Wee Waa High School Biodiversity Assessment
Biodiversity Development Assessment Report

School Infrastructure NSW

ecological AUSTRALIA
A TETRA TECH COMPANY

1300 646 131
www.ecoaus.com.au

DOCUMENT TRACKING

Project Name	Wee Waa High School Biodiversity Assessment
Project Number	**21SYD** 19423
Project Manager	David Bonjer
Accredited Assessor Certification	 I certify that this report has been prepared in the basis of the requirements of, and information provided under the Biodiversity Assessment Method and s6.15 of the BC Act. In preparing this assessment I have acted consistent with the Accredits BAM Assessor Code of Conduct. I have considered the circumstances and there is no actual or perceived conflict of interest. **Phoebe Smith (BAAS21011)**
Prepared by	Ronnie Hill, Phoebe Smith, Erin Hodgkin
Reviewed by	Meredith Henderson
Approved by	David Bonjer
Status	**Final**
Version Number	**V4**
Last saved on	**27 January 2022**

This report should be cited as 'Eco Logical Australia 2021. *Wee Waa High School Biodiversity Assessment*. Prepared for School Infrastructure NSW.'

ACKNOWLEDGEMENTS

This document has been prepared by Eco Logical Australia Pty Ltd with support from School Infrastructure NSW

Disclaimer
This document may only be used for the purpose for which it was commissioned and in accordance with the contract between Eco Logical Australia Pty Ltd and School Infrastructure NSW. The scope of services was defined in consultation with School Infrastructure NSW, by time and budgetary constraints imposed by the client*, and the availability of reports and other data on the subject area. Changes to available information, legislation and schedules are made on an ongoing basis and readers should obtain up to date information. Eco Logical Australia Pty Ltd accepts no liability or responsibility whatsoever for or in respect of any use of or reliance upon this report and its supporting material by any third party. Information provided is not intended to be a substitute for site specific assessment or legal advice in relation to any matter. Unauthorised use of this report in any form is prohibited.*

Template 2.8.1

Executive Summary

Eco Logical Australia Pty Ltd was engaged by Schools Infrastructure c/- Ontoit to prepare this Biodiversity Development Assessment Report (BDAR). This BDAR was prepared to meet the requirements of the Biodiversity Assessment Method (BAM) 2020 to accompany a State Significant Development Application for Wee Waa High School at 105-107 Mitchell Street, Wee Waa (Lot 1 DP 577294 and Lot 2 DP 550633) in the Narrabri local government area. This report describes the biodiversity values within the development site, describes the impacts and outlines the measures to be taken to avoid, minimise and mitigate impacts to the vegetation and species habitat present within the subject land.

This report has followed the BAM established under Section 6.7 of the *Biodiversity Conservation Act 2016* (BC Act.

The proposed development would clear 1.47ha of native vegetation identified as Plant Community Type (PCT) 40: Coolibah open woodland wetland with chenopod/grassy ground cover on grey and brown clay floodplains which is associated with the threatened ecological community Coolibah open woodland wetland with chenopod/grassy ground cover on grey and brown clay floodplains under the BC Act. This ecological community is also listed as threatened under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act), however only Vegetation Zone (VZ) 2 within the subject land met the key diagnostics required to be considered part of the Commonwealth-listed ecological community. Ecosystem credits related to the impacts proposed for these PCTs are outlined below.

Vegetation Zone	Management Zone	PCT ID	PCT Name	Credit Class	Direct impact (ha)	Credits required
1	-	40	Coolibah open woodland wetland with chenopod/grassy ground cover on grey and brown clay floodplains	Ecosystem Credits (No HBT Cr, TEC)	0.53	9
2	A	40	Coolibah open woodland wetland with chenopod/grassy ground cover on grey and brown clay floodplains	Ecosystem Credits (No HBT Cr, TEC)	0.81	25
2	B (to be managed)	40	Coolibah open woodland wetland with chenopod/grassy ground cover on grey and brown clay floodplains	Ecosystem Credits (No HBT Cr, TEC)	0.13	
				Total	**1.47**	**34**

This vegetation also provides habitat for four threatened flora species which were 'assumed present' within the subject land due to survey period timing constraints. The species credit requirements to offset impacts to habitat for these threatened species are outlined below.

Species	Common Name	Direct impact number of individuals / habitat (ha)	Credits required	Comment
Desmodium campylocaulon	Creeping Tick-trefoil	1.47	34	Assumed present
Digitaria porrecta	Finger Panic Grass	1.47	34	Assumed present
Homopholis belsonii	Belson's Panic	1.47	34	Assumed present
Lepidium monoplocoides	Winged Peppercress	1.47	34	Assumed present

Contents

List of Figures

List of Tables

© ECO LOGICAL AUSTRALIA PTY LTD

Abbreviations

Abbreviation	Description
BAM	Biodiversity Assessment Method
BAMC	Biodiversity Assessment Method Credit Calculator
BC Act	NSW *Biodiversity Conservation Act 2016*
BDAR	Biodiversity Development Assessment Report
BSSAR	Biodiversity Stewardship Site Assessment Report
CEEC	Critically Endangered Ecological Community
DAWE	Commonwealth Department of Agriculture, Water and the Environment
DNG	Derived Native Grassland
DPIE	NSW Department of Planning, Industry and Environment
EEC	Endangered Ecological Community
ELA	Eco Logical Australia Pty Ltd
EP&A Act	NSW *Environmental Planning and Assessment Act 1979*
EPBC Act	Commonwealth *Environment Protection and Biodiversity Conservation Act 1999*
FM Act	NSW *Fisheries Management Act 1994*
GIS	Geographic Information System
GPS	Global Positioning System
IBRA	Interim Biogeographic Regionalisation for Australia
LGA	Local Government Area
LLS	Local Land Service
NSW	New South Wales
NRAR	Natural Resources Assessor Regulatory
PCT	Plant Community Type
SEPP	State Environmental Planning Policy
SSD	State Significant Development
SSI	State Significant Infrastructure
TEC	Threatened Ecological Community
VIS	Vegetation Information System
WM Act	NSW *Water Management Act 2000*

© ECO LOGICAL AUSTRALIA PTY LTD

1. Introduction

This Biodiversity Development Assessment Report (BDAR) has been prepared by Ronnie Hill. It has been peer reviewed and certified by Phoebe Smith, who is an Accredited Person (BAAS21011) to apply the Biodiversity Assessment Method (BAM) under the NSW *Biodiversity Conservation Act 2016* (BC Act). All credit calculations have been undertaken using the BAM Calculator (BAMC) version in case number 00027940/BAAS21011/21/00027941.

Definitions of terminology used throughout this report are presented in Appendix A.

1.1. General description of the subject land

The proposed subject land is defined as the area of land that is subject to the proposed development application (DA). The Study Area is approximately 1.99 ha in size, and the subject land is approximately 1.47 ha in size, and occurs within the Narrabri Shire local government area. The terrain is flat, low lying and would have originally be prone to flooding prior to installation of the towns levee bank. Large open grasslands feature across most of the site, with irregular patches of remnant woodland throughout. A constructed drainage line intersects the subject land from the west to east.

The subject land consists of the following parcels of land:

- 105-107 Mitchell Street, Wee Waa (Lot 1 DP 577294 and Lot 2 DP 550633).

The entirety of the subject land is zoned R1 General Residential under the Narrabri Local Environmental Plan 2012.

This report includes two base maps, the Location Map (Figure 1) and the Site Map (Figure 2).

1.2. Brief description of the proposal

Students and staff were evacuated from the current Wee Waa High School site due to ongoing health issues in late 2020. Students are currently co-located within the town's primary school in an overcrowded site. A Ministerial announcement made on 3 June 2021 committed to the construction of a new High School at Wee Waa on existing Department of Education owned land and adjacent Crown land as an urgent priority. The site is located on Mitchell Street/Kamliaroi Highway and is legally described as Lot 1 DP577294 and Lot 2 DP550633.

This report accompanies a State Significant Development Application which seeks consent for the construction of a new high school in the form of a two-storey building, an Indigenous learning centre, sporting fields, agricultural plots and associated civil and utilities works. The school will service 200 students with potential to grow to a total capacity of 300 students, subject to further funding and service need, and 61 staff. For a detailed project description refer to the EIS prepared by Ethos Urban.

1.3. Construction footprint

The proposed Wee Waa High School will involve the following

- Construction of buildings and amenities
- Construction footprint indicating clearing associated with temporary construction facilities and infrastructure.

The subject land boundary and final construction footprint are presented in Figure 2.

© ECO LOGICAL AUSTRALIA PTY LTD

1.4. Sources of information used

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

- BioNet Vegetation Classification System (accessed August & October 2021)
- BioNet / Atlas of NSW Wildlife 5 km database search (Department of Planning, Industry and Environment DPIE 2020a) (accessed July 2021)
- Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act) Protected Matters Search Tool 5 km database search (Department of Agriculture, Water and Environment DAWE 2020a) (accessed August 2021)
- Threatened species profiles and recovery plans (accessed October 2021)
- Biodiversity Assessment Methodology Calculator (accessed October 2021)
- Threatened Biodiversity Data Collection (accessed October 2021)
- NSW Government Biodiversity Values Map (DPIE 2020c) (accessed on 6 August 2021)
- Previous vegetation mapping datasets
- State Vegetation Type Map: Border Rivers Gwydir / Namoi Region Version 2.0. VIS_ID 4467 (DPIE 2018)
- Threatened species guidelines (accessed October 2021)

1.5. Planning Secretary's Environmental Assessment Requirements

The development of a BDAR was requested as part of the issued SEARs (SSD-21854025) dated July 6, 2021. Parts of the SEARs relevant to this section of the EIS are given in the table below.

Planning Secretary's Environmental Assessment Requirements
Section 4.12(8) of the Environmental Planning and Assessment Act 1979
Schedule 2 of the Environmental Planning and Assessment Regulation 2000

Application Number	SSD-21854025
Project Name	New Wee Waa High School
Location	105-107 Mitchell Street, Wee Waa
Applicant	Department of Education
Date of Issue	6 July 2021
Biodiversity Requirements	Biodiversity • Provide a BDAR, that assesses the biodiversity impacts of the proposed development in accordance with the requirements of the Biodiversity Conservation Act 2016, Biodiversity Conservation Regulation 2017 and Biodiversity Assessment Method, except where a BDAR waiver has been issued in relation to the development or the development is located on biodiversity certified land. • measures to avoid, minimise and if necessary, offset predicted impacts, including detailed contingency plans for managing any significant risks to the environment and triggers for each action.

