

HANSEN YUNCKEN

Biodiversity Development Assessment Report

NEW PRIMARY SCHOOL, WAGGA WAGGA



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ACRONYMS AND ABBREVIATIONS

BAM	Biodiversity Assessment Methodology
BC Act	Biodiversity Conservation Act 2016 (NSW)
BCD	NSW Biodiversity and Conservation Division, Department of Planning, Industry and Environment
BDAR	Biodiversity Development Assessment Report
BOM	Australian Bureau of Meteorology
BOS	Biodiversity Offsets Scheme (NSW)
CEEC	Critically Endangered Ecological Community
DOEE	(Cwth) Department of Environment and Energy
DBH	Diameter at Breast Height
DPE	(NSW) Department of Planning and Environment, now DPIE
DPIE	(NSW) Department of Planning, Industry and Environment
EEC	Endangered Ecological Community
EPBC Act	<i>Environmental Protection and Biodiversity Conservation Act 1999</i> (Cwth)
EP&A Act	<i>Environmental Planning and Assessment Act 1979</i> (NSW)
EIS	Environmental Impact Statement
FM Act	<i>Fisheries Management Act 1994</i> (NSW)
GIS	Geographic Information System
ha	hectares
HBT	Hollow-bearing Tree
km	kilometres
m	Metres
MNES	Matters of National environmental significance under the EPBC Act (c.f.)
NSW	New South Wales
REAP	Regional Environmental Action Plan (NSW)
OEH	(NSW) Office of Environment and Heritage, now BCD
SSD	State Significant Development
SEARS	Secretary's Environmental Assessment Requirements
SAIL	Serious and Irreversible Impact
SEPP	State Environmental Planning Policy (NSW)
SINSW	Schools Infrastructure NSW

sp/spp	Species/multiple species
TEC	Threatened Ecological Community

EXECUTIVE SUMMARY

Hansen Yuncken is planning for the construction of a public school in the suburb of Estella, in the Wagga Wagga Local Government Area, NSW. The proposal would develop approximately 2.2 ha of the 3.1 ha development site. This Biodiversity Development Assessment Report (BDAR) was originally prepared by NGH for Hayball (Draft v1) and has now been updated to reflect design changes provided by Hansen Yuncken (Draft v2).

The aim of this BDAR is to address the biodiversity matters raised in the Secretary's Environmental Assessment Requirements (SEARs) and to address the requirements of the Biodiversity Conservation Act 2016. This BDAR forms part of an Environmental Impact Statement (EIS) for the State Significant Development (SSD), prepared under Part 4 of the *Environmental Planning and Assessment Act 1979* (EP&A Act).

The Biodiversity Assessment Methodology (BAM) is the required assessment methodology for SSDs that trigger the NSW Biodiversity Offsets Scheme, under the NSW *Biodiversity Conservation Act 2016*. This report follows the field work methodologies and assessment format required by the BAM.

2.2 ha of Blakely's Red Gum – Yellow Box grassy tall woodland of the NSW South Western Slopes Bioregion would be impacted for the construction of the school buildings and landscaping of grounds. This is comprised of 1.5 ha in the form of derived grassland and 0.7 ha in the form of planted vegetation representing this community. The clearing of the native vegetation results in the generation of 15 ecosystem credits.

One species credit species, the Superb Parrot (*Polytelis swainsonii*), was observed within the development site during the site surveys. No hollows were detected on site and the trees present are unlikely to have developed hollows as they have been planted less than 50 years ago. Thus, no breeding habitat is present for the Superb Parrot and no species credits are generated. Targeted surveys were undertaken for 17 other threatened species credits species. The site has very limited habitat value and none of these threatened species were detected on site. No species credits are required for the development.

Impacts to federally listed species have been assessed and include the Superb Parrot, Swift Parrot, Regent Honeyeater and Koala. Potential impacts have been assessed in accordance with the EPBC guidelines and are considered unlikely to be significant. No referral is considered necessary to the Federal Department of Environment and Energy (DOEE).

Consideration has been given to avoiding and minimising impacts to biodiversity throughout each phase of the proposal. Site selection options have been assessed against key environmental, social and economic criteria. Mitigation and management measures will be put in place to adequately address impacts associated with the proposal, both direct and indirect.

The retirement of the credits generated will be carried out in accordance with the NSW Biodiversity Offsets Scheme under the *Biodiversity Conservation Act 2016*. With the retirement of credits and effective implementation of the mitigation measures, the proposal is consistent with the requirements of the BAM.

1 INTRODUCTION

The proposal for the new Primary School in Wagga Wagga is classified as State Significant Development (SSD) under the State and Regional Development State Environmental Planning Policy (SEPP) and therefore a 'major project'. This Biodiversity Development Assessment Report (BDAR) assesses the impacts of the proposed new Primary School in Wagga Wagga (the proposal) according to the NSW Biodiversity Assessment Methodology (BAM) as required by the Secretary's Environmental Assessment Requirements (SEARs) for the proposal. NGH has prepared this report on behalf of the proponent, Hansen Yuncken.

The following terms are used in this document:

- **Development footprint** – The area of land that is directly impacted on by the proposal. The development footprint is approximately 2.2 ha.
- **Development site** – The area of land that is subject to a proposed development. The development site is approximately 3.1ha. The development site is the area surveyed for this assessment.
- **Subject land** – All land within the affected lot boundaries (3.1 ha).
- **Buffer area** – All land within 1500 m of the outside edge of the boundary of the development site.

1.1 THE PROPOSAL

The development site for the new Primary School covers approximately 3 ha of land and involves the construction of 16 teaching spaces and connection with nearby land uses including recreation spaces to the east, and the Charles Sturt University Campus to the north.

The proposal would include the following elements:

- Construction of 7 multistorey buildings
- Construction of internal footpaths between buildings
- Perimeter security fencing.
- Construction of a new carpark, vehicle entry and pedestrian entry.
- Landscaping of school grounds to include outdoor areas, seating, play equipment and new plantings.

1.2 THE DEVELOPMENT SITE

1.2.1 Site location

The proposed location of the new Primary School is in the Wagga Wagga Local Government Area, within the grounds of Charles Sturt University (CSU), between Estella Road and Darnell Smith Drive (Figure 1-1). The subject land is Lot 1 DP 1253885, which is approximately 3.0 ha in size and is owned by Schools Infrastructure NSW (SINSW). Land surrounding the development site, is mostly cleared and comprised of sporting ovals to the East, residential land to the South, cleared agricultural paddocks to the west and university grounds to the North.

1.2.2 Site description

The development site is located on gently sloping land. The development site has been cleared in the past, most likely for past agricultural practices but has undergone restoration activities over the last 30 years. Three planted tree lots occur along the fence lines of the site, these are comprised of a diverse mix of local and non-local native species. The western boundary is comprised of plantings about 20 to 30 years old. This tree lot contains some older Yellow Box (*Eucalyptus melliodora*) and Red Box (*Eucalyptus polyanthemos*), however is mostly dominated by native plants not local to the area such as Cootamundra Wattle (*Acacia baileyana*) and White Cedar (*Melia azedarach*). The southern boundary plantings are comprised of a stand of semi-mature Yellow Box, densely planted in rows and of a uniform age. The eastern boundary of the site is comprised of a mix of local native species about 5 to 10 years old.

The remaining area of the development site is a derived native grassland dominated almost exclusively by Red Grass (*Bothriochloa macra*). Isolated juvenile Yellow Box trees (*Eucalyptus melliodora*) are regenerating throughout the grassland.



Figure 1-1 Site Map

1.3 STUDY AIMS

This BDAR has been prepared by NGH on behalf of Hansen Yuncken.

The aim of this BDAR is to address the requirements of the Secretary's Environmental Assessment Requirements (SEARs) listed below:

- *Biodiversity impacts related to the proposed development are to be assessed in accordance with Section 7.9 of the Biodiversity Conservation Act 2016 using the Biodiversity Assessment Method (BAM) and documented in a Biodiversity Development Assessment Report (BDAR). The BDAR must include information in the form detailed in the Biodiversity Conservation Act 2016 (s6.12), Biodiversity Conservation Regulation 2017 (s6.8) and the BAM unless OEH and DPE determine that the proposed development is not likely to have any significant impact on biodiversity values.*
- *The BDAR must document the application of the avoid, minimise and offset framework including assessing all direct, indirect and prescribed impacts in accordance with the BAM*
- *The BDAR must include details of the measures proposed to address the offset obligation as follows;*
 - a) *The total number and classes of biodiversity credits required to be retired for the development/project*
 - b) *The number and classes of like-for-like biodiversity credits proposed to be retired*
 - c) *The number and classes of biodiversity credits proposed to be retired in accordance with the variation rules*
 - d) *Any proposal to fund a biodiversity conservation fund*
 - e) *Any proposal to make a payment to the biodiversity conservation fund*
- *The BDAR must be prepared by a person accredited in accordance with the Accreditation Scheme for the Application of the Biodiversity Assessment Method Order 2017 under s6.10 of the Biodiversity Conservation Act 2016.*

This BDAR also addresses the assessment requirements of the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act).

1.4 SOURCE OF INFORMATION USED IN THE ASSESSMENT

The following information sources were used in the preparation of this report:

- Proposal layers, construction methodology and concept designs provided by Hansen Yuncken.
- Commonwealth Department of Environment and Energy (DoEE) Species Profiles and Threats database (SPRAT) <http://www.environment.gov.au/cgi-bin/sprat/public/sprat.pl>.
- Commonwealth Department of Environment and Energy Protected Matters Search Tool Accessed online at <http://environment.gov.au/epbc/protected-matters-search-tool>
- NSW OEH's Biodiversity Assessment Method (BAM) calculator (<https://www.lmbc.nsw.gov.au/bamcalc> - accessed by login through the BOAMS).
- NSW OEH's BioNet threatened biodiversity database Accessed online via login at <http://www.bionet.nsw.gov.au/>.
- OEH Threatened Species Profiles <http://www.environment.nsw.gov.au/threatenedSpeciesApp/> and www.environment.nsw.gov.au/AtlasApp/UI_Modules/

- OEH BioNet Vegetation Classification Database (OEH 2017) Accessed online via login at <http://www.environment.nsw.gov.au/NSWVCA20PRapp/default.aspx>
- Office of Environment and Heritage (OEH) (2017). Biodiversity Assessment Method
- NSW Government SEED Mapping
https://geo.seed.nsw.gov.au/Public_View/index.html?viewer=Public_View&locale=en-AU
- NSW Biodiversity Values Map
<https://www.lmbc.nsw.gov.au/Maps/index.html?viewer=BVMap>

2 LANDSCAPE FEATURES

2.1 IBRA BIOREGIONS AND SUBREGIONS

Bioregions are large, geographically distinct areas of land with common characteristics such as geology, landform patterns, climate, ecological features, and flora and fauna communities. The development site is located within the NSW South Western Slopes Bioregion, in the Lower Slopes subregion. The bioregion is characterised by a sub-humid climate with hot summers and no dry season and a temperate climate with warm summers occurs along the eastern boundary of the bioregion (OEH, 2016). The geology is characteristic of the eastern Lachlan Fold Belt, comprised of Cambrian to Early Carboniferous sedimentary and volcanic rocks, with characteristic landforms of undulating and hilly ranges and isolated peaks set in wide valleys at the apices of the Riverina alluvial fans. The pre-European vegetation type is dominated by Red Ironbark (*Eucalyptus sideroxylon*), Red Gum, and Red Stringybark (*E. macrorhyncha*) in the ranges, Grey Box (*E. microcarpa*) Woodlands with Yellow Box (*E. melliodora*), White Cypress Pine (*Callitris glaucophylla*) and Belah (*Casuarina cristata*) in the lower areas, Poplar Box (*E. populneus*), Kurrajong (*Brachychiton populneus*), Wilga (*Geijera parviflora*) and Red Box (*E. polyanthemus*) in the north, Black Box (*E. largiflorens*) in the West and River Red Gum along rivers and creeks.

The dominant IBRA subregion impacted by the proposal is the Lower Slopes subregion. This was entered into the BAM Calculator for the proposal.

2.2 NATIVE VEGETATION

As determined by GIS mapping from aerial imagery and local knowledge of the locality, approximately 218.4ha of native vegetation occurs in the 1500m buffer area. This native vegetation in the landscape surrounding the development is considered to be predominantly grassy woodland comprised of Yellow Box, Blakely's Red gum (*Eucalyptus blakelyi*), White Box (*Eucalyptus albens*), Grey Box, River Red Gum (*Eucalyptus camaldulensis*) and areas of derived native grasslands.

2.3 RIVER AND STREAMS

There are no rivers or streams within the development site. The nearest water body is a dam located approximately 200 m north-east and 415m east of the development site.

The nearest natural watercourse is Dukes creek, a 1st order stream under the Strahler stream classification system (Strahler, 1952) 1.35 km south-east of the development site. There is an unnamed drainage line off Dukes Creek, 1.1km east of the development site.

According to Wagga Wagga City Council online mapping, the development site is not subject to flooding or groundwater vulnerability.

2.4 WETLANDS

No wetlands occur within or adjacent to the development site. The nearest important wetland listed under the EPBC Act is Hattah-Kulkyne Lakes, which is over 400 – 500 km from the development site. There is no apparent connectivity from the development site to this wetland.

2.5 CONNECTIVITY FEATURES

The native vegetation remaining provides limited connectivity features in or adjacent to the development site. The remnant and planted vegetation, including paddock trees, provide some habitat connectivity for more disturbance tolerant and mobile species to travel across the landscape.

2.6 AREAS OF GEOLOGICAL SIGNIFICANCE

No karsts, caves, crevices or cliffs or other areas of geological significance occur in or adjacent to the development site.

2.7 SITE CONTEXT COMPONENTS

Method applied

The proposal conforms to the definition of a *site-based development* under the Biodiversity Assessment Methodology. The site-based development assessment methodology has been used in this BAM assessment.

Percent Native Vegetation Cover

The Percent Native Vegetation Cover within the 1500 m buffer area surrounding the development site prior to the development was calculated to be 26.4%. This was entered into the BAM calculator for the proposal.

This Percent Native Vegetation was calculated by estimating the area of native vegetation (woody and non-woody) within the 1500 buffer area. Areas of native vegetation were calculated using GIS mapping, aerial photography and surveys of the surrounding area. The total area of the 1500m buffer area is 827.2ha. The area of native vegetation within the buffer area is estimated to be 218.4ha. This puts the native vegetation cover class to be in the 10-30% class.

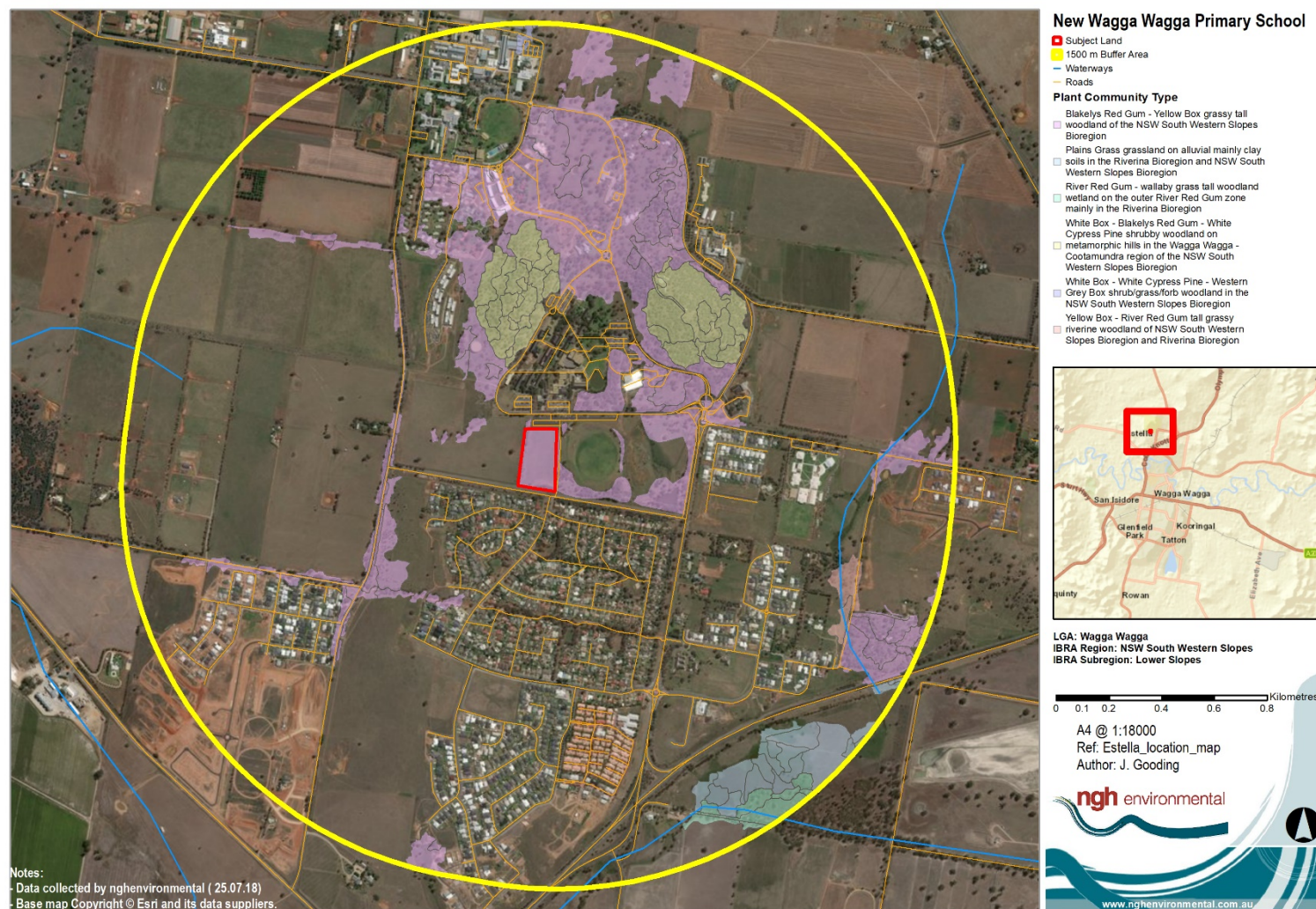


Figure 2-1 Location map

3 NATIVE VEGETATION

3.1 NATIVE VEGETATION EXTENT

Approximately 3.1 ha of native vegetation occurs within the development site (Figure 3-1). This is comprised of:

- 0.94 ha of planted native vegetation on the Eastern, Southern and Western Boundary.
- 2.15 ha of native grassland comprising the rest of the development site.

The entire study area is considered to comprise Native Vegetation. Under the Biodiversity Conservation Act, Native Vegetation is considered any plant that is native to NSW and includes planted vegetation.



Figure 3-1 Native vegetation extent within the development site

3.2 PLANT COMMUNITY TYPES (PCTS)

3.2.1 Methods to assess PCTs

Review of existing information

A search was undertaken of the OEH BioNet Vegetation Information System (BioNET VIS) database and the NSW Seed Mapping Portal to access existing vegetation mapping information within the development site. Two relevant existing vegetation maps provided information on the surrounding area. These were;

- Riverina Regional Native Vegetation Map_ VIS_ID4469
- NSW Government Seed Mapping Portal

These two data sources showed the development site mapped as non-native vegetation. Patches of native vegetation are mapped surrounding the site to the north and east. These surrounding Plant Community Types (PCTs) are:

- PCT 277: Blakely's Red Gum – Yellow Box Grassy tall woodland of the NSW South Western Slopes Bioregion
- PCT 346: White Box – Blakely's Red Gum – White Cypress Pine shrubby woodland on metamorphic hills in the Wagga Wagga – Cootamundra region of the NSW South Western Slopes Bioregion.

PCT277 is the dominant vegetation type with 132 ha occurring in the 1500m buffer area. PCT 346 occurs on the rocky hills within the grounds of Charles Sturt University.

Floristic survey

A site overview was undertaken on the 25th July 2018. The entire subject land was surveyed by two ecologists. The aim of the survey was to confirm the PCT's present in the development site, along with their condition and extent. Random meander searches were conducted to gain an overview of the plant species present and determine variation within vegetation types. 400m² (20m by 20m) floristic plots were undertaken in areas of native vegetation to gain a comprehensive plant list. PCT's were identified using the BioNet VIS, based on the native species present, landform, physiography and location in the IBRA subregion. The PCTs were then stratified into areas of similar condition class to determine vegetation zones for each PCT.

Further detailed floristic surveys were undertaken on the 5th October 2018 by two ecologists. The surveys were undertaken using the methodology presented in the BAM (2017). The required number of vegetation integrity plots of 20m by 50m were established in each vegetation zone. Data was collected on the composition, structure and function of the vegetation. Personnel undertaking the field work have been trained in the BAM and were directed by persons accredited under the BAM (Appendix A).

3.2.2 PCTs identified on the development site

One PCT was identified on the development site, PCT 277 – Blakely's Red Gum – Yellow Box Grassy Tall Woodland of the NSW South Western Slopes Bioregion.

