, the species has not been subsequently detected during more recent frog surveys in the vicinity (e.g. Holbrook, Nyngan, Wagga Wagga and Tocumwal). It is typically associated with periodically inundated areas in grassland, woodland and disturbed habitats.	No – habitat degraded	The species has not been recorded in the locality, and recent surveys in the Wagga Wagga area have not detected the species. <u>Conclusion – the species is considered unlikely to occur in the subject land.</u>
<i>Cullen parvum</i> Small Scurf-pea	Endangered	-	The Small Scurf-pea is known in NSW from only two herbarium collections; one from Wagga Wagga in 1884 and the other from Jindera (near Albury) in 1967. A small population was recently reported from near Jerilderie (although it has not been relocated). In recent years, two populations have been recorded in travelling stock reserves south-west of Wagga Wagga, and a population reputedly exists on a roadside near Galong. Another population has recently been discovered on private land near Young. Large populations have been recorded in grassy gaps in the Red Gum Woodlands of Barmah State Park, just across the border in Victoria. Extensive suitable habitat probably occurs across the border in NSW. In known populations in Victoria and NSW, plants are found in grassland, River Red Gum ( <i>Eucalyptus camaldulensis</i> ) Woodland or Box-Gum Woodland, sometimes on grazed land and usually on table drains or adjacent to drainage lines or watercourses, in areas with rainfall of between 450 and 700 mm.	No – habitat degraded	The majority of the subject land has been pasture improved or tilled and cropped and grazed over an extended period of time. As a result, the groundstorey across the subject land supports a low cover and very low diversity of disturbance tolerant native species. <u>Conclusion – the habitat has been degraded to the extent that the species is considered unlikely to occur.</u>
<i>Delma impar</i> Striped Legless-lizard	Vulnerable	Vulnerable	Striped Legless Lizard is mainly found in Natural Temperate Grassland but has also been captured in grasslands that have a high exotic component. It is also found in secondary grassland near Natural Temperate Grassland and occasionally in open Box-Gum Woodland. Habitat is characterised by perennial, tussock-forming grasses such as Kangaroo Grass <i>Themeda triandra</i> , Speargrasses <i>Austrostipa</i> spp., Poa Tussocks <i>Poa</i> spp., and occasionally Wallaby Grasses <i>Rytidosperma</i> spp.. The species can sometimes be found in modified grasslands with a significant content of exotic grasses, and in grasslands with significant amounts of surface rocks (used for shelter). Some of the main threats to this species listed in the TBDC are habitat loss through vegetation clearing for agricultural purposes (e.g. pasture improvement including slashing, ploughing, and sowing of non-native species), habitat degradation through invasion by weeds or escaped pasture species, and overgrazing by domestic stock.	No – microhabitat features, habitat degraded	The majority of the subject land has been pasture improved or tilled and cropped and grazed over an extended period of time. As a result, the groundstorey across the subject land supports a low cover and very low diversity of disturbance tolerant native species. The groundlayer does not contain sufficient tussock structure or appropriate grasses to support this species. In addition, the species has not been recorded in the locality. <u>Conclusion – the habitat has been degraded to the extent that the species is considered unlikely to occur.</u>
<i>Euphrasia arguta</i> Euphrasia arguta	Critically Endangered	Critically Endangered	Euphrasia arguta was rediscovered in the Nundle area of the NSW north western slopes and tablelands in 2008. Prior to this, it had not been collected for 100 years. Historically, Euphrasia arguta has only been recorded from relatively few places within an area extending from Sydney to Bathurst and north to Walcha. The Royal Botanic Gardens Specimen Register records an additional location reported and vouchered in 2002 from near the Hastings River; and Euphrasia arguta was also recorded from the Barrington Tops in 2012. Historic records of the species noted the following habitats: 'in the open forest country around Bathurst in sub humid places', 'on the grassy country near Bathurst', and 'in meadows near rivers'. Plants from the Nundle area have been reported from eucalypt forest with a mixed grass and shrub understorey; here, plants were most dense in an open disturbed area and along the roadside, indicating the species had regenerated following disturbance.	No – habitat degraded	The majority of the subject land has been pasture improved or tilled and cropped and grazed over an extended period of time. As a result, the groundstorey across the subject land supports a low cover and very low diversity of disturbance tolerant native species. In addition, the species has not been recorded in the locality. <u>Conclusion – the habitat has been degraded to the extent that the species is considered unlikely to occur.</u>

Species	NSW (BC Act) listing status	National (EPBC Act) listing status	Habitat requirements	Presence	Justification for exclusion
<i>Haliaeetus leucogaster</i> White-bellied Sea-Eagle (Breeding)	Vulnerable	-	Breeding habitat consists of mature tall open forest, open forest, tall woodland, and swamp sclerophyll forest close to foraging habitat. Nest trees are typically large emergent eucalypts and often have emergent dead branches or large dead trees nearby which are used as 'guard roosts'. Nests are large structures built from sticks and lined with leaves or grass. The TBDC lists 'living or dead mature trees in suitable vegetation within 1km of a river, lake, large dam, creek, wetland, or coastline' as a breeding habitat constraint.	No – habitat constraint	The species has not been recorded within 10 km of the subject land, and the subject land does not contain potential breeding habitat. <u>Conclusion – the species is considered unlikely to occur in the subject land.</u>
<i>Hieraetus morphnoides</i> Little Eagle (Breeding)	Vulnerable	-	This species occupies open eucalypts forest, woodland, or open woodland. Sheoak or <i>Acacia</i> woodlands and riparian woodlands of interior NSW are also used. The species nests in tall living trees within a remnant patch, where pairs build a large stick nest in winter. The TBDC 'Nest trees - live (occasionally dead) large old trees within vegetation' as a breeding habitat constraint for this species.	Yes – confirmed	Surveys were conducted across the subject land and remnant trees were assessed for the presence/absence of habitat features and for signs of fauna nesting in stick nests (Figure 9). An active Little Eagle nest was recorded during the surveys (see Figure 9). <u>Conclusion – this species is confirmed to breed in the subject land.</u>
<i>Lathamus discolor</i> Swift Parrot (Breeding)	Endangered	Critically Endangered	This species breeds in Tasmania from September to January, nesting in old trees with hollows and feeding in forests dominated by Tasmanian Blue Gum <i>Eucalyptus globulus</i> . The species migrates between February and October to south-eastern Australia from Victoria and the eastern parts of South Australia to south-east Queensland. On the mainland, they occur in areas where eucalypts are flowering profusely or where there are abundant lerp (from sap-sucking bugs) infestations. In NSW, the species mostly occurs on the coast and south west slopes. The TBDC lists 'as per mapped areas' as a breeding habitat constraint for this species.	No – habitat constraint	The subject land is not identified as an 'important area' for Swift Parrot on the 'BAM – Important Areas' map <sup>25</sup> . However, important areas are mapped to the north-east in vegetation surrounding Lake Albert. <u>Conclusion - the subject land lacks the breeding habitat constraints required for this species.</u>
<i>Litoria booroolongensis</i> Booroolong Frog	Endangered	Endangered	This species lives along permanent streams with some fringing vegetation cover such as ferns, sedges, or grasses. Adults occur on or near cobble banks and other rock structures within stream margins and shelter under rocks or amongst vegetation near the ground on the stream edge. Eggs are laid in submerged rock crevices and tadpoles grow in slow-flowing connected or isolated pools.	No – habitat degraded, microhabitat features	The subject land does not contain potential habitat for the species as it lacks permanent streams, rivers, other suitable waterbodies, and riparian habitat. <u>Conclusion – the subject land has been degraded to the extent that the species is considered unlikely to occur.</u>
<i>Litoria raniformis</i> Southern Bell Frog	Endangered	Vulnerable	In NSW and the ACT, the range of the species was centred on the Murray and Murrumbidgee River valleys and their tributaries. The species is currently widespread throughout the Murray River valley and has been recorded from six Catchment Management Areas in NSW: Lower Murray Darling, Murrumbidgee, Murray, Lachlan, Central West and South East. The species is usually found in or around permanent or ephemeral Black Box/Lignum/Nitre Goosefoot swamps, Lignum/Typha swamps and River Red Gum swamps or billabongs along floodplains and river valleys. During the breeding season animals are found floating amongst aquatic vegetation (especially Cumbungi or Common Reeds) within or at the edge of slow-moving streams, marshes, lagoons, lakes, farm dams and rice crop. Tadpoles require standing water for at least 4 months for development and metamorphosis to occur but can take up to 12 months to develop. Outside the breeding season animals disperse away from the water and take shelter beneath ground debris such as fallen timber and bark, rocks, grass clumps and in deep soil cracks.	No – microhabitat features, habitat degraded	The subject land does not support permanent or ephemeral Black Box/Lignum/Nitre Goosefoot swamps, Lignum/Typha swamps, or River Red Gum swamps or billabongs. While the subject land contains a creek and smaller drainage line, these habitat features supported little riparian vegetation and were mostly dry at the time of survey. The only potential habitat in the subject land is limited to the large farm dam that supports a mix of native and exotic fringing vegetation. However, the species has not been recorded within 10 km of the subject land and has only been recorded twice within the Wagga Wagga Local Government Area. These records are from 1979 and 1999 and are 14 kms and 32 km from the subject land, respectively. Given the paucity of records in the locality and the degraded nature of the potential habitat within the subject land, the species is considered unlikely to occur. <u>Conclusion – the species is considered unlikely to occur in the subject land.</u>

<sup>25</sup> [https://webmap.environment.nsw.gov.au/Html5Viewer291/index.html?viewer=BAM\\_ImportantAreas](https://webmap.environment.nsw.gov.au/Html5Viewer291/index.html?viewer=BAM_ImportantAreas)

Species	NSW (BC Act) listing status	National (EPBC Act) listing status	Habitat requirements	Presence	Justification for exclusion
<i>Lophoictinia isura</i> Square-tailed Kite (Breeding)	Vulnerable	-	This species is found in a variety of timbered habitats including dry woodlands and open forests. It shows a particular preference for timbered watercourses. Breeding is from July to February, with nest sites generally located along or near watercourses, in a fork or on large horizontal limbs. The TBDC lists 'nest trees' as a breeding habitat constraint. The TBDC general notes state 'it will be difficult to identify a Kite nest (there are lots of comparable sized stick nests built by other species), especially given Kites have large territories and other stick nesters will undoubtedly also be nesting where Kites might be recorded. Kites will need be in attendance to confirm breeding sites.'	No – surveyed	The subject land does not contain timbered watercourses and the species has not been recorded within 10 km of the subject land (Figure 8). In addition, targeted bird surveys were conducted across the subject land, and remnant trees were assessed for the presence/absence of habitat features and for signs of fauna nesting in stick nests (Figure 9). No Square-tailed Kites were recorded. <u>Conclusion – the species is considered unlikely to breed in the subject land.</u>
<i>Macquaria australasica</i> Macquarie Perch	-	Endangered	Macquarie Perch have declined considerably from their historical distribution. They are found in the Murray-Darling Basin (particularly upstream reaches) of the Lachlan, Murrumbidgee, and Murray rivers, and parts of south-eastern coastal NSW, including the Hawkesbury and Shoalhaven catchments. Macquarie perch are found in both river and lake habitats, especially the upper reaches of rivers and their substantial tributaries.	No – microhabitat features	There is no habitat for this species in the subject land. <u>Conclusion – the species is considered unlikely to occur in the subject land.</u>
<i>Miniopterus orianae oceanensis</i> Large Bent-winged Bat (Breeding)	Vulnerable	-	Caves are the primary roosting habitat, but the species also use derelict mines, storm-water tunnels, buildings, and other man-made structures. The species forms discrete populations centred on a maternity cave that is used annually in spring and summer for the birth and rearing of young. Maternity caves have very specific temperature and humidity regimes. Breeding or roosting colonies can number from 100 to 150,000 individuals. The TBDC list the following breeding habitat constraint, 'Cave, tunnel, mine, culvert or other structure known or suspected to be used for breeding including species records with microhabitat code "IC - in cave", observation type code "E nest-roost", with numbers of individuals >500.'	No – habitat constraint	The subject land does not contain potential breeding habitat (caves, tunnels, mines, culverts, etc.). <u>Conclusion – the subject land lacks the breeding habitat constraints required for this species.</u>
<i>Myotis macropus</i> Southern Myotis	Vulnerable	-	The Southern Myotis occurs from the north-west of Australia, across the top-end and south to western Victoria. It is rarely found more than 100 km inland, except along major rivers. The species roosts close to water in caves, hollow-bearing trees, man-made structures (bridges, culverts etc) and in dense foliage. Colonies occur close to water bodies, ranging from rainforest streams to large lakes and reservoirs. The species is dependent on waterways (i.e. medium to large permanent creeks, rivers, lakes, or other waterways with pools/stretches 3 m wide or greater <sup>26</sup> ), where it catches aquatic insects and small fish with their large hind claws, and also catches flying insects. The TBDC lists 'hollow bearing trees within 200 m of riparian zone', 'bridges, caves or artificial structures within 200 m of riparian zone', and 'waterbodies; this include rivers, creeks, billabongs, lagoons, dams and other waterbodies on or within 200m of the site' as habitat constraints for this species.	No – habitat constraint	The species has been recorded several times within 10 km of the subject land. The subject land contains potential breeding habitat (i.e. hollow bearing trees within 200 m of a large dam), however these trees were inspected during spring surveys and found to be occupied by European honeybees or common native or exotic bird species. <u>Conclusion – the species is considered unlikely to occur in the subject land.</u>
<i>Ninox connivens</i> Barking Owl (Breeding)	Vulnerable	-	This species inhabits woodland and open forest, including fragmented remnants and partly cleared farmland. During nesting season, the male perches in a nearby tree overlooking the hollow entrance. Two or three eggs are laid in hollows of large, old trees. Living eucalypts are preferred though dead trees are also used. Nest sites are used repeatedly over years by a pair. Nesting occurs during mid-winter and spring, being variable between pairs and among years. As a rule of thumb, laying occurs during August and fledging in November. The female incubates for 5 weeks, roosts outside the hollow when chicks are 4 weeks old, then fledging occurs 2-3 weeks later. The TBDC lists 'living or dead trees with hollows greater than 20 cm diameter and greater than 4 m above the ground' as a breeding habitat constraint for this species.	No – surveyed	The species has been recorded several times within 10 km of the subject land. The subject land contains potential breeding habitat (i.e. hollow bearing trees). Targeted surveys did not record this species. <u>Conclusion – the species is considered unlikely to occur in the subject land.</u>

<sup>26</sup> Anderson. J., Law. B., and Tidemann (2005). *Stream use by the Large-footed Myotis Myotis Macropus in relation to environmental variables in Northern New South Wales*. Australian Mammalogy 28:15-26.