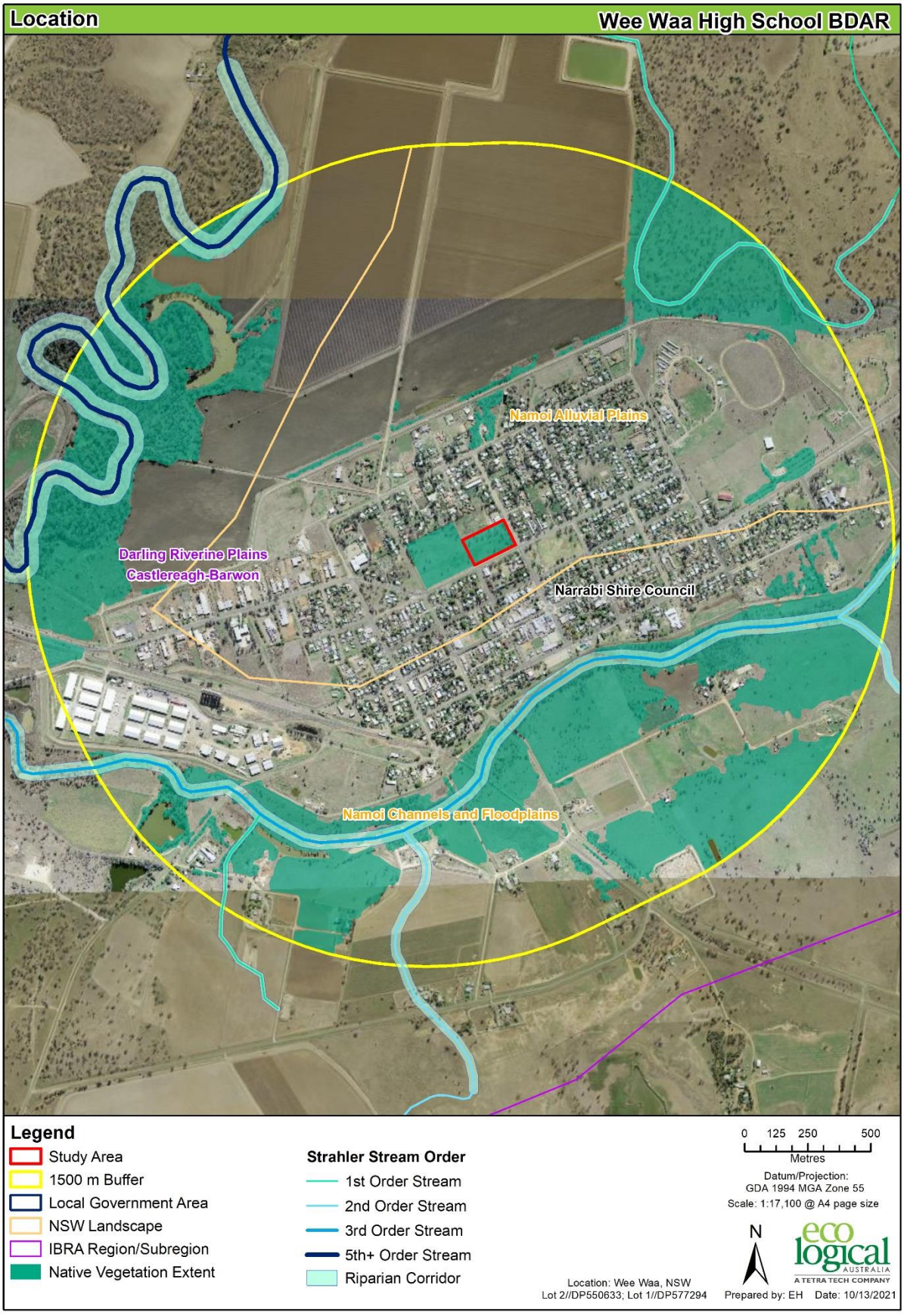


Figure 1: Location map

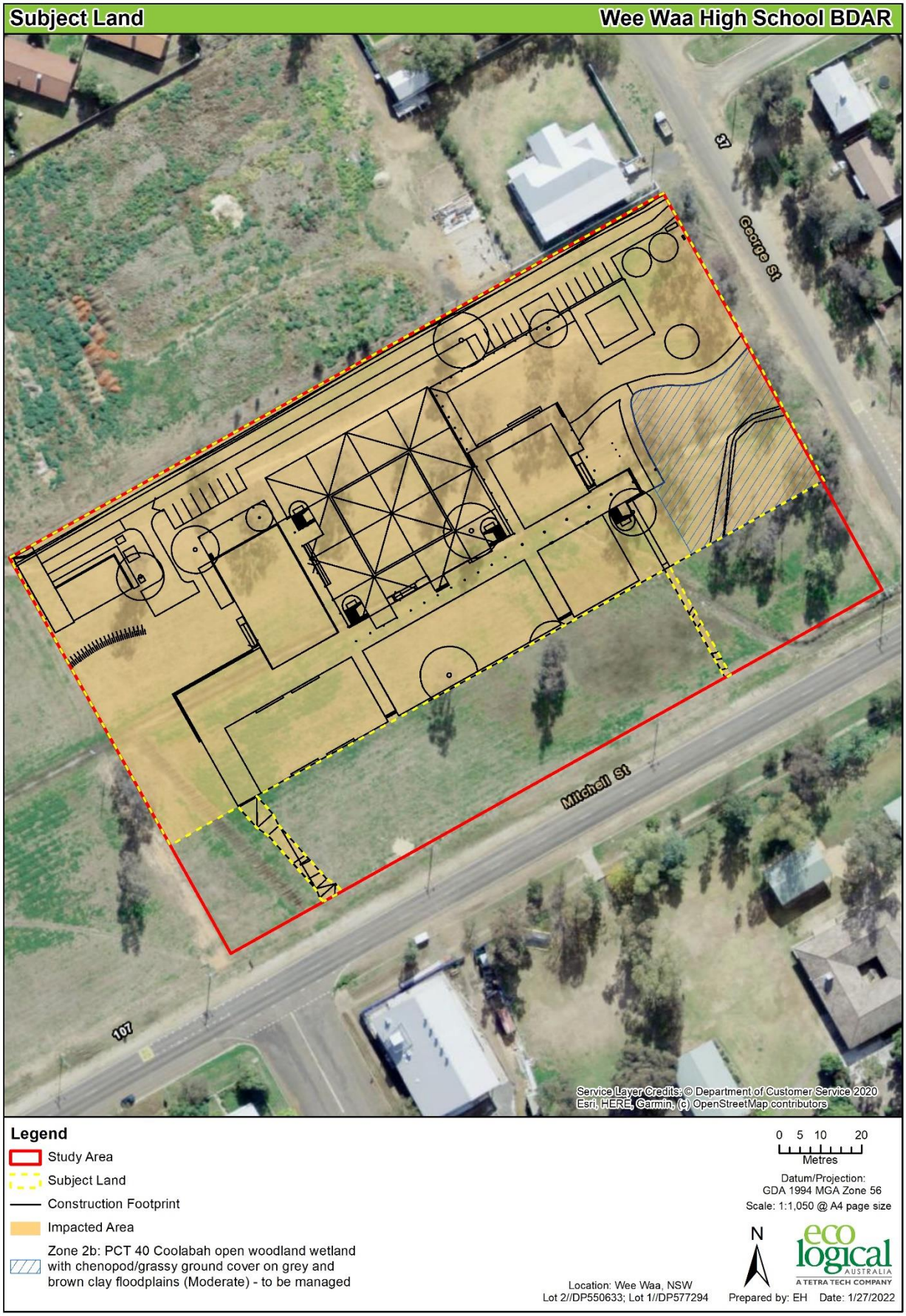


Figure 2: Subject land map

1.6. Legislative context

Legislation relevant to the subject land is outlined in Table 1.

Table 1: Legislative context

Name	Relevance to the project	Report Section
Commonwealth		
Environment Protection and Biodiversity Conservation Act 1999	Matters of national Environmental Significance have been identified on or near the subject land. This report assesses impacts to MNES and concludes that the development is not likely to have a significant impact on MNES.	MNES are addressed in Section 2.6
State		
Environmental Planning and Assessment Act 1979	The proposed development is to be assessed under Part 4.3 of the EP&A Act (Development that needs consent (except complying development)). The land is zoned as R1 General Residential, though is a prescribed zone under the State Environmental Planning Policy (Educational Establishments and Child Care Facilities) 2017 (Education SEPP).As such the development will also be considered under the Education SEPP as Development Permitted with Consent as well as in accordance with the State Environmental Planning Policy (State and Regional Development) 2011 (State and Regional SEPP) (outlined in the Education SEPP and State and Regional SEPP below respectively). The development of a BDAR was requested as part of the issued SEARs (SSD-21854025) dated 6 July 2021.	Biodiversity values are assessed in Section 1. Impacts Are assessed in Sections 2.
Biodiversity Conservation Act 2016	The proposed development is a SSD and therefore requires submission of a Biodiversity Development Assessment Report.	This report is a BDAR prepared in accordance with the BAM (2020).
Fisheries Management Act 1994	The development does not involve impacts to Key Fish Habitat, does not involve harm to marine vegetation, dredging, reclamation or obstruction of fish passage. A permit or consultation under the FM Act is not required.	N/A
Local Land Services Amendment Act 2016	The LLS Act does not apply to areas of the state to which the SEPP Vegetation applies. The Vegetation SEPP applies to R1 zoned land within the Narrabri local government area.	N/A
Water Management Act 2000	The project does not involve works on waterfront land. A Controlled Activity Approval under s91 of the WM Act is not required.	N/A
Environmental Planning Instruments		
SEPP (State and Regional Development) 2011	The proposed development is permitted with consent under Part 4 of the EP&A Act and is included under Schedule 1 of this SEPP. The proposed development is identified as an SSD under this SEPP.	-
SEPP (Educational Establishments and Child Care Facilities) 2017	The proposed development falls under this SEPP as the land is a prescribed zone under the SEPP. Exempt development or develop permitted without consent only applies to areas under this SEPP where a school already exists. Complying development does not apply to the proposed development as MNES exist within the DA boundary, in addition to the site being previously identified as 'flood affected'.	-

Name	Relevance to the project	Report Section
	The proposed development thus falls under development permitted with consent as per Clause 35 of the Education SEPP, following the panning pathways within the State and Regional SEPP.	
Koala SEPP 2021 – Koala Habitat Protection (2021)	The proposed development is located within an LGA where the SEPP 2021 applies. However, the SEPP 2021 only applies to developments where council is the determining authority and therefore does not apply to the proposed development.	-
Narrabri Local Environment Plan (2012)	The subject site is zoned R1 General Residential under the Narrabri LEP. Under the LEP 2012 educational facilities are prohibited within the R1 Zone, however as the R1 zone is a prescribed zone under the Education SEPP this land use is permitted.	-
Wee Waa Levee Risk Management Plan and Study Report (2019)	Whilst the site is not identified as being on flood prone land through the Narrabri LEP 2012 or SEED Mapping, the referenced report has identified previous flooding at the proposed subject land. A suitable report should be commissioned to identify inconsistencies in the planning documents and resolve the flood mapping.	-

2. Landscape features

The site-based method was applied for this assessment; therefore, the assessment area is the 1,500 m buffer surrounding the outside edge of the boundary of the subject land.