PCT 277 – Blakely’s Red Gum – Yellow Box grassy tall woodland of the NSW South Western Slopes Bioregion		
Vegetation formation	Grassy Woodlands	
Vegetation class	Western Slopes Grassy Woodlands	
Vegetation type	PCT ID	277
	Common Community Name	Blakely’s Red Gum – Yellow Box grassy tall woodland
Approximate extent within the development site	3.1 ha with 0.94 ha comprised of planted vegetation and 2.15 ha comprised of a derived native grassland.	
Species relied upon for PCT identification	Species name	Relative abundance
	Yellow Box (<i>Eucalyptus melliodora</i>)	0 -20% cover
	Red Grass (<i>Bothriochloa macra</i>)	30-60% cover
	Spear Grass (<i>Austrostipa scabra</i>)	0-20% cover
	Native Wheat Grass (<i>Elymus scaber</i>)	0.1% cover
	Snow Grass (<i>Poa sieberiana</i>)	0.1% cover
Justification of evidence used to identify the PCT	The vegetation has been cleared in the past and very little remnant vegetation remains. One mature Yellow Box remains on the development site but it is unclear whether this has been planted in the past. PCT277 is widespread in the locality and the dominant vegetation type mapped in the locality. The planted vegetation is comprised of species that would occur in this community such as Yellow Box, Blakely’s Red Gum and Silver Wattle. The understory grasses, Red Grass, Spear Grass and Native Wheat Grass are also typical of this community. The gentle slope of the landform and clay soils are also consistent with the PCT. Based on these factors, PCT 277 is considered the best fit for the planted vegetation and native grassland.	
TEC Status	PCT277 can form part of the Endangered Ecological Community (EEC) - White Box Yellow Box Blakely’s Red Gum Woodland. The planted vegetation along the Eastern and Southern boundary are comprised of native species that are characteristic to the EEC and these areas are considered to form part of the Endangered community. However, the planted vegetation along the Western Boundary is comprised of planted species that are not representative of the community such as Cootamundra Wattle and White Cedar and this area is not considered to form part of the EEC. The grassland vegetation is partially intact with native grasses and comprises the EEC although in a degraded state.	
Estimate of percent cleared	94%	

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

Examples



Figure 3-2 Example of PCT 277_ Derived Grassland



Figure 3-3 Example of PCT277_ Planted Vegetation

3.3 VEGETATION INTEGRITY ASSESSMENT

3.3.1 Vegetation zones and survey effort

The random meander, overview inspection and detailed floristic plots have been used to assist the delineation of zones. One PCT was identified in the development site. This PCT was stratified into three zones based on the condition and structure of the vegetation (Table 3-1).

Six vegetation integrity plots were conducted throughout the three zones. The number of floristic plots undertaken in each zone was in line with the minimum plot requirements per zone area as specified in the BAM (2017). Additional plots were undertaken in Zone 1 and Zone 3 to sample minor variation throughout the zones.

Table 3-1 Vegetation zones for the development footprint

Zone ID	PCT ID	Condition	Zone area (ha)	Survey effort (# plots)	Patch size (ha)
1	277	Derived Grassland_ Low This zone is characterised by a derived native grassland dominated by Red Grass (<i>Bothriochloa macra</i>). This species provides greater than 50% vegetation foliage cover however very few other native species are present. Exotic annual grasses and forbs such as Soft Brome (<i>*Bromus hordeaceus</i>), Witchgrass (<i>*Panicum spp.</i>), Clover (<i>*Trifolium spp</i>) are also present. Isolated juvenile Yellow Box trees (<i>Eucalyptus melliodora</i>) are regenerating throughout the grassland.	1.96	2	2
2	277	Derived Grassland_ Moderate A derived native grassland with a mix of native grasses and forbs such as Wallaby Grass (<i>Rytidosperma spp.</i>), Speargrass (<i>Austrostipa scabra</i>) and Fuzzweed (<i>Vittadinia sp.</i>). A few juvenile Yellow Box trees (<i>Eucalyptus melliodora</i>) are regenerating throughout the patch.	0.18	1	2
3	277	Planted Vegetation_mature Two planted tree lots occur along the Western and southern boundary of the site. These trees are 20 – 40 years in age and comprised of planted Yellow Box and Red Box (<i>Eucalyptus polyanthemos</i>). Scattered shrubs of Cootamundra wattle (<i>Acacia baileyana</i>) and Western Silver Wattle (<i>Acacia decora</i>) are also present.	0.53	2	130
4	277	Planted Vegetation_Juvenile One planted tree lot occurs on the Eastern boundary of the site. These trees are less than 10 years in age and comprised of a diverse mix of trees and shrubs such as Yellow Box, Blakely's Rd Gum (<i>Eucalyptus blakelyi</i>), White Cypress Pine (<i>Callitris glaucophylla</i>), Kurrajong (<i>Brachychiton populneus</i>), Silver Wattle (<i>Acacia dealbata</i>) and Sticky Hop-bush (<i>Dodonaea viscosa</i>).	0.41	1	130

3.3.2 Vegetation integrity assessment results.

62 plant species were identified within the 6 vegetation integrity survey plots comprising 32 native species and 30 exotic species. The results of the plot field data and photos of each plot can be found in Appendix A and Appendix B.

The plot data from the vegetation integrity survey plots were entered into the BAM calculator by accredited assessor (Julie Gooding- BAAS18074). The results of the vegetation integrity assessment are summarised in Table 3-2 for the vegetation zones that are impacted.

Table 3-2 Table of current vegetation integrity scores for each vegetation zone within the development site.

Zone ID	Condition	Composition score	Structure score	Function score	Vegetation Integrity Score
1	PCT 277: Derived Grassland_low	6.4	54.7	1.1	7.3
2	PCT 277: Derived Grassland_moderate	30.4	54.8	10.7	25.2
3	PCT 277: Planted Vegetation_Mature	20.7	60.4	43.6	37.9
4	PCT 277: Planted Vegetation_Juvenile	35.2	60.4	80.7	49.9

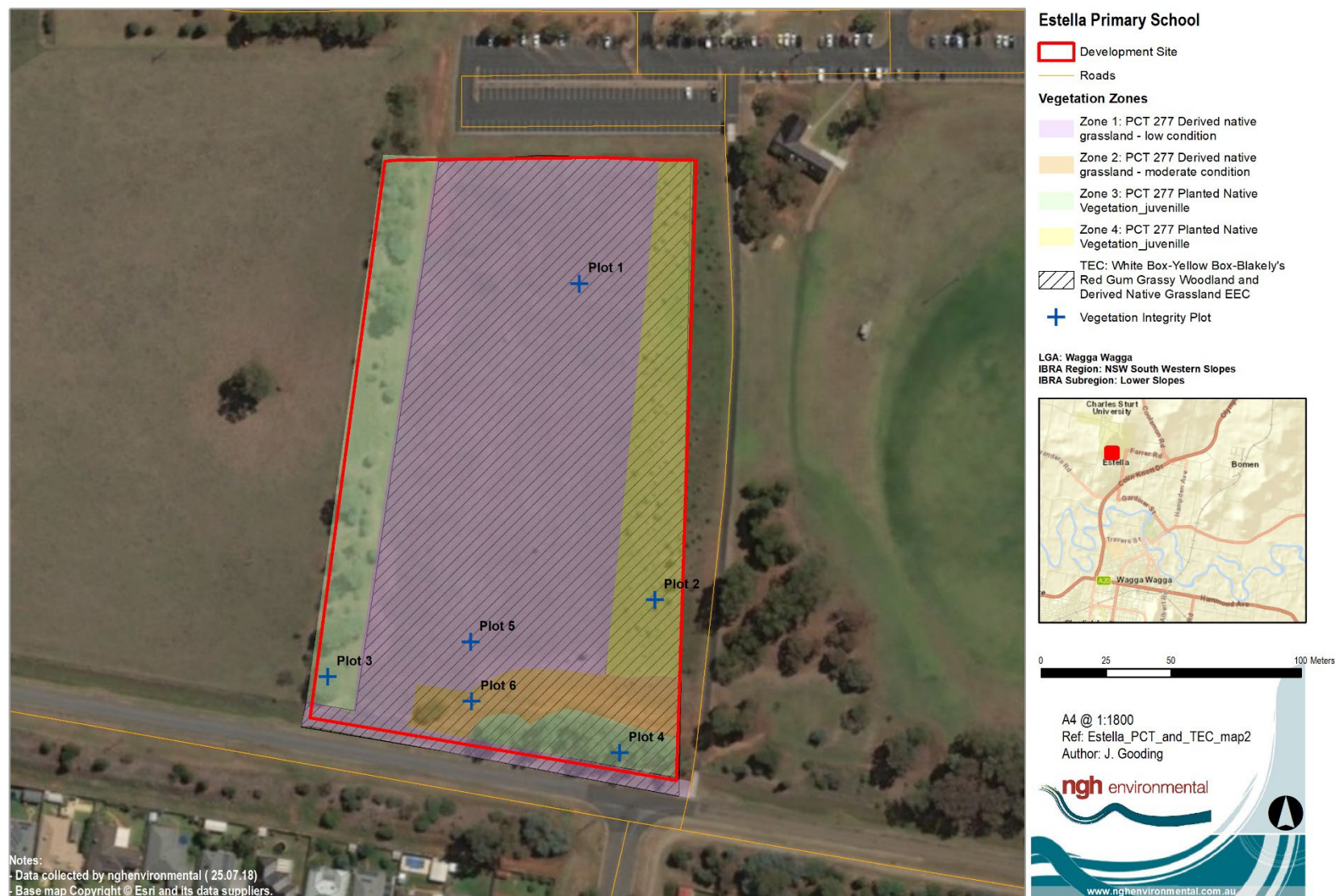


Figure 3-4 Vegetation zones in the development site

4 THREATENED SPECIES

4.1 ECOSYSTEM CREDIT SPECIES

The following ecosystem credit species were returned by the calculator as being associated with the PCT present in the development site (Table 4-1). These species are assumed to occur on site and contribute to ecosystem credits. The Superb Parrot was observed on site during the field surveys.

Table 4-1 Ecosystem Credit Species

Ecosystem credit species	Vegetation type(s)	NSW Listing Status	National Listing Status
<i>Anthochaera phrygia</i> Regent Honeyeater	PCT277-Blakely's Red Gum - Yellow Box grassy tall woodland of the NSW South Western Slopes Bioregion	Critically Endangered	Critically Endangered
<i>Artamus cyanopterus cyanopterus</i> Dusky Woodswallow	PCT277-Blakely's Red Gum - Yellow Box grassy tall woodland of the NSW South Western Slopes Bioregion	Vulnerable	Not listed
<i>Callocephalon fimbriatum</i> Gang-gang Cockatoo	PCT277-Blakely's Red Gum - Yellow Box grassy tall woodland of the NSW South Western Slopes Bioregion	Vulnerable	Not listed
<i>Chthonicola sagittata</i> Speckled Warbler	PCT277-Blakely's Red Gum - Yellow Box grassy tall woodland of the NSW South Western Slopes Bioregion	Vulnerable	Not listed
<i>Circus assimilis</i> Spotted Harrier	PCT277-Blakely's Red Gum - Yellow Box grassy tall woodland of the NSW South Western Slopes Bioregion	Vulnerable	Not listed
<i>Climacteris picumnus victoriae</i> Brown Treecreeper	PCT277-Blakely's Red Gum - Yellow Box grassy tall woodland of the NSW South Western Slopes Bioregion	Vulnerable	Not listed
<i>Daphoenositta chrysoptera</i> Varied Sittella	PCT277-Blakely's Red Gum - Yellow Box grassy tall woodland of the NSW South Western Slopes Bioregion	Vulnerable	Not listed
<i>Dasyurus maculatus</i> Spotted-tailed Quoll	PCT277-Blakely's Red Gum - Yellow Box grassy tall woodland of the NSW South Western Slopes Bioregion	Vulnerable	Endangered
<i>Glossopsitta pusilla</i> Little Lorikeet	PCT277-Blakely's Red Gum - Yellow Box grassy tall woodland of the NSW South Western Slopes Bioregion	Vulnerable	Not listed
<i>Haliaeetus leucogaster</i> White-bellied Sea-Eagle	PCT277-Blakely's Red Gum - Yellow Box grassy tall woodland of the NSW South Western Slopes Bioregion	Vulnerable	Not listed

Ecosystem species	credit	Vegetation type(s)	NSW Listing Status	National Listing Status
<i>Hieraaetus morphnoides</i> Little Eagle		PCT277-Blakely's Red Gum - Yellow Box grassy tall woodland of the NSW South Western Slopes Bioregion	Vulnerable	Not listed
<i>Lathamus discolor</i> Swift Parrot		PCT277-Blakely's Red Gum - Yellow Box grassy tall woodland of the NSW South Western Slopes Bioregion	Endangered	Critically Endangered
<i>Lophochroa leadbeateri</i> Major Mitchell's Cockatoo		PCT 796-Derived grassland of the NSW South Western Slopes	Vulnerable	Not listed
<i>Lophoictinia isura</i> Square-tailed Kite		PCT277-Blakely's Red Gum - Yellow Box grassy tall woodland of the NSW South Western Slopes Bioregion	Vulnerable	Not listed
<i>Melanodryas cucullata cucullata</i> Hooded Robin (south-eastern form)		PCT277-Blakely's Red Gum - Yellow Box grassy tall woodland of the NSW South Western Slopes Bioregion	Vulnerable	Not listed
<i>Melithreptus gularis</i> Black-chinned Honeyeater		PCT277-Blakely's Red Gum - Yellow Box grassy tall woodland of the NSW South Western Slopes Bioregion	Vulnerable	Not listed
<i>Neophema pulchella</i> Turquoise Parrot		PCT277-Blakely's Red Gum - Yellow Box grassy tall woodland of the NSW South Western Slopes Bioregion	Vulnerable	Not listed
<i>Ninox connivens</i> Barking Owl		PCT277-Blakely's Red Gum - Yellow Box grassy tall woodland of the NSW South Western Slopes Bioregion	Vulnerable	Not listed
<i>Petroica boodang</i> Scarlet Robin		PCT277-Blakely's Red Gum - Yellow Box grassy tall woodland of the NSW South Western Slopes Bioregion	Vulnerable	Not listed
<i>Petroica phoenicea</i> Flame Robin		PCT277-Blakely's Red Gum - Yellow Box grassy tall woodland of the NSW South Western Slopes Bioregion	Vulnerable	Not listed
<i>Phascolarctos cinereus</i> Koala (Foraging)		PCT277-Blakely's Red Gum - Yellow Box grassy tall woodland of the NSW South Western Slopes Bioregion	Vulnerable	Vulnerable
<i>Polytelis swainsonii</i> Superb Parrot		PCT277-Blakely's Red Gum - Yellow Box grassy tall woodland of the NSW South Western Slopes Bioregion	Vulnerable	Vulnerable
<i>Pomatostomus temporalis temporalis</i> Grey-crowned Babbler (eastern subspecies)		PCT277-Blakely's Red Gum - Yellow Box grassy tall woodland of the NSW South Western Slopes Bioregion	Vulnerable	Not listed

Ecosystem species	credit	Vegetation type(s)	NSW Listing Status	National Listing Status
<i>Pteropus poliocephalus</i> Grey-headed Flying fox		PCT277-Blakely's Red Gum - Yellow Box grassy tall woodland of the NSW South Western Slopes Bioregion	Vulnerable	Vulnerable
<i>Saccolaimus flaviventris</i> Yellow-bellied Sheath-tail-bat		PCT277-Blakely's Red Gum - Yellow Box grassy tall woodland of the NSW South Western Slopes Bioregion	Vulnerable	Not listed
<i>Stagonopleura guttata</i> Diamond Firetail		PCT277-Blakely's Red Gum - Yellow Box grassy tall woodland of the NSW South Western Slopes Bioregion	Vulnerable	Not listed
<i>Tyto novaehollandiae</i> Masked Owl		PCT277-Blakely's Red Gum - Yellow Box grassy tall woodland of the NSW South Western Slopes Bioregion	Vulnerable	Not listed

4.1.1 Species excluded from the assessment

The painted honeyeater (*Grantiella picta*) was excluded from the ecosystems credit species as Mistletoes are not at a density greater than five mistletoes per hectare in the development site.

4.2 SPECIES CREDIT SPECIES

4.2.1 Candidate species to be assessed

The BAM Calculator predicted the following species credit species to occur at the development site.

Table 4-2 Candidate species credit species requiring assessment

Species Credit Species	Habitat components and geographic restrictions	Sensitivity to gain class	NSW listing status	National listing status
Fauna				
Barking Owl <i>Ninox connivens</i> (Breeding)	Woodland and open forest, including fragmented remnants and partly cleared farmland. Known in subregion.	High	Vulnerable	Not listed
Bush Stone-curlew <i>Burhinus grallarius</i>	Open forests and woodlands with a sparse, grassy ground layer and fallen timber. Known in subregion.	High	Endangered	Not listed
Eastern Pygmy Possum <i>Cercartetus nanus</i>	Broad range of habitat from rainforest through sclerophyll forest and	High	Vulnerable	Not listed

Species Credit Species	Habitat components and geographic restrictions	Sensitivity to gain class	NSW listing status	National listing status
	woodland to heath, but in most areas woodlands and heath preferred. Known in subregion.			
Gang-gang Cockatoo <i>Callocephalon fimbriatum</i> (Breeding)	In spring and summer, tall mountain forests and woodlands, particularly in heavily timbered and mature wet sclerophyll forests. In autumn and winter, lower altitudes in drier, more open eucalypt forests and woodlands, particularly box-gum and box-ironbark assemblages. Known in subregion.	High (breeding) / Moderate (foraging)	Vulnerable	Not listed
Grey-headed Flying-fox <i>Pteropus poliocephalus</i>	Range of vegetation communities including rainforest, open forest, and closed and open woodland. Roost sites usually near water, including lakes, rivers, and coastlines. Known to roost in locality.	High	Vulnerable	Vulnerable
Koala <i>Phascolarctos cinereus</i>	Temperate, subtropical and tropical eucalypt woodlands and forests where suitable food trees grow, of which there are more than 70 eucalypt species and 30 non-eucalypt species that are particularly abundant on fertile clay soils. Known in subregion.	High	Vulnerable	Vulnerable
Little Eagle <i>Hieraaetus morphnoides</i>	Open eucalypt forest, woodland, or open woodland, and Sheoak or Acacia woodlands and riparian woodlands in interior NSW, where they nest in tall living trees within a remnant patch. Known in subregion.	Moderate	Vulnerable	Not listed

Species Credit Species	Habitat components and geographic restrictions	Sensitivity to gain class	NSW listing status	National listing status
Masked Owl <i>Tyto novaehollandiae</i> (Breeding)	Dry eucalypt forests and woodlands from sea levels to 1100 m. Hunts along the edges of forests, including roadsides. Known in subregion.	High	Vulnerable	Not listed
Regent Honeyeater <i>Anthochaera phrygia</i>	Temperate woodlands and open forests of the inland slopes of south-east Australia, in particular dry open forest, woodland, Box-Ironbark woodland, and riparian forests of River Sheoak.	High	Critically Endangered	Critically Endangered
Square-tailed Kite <i>Lophoictinia isura</i>	Timbered habitats including dry woodlands and open forests, particularly timbered watercourses. Known in subregion.	Moderate	Vulnerable	Not listed
Squirrel Glider <i>Petaurus norfolcensis</i>	Old growth box, box-ironbark woodlands, and River Red Gum forests west of the Great Dividing Range. Abundant tree hollows required for refuge and nesting. Known in subregion.	High	Vulnerable	Not listed
Superb Parrot <i>Polytelis swainsonii</i> (Breeding)	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. polyanthemus</i> with hollows greater than 5cm diameter; greater than 4m above ground or trees with a DBH of greater than 30cm.	High	Vulnerable	Vulnerable
Swift Parrot <i>Lathamus discolor</i>	On the coast and southwest slopes in areas with abundant flowering eucalypts or lerp. Feed trees include winter flowering species such as Swamp	Moderate	Endangered	Critically Endangered

Species Credit Species	Habitat components and geographic restrictions	Sensitivity to gain class	NSW listing status	National listing status
	Mahogany, Spotted Gum, Red Bloodwood, Mugga Ironbark, and White Box. Known in subregion.			
White-bellied Sea-eagle <i>Haliaeetus leucogaster</i>	Large areas of open water including larger rivers, swamps, lakes, and the sea. Coastal dunes, tidal flats, grassland, heathland, woodland, and forest. Breeding habitat mature tall open forest, open forest, tall woodland, and swamp sclerophyll forest close to foraging habitat. Known in subregion.	High	Vulnerable	Not listed
Flora				
Ausfeld's Wattle <i>Acacia ausfeldii</i>	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.	High	Vulnerable	Not listed
Small Scurf-pea <i>Cullen parvum</i>	Grassland, River Red Gum 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 between 450 and 700 mm.	High	Endangered	Not listed
Small Purple-pea <i>Swainsona recta</i>	Predominantly grassy woodlands, but sometimes extends into grassy open forest, usually with tree cover including Blakely's Red Gum, Yellow Box, and White Box.	High	Endangered	Endangered
Silky Swainson-pea <i>Swainsona sericea</i>	Box-gum woodland in southern tablelands and South West Slopes. Sometimes in	High	Vulnerable	Not listed

Species Credit Species	Habitat components and geographic restrictions	Sensitivity to gain class	NSW listing status	National listing status
	association with cypress pines.			

4.2.2 Exclusions based on habitat features

The following species credit species have been excluded from further assessment based on the habitat features present at the development site.