Species	NSW (BC Act) listing status	National (EPBC Act) listing status	Habitat requirements	Presence	Justification for exclusion
<i>Numenius madagascariensis</i> Eastern Curlew	-	Critically Endangered	Within Australia, the Eastern Curlew has a primarily coastal distribution and are rarely recorded inland. It generally occupies coastal lakes, inlets, bays and estuarine habitats, and in New South Wales is mainly found in intertidal mudflats and sometimes saltmarsh of sheltered coasts. It forages in or at the edge of shallow water, occasionally on exposed algal mats or waterweed, or on banks of beach-cast seagrass or seaweed. It roosts on sandy spits and islets, especially on dry beach sand near the high-water mark, and among coastal vegetation including low saltmarsh or mangroves. The species breeds in Russia and north-eastern China. The TBDC lists ' <i>as per mapped areas</i> ' as a foraging habitat constraint for this species.	No – habitat constraint, microhabitat features	The subject land is far from coastal regions and does not support lakes, insets, bays, estuarine habitats, mudflats, or saltmarshes. While it is possible that the species may periodically visit the subject land during movements through the landscape, the species was not recorded in the subject land and no other records occur in the locality (Figure 8). Finally, the subject land does not contain nesting resources or potentially significant foraging resources for the species, and is not identified as an 'important area' the species on the 'BAM – Important Areas' map. <u>Conclusion – the species is considered unlikely to occur in the subject land.</u>
<i>Petaurus norfolcensis</i> Squirrel Glider	Vulnerable	-	West of the Great Diving Range, this species inhabits mature or old growth Box, Box-Ironbark woodlands, and River Red Gum forest. It prefers mixed species stands with a shrub or Acacia midstorey. The species requires abundant tree hollows for refuge and nest sites, and relies on large old trees with hollows for breeding and nesting. These trees are also critical for movement and typically need to be closely connected (i.e. no more than 50 m apart).	No – surveyed	The closest record of this species is approximately 4 km to the north-west of the subject land. While the majority of the subject land has been cleared, it still supports large, hollow-bearing remnant trees that may be used as habitat by this species. However, these trees are often widely spaced (>50 m) and the midstorey and shrubstorey are entirely absent. Targeted surveys did not record this species. <u>Conclusion – the species is considered unlikely to occur in the subject land.</u>
<i>Petaurus norfolcensis</i> Squirrel Glider in the Wagga Wagga Local Government Area	Endangered Population	-	The extent of the endangered population is legally defined by the boundaries of the Wagga Wagga LGA. The distribution of the Squirrel Glider and its known or potential habitats within, or linked across, this boundary is not well defined. However, potential habitat occurs at low densities and is patchily distributed on public lands (TSRs, NPWS reserves, Bush Heritage Trust reserves), private lands and roadside corridors with remnant vegetation.	No – surveyed	The closest record of this species is approximately 4 km to the north-west of the subject land. While the majority of the subject land has been cleared, it still supports large, hollow-bearing remnant trees that may be used as habitat by this species. However, these trees are often widely spaced (>50 m) and the midstorey and shrubstorey are entirely absent. Targeted surveys did not record this species. <u>Conclusion – the species is considered unlikely to occur in the subject land.</u>
<i>Petrogale penicillata</i> Brush-tailed Rock-wallaby	Endangered	Vulnerable	This species occupies rocky escarpments, outcrops, and cliffs, with a preference for complex structures with fissures, caves, and ledges (often facing north). The species is highly territorial and have strong site fidelity with an average home range size of about 15 ha. The TBDC lists ' <i>land within 1 km of rocky escarpments, gorges, steep slopes, boulder piles, rock outcrops or cliff lines</i> ' as a habitat constraint for this species.	No – habitat constraint	The subject land does support or occur within 1 km of rocky escarpments, gorges, steep slopes, boulder piles, rock outcrops or cliff lines. <u>Conclusion – the subject land lacks the habitat constraints required for this species.</u>
<i>Phascogale tapoatafa</i> Brush-tailed Phascogale	Vulnerable	-	The Brush-tailed Phascogale has a patchy distribution around the coast of Australia. In NSW it is mainly found east of the Great Dividing Range although there are occasional records west of the divide. This species prefers dry sclerophyll open forest with sparse groundcover of herbs, grasses, shrubs or leaf litter. It also inhabits heath, swamps, rainforest, and wet sclerophyll forest. It is an agile climber foraging preferentially in rough barked trees of 25 cm DBH or greater. The species nests and shelters in tree hollows with entrances 2.5 – 4 cm wide and uses many different hollows over a short time span. The TBDC lists ' <i>Loss of hollow-bearing trees</i> ' and ' <i>Predation by foxes and cats</i> ' as some of the key threats to this species.	No – microhabitat features, habitat degraded	The subject land and does not support dry sclerophyll forest, heath, swamps, rainforest, or wet sclerophyll forest. In addition, the species has not been recorded within 10 km of the subject land (Figure 8). As such, the subject land lacks the primary microhabitat features required for this species and has been degraded to the extent that the species is considered unlikely to occur. <u>Conclusion – the species is considered unlikely to occur in the subject land.</u>
<i>Phascolarctos cinereus</i> Koala (Breeding)	Vulnerable	Vulnerable	This species inhabits eucalypt woodlands and forests, feeding on the foliage of more than 70 eucalypt species and 30 non-eucalypt species. Home range size varies with quality of habitat, ranging from less than 2 hectares to several hundred hectares in size. The TBDC lists ' <i>areas identified via survey as important habitat</i> ' as a habitat constraint for breeding for this species. 'Important habitat' is defined in TBDC by the density of Koalas and quality of habitat as determined by on-site survey.	No – habitat constraint, habitat degraded	The majority of the subject land has been historically cleared and the remaining vegetation is thinned, fragmented, and isolated (Figure 6). The midstorey and shrubstorey are entirely absent. In addition, despite being conspicuous when present, no Koalas or signs of Koala presence were detected during the surveys conducted for this BDAR. While there is a Koala record within 300 m of the subject land, it is from 1964. The nearest recent record is from 2004 approx. 2 km to the south-west (refer to Figure 8). The degraded vegetation combined with the lack of recent Koala observations indicates that the subject land should not be classified as 'important habitat' for breeding. <u>Conclusion – the species is considered unlikely to breed in the subject land.</u>

Species	NSW (BC Act) listing status	National (EPBC Act) listing status	Habitat requirements	Presence	Justification for exclusion
<i>Polytelis swainsonii</i> Superb Parrot (Breeding)	Vulnerable	Vulnerable	This species inhabits Box-Gum Woodland, Box-Cypress-pine Woodland, Boree Woodlands, and River Red Gum Forest. On the South West Slopes nest trees can be in open Box-Gum Woodland or isolated paddock trees. Species known to be used for nesting are Blakely's Red Gum, Yellow Box, Apple Box, and Red Box. The species breeds in hollow branches of tall eucalypt trees within 10 kilometres of feeding areas. The TBDC lists "living or dead <i>E. blakelyi</i> , <i>E. melliodora</i> , <i>E. albens</i> , <i>E. camaldulensis</i> , <i>E. microcarpa</i> , <i>E. polyanthemos</i> , <i>E. mannifera</i> , <i>E. intertexta</i> with hollows greater than 5cm diameter; greater than 4m above ground or trees with a DBH of greater than 30cm" as a breeding habitat constraint.	No – surveyed	Superb Parrots were recorded foraging in the subject land during May 2021, and the subject land contains suitable nesting habitat for the species. No sign of Superb Parrots nesting in tree hollows was detected during surveys. <u>Conclusion – the species is considered unlikely to breed in the subject land.</u>
<i>Prasophyllum petilum</i> Tarengo Leek Orchid	Endangered	Endangered	The Tarengo Leek Orchid occurs on relatively fertile soils in grassy woodland or natural grassland. The species is intolerant of grazing and this is considered to be the key reason it has been found only within cemeteries and Travelling Stock Routes, land from which grazing has been restricted. The BAM Calculator lists 'East of Binalong, south and east of Boorowa' as a geographic limitation for this species.	No – geographic limitation, habitat degraded	The majority of the subject land has been pasture improved or tilled and cropped and grazed over an extended period of time. As a result, the groundstorey across the subject land supports a low cover and very low diversity of disturbance tolerant native species. In addition, the subject land is not 'East of Binalong, south and east of Boorowa'. <u>Conclusion – the subject land is outside the geographic limitations and the habitat has been degraded to the extent that the species is considered unlikely to occur.</u>
<i>Prasophyllum sp. Wybong</i>	-	Critically Endangered	The NSW Herbarium considers <i>Prasophyllum sp. Wybong</i> (C. Phelps ORG5269) and <i>Prasophyllum petilum</i> to be synonyms (i.e. the same species). This taxonomic recognition will be released in the next Orchidaceae taxonomic update via the Australian Plant Census, which provides a list of currently accepted names. As it stands, the two species are treated as one for NSW regulatory purposes, with the distinction maintained under Commonwealth legislation. Endemic to NSW, it is known from near Ilford, Premer, Muswellbrook, Wybong, Yeoval, Inverell, Tenterfield, Currabubula, and the Pilliga area. Most populations are small, although the Wybong population contains by far the largest number of individuals. The species is known to occur in open eucalypt woodland and grassland	No – habitat degraded	The majority of the subject land has been pasture improved or tilled and cropped and grazed over an extended period of time. As a result, the groundstorey across the subject land supports a low cover and very low diversity of disturbance tolerant native species. In addition, the species has not been recorded in the locality. <u>Conclusion – the habitat has been degraded to the extent that the species is considered unlikely to occur.</u>
<i>Pteropus poliocephalus</i> Grey-headed Flying-fox (Breeding)	Vulnerable	Vulnerable	Roosting camps are generally located within 20 km of a regular food source and are commonly found in gullies, close to water, in vegetation with a dense canopy. Individual camps may have tens of thousands of animals and are used for mating, and for giving birth and rearing young. Site fidelity to camps is high; some camps have been used for over a century. The TBDC lists 'breeding camps' as a breeding habitat constraint for this species.	No – habitat constraint	While the species has been recorded within 2 km and is likely to visit the subject land occasionally to forage, field surveys confirmed that the subject land does not support breeding camps. <u>Conclusion – the subject land lacks the breeding habitat constraints required for this species.</u>
<i>Senecio garlandii</i> Woolly Ragwort	Vulnerable	-	This daisy is found between Temora, Bethungra and Albury and possibly Burrinjuck near Yass. The largest populations are at The Rock and Mt Tabletop (and surrounds). There is a single population in Victoria at Chiltern. Woolly Ragwort occurs on sheltered slopes of rocky outcrops.	No – habitat degraded	The majority of the subject land has been pasture improved or tilled and cropped and grazed over an extended period of time. As a result, the groundstorey across the subject land supports a low cover and very low diversity of disturbance tolerant native species. In addition, the subject land does not support rocky outcrops. <u>Conclusion – the habitat has been degraded to the extent that the species is considered unlikely to occur.</u>
<i>Swainsona recta</i> Small Purple-pea	Endangered	Endangered	Before European settlement Small Purple-pea occurred in the grassy understorey of woodlands and open-forests dominated by Blakely's Red Gum <i>E. blakelyi</i> , Yellow Box <i>E. melliodora</i> , Candlebark Gum <i>E. rubida</i> , and Long-leaf Box <i>E. goniocalyx</i> . It grows in association with understorey dominants that include Kangaroo Grass <i>Themeda australis</i> , Poa tussocks <i>Poa</i> spp. and Speargrasses <i>Austrostipa</i> spp.. Some of the main threats to this species listed in the TBDC are: 1) grazing and trampling by cattle, sheep and goats; and 2) loss, degradation and fragmentation of habitat and/or populations for residential developments, agricultural developments, and by weed invasion (including exotic grasses mostly, as well as bridal creeper and St John's wort).	No – habitat degraded	The majority of the subject land has been pasture improved or tilled and cropped and grazed over an extended period of time. As a result, the groundstorey across the subject land supports a low cover and very low diversity of disturbance tolerant native species. In addition, the species has not been recently recorded in the locality. <u>Conclusion – the habitat has been degraded to the extent that the species is considered unlikely to occur.</u>