The landscape features considered for this assessment are presented in Table 2, Figure 1 and Figure 2.

Table 2: Landscape features

Landscape feature	Subject Land	Data source
IBRA Region(s)	Darling Riverine Plains	Interim Biogeographic Regionalisation for Australia, Version 7
IBRA subregion(s)	Castlereagh Barwon	Interim Biogeographic Regionalisation for Australia, Version 7
Rivers and streams	The subject land does not contain any rivers or streams.	NSW LPI Waterway mapping
Estuaries and wetlands	The subject land does not contain any estuaries or wetlands.	NSW directory of important wetlands
Connectivity of different areas of habitat	The subject land does not contain connectivity to different areas of habitat as it is located approximately 250m north of the Wee Waa CBD and is surrounded by residential housing. The nearest patch of native vegetation is approximately 400 m to the north east.	Aerial imagery
Geological features of significance and soil hazard features	The subject land does not contain areas of geological significance and soil hazard features.	Aerial imagery, site inspection, geological maps
Areas of Outstanding Biodiversity Value	The subject land does not occur within a registered AoBV	Register of Declared Areas of Outstanding Biodiversity Value (DPIE 2020)
NSW (Mitchell) Landscapes	Namoi Alluvial Plains	NSW (Mitchell) Landscapes - version 3.1 (DPIE 2016)
Additional features required to be assessed	Nil	N/A
Percent (%) native vegetation extent	There are no differences between the mapped vegetation extent and the aerial imagery. The development footprint is approximately 1.99 ha and contains 1.99 ha of native vegetation The assessment area is approximately 878 ha and contains approximately 232 ha of native vegetation (26.4%).	Calculated using aerial imagery and ArcGIS software

3. Native Vegetation

3.1. Survey Effort

Vegetation survey was undertaken within the subject land by ELA ecologist Ronnie Hill on 2nd & 3rd August 2021 and Matt Elsley on 30th September and 1st October. Random meander surveys similar to that described in Cropper (1993) were undertaken to identify PCTs and stratify them into vegetation zones based on condition (Figure 3).

A total of two full floristic vegetation integrity plots in accordance with BAM 2020 were surveyed to identify Plant Community Types (PCTs) and Threatened Ecological Communities (TECs) on the subject land (Table 3). All field data collected at full-floristic and vegetation integrity plots is included in Appendix B.

Table 3: Full-floristic PCT identification plots

PCT ID	PCT Name	Number of plots surveyed
40	Coolibah open woodland wetland with chenopod/grassy ground cover on grey and brown clay floodplains	2

3.2. Native vegetation extent on the subject land

There were no differences between extent of vegetation mapped and that shown in the imagery. Imagery was sourced from Six Maps.

3.3. Plant Community Types present

The vegetation on the subject land was mostly degraded. One PCT consisting of two condition types were identified on the subject land (Table 4, Table 6, Figure 3).

Table 4: Plant Community Types

PCT ID	PCT Name	Vegetation Class	Vegetation Formation	Area	Percent cleared
40	Coolibah open woodland wetland with chenopod/grassy ground cover on grey and brown clay floodplains	North-west Floodplain Woodlands	Semi-arid Woodlands (Grassy sub-formation)	1.47	63

3.3.1. Plant Community Type selection justification

Random meander surveys identified that the patch of vegetation on the subject land was consistent with native vegetation. The dominant woody vegetation across the site consisted of the canopy species *Eucalyptus coolibah* (Coolibah), and mid-storey species, *Acacia salicina* (Cooba) and *Myoporum montanum* (Water Bush). The understory was dominated by the native grasses, *Dichanthium sericeum*

subsp. *sericeum* (Queensland Bluegrass), *Enteropogon acicularis* (Curly Windmill Grass) and sub shrubs *Salsola australis* and *Sclerolaena* spp. Herbs and Forbs present were *Marsilea drummondii* (Common Nardoo), *Alternanthera angustifolia* and *Bulbine bulbosa* (Bulbine Lily).

Justification features for the selection of the PCT occurring on the subject land is based on several features. The soil landscape, elevation, analysis of key representative species, previous vegetation mapping was used to determine the 'best-fit' PCT for the native vegetation within the subject land.

Previous vegetation mapping published by (DPIE 2018) noted the subject land area as non-native vegetation. Five other PCTs were mapped within the assessment area, including:

- PCT 36 *'River Red Gum tall to very tall open forest / woodland wetland on rivers on floodplains mainly in the Darling Riverine Plains Bioregion'*
- PCT 39 *'Coolibah - River Coobah - Lignum woodland wetland of frequently flooded floodplains mainly in the Darling Riverine Plains Bioregion'*
- PCT 53 *'Shallow freshwater wetland sedgeland in depressions on floodplains on inland alluvial plains and floodplains'*
- PCT 241 *'River Coobah swamp wetland on the floodplains of the Darling Riverine Plains Bioregion and Brigalow Belt South Bioregion'*
- PCT 247' '*Lignum shrubland wetland on regularly flooded alluvial depressions in the Brigalow Belt South Bioregion and Darling Riverine Plains Bioregion'*.

The study area's NSW Landscape Namoi Alluvial Plains and its landscape position were also considered.

A review of the 'North-west Floodplain Woodlands' vegetation class containing the species assemblage mentioned within the BioNet tool narrowed the search to two PCTs:

- PCT 39 '*Coolibah - River Coobah - Lignum woodland wetland of frequently flooded floodplains mainly in the Darling Riverine Plains Bioregion'* or
- PCT 40 '*Coolibah open woodland wetland with chenopod/grassy ground cover on grey and brown clay floodplains'*.

PCT 40 '*Coolibah open woodland wetland with chenopod/grassy ground cover on grey and brown clay floodplains*' was the strongest match with PCT 39 being discarded due to the absence of the wetland species, *Duma florulenta* (Lignum) and due to its lower landscape position, which is more prone to inundation. Plot data indicated a similar species assemblage of the grassland areas (no canopy) to that of the patches containing canopy. The entire subject land was identified as containing PCT 40.

3.4. Threatened Ecological Communities

PCT 40 is associated with the Threatened Ecological Community (TEC) '*Coolibah-Black Box Woodland in the Darling Riverine Plains, Brigalow Belt South, Cobar Peneplain and Mulga Lands Bioregions*'. According to the 2011-2012 scientific determination (DPIEa, 2019), areas subjected to tree clearing or ring-barking may have very little or no tree cover. In these areas, typically woodlands containing canopy cover will form mosaics with grasslands containing no canopy, similar to that which occurs within the subject land. Furthermore, the definition states that at any one time, above ground individuals of some species may be absent, but the species may be represented below ground in the soil seed banks or as

dormant structures such as bulbs, corms, rhizomes, rootstocks or lignotubers (DPIEa, 2019). The entire subject land is considered the TEC (Table 5 and Figure 3: Plant Community TypesFigure 4).

This TEC is also listed under the EPBC Act. However, its definition is narrower than the NSW description. The vegetation community patches that contain canopy within the subject land conform to the following condition thresholds:

- the patch size is greater than 5 ha; AND
- crown cover of trees in the patch must be >8; AND
- Coolibah and/or Black Box in the tree canopy must be present in the patch that are either; AND
    - mature trees with a main stem that has a dbh of >30cm; OR
    - hollow-bearing trees (live or dead); OR
    - coppiced trees with a main stem that has a dbh of ≥20 cm.
- Groundlayer is 10% or more of the ground cover comprises native graminoids, other herbs, chenopods and/or native low shrubs' AND
- Exotic species in the ground layer, the percentage cover of non-native perennial plant species does not exceed the percentage cover of native plant species (annual or perennial).

As such only the patches of the vegetation community that contain canopy conform to the EPBC Act listing. This was determined by reviewing the plot data presented in Appendix B and C.

Table 5: Threatened Ecological Communities

PCT ID	BC Act			EPBC Act		
	Listing status	Name	Area (ha)	Listing status	Name	Area (ha)
40	E	Coolibah-Black Box Woodland in the Darling Riverine Plains, Brigalow Belt South, Cobar Peneplain and Mulga Lands Bioregions	1.47	E	Coolibah - Black Box Woodlands of the Darling Riverine Plains and the Brigalow Belt South Bioregions	0.94

3.5. Vegetation integrity assessment

3.5.1. Vegetation zones

A total of two vegetation zones were identified on the subject land based on the broad condition state of each PCT. A total of two vegetation integrity survey plots were collected on the subject land consistent with the BAM (Table 6). Descriptions of vegetation zones are provided in Table 7 to Table 8.

Table 6: Vegetation zones and vegetation integrity survey plots collected on the subject land

Vegetation Zone	PCT ID	PCT Name	Condition	Area (ha)	Patch Size	Vegetation Integrity Survey Plots required	Vegetation Integrity Survey Plots collected
1	40	*Coolibah open woodland wetland with chenopod/grassy ground cover on grey and brown clay floodplains*	No canopy	0.52	6.06	1	1
2	40	*Coolibah open woodland wetland with chenopod/grassy ground cover on grey and brown clay floodplains*	Moderate	0.94	6.06	1	1
			Total	1.46	6.06	2	2

3.5.2. Patch size

Patch size was calculated using available vegetation mapping for all patches of intact native vegetation on and adjoining the subject land. Patch size was assigned to one of four classes (<5 ha, 5-24 ha, 25-100 ha or ≥100 ha). A patch size (6.06ha) 5-24 ha was determined for the subject land.