Table 4-3 Species credit species included and excluded based on habitat features

Species Credit Species	Habitat constraints	Included or excluded	Reason for inclusion or exclusion
Fauna			
Pink-tailed Legless Lizard <i>Aprasia parapulchella</i>	Rocky areas or within 50m of rocky areas	Excluded	No Rocky areas within development site and development site not within 50m of rocky areas.
Large-eared Pied Bat <i>Chalinolobus dwyeri</i>	Cliffs or within 2km of rocky areas containing caves, overhangs, escarpments, outcrops or crevices or within 2km of old mines or tunnels	Excluded	No Cliffs within development site and development not within 2km of areas containing cliffs, caves or mines.
Gang-gang Cockatoo (Breeding) <i>Callocephalon fimbriatum</i>	Breeding constraint – Hollow Bearing Trees	Excluded	No hollow bearing trees in development site
Superb Parrot (Breeding) <i>Polytelis swainsonii</i>	Breeding constraint – Hollow Bearing Trees	Excluded	No hollow bearing trees in development site
Regent Honeyeater (Breeding) <i>Anthochaera phrygia</i>	Breeding constraint – Mapped Important Areas	Excluded	Development site not within a mapped important area (OEH, 2018)
Swift Parrot <i>Lathamus discolor</i>	Mapped Important Areas	Excluded	Development site not within a mapped important area (OEH, 2018)

4.2.3 Candidate species requiring confirmation of presence or absence

The species listed in Table 4-5 are those that are considered to have habitats present at the development site. Surveys were conducted for these species and the results are summarised in Table 4-5. Details of the survey methodologies and results are provided for each surveyed species below. Targeted survey locations are mapped on Figure 4-1.

Table 4-4 Summary of species credit species surveyed at the development site

Species Credit Species	Biodiversity risk weighting	Assumed to occur/survey/ expert report	Present on site?	Species polygon area or count
Fauna				
Barking Owl <i>Ninox connivens</i>	2.00	Surveyed August 2018	No	n/a
Bush Stone-curlew <i>Burhinus grallarius</i>	2.00	Surveyed August 2018	No	n/a
Eastern Pygmy Possum <i>Cercartetus nanus</i>	2.00	Surveyed December 2018	No	n/a
Gang-gang Cockatoo <i>Callocephalon fimbriatum</i>	2.00	Surveyed October 2018	No	n/a
Grey-headed Flying-fox <i>Pteropus poliocephalus</i>	2.00	Surveyed August 2018	No	n/a
Koala <i>Phascolarctos cinereus</i>	2.00	Surveyed August 2018	No	n/a
Little Eagle <i>Hieraaetus morphnoides</i>	1.50	Surveyed October 2018	No	n/a
Masked Owl <i>Tyto novaehollandiae</i>	2.00	Surveyed August 2018	No	n/a
Regent Honeyeater <i>Anthochaera phrygia</i>	3.00	Surveyed October 2018	No – development site not within mapped important areas	n/a
Square-tailed Kite <i>Lophoictinia isura</i>	1.50	Surveyed October 2018	No	n/a
Squirrel Glider <i>Petaurus norfolcensis</i>	2.00	Surveyed August 2018	No	n/a
Superb Parrot <i>Polytelis swainsonii</i>	2.00	Surveyed October 2018	Yes – however no HBT present on site	No breeding habitat present
Swift Parrot <i>Lathamus discolor</i>	3.00	Surveyed July 2018	No – development site not within mapped important areas	n/a
White-bellied Sea-eagle <i>Haliaeetus leucogaster</i>	2.00	Surveyed October 2018	No	n/a

Species Credit Species	Biodiversity risk weighting	Assumed to occur/survey/ expert report	Present on site?	Species polygon area or count
Flora				
Ausfeld's Wattle <i>Acacia ausfeldii</i>	2.00	Surveyed October 2018	No	n/a
Silky Swainson-pea <i>Swainsona sericea</i>	2.00	Surveyed October 2018	No	n/a
Small Purple-pea <i>Swainsona recta</i>	2.00	Surveyed October 2018	No	n/a
Small Scurf-pea <i>Cullen parvum</i>	2.00	Surveyed December 2018	No	n/a

Nocturnal Mammals (Koala, Squirrel Glider, Grey-headed Flying Fox, Eastern Pygmy Possum)

SURVEY EFFORT

Targeted spotlighting surveys were undertaken on the evenings of the 28th & 31st August 2018 and 4th & 5th December 2018 by two consultants for a total of approximately one and a half hours each night. A 100-watt spotlight was used in foot surveys within planted vegetation and isolated paddock trees

SURVEY RESULTS

No Koalas, Squirrel Gliders, Grey-headed Flying Fox's or Eastern Pygmy Possum's were observed during the surveys and they are not considered to occur within the development site.

Nocturnal Birds (Masked Owl, Barking Owl and Bush-stone Curlew)

SURVEY EFFORT

Targeted spotlighting surveys were undertaken on the evenings of the 28th & 31st August 2018 by two ecologists for a total of approximately one and a half hours each night. A 100-watt spotlight was used in foot surveys within planted vegetation and isolated paddock trees. Call playback of the Masked Owl, Barking Owl, and Bush Stone-curlew was undertaken at two separate locations within the development site at the locations shown in Figure 4-1. Call playback was undertaken for a period of 5 minutes with a ten-minute listening period following.

SURVEY RESULTS

No Masked Owls, Barking Owls or Bush-stone Curlews were observed or vocalisations heard during the site surveys and they are not considered to occur on the development site.

Diurnal Birds (Little Eagle, White-bellied Sea Eagle, Square-tailed Kite, Regent Honeyeater, Gang-gang Cockatoo, Superb Parrot, Major Mitchell Cockatoo)

SURVEY EFFORT

A bird census was completed on the 25th July 2018 and 5th October 2018. Two 20-minute point surveys for birds were carried out, as well as opportunistic surveys throughout the site visit including traversing the site on foot.

Targeted surveys for the Swift Parrot were undertaken on the 25th July 2018. Two 20-minute point surveys were undertaken where suitable foraging habitat for the Swift Parrot could occur.

Targeted Hollow Bearing Trees surveys were carried out on the 5th October 2018 to identify trees with suitable hollows that may be used by the Superb Parrot or Major Mitchell Cockatoo. All trees were surveyed for the presence of hollows. No hollow bearing trees were identified within the development site.

Surveys of the trees were undertaken to determine presence of large stick nests that would be used by breeding raptors.

SURVEY RESULTS

Sightings of two Superb Parrots were seen on the 28th August, 2018. No other sightings of threatened birds were seen.

No hollow bearing trees were identified within the development site. All trees are less than approximately 40 years old and are not mature enough to develop hollows. With the absence of hollows, it is unlikely any breeding population of Superb Parrots or Major Mitchell Cockatoos could occur in the development site.

No large stick nests were observed in the development site. One Magpie Nest was detected in the plantings in the southern boundary and one thornbill nest was detected in an Acacia shrub in the plantings in the Western Boundary. The absence of stick nests indicates that is unlikely any raptors, Little Eagle, White-bellied Sea Eagle and Square-tailed Kite could occur in the development sit.

The development site does not fall within a mapped important area for the Swift Parrot and Regent Honeyeater (OEH, 2018) and these species are not considered to occur within the development site.

A full list of bird species observed during the surveys are shown in Appendix C.

Threatened peas (Small Purple Pea, Silky Swainson-pea, Small Scurf-pea)

SURVEY EFFORT

Suitable habitat for these species occur in the grassland areas and planted vegetation. Targeted searches for these species were undertaken on the 5th October 2018 and 4th December 2018 for a period of approximately 2 hours. Areas of suitable habitat within the development footprint were surveyed using the parallel field traverse survey technique in the accordance with the NSW Guide to Surveying Threatened Plants (OEH, 2016).

SURVEY RESULTS

No threatened flora were detected within the survey area. They are not considered to occur within the development site.

Threatened Shrubs (Ausfeld's Wattle)

SURVEY EFFORT

Suitable habitat for this species could occur in areas of planted vegetation. Surveys were undertaken for these species on the 5th October 2017 within the planted vegetation areas. Along the eastern boundary of the development site there is a diverse mix of trees and shrubs. Along the western and southern boundary there are a few native shrubs not local to the area.

SURVEY RESULTS

The threatened shrubs were not detected during the site surveys. Although a number of understory shrubs occurred within the planted vegetation in the development site. It is considered unlikely that the species would have been overlooked if present and they are not considered to occur within the development site.

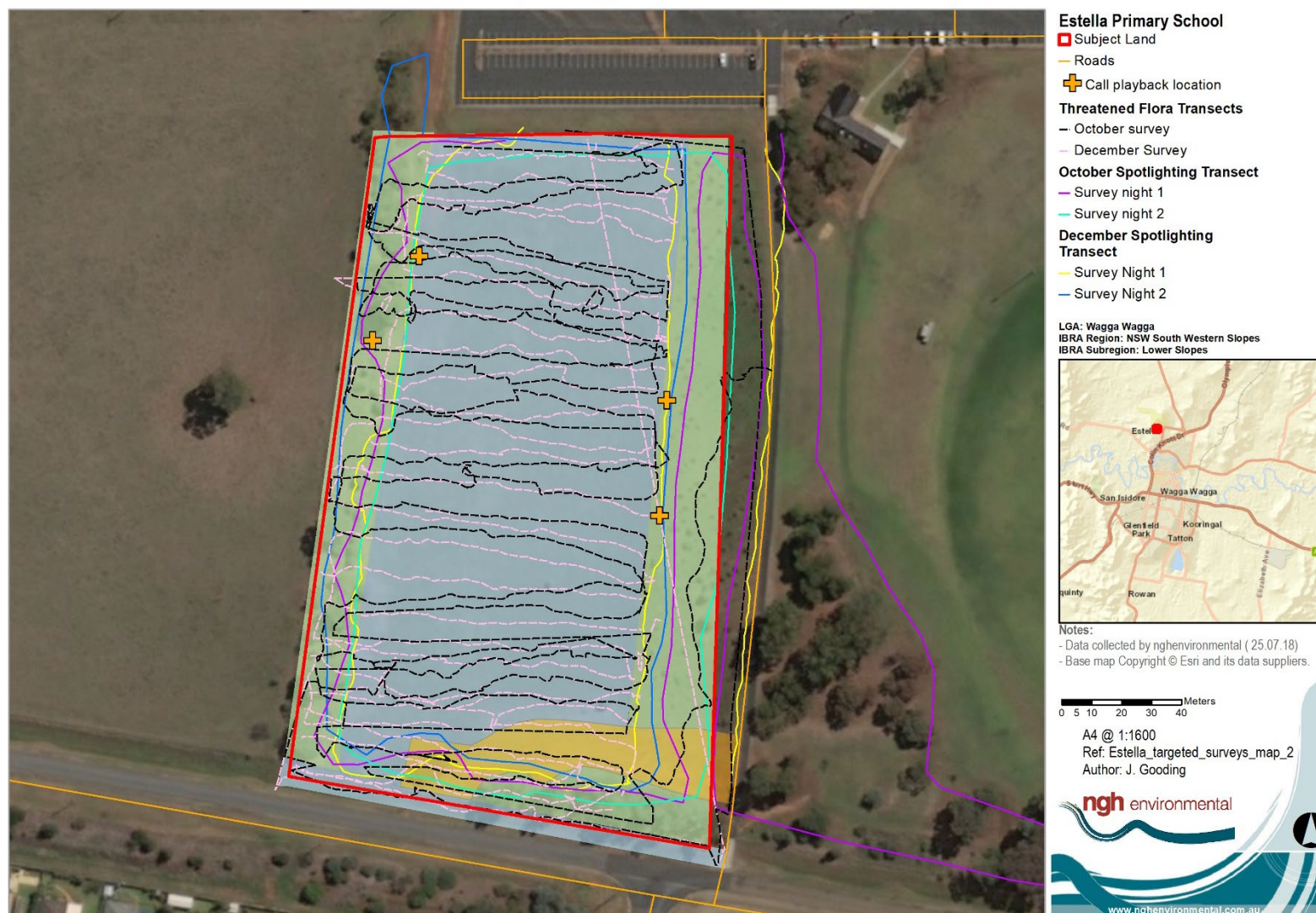


Figure 4-1 Targeted survey locations

4.3 ADDITIONAL HABITAT FEATURES RELEVANT TO PRESCRIBED BIODIVERSITY IMPACTS

4.3.1 Occurrences of karst, caves, crevices and cliffs

No karsts, caves, crevices and cliffs occur within the development site.

4.3.2 Occurrences of rock

No surface rocks or rocky outcrops occur within the development site

4.3.3 Occurrences of human made structures and non-native vegetation

No human made structures that could be utilised by threatened species occur within the development site.

All vegetation within the development site is considered native vegetation and no areas of non-native vegetation occur in the development site.

4.3.4 Hydrological processes that sustain and interact with the rivers, streams and wetlands

The development site is located on lower slopes. No rivers, streams or wetlands occur within or adjacent to the development site. The nearest natural water course is Dukes Creek, 1.35 km south-east of the site, and an unnamed drainage line off Dukes Creek, 1.1km east of the development site.

There are two small dams located approximately 200 m north-east and 415 m east of the development site. These dams would not be impacted by the development.

5 MATTERS OF NATIONAL ENVIRONMENTAL SIGNIFICANCE

An EPBC protected matters database search was undertaken on the 25th October 2019 (10km buffer of the development site) to identify Matters of National Environmental Significance (MNES) that have the potential to occur within the development site (refer to Appendix E) Relevant to Biodiversity these include:

- Wetlands of International Importance
- Threatened Ecological Communities
- Threatened species
- Migratory species

The potential for these MNES to occur at the site are discussed below.

5.1 WETLANDS OF INTERNATIONAL IMPORTANCE

Four wetlands of international importance were returned from the protected matters report. All wetlands returned from the search are over 400km away and are not connected to the proposal site. The nearest of these (400 – 500 km upstream) is Hattah-Kulkyne Lakes. Hattah-Kulkyne Lakes are around 500 km west of the development site. It is fed by the Murray River. There is no apparent connectivity between the development site and the Murray River. All other wetlands returned from the search are over 500 km away.

5.2 THREATENED ECOLOGICAL COMMUNITIES

Three threatened ecological communities (TEC's) were identified in the protected matters report. One of these TEC's could potentially occur in the development site based on the presence of remnant Yellow Box and Blakely's Red Gum trees in the surrounding area. This TEC is:

- White Box – Yellow Box – Blakely's Red Gum Grassy Woodland and Derived native grassland
– Critically Endangered

An assessment of whether the vegetation communities within the development site met the condition threshold for each of the EPBC listed communities was undertaken. The derived native grassland and planted vegetation do not meet the condition threshold for the EPBC listed community due to a lack of diversity of native understory species and lack of mature trees within the patch.

5.3 THREATENED SPECIES

Twenty six threatened species were identified in the protected matters report. Of these, six are considered to have the potential to occur in the development site. These are;

- A Spear grass *Austrostipa wakoolica*- Endangered EPBC Act
- Small Purple Pea *Swainsona recta* – Endangered EPBC Act
- Swift Parrot *Lathamus discolor* – Critically Endangered EPBC Act
- Regent Honeyeater *Anthochaera phryga* – Critically Endangered EPBC Act
- Superb Parrot *Polytelis swainsonii* – Vulnerable EPBC Act
- Koala *Phascolarctos cinereus* – Vulnerable EPBC Act

Targeted surveys were undertaken for these species. One of these species, the Superb Parrot was recorded during the site survey. Two Superb Parrots were observed foraging within the canopy of the planted vegetation. No other EPBC listed threatened species were detected during the site survey, however based on the presence of suitable habitat within the development site and nearby records, the Swift Parrot (non-breeding) and Regent Honeyeater (non-breeding) were considered to have the potential to occur within the development site on occasion.

5.4 MIGRATORY SPECIES

Ten listed migratory species were identified in the PMST report. Based on an assessment of habitat and distribution (Appendix F), two of these species could potentially occur in the development site. These are the:

- Fork-tailed Swift
- White-throated Needletail

However, as these species are almost exclusively aerial, they are considered unlikely to rely on the habitats present within the development site.

6 AVOID AND MINIMISE IMPACTS

6.1 AVOIDING AND MINIMISING IMPACTS ON NATIVE VEGETATION AND HABITAT

6.1.1 Site selection – consideration of alternative locations/routes

During the site selection for the new Primary School in Wagga Wagga, a number of alternative locations were considered. SINSW has reviewed the need for a new primary school in many areas within the Wagga Wagga LGA using a GIS (Geographic Information System) model and analysis of the local socio-economic growth of the region.

The proposed site was selected because;

- The land has been previously disturbed from past and current agricultural activities.
- Low ecological constraints (predominantly cleared land with minimal vegetation removal).
- Existing road access.
- It is located within close proximity to the new residential subdivision and would meet the needs of a growing community.
- The development site is not subject to land hazards such as flooding or bush fire and is not known to hold land contamination.
- The proposal is not likely to generate land use conflicts with surrounding land uses.

The development site is considered to be suitable for the proposal

6.1.2 Proposal planning phase – detailed design

A Preliminary Constraints Analysis (PCA) was conducted by NGH Environmental (2018), which informed the proposed site layout design.

Vegetation constituting the highest ecological constraints such as forming components of EECs and providing threatened flora and fauna habitat were avoided and minimised as far as practical by:

- Refining the layout to avoid vegetation clearing of planted vegetation whenever possible, reducing the clearing footprint of the project
- Retaining large and semi-mature trees that will continue to provide habitat for fauna
- Landscaping plans incorporating the existing tree plantings and using the natural environment for nature education areas.
- Making provisions for the landscaping of new plantings and ongoing maintenance of retained native vegetation habitat on the development site.

The final site layout and location has not been able to completely avoid all areas of biodiversity value due to;

- the small area of the development site providing limited scope for movement of buildings or carparks.
- Council requirements for asset protection zones in bushfire prone land (Peterson, 2018)
- Defected trees that may provide a hazard in the school environment. (Ryan, 2019)

The final design footprint is detailed in Figure 6-1.

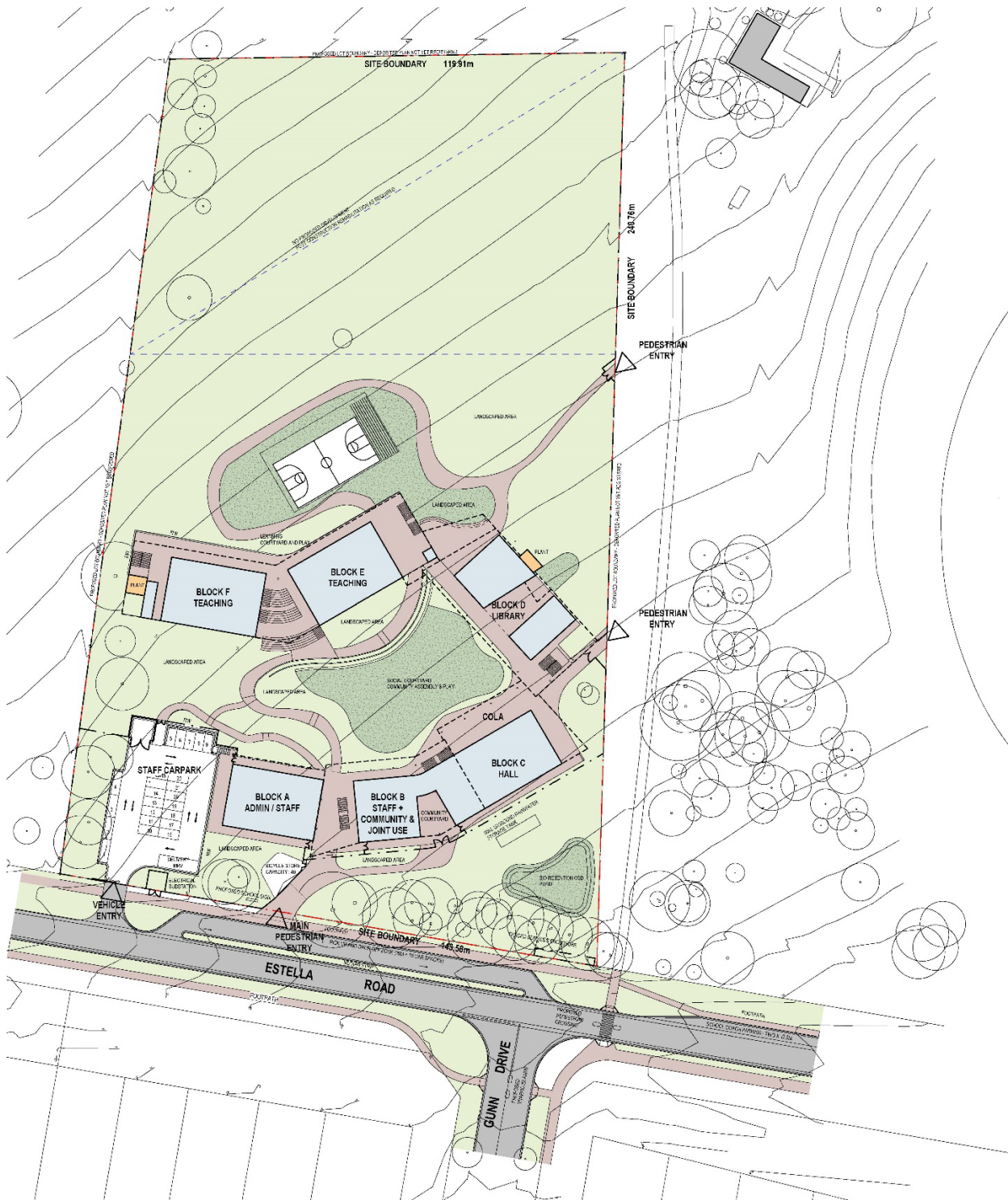


Figure 6-1 Final project design

6.2 AVOIDING AND MINIMISING PRESCRIBED BIODIVERSITY IMPACTS

The BC Regulation (clause 6.1) identifies actions that are prescribed as impacts to be assessed under the biodiversity offsets scheme. The following prescribed impacts are relevant to the proposal:

- Impacts of development on the connectivity on different areas of habitat of threatened species that facilitates the movement of those species across their range.
- Impacts of development on the connectivity on movement of threatened species that maintains their life cycle.
- Impacts of development on water quality, water bodies and hydrological processes that sustain threatened species and threatened ecological communities.
- Impacts of vehicle strikes on threatened species or on animals that are part of a TEC.