Species	NSW (BC Act) listing status	National (EPBC Act) listing status	Habitat requirements	Presence	Justification for exclusion
<i>Swainsona sericea</i> Silky Swainson-pea	Vulnerable	-	This species is found in Natural Temperate Grassland and Snow Gum <i>Eucalyptus pauciflora</i> Woodland on the Monaro, and in Box-Gum Woodland in the Southern Tablelands and South West Slopes. It is sometimes found in association with Cypress-pines <i>Callitris</i> spp.. Some of the main threats to this species listed in the TBDC are loss and degradation of habitat and/or populations for: 1) residential developments; 2) invasion of weeds; 3) intensification of grazing regimes; and 4) agricultural developments.	No – habitat degraded	The majority of the subject land has been pasture improved or tilled and cropped and grazed over an extended period of time. As a result, the groundstorey across the subject land supports a low cover and very low diversity of disturbance tolerant native species. In addition, the species has not been recorded in the locality. <u>Conclusion – the habitat has been degraded to the extent that the species is considered unlikely to occur.</u>
<i>Synemon plana</i> Golden Sun Moth	Endangered	Critically Endangered	The species occurs in Natural Temperate Grasslands and grassy Box-Gum Woodlands in which the groundlayer is dominated by Wallaby grasses <i>Rytidosperma</i> spp.. Grasslands dominated by Wallaby grasses are typically low and open and the bare ground between the tussocks is thought to be an important microhabitat feature for the Golden Sun Moth as it is typically these areas on which the females are observed displaying to attract males. Habitat may contain several Wallaby grass species, which are typically associated with other grasses particularly Speargrasses <i>Austrostipa</i> spp. or Kangaroo Grass <i>Themeda australis</i> . The TBDC lists ‘Wallaby grass <i>Rytidosperma</i> sp., Chilean needlegrass <i>Nassella nessiana</i> or Serrated Tussock <i>N. trichotoma</i> ’ as a habitat constraint, and the BAM Calculator lists ‘Not east of Lake George Escarpment or Great Dividing Range’ as a geographic limitation. Some of the main threats to this species listed in the TBDC are loss and degradation of habitat by urban, residential, infrastructure, and agricultural development, modifications to agricultural practices (e.g. fertiliser application, ploughing, and inappropriate grazing), overgrazing by domestic stock, and invasive grasses.	No – habitat degraded, habitat constraint	The majority of the subject land has been pasture improved or tilled and cropped and grazed over an extended period of time. As a result, the groundstorey across the subject land supports a low cover and very low diversity of disturbance tolerant native species. The groundlayer does not contain appropriate food species to support this species. In addition, the species is not known to occur in the locality. <u>Conclusion – the habitat has been degraded to the extent that the species is considered unlikely to occur.</u>
<i>Tyto novaehollandiae</i> Masked Owl (Breeding)	Vulnerable	-	This species lives in dry eucalypt forests and woodlands from sea level to 1100 m. The species roosts and breeds in moist eucalypt forested gullies, using large tree hollows. Dead stags are especially popular for roosting/breeding habitat and are a limited resource due to natural attrition. The TBDC lists ‘living or dead trees with hollows greater than 20cm diameter’ as a breeding habitat constraint for this species.	No – surveyed	The subject land contains potential breeding habitat (i.e. hollow bearing trees), however the species has not been recorded in the locality. Targeted surveys did not record this species. <u>Conclusion – the species is considered unlikely to occur in the subject land.</u>

#### 2.3.4.2 BAM targeted survey results

As noted in Table 14, targeted surveys were completed to confirm the occurrence and/or habitat potential for the species credit species flagged by the BAM as having the potential to occur in the relevant PCT of the subject land.

##### Threatened flora

As detailed in Table 14, all of the threatened flora species credit species flagged by the BAM are considered unlikely to occur in the subject land given that the groundstorey and shrubstorey vegetation across the entire subject land is moderately to highly disturbed, shows signs of historic cultivation and/or pasture improvement, supports a variety of weeds, has been heavily grazed over an extend period by stock, and is currently moderately to heavily grazed by stock and Eastern Grey Kangaroos.

A total of 72 flora species were recorded during field surveys, comprising 27 native species and 45 exotic species (Appendix B).

None of the EPBC or BC Act threatened flora species credit species identified in Table 14 were recorded in the subject land and none are considered likely to occur.

##### Threatened fauna

A total of 55 native fauna species were recorded during field surveys, comprising 49 bird species, two amphibian species, and four mammal species (Appendix D). Two exotic fauna species were recorded, comprising one bird (Common Starling) and one mammal (European Rabbit).

##### Threatened birds

A total of 43 bird species were recorded during the winter survey, comprising 42 native species and 1 exotic species (Appendix D).

Four threatened species were recorded during targeted bird surveys, specifically Superb Parrot *Polytelis swainsonii* (EPBC and BC Act Vulnerable), Little Eagle *Hieraaetus morphnoides* (BC Act Vulnerable), White-winged Triller *Lalage tricolor* (BC Act Vulnerable) and Flame Robin *Petroica phoenicea* (BC Act Vulnerable). Further surveys during the breeding season found no evidence of Superb Parrots nesting in the subject land, but confirmed an active Little Eagle nest to the south of the large dam (Figure 9). The proposed development will result in the removal of the occupied Little Eagle nest tree, and is expected to result in the Little Eagle abandoning the area as a breeding site.



Figure 9. Tree Habitat Assessment, Fauna Nesting Survey, and Bird Survey Results

## 3 Part 2 – Impact Assessment (BAM Stage 2)

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Part 2 of this BDAR provides an assessment of the impacts of the proposed development as set out in Stage 2 of the BAM.

### 3.1 Avoidance and Minimisation of Impacts on Biodiversity Values

In accordance with the BAM, a proponent is required to demonstrate that all reasonable and practicable measures have been employed to avoid and minimise the impacts of a project on biodiversity values. Accordingly, this section outlines the avoidance and minimisation measures that have been incorporated into the project design of the proposed development.

#### 3.1.1 Location

##### 3.1.1.1 Locating the project where there are low or no biodiversity values

The entire subject land has been substantially modified by its current and past land use, which has primarily been grazing and cropping. This has led to extensive clearing of the native woody overstorey, midstorey, and shrubstorey across the vast majority of the subject land, leaving scattered and isolated paddock trees. The majority of the cleared land has been cultivated and sown to crops or pasture, supports a variety of weeds, and is currently moderately grazed by stock and Eastern Grey Kangaroo. The creek and other small patches of vegetation (i.e. PCT277 Zone 1) have retained a more intact native overstorey with some regeneration. However, no part of the subject land retains a native dominant groundstorey. Finally, the subject land contains several significant weeds such as Blackberry and Willow.

The proposed development has therefore been located in an area that largely lacks significant biodiversity values. This is highlighted by the fact that 92% (102.00 ha) of the subject land does not support any significant biodiversity values (i.e. no threatened ecological community or likely habitat for threatened flora and fauna).

In addition, the proposed development has been designed to avoid the creek and drainage line which contain most of the remaining native vegetation and potential threatened species habitat. As outlined in the Sunnyside Estate Urban Design Report<sup>27</sup>, these areas will be retained and managed as urban open space. The proposed development will therefore only impact 1.59 ha (16%) of the BC Act native vegetation present within the subject land.

##### 3.1.1.2 Locating the project in areas where the native vegetation or threatened species habitat is in the poorest condition

The subject land contains 8.64 ha of BC Act Box-Gum Woodland in highly modified condition. The proposed development has been designed to avoid the creek and drainage line which contain most of the BC Act Box-Gum Woodland and potential threatened species habitat. As outlined in the Sunnyside Estate Urban Design Report, these areas will be retained and managed as urban open space. The proposed development will therefore only impact 2.39 ha (28%) of the highly modified BC Act Box-Gum Woodland within the subject land.

The subject land contains 59 mature hollow-bearing remnant eucalypts. The proposed development has been designed to retain as many of the remnant eucalypts as practicable, by incorporating trees into open spaces and larger residential blocks. As a result, the proposed development will retain at

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<sup>27</sup> Siva Projects (2020). *Sunnyside Estate 456-474 Plumpton Road, Wagga Wagga, NSW*. Urban Design Report.

least 28 (TBC in the final design) of the large hollow-bearing remnant eucalypts and protect them in accordance with the Australian Standard<sup>28</sup>.

The proposed development impacts 71.08 ha of vegetation (i.e. 2.39 ha of PCT277 Zone 1 and 68.7 ha of PCT277 Zone 2). Of that, 97% (68.7 ha) is highly modified vegetation dominated by a variety of exotic perennial and annual pasture species (i.e. PCT277 Zone 2). Of the 9.74 ha of BC Act native vegetation that occurs in the subject land (i.e. PCT277 Zone 1 plus 1.10 ha of planted native vegetation), 75% (7.31 ha) will be avoided.

The proposed development has therefore been located in areas where the native vegetation and habitat is in the poorest condition.

#### **3.1.1.3 Locating the project such that connectivity enabling movement of species and genetic material between areas of adjacent or nearby habitat is maintained.**

The proposed development has been designed to avoid the creek and drainage line which contain most of the native vegetation and potential threatened species habitat. These areas also provide connectivity between patches of native vegetation to the east and south of the subject land. As outlined in the Sunnyside Estate Urban Design Report, these areas will be retained and managed as urban open space. Management of these areas will include weed control and planting native species to improve the habitat value.

The proposed development will also retain a number of scattered remnant paddock trees within the development area, by incorporating trees into open spaces and larger residential blocks. These retained trees provide connectivity across the landscape for a variety of birds which can use isolated paddock trees as 'stepping stones' to move between larger patches of vegetation.

### **3.1.2 Design**

#### **3.1.2.1 Reducing the clearing footprint of the project**

As mentioned previously, the design of the proposed development includes a number of measures which aim to avoid and minimise impacts to the significant ecological values of the subject land. The proposed development achieves this by avoiding the creek and drainage line areas which include the majority of the native vegetation and threatened species habitat. The proposed development also aims to retain many of the mature hollow-bearing trees. By reducing the clearance footprint, the proposed development avoids:

- 75% (7.31 ha) of the BC Act native vegetation that occurs in the subject land;
- 72% (6.25 ha) of the BC Act Box-Gum Woodland that occurs in the subject land; and
- 47% (28) of the mature hollow-bearing remnant trees that occur in the subject land (this number is expected to be higher in the final design).

#### **3.1.2.2 Locating ancillary facilities in areas: where there are no biodiversity values; where the native vegetation or threatened species habitat is in the poorest condition; and that avoid habitat for species and vegetation in high threat status categories**

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<sup>28</sup> Standards Australia (2009) *Australian Standard. Protection of trees on development sites*.  
<https://www.tcaa.com.au/wp-content/uploads/2018/11/AS-4970-2009-Protection-of-trees-on-development-sites.pdf>

Given that the proposed development is located immediately adjacent to existing urban development (i.e. Wagga Wagga), many of the biodiversity impacts associated with a new development will be reduced (i.e. impacts related to services, roads, bushfire protection, flood planning, etc.). In addition, all ancillary facilities associated with the construction and operation of the proposed development will be located to avoid the significant biodiversity values that will be retained by the proposed development.

### **3.1.2.3 Making provision for the demarcation, ecological restoration, rehabilitation, and/or ongoing maintenance of retained native vegetation and habitat**

As mentioned previously, the proposed development avoids many of the more significant ecological values that occur in the subject land by avoiding impacts to the majority of the native vegetation and potential threatened species habitat. These measures avoid:

- 75% (7.31 ha) of the BC Act native vegetation that occurs in the subject land; and
- 72% (6.25 ha) of the BC Act Box-Gum Woodland that occurs in the subject land.