Table 7: Zone 1 PCT 40 No canopy

PCT 40: - Coolibah open woodland wetland with chenopod/grassy ground cover on grey and brown clay floodplains (No Canopy)			
Vegetation formation/class	North-west Floodplain Woodlands / Semi-arid Woodlands (Grassy sub-formation)		
Conservation status	NSW BC Act EEC: Coolibah open woodland wetland with chenopod/grassy ground cover on grey and brown clay floodplains'		
Description	This community occurs as a cleared area containing no canopy, few shrubs and native and exotic groundcover in the form of native grasses and forbs.		
Characteristic canopy trees	N/A		
Characteristic mid-storey	N/A		
Characteristic groundcovers	*Alternanthera angustifolia, Dichanthium sericeum subsp. sericeum* (Queensland Bluegrass), *Marsilea drummondii* (Common Nardoo), *Sclerolaena spp.*		
Mean native richness	15		
Exotic species / HTW cover	*Chloris gayana* (Rhodes Grass) *Eragrostis curvula* (African Lovegrass)		
Condition	No Canopy		
Variation and disturbance	High level of disturbance, canopy and midstorey species are absent. A number of introduced species are present and in high covers throughout the zone.		
No. sites sampled	1		
Threatened flora species	*Desmodium campylocaulon* (Creeping Tick-trefoil), *Digitaria porrecta* (Finger Panic Grass), *Homopholis belsonii* (Belson's Panic), *Lepidium monoplocoides* (Winged Peppercress)		
Fauna habitats	Cracking soils, flowering herbs and dense grass.		
Composition	**Structure**	**Function**	**Vegetation Integrity Score**
62.1	36.4	15	32.4

Table 8: Zone 2 PCT 40 Moderate

PCT 40: - Coolibah open woodland wetland with chenopod/grassy ground cover on grey and brown clay floodplains (Moderate)	
Vegetation formation/class	North-west Floodplain Woodlands / Semi-arid Woodlands (Grassy sub-formation)
Conservation status	NSW BC Act EEC, 'Coolibah open woodland wetland with chenopod/grassy ground cover on grey and brown clay floodplains', and EPBC Act EEC, 'Coolibah - Black Box Woodlands of the Darling Riverine Plains and the Brigalow Belt South Bioregions'.
Description	This community occurs as remnant scattered patches of woodland across the subject land. The community canopy height ranges from 7-15m. Mid-storey is present in some patches, generally up to 5m tall.
Characteristic canopy trees	*Eucalyptus coolibah* subsp. *coolibah* (Coolibah)
Characteristic mid-storey	*Acacia salicina* (Cooba), *Myoporum montanum* (Western Boobialla)
Characteristic groundcovers	*Alternanthera angustifolia, Dichanthium sericeum subsp. sericeum (Queensland Bluegrass), Marsilea drummondii (Common Nardoo), Sclerolaena spp.*
Mean native richness	21
Exotic species / HTW cover	*Lycium ferocissimum* (African Boxthorn) *Chloris gayana* (Rhodes Grass) *Eragrostis curvula* (African Lovegrass)
Condition	Moderate
Variation and disturbance	Moderate level of disturbance, most patches midstorey species are absent. A number of introduced species are present throughout the zone. Patches are connected via DNG variant of this PCT.
No. sites sampled	1
Threatened flora species	*Desmodium campylocaulon* (Creeping Tick-trefoil), *Digitaria porrecta* (Finger Panic Grass), *Homopholis belsonii* (Belson's Panic), *Lepidium monoplocoides* (Winged Peppercress)
Fauna habitats	Hollow Bearing Trees, annual flowering canopy, native groundcover and midstorey species.

Composition	Structure	Function	Vegetation Integrity Score
70.6	56.5	57.7	61.3

3.5.3. Assessing vegetation integrity

A vegetation integrity assessment using the BAM Calculator (BAMC) was undertaken and the results are outlined in Table 9.

Table 9: Vegetation integrity scores

Veg Zone	PCT ID	Condition	Area (ha)	Composition Condition Score	Structure Condition Score	Function Condition Score	Presence of Hollow bearing trees	Current vegetation integrity score
Zone 1	40	No canopy	0.52	62.1	36.4	15	No	32.4
Zone 2	40	Moderate	0.94	70.6	56.5	57.7	Yes	61.3