How these prescribed impacts have been avoided and minimised by the proposal is detailed below.

6.2.1 Impacts of development on the connectivity of different areas of habitat of threatened species that facilitates the movement of those species across their range.

The development footprint was designed to avoid impacts to native vegetation. A development site was selected that has been cleared in the past. The linear strips of planted vegetation that may provide corridors for movement have been partially avoided by the proposal. The final site layout could not completely avoid all impacts to the planted native vegetation and derived native grassland.

Of 1.90 ha of planted native vegetation within the development site, 0.70 ha would be permanently removed. A total of 1.20 ha of planted native vegetation would be retained within the development site. Landscaping within the schoolgrounds will increase tree cover in the development site. This retained and enhanced vegetation would continue to provide habitat connectivity to surrounding habitat and provide an important refuge for movement across the landscape.

6.2.2 Impacts of development on the connectivity on movement of threatened species that maintains their lifecycle.

As discussed in Section 6.2.2 above, the proposal has been designed to maintain connectivity where possible. This would include migratory species that rely on seasonal movements to maintain their lifecycle.

The development footprint was designed to avoid impacts on areas that may provide breeding habitat for threatened species. A total of 1.20 ha of planted native vegetation would be retained within the development site. Landscaping within the schoolground will increase tree cover in the development site. This area may provide an important refuge for movement across the landscape and would remain with the development site.

6.2.3 Impacts of development on water quality, water bodies and hydrological processes that sustain threatened species and threatened ecological communities.

The development footprint was designed to avoid impacts to any waterbodies or hydrological processes. There are no waterbodies within the development site and thus no direct impacts to threatened species or TECs are considered to occur.

Hydrological processes across the site would not be modified and current drainage across the site would be maintained. Current drainage runs to the stormwater drains along Estella Road. Sediment and erosion and pollution control measures will be put in place to maintain water quality moving outside of the development footprint. No indirect impacts to surrounding dams or the wetlands or rivers downstream are considered likely.

6.2.4 *Impacts of vehicle strikes on threatened species or on animals that are part of a TEC.*

The location of the access roads were chosen as they are already existing roads that are used by trucks and vehicles. As such, the risk of vehicle strike is already present. An increase in vehicle traffic may increase the risk of vehicle strike on threatened species occurring in or near the development site.

No additional roads would be constructed as a result of the proposal. During construction, site management to enforce and reduce site speed limits would minimise impacts of vehicle strikes. During operation, the implementation of school zones with reduced speeds would also minimise impacts of vehicle strikes during school drop-off and pick-up hours.

No barriers to movement would be created that could funnel any threatened species into these transport corridors.

7 IMPACTS UNABLE TO BE AVOIDED

7.1 DIRECT IMPACTS

The construction and operational phases of the proposal has the potential to impact biodiversity values at the site that cannot be avoided. This would occur through direct impacts such as habitat clearance and installation and existence of infrastructure.

Table 7-1 Potential impacts to biodiversity during the construction and operational phases

Nature of impact	Extent	Frequency	Duration and timing	Consequence
Direct impacts				
Habitat clearance for permanent and temporary construction facilities (e.g. Buildings, compound sites, stockpile sites, access tracks)	2.15 ha	One-off	Construction phase: Short-term	• Direct loss of native flora and fauna habitat • Potential over-clearing of habitat outside proposed development footprint • Injury and mortality of fauna during clearing of fauna habitat and habitat trees • Disturbance to stags, fallen timber, and bush rock
Displacement of resident fauna	Unknown	Regular	Construction, operation	• Direct loss of native fauna • Decline in local fauna populations
Injury or death of fauna	Unknown	Regular	Construction	• Direct loss of native fauna • Decline in local fauna populations

7.1.1 Loss of native vegetation

2.15 ha of native vegetation would be impacted by the development. Impacts to Zone 1, Zone 2 and Zone 4 would comprise complete clearing of native vegetation with the construction of buildings, carparks and school grounds.

Only partial clearing of native vegetation would occur in Vegetation Zone 3 (PCT 277_mature planted Vegetation). The majority of the overstory trees would remain within these zones, with only two trees required to be removed. However, as these areas are within the bushfire asset protection zone, smaller shrubs will be removed and will not be allowed to regenerate. Ground cover species will likely be disturbed through the construction and landscaping of the school grounds. As a precautionary approach, complete clearing is assumed for understory and groundcover species in this zone. Future vegetation integrity scores for this zone modelled the anticipated changes to diversity and structure of the management requirements of the asset protection zone. These changes are as follows and shown in Table 7-2;

- the composition of the trees remains the same and the structure of trees reduced by 7.5% to account for clearing of two trees.
- The composition and structure of shrubs were reduced to zero as these would likely all be removed

- The composition and structure for the grasses and forbs were reduced to zero as there would likely be groundcover disturbance.
- Fallen timber was reduced to zero as it would be removed.
- Stem size class and regeneration stems were reduced in value as smaller trees would also be removed for bushfire management.

Table 7-2 Zone 3 change in vegetation Integrity Score

Composition	Tree (#)	Shrub (#)	Grass (#)	Forb (#)	Fern (#)	Other (#)	Final Score
Current composition	1	1	3.5	1	0	0	20.7
Future composition	1	0	0	0	0	0	2.2
Structure	Tree (%)	Shrub (%)	Grass (%)	Forb (%)	Fern (%)	Other (%)	Final Score
Current structure	37.5	15	13.1	0.6	0	0	60.4
Future structure	30	0	0	0	0	0	32.7
Function	Regen	Large Trees (#)	Litter cover (%)	Coarse Woody Debris (m)	Stem size classes (#)	High threat Weed Cover (%)	Final Score
Current function	0.5	0.5	89.6	0.3	3.5	0.6	43.6
Future function	Absent	0.5	20	0	2	0	18.7

A summary of the changes in vegetation integrity scores as a result of clearing are documented for each vegetation zone in Table 7-3 below.

Table 7-3 Table of current and future vegetation integrity scores for each vegetation zone within the development site.

Zone ID	PCT	Impact assumptions (Management Zones)	EEC and/or threatened species habitat?	Impact Area (ha)	Current vegetation Integrity Score	Future vegetation Integrity Score
1	277_Derived Grassland_Low Condition	Total removal of vegetation	White Box Yellow Box Blakely's Red Gum Woodland EEC.	1.29	7.3	0
2	277_Derived Grassland_Moderate Condition	Total removal of vegetation	White Box Yellow Box Blakely's Red Gum Woodland EEC.	0.18	25.2	0
3	277_Planted vegetation_mature	Partial clearing_understory only	N/A	0.37	37.9	11.1

4	277_Planted vegetation_juvenile	Total removal of vegetation	N/A	0.31	49.9	0
			TOTAL:	2.15		

7.1.2 *Loss of species credit species habitat or individuals*

No species credit species were detected in the development site throughout targeted surveys. No loss of species credit species habitat is considered to occur.

7.1.3 *Loss of hollow-bearing trees*

No hollow bearing trees were identified within the development site. All trees within the development site are less than 40yrs old and unlikely to have developed hollows.

7.2 **INDIRECT IMPACTS**

Indirect impacts of the proposal include soil and water contamination, creation of barriers to fauna movement, or the generation of excessive dust, light or noise. Section 9.1.4.2 of the BAM identifies the specific indirect impacts that must be considered. Table 7-4 below details the type, frequency, intensity, duration and consequence of the indirect impacts that may occur as a consequence of the proposal as identified by Section 9.1.4.2 of the BAM. Given the current condition of the site and current land management practices, indirect impacts that are unlikely to occur or be exacerbated as a result of the proposal include:

- Inhibition of nitrogen fixation and increased soil salinity
- Wood collection
- Bush rock removal and disturbance
- Increase in predatory species populations
- Increase in pest animal populations
- Increased risk of fire
- Loss of breeding habitat
- Disturbance to specialist breeding and foraging habitat
- Reduced viability of adjacent habitat due to edge effects
- Reduced viability of adjacent habitats due to noise, dust or light spill
- Increased risk of starvation, exposure and loss of shade or shelter
- Trampling of threatened flora species

Table 7-4 Potential impacts to biodiversity during the construction and operational phases

Nature of impact	Extent	Frequency	Duration and timing	TEC, threatened species and habitats likely to be affected	Consequence for bioregional persistence
Indirect impacts (those listed below are included in the BAM)					
Inadvertent impacts on adjacent habitat or vegetation	Unknown	Rare	Construction Phase: Short-term	White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland EEC	- Direct loss of native flora and fauna habitat - Injury and mortality of fauna during clearing of fauna habitat and habitat trees - Disturbance to stags, fallen timber, and bush rock - Increased edge effects
Transport of weeds and pathogens from the site to adjacent vegetation	Unknown	Irregular	Construction & Operational Phase: Long-term	White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland EEC	- Degradation of White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland EEC through weed encroachment - Minor loss of native flora and fauna habitat. The combined impacts are likely to be minor in nature if they occur at all and would result in a negligible consequence for bioregional persistence
Rubbish dumping	Unknown	Irregular	Construction & Operational	White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland EEC.	Degradation of White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland EEC

7.3 PRESCRIBED IMPACTS

The following prescribed biodiversity impacts are relevant to the proposal:

- Impacts of development on the connectivity of different areas of habitat of threatened species that facilitates the movement of those species across their range
- Impacts of development on the connectivity on movement of threatened species that maintains their life cycle
- Impacts of vehicle strikes on threatened species or on animals that are part of a TEC

These are discussed in detail below and the necessary information required by Section 9.2 of the BAM provided.

7.3.1 *impacts of development on the connectivity of different areas of habitat of threatened species that facilitates the movement of those species across their range*

The development site occurs within a highly cleared landscape and no major connectivity links occur across the site. Linear strips of planted vegetation along the boundary of the development footprint and scattered paddock trees provide moderate quality connectivity for disturbance tolerant species.

Threatened species that are moving across the site would be highly mobile species capable of crossing over large areas of cleared landscapes. The proposal would impact on connectivity through the removal of 0.7 ha of planted Blakely's Red Gum – Yellow Box grassy tall woodland and scattered paddock trees over the 3.1 ha development site

These trees may provide some 'stepping stone' connectivity for highly mobile aerial species such as the Superb Parrot (*Polytelis swainsonii*), Swift Parrot (*Lathamus discolor*), Little Eagle (*Hieraaetus morphnoides*), Gang-gang Cockatoo (*Callocephalon fimbriatum*) and Major Mitchell Cockatoo (*Lophochroa leadbeateri*). These species are capable of flying over cleared areas and their movement across the landscape would unlikely be impeded by the removal of these trees.

Boundary fencing would create a barrier for movement to threatened species that traverse along the ground, such as the Koala. However, no koalas have been recorded within 10 km of the development site in the last 10 years, and the habitat within development area is not considered to be critical to the survival of the koala (refer to Section 7.4.2).

Based on these factors, the proposal is unlikely to have a substantive impact on movement of threatened species across their range.

7.3.2 *impacts of the development on movement of threatened species that maintains their life cycle*

Superb Parrots remain in the Riverina area year-round, where they nest in the hollows of large trees in open box-gum woodland or isolated paddock trees, including Blakely's Red Gum, Yellow Box, Apple Box and Red Box (OEH, 2018).

The development footprint intersects a likely movement corridor for this species along the western, southern and eastern boundary of the development site. Construction would involve the removal of several mature trees along the eastern and western boundary of the development footprint. There would also be some short-term, indirect disturbance associated with construction. The habitat to be removed is not likely to be important to the life cycle of these species, given their high mobility (described in Section 7.3.1) and

the minimal proportion of habitat to be removed. The proposal is therefore not likely to disrupt the movement of these species and would not have a substantive impact on their bioregional persistence.

7.3.3 impacts of development on water quality, water bodies and hydrological processes that sustain threatened species and threatened ecological communities

There are no water bodies within the development footprint. Construction of the proposal would not directly affect surface water quality. Indirectly, the proposed works would involve a range of activities that would disturb soils and potentially lead to sediment laden runoff. Drainage from the site would lead to the stormwater gutters on Estella Rd affecting local waterways such as the Murrumbidgee River during rainfall events. The implementation of erosion and sedimentation control plans during construction would reduce potential impacts to local waterways.

Operation of the proposal would have minimal potential for any impact to surface water quality. Appropriate drainage features would be constructed along pathways, carparks, and within the building infrastructure to minimise the risk of dirty water leaving the site or entering waterways. With the exception of internal parking areas and areas around the buildings, the site would be largely vegetated with grass cover throughout the playground and native tree plantings along the boundary. There would be a low risk of sediment runoff into local waterways.

7.3.4 impacts of vehicle strikes on threatened species of animals or on animals that are part of a TEC

Superb Parrots have been recorded on site and so may be at risk of vehicle strike. Superb Parrots are particularly vulnerable to vehicle strike when feeding on spilled grain along roadsides (Baker-Gabb, 2011). Estella Road is not a major grain transport routes, and there is minimal foraging habitat for Superb Parrot on the roadsides. Superb Parrots recorded during site inspections were flying above the canopy, well above vehicle height.

Mitigation measures will be implemented to enforce a site speed. With the recommended mitigation measures, it is therefore not likely that vehicles associated with the proposal will have a substantive impact on this species.

7.4 IMPACTS TO MATTERS OF NATIONAL ENVIRONMENTAL SIGNIFICANCE

7.4.1 Threatened Ecological Communities

One EPBC listed ecological community, White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland EEC, had the potential to occur within the development site, based on the presence of remnant Yellow Box and Blakely's Red Gum trees in the surrounding area. However, the derived native grassland and planted vegetation do not meet the condition threshold for the EPBC listed community due to a lack of diversity of native understory species and lack of mature trees within the patch.

No EPBC listed communities are considered to occur within the development site.

7.4.2 Threatened Species

Superb Parrot and Swift Parrot

One EPBC-listed species was recorded during the surveys; two Superb Parrots were seen perching in the canopy within the development site. Habitat for this species within the development site is primarily limited to planted vegetation which provides moderate quality foraging habitat.

The Swift Parrot was considered to have the potential to occur in the development site due to records of the bird within a 10km radius (Bionet, 2018).

EPBC Assessments of significance were completed for these three fauna species (Appendix H). These concluded that a significant impact was unlikely, on the basis that the proposal would not:

- Lead to a reduction of the size or area of occupancy of a population, or fragment or disrupt the breeding cycle of a population
- Affect habitat critical to the survival of these species
- Affect habitat or introduce disease such that these species would decline
- Introduce invasive species harmful to the species
- Interfere with the recovery of these species.

No referral is considered necessary to the Federal Department of Environment.

Koala

The EPBC Referral Guidelines for the Koala (DoE 2014) documents the 'Koala habitat assessment tool' to assist proponents in determining if a proposal may impact on habitat critical to the survival of the Koala. The tool is provided as Table 7-5 below as it applies to the proposal. Impact areas that score five or more using the habitat assessment tool contain habitat critical to the survival of the Koala. The assessment in Table 7-5 resulted in a score of 3 and as such habitat within the study area is not considered to be critical to the survival of the Koala. An assessment of significant impact is not required.

Table 7-5: Koala habitat assessment tool for inland areas (DoE 2014)

Attribute	Score	Inland	Applicable to the proposal?
Koala occurrence	+2 (high)	Evidence of one or more koalas within the last 5 years.	

Attribute	Score	Inland	Applicable to the proposal?
	+1 (medium)	Evidence of one or more koalas within 2 km of the edge of the impact area within the last 10 years.	✓ No records within 10km within the last 10 years
	0 (low)	None of the above.	
Vegetation composition	+2 (high)	Has forest, woodland or shrubland with emerging trees with 2 or more known koala food tree species, OR 1 food tree species that alone accounts for >50% of the vegetation in the relevant strata.	✓ Secondary food tree species present, Blakely's Red Gum and Yellow Box
	+1 (medium)	Has forest, woodland or shrubland with emerging trees with only 1 species of known koala food tree present.	
	0 (low)	None of the above.	
Habitat connectivity	+2 (high)	Area is part of a contiguous landscape ≥ 1000 ha.	✓
	+1 (medium)	Area is part of a contiguous landscape < 1000 ha, but ≥ 500 ha.	
	0 (low)	None of the above.	
Key existing threats	+2 (high)	Little or no evidence of koala mortality from vehicle strike or dog attack at present in areas that score 1 or 2 for koala occurrence. Areas which score 0 for koala occurrence and have no dog or vehicle threat present	✓ No Koala mortality observed during the survey
	+1 (medium)	Evidence of infrequent or irregular koala mortality from vehicle strike or dog attack at present in areas that score 1 or 2 for koala occurrence, OR Areas which score 0 for koala occurrence and are likely to have some degree dog or vehicle threat present.	

Attribute	Score	Inland	Applicable to the proposal?
	0 (low)	Evidence of frequent or regular koala mortality from vehicle strike or dog attack in the study area at present, OR Areas which score 0 for koala occurrence and have a significant dog or vehicle threat present.	
Recovery value	+2 (high)	Habitat is likely to be important for achieving the interim recovery objectives for the relevant context, as outlined in Table 1.	✓ Study area is not considered a habitat refuge nor does it provide important connectivity to large areas surrounding a habitat refuge
	+1 (medium)	Uncertain whether the habitat is important for achieving the interim recovery objectives for the relevant context, as outlined in Table 1.	
	0 (low)	Habitat is unlikely to be important for achieving the interim recovery objectives for the relevant context, as outlined in Table 1.	
Total	3	Decision: Habitat not critical to the survival of the Koala—assessment of significance not required	

7.4.3 Migratory species

Two migratory species, the Fork-tailed Swift and the White-throated Needletail could occur on the site on occasion. However, as these species are almost exclusively aerial (DoE, 2015) impacts to these species are considered unlikely. The proposal is unlikely to impact on any EPBC listed Migratory Species.

7.5 LIMITATIONS TO DATA, ASSUMPTIONS AND PREDICTIONS

The floristic plots are based on a single visit survey. Floristic surveys were undertaken during the optimal flowering time for species in Spring however it is possible that not all plant species were detected that may be present at the site due to seasonal and climatic constraints. In particular, inconspicuous or geophytic species which flower outside the surveyed period may not have been recorded and dry drought conditions may have reduced the abundance and cover of forbs and grasses.

8 MITIGATING AND MANAGING IMPACTS

8.1 MITIGATION MEASURES

A general summary of the key measures required to mitigate the impacts of the proposal is provided below. Mitigation measures proposed to manage impacts, including proposed techniques, timing, frequency, responsibility for implementing each measure, risk of failure and an analysis of the consequences of any residual impacts are provided in Table 8-1.

8.1.1 *Impacts from the clearing of vegetation and habitats*

1. Time works to avoid critical life cycle events
2. Implement clearing protocols during tree clearing works, including pre-clearing surveys, daily surveys and staged clearing, with the presence of a trained ecologist or wildlife handler
3. Relocate habitat features (fallen timber) from within the development site to an adjacent area.

8.1.2 *Indirect impacts*

1. Clearing protocols that identify vegetation to be retained, prevent inadvertent damage and reduce soil disturbance; for example, removal of native vegetation by chainsaw, rather than heavy machinery, is preferable in situations where partial clearing is proposed
2. Temporary fencing to protect significant environmental features such as vegetation to be retained
3. Hygiene protocols to prevent the spread of weeds or pathogens between infected areas and uninfected areas
4. Staff training and site briefing to communicate environmental features to be protected and measures to be implemented
5. Sediment barriers and spill management protocols to control the quality of water runoff from the site into the receiving environment.