As stipulated in the Construction Environmental Management Plan (CEMP), the avoided areas will be protected from impacts during the works by the establishment of sturdy barriers which demarcate the maximum extent of works. In addition, as outlined in the Sunnyside Estate Urban Design Report, the retained vegetation will be managed and maintained as urban open space, providing a range of environmental values including ecological habitat, passive and active recreation, storm water conveyance, and fauna movement corridors. Management of these areas will also include restoration and rehabilitation (e.g. weed control and planting native species) to improve the condition and habitat value.

## **3.2 Residual Biodiversity Impacts of the Proposed Development**

### **3.2.1 Direct impacts on native vegetation and habitat**

The proposed development has a total development footprint of 71.08 ha and will involve subdivision of the subject land into residential blocks, with associated roads and services.

As shown in Figure 10, the proposed development will result in the following direct impacts:

- clearance of 2.39 ha of PCT277 Zone 1 – canopy, regeneration, exotic dominant understorey, low native forb diversity (BC Act Box-Gum Woodland);
- clearance of 2.43 ha of BC Act native vegetation, includes 2.39 ha of PCT277 Zone 1 and 0.04 ha of planted native vegetation;
- removal of up to 31 (TBC in final design) mature hollow-bearing remnant trees in both PCT277 Zones 1 and 2 (Figure 10); and
- removal of a Little Eagle nest tree and 27.83 ha of Little Eagle breeding habitat (see below).

As shown in Figure 10, the proposed development will also result in the clearance of:

- 68.7 ha of PCT277 Zone 2 – low diversity exotic pasture.

The 68.7 ha of PCT277 Zone 2 is clearly dominated by exotic grasses and forbs, and does not meet the definition of BC Act native vegetation. However, part of this area supports breeding habitat for Little Eagle (see below).

### Little Eagle Breeding Habitat

The proposed development will result in the removal of a Little Eagle nest tree, which was confirmed to be in active use in spring 2021. As stated in the NSW Bionet Threatened Biodiversity Profile Data Collection:

*“Where a breeding site has been identified in accordance with the BAM the species buffer polygon should be established by providing a circular polygon with a 300m radius around the nest tree.”*

The application of a 300 m buffer around the nest tree results in a total of 27.83 ha of Little Eagle breeding habitat, of which 23.79 ha occurs within the subject land. As the proposed development will result in the removal of this tree, it is assumed that the development will have a direct impact on all 27.83 ha of the breeding habitat. As shown in Figure 10, the 27.83 ha of habitat consists of:

- 1.94 ha of PCT277 Zone 1;
- 21.85 ha of PCT277 Zone 2; and
- 4.04 ha of area outside the subject land. For the purposes of this assessment, this area is assumed to be equivalent to PCT277 Zone 1, as it contains an intact native canopy similar to that recorded in Zone 1.

### 3.2.2 Indirect impacts on native vegetation and habitat

The proposed development has the potential to indirectly impact retained or adjacent native vegetation and habitat. Potential indirect impacts are listed below.

- Increased sedimentation of receiving waterways during construction.
- Increased noise, vibration, and dust during construction.
- Weed introduction and/or spread during construction and occupation.
- Incidental damage or removal of retained native vegetation and habitat during construction and occupation.
- Increase in pest animal populations as a result of increased human activity during occupation.

The above potential indirect impacts could occur during the construction and/or occupation of the subject land and may reduce the extent and/or condition of the surrounding native vegetation and habitat. This may occur in the short-term during the construction phase of the proposed development and in the long-term during the occupation phase of the proposed development.

However, the proposed development reduces the likelihood of indirect impacts by enacting the following principles detailed in Section 3.1 to avoid and minimise impacts to native vegetation and habitat.

- Locating the project where there are low or no biodiversity values.
- Locating the project in areas where the native vegetation or threatened species habitat is in the poorest condition.
- Locating the project such that connectivity enabling movement of species and genetic material between areas of adjacent or nearby habitat is maintained.

- Reducing the clearing footprint of the project.
- Locating ancillary facilities in areas: where there are no biodiversity values; where the native vegetation or threatened species habitat is in the poorest condition; and that avoid habitat for species and vegetation in high threat status categories.
- Making provision for the demarcation, ecological restoration, rehabilitation, and/or ongoing maintenance of retained native vegetation and habitat.

In addition, potential indirect impacts will be minimised and mitigated during construction by the measures outlined in Section 3.3, and during occupation by the measures outlined in Section 3.1 and Section 3.3. These measures:

- control potential sedimentation of receiving waterways during construction and operation;
- control noise, vibration, and dust spill during construction;
- control weed introduction and/or spread during construction and occupation;
- control incidental damage of retained native vegetation and habitat during construction; and
- control pest animal populations as a result of increased human activity during occupation.

In combination, the above measures are considered sufficient to reduce the risk of indirect impacts to an acceptably low level. As such, the proposed development is unlikely to result in any indirect impacts on native vegetation or habitat.

### 3.2.3 Prescribed biodiversity impacts

As described in Section 8.2 of the BAM, some types of projects may have impacts on biodiversity values in addition to, or instead of, impacts from clearing vegetation and/or loss of habitat. For many of these impacts the biodiversity values may be difficult to quantify, replace or offset, making avoiding and minimising impacts critical. Clause 6.1 of the BC Regulation identifies the following as impacts that are 'prescribed biodiversity impacts' that must be assessed using the BOS.

*(a) impacts of development on the habitat of threatened species or ecological communities associated with:*

*(i) karst, caves, crevices, cliffs and other geological features of significance;*

*(ii) rocks;*

*(iii) human made structures;*

*(iv) non-native vegetation;*

*(b) impacts of development on the connectivity of different areas of habitat of threatened species that facilitates the movement of those species across their range;*

*(c) impacts of development on movement of threatened species that maintains their life cycle;*

*(d) impacts of development on water quality, water bodies and hydrological processes that sustain threatened species and threatened ecological communities (including from subsidence or upsidence resulting from underground mining);*

*(e) impacts of wind turbine strikes on protected animals; and*

*(f) impacts of vehicle strikes on threatened species or on animals that are part of a TEC.*

A potential 'prescribed biodiversity impact' due to the proposed development was identified during the development of this BDAR. As described in the following section, this potential impact was not determined to be a 'prescribed biodiversity impact'.

Notwithstanding this, the avoidance and minimisation measures detailed in Section 3.1 and the mitigation measures detailed in Section 3.3 will reduce the impact of the proposed development on the below potential 'prescribed biodiversity impact'.

#### **3.2.3.1 Human made structures**

The subject land contains several human made structures, including sheds and a dilapidated workers cottage. Inspections of these structures found no evidence of current occupation by any threatened species.

The proposed development is therefore considered unlikely to have a prescribed biodiversity impact on any threatened species or ecological community.

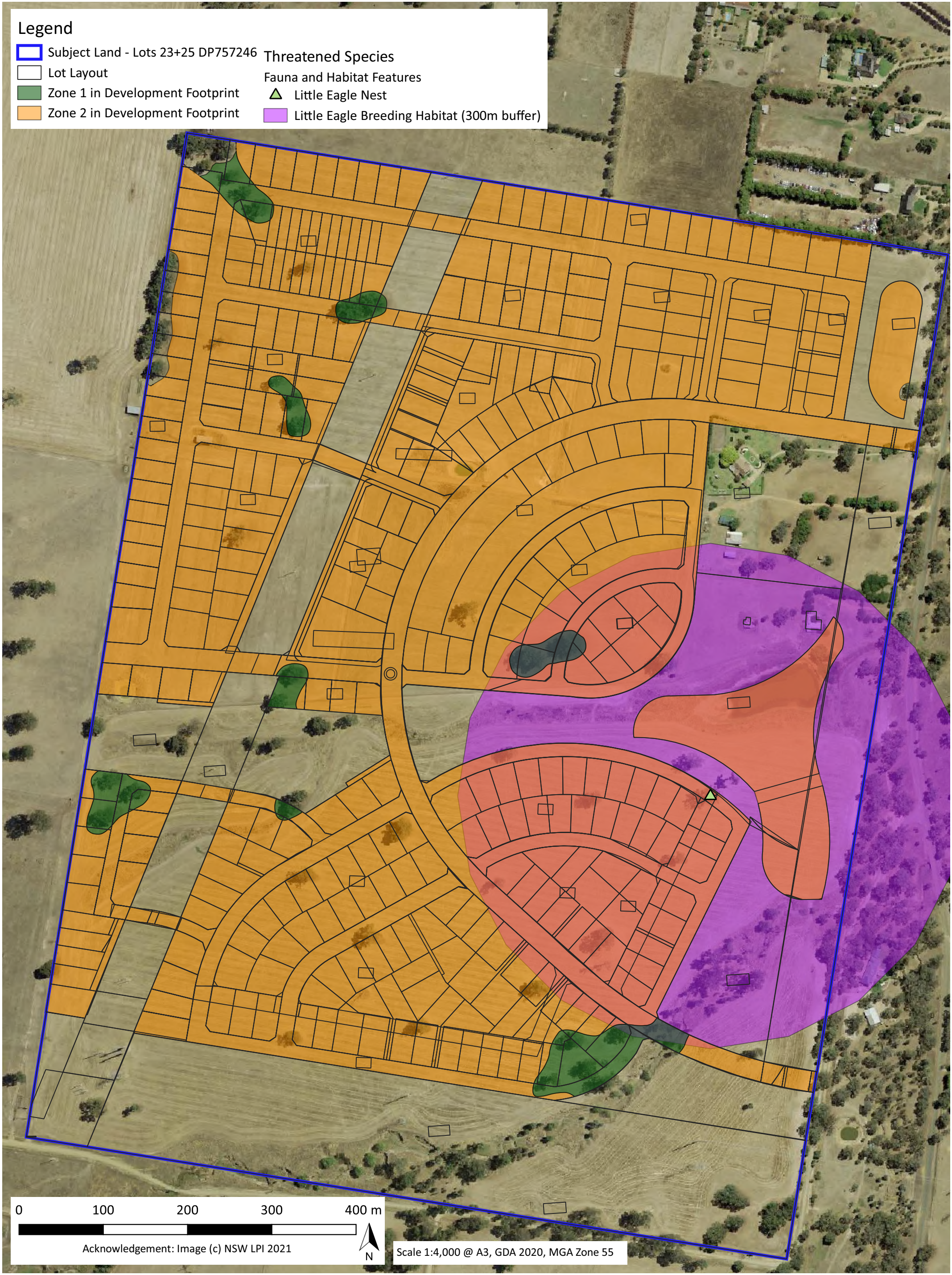


Figure 10. Residual Biodiversity Impacts of the Proposed Development

### 3.3 Mitigation of Residual Impacts on Biodiversity Values

The following mitigation techniques will be implemented to address the residual impacts on biodiversity values during and after the construction phase of the proposed development. In combination, these mitigation measures are considered sufficient to reduce the risk of residual impacts to an acceptably low level.

#### 3.3.1 Construction

A Construction Environmental Management Plan (CEMP) will be developed to guide the proposed development from before construction commences and until construction is completed. At a minimum the CEMP will include:

- appropriate definition of clearing boundaries;
- protective fencing around sensitive values;
- buffer zones around sensitive values;
- clearing procedures;
- weed management procedures;
- sediment and erosion controls to prevent site run-off;
- noise, vibration, and dust control;
- flow controls;
- pollution and waste management;
- water treatment standards before release; and
- monitoring, reporting, and compliance requirements.

Best practice sediment and erosion control, such as the use of sediment traps, sediment interception ponds, silt fences and haybale fences, will be implemented as required during construction to minimise the flow of water and associated material into the surrounding areas and water sources.

The key potential risk to the biodiversity values of the subject land and adjoining areas during construction of the proposed development is the facilitated spread of the high threat weeds currently occurring in the locality and/or the introduction of new weeds. Therefore, at a minimum, the following weed management measures will be implemented construction.

- Appropriate vehicle hygiene will be maintained. Vehicles and machinery entering the subject land will be clean of weed seed or propagules.
- Only sterile materials such as hessian/jute or rice straw will be used for soil stabilisation or similar purposes.
- High threat weeds will be prevented from establishing on newly created road verges, landscaped areas, and other open space.

### 3.3.2 Occupation

A weed control program will be developed and implemented to address the existing significant weeds in the site. This program will include initial intensive treatment to remove the current weeds prior to the proposed development, together with ongoing monitoring and control.

Any future landscaping for the proposed development (subdivision and creation of lots) in areas of the subject land outside of the newly created lots will use only local native plant species. Where practicable within open space areas, all strata will be re-established (i.e. groundcover, midstorey shrubs, and canopy trees) to create fauna habitat complexity. This will discourage urban adapted species and encourage small woodland birds to visit the subject land.

Owners of newly created lots will be encouraged to use local native plant species for landscaping, and to re-establish all strata where practicable (i.e. groundcover, midstorey shrubs, and canopy trees). This will create fauna habitat complexity which will discourage urban adapted species and encourage small woodland birds and other native fauna to visit or traverse the subject land.