3.6. Use of local data

- The use of local data is not proposed for this development

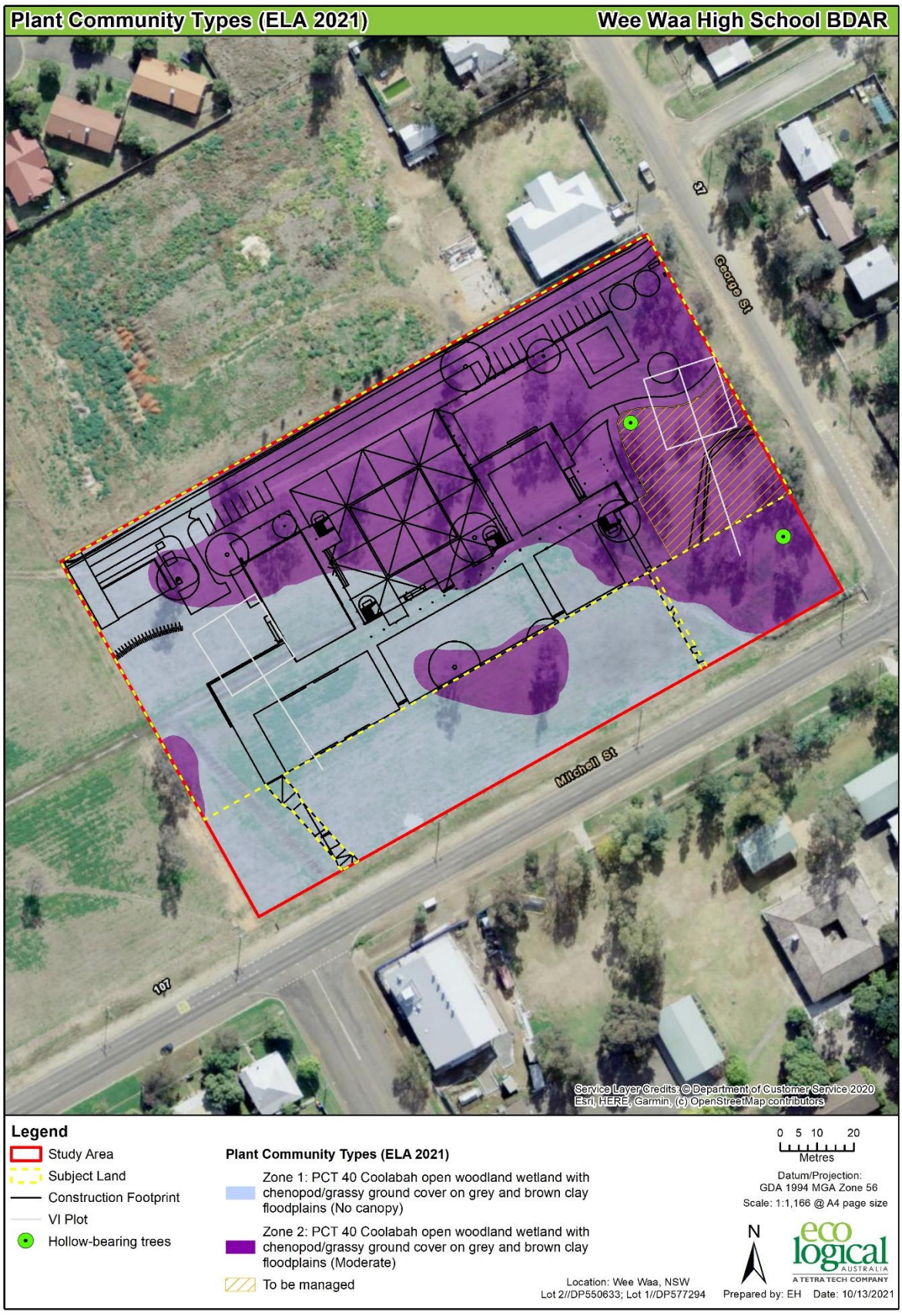


Figure 3: Plant Community Types

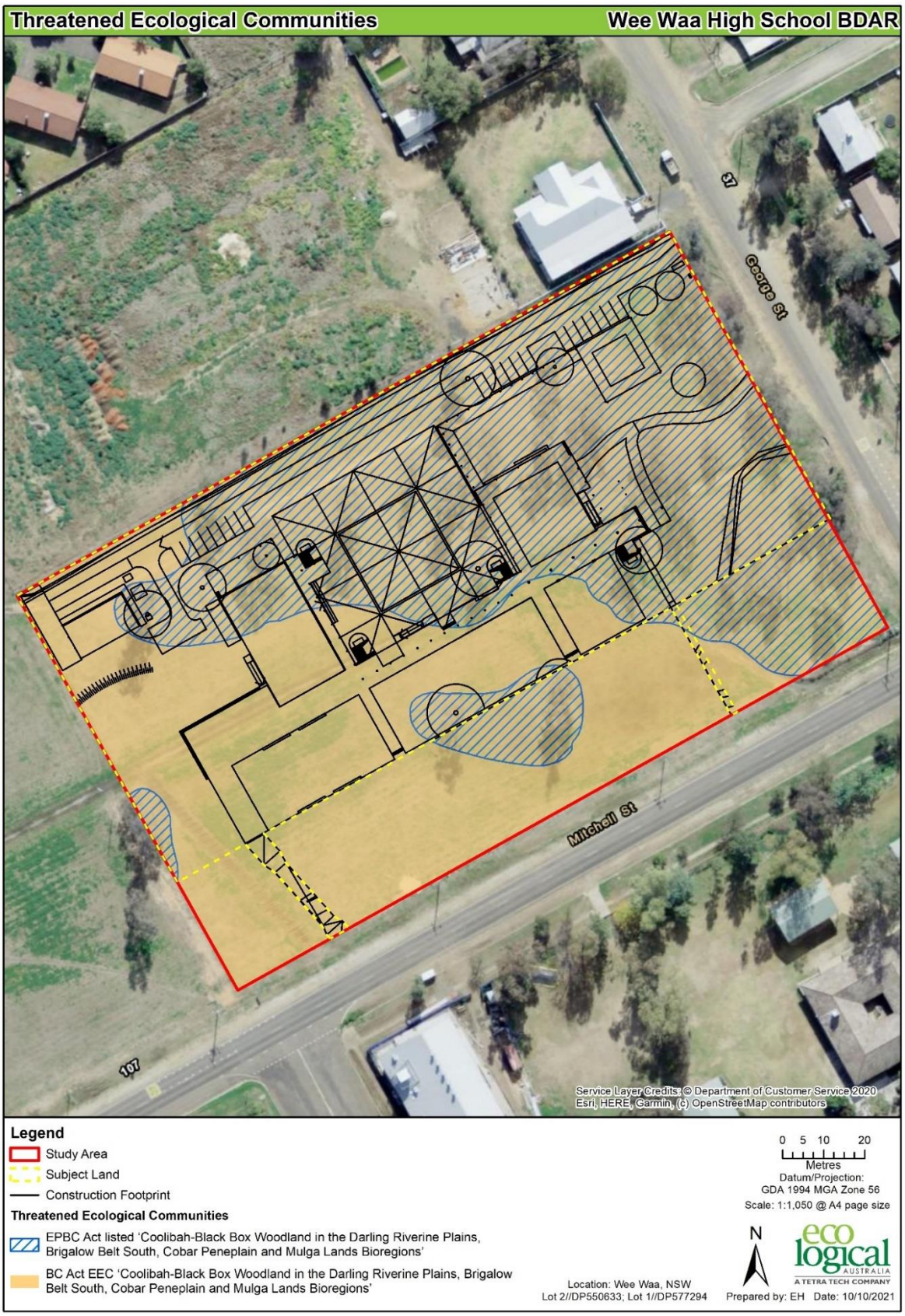


Figure 4: Threatened Ecological Communities

4. Threatened species

4.1. Ecosystem credit species

Ecosystem credit species predicted to occur within the subject land are generated by the BAMC following the input of Vegetation Integrity (VI) data and the PCTs identified within Chapter 3. Ecosystem credit species predicted to occur at the subject land, their associated habitat constraints, geographic limitations, sensitivity to gain class and justification for inclusion / exclusion is included in Table 10.

Table 10: Predicted ecosystem credit species

Species	Common Name	Habitat Constraints	Geographic limitations	Sensitivity to gain class	BC Act listing status	EPBC Act Listing status	Justification for inclusion or exclusion of species
Anomalopus mackayi	Five-clawed Wormskink	Presence of cracking clay soils AND Fallen/standing dead timber Including logs, decomposing logs, tree roots & leaf litter.	-	High	E	V	Included Marginal habitat available.
Anseranas semipalmata	Magpie Goose	-	-	Moderate	V	-	Included Marginal foraging habitat available
Antechinomys laniger	Kultarr	-	-	High	E	-	Included Foraging habitat available.
Artamus cyanopterus cyanopterus	Dusky Woodswallow	-	-	Moderate	V	-	Included Foraging habitat available.
Aspidites ramsayi	Woma	-	-	High	V	-	Included Marginal habitat available.
Calyptorhynchus banksii samueli	Red-tailed Black-Cockatoo (inland subspecies)	-	-	High	V		Included Foraging habitat available.
Certhionyx variegatus	Pied Honeyeater	-	-	Moderate	V	-	Included Foraging habitat available.
Chalinolobus picatus	Little Pied Bat	-	-	High	V		Included Foraging habitat available.
Circus assimilis	Spotted Harrier	-	-	Moderate	V	-	Included Foraging habitat available.
Daphoenositta chrysoptera	Varied Sittella	-	-	Moderate	V	-	Included Foraging habitat available.

© ECO LOGICAL AUSTRALIA PTY LTD

Species	Common Name	Habitat Constraints	Geographic limitations	Sensitivity to gain class	BC Act listing status	EPBC Act Listing status	Justification for inclusion or exclusion of species
Ephippiorhynchus asiaticus	Black-necked Stork	Shallow, open freshwater or saline wetlands or shallow edges of deeper wetlands within 300m of swamps/waterbodies	-	Moderate	E	-	Excluded The subject land is not a wetland within 300m of a swamp or waterbody.
Falco hypoleucos	Grey Falcon	-	-	Moderate	E	-	Included Foraging habitat available.
Falco subniger	Black Falcon	-	-	Moderate	V	-	Included Foraging habitat available.
Grantiella picta	Painted Honeyeater	Mistletoes present at a density of greater than five mistletoes per hectare	-	Moderate	V	-	Included Mistletoes present across the subject land (Excluded from VZ 1 due to no canopy present).
Grus rubicunda	Brolga	-	-	Moderate	V	-	Included Foraging habitat available.
Haliaeetus leucogaster	White-bellied Sea-Eagle	Within 1km of a rivers, lakes, large dams or creeks, wetlands and coastlines	-	High	V	-	Included Subject land is within 1km of a river.
Hamirostra melanosternon	Black-breasted Buzzard	-	-	Moderate	V	-	Included Foraging habitat available.
Hieraaetus morphnoides	Little Eagle	-	-	Moderate	V	-	Included Foraging habitat available.
Hirundapus caudacutus	White-throated Needletail	-	-	High	-	V	Included Foraging habitat available.
Lophochroa leadbeateri	Major Mitchell's Cockatoo	-	-	High	V	-	Included Foraging habitat available.

© ECO LOGICAL AUSTRALIA PTY LTD

Species	Common Name	Habitat Constraints	Geographic limitations	Sensitivity to gain class	BC Act listing status	EPBC Act Listing status	Justification for inclusion or exclusion of species
Lophoictinia isura	Square-tailed Kite	-	-	Moderate	V	-	Included Foraging habitat available.
Melanodryas cucullata cucullata	Hooded Robin (south-eastern form)	-	-	Moderate	V	-	Included Foraging habitat available.
Ninox connivens	Barking Owl	-	-	High	V	-	Included Foraging habitat available.
Nyctophilus corbeni	Corben's Long-eared Bat	-	-	High	V	V	Included Foraging habitat available.
Phaps histrionica	Flock Bronzewing	-	-	High	E	-	Included Foraging habitat available.
Phascolarctos cinereus	Koala	-	-	High	V	V	Included Foraging habitat available.
Polytelis swainsonii	Superb Parrot	-	-	Moderate	V	V	Included Foraging habitat available.
Pomatostomus Temporalis temporalis	Grey-crowned Babbler (eastern subspecies)	-	-	Moderate	V	-	Included Foraging habitat available.
Rostratula australis	Australian Painted Snipe	-	-	Moderate	E	E	Included Marginal foraging habitat available.
Saccolaimus flaviventris	Yellow-bellied Sheathtail-bat	-	-	High	V	-	Included Foraging habitat available.
Sminthopsis macroura	Stripe-faced Dunnart	-	-	High	V		Included Foraging habitat available.
Stagonopleura guttata	Diamond Firetail	-	-	Moderate	V	-	Included Foraging habitat available.

© ECO LOGICAL AUSTRALIA PTY LTD

Species	Common Name	Habitat Constraints	Geographic limitations	Sensitivity to gain class	BC Act listing status	EPBC Act Listing status	Justification for inclusion or exclusion of species
Tyto novaehollandiae	Masked Owl	-	-	High	V	-	Included Foraging habitat available.

© ECO LOGICAL AUSTRALIA PTY LTD

4.2. Species credit species

4.2.1. Identification of species credit species

Species credit species that require further assessment on the subject land (i.e. candidate species), their associated habitat constraints, geographic limitations, sensitivity to gain class, justification for inclusion / exclusion of species credit species and whether the species was present or absence from the subject land is included in Table 11.

Table 11: Candidate species credit species

Species	Common Name	Habitat Constraints	Geographic limitations	Sensitivity to gain class	BC Act listing status	EPBC Act Listing status	Justification for inclusion or exclusion of species	Presence/absence in subject land
Ardeotis australis	Australian Bustard	-	-	High	E	-	Excluded Subject land does not contain tussock or hummock grasses that this species mainly inhabits.	N/A
Atriplex infrequens	A saltbush	-	-	High	V	V	Excluded Subject land is considered too disturbed for this species. No broad drainage tracts or inundated habitats occur within the subject land.	N/A
Burhinus grallarius	Bush Stone-curlew	Fallen/standing dead timber including logs	-		E	-	Included The subject land contains very limited fallen timber as per VI plot data in Appendix C. Only 5m of fallen logs was recorded within Plot 1. No individuals were	Absent – not identified during nocturnal surveys

© ECO LOGICAL AUSTRALIA PTY LTD

Species	Common Name	Habitat Constraints	Geographic limitations	Sensitivity to gain class	BC Act listing status	EPBC Act Listing status	Justification for inclusion or exclusion of species	Presence/absence in subject land
							recorded during nocturnal surveys.	
Calyptorhynchus banksii samueli (Breeding)	Red-tailed Black-Cockatoo (inland subspecies)	Living or dead tree with hollows greater than 15cm diameter and greater than 5m above ground	-	High	V	-	Included Suitable breeding habitat	Absent – not identified during targeted survey.
Desmodium campylocaulon	Creeping Tick-trefoil	-	-	High	E	-	Included Marginal habitat	Present – assumed present.
Digitaria porrecta	Finger Panic Grass	-	-	Moderate	E	-	Included Marginal habitat	Present – assumed present.
Geophaps scripta scripta	Squatter Pigeon (southern subspecies)	-	-	High	CE	V	Excluded This species prefers sandy areas and close proximity to water, both of which are not features of the subject land.	N/A
Haliaeetus leucogaster (Breeding)	White-bellied Sea-Eagle	Living or dead mature trees within suitable vegetation within 1km of a rivers, lakes, large dams or creeks, wetlands and coastlines AND the presence of a large stick nest in the canopy	-	High	V	-	Included Subject land within 1km of river	Absent – not identified during targeted survey.
Hamirostra melanosternon (Breeding)	Black-breasted Buzzard	Land within 40 m of riparian woodland on inland watercourses/waterholes	-	Moderate	V	-	Excluded	N/A

© ECO LOGICAL AUSTRALIA PTY LTD

Species	Common Name	Habitat Constraints	Geographic limitations	Sensitivity to gain class	BC Act listing status	EPBC Act Listing status	Justification for inclusion or exclusion of species	Presence/absence in subject land
		containing dead or dying eucalypts					Subject land is not within 40 m of a watercourse.	
Hieraaetus morphnoides (Breeding)	Little Eagle	Nest trees - live (occasionally dead) large old trees within vegetation.		Moderate	V	-	Included Large old trees	Absent – not identified during targeted survey.
Homopholis belsonii	Belson's Panic	-	-	High	E	V	Included Marginal habitat	Present – assumed present.
Hoplocephalus bitorquatus	Pale-headed Snake	-	-	High	V	-	Excluded The subject land exists as an isolated patch and is considered too distant from nearby vegetation, additionally site is considered too degraded for this species.	-
Lepidium monoplocoides	Winged Peppercress	-	-	High	E	E	Included Marginal habitat	Present – assumed present.
Lophochroa leadbeateri (Breeding)	Major Mitchell's Cockatoo	Living or dead tree with hollows greater than 10cm diameter	-	High	V	-	Included Hollow bearing trees	Absent – not identified during targeted survey.
Lophoictinia isura (Breeding)	Square-tailed Kite	Nest trees	-	Moderate	V	-	Included Nest trees	Absent – not identified during targeted survey.