8.1.3 *Prescribed impacts*

1. Appropriate landscape plantings of local indigenous species to replace loss of planted vegetation

Table 8-1 Mitigation measures proposed to avoid and minimise impacts on native vegetation and habitat

Mitigation measure	Proposed techniques	Timing	Frequency	Responsibility	Risk of failure	Risk and consequences of residual impacts
Displacement of resident fauna through vegetation clearing and habitat removal						
Implement clearing protocols during tree clearing works, including pre-clearing surveys, daily surveys and staged clearing, with the presence of a trained ecologist or wildlife handler	• Pre-clearing checklist • Tree clearing procedure	Construction	Regular	Contractor	Low	Species not detected during pre-clearing surveys may be impacted.
Relocate habitat features (fallen timber, hollow logs) from within the development site	• Tree-clearing procedure including relocation of habitat features to adjacent area for habitat enhancement	Construction	Regular	Contractor	Low	None
Indirect impacts on native vegetation and habitat						
Clearing protocols that identify vegetation to be retained, prevent inadvertent damage and reduce soil disturbance; for example, removal of native vegetation by chainsaw, rather than heavy machinery, is preferable in situations where partial clearing is proposed	• Approved clearing limits to be clearly delineated with temporary fencing or similar prior to construction commencing. • No stockpiling or storage within dripline of any mature trees • In areas to clear adjacent to areas to be retained, chainsaws would be used rather than heavy machinery to minimise risk of unauthorised disturbance • Strict weed protocol must be observed at all times	Construction	Regular	Contractor	Low	Impacts to retained vegetation if protocols not followed (low risk)
Temporary fencing to protect vegetation to be retained	• Prior to construction commencing, exclusion fencing	Construction	Regularly	Contractor	Low	None

Mitigation measure	Proposed techniques	Timing	Frequency	Responsibility	Risk of failure	Risk and consequences of residual impacts
	and signage would be installed around habitat to be retained					
Hygiene protocols to prevent the spread of weeds or pathogens between infected areas and uninfected areas	- A Weed Management procedure would be developed for the proposal to prevent and minimise the spread of weeds. This would include: - Management protocol for declared priority weeds under the <i>Biosecurity Act 2015</i> during and after construction - Weed hygiene protocol in relation to plant, machinery, and fill - Any occurrences of pathogens such as Myrtle Rust and Phytophthora would be monitored, treated, and reported. - The weed management procedure would be incorporated into the Biodiversity Management Plan.	Construction , Operation	Regular	Contractor	Low	Weed encroachment (low risk)
Staff training and site briefing to communicate environmental features to be protected and measures to be implemented	- Site induction - Toolbox talks	Construction	Regular	Contractor	Low	Impacts to native vegetation if staff training not being followed (low risk)
Erosion and sediment controls	An erosion and sediment control plan would be prepared in	Construction	Regular	Contractor	Low	Impacts may occur if erosion and sedimentation

Mitigation measure	Proposed techniques	Timing	Frequency	Responsibility	Risk of failure	Risk and consequences of residual impacts
	conjunction with the final design and implemented					control plan not implemented (low risk)
Prescribed biodiversity impacts						
Appropriate landscape plantings of local indigenous species to replace loss of planted vegetation	Landscape plantings will be comprised of local indigenous species.	Operation	Regular	Client	Low	Plants not surviving (low risk)

8.2 ADAPTIVE MANAGEMENT STRATEGY

No adaptive management strategy is proposed for the development.

9 SERIOUS AND IRREVERSIBLE IMPACTS (SAII)

9.1 POTENTIAL SERIOUS AND IRREVERSIBLE IMPACT ENTITIES

The principles used to determine if a development will have serious and irreversible impacts, include impacts that:

- Will cause a further decline of the species or ecological community that is currently observed, estimated, inferred, or reasonably suspected to be in a rapid rate of decline, or
- Will further reduce the population size of the species or ecological community that is currently observed, estimated, inferred, or reasonably suspected to have a very small population size, or
- Impact on the habitat of a species or ecological community that is currently observed, estimated, inferred, or reasonably suspected to have a very limited geographic distribution, or
- Impact on a species or ecological community that is unlikely to respond to measures to improve habitat and vegetation integrity and is therefore irreplaceable.

9.1.1 Threatened ecological communities

One threatened ecological community will be impacted on by the proposal that is listed as a potential SAI entity in the *Guidance to assist a decision-maker to determine a serious and irreversible impact*. This is the;

- White Box-Yellow Box- Blakely's Red Gum Woodland (Box-gum Woodland)

9.1.2 Threatened species

No threatened flora or fauna species with potential for impacts are listed as potential SAI entities in the *Guidance to assist a decision-maker to determine a serious and irreversible impact*.

9.1.3 Additional potential entities

There are no further species considered to be potential SAI entities.

9.2 ASSESSMENT OF SERIOUS AND IRREVERSIBLE IMPACTS

9.2.1 White Box – Yellow Box – Blakely's Red Gum Woodland (Box-gum Woodland)

An assessment of the impacts to the Box-gum woodland was undertaken. Figure 9-1 shows the location of the Box-gum woodland within the development site.

- a) **the action and measures taken to avoid the direct and indirect impact on the potential entity for an SAI**

3.1 ha of planted box-gum Woodland and derived native grassland that forms part of the Box-gum Woodland EEC occurs within the development site. However, the Box-gum Woodland is highly degraded and in a poor state, having been cleared in the past and a

low diversity of underground species. The area selected for development has avoided mature remnant trees or larger more intact areas of Box-gum Woodland that are in the locality.

b) the area (ha) and condition of the TEC to be impacted directly and indirectly by the proposed development. The condition of the TEC is to be represented by the vegetation integrity score for each vegetation zone

Up to 2.15 ha of Box-gum woodland would be impacted by the proposal through the construction of the primary school. The majority of this vegetation is a degraded state in the form of a grassland with very low diversity of native species. The Vegetation integrity scores for the Box Gum Woodland are shown in Table 9-1.

Table 9-1 Vegetation Integrity Scores for Box-gum Woodland

Zone ID	Condition	Vegetation Integrity Score	Area impacted (ha)
1	Derived Grassland_Low	7.3	1.29
2	Derived Grassland_Moderate	26.1	0.18
3	Planted_mature	37.9	0.37
4	Planted_juvenile	49.9	0.31

c) a description of the extent to which the impact exceeds the threshold for the potential entity that is specified in the Guidance to assist a decision-maker to determine a serious and irreversible impact

No threshold has yet been defined by OEH for the extent of Box-gum Woodland to be removed that constitutes a serious and irreversible impact.

d) the extent and overall condition of the potential TEC within an area of 1000ha, and then 10,000ha, surrounding the proposed development footprint

Using GIS and State Vegetation Mapping, it is estimated 142 ha of Box-gum Woodland occurs within an area of 1000 ha surrounding the proposed development footprint and 6543 ha of Box-gum Woodland and derived grassland occurs within an area of 10000 ha surrounding the proposed development footprint (Figure 9-1 & 9-2).

e) an estimate of the extant area and overall condition of the potential TEC remaining in the IBRA subregion before and after the impact of the proposed development has been taken into consideration

Using GIS and State Vegetation Mapping (VIS_4468 & 4469), it is estimated that 32,801 ha of Box-gum Woodland occurs within the Lower Slopes IBRA Subregion. Vegetation mapped from aerial imagery is assumed to be in moderate to good condition. 2.15 ha is proposed to be impacted which is less than 0.01% of the estimated extent remaining.

f) an estimate of the area of the potential TEC that is in the reserve system within the IBRA region and the IBRA subregion

In NSW Box-gum grassy Woodland is known to occur within at least 42 reserve systems. 8,000 ha of Box-gum woodland is estimated to occur in national parks and nature reserves within the NSW South Western Slopes IBRA Region (Benson 2008).

g) the development, clearing or biodiversity certification proposal's impact on:

- i. **abiotic factors critical to the long-term survival of the potential TEC; for example, how much the impact will lead to a reduction of groundwater levels or the substantial alteration of surface water patterns**

Groundwater supplies and levels are unlikely to be affected by the proposal plant and no groundwater is anticipated to be intercepted or extracted. During construction, the proposal would have a short-term gross impact upon soils and possibly surface water flow, within discreet areas. These impacts are manageable with the implementation of erosion and sediment controls and would be unlikely to impact on abiotic factors critical to the long-term survival of Box-gum woodland.

- ii. **characteristic and functionally important species through impacts such as, but not limited to, inappropriate fire/flooding regimes, removal of understorey species or harvesting of plants**

Species diversity of the vegetation within the development site is low and comprised of common and disturbance tolerant native species. No characteristic or functionally important species would be lost through the removal of the Box-gum woodland.

No impacts are anticipated to Box-Gum Woodland in the locality. No introduced fire or flooding regimes would occur and no increase of natural occurrences of these events is anticipated from the development.

- iii. **the quality and integrity of an occurrence of the potential TEC through threats and indirect impacts**

The area of derived grassland within the development site would be permanently removed. However, the proposal would not impact on the Box-gum Woodland in the locality. No threats or indirect impacts are anticipated to the 142 ha of Box-gum Woodland in the locality through the construction of a school.

h) direct or indirect fragmentation and isolation of an important area of the potential TEC

The majority of the derived grassland within the development site would be permanently removed, and patches of planted vegetation along the eastern and western boundary of the development site would be removed. However, this derived grassland is in low condition due to the very low diversity of native species.

Connectivity of the woodland would still be maintained along the southern boundary of the development site. No barriers to movement would be in place and the proposal would not isolate any parts of the woodland.

i) the measures proposed to contribute to the recovery of the potential TEC in the IBRA subregion.

The 2.15 ha of Box-gum woodland to be removed will be offset by 15 ecosystem credits that will be used for management of another area of Box-gum woodland in the same IBRA region.

The proposal would impact 2.15 ha of the 3.1 ha of Box Gum Woodland within the development site, however the patch is highly modified and in poor condition. It does not constitute a patch that is vital to sustain the habitat for the ecological community. It does not provide connectivity to any other areas of Box Gum Woodland or native vegetation. The development would not impact on better condition Box Gum Woodland in the locality. Based on the assessment above, it is considered unlikely the proposal would have a serious and irreversible impact on the White Box Yellow Box Blakely's Red Gum Woodland EEC.

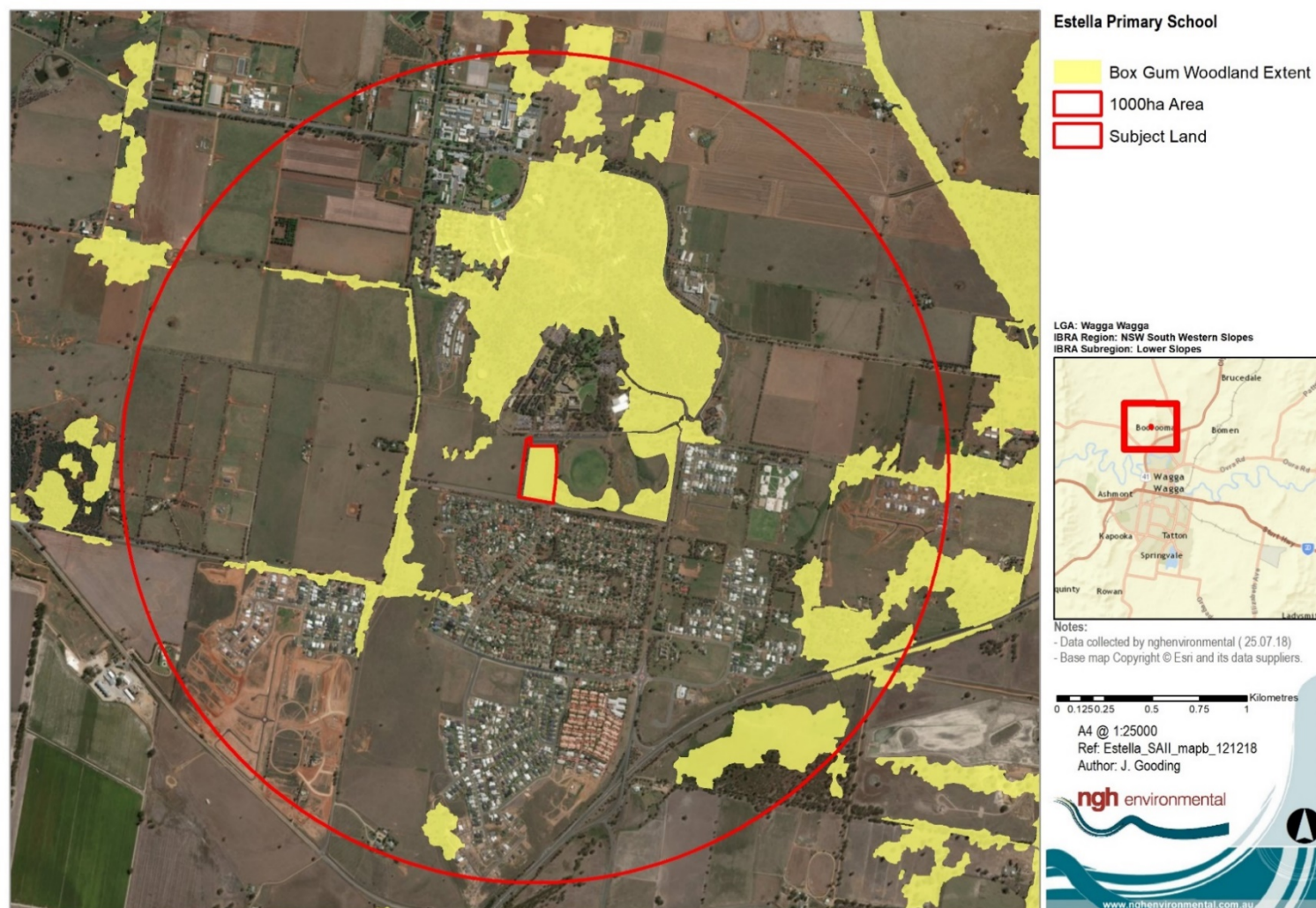


Figure 9-1 Location of serious irreversible entities within 1000ha of the development site.

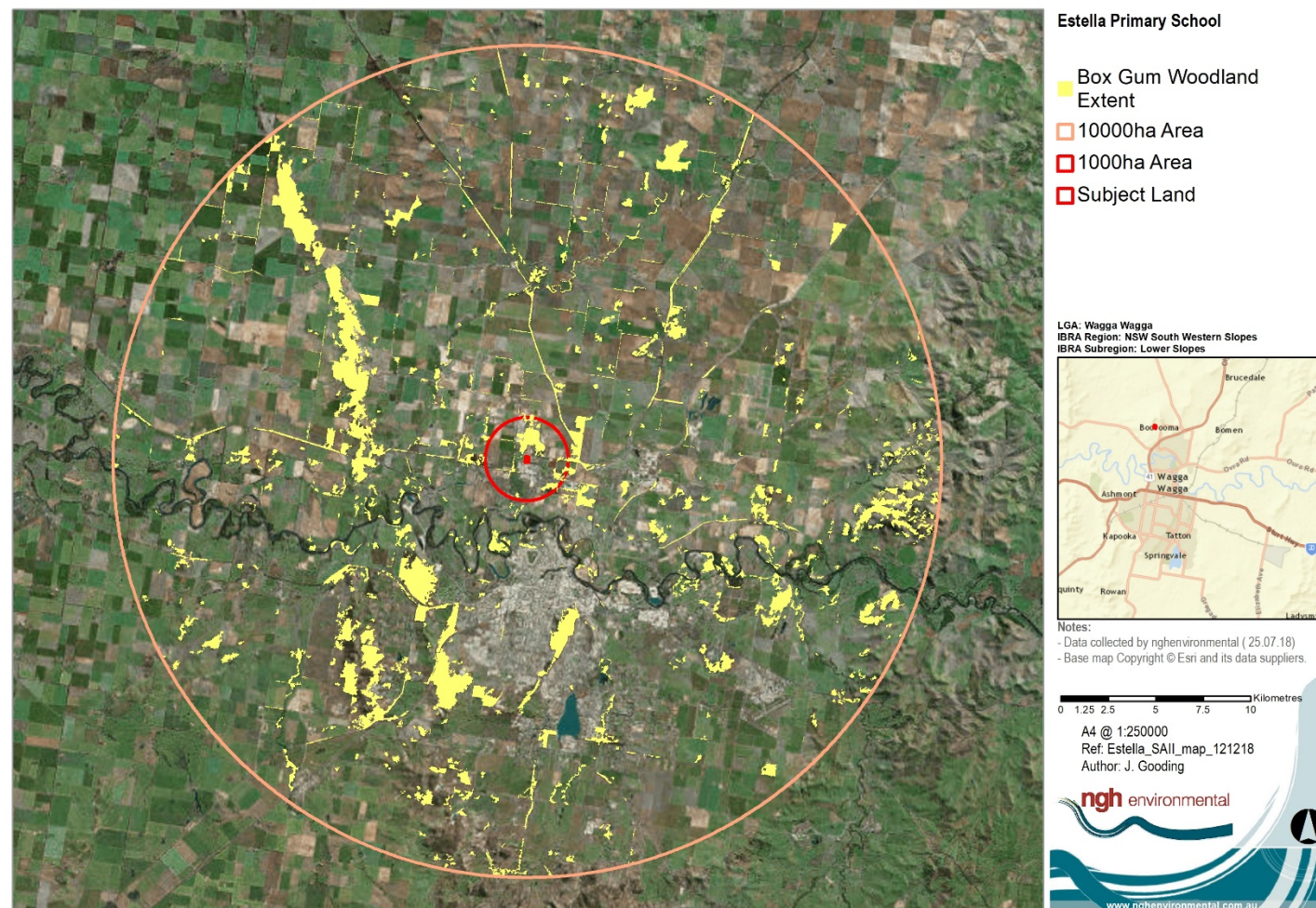


Figure 9-2 Location of serious and irreversible impacts entity within 10000ha of the development site

10 REQUIREMENT TO OFFSET

10.1 IMPACTS REQUIRING AN OFFSET

10.1.1 Ecosystem credits

An offset is required for all impacts of development on PCTs that are associated with:

- a) a vegetation zone that has a vegetation integrity score ≥ 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 ≥ 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 ≥ 20 where the PCT is not representative of a TEC or associated with threatened species habitat.

The PCTs and vegetation zones requiring offset and the ecosystem credits required are documented in Table 10-1 and mapped on Figure 10-1.

Table 10-1 PCTs and vegetation zones that require offsets

Zone ID	PCT ID	Condition	Zone area (ha)	Vegetation integrity loss	Ecosystem credits required
2	277	Derived Grassland_moderate condition	0.18	25.2	2
3	277	Planted Vegetation_mature	0.37	26.8	5
4	277	Planted Vegetation_juvenile	0.31	49.9	8
				TOTAL	15

The full Biodiversity Credit Report generated by the BAM Calculator is provided in Appendix D.

10.1.2 Species credits

No species credits species were detected on site and no species offsets are required for the development.

10.1.3 Offsets required under the EPBC Act

No species listed on the EPBC Act have been identified as having the potential to be significantly impacted by the development. As such, the proposal is not considered to require offsets in accordance with the EPBC Offsets Policy.

10.2 IMPACTS NOT REQUIRING AN OFFSET

Impacts to PCTs that do not meet the thresholds identified in Section 10.1.1 do not require offsets. These PCTs and vegetation zones are identified in Table 10-2.

Table 10-2 PCTs and vegetation zones that do not require offsets

Zone ID	PCT ID	PCT name	Zone area (ha)	Vegetation integrity score
1	277	Derived Grassland_Low condition	1.29	7.3

The low condition grassland does not meet the threshold for requiring an offset. Although there is greater than 50% native ground cover, the diversity of native species is very poor with Red Grass (*Bothriochloa macra*) being one of the only dominant native species.

10.3 AREAS NOT REQUIRING ASSESSMENT

All areas within the development site are comprised of native vegetation and have been assessed under the BAM.