The proposed development has been designed to retain as many of the site's remnant eucalypts as practicable, by incorporating trees into open spaces and larger residential blocks. As a result, the proposed development will retain at least 28 (TBC in final design) of the large hollow-bearing remnant eucalypts and manage them in accordance with the Australian Standard.

### 3.3.3 Adaptive management for uncertain impacts

As per Chapter 9.4 of the BAM, an adaptive management strategy is required for impacts on biodiversity values that are infrequent or difficult to measure prior to commencement of the proposed development. Such impacts are referred to as uncertain impacts. If uncertain impacts are identified, the proponent must develop an adaptive management strategy. As per Chapter 9.4.2 of the BAM, the following impacts are identified as uncertain impacts.

- Impacts related to damage to karst, caves, crevices, cliffs and other geological features of significance.
- Impacts related to subsidence and upsidence resulting from underground mining.
- Impacts related to wind turbine strikes.
- Impacts related to vehicle strikes.

The proposed development is unlikely to result in biodiversity impacts that are unforeseen or uncertain, especially given that:

- the subject land does not support karst, caves, crevices, cliffs and other geological features of significance;
- the proposed development does not include underground mining;
- the proposed development does not include wind turbines; and
- the proposed development is unlikely to substantively increase the incidence of vehicle strikes.

As such, an adaptive management strategy is not required for the proposed development.

### 3.4 Serious and irreversible impacts

The guidance to assist a decisionmaker to determine a serious and irreversible impact (NSW Government 2019<sup>29</sup>) provides a list of threatened species and ecological communities which are likely to be the subject of serious and irreversible impacts (SAIL). The potential for a project to impact these SAIL entities must be assessed in the BDAR.

The subject land supports the following listed ecological community which is listed as an SAIL entity.

- PCT277 - 'White Box – Yellow Box – Blakely's Red Gum Woodland' (BC Act Box-Gum Woodland)

The proposed development will result in the removal of a total of 2.39 ha of BC Act Box-Gum Woodland, comprised entirely of PCT277 Zone 1. The below additional information is provided to support the decision maker to determine if the proposed 2.39 ha of BC Act Box-Gum Woodland constitutes a SAIL.

#### 3.4.1 Box-Gum Woodland

The following information is presented according to the requirements outlined in Section 10.2 of the BAM and has been informed by the following databases and documents.

- NSW Government Saving Our Species (SOS) profile<sup>30</sup> and project report<sup>31</sup>.
- NSW Government Office of Environment & Heritage White Box - Yellow Box - Blakely's Red Gum Grassy Woodland and Derived Native Grassland profile<sup>32</sup>.
- NSW Threatened Species Scientific Committee (TSSC). *Notice of and reason for the Final Determination* (2020b)<sup>33</sup>.
- NSW Threatened Species Scientific Committee (TSSC). *Conservation and Assessment of White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland* (2020c)<sup>34</sup>.
- Threatened Species Scientific Committee (TSSC) *White Box - Yellow Box - Blakely's Red Gum Grassy Woodlands and Derived Native Grasslands listing advice and conservation advice (EPBC Act)*<sup>35</sup>.

<sup>29</sup> NSW Government (2019). *Guidance to assist a decision-maker to determine a serious and irreversible impact*. State of New South Wales and Department of Planning, Industry and Environment.

<https://www.environment.nsw.gov.au/topics/animals-and-plants/biodiversity-offsets-scheme/local-government-and-other-decision-makers/serious-and-irreversible-impacts-of-development>

<sup>30</sup> <https://www.environment.nsw.gov.au/savingourspeciesapp/project.aspx?ProfileID=10837>

<sup>31</sup> <https://www.environment.nsw.gov.au/savingourspeciesapp/ViewFile.aspx?ReportProjectID=988&ReportProfileID=10837>

<sup>32</sup> <https://www.environment.nsw.gov.au/threatenedSpeciesApp/profile.aspx?id=10837>

<sup>33</sup> [https://www.environment.nsw.gov.au/-/media/OEH/Corporate-Site/Documents/Animals-and-plants/Scientific-Committee/Determinations/2020/white-box-yellow-box-final-determination-ceec.pdf?la=en&hash=DD6076E55435D715E7E90B1A901EEB83D488563B#:~:text=4.10%20The%20distribution%20of%20White,1981\)%2C%20although%20occurrences%20on%20the](https://www.environment.nsw.gov.au/-/media/OEH/Corporate-Site/Documents/Animals-and-plants/Scientific-Committee/Determinations/2020/white-box-yellow-box-final-determination-ceec.pdf?la=en&hash=DD6076E55435D715E7E90B1A901EEB83D488563B#:~:text=4.10%20The%20distribution%20of%20White,1981)%2C%20although%20occurrences%20on%20the)

<sup>34</sup> <https://www.environment.nsw.gov.au/-/media/OEH/Corporate-Site/Documents/Animals-and-plants/Scientific-Committee/Determinations/2020/white-box-yellow-box-final-determination-conservation-assessment.pdf?la=en&hash=F8E09AABE537A9AB6CBB7A38BCE44956C0D986#:~:text=The%20distribution%20of%20White%20Box,Page%204%20NSW%20Threatened%20Species>

<sup>35</sup> <http://www.environment.gov.au/system/files/pages/dc3ad3aa6-2230-44cb-9a2f-5e1dca33db6b/files/box-gum.pdf>

- *White box - Yellow box - Blakely's red gum grassy woodlands and derived native grasslands* (Commonwealth of Australia 2006<sup>36</sup>).
- *National Recovery Plan for White Box - Yellow Box - Blakely's Red Gum Grassy Woodland and Derived Native Grassland* (DECCW 2010<sup>37</sup>).

#### 3.4.1.1 Box-Gum Woodland – SAI additional information

##### 1. *the action and measures taken to avoid the direct and indirect impact on the TEC at risk of an SAI*

In total, the subject land was assessed as supporting 8.64 ha of BC Act Box-Gum Woodland in highly modified condition (i.e. PCT277 Zone 1). Of that, the proposed development of the subject land will only impact 28% (2.39 ha).

The proposed development enacts the following principles detailed in Section 3.1 to avoid and minimise impacts to Box-Gum Woodland.

- Locating the project where there are low or no biodiversity values.
- Locating the project in areas where the native vegetation or threatened species habitat is in the poorest condition.
- Locating the project such that connectivity enabling movement of species and genetic material between areas of adjacent or nearby habitat is maintained.
- Reducing the clearing footprint of the project.
- Locating ancillary facilities in areas: where there are no biodiversity values; where the native vegetation or threatened species habitat is in the poorest condition; and that avoid habitat for species and vegetation in high threat status categories.
- Making provision for the demarcation, ecological restoration, rehabilitation, and/or ongoing maintenance of retained native vegetation and habitat.

Potential indirect impacts, including indirect impacts to Box-Gum Woodland, will be minimised and mitigated by the measures outlined in Section 3.3. These measures include the following.

- A CEMP to guide the proposed development from when construction commences until construction is completed.
- Best practice weed, sediment, and erosion control.
- Only using local native species for plantings in areas of the subject land outside of the newly created lots.

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<sup>36</sup> Commonwealth of Australia (2006). *White box - Yellow box - Blakely's red gum grassy woodlands and derived native grasslands*. EPBC Act Policy Statements, Nationally threatened species and ecological communities.

<sup>37</sup> DECCW (2010). *National Recovery Plan for White Box - Yellow Box - Blakely's Red Gum Grassy Woodland and Derived Native Grassland*. Department of Environment, Climate Change and Water NSW, Sydney

**2. The current status of the TEC including:**

- a. evidence of reduction in geographic distribution (Principle 1, clause 6.7(2)(a) BC Regulation) as the current total geographic extent of the TEC in NSW and estimated reduction in geographic extent of the TEC since 1970 (not including impacts of the proposal).**
- b. extent of reduction in ecological function for the TEC using evidence that describes the degree of environmental degradation or disruption to biotic processes (Principle 2, clause 6.7(2)(b) BC regulation) indicated by:**
  - i. change in community structure**
  - ii. change in species composition**
  - iii. disruption of ecological processes**
  - iv. invasion and establishment of exotic species**
  - v. degradation of habitat, and**
  - vi. fragmentation of habitat**
- c. evidence of restricted geographic distribution (Principle 3, clause 6.7(2)(c) BC Regulation), based on the TEC's geographic range in NSW according to the**
  - i. Extent of occurrence**
  - ii. Area of occupancy, and**
  - iii. Number of threat-defined locations**
- d. evidence that the TEC is unlikely to respond to management (Principle 4, clause 6.7(2)(d) BC Regulation).**

White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland is listed under the NSW BC Act as a Critically Endangered Ecological Community. It is considered to be an SAI entity based on Principles 1 and 2<sup>38</sup>. As stated in the Final Determination (NSW TSSC 2020<sup>39</sup>):

*"White Box – Yellow Box – Blakely's Red Gum Grassy Woodland and Derived Native Grassland has undergone a very large reduction in geographic distribution. The Community has been extensively cleared throughout its range and remnants typically are small, isolated, highly fragmented, occur in predominantly cleared landscapes and exhibit highly modified understoreys (TSSC 2006). Based on a compilation of available maps depicting the current extent of the community, TSSC (2006) estimated that less than 5% of the original distribution remained, however the extent to which remaining examples continue to support characteristic biota, their interactions and function is unknown..."*

<sup>38</sup> <https://www.environment.nsw.gov.au/topics/animals-and-plants/biodiversity-offsets-scheme/local-government-and-other-decision-makers/serious-and-irreversible-impacts-of-development>

<sup>39</sup> NSW Threatened Species Scientific Committee (2020), *Notice of and reason for the Final Determination*.

*...White Box – Yellow Box – Blakely’s Red Gum Grassy Woodland and Derived Native Grassland is subject to a number of threatening processes that have caused severe declines in biotic processes and interactions throughout its range and are likely to cause continuing decline in the future.”*

**3. n/a (the TEC is not data deficient)**

**4. in relation to the impacts from the proposal on the TEC at risk of an SAIL:**

**a. the impact on the geographic extent of the TEC (Principles 1 and 3) by estimating the total area of the TEC to be impacted by the proposal:**

**i. in hectares, and**

**ii. as a percentage of the current geographic extent of the TEC in NSW**

The current geographic extent of the TEC in NSW varies widely between estimates. The following information was taken from the NSW TSSC Conservation Assessment of White Box-Yellow Box-Blakely’s Red Gum Grass Woodland and Derived Native Grassland (Table 2a, NSW TSSC<sup>40</sup>):

- Former (pre-1750) extent in NSW = 3,717,366 ha.
- Current extent in NSW = 250,729 ha (93% cleared).
- Former extent (pre-1750) in Wagga Wagga Shire = 306,047 ha.
- Current extent in Wagga Wagga Shire = 10,460 ha (97% cleared).

In total, the subject land was assessed as supporting 8.64 ha of highly degraded BC Act Box-Gum Woodland (i.e. PCT277 Zone 1), and the proposed development will have a direct impact on 2.39 ha (27%) of this. The proposed development will therefore impact 0.02% of the TEC in Wagga Wagga Shire, or 0.00095% of the total extent in NSW.

**b. The extent that the proposed impacts are likely to contribute to further environmental degradation or the disruption of biotic processes (Principle 2) of the TEC by:**

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

In total, the subject land was assessed as supporting 8.64 ha of BC Act Box-Gum Woodland (i.e. PCT277 Zone 1). The proposed development of the subject land will have a direct impact on 2.39 ha (27%) of this area, while the remaining 6.25 ha (72%) will be retained and managed in open space areas. The proposed development will also involve removal of up to 31 (52%) of the mature hollow-bearing trees in the subject land (Figure 9 and 11). The subject land is surrounded by mostly cleared agricultural and rural residential land.

As shown in Figure 12, a 500 m buffer around the subject land contains approximately 86.5 ha of native woody vegetation, in similar condition to that within the subject land. The areas to be cleared are either small, already isolated patches, or small areas on the edge of a larger patch. The development will not significantly reduce the size or result in an increase in isolation of the remaining patches.

<sup>40</sup> NSW Threatened Species Scientific Committee (2020). *Conservation Assessment of White Box-Yellow Box-Blakely’s Red Gum Grassy Woodland and Derived Native Grassland*.

**ii. Describing the impacts on connectivity and fragmentation of the remaining areas of TEC measured by:**

- **Distance between isolated areas of the TEC, presented as the average distance if the remnant is retained AND the average distance if the remnant is removed as proposed, and**

The average minimum distance between all patches of native woody vegetation within 500 m of the subject land (including vegetation within the subject land, refer to Figure 11):

- if the remnant is retained = 84 m; and
- if the remnant is removed as proposed = 88 m.

The proposed development would therefore result in an average increase of 4 m (5%) for the minimum distance between all patches of native woody vegetation within 500 m of the subject land

In total, the subject land was assessed as supporting 8.64 ha of BC Act Box-Gum Woodland (i.e. PCT277 Zone 1). The proposed development of the subject land will have a direct impact on 2.39 ha (27%) of this area, while the remaining 6.25 ha (72%) will be retained and managed in open space areas.