© ECO LOGICAL AUSTRALIA PTY LTD

Species	Common Name	Habitat Constraints	Geographic limitations	Sensitivity to gain class	BC Act listing status	EPBC Act Listing status	Justification for inclusion or exclusion of species	Presence/absence in subject land
Ninox connivens (Breeding)	Barking Owl	Living or dead trees with hollows greater than 20 cm diameter and greater than 4m above the ground.	-	High	V	-	Excluded No HBTs with hollows > 20cm are within the subject land. HBT's identified within original footprint were stagwatched and no individuals or evidence of utilisation was recorded.	N/A
Phascolarctos cinereus (Breeding)	Koala	Other, Areas identified via survey as important habitat	-	High	V	V	Included Koala feed trees within subject land	Absent – not identified during SAT survey.
Phyllanthus maderaspatensis		Floodplains and/or clay soils	-	High	E	-	Included Marginal habitat	Absent – not identified during targeted flora survey.
Polytelis swainsonii (Breeding)	Superb Parrot	Living or dead *E. blakelyi, E. melliodora, E. albens, E. camaldulensis, E. microcarpa, E. polyanthemos, E. mannifera, E. intertexta* with hollows greater than 5cm diameter; greater than 4m above ground or trees with a DBH of greater than 30cm.	-	High	V	V	Included Hollow bearing trees	Absent – not identified during targeted flora survey.

© ECO LOGICAL AUSTRALIA PTY LTD

Species	Common Name	Habitat Constraints	Geographic limitations	Sensitivity to gain class	BC Act listing status	EPBC Act Listing status	Justification for inclusion or exclusion of species	Presence/absence in subject land
Sida rohlenae	Shrub Sida	-	-	High	E	-	Included Grey clay soils were identified within the subject land. All candidate flora species produced by BAM-C were targeted. This species was not identified during targeted flora surveys.	Absent – not identified during targeted flora survey.
Swainsona murrayana	Slender Darling Pea	-	-	High	V	V	Included Marginal habitat	Absent – not identified during targeted flora survey.
Tyto novaehollandiae (Breeding)	Masked Owl	Living or dead trees with hollows greater than 20cm diameter.	-	High	V	-	Excluded No HBTs with hollows > 20cm are within the subject land. HBT's identified within original footprint were stagwatched and no individuals or evidence of utilisation was recorded.	N/A

© ECO LOGICAL AUSTRALIA PTY LTD

4.2.2. Targeted surveys

The site visit involved an assessment of habitat and mapping of habitat features, namely hollow-bearing trees (HBTs)and other fauna features. Targeted surveys for species credit species were undertaken at the subject land on the dates outlined in Table 12. The location of targeted surveys are shown on Figure 5. Relevant experience of staff undertaking surveys are provided in Appendix D.

Table 12: Targeted surveys (ELA, 2021)

Date	Required Survey Period	Surveyors	Target species
4/08/2021 (August)	July-December	Ronnie Hill	White-bellied Sea-Eagle (Breeding)
	August-October	Ronnie Hill	Little Eagle (Breeding)
30/09/2021 (September)	All Year	Matthew Elsley	Koala (Breeding)
	All Year	Matthew Elsley	Bush-stone Curlew
	August-October	Matthew Elsley	Little Eagle (Breeding)
	September-December	Matthew Elsley	Major Mitchell's Cockatoo (Breeding)
	May-July, September-December	Matthew Elsley	Red-tailed Black-Cockatoo (Breeding)
	September-January	Matthew Elsley	Square-tailed Kite (Breeding)
	September-November	Matthew Elsley	Superb Parrot (Breeding)
	August-October	Matthew Elsley	White-bellied Sea-Eagle (Breeding)
	September-March	Matthew Elsley	*Phyllanthus maderaspatensis*
	September	Matthew Elsley	*Swainsona murrayana*
	September-December	Matthew Elsley	Major Mitchell's Cockatoo (Breeding)
1/10/2021 (October)	All Year	Matthew Elsley	Bush-stone Curlew
	May-July, September-December	Matthew Elsley	Red-tailed Black-Cockatoo (Breeding)
	September-November	Matthew Elsley	Superb Parrot (Breeding)

Weather conditions during the targeted surveys are outlined in Table 13.

Table 13: Weather conditions

Date	Rainfall (mm)	Minimum temperature °C	Maximum temperature °C
4/08/2021	0	3.7	15.2
30/09/2021	39.2	11.6	24.5
1/10/2021	4.8	14.7	26.3

Survey effort undertaken at the development is outlined in Table 14.

Table 14: Survey effort

Method	Habitat (ha)	Stratification units	Total effort	Target species
Search for breeding habitat (stick nests)	1.1	2 person hours x 2 days	4 person hours	-White-bellied Sea-Eagle (breeding) - Little Eagle (breeding) -Square-tailed Kite (breeding)
Search for breeding habitat (hollows) and diurnal bird survey (stag watch)	1.1	4 person hours x 4 days	8 person hours	-Major Mitchell's Cockatoo (breeding) -Red-tailed Black-Cockatoo (breeding) -Superb Parrot (breeding)
SAT surveys	1.1	2 person hours (1 x SAT)	2 person hours (1 x SAT)	Koala
Parallel transects	1.99	5-10m transects (8 person hours)	8 person hours	-*Swainsona murrayana* -*Phyllanthus maderaspatensis* -*Sida rohlenae*
Nocturnal Surveys (Spotlighting)		2 person hours x 2 nights	2 person hours	-Bush-stone Curlew

4.2.3. Results of targeted surveys

No species credit species were identified as present on the subject land, following completion of targeted surveys (Table 15).

Table 15: Targeted survey results

Species	Common Name	Species presence	Comment
Burhinus grallarius	Bush-stone Curlew	No (surveyed)	Not recorded during nocturnal surveys for original footprint
Calyptorhynchus banksii samueli	Red-tailed Black-Cockatoo (Inland Subspecies)	No (surveyed)	
Desmodium campylocaulon	Creeping Tick-trefoil	Yes (assumed present)	Due to survey period constraints
Digitaria porrecta	Finger Panic Grass	Yes (assumed present)	Due to survey period constraints
Haliaeetus leucogaster	White-bellied Sea-Eagle	No (surveyed)	
Hieraaetus morphnoides	Little Eagle	No (surveyed)	
Homopholis belsonii	Belson's Panic	Yes (assumed present)	Due to survey period constraints
Lepidium monoplocoides	Winged Peppercress	Yes (assumed present)	Due to survey period constraints
Lophochroa leadbeateri	Major Mitchell's Cockatoo	No (surveyed)	

Species	Common Name	Species presence	Comment
Lophoictinia isura	Square-tailed Kite	No (surveyed)	
Phyllanthus maderaspatensis	Phyllanthus maderaspatensis	No (surveyed)	
Polytelis swainsonii	Superb Parrot	No (surveyed)	
Sida rohlenae	Shrub Sida	No (surveyed)	
Swainsona murrayana	Slender Darling Pea	No (surveyed)	

© ECO LOGICAL AUSTRALIA PTY LTD

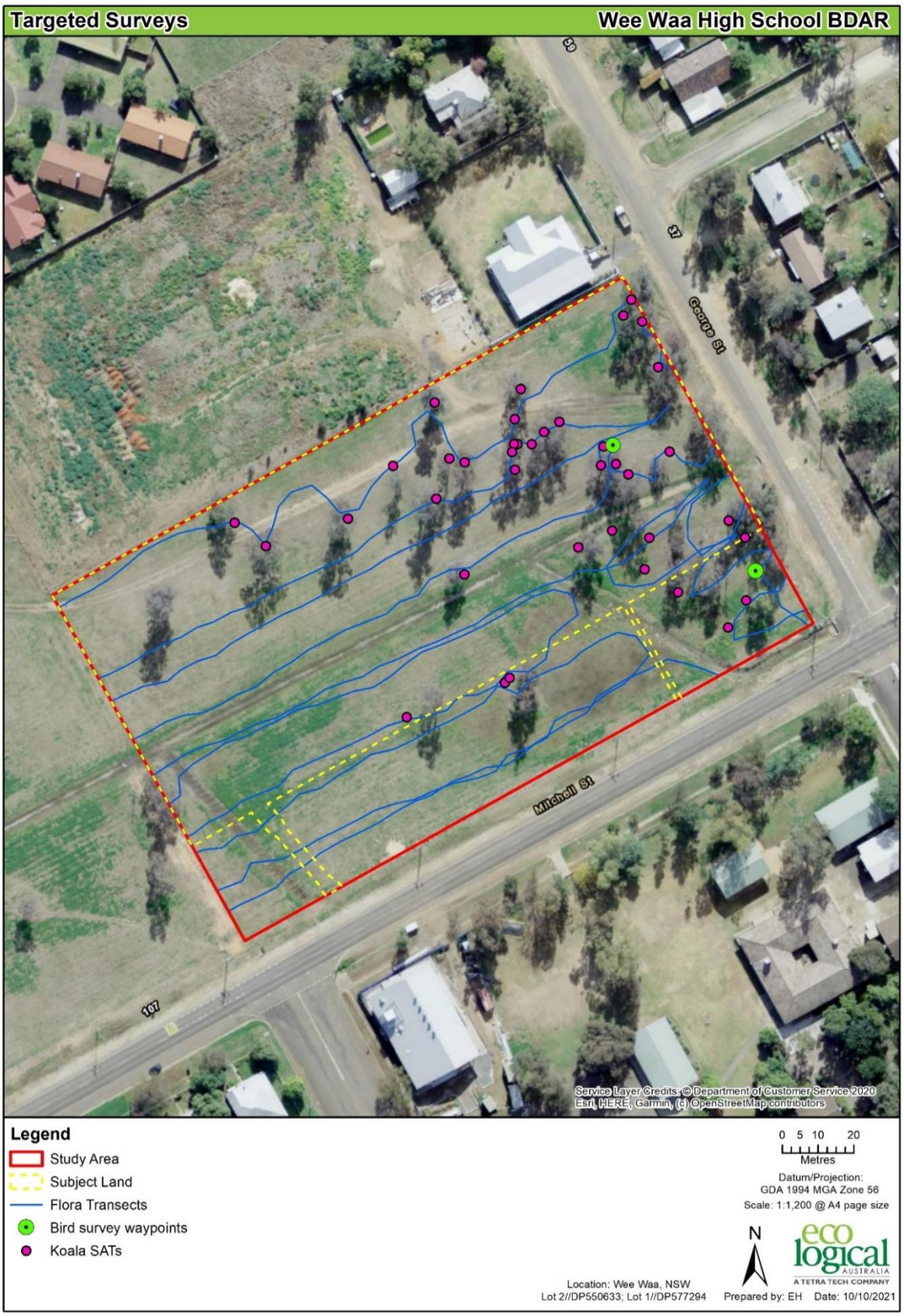


Figure 5: Targeted surveys

5. Identification of prescribed additional biodiversity impact entities

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

There are no karsts, caves, crevices, cliffs, rocks or other geological features of significance in the subject land.