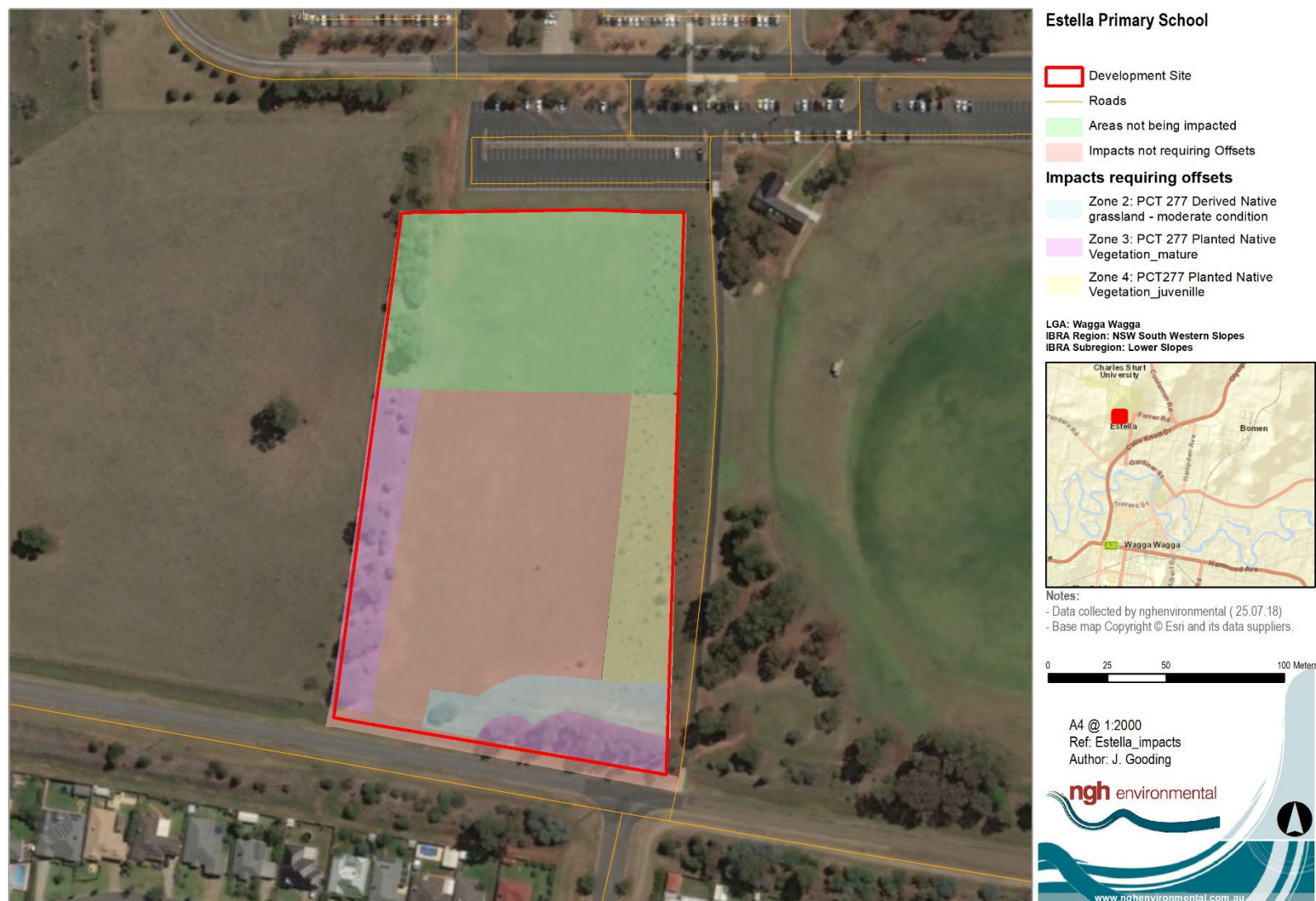


Figure 10-1 Impacts requiring offset, not requiring offset and not requiring assessment

11 CONCLUSIONS

NGH has prepared this BDAR on behalf of Hansen Yuncken for the proposed new Primary School in Wagga Wagga, NSW. The purpose of this BDAR was to address the requirements of the BAM and to address the biodiversity matters raised in the SEARs. In this BDAR, biodiversity impacts have been assessed through:

- Comprehensive mapping and assessment completed in accordance with the BAM
- Mitigation measures which have been outlined to reduce the impacts to biodiversity
- The generation of 15 Ecosystem Credits for impacts to Blakley's Red gum – Yellow Box grassy tall woodland of the NSW South Western Slopes Bioregion (PCT277)

The retirement of these credits will be carried out in accordance with the NSW Biodiversity Offsets scheme, and will be achieved by either;

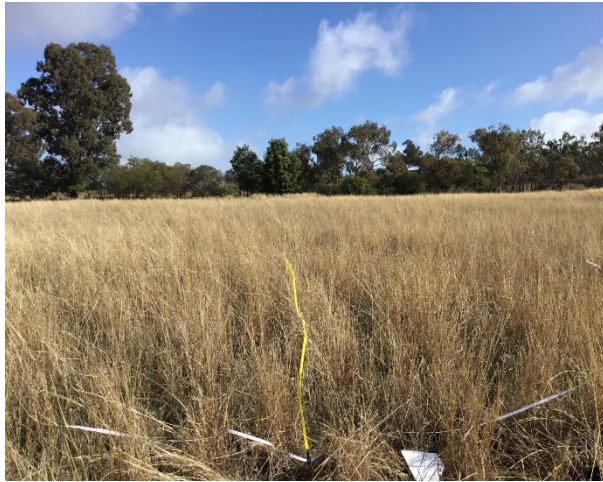
- (a) Retiring credits under the Biodiversity Offsets Scheme, or
- (b) Making payments into the Biodiversity Conservation Fund using the offset payments calculator, or
- (c) Funding a biodiversity action that benefits the threatened entity(ies) impacted by the development.

12 REFERENCES

- Baker-Gabb (2011) National Recovery Plan for the Superb Parrot *Polytelis swainsonii*. Department of Sustainability and Environment, Melbourne.
- DoE (2013) Matters of National Environmental Significance: Significant impact guidelines, Commonwealth of Australia.
- DoE (2016). Species Profile and Threats Database, Department of Sustainability, Environment, Water, Population and Communities, Canberra. Available from: <http://www.environment.gov.au/sprat>.
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- NGH Environmental (2014) Vegetation Restoration Plan, Charles Sturt University, Wagga Wagga Campus, NSW
- Office of Environment and Heritage (OEH) (2016) South Western Slopes Bioregion. Accessed at <https://www.environment.nsw.gov.au/bioregions/NSWSouthWesternSlopesBioregion.htm>
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- Office of Environment and Heritage (OEH) (2017) BioNet Vegetation Information System: Classification Database. Accessed online at <http://www.environment.nsw.gov.au/research/Visclassification.htm>
- Peterson (2018) Bushfire Assessment, Estella Road Public School, Peterson Bushfire Expert Consulting Services
- Ryan, W. (2019) Arboricultural Assessment Report, New Public School - Wagga Wagga, Wade Ryan Contracting.

APPENDIX A PLOT PHOTOS

Plot 1 – PCT 277_Derived Grassland_low condition



Plot 2 – PCT 277_Planted Vegetation_juvenile



Plot 3 – PCT 277_Planted Vegetation_mature



Plot 4 - PCT 277_Planted Vegetation_mature



Plot 5 – PCT 277_Derived Grassland_low condition



Plot 6 - PCT 277_Derived Grassland_moderate condition



APPENDIX B FLORA SPECIES LIST

Floristic survey results are presented for the six vegetation integrity plots undertaken in the development site.

The foliage cover of species is based on visual estimates of foliage cover within a standard 20 metre x 20 metre plot. Incidentals are recorded using the random meander method (Cropper 1993).

Where uncertainty exists due to the unavailability of reproductive material, the taxon is preceded by a question mark, or plants are identified to genus level only. Species of conservation significance are bolded. Introduced species are denoted by an asterisk. Priority or significant environmental weeds are indicated with a 'Δ' symbol. Scientific nomenclature follows Harden (1990-2002) and the Sydney Royal Botanic Gardens PlantNet website, updated with recent changes accepted by the Angiosperm Phylogeny Group (2016) and the Australian Plant Census (2017).

Family	Exotic	Scientific Name	Common Name	Plot 1		Plot 2		Plot 3		Plot 4		Plot 5		Plot 6		Incidentals
				PCT 277 Derived grassland		PCT 277 Planted_ju venile		PCT 277 Planted_m ature		PCT 277 Planted_m ature		PCT 277 Derived grassland		PCT 277 Derived grassland		
				%	#	%	#	%	#	%	#	%	#	%	#	
TREES																
Malvaceae		<i>Brachychiton populneus</i>	Kurrajong			2	3									
Cupressaceae		<i>Callitris glaucophylla</i>	White Cypress Pine			3	3									
Casuarinaceae		<i>Casuarina spp.</i>				1	1									
Myrtaceae		<i>Eucalyptus albens</i>	White Box			10	4									
Myrtaceae		<i>Eucalyptus blakelyi</i>	Blakely's Red Gum			2	2									
Myrtaceae		<i>Eucalyptus macrorhyncha</i>	Red Stringybark			1	1									
Myrtaceae		<i>Eucalyptus melliodora</i>	Yellow Box			20	10			45	7			1	2	
Myrtaceae		<i>Eucalyptus polyanthemos</i>	Red Box					30	5							
Meliaceae		<i>Melia azedarach</i>	White Cedar													✓
SHRUBS																
Fabaceae (Mimosoideae)		<i>Acacia baileyana</i>	Cootamundra Wattle					10	11							
Fabaceae (Mimosoideae)		<i>Acacia dealbata</i>	Silver Wattle			10	4									
Fabaceae (Mimosoideae)		<i>Acacia decora</i>	Western Silver Wattle							20	20					
Fabaceae (Mimosoideae)		<i>Acacia implexa</i>	Hickory Wattle			8	3									✓
Fabaceae (Mimosoideae)		<i>Acacia spp.</i>	Wattle			1	1									
Sapindaceae		<i>Dodonaea viscosa</i>	Sticky Hop-bush			5	4									
Solanaceae	* Δ	<i>Lycium ferocissimum</i>	African Boxthorn					0.1	1							
Oleaceae	*	<i>Olea europaea</i>	Common Olive							0.1	2					✓
FORBS																
Amaranthaceae	*	<i>Alternanthera pungens</i>	Khaki Weed													✓
Poaceae	*	<i>Bromus spp.</i>	A Brome	5	500											
Asteraceae	*	<i>Centaurea solstitialis</i>	St Barnabys Thistle													✓
Chenopodiaceae	*	<i>Chenopodium spp.</i>	Goosefoot, Crumbweed					0.1	3							
Asteraceae	*	<i>Chondrilla juncea</i>	Skeleton Weed	0.1	20	0.1	10					0.5	30			
Asteraceae	*	<i>Cirsium vulgare</i>	Spear Thistle													✓
Boraginaceae	*	<i>Echium plantagineum</i>	Patterson's Curse													✓
Chenopodiaceae		<i>Einadia nutans</i>	Climbing Saltbush							1	15					

Onagraceae		<i>Epilobium billardierianum</i>	Willow Herb	1	10	0.1	5					0.1	1			
Euphorbiaceae		<i>Euphorbia drummondii</i>	Caustic Weed											0.1	1	
Fumariaceae	*	<i>Fumaria spp.</i>	Fumitory									0.2	30			
Clusiaceae	* Δ	<i>Hypericum perforatum</i>	St. Johns Wort			1	50							0.1	1	
Asteraceae	*	<i>Hypochaeris radicata</i>	Catsear	1	200	0.3	50	0.1	20	0.1	5	0.2	100	0.1	20	
Asteraceae	*	<i>Lactuca serriola</i>	Prickly Lettuce			0.1	30									
Malvaceae	*	<i>Malva parviflora</i>	Small-flowered Mallow													√
Lamiaceae	*	<i>Marrubium vulgare</i>	White Horehound													√
Fabaceae (Faboideae)	*	<i>Medicago spp.</i>	A Medic									1	10			
Oxalidaceae		<i>Oxalis perennans</i>				0.1	10			0.1	1					
Iridaceae	*	<i>Romulea rosea</i>	Onion Grass	0.1	5	0.1	100					0.1	30			
Polygonaceae		<i>Rumex brownii</i>	Swamp Dock	0.1	5											
Asteraceae	*	<i>Sonchus oleraceus</i>	Common Sowthistle			0.1	5									
Asteraceae	*	<i>Taraxacum officinale</i>	Dandelion											0.1	2	
Fabaceae (Faboideae)	*	<i>Trifolium spp.</i>	A Clover	2	500											
Fabaceae (Faboideae)	*	<i>Trifolium subterraneum</i>	Subterranean Clover	2	500	1	500	1	100			1	100			
Asteraceae		<i>Vittadinia gracilis</i>	Woolly New Holland Daisy			0.1	1							0.5	50	
GRASS AND GRASS LIKE																
Poaceae		<i>Austrostipa scabra</i>	Speargrass			0.1	10	8	200	0.1	10			20	500	
Poaceae	*	<i>Avena fatua</i>	Wild Oats	0.1	30	10	1000			0.1	150	5	1000			
Poaceae		<i>Bothriochloa macra</i>	Red Grass	60	1000	20	500	4	80			30	400	2		
Poaceae	*	<i>Bromus diandrus</i>	Great Brome							1	100	25	1000			
Poaceae	*	<i>Bromus hordeaceus</i>	Soft Brome	5	1000											
Poaceae	*	<i>Bromus molliformis</i>	Soft Brome									30	1000			
Poaceae		<i>Cynodon dactylon</i>	Common Couch													√
Poaceae	*	<i>Digitaria spp.</i>	A Finger Grass	0.1	10											
Poaceae		<i>Elymus scaber</i>	Common Wheatgrass							0.1	10					
Poaceae	*	<i>Eragrostis cilianensis</i>	Stinkgrass	0.1	20	0.1	5	0.1	5							
Poaceae	*	<i>Lolium spp.</i>	A Ryegrass			25	1000			1	50					
Poaceae	*	<i>Panicum capillare</i>	Witchgrass	10	500	0.1	5	2	30			2	50			
Poaceae		<i>Paspalidium spp.</i>		0.1	10									1	25	

Poaceae		<i>Poa sieberiana</i>	Snowgrass					1	20							
Poaceae		<i>Rytidosperma caespitosum</i>	Ringed Wallaby Grass											20	500	
Poaceae		<i>Rytidosperma duttonianum</i>	Brown-back Wallaby Grass							3	50					
Poaceae		<i>Rytidosperma richardsonii</i>	Straw Wallaby-grass													
Poaceae		<i>Rytidosperma spp.</i>						10	200							
Poaceae	*	<i>Vulpia spp.</i>	Rat's-tail Fescue					5	1000							
			Eragrostis					0.1	3							

APPENDIX C FAUNA SPECIES LIST

The following fauna were observed opportunistically and during targeted surveys

Common name	Scientific name	Status (BC/EPBC)	Observation type
Birds			
Buff-rumped Thornbill	<i>Acanthiza reguloides</i>	Not listed	Seen
Red Wattlebird	<i>Anthochaera carunculata</i>	Not listed	Seen
Australian Raven	<i>Corvus coronoides</i>	Not listed	Seen
Magpie	<i>Cracticus tibicen</i>	Not listed	Seen
Black Shouldered Kite	<i>Elanus axillaris</i>	Not listed	Seen
Galah	<i>Eolophus roseicapillia</i>	Not listed	Seen
Nankeen Kestrel	<i>Falco cenchroides</i>	Not listed	Seen
Noisy Miner	<i>Manorina melanocephala</i>	Not listed	Seen
Crested Pigeon	<i>Ocyphaps lophotes</i>	Not listed	Seen
Pied Currawong	<i>Strepera graculina</i>	Not listed	Seen
Rainbow Lorikeet	<i>Trichoglossus moluccanus</i>	Not listed	Seen
Superb Parrot	<i>Polytelis swainsonii</i>	Vulnerable	Seen
Mammals			
Eastern Grey Kangaroo	<i>Macropus giganteus</i>	Not listed	Seen
Rabbit	* <i>Oryctolagus cuniculus</i>	Not listed	Seen
Fox	* <i>Vulpes vulpes</i>	Not listed	Seen
Reptiles			
Eastern Brown Snake	<i>Pseudonaja textilis</i>	Not listed	Seen

* indicates non-native.

APPENDIX D EPBC PROTECTED MATTERS SEARCH



EPBC Act Protected Matters Report

This report provides general guidance on matters of national environmental significance and other matters protected by the EPBC Act in the area you have selected.

Information on the coverage of this report and qualifications on data supporting this report are contained in the caveat at the end of the report.

Information is available about [Environment Assessments](#) and the EPBC Act including significance guidelines, forms and application process details.

Report created: 25/10/19 12:15:32

[Summary](#)

[Details](#)

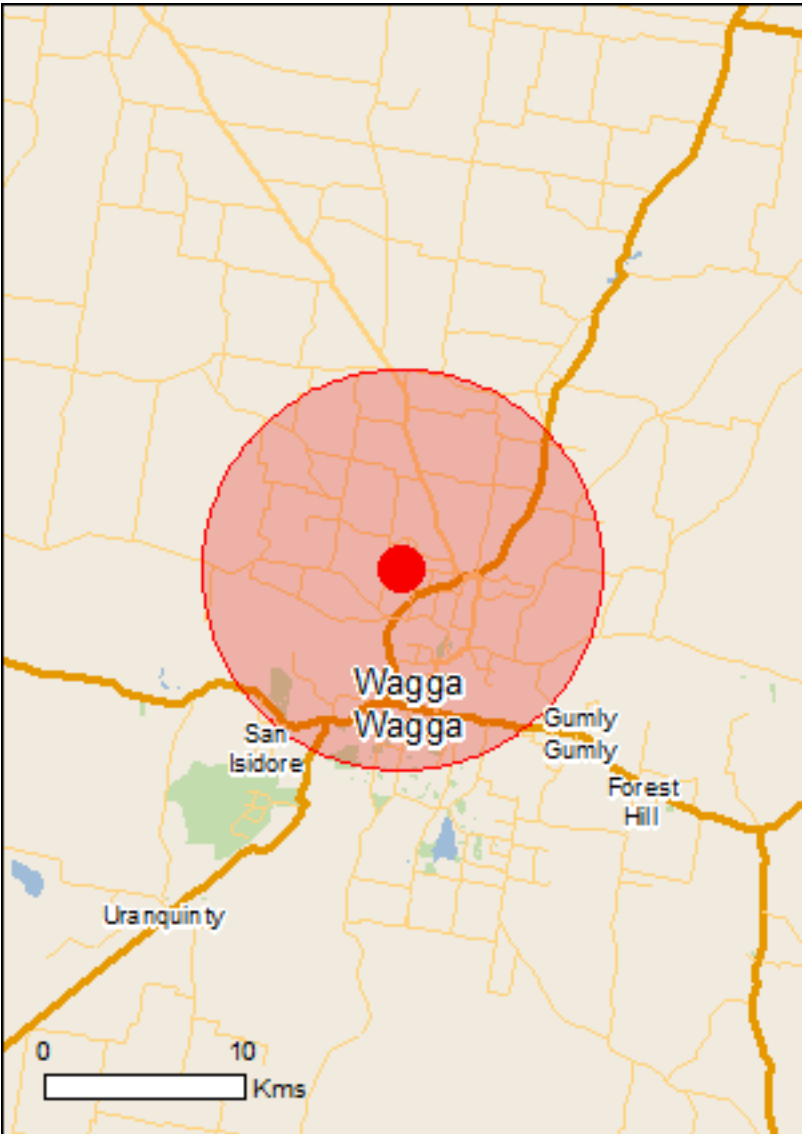
[Matters of NES](#)

[Other Matters Protected by the EPBC Act](#)

[Extra Information](#)

[Caveat](#)

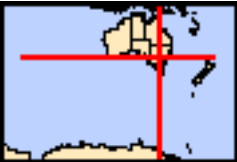
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[Coordinates](#)

Buffer: 10.0Km



Summary

Matters of National Environmental Significance

This part of the report summarises the matters of national environmental significance that may occur in, or may relate to, the area you nominated. Further information is available in the detail part of the report, which can be accessed by scrolling or following the links below. If you are proposing to undertake an activity that may have a significant impact on one or more matters of national environmental significance then you should consider the [Administrative Guidelines on Significance](#).