The proposed development has been designed to avoid the creek and drainage line which contain most of the BC Act Box-Gum Woodland. These areas also provide connectivity between patches of native vegetation to the east and south of the subject land. As outlined in the Sunnyside Estate Urban Design Report, these areas will be retained and managed as urban open space. Management of these areas will include weed control and planting native species to improve the habitat value.

The proposed development will also retain most of the scattered remnant paddock trees within the development area, by incorporating trees into open spaces and larger residential blocks. These retained trees provide connectivity across the landscape for a variety of birds which can use isolated paddock trees as 'stepping stones' to move between larger patches of vegetation

The proposed impact to 2.39 ha of degraded BC Act Box-Gum Woodland is therefore considered unlikely to further isolate retained and adjacent areas of the TEC.

- **Estimated maximum dispersal distance for native flora species characteristic of the TEC, and**

The vegetation across the subject land is highly disturbed as 92% has been historically cleared and is now entirely dominated by exotic grasses and weeds (i.e. PCT277 Zone 2). The remaining 8% of the vegetation (i.e. PCT277 Zone 1), while supporting a remnant canopy, is still moderately disturbed as the canopy has been historically thinned, the midstorey and shrubstorey are absent, the groundstorey is grazed, shows signs of historic cultivation and/or pasture improvement, and currently supports a variety of perennial and annual exotic grasses and weeds.

Consideration of the above information indicates that the proposed development is largely located in an area that supports low-quality vegetation and flora habitat. In addition, the proposed development will not significantly reduce the size or result in an increase in isolation of

the remaining patches of the TEC. As a result, the proposed development is considered unlikely to impact the dispersal of any flora species characteristic of the TEC.

- **Other information relevant to describing the impact on connectivity and fragmentation, such as the area to perimeter ratio for remaining areas of the TEC as a result of the development**

The average area to perimeter ratio for all patches of native woody vegetation within 500 m of the subject land (including vegetation within the subject land, refer to Figure 11):

- if the remnant is retained = 22.78; and
- if the remnant is removed as proposed = 21.67.

The proposed development would therefore result in an average decrease of 1.11 (5%) for the average area to perimeter ratio for all patches of native woody vegetation within 500 m of the subject land.

- iii. **Describing the condition of the TEC according to the vegetation integrity score for the relevant vegetation zones(s). Include the relevant composition, structure and function condition scores for each vegetation zone.**

The proposed development will directly impact (i.e. remove) of a total of 2.39 ha of BC Act listed Box-Gum Woodland, comprised of the following vegetation condition zone.

- PCT277 Zone 1. Vegetation Integrity Score of 27.2 (composition 11.1, structure 41.3, and function 44.2). As described in Table 7, this zone is characterised as *Thinned canopy with some regeneration. The midstorey and shrubstorey are absent. Low diversity exotic groundlayer dominated by a variety of exotic grasses and weeds (e.g. Witchgrass *Panicum capillare*, Ryegrass *Lolium perenne*, Patterson's Curse *Echium plantagineum*). Low density of significant weed species. Moderately grazed by stock and Eastern Grey Kangaroos.*

As described above, this zone of BC Act Box-Gum Woodland has been substantially degraded by historic and current agricultural activities and only meets the definition of the TEC in a highly modified form.

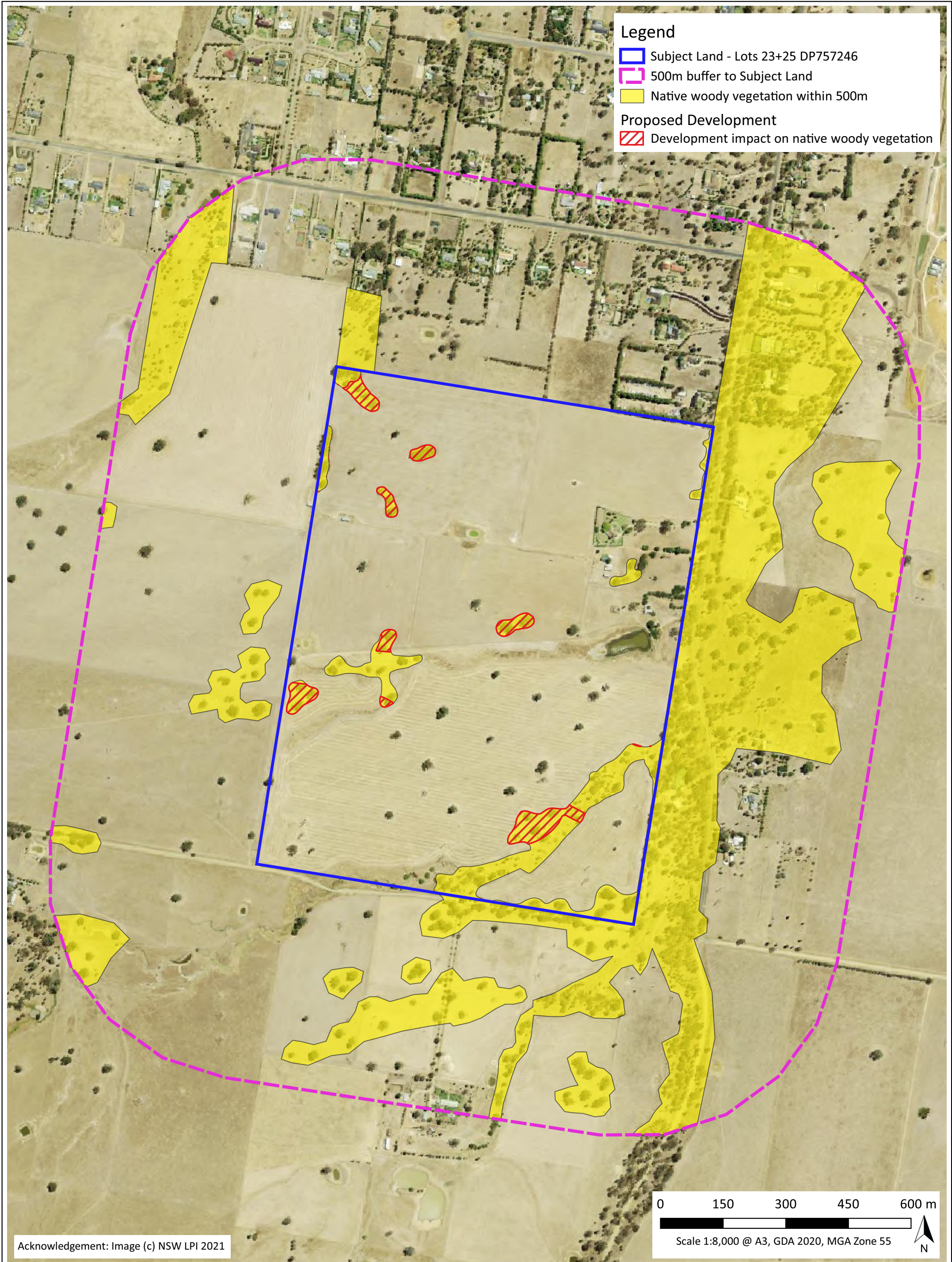


Figure 11. Box-Gum Woodland within 500m of the subject land

## 3.5 Legislative Requirements

### 3.5.1 Commonwealth EPBC Act – Referral

The proposed development is unlikely to have a significant impact on an EPBC Act listed MNES given the subject land:

- does not support any EPBC Act listed ecological communities;
- does not support any EPBC Act listed flora species; and
- is considered unlikely to contain habitat of potential importance to EPBC Act listed threatened or migratory fauna species<sup>41</sup>.

In light of the above, EPBC Act referral for the proposed development of the subject land is considered unwarranted at this time and is not recommended.

### 3.5.2 NSW BC Act – Biodiversity Offset Requirements

The BAM Calculator is the tool for quantifying the offset requirements for a project, the output being expressed as ecosystem credits and species credits. The results of the BAM credit calculations completed for the proposed development are provided below and detailed in Appendix E.

#### 3.5.2.1 Biodiversity risk weighting

The biodiversity risk weighting (Section 6.6 of the BAM) is a tool used in the BOS to mitigate the risk in offsetting the loss of vegetation, threatened entities and/or their habitat. The biodiversity risk weighting does this by increasing the quantum of credits required at an impact site. The biodiversity risk weighting is derived from two components:

- sensitivity to loss – based on threat status under legislation or evidence-based information that suggests the entity is at an increased risk of loss; and
- sensitivity to potential gain – based on life history characteristics and ecological information for a species.

The subject land contains vegetation with a vegetation integrity score that requires offsetting for impacts on ecosystem credits. The subject land also contains threatened species habitat that requires offsetting for impacts on species credits. The biodiversity risk weighting for the identified ecosystem credits and species credits is shown below.

- PCT277 – Biodiversity risk rating of 2.50.
- *Hieraaetus morphnoides* Little Eagle – Biodiversity risk rating of 1.50.

#### 3.5.2.2 Ecosystem credit requirements

The results of the BAM ecosystem credit calculations completed for the proposed development are provided in Table 15. As shown in Table 15, only one of the vegetation zones in the subject land has

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<sup>41</sup> This can only be confirmed following targeted threatened fauna surveys for the relevant species identified in Table 14.

a vegetation integrity score sufficient for its clearance to result in generation of ecosystem credits, as outlined in Section 10.3.1.1 of the BAM, these being:

- (a) a vegetation integrity score of  $\geq 15$  where the PCT is representative of an endangered or critically endangered ecological community, or
- (b) a vegetation zone that has a vegetation integrity score of  $\geq 17$  where the PCT is associated with threatened species habitat (as represented by ecosystem credits), or is representative of a vulnerable ecological community, or
- (c) a vegetation zone that has a vegetation integrity score  $\geq 20$  where the PCT is not representative of a TEC or associated with threatened species habitat.

Accordingly, the proposed development does generate an ecosystem credit obligation, as determined by the BAM Calculator on 10 February 2022.

**Table 15. Ecosystem credit requirements.**

PCT & Vegetation Zone	Vegetation Integrity Score	Proposed Clearance Area (ha)	Credits Required
PCT277 Zone 1	27.2	2.39	41
PCT277 Zone 2	4.3	68.7	0

### 3.5.2.3 Species credit requirements

The subject land supports breeding habitat for the Little Eagle, which is a species credit species. The Little Eagle breeding habitat consists of 5.98 ha in PCT277 Zone 1 (including 4.04 ha outside of the subject land), and 21.85 ha in PCT277 Zone 2 (see Section 3.2.1). Accordingly, as detailed in Table 16, the proposed development does generate a species credit obligation, as determined by the BAM Calculator on 10 February 2022.

**Table 16. Species credit requirements.**

Species	PCT & Vegetation Zone	Habitat Condition (Vegetation Integrity) Loss	Proposed Clearance Area (ha)	Credits Required
Little Eagle <i>Hieraetus morphnoides</i>	PCT277 Zone 1	27.2	5.98	61*
	PCT277 Zone 2	4.3	21.85	35
	Total		27.83	96

\* As detailed in Section 3.2.1, the impact on Little Eagle breeding habitat includes 4.04 ha of PCT277 Zone 1 located outside of the subject land. This additional impact cannot be captured in the online BAM Calculator and is therefore not included in Appendix E. In order to capture the additional impact in this BDAR, a hypothetical BAM Calculator scenario was carried out that increased the impact area for PCT277 Zone 1 to allocate the 5.98 ha as the total impact to PCT277 Zone 1 as Little Eagle breeding habitat. This increased the Little Eagle species credit liability for PCT277 Zone 1 to 61. The increased species credits generated following this process are included in Table 16.

The proposed development will result in the removal of a Little Eagle nest tree, which was confirmed to be in active use in spring 2021. As stated in the NSW Bionet Threatened Biodiversity Profile Data Collection:

*“Where a breeding site has been identified in accordance with the BAM the species buffer polygon should be established by providing a circular polygon with a 300m radius around the nest tree.”*

The application of a 300 m buffer around the nest tree results in a total of 27.83 ha of Little Eagle breeding habitat, of which 23.79 ha occurs within the subject land. As the proposed development will result in the removal of this tree, it is assumed that the development will have a direct impact on all 27.83 ha of the breeding habitat. As shown in Figure 10, the 27.83 ha of habitat consists of:

- 1.94 ha of PCT277 Zone 1;
- 21.85 ha of PCT277 Zone 2; and
- 4.04 ha of area outside the subject land. For the purposes of this assessment, this area is assumed to be equivalent to PCT277 Zone 1, as it contains an intact native canopy similar to that recorded in Zone 1.

#### 3.5.2.4 Credit obligation options

As detailed by the NSW Department of Planning, Industry and Environment<sup>42</sup>, the proponent can address the estimated offset obligation outlined in the following two ways (options).