5.2. Human-made structures and non-native vegetation

There are no human-made structures or non-native vegetation in the subject land.

5.3. Habitat connectivity

The subject land is situated within the township of Wee Waa. The vegetation that occurs exists as an isolated patch and has no habitat connectivity to areas outside of the identified patch (6.06 ha: Figure 1). Adjacent areas of vegetation to the subject land, but which also occur within the 6.06 ha patch, within an area that is currently being investigated for stormwater and flooding works and is likely to be removed.

5.4. Water bodies, water quality and hydrological processes that sustain threatened entities

The nearest water body is the Namoi River approximately 1.5 km away that is connected via stormwater channels. The site contains stormwater channels that intermittently contain stormwater. No other water bodies are located on site.

5.5. Wind farm developments

This development is not a wind farm.

5.6. Vehicle strikes

Given that the development site is located within the township of Wee Waa, the construction of the school will not increase the likelihood of vehicle strike to native fauna and is not considered a prescribed impact with respect to the proposed development.

© ECO LOGICAL AUSTRALIA PTY LTD

6. Avoiding and Minimising Impacts on Biodiversity Values

6.1. Locating a project to avoid and minimise impacts on biodiversity values

6.1.1. Direct and indirect impacts

The development has been located in a way which avoids and minimises impacts as outlined in Table 16.

Table 16 Locating a project to avoid and minimise impacts on vegetation and habitat

Approach	How addressed	Justification
Locating the project in areas where there are no biodiversity values	The project has utilised areas where there are low biodiversity values including areas with no canopy and areas with very low biodiversity values such as exotic grasslands, scattered canopy and degraded vegetation.	Where practical, the subject land has been located within degraded areas containing poor habitat features and a small portion of moderately good condition native vegetation of which 0.81ha will be removed and 0.13ha will be predominantly retained (managed). Refer to Section 7.2 for justification of management.
Locating the project in areas where the native vegetation or threatened species habitat is in the poorest condition	The project is predominantly located where native vegetation is in degraded condition and threatened species habitat is considered marginal foraging habitat.	The project will impact on 1.47 ha of native vegetation which is disturbed by high threat exotic weeds and contain low to moderate vegetation integrity score (32.4-61.3). Areas of moderate condition native vegetation, where vegetation integrity and habitat for threatened species is highest has predominantly been avoided within the subject land, with 0.13 ha of moderate condition vegetation located within the proposed 'to be managed' area of which will only be partially affected via ongoing management. Such management is expected to include slashing. However predominantly retained with existing levels, existing native grasses and existing trees (as much as is possible)
Locating the project in areas that avoid habitat for species and vegetation in high threat categories (e.g. an EEC or CEEC), indicated by the biodiversity risk weighting for a species	The project will remove 1.34 ha of an EEC and partially affect 0.13 ha of the EEC, of which will predominantly be retained.	One EEC will be affected within the subject land. This EEC is located within an isolated patch and occurs in a degraded and moderate condition. Only marginal foraging habitat for threatened fauna and marginal habitat for threatened flora species within this high threat category will be impacted of which 0.13ha of the moderate condition will be partially retained.

Approach	How addressed	Justification
Locating the project such that connectivity enabling movement of species and genetic material between areas of adjacent or nearby habitat is maintained	The project is in a patch of vegetated land that is isolated from nearby vegetated habitat. Connectivity is not expected to be impacted because of this project	No connectivity will be impacted by the project due to the isolated nature of the patch.

6.1.2. Prescribed biodiversity impacts

No prescribed impacts have been identified. The Stormwater Management Plan prepared by MDE Pty Ltd (July 2021) describes the site as essentially flat with a maximum elevation of 191.1m AHD to a low point of 189.9m AHD, a difference of 0.02m. The objective of the Stormwater Management Plan is to achieve no deterioration in water quality to the downstream environment. The objectives are achieved primarily through vegetated swales with additional water quality measures including stormwater pit inserts and first flush devices on rainwater tanks. The plan demonstrates compliance with local and state government requirements. The SMP states that Erosion and Sediment Controls will remain in place until sufficient grass cover is achieved.

The Stormwater Management Plan also shows that the post development discharge rate of 173 l/s is a better outcome that the pre-development rate of 231 l/s.

On this basis, no significant impacts to waterbodies or water quality that sustain threatened species is anticipated.

6.2. Designing a project to avoid and minimise impacts on biodiversity values

6.2.1. Direct and indirect impacts

The development has been designed in a way which avoids and minimises impacts as outlined in Table 17.

Table 17: Designing a project to avoid and minimise impacts on vegetation and habitat

Approach	How addressed	Justification
Reducing the clearing footprint of the project	The clearing footprint has been minimised where possible within the scope of the development.	Efforts have been made in the design to avoid affecting native vegetation within the south eastern portion of the subject land mapped as 'to be managed' for the ongoing traditional management by the Kamilaroi People (Refer to Section 7.2)
Locating ancillary facilities in areas where there are no biodiversity values	Ancillary features will be located within the existing footprint.	Ancillary features for the purposes of construction will be predominantly located within the footprint, avoiding additional impacts to areas containing biodiversity values.
Locating ancillary facilities in areas where the native vegetation or	Ancillary facilities have been located within the exisitng footprint	Ancillary features for the purposes of construction will be predominantly

Approach	How addressed	Justification
threatened species habitat is in the poorest condition (i.e. areas that have a lower vegetation integrity score)		located within the construction footprint, avoiding additional impacts to areas of native vegetation. The majority of the native vegetation proposed to be removed is comprised of no canopy or native vegetation in a degraded condition with a vegetation integrity score of 32.4 (Vegetation Zone 1: PCT 40 (No Canopy). Only a small area (0.81 ha) of Moderate condition (Vegetation Zone 2: PCT 40 (Moderate) vegetation will be removed and 0.13ha of this area will be partially affected via slashing with some clearing needed for essential infrastructure.
Locating ancillary facilities in areas that avoid habitat for species and vegetation in high threat status categories (e.g. an EEC or CEEC)	Ancillary facilities will result in the removal of vegetation in a high threat category in the form of 1.34 ha of an EEC and partially impact 0.13ha of the EEC, of which will predominantly be retained.	One EEC will be affected within the subject land. This EEC is located in an isolated patch and EEC occurs in a degraded and moderate condition. Only marginal foraging habitat for threatened fauna and marginal habitat for threatened flora species within this high threat category will be affected of which 0.13ha of the moderate condition will be partially retained.
Providing structures to enable species and genetic material to move across barriers or hostile gaps	Structures to enable species and genetic material to move across barriers will not be constructed.	The project is located in a fragmented urban landscape within an isolated patch of vegetation with minimal connectivity to nearby habitat. No connectivity is considered to be affected.
Making provision for the demarcation, ecological restoration, rehabilitation and/or ongoing maintenance of Retained native vegetation habitat within the subject land.	The development site is to be clearly demarcated to avoid impacts to retained vegetation.	The development site is to be clearly demarcated to avoid impacts to retained vegetation. Any trees planted as part of landscaping works should be consistent with the surrounding native vegetation community within the subject land. The removal of understorey vegetation as a result of the 'to be managed' area will include the removal of high threat weeds dominating the vegetation zone which may allow regrowth of native understorey species.

6.2.2. Prescribed biodiversity impacts

No prescribed impacts have been identified.

7. Assessment of Impacts

7.1. Direct impacts

The direct impacts of the development on:

- native vegetation and threatened ecological communities are outlined in Table 18
- threatened species and threatened species habitat is outlined in Table 19
- prescribed biodiversity impacts is outlined in Section 7.5.

Direct impacts including the final project footprint (construction and operation) are shown on Figure 6.

Table 18: Direct impacts to native vegetation

PCT ID	PCT Name	BC Act listing	EPBC Act listing	Direct impact (ha)
40	Coolibah-Black Box Woodland in the Darling Riverine Plains, Brigalow Belt South, Cobar Peneplain and Mulga Lands Bioregions	EEC Coolibah open woodland wetland with chenopod/grassy ground cover on grey and brown clay floodplains'	EEC Coolibah - Black Box Woodlands of the Darling Riverine Plains and the Brigalow Belt South Bioregions	1.47

Table 19: Direct impacts on threatened species and threatened species habitat

Species	Common Name	Comment	Direct impact number of individuals / habitat (ha)	BC Act listing status	EPBC Act Listing status
Desmodium campylocaulon	Creeping Tick-trefoil	Assumed present due to survey period constraints	1.47	E	-
Digitaria porrecta	Finger Panic Grass	Assumed present due to survey period constraints	1.47	E	-
Homopholis belsonii	Belson's Panic	Assumed present due to survey period constraints	1.47	E	V
Lepidium monoplocoides	Winged Peppercress	Assumed present due to survey period constraints	1.47	E	E

7.2. Management zones and change in vegetation integrity

Two management zones have been established for the proposed development to assess the change to vegetation integrity zones resulting from a different management regime relating to vegetation

removal/management in Vegetation Zone 2. A portion of the subject land (south eastern portion) is 'to be managed' continuously throughout the operation of the high school. This area (2B) requires management of understorey and a reduction of canopy cover, however, does not require complete vegetation removal. A description and justification for management zones is provided in Table 20. The change in vegetation integrity as a result of the development is outlined in Table 21.