World Heritage Properties:	None
National Heritage Places:	None
Wetlands of International Importance:	4
Great Barrier Reef Marine Park:	None
Commonwealth Marine Area:	None
Listed Threatened Ecological Communities:	3
Listed Threatened Species:	26
Listed Migratory Species:	10

Other Matters Protected by the EPBC Act

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

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

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

Commonwealth Land:	9
Commonwealth Heritage Places:	None
Listed Marine Species:	17
Whales and Other Cetaceans:	None
Critical Habitats:	None
Commonwealth Reserves Terrestrial:	None
Australian Marine Parks:	None

Extra Information

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

State and Territory Reserves:	None
Regional Forest Agreements:	None
Invasive Species:	30
Nationally Important Wetlands:	None
Key Ecological Features (Marine)	None

Details

Matters of National Environmental Significance

Wetlands of International Importance (Ramsar)		[Resource Information]
Name	Proximity	
Banrock station wetland complex	600 - 700km upstream	
Hattah-kulkyne lakes	400 - 500km upstream	
Riverland	500 - 600km upstream	
The coorong, and lakes alexandrina and albert wetland	600 - 700km upstream	

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

Name	Status	Type of Presence
Grey Box (Eucalyptus microcarpa) Grassy Woodlands and Derived Native Grasslands of South-eastern Australia	Endangered	Community likely to occur within area
Weeping Myall Woodlands	Endangered	Community may occur within area
White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland	Critically Endangered	Community likely to occur within area

Listed Threatened Species	[Resource Information]
---------------------------	--------------------------

Name	Status	Type of Presence
Birds		
Anthochaera phrygia Regent Honeyeater [82338]	Critically Endangered	Foraging, feeding or related behaviour may occur within area
Botaurus poiciloptilus Australasian Bittern [1001]	Endangered	Species or species habitat known to occur within area
Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	Species or species habitat likely to occur within area
Grantiella picta Painted Honeyeater [470]	Vulnerable	Species or species habitat likely to occur within area
Hirundapus caudacutus White-throated Needletail [682]	Vulnerable	Species or species habitat may occur within area
Lathamus discolor Swift Parrot [744]	Critically Endangered	Species or species habitat known to occur within area
Leipoa ocellata Malleefowl [934]	Vulnerable	Species or species habitat likely to occur within area
Numenius madagascariensis Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat may occur within area

Name	Status	Type of Presence
Polytelis swainsonii Superb Parrot [738]	Vulnerable	Breeding known to occur within area
Rostratula australis Australian Painted-snipe, Australian Painted Snipe [77037]	Endangered	Species or species habitat likely to occur within area
Fish		
Galaxias rostratus Flathead Galaxias, Beaked Minnow, Flat-headed Galaxias, Flat-headed Jollytail, Flat-headed Minnow [84745]	Critically Endangered	Species or species habitat may occur within area
Maccullochella peelii Murray Cod [66633]	Vulnerable	Species or species habitat known to occur within area
Macquaria australasica Macquarie Perch [66632]	Endangered	Species or species habitat may occur within area
Frogs		
Crinia sloanei Sloane's Froglet [59151]	Endangered	Species or species habitat may occur within area
Litoria raniformis Growling Grass Frog, Southern Bell Frog, Green and Golden Frog, Warty Swamp Frog [1828]	Vulnerable	Species or species habitat likely to occur within area
Mammals		
Dasyurus maculatus maculatus (SE mainland population) Spot-tailed Quoll, Spotted-tail Quoll, Tiger Quoll (southeastern mainland population) [75184]	Endangered	Species or species habitat may occur within area
Nyctophilus corbeni Corben's Long-eared Bat, South-eastern Long-eared Bat [83395]	Vulnerable	Species or species habitat may occur within area
Phascolarctos cinereus (combined populations of Qld, NSW and the ACT) Koala (combined populations of Queensland, New South Wales and the Australian Capital Territory) [85104]	Vulnerable	Species or species habitat known to occur within area
Pteropus poliocephalus Grey-headed Flying-fox [186]	Vulnerable	Roosting known to occur within area
Plants		
Austrostipa wakoolica [66623]	Endangered	Species or species habitat may occur within area
Caladenia arenaria Sand-hill Spider-orchid [9275]	Endangered	Species or species habitat may occur within area
Prasophyllum petilum Tarengo Leek Orchid [55144]	Endangered	Species or species habitat may occur within area
Swainsona murrayana Slender Darling-pea, Slender Swainson, Murray Swainson-pea [6765]	Vulnerable	Species or species habitat likely to occur within area
Swainsona recta Small Purple-pea, Mountain Swainson-pea, Small Purple Pea [7580]	Endangered	Species or species habitat may occur within area
Reptiles		
Aprasia parapulchella Pink-tailed Worm-lizard, Pink-tailed Legless Lizard [1665]	Vulnerable	Species or species habitat may occur within area

Name	Status	Type of Presence
Delma impar Striped Legless Lizard, Striped Snake-lizard [1649]	Vulnerable	Species or species habitat may occur within area
Listed Migratory Species [Resource Information]		
* Species is listed under a different scientific name on the EPBC Act - Threatened Species list.		
Name	Threatened	Type of Presence
Migratory Marine Birds		
Apus pacificus Fork-tailed Swift [678]		Species or species habitat likely to occur within area
Migratory Terrestrial Species		
Hirundapus caudacutus White-throated Needletail [682]	Vulnerable	Species or species habitat may occur within area
Motacilla flava Yellow Wagtail [644]		Species or species habitat may occur within area
Myiagra cyanoleuca Satin Flycatcher [612]		Species or species habitat known to occur within area
Migratory Wetlands Species		
Actitis hypoleucos Common Sandpiper [59309]		Species or species habitat may occur within area
Calidris acuminata Sharp-tailed Sandpiper [874]		Species or species habitat known to occur within area
Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	Species or species habitat likely to occur within area
Calidris melanotos Pectoral Sandpiper [858]		Species or species habitat may occur within area
Gallinago hardwickii Latham's Snipe, Japanese Snipe [863]		Species or species habitat may occur within area
Numenius madagascariensis Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat may occur within area

Other Matters Protected by the EPBC Act

Commonwealth Land [Resource Information]
The Commonwealth area listed below may indicate the presence of Commonwealth land in this vicinity. Due to the unreliability of the data source, all proposals should be checked as to whether it impacts on a Commonwealth area, before making a definitive decision. Contact the State or Territory government land department for further information.
Name
Commonwealth Land - Commonwealth Land - Australian Broadcasting Corporation Commonwealth Land - Australian Telecommunications Commission Commonwealth Land - Commonwealth Bank of Australia Commonwealth Land - Defence Housing Authority Commonwealth Land - Defence Service Homes Corporation Commonwealth Land - Director of War Service Homes Defence - BLAMEY BARRACKS - KAPOOKA Defence - WAGGA ARES DEPOT ; BLAMEY BKS -WAGGA WAGGA TRG DEP

Listed Marine Species

[Resource Information]

* Species is listed under a different scientific name on the EPBC Act - Threatened Species list.

Name	Threatened	Type of Presence
Birds		
Actitis hypoleucos Common Sandpiper [59309]		Species or species habitat may occur within area
Apus pacificus Fork-tailed Swift [678]		Species or species habitat likely to occur within area
Ardea alba Great Egret, White Egret [59541]		Species or species habitat known to occur within area
Ardea ibis Cattle Egret [59542]		Species or species habitat may occur within area
Calidris acuminata Sharp-tailed Sandpiper [874]		Species or species habitat known to occur within area
Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	Species or species habitat likely to occur within area
Calidris melanotos Pectoral Sandpiper [858]		Species or species habitat may occur within area
Chrysococcyx osculans Black-eared Cuckoo [705]		Species or species habitat likely to occur within area
Gallinago hardwickii Latham's Snipe, Japanese Snipe [863]		Species or species habitat may occur within area
Haliaeetus leucogaster White-bellied Sea-Eagle [943]		Species or species habitat likely to occur within area
Hirundapus caudacutus White-throated Needletail [682]	Vulnerable	Species or species habitat may occur within area
Lathamus discolor Swift Parrot [744]	Critically Endangered	Species or species habitat known to occur within area
Merops ornatus Rainbow Bee-eater [670]		Species or species habitat may occur within area
Motacilla flava Yellow Wagtail [644]		Species or species habitat may occur within area
Myiagra cyanoleuca Satin Flycatcher [612]		Species or species habitat known to occur within area
Numenius madagascariensis Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat may occur within area
Rostratula benghalensis (sensu lato) Painted Snipe [889]	Endangered*	Species or species habitat likely to occur within area

Extra Information

Invasive Species

[Resource Information]

Weeds reported here are the 20 species of national significance (WoNS), along with other introduced plants that are considered by the States and Territories to pose a particularly significant threat to biodiversity. The following feral animals are reported: Goat, Red Fox, Cat, Rabbit, Pig, Water Buffalo and Cane Toad. Maps from Landscape Health Project, National Land and Water Resouces Audit, 2001.

Name	Status	Type of Presence
Birds		
Alauda arvensis Skylark [656]		Species or species habitat likely to occur within area
Anas platyrhynchos Mallard [974]		Species or species habitat likely to occur within area
Carduelis carduelis European Goldfinch [403]		Species or species habitat likely to occur within area
Columba livia Rock Pigeon, Rock Dove, Domestic Pigeon [803]		Species or species habitat likely to occur within area
Passer domesticus House Sparrow [405]		Species or species habitat likely to occur within area
Passer montanus Eurasian Tree Sparrow [406]		Species or species habitat likely to occur within area
Sturnus vulgaris Common Starling [389]		Species or species habitat likely to occur within area
Turdus merula Common Blackbird, Eurasian Blackbird [596]		Species or species habitat likely to occur within area
Mammals		
Bos taurus Domestic Cattle [16]		Species or species habitat likely to occur within area
Canis lupus familiaris Domestic Dog [82654]		Species or species habitat likely to occur within area

Name	Status	Type of Presence
Felis catus Cat, House Cat, Domestic Cat [19]		Species or species habitat likely to occur within area
Feral deer Feral deer species in Australia [85733]		Species or species habitat likely to occur within area
Lepus capensis Brown Hare [127]		Species or species habitat likely to occur within area
Mus musculus House Mouse [120]		Species or species habitat likely to occur within area
Oryctolagus cuniculus Rabbit, European Rabbit [128]		Species or species habitat likely to occur within area
Rattus rattus Black Rat, Ship Rat [84]		Species or species habitat likely to occur within area
Vulpes vulpes Red Fox, Fox [18]		Species or species habitat likely to occur within area
Plants		
Asparagus asparagoides Bridal Creeper, Bridal Veil Creeper, Smilax, Florist's Smilax, Smilax Asparagus [22473]		Species or species habitat likely to occur within area
Eichhornia crassipes Water Hyacinth, Water Orchid, Nile Lily [13466]		Species or species habitat likely to occur within area
Genista monspessulana Montpellier Broom, Cape Broom, Canary Broom, Common Broom, French Broom, Soft Broom [20126]		Species or species habitat likely to occur within area
Lycium ferocissimum African Boxthorn, Boxthorn [19235]		Species or species habitat likely to occur within area
Nassella neesiana Chilean Needle grass [67699]		Species or species habitat likely to occur within area
Nassella trichotoma Serrated Tussock, Yass River Tussock, Yass Tussock, Nassella Tussock (NZ) [18884]		Species or species habitat likely to occur within area
Opuntia spp. Prickly Pears [82753]		Species or species habitat likely to occur within area
Pinus radiata Radiata Pine Monterey Pine, Insignis Pine, Wilding Pine [20780]		Species or species habitat may occur within area
Rubus fruticosus aggregate Blackberry, European Blackberry [68406]		Species or species habitat likely to occur within area
Salix spp. except S.babylonica, S.x calodendron & S.x reichardtii Willows except Weeping Willow, Pussy Willow and Sterile Pussy Willow [68497]		Species or species habitat likely to occur within area
Salvinia molesta Salvinia, Giant Salvinia, Aquarium Watermoss, Kariba Weed [13665]		Species or species habitat likely to occur within area

Name	Status	Type of Presence
Senecio madagascariensis		
Fireweed, Madagascar Ragwort, Madagascar Groundsel [2624]		Species or species habitat likely to occur within area
Solanum elaeagnifolium		
Silver Nightshade, Silver-leaved Nightshade, White Horse Nettle, Silver-leaf Nightshade, Tomato Weed, White Nightshade, Bull-nettle, Prairie-berry, Satansbos, Silver-leaf Bitter-apple, Silverleaf-nettle, Trompillo [12323]		Species or species habitat likely to occur within area

Caveat

The information presented in this report has been provided by a range of data sources as acknowledged at the end of the report.

This report is designed to assist in identifying the locations of places which may be relevant in determining obligations under the Environment Protection and Biodiversity Conservation Act 1999. It holds mapped locations of World and National Heritage properties, Wetlands of International and National Importance, Commonwealth and State/Territory reserves, listed threatened, migratory and marine species and listed threatened ecological communities. Mapping of Commonwealth land is not complete at this stage. Maps have been collated from a range of sources at various resolutions.

Not all species listed under the EPBC Act have been mapped (see below) and therefore a report is a general guide only. Where available data supports mapping, the type of presence that can be determined from the data is indicated in general terms. People using this information in making a referral may need to consider the qualifications below and may need to seek and consider other information sources.

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

Threatened, migratory and marine species distributions have been derived through a variety of methods. Where distributions are well known and if time permits, maps are derived using either thematic spatial data (i.e. vegetation, soils, geology, elevation, aspect, terrain, etc) together with point locations and described habitat; or environmental modelling (MAXENT or BIOCLIM habitat modelling) using point locations and environmental data layers.

Where very little information is available for species or large number of maps are required in a short time-frame, maps are derived either from 0.04 or 0.02 decimal degree cells; by an automated process using polygon capture techniques (static two kilometre grid cells, alpha-hull and convex hull); or captured manually or by using topographic features (national park boundaries, islands, etc). In the early stages of the distribution mapping process (1999-early 2000s) distributions were defined by degree blocks, 100K or 250K map sheets to rapidly create distribution maps. More reliable distribution mapping methods are used to update these distributions as time permits.

Only selected species covered by the following provisions of the EPBC Act have been mapped:

- migratory and
- marine

The following species and ecological communities have not been mapped and do not appear in reports produced from this database:

- threatened species listed as extinct or considered as vagrants
- some species and ecological communities that have only recently been listed
- some terrestrial species that overfly the Commonwealth marine area
- migratory species that are very widespread, vagrant, or only occur in small numbers

The following groups have been mapped, but may not cover the complete distribution of the species:

- non-threatened seabirds which have only been mapped for recorded breeding sites
- seals which have only been mapped for breeding sites near the Australian continent

Such breeding sites may be important for the protection of the Commonwealth Marine environment.

Coordinates

-35.0661 147.35279

Acknowledgements

This database has been compiled from a range of data sources. The department acknowledges the following custodians who have contributed valuable data and advice:

- [-Office of Environment and Heritage, New South Wales](#)
- [-Department of Environment and Primary Industries, Victoria](#)
- [-Department of Primary Industries, Parks, Water and Environment, Tasmania](#)
- [-Department of Environment, Water and Natural Resources, South Australia](#)
- [-Department of Land and Resource Management, Northern Territory](#)
- [-Department of Environmental and Heritage Protection, Queensland](#)
- [-Department of Parks and Wildlife, Western Australia](#)
- [-Environment and Planning Directorate, ACT](#)
- [-Birdlife Australia](#)
- [-Australian Bird and Bat Banding Scheme](#)
- [-Australian National Wildlife Collection](#)
- Natural history museums of Australia
- [-Museum Victoria](#)
- [-Australian Museum](#)
- [-South Australian Museum](#)
- [-Queensland Museum](#)
- [-Online Zoological Collections of Australian Museums](#)
- [-Queensland Herbarium](#)
- [-National Herbarium of NSW](#)
- [-Royal Botanic Gardens and National Herbarium of Victoria](#)
- [-Tasmanian Herbarium](#)
- [-State Herbarium of South Australia](#)
- [-Northern Territory Herbarium](#)
- [-Western Australian Herbarium](#)
- [-Australian National Herbarium, Canberra](#)
- [-University of New England](#)
- [-Ocean Biogeographic Information System](#)
- [-Australian Government, Department of Defence](#)
- [Forestry Corporation, NSW](#)
- [-Geoscience Australia](#)
- [-CSIRO](#)
- [-Australian Tropical Herbarium, Cairns](#)
- [-eBird Australia](#)
- [-Australian Government – Australian Antarctic Data Centre](#)
- [-Museum and Art Gallery of the Northern Territory](#)
- [-Australian Government National Environmental Science Program](#)
- [-Australian Institute of Marine Science](#)
- [-Reef Life Survey Australia](#)
- [-American Museum of Natural History](#)
- [-Queen Victoria Museum and Art Gallery, Inveresk, Tasmania](#)
- [-Tasmanian Museum and Art Gallery, Hobart, Tasmania](#)
- Other groups and individuals

The Department is extremely grateful to the many organisations and individuals who provided expert advice and information on numerous draft distributions.

Please feel free to provide feedback via the [Contact Us](#) page.

APPENDIX E MNES HABITAT ASSESSMENT

Name	Habitat	Habitat Present	Likelihood of occurrence	Potential for impact?
FAUNA				
Australian Bittern <i>Botaurus poiciloptilus</i>	Permanent freshwater wetlands with tall, dense vegetation.	Absent – no freshwater wetlands with dense vegetation	Unlikely	No – Unlikely to occur on site
Anthochaera phrygia Regent Honeyeater	A semi-nomadic species occurring in temperate eucalypt woodlands and open forests. Most records are from box-ironbark eucalypt forest associations and wet lowland coastal forests	Present - Box-Gum woodland an associated vegetation community	Possible – site within known distribution	Yes – Assessment of Significance undertaken
Curlew Sandpiper <i>Calidris ferruginea</i>	Intertidal mudflats in both fresh and brackish waters in sheltered coastal areas, such as estuaries, bays, inlets, and lagoons. Also recorded inland, including around ephemeral and permanent lakes, dams, and waterholes, usually with bare edges of mud or sand	Absent – no intertidal mudflats	Unlikely	No – Unlikely to occur on site
Painted Honeyeater <i>Grantiella picta</i>	Boree/Weeping Myall, Brigalow, and Box-Gum Woodlands and Box-Ironbark Forests. Specialist feeder on the fruits of mistletoes.	Scattered paddock trees of box-gum woodland. No mistletoes present.	Unlikely – not detected during site surveys. No suitable food sources. (mistletoes)	No – Unlikely to occur on site
White-throated Needletail <i>Hirundapus caudacutus</i>	This migratory terrestrial species occurs in Australia from late spring to early autumn. Found across a range of habitats more often over woodland areas, where it is almost exclusively aerial. Large tracts of native vegetation may be a key	Present – woodland areas within development site.		No – exclusively aerial species unlikely to rely on habitat within proposal area.

Name	Habitat	Habitat Present	Likelihood of occurrence	Potential for impact?
	habitat requirement for this species. Found to roost in tree hollows in tall trees on ridge-tops, on bark or rock faces			
Swift Parrot <i>Lathamus discolor</i>	On the coast and southwest slopes in areas with abundant flowering eucalypts or lerp. Feed trees include winter flowering species such as Swamp Mahogany, Spotted Gum, Red Bloodwood, Mugga Ironbark, and White Box and Lerp infested trees such as Grey Box and Black Butt.	Present	Possible – known records within 10km radius.	Possible, Assessment of significance undertaken
Mallee Fowl <i>Leipoa ocellata</i>	Semi-arid to arid shrublands and low woodlands, especially those dominated by Mallee and/or Acacia which are tall, dense, and floristically rich. A sandy to sandy-loam substrate and abundance of leaf litter are required for breeding.	Absent	Unlikely	No – Unlikely to occur on site
Eastern Curlew <i>Numenius madagascariensis</i>	Large intertidal mudflats often with seagrass beds along sheltered coasts including in estuaries, bays, harbours, inlets, lagoons, and among saltmarshes and mangroves.	Absent	Unlikely	No – Unlikely to occur on site
Superb Parrot <i>Polytelis swainsonii</i>	Box-Gum, Box-Cypress, and Boree Woodlands and River Red Gum Forests. They nest in hollows of large trees in tall open forest or woodland.	Present	Present – recorded during site survey	Yes – Assessment of Significance undertaken
Australian Painted Snipe <i>Rostratula australis</i>	Shallow terrestrial freshwater or occasionally brackish wetlands, including temporary and permanent lakes, swamps, and claypans,	Absent	Unlikely	No – Unlikely to occur on site

Name	Habitat	Habitat Present	Likelihood of occurrence	Potential for impact?
	as well as inundated or waterlogged grassland or saltmarsh, dams, rice crops, sewage farms, and bore drains. Fringes of swamps, dams, and nearby marshy areas with cover of grasses, lignum, low scrub, or open timber. Shallow wetlands with areas of bare wet mud.			
Flathead Galaxias <i>Galaxias rostratus</i>	Still or slow-moving water bodies such as wetlands and lowland streams. Range of habitats including rock and sandy bottoms and aquatic vegetation.	Absent – No waterbodies	Unlikely	No – No suitable habitat
Murray Cod <i>Maccullochella peelii</i>	Wide range of warm water habitat including clear rocky streams, slow flowing turbid rivers, and billabongs, most frequently in main river channel and larger tributaries but occasionally in floodplain channels during floods. Near complex structural cover such as large rocks, woody debris, and overhanging vegetation.	Absent – No waterbodies	Unlikely	No – No suitable habitat
Macquarie Perch <i>Macquaria australasica</i>	Both river and lake habitats; especially the upper reaches of rivers and their tributaries. Clear, deep, rocky holes with plenty of cover including aquatic vegetation, large boulders, large woody debris, and overhanging banks.	Absent – No waterbodies	Unlikely	No – No suitable habitat
Sloane's Froglet <i>Crinia sloanei</i>	Semi-permanent/ephemeral wet areas containing relatively shallow sections with submergent and emergent vegetation.	Absent – No waterbodies or ephemeral wet areas	Unlikely	No – no suitable habitat.