1. The proponent can ‘*identify and purchase the required ‘like for like’ credits in the market and then retire those credits via OEH BOAMS [Biodiversity Offsets and Agreement Management System]. For example, credits could be located by using the OEH registers or by retaining a broker to locate credits for them.*’
2. The proponent can ‘*use the Offsets Payment Calculator to determine the cost of its credit obligation, and transfer this amount to the Biodiversity Conservation Fund via OEH BOAMS. The Biodiversity Conservation Trust is then responsible for identifying and securing the credit obligation.*’

When the proponent has completed these steps for all credits that the proponent is required to retire, they can proceed with their activity in accordance with their approval. The consent authority is responsible for ensuring compliance with credit obligations, and any other conditions of the consent or approval.

If the proponent chooses Option 2 to meet the credit obligations, the amount which must be paid into the Biodiversity Conservation Fund is determined at the time the proponent applies for an invoice from the Biodiversity Conservation Trust. A risk premium is included in that calculation to account for fact that the risks and costs involved in securing the offset have effectively been transferred to the Biodiversity Conservation Trust. These risks include the statistical probability that the market credit price paid by the Biodiversity Conservation Trust to landholders is higher or lower than that predicted. The benefits associated with Option 2 include a more streamlined process and no ongoing obligations once the required amount has been paid to the Biodiversity Conservation Fund.

If the proponent chooses Option 1 to meet the credit obligations, the cost per credit purchased from the market is likely to be lower than that to pay into the Biodiversity Conservation Fund, and as such, the total monetary cost of the offset obligation is likely to be lower than Option 2. However, the

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<sup>42</sup> <https://www.environment.nsw.gov.au/biodiversity/offsetsscheme.htm>

disadvantages associated with Option 1 include a more complicated process and potential delays associated with sourcing credits from the BOS credit market.

### 3.5.3 NSW Koala SEPP – Koala Habitat Protection Requirements

The *State Environmental Planning Policy (Koala Habitat Protection) 2021* (the 'Koala Habitat Protection SEPP 2021') commenced on 17 March 2021, replacing the Koala Habitat Protection SEPP 2020. However, the Koala Habitat Protection SEPP 2020 continues to apply for RU1, RU2, and RU3 zoned land outside of the Sydney Metropolitan Area and Central Coast. Regarding the application of the Koala Habitat Protection SEPP 2020 for the proposed development of the subject land, the following points are noted.

- The subject land is located within the City of Wagga Wagga Local Government Area (LGA), which is an LGA to which the Koala Habitat Protection SEPP applies as listed in Schedule 1.
- The subject land is zoned RU1 Primary Production.
- The subject land has an area of greater than 1 hectare.

As demonstrated by the above assessment, the development control provisions of the Koala Habitat Protection SEPP 2020 apply to the proposed development. However, it is noted that if the subject land is rezoned to urban residential, the Koala Habitat Protection SEPP 2021 will apply.

Therefore, pursuant to the Koala Habitat Protection SEPP 2020, the proposed development must determine:

*Step 1 – Is the land potential koala habitat?*

*Potential koala habitat means areas of native vegetation where trees of the types listed in Schedule 2 constitute at least 15% of the total number of trees in the upper or lower strata of the tree component.*

The subject land does not contain any Koala tree feed species listed in Schedule 2. Therefore no part of the subject land is considered to be potential koala habitat.

*Step 2 – Is the land core koala habitat?*

*Core koala habitat means an area of land with a resident population of koalas, evidenced by attributes such as breeding females, being females with young, and recent sightings of and historical records of a population.*

There are four records of Koala within 10 km of the subject land in the last 18 years (BioNet). However, all these records were taken during a community survey in 2006 and have an accuracy of 10 km.

In addition, the subject land has been highly modified and does not contain substantial areas of habitat required to support an ongoing or viable Koala population. As such, the subject land does not

support habitat features of value to Koala and is unlikely to constitute important or occupied Koala habitat.

*Step 3 – Can development consent be granted in relation to core koala habitat?*

With regard to the above and with respect to the Koala Habitat Protection SEPP 2020, the subject land is therefore considered unlikely to constitute important or occupied Koala habitat now or in the future.

In light of the above, Council can be satisfied that the subject land is not Koala habitat, and it is therefore not prevented, because of the Koala Habitat Protection SEPP 2020, from granting consent to a development application within the subject land.

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- Land Zoning Map - Sheet LZN\_004E.
- Lot Size Map - Sheet LSZ\_004E.
- Terrestrial Biodiversity Map - Sheet BIO\_004.

## Appendices

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## Appendix A. BAM Plot/Transect Scores

PCT code	Veg. Zone	Plot No.	Composition (species richness)					
			Tree	Shrub	Grass & grass like	Forb	Fern	Other
277	1	1	1	0	0	1	0	0
		2	1	0	5	3	0	0
		3	1	0	2	1	0	0
	2	1	0	0	0	2	0	0
		2	0	0	5	1	0	0
		3	0	0	2	5	0	0

PCT code	Veg. Zone	Plot No.	Structure (% cover)					
			Tree	Shrub	Grass & grass like	Forb	Fern	Other
277	1	1	15	0	0	5	0	0
		2	20	0	11.5	0.5	0	0
		3	5	0	0.4	5	0	0
	2	1	0	0	0	10.1	0	0
		2	0	0	29.1	0.1	0	0
		3	0	0	2.1	12.3	0	0

PCT code	Veg. Zone	Plot No.	Function									
			Stem classes					No. of large trees	Hollow bearing trees	% Litter cover	Coarse woody debris (m)	% High threat weed cover
			Regen.	5-9	10-19	20-29	30-49					
277	1	1	-	-	-	-	-	2	2	3.2	0	0.1
		2	x	-	-	x	x	1	1	1.4	19	10.2
		3	x	x	x	x	x	0	0	6.2	12	0
	2	1	-	-	-	-	-	0	0	6	0	0
		2	-	-	-	-	-	0	0	0	0	0.2
		3	-	-	-	-	-	0	0	10	0	11.1

## Appendix B. Flora Species Recorded by Plot and Percent Cover

Species List	Common Name	277.1.1	277.1.2	277.1.3	277.2.1	277.2.2	277.2.3	outside plots
<b>Exotics</b>								
<i>Acetosella vulgaris</i>	Sheep's Sorrel					0.2	5.0	
<i>Arctotheca calendula</i>	Cape Weed			0.1			1.0	
<i>Avena sp.</i>	Wild Oats							X
<i>Bromus sp.</i>	Brome Grass	2.0	2.0	0.2				
<i>Capsella bursa-pastoris</i>	Shepherd's Purse				1.0			
<i>Carthamus lanatus</i>	Saffron Thistle							X
<i>Chenopodium album</i>	Fat-hen	0.1						
<i>Citrullus lanatus</i>	Camel Melon			0.1				
<i>Cirsium vulgare</i>	Spear Thistle		0.1					
<i>Conyza sp.</i>	Fleabane		0.2				0.2	
<i>Cucumis myriocarpus</i>	Prickly Paddy Melon	0.2						
<i>Cynodon dactylon</i>	Couch Grass							X
<i>Cyperus eragrostis</i>	Tall Flat-sedge		0.2				0.1	
<i>Digitaria sanguinalis</i>	Summer Grass							X
<i>Digitaria sp.</i>	Summer Grass					3.0	10.0	
<i>Digitaria sp.</i>	Small Digitaria						15.0	
<i>Echium plantagineum</i>	Paterson's Curse		10.0					
<i>Eleusine tristachya</i>	Goose Grass							X
<i>Eragrostis cilianensis</i>	Stinkgrass		2.0	2.0		5.0	20.0	
<i>Eragrostis pilosa</i>	Soft Lovegrass			1.0			15.0	
<i>Gnaphalium americanum</i>	Purple Cudweed		0.1				0.1	
<i>Hypochaeris glabra</i>	Smooth Cats-ear		0.2				0.1	
<i>Hypochaeris radicata</i>	Flatweed	0.5		0.1			5.0	
<i>Lepidium africanum</i>	African Peppergrass				0.1			
<i>Lolium perenne</i>	Perennial Ryegrass	10.0			20.0			
<i>Malva sp.</i>	Mallow / Marshmallow Weed	0.2	1.0	0.1	0.1			

Species List	Common Name	277.1.1	277.1.2	277.1.3	277.2.1	277.2.2	277.2.3	outside plots
<i>Marrubium vulgare</i>	White Horehound			0.1				
<i>Medicago sativa</i>	Lucerne	15.0			60.0			
<i>Melia azedarach</i>	White Cedar							X
<i>Panicum capillare</i>	Witchgrass	15.0	5.0	10.0	15.0	5.0	5.0	
<i>Paspalum dilatatum</i>	Paspalum Grass		5.0				1.0	
<i>Pennisetum clandestinum</i>	Kikuyu grass		2.0					
<i>Polygonum aviculare</i>	Wireweed	0.5						
<i>Romulea rosea</i>	Onion Grass		4.0				5.0	
<i>Rubus fruticosus</i>	Blackberry		1.0					
<i>Salix sp.</i>	Willow							X
<i>Salvia verbenaca</i>	Wild Sage							X
<i>Setaria parviflora</i>	Slender Pigeon Grass		2.0			1.0		
<i>Schinus molle</i>	Peppercorn Tree							X
<i>Solanum nigrum</i>	Black Nightshade	0.2	0.1	0.1				
<i>Sonchus sp.</i>	Milk/Sow Thistle							X
<i>Sporobolus sp.</i>	Rat's Tail Grass		1.0			3.0	0.1	
<i>Taraxacum officinale</i>	Common Dandelion							X
<i>Trifolium sp.</i>	Clover				1.0		5.0	
<i>Xanthium spinosum</i>	Bathurst Burr	0.1						
<b>Natives</b>								
<i>Amphibromus nervosus</i>	Common Swamp Wallaby-grass							X
<i>Amyema sp.</i>	Box Mistletoe							X
<i>Austrostipa bigeniculata</i>	Tall Speargrass		2.0	0.1				
<i>Austrostipa densiflora</i>	Brush Tail Spear Grass							X
<i>Austrostipa scabra</i>	Rough Spear-grass		1.0			1.0		
<i>Bothriochloa macra</i>	Red-leg Grass					1.0		
<i>Brachychiton populneus</i>	Kurrajong							X
<i>Carex appressa</i>	Tall Sedge							X
<i>Chloris truncata</i>	Windmill Grass		1.0	0.3		2.0	2.0	

Species List	Common Name	277.1.1	277.1.2	277.1.3	277.2.1	277.2.2	277.2.3	outside plots
<i>Dichopogon fimbriatus</i>	Chocolate Lilly							X
<i>Dysphania pumilio</i>	Small Crumbweed	5.0	0.2	5.0	10.0		2.0	
<i>Eleocharis acuta</i>	Common Spikerush							X
<i>Epilobium billardierianum</i>	Glabrous Willow Herb					0.1	0.2	
<i>Eucalyptus albens</i>	White Box	15.0						
<i>Eucalyptus blakelyi</i>	Blakely's Red Gum		20.0					
<i>Eucalyptus melliodora</i>	Yellow Box			5.0				
<i>Eucalyptus microcarpa</i>	Grey Box							X
<i>Hypericum gramineum</i>	Native St John's Wort						5.0	
<i>Juncus australis</i>	Austral Rush						0.1	
<i>Juncus subsecundus</i>	Fingered Rush					0.1		
<i>Lythrum hyssopifolia</i>	Hyssop Loosestrife						5.0	
<i>Oxalis perennans</i>	Woody-Root Oxalis		0.2					
<i>Panicum effusum</i>	Hairy Panic							X
<i>Paspalidium gracile</i>	Graceful Panic Grass		7.0			25.0		
<i>Rumex brownii</i>	Swamp Dock		0.1					
<i>Rytidosperma sp.</i>	Wallaby Grass		0.5					
<i>Vittadinia cuneata</i>	Fuzzweed				0.1			
<i>Wahlenbergia communis</i>	Native Bluebell						0.1	
<b>Number of Species</b>		13	26	14	9	12	23	20
<b>Number of Native Species</b>		2	9	4	2	6	7	9
<b>Number of Native Non-grass Species</b>		1	3	1	2	1	5	6
<b>Number of Exotic Species</b>		11	17	10	7	6	16	11
<b>% Perennial Native Ground Cover</b>		10.7	26.7	28.4	9.4	62.9	14.1	n/a