Name	Habitat	Habitat Present	Likelihood of occurrence	Potential for impact?
Southern Bell Frog <i>Litoria raniformis</i>	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.	Absent	Unlikely	No – Unlikely to occur on site.
Corben's Long-eared Bat <i>Nyctophilus corbei</i>	Variety of vegetation types, most commonly Mallee, Bulloke, and Box-dominated communities, but most common in vegetation with distinct canopy and dense understorey. Roost in tree hollows, crevices, and under loose bark.	Absent – No dense understory or distinct canopy.	Unlikely – no suitable habitat.	No – Unlikely to occur on site
Koala <i>Phascolarctos cinereus</i>	Temperate, subtropical and tropical eucalypt woodlands and forests where suitable food trees grow, of which there are more than 70 eucalypt species and 30 non-eucalypt species that are particularly abundant on fertile clay soils.	Present	Unlikely – not detected during site surveys	No – Habitat not critical to the survival of the Koala.
Spotted Tail Quoll <i>Dasyurus maculatus</i>	Recorded across a range of habitat types, including rainforest, open forest, woodland, coastal heath and inland riparian forest, from the sub-alpine zone to the coastline. Individual animals use hollow-bearing trees, fallen logs, small caves, rock outcrops and rocky-cliff faces as den sites.	Absent	Unlikely – No suitable habitat	No – Unlikely to occur on site

Name	Habitat	Habitat Present	Likelihood of occurrence	Potential for impact?
Grey-headed Flying-fox <i>Pteropus poliocephalus</i>	Range of vegetation communities including rainforest, open forest, and closed and open woodland. Roost sites usually near water, including lakes, rivers, and coastlines.	Absent	Unlikely – No suitable habitat	No – Unlikely to occur on site
Striped Legless Lizard <i>Delma impar</i>	Found mainly in Natural Temperate Grassland but has also been captured in grasslands that have a high exotic component. Habitat is where grassland is dominated by perennial, tussock-forming grasses such as Kangaroo Grass <i>Themeda australis</i> , spear-grasses <i>Austrostipa</i> spp. and poa tussocks <i>Poa</i> spp., and occasionally wallaby grasses <i>Austrodanthonia</i> spp	Present	Unlikely – not known to occur in area.	No – Unlikely to occur on site
Pink-tailed Worm-lizard <i>Aprasia parapulchella</i>	Inhabits sloping open woodland areas with predominantly native grassy ground layers. Commonly found beneath small, partially-embedded rock.	Absent – no rocky outcrops or partially buried rocks.	Unlikely – No suitable habitat	No – Unlikely to occur on site
FLORA				
A spear-grass <i>Austrostipa wakoolica</i>	Grows on floodplains of the Murray River tributaries, in open woodland on grey, silty clay or sandy loam soils.	Present	Unlikely – development site within known distribution however targeted surveys did not detect this species.	No – not detected within development site
Sand-hill Spider-orchid	Occurs in woodland with sandy soil, especially that's dominated by White Cypress Pine (<i>Callitris glaucophylla</i>).	Absent – No <i>Callitris</i> or Sandy soils in	Unlikely - Highly disturbed understory and no characteristic	No – Unlikely to occur on site

Name	Habitat	Habitat Present	Likelihood of occurrence	Potential for impact?
<i>Caladenia arenaria</i>		development site.	associated species present.	
Small Purple-pea <i>Swainsona recta</i>	Grows in grassy understory of woodlands and open forests dominated by Blakely's Red Gum and Yellow Box.	Present	Unlikely – not detected during site surveys	No – Unlikely to occur on site
Slender Darling-pea <i>Swainsona murrayana</i>	The species has been collected from clay-based soils, ranging from grey, red and brown cracking clays to red-brown earths and loams. Grows in a variety of vegetation types including bladder saltbush, black box and grassland communities on level plains, floodplains and depressions and is often found with <i>Maireana</i> species. Plants have been found in remnant native grasslands or grassy woodlands that have been intermittently grazed or cultivated.	Absent – Not within associated vegetation communities	Unlikely – nearest known records ~100 km West, south of Narrandera. Highly disturbed understory.	No – Unlikely to occur on site
Tarengo Leek Orchid <i>Prasophyllum petilum</i>	Grows in grassy woodland with river tussock, Black Gum and Leptospermum sp	Absent – Associated species not present	Unlikely – Proposal area not within known distribution.	No – Unlikely to occur on site
Endangered Ecological Community				
Grey Box Grassy Woodlands and Derived Native Grasslands of South-eastern Australia	Characterised by a tree canopy is dominated ($\geq 50\%$ canopy crown cover) by <i>Eucalyptus microcarpa</i> (Grey Box).	Absent – No Grey Box present in study area	Unlikely – No characteristic tree species present	No – Does not occur in development site
Weeping Myall Woodlands	Occurs in a range from open woodlands to woodlands, generally 4-12 m high, in which Weeping Myall (<i>Acacia pendula</i>) trees are the sole or dominant overstorey species	Absent No Weeping Myall (<i>Acacia pendula</i>) in study area.	Unlikely – No characteristic tree species present	No – Does not occur in development site

Name	Habitat	Habitat Present	Likelihood of occurrence	Potential for impact?
White Box – Yellow Box – Blakely's Red Gum Grassy Woodland and Derived Native Grassland.	Characterised by the presence or prior occurrence of White Box, Yellow Box and/or Blakely's Red Gum.	Present	Unlikely – Exotic and highly disturbed groundcover does not meet the condition threshold for the community.	No – Does not occur in development site

APPENDIX F EPBC ASSESSMENT OF SIGNIFICANT IMPACT

The *Environment Protection and Biodiversity Conservation Act 1999* specifies factors to be taken into account in deciding whether a development is likely to significantly affect Endangered Ecological Communities, threatened species and migratory species, listed at the Commonwealth level. The *Matters of Environmental Significance – Significant Impact Guidelines* (DoE 2013) identify the factors the need to be considered.

CRITICALLY ENDANGERED AND ENDANGERED SPECIES

The following assessment assesses the significance of the likely impacts associated with the proposed works on these endangered and critically endangered species:

- Swift Parrot – Critically Endangered
- Regent Honeyeater – Critically Endangered

a) Will the action lead to a long-term decrease in the size of a population of a species?

Swift Parrot

Potential foraging habitat for the Swift Parrot occurs within the development site and would be removed by the proposal. Surveys did not detect the Swift Parrot, however this species has been previously recorded within a 10km radius in the grounds of CSU and so the development site is considered known habitat. The proposal is not located in a mapped important area for this species.

The proposal would involve the removal of around 2.2 ha of vegetation, comprising around 0.7 ha of planted vegetation, and 1.5 ha of derived grassland. No hollow bearing trees would be removed. The quality of foraging habitat for these species is low to moderate, being largely cleared and dominated by Red Grass (*Bothriochloa macra*) and native plantings along the boundary of the development site. In this context, the proposal would not lead to a long-term decrease in the size of a population of these species.

Regent Honeyeater

The Regent Honeyeater is considered to occur as a single population throughout its range. No known records occur within the development site and they were not detected during the site surveys. The development site is not considered known habitat but provides potential foraging habitat.

The proposal would involve the removal of around 0.7 ha of planted Yellow Box Woodland. There would also be some disturbance associated with construction, including noise, vibration, light. The quality of potential habitat for these species is low, being highly disturbed from past clearing. Given the relatively small amount of habitat to be removed, and with the recommended mitigation measures, the likelihood of the proposal leading to a long-term decrease in the size of a population of this species is minimal.

b) Will the action reduce the area of occupancy of the species?

Swift Parrot

The proposal would involve the removal of around 2.2 ha of foraging habitat. No hollow bearing trees would be removed. There would also be some disturbance associated with construction. The development site is not within a mapped important area for this species.

The quality of potential habitat for these species is low, and the area of habitat to be removed is relatively small. In this context, while removal of this habitat could reduce the area of occupancy, it would not have a significant impact on population of these species.

Regent Honeyeater

The proposal would involve the removal of around 0.7 ha of potential foraging habitat. There would also be some disturbance associated with construction. The development site is not considered known habitat and is not within a mapped important area for this species.

The quality of habitat in the development site is low, being highly fragmented and partially cleared. The area of habitat to be removed is relatively small in the context of the Regent Honeyeaters range across South Eastern Australia. In this context, while removal of this habitat could reduce the area of occupancy, it would not be considered important habitat.

c) Will the action fragment an existing population into two or more populations?

Swift Parrot

The proposal is situated adjacent to Charles Sturt University and the suburb of Estella. The existing university and suburb, and its associated roads and infrastructure, may already contribute to fragmentation of the existing population. However, it is considered unlikely for the proposal to fragment any existing populations of these species. Given that the quality of foraging habitat to be removed is low condition, the area of habitat to be removed is relatively small, and suitable habitat would be retained in the surrounding area.

Regent Honeyeater

The Regent honeyeater population comprises a single population that moves throughout its range of South Eastern Australia. The proposal would involve the removal of around 0.8 ha of potential foraging habitat. There would also be some noise disturbance associated with construction.

The area of habitat to be removed is relatively small in the context of the Regent Honeyeaters range across South-Eastern Australia and would not disrupt movement for the Regent Honeyeater. The proposal would not fragment an existing population of this species into two or more populations.

d) Will the action adversely affect habitat critical to the survival of a species?

Swift Parrot

The Register of Critical Habitat established under the EPBC Act does not list any critical habitat for these species.

Regent Honeyeater

Critical habitat for the survival of the Regent Honeyeater listed in the national recovery plan includes

- any breeding or foraging habitat where the species is likely to occur (as defined by the distribution map)
- Any newly discovered breeding or foraging locations

The development site falls within the mapped areas of where this species is likely to occur but not within a key breeding area. 0.8 ha of habitat would be removed; however, this vegetation is of low habitat quality comprised of smaller isolated patches within a cleared and disturbed landscape.

e) Will the action disrupt the breeding cycle of a population?

Swift Parrot

Swift Parrots breed between September and January in the hollows of large old trees in Tasmania. The proposal does not occur in Tasmania and would not involve the removal of hollow bearing trees. Around 2.2 ha of potential foraging habitat would be removed as a result of the proposal. There would also be some disturbance associated with construction.

The development site is not within a mapped important area for this species (OEH, 2018). The quality of potential habitat is low, and no breeding habitat would be removed. It is considered that the proposal would not disrupt the breeding cycle of an important population of these species.

Regent Honeyeater

Four key breeding areas occur in the known range of the Regent Honeyeater. The development site is not within a known breeding area for the Regent Honeyeater; thus, the proposal is unlikely to disrupt the breeding cycle of the species.

f) Will the action modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline?

Swift Parrot

The action is proposed to remove approximately 2.2 ha of potential foraging habitat. This is comprised of around 0.70 ha of planted vegetation, and 1.5 ha of derived grassland. No hollow bearing trees would be removed.

The development site is considered known habitat; however, it is not within a mapped important area for this species. The quality of potential foraging habitat is low, and the area of habitat to be removed is relatively small. With the implementation of the recommended mitigation measures, the proposal would not modify, destroy, remove, isolate, or decrease the availability or quality of habitat to the extent that a population of this species would be likely to decline.

Regent Honeyeater

The proposal would involve the removal of around 0.7 ha of potential foraging habitat, comprised of small isolated of planted Yellow Box Woodland. This habitat is considered low quality having been partially cleared and degraded from intense agricultural activities. There would also be some disturbance associated with construction, which could decrease the quality of some habitat in the short-term. The development site is not considered known habitat and is considered potential foraging habitat only.

While the proposal may reduce the availability of habitat, this habitat is considered low quality. The likelihood of the action modifying, destroying, removing, isolating, or decreasing the availability or quality of habitat to the extent that these species would be likely to decline is minimal.

g) Will the action result in invasive species that are harmful to a critically endangered or endangered species becoming established in the endangered / critically endangered species habitat?

Swift Parrot and Regent Honeyeater

The proposal will modify the current land use, potentially creating additional shelter habitat for predatory invasive species such as foxes and cats, which are considered likely to be locally prevalent regardless of the proposal. These species are already widespread in the local environment and the proposal is not anticipated to increase the numbers of feral pest animals.

There is a risk that invasive weeds could be established and spread within the site via seeds or plant parts on machinery during construction and via visitors during operation. However, with the recommended mitigation measures of cleaning construction equipment and machinery prior to entering the site, and monitoring cleared areas for weed growth, the action is unlikely to result in the establishment of harmful invasive species within these species' habitat.

h) Will the action introduce disease that may cause the species to decline?

Swift Parrot and Regent Honeyeater

There is a risk that pathogens could be established and spread within the site via machinery during construction. However, with the recommended mitigation measures of cleaning construction equipment and machinery prior to entering the site, the action is unlikely to introduce any disease which may cause these species to decline.

i) Will the action interfere with the recovery of the species?

Swift Parrot

The National Recovery Plan for the Swift Parrot lists the following objectives:

1. To identify and prioritise habitats and sites used by the species across its range, on all land tenures.
2. To implement management strategies to protect and improve habitats and sites on all land tenures.

3. To monitor and manage the incidence of collisions, competition and Beak and Feather Disease (BFD).
4. To monitor population trends and distribution throughout the range.
1. Enhance the condition of habitat across the Regent Honeyeater range to maximise survival and reproductive success and provide refugia during periods of extreme environmental fluctuation.

The proposal would not interfere with any of these objectives.

Regent Honeyeater

The National Recovery Plan for the Regent Honeyeater lists the following objectives;

1. Reverse the long-term population trend to decline and increase the number of regent honeyeaters to a level where there is a viable, wild breeding population even in poor breeding years.
2. Enhance the condition of habitat across the regent honeyeater ranges to maximise survival and reproductive success and provide refugia during periods of extreme environmental fluctuation.

The proposal would not interfere with any of these objectives.

Conclusion

A significant impact to these species is considered unlikely, on the basis that the proposal would not:

- Lead to a reduction of the size that would cause the species to decline
- Reduce the area of occupancy of the species that would cause the species to decline
- Fragment the population of these species
- Disrupt the breeding cycle of a population.
- Affect habitat critical to the survival of these species.
- Affect habitat or introduce disease such that these species would decline.
- Introduce / substantively exacerbate invasive species harmful to the species.
- Interfere with the recovery of these species.

A referral to the Federal DOEE is not considered necessary.

VULNERABLE SPECIES

The following assessment assesses the significance of the likely impacts associated with the proposed works on these vulnerable species:

- Superb Parrot - Vulnerable

a) Will the action lead to a long-term decrease in the size of an important population of a species?

Superb Parrot

Potential foraging habitat for the Superb Parrot occurs within the development site and would be removed by the proposal. Surveys did detect the Superb Parrot and so the development site is considered known habitat. An important population is a population that is necessary for a species long term survival. The two superb parrots identified in the development site are not considered an important population as they; are not identified in the recovery plan as an important population, are not breeding within the development site (due to the absence of hollow bearing trees), highly mobile species that are not maintaining genetic diversity of the population and they are not near the limit of their species range. The proposal is not located in an important population of these species.

The proposal would involve the removal of around 2.2 ha of vegetation, comprising around 0.7 ha of planted vegetation, and 1.5 ha of derived grassland. No hollow bearing trees would be removed. The quality of

foraging habitat for these species is low to moderate, being largely cleared and dominated by Red Grass and native plantings along the boundary of the development site. In this context, the proposal would not lead to a long-term decrease in the size of an important population of these species.

b) Will the action reduce the area of occupancy of an important population of a species?

Superb Parrot

The proposal would involve the removal of around 2.2 ha of vegetation, comprising around 0.7 ha of planted vegetation, and 1.5 ha of derived grassland. No hollow bearing trees would be removed. There would also be some disturbance associated with construction. The development site is not within a known important population of these species.

The quality of potential habitat for these species is low, and the area of habitat to be removed is relatively small. In this context, while removal of this habitat could reduce the area of occupancy, it would not have a significant impact on an important population of these species.

c) Will the action fragment an existing important population into two or more populations?

Superb Parrot

The proposal is situated adjacent to Charles Sturt University and the suburb of Estella. The existing university and suburb, and its associated roads and infrastructure, may already contribute to fragmentation of the existing population. However, it is considered unlikely for the proposal to fragment any existing populations of these species. Given that the quality of foraging habitat to be removed is low condition, the area of habitat to be removed is relatively small, and suitable habitat would be retained within the development area.

d) Will the action adversely affect habitat critical to the survival of a species?

Superb Parrot

The Register of Critical Habitat established under the EPBC Act does not list any critical habitat for these species.

e) Will the action disrupt the breeding cycle of an important population?

Superb Parrot

Superb Parrots breed between September and January in the hollows of large trees, which may be dead or alive. The proposal would not involve the removal of hollow bearing trees which provide potential breeding habitat. Around 2.2 ha of potential foraging habitat would be removed as a result of the proposal. There would also be some disturbance associated with construction.

The development site is not within a known important population of these species. The quality of potential habitat is low, and no breeding habitat would be removed. It is considered that the proposal would not disrupt the breeding cycle of an important population of these species.

f) Will the action modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline?

Superb Parrot

The action is proposed to remove approximately 2.2 ha of potential foraging habitat. No hollow bearing trees would be removed.

The development site is considered known habitat; however, it is not within a known important population of these species. The quality of potential foraging habitat is low, and the area of habitat to be removed is relatively small. With the implementation of the recommended mitigation measures, the proposal would not modify, destroy, remove, isolate, or decrease the availability or quality of habitat to the extent that an important population of these species would be likely to decline.

g) Will the action result in invasive species that are harmful to a vulnerable species becoming established in the vulnerable species' habitat?

Superb Parrot

There is a risk that invasive weeds could be established and spread within the site via seeds or plant parts on machinery during construction and via visitors during operation. However, with the recommended mitigation measures of cleaning construction equipment and machinery prior to entering the site, and monitoring cleared areas for weed growth, the action is unlikely to result in the establishment of harmful invasive species within these species' habitat.

h) Will the action introduce disease that may cause the species to decline?

Superb Parrot

There is a risk that pathogens could be established and spread within the site via machinery during construction. However, with the recommended mitigation measures of cleaning construction equipment and machinery prior to entering the site, the action is unlikely to introduce any disease which may cause these species to decline.

i) Will the action interfere substantially with the recovery of the species?

Superb Parrot

The National Recovery Plan for Superb Parrot lists the following specific objectives:

1. Determine population trends in the Superb Parrot.
2. Increase the level of knowledge of the Superb Parrot's ecological requirements.
3. Develop and implement threat abatement strategies.
4. Increase community involvement in and awareness of the Superb Parrot recovery program.

The proposal would not interfere with any of these objectives.

APPENDIX G BAM CALCULATOR CREDIT REPORT

BAM Credit Summary Report

Proposal Details

Assessment Id	Proposal Name	BAM data last updated *
00013206/BAAS18074/19/00013207	Estella Primary School	30/10/2019
Assessor Name	Report Created	BAM Data version *
Julie Gooding	01/11/2019	16
Assessor Number	BAM Case Status	Date Finalised
BAAS18074	Finalised	01/11/2019
Assessment Revision	Assessment Type	
0	Major Projects	

* 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	Vegetation integrity loss / gain	Area (ha)	Constant	Species sensitivity to gain class (for BRW)	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_Derivedgrass land_low	7.3	1.3	0.25	High Sensitivity to Potential Gain	2.00	TRUE	0

BAM Credit Summary Report

2	277_Derivedgrass land_mod	25.2	0.2	0.25	High Sensitivity to Potential Gain	2.00	TRUE	2
3	277_plantedmatu re	26.8	0.4	0.25	High Sensitivity to Potential Gain	2.00	TRUE	5
4	277_plantedjuven ille	49.9	0.3	0.25	High Sensitivity to Potential Gain	2.00	TRUE	8
							Subtotal	15
							Total	15

Species credits for threatened species

Vegetation zone name	Habitat condition (HC)	Area (ha) / individual (HL)	Constant	Biodiversity risk weighting	Potential SAIL	Species credits
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BAM Biodiversity Credit Report (Like for like)

Proposal Details

Assessment Id	Proposal Name	BAM data last updated *
00013206/BAAS18074/19/00013207	Estella Primary School	30/10/2019
Assessor Name	Assessor Number	BAM Data version *
Julie Gooding	BAAS18074	16
Proponent Names	Report Created	BAM Case Status
NSW Department of Education	01/11/2019	Finalised
Assessment Revision	Assessment Type	Date Finalised
0	Major Projects	01/11/2019

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

Potential Serious and Irreversible Impacts

Name of threatened ecological community	Listing status	Name of Plant Community Type/ID
White Box Yellow Box Blakely's Red Gum Woodland	Endangered Ecological Community	277-Blakely's Red Gum - Yellow Box grassy tall woodland of the NSW South Western Slopes Bioregion

Nil

Additional Information for Approval

PCTs With Customized Benchmarks



BAM Biodiversity Credit Report (Like for like)

No Changes

Predicted Threatened Species Not On Site

No Changes

Ecosystem Credit Summary (Number and class of biodiversity credits to be retired)

Name of Plant Community Type/ID	Name of threatened ecological community	Area of impact	Number of credits to be retired
277-Blakely's Red Gum - Yellow Box grassy tall woodland of the NSW South Western Slopes Bioregion	White Box Yellow Box Blakely's Red Gum Woodland	2.2	15.00

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

Like-for-like credit retirement options

Name of offset trading group	Trading group	HBT	IBRA region
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BAM Biodiversity Credit Report (Like for like)

	White Box Yellow Box Blakely's Red Gum - Woodland This includes PCT's: 2, 74, 75, 83, 250, 266, 267, 268, 270, 274, 275, 276, 277, 278, 279, 280, 281, 282, 283, 284, 286, 298, 302, 312, 341, 342, 347, 350, 352, 356, 367, 381, 382, 395, 403, 421, 433, 434, 435, 436, 437, 451, 483, 484, 488, 492, 496, 506, 508, 509, 510, 511, 528, 538, 544, 563, 567, 571, 589, 590, 597, 599, 618, 619, 622, 633, 654, 702, 703, 704, 705, 710, 711, 796, 797, 799, 840, 847, 851, 921, 1099, 1103, 1303, 1304, 1307, 1324, 1329, 1330, 1331, 1332, 1333, 1334, 1383, 1401, 1512, 1601, 1606, 1608, 1611, 1691, 1693, 1695, 1698		Yes	Lower Slopes, Bogan-Macquarie, Inland Slopes, Lachlan Plains, Murray Fans, Murrumbidgee and Nymagee. or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.

Species Credit Summary

No Species Credit Data

APPENDIX H PERSONNEL

Name	Title	Qualifications	Roles
Dave Maynard	Principal Ecologist	- BAM Accredited Assessor - B Science (Ecology, First Class Honours)	Review of BDAR
Julie Gooding	Environmental Consultant - Ecologist	- BAM Accredited Assessor (BAAS18074) B. Science (Biology)	Field Work including PCT identification, vegetation mapping, vegetation plots and threatened flora surveys. Co-author of BDAR
Jessie Whieldon	Environmental Consultant - Graduate	B. Environmental Science	Field Work Co-author of BDAR
Jess Murphy	Environmental Consultant - Ecologist	B. Science - Master Environmental Science and Management	Field Work
Bridgette Poulton	Environmental Consultant -	B. Science (Biology & Environmental science) - Masters Environmental Science	Field Work
Lisa Hamilton	Environmental Consultant - Ecologist	B. Environmental Science	Field Work