## Appendix C. Tree Habitat Assessment Results

Tree number	Species Name	Common Name	Age Class	DBH (cm)	Height (m)	Crown Diameter (m)	Hollows			Alive/Dead	Notes
							S	M	L		
1	<i>E. melliodora</i>	Yellow Box	Old	200	18	20		2		A	
2	<i>E. blakelyi</i>	Blakely's Red Gum	Mature	100	16	15		1		A	
3	<i>E. blakelyi</i>	Blakely's Red Gum	Old	130	18	10		2	1	A	
4	<i>E. melliodora</i>	Yellow Box	Mature	60	19	10		1		A	Stick Nest.
5	<i>E. melliodora</i>	Yellow Box	Mature	150	17	10	2	4		A	2 medium-large stick nests high in tree, 1 small stick nest. Galah Pair in medium hollow. Superb Parrots foraging
6	<i>E. blakelyi</i>	Blakely's Red Gum	Mature	80	16	15	2	4	2	A	Scar on Trunk. Old stick nest.
7	-	Stag	Dead	45	5	-	1	2	1	Dead	
8	<i>E. albens</i>	White Box	Mature	100	15	15	4	3		A	
9	<i>E. albens</i>	White Box	Mature	85	15	10	3	3		A	Galahs
10	<i>E. albens</i>	White Box	Mature	100	12	10		2	2	A	
11	<i>E. melliodora</i>	Yellow Box	Mature	50	10	6		1		A	
12	<i>E. blakelyi</i>	Blakely's Red Gum	Mature	110	20	12	1			A	
13	<i>E. melliodora</i>	Yellow Box	Mature	110	10	12	2	2		A	Dead Central Trunk
14	<i>E. melliodora</i>	Yellow Box	Mature	225	18	20	1	1		A	Mistletoe
15	-	Stag	Dead	55	7	-		1		Dead	Black Kites in Stag. The nest is nearby in Tree 18
16	-	Stag	Dead	75	12	-	1			Dead	
17	-	Stag	Dead	45	10	-		1		Dead	
18	<i>E. blakelyi</i>	Blakely's Red Gum	Mature	95	17	8		2	1	A	Stick Nest (Black Kites)
19	<i>E. blakelyi</i>	Blakely's Red Gum	Mature	90,90	17	10		3	1	A	
20	<i>E. melliodora</i>	Yellow Box	Mature	100,95	10	15	1			A	
21	<i>E. albens</i>	White Box	Mature	105	17	10	4			A	Full of birds (Galahs, Willy Wag Tail, Grass Parrots). Large Stick Nest
22	<i>E. albens</i>	White Box	Mature	100,80	11	20	2	3		A	2 Large trunks
23	<i>E. albens</i>	White Box	Mature	110	22	10	2	3		A	
24	<i>E. albens</i>	White Box	Mature	80	7	10	2			A	
25	-	Stag	Dead	100	18	-	4	2		Dead	Grass parrots and Galahs in hollows
26	<i>E. albens</i>	White Box	Mature	100,100	10	20		4		A	Stick nest
27	-	Stag	Dead	120	15	-	1	5		Dead	
28	<i>E. albens</i>	White Box	Mature	105	15	10		1	1	A	
29	<i>E. albens</i>	White Box	Mature	95	20	16	3	2		A	
30	<i>E. albens</i>	White Box	Mature	60	12	12		1	1	A	
31	<i>E. albens</i>	White Box	Mature	100	18	12	4	4		A	
32	<i>E. melliodora</i>	Yellow Box	Mature	110	16	12	3			A	
33	<i>E. albens</i>	White Box	Mature	75	13	6	2			A	
34	<i>E. albens</i>	White Box	Mature	90	15	15	4	3		A	
35	<i>E. microcarpa</i>	Grey Box	Mature	105	13	10	2	2	1	A	
36	<i>E. microcarpa</i>	Grey Box	Mature	100,65	15	15	1			A	
37	<i>E. microcarpa</i>	Grey Box	Mature	95	16	13	1	4	1	A	Hollows clearly inhabited
38	<i>E. melliodora</i>	Yellow Box	Mature	110,100, 80,80	13	10	2	4	1	A	Many large stems. Dead stem contains most of the hollows
39	<i>E. albens</i>	White Box	Mature	80	20	6		2	3	A	
40	<i>E. melliodora</i>	Yellow Box	Mature	120	20	18				A	no hollows
41	<i>E. albens</i>	White Box	Mature	80	13	8			1	A	
42	<i>E. blakelyi</i>	Blakely's Red Gum	Old	102	16	12	2		1	A	

Tree number	Species Name	Common Name	Age Class	DBH (cm)	Height (m)	Crown Diameter (m)	Hollows			Alive/Dead	Notes
							S	M	L		
43	<i>E. albens</i>	White Box	Mature	120	15	10		1		A	
44	<i>E. blakelyi</i>	Blakely's Red Gum	Mature	240	16	15	1			A	
45	<i>E. melliodora</i>	Yellow Box	Mature	190	18	15		2	2	A	Large stick nest - Little Eagle (Confirmed 1/11/2021)
46	<i>E. melliodora</i>	Yellow Box	Mature	120	17	12	2	2		A	
47	<i>E. microcarpa</i>	Grey Box	Mature	170	16	8		3		A	
48	-	Stag	Dead	80	17	-				A	no hollows
49	<i>E. blakelyi</i>	Blakely's Red Gum	Mature	75	16	10	1			A	
50	<i>E. blakelyi</i>	Blakely's Red Gum	Mature	70	15	6		1		A	Pruned trunks.
51	<i>E. albens</i>	White Box	Mature	95	16	10	1	1		A	Bees in medium hollow. Stick nest
52	<i>E. blakelyi</i>	Blakely's Red Gum	Mature	300	14	15	1	1	1	A	
53	<i>E. blakelyi</i>	Blakely's Red Gum	Mature	85	16	8		1		A	
54	<i>E. blakelyi</i>	Blakely's Red Gum	Mature	80	16	12		2		A	
55	<i>E. blakelyi</i>	Blakely's Red Gum	Mature	95	22	10		1	1	A	
56	<i>E. blakelyi</i>	Blakely's Red Gum	Mature	85	15	20		1		A	
57	<i>E. blakelyi</i>	Blakely's Red Gum	Mature	70	12	8		2		A	
58	-	Stag	Dead	135	16	-	4	3		Dead	
59	<i>E. blakelyi</i>	Blakely's Red Gum	Mature	140	14	10		2	3	A	
60	<i>E. blakelyi</i>	Blakely's Red Gum	Mature	90,60	15	8		1		A	Wood duck nest in hollow
61	<i>E. blakelyi</i>	Blakely's Red Gum	Mature	150	13	10	1			A	Bees in Hollow, 2 smaller hollows occupied by Starlings

## Appendix D. Fauna Species Recorded

Classification	Scientific Name	Common Name	BC Act	EPBC Act
Amphibia	<i>Crinia signifera</i>	Common Eastern Froglet	Protected	-
Amphibia	<i>Litoria peronii</i>	Peron's Tree Frog	Protected	-
Aves	<i>Acanthiza chrysorrhoa</i>	Yellow-rumped Thornbill	Protected	-
Aves	<i>Alisterus scapularis</i>	Australian King-Parrot	Protected	-
Aves	<i>Anas gracilis</i>	Grey Teal	Protected	-
Aves	<i>Anas superciliosa</i>	Pacific Black Duck	Protected	-
Aves	<i>Anthochaera carunculata</i>	Red Wattlebird	Protected	-
Aves	<i>Cacatua galerita</i>	Sulphur-crested Cockatoo	Protected	-
Aves	<i>Chenonetta jubata</i>	Australian Wood Duck	Protected	-
Aves	<i>Cheramoeca leucosterna</i>	White-backed Swallow	Protected	-
Aves	<i>Coracina novaehollandiae</i>	Black-faced Cuckoo-shrike	Protected	-
Aves	<i>Corcorax melanorhamphos</i>	White-winged Chough	Protected	-
Aves	<i>Corvus coronoides</i>	Australian Raven	Protected	-
Aves	<i>Coturnix pectoralis</i>	Stubble Quail	Protected	-
Aves	<i>Dacelo novaeguineae</i>	Laughing Kookaburra	Protected	-
Aves	<i>Dicaeum hirundinaceum</i>	Mistletoebird	Protected	-
Aves	<i>Egretta novaehollandiae</i>	White-faced Heron	Protected	-
Aves	<i>Eolophus roseicapilla</i>	Galah	Protected	-
Aves	<i>Entomyzon cyanotis</i>	Blue-faced Honeyeater	Protected	-
Aves	<i>Falco berigora</i>	Brown Falcon	Protected	-
Aves	<i>Falco cenchroides</i>	Nankeen Kestrel	Protected	-
Aves	<i>Grallina cyanoleuca</i>	Magpie-lark	Protected	-
Aves	<i>Gymnorhina tibicen</i>	Australian Magpie	Protected	-
Aves	<i>Haliastur sphenurus</i>	Whistling kite	Protected	-
<b>Aves</b>	<b><i>Hieraaetus morphnoides</i></b>	<b>Little Eagle</b>	<b>Vulnerable</b>	-
Aves	<i>Hirundo neoxena</i>	Welcome Swallow	Protected	-
<b>Aves</b>	<b><i>Lalage tricolor</i></b>	<b>White-winged Triller</b>	<b>Vulnerable</b>	-
Aves	<i>Lichenostomus penicillatus</i>	White-plumed Honeyeater	Protected	-
Aves	<i>Malurus cyaneus</i>	Superb Fairy-wren	Protected	-
Aves	<i>Manorina melanocephala</i>	Noisy Miner	Protected	-
Aves	<i>Merops ornatus</i>	Rainbow Bee-eater	Protected	-
Aves	<i>Microcarbo melanoleucos</i>	Little pied Cormorant	Protected	-
Aves	<i>Milvus migrans</i>	Black Kite	Protected	-
Aves	<i>Ocyphaps lophotes</i>	Crested Pigeon	Protected	-
Aves	<i>Pardalotus striatus</i>	Striated Pardalote	Protected	-
Aves	<i>Petrochelidon nigricans</i>	Tree Martin	Protected	-
<b>Aves</b>	<b><i>Petroica phoenica</i></b>	<b>Flame Robin</b>	<b>Vulnerable</b>	-
Aves	<i>Philemon corniculatus</i>	Noisy Friarbird	Protected	-
Aves	<i>Platycercus elegans</i>	Crimson Rosella	Protected	-
Aves	<i>Platycercus eximius</i>	Eastern Rosella	Protected	-
<b>Aves</b>	<b><i>Polytelis swainsonii</i></b>	<b>Superb Parrot</b>	<b>Vulnerable</b>	<b>Vulnerable</b>
Aves	<i>Psephotus haematonotus</i>	Red-rumped Parrot	Protected	-
Aves	<i>Rhipidura albiscapa</i>	Grey Fantail	Protected	-
Aves	<i>Rhipidura leucophrys</i>	Willy Wagtail	Protected	-

Aves	<i>Strepera graculina</i>	Pied Currawong	Protected	-
Aves	<i>Sturnus vulgaris</i>	Common Starling	-	-
Aves	<i>Tachybaptus novaehollandiae</i>	Australasian Grebe	Protected	-
Aves	<i>Taeniopygia bichenovii</i>	Double-barred Finch	Protected	-
Aves	<i>Trichoglossus haematodus</i>	Rainbow Lorikeet	Protected	-
Aves	<i>Tyto alba</i>	Barn Owl	Protected	-
Aves	<i>Vanellus miles</i>	Masked Lapwing	Protected	-
Mammalia	<i>Macropus giganteus</i>	Eastern Grey Kangaroo	Protected	-
Mammalia	<i>Oryctolagus cuniculus</i>	European Rabbit	-	-
Mammalia	<i>Trichosurus vulpecula</i>	Common Brushtail Possum	Protected	-
Mammalia	<i>Microbat sp.</i>	Microbats	Protected	-

## Appendix E. BAM Credit Summary Report

## Proposal Details

Assessment Id	Proposal Name	BAM data last updated *
00026318/BAAS17089/21/00026319	3030 456-474 Plumpton Road Rowan - BDAR	24/11/2021
Assessor Name	Report Created	BAM Data version *
Robert Speirs	10/02/2022	50
Assessor Number	BAM Case Status	Date Finalised
BAAS17089	Open	To be finalised
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 SAIL	Ecosystem credits

Blakely's Red Gum - Yellow Box grassy tall woodland of the NSW South Western Slopes Bioregion												
1	277_1	White Box - Yellow Box - Blakely's Red Gum Grassy Woodland and Derived Native Grassland in the NSW North Coast, New England Tableland, Nandewar, Brigalow Belt South, Sydney Basin, South Eastern Highla	27.2	27.2	2.4	PCT Cleared - 94%	High Sensitivity to Potential Gain	Critically Endangered Ecological Community	Critically Endangered	2.50	TRUE	41

## BAM Credit Summary Report

2	277_2	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	4.3	4.3	68.7	PCT Cleared - 94%	High Sensitivity to Potential Gain	Critically Endangered Ecological Community	Critically Endangered	2.50	TRUE	0
											<b>Subtotal</b>	<b>41</b>
											<b>Total</b>	<b>41</b>

### 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
<b><i>Hieraaetus morphnoides</i> / Little Eagle ( Fauna )</b>									
277_1	27.2	27.2	1.9			Vulnerable	Not Listed	False	20
277_2	4.3	4.3	21.8			Vulnerable	Not Listed	False	35

## BAM Credit Summary Report

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								<b>Subtotal</b>	<b>55</b>
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