Areas requiring full impact (Management Zone A) and partial impact (Management Zone B) are displayed in Figure 6.

In accordance with the landscape architect the following is noted for the ongoing management of Management Zone 2B. This area is intended to be kept as close to its natural undisturbed state as possible so that the traditional practices of the Kamilaroi People can be practiced/demonstrated within the subject land. It is our understanding that the native grasses have the potential to be harvested and used in the preparation of bush foods and that there is a strong desire within the local indigenous community to enable these practices to be carried out. The management techniques for this area will be informed by the on-going 'Designing with Country' process that is currently in place. Slashing frequency is to be determined to allow for seed harvesting and the re-setting of seeds and the perpetual natural reseeding of the native grasses in the area. Canopy cover is to retain as much existing vegetation on site as possible to provide shade and habitat, as such canopy reduction will be limited to the removal of designated trees identified on the Landscape Architect plans (Moir LA 2021) for essential infrastructure. Intentions regarding fallen timber and weed control targets are to be determined through the 'Designing With Country' process identified above.

Management activities proposed such as slashing are expected to either stimulate growth for native grass candidate species through disturbance and re seeding or cause minimal damage to other groundcover species due to their hardy growth habit and good adaptability to disturbance. All 'assumed present' threatened flora species are documented to respond well to fire regimes and most occur within disturbed sites.

- *Desmodium campylocaulon* is known to be strongly stoloniferous and resistant to grazing regimes. Therefore it is likely this species will endure infrequent slashing events.
- *Digitaria porrecta* is known to inhabit sites that have undergone livestock grazing and trampling and is known to persist in habitat with physical disturbance such as roads.
- *Lepidium monoplocoides* does not respond well to disturbance such as grazing, therefore frequent slashing is not proposed.
- *Homopholis belsonii* is poorly documented, however expert ecological observations suggest this species prefers modified sites and therefore has the potential to respond well to disturbance such as infrequent slashing events.

(DPIE 2022)

As such the above commentary has been used to justify the following future VI scores for Management Zone 2B. A Vegetation Management Plan will be prepared as a post-approval document to guide management of vegetation in this zone.

Table 20: Justification for management zones

Management Zone	Management Type	Description	Future Composition Score Change	Future Structure Score Change	Future Function Score Change
2 A	Full impact	This management zone assumes 100% impact to vegetation. Future integrity score is zero (0).	Zero (0) for all growth form groups	Zero (0) for all growth form groups	Zero (0) for all growth form groups
2 B	To be managed	This management zone requires the following requirements for vegetation impact: Tree canopy maximum cover 15% The understorey will be periodically managed via slashing with a small area to be cleared for a drain.	Tree = No Change Shrub = 0 Grass = From 8 to 6 Forb = From 9 to 5 Fern =No change Other = No change	Tree = From 22 to 15% cover Shrub = 0 Grass and Grasslike = From 24.3 to 20 Forb =From 0.9 to 0.5 Fern = No Change Other = No Change	Large Trees = From 3 to 2 Hollows = No change Litter = 30 Tree stems = No Change Regen stems = 0 High threat exotic = No change

7.3. Change in vegetation integrity

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

.

Table 21: Change in vegetation integrity

Veg Zone	PCT ID	Condition	Area (ha)	Current vegetation integrity score	Future vegetation integrity score	Change in vegetation integrity	Total VI loss
1	40	No Canopy	0.53	32.4	0	-32.4	-32.4
2a	40	Moderate	0.81	61.3	0	-61.3	
2b (to be managed	40	Moderate	0.13	61.3	56.1	-5.2	-53.5

7.4. Indirect impacts

The indirect impacts of the development are outlined in Table 22.

Table 22: Indirect impacts

Indirect impact	Description (nature, extent and frequency)	Biodiversity affected	Duration/ Timing	Consequence
inadvertent impacts on adjacent habitat or vegetation	Damage to adjacent habitat or vegetation, Adjacent vegetation Daily, during construction works	Native vegetation, EEC	Throughout construction and operation period/ Short-term impacts	Damage to adjacent habitat or vegetation
Reduced viability of adjacent habitat due to edge effects	Increased edge effects into partially retained vegetation Potential as result of construction or operation of the project Daily, during construction and operation	Native vegetation, EEC	Potentially long-term impacts/ Sporadic throughout construction period	Increased edge effects into partially retained vegetation within 'to be managed' area
Reduced viability of adjacent habitat due to noise, dust or light spill	Noise and dust created from machinery (no night works proposed therefore no light spill) Noise and dust likely to carry beyond subject land boundary Daily, during construction works	Native vegetation, EEC	Sporadic throughout construction period/ Short-term impacts	Damage to adjacent habitat
transport of weeds and pathogens from the site to adjacent vegetation	Spread of weed seed or pathogens Potential for spread into adjacent habitat Daily, during construction works	Native vegetation, EEC	Sporadic throughout construction period/ Short-term impacts	Spread of weed seed or pathogens
Increased risk of starvation or exposure and loss of shade or shelter	N/A – Native vegetation within the development site would be removed such that fragmentation of any adjacent habitat would not be increased.	N/A	N/A	N/A
loss of breeding habitat	Negligible. No specialist breeding habitat identified within the subject land	N/A	N/A	N/A
trampling of threatened flora species	Potential for assumed present threatened flora species to be trampled in 'to be managed' area.	Native vegetation, TEC	Throughout construction period/ Short-term impacts	Loss or damage to threatened flora species

Indirect impact	Description (nature, extent and frequency)	Biodiversity affected	Duration/ Timing	Consequence
rubbish dumping	Rubbish left by contractors during works Potential to cause localised rubbish dumping, Daily, during construction works	Native vegetation, TEC	Sporadic throughout construction period/ Short-term impacts	Ingestion by local fauna and damage to adjacent habitat
wood collection	Minimal woody debris available for collection Within retained vegetation.	Native vegetation, TEC	Daily, during both construction and operational phases/ Throughout operational phase of project	Removal of terrestrial habitat
removal and disturbance of rocks including bush rock	Negligible. No bush rocks or rock habitat was recorded within subject land	N/A	N/A	N/A
increase in predators	Negligible likelihood of impact given the position of the subject land in a highly urbanised area	N/A	N/A	N/A
increase in pest animal populations	Negligible likelihood of impact given the position of the subject land in a highly urbanised area	N/A	N/A	N/A
changed fire regimes	During construction, working machinery /chemicals have the potential to spark fire, Within development site area and potential to spread through adjacent native vegetation, Daily, during both construction and operational phases.	Native vegetation, TEC	Throughout life of project/ Short-term and potentially long-term impacts	Uncontrolled fire – damage to retained habitat
disturbance to specialist breeding and foraging habitat, e.g.	Negligible. No specialist breeding or foraging habitat identified within the subject land	N/A	N/A	N/A

Indirect impact	Description (nature, extent and frequency)	Biodiversity affected	Duration/ Timing	Consequence
beach nesting for shorebirds.				
sedimentation and contaminated and/or nutrient rich run-off	Runoff during works, Downhill from existing hardstand surfaces During heavy rainfall or storm events	Native vegetation, TEC	During rainfall events/ Short Term	Sedimentations

7.5. Prescribed biodiversity impacts

The development does not have any prescribed biodiversity impacts.

7.6. Mitigating and managing direct and indirect impacts

Measures proposed to mitigate and manage impacts at the subject land before, during and after construction are outlined in Table 23.

Table 23: Measures proposed to mitigate and manage impacts

Measure	Risk before mitigation	Risk after mitigation	Action	Outcome	Timing	Responsibility
Instigating clearing protocols including pre-clearing surveys, daily surveys and staged clearing, the presence of a trained ecological or licensed wildlife handler during clearing events	Moderate	Minor	No hollow bearing trees are expected to be cleared for the project, however hollow bearing trees occur within the subject land. A pre-clearance survey of trees across the subject land and identification/location of habitat trees (e.g. trees with nests or to identify trees with any new hollows) by a suitably qualified ecologist is required. Supervision by a qualified ecologist/licensed wildlife handler during tree removal in accordance with best practice methods.	Any fauna utilising habitat within the development site will be identified and managed to ensure clearing works minimise the likelihood of injuring resident fauna. Displaced fauna will be taken to a wildlife carer	Prior to and during clearing works	Project Manager / Ecologist
Ensure clearing works are conducted outside of known seasonal breeding times for candidate species	Moderate	Minor	Where possible, undertake clearing works outside of known seasonal breeding events for candidate fauna species known to inhabit the locality i.e. Major Mitchell's Cockatoo, Red-tailed Cockatoo, Superb Parrot, White-bellied Sea-Eagle, Little Eagle and Square-tailed Kite. Such breeding times take place between May-January.	Protect breeding pairs and offspring from risk of inadvertent injury during construction works. If nesting activity is recorded during pre-clearance or construction, all construction work must stop, and a suitably qualified person is to be notified before re-commencement of works.	During clearing work (February-April)	Project Manager / Ecologist
Demarcate 'no go zones', to protect retained vegetation during construction works	Moderate	Minor	Install temporary fencing and signage 'no go zones' along the boundary of any vegetation to be retained	Protect retained vegetation from inadvertent damage during construction works	Prior to clearing works	Project Manager / Ecologist

© ECO LOGICAL AUSTRALIA PTY LTD

Measure	Risk before mitigation	Risk after mitigation	Action	Outcome	Timing	Responsibility
Installing artificial habitats for fauna in adjacent retained vegetation and habitat or human made structures to replace the habitat resources lost and encourage animals to move from the impacted site, e.g. nest boxes	Moderate	Minor	Should any trees removed that have hollows/hollow trunks/fissures, they should be retained as ground fauna habitat and/or used as replacement hollows and attached to trees within the within the development site. If it is impractical to use salvaged hollows as replacement tree hollows, compensatory nest boxes should be installed where practical at a ratio of one nest box installed per hollow removed (if applicable).	Replacement of habitat features removed	Prior to and during clearing works	Project Manager/ Ecologist
Sediment barriers or sedimentation ponds to control the quality of water released from the site into the receiving environment	Minor	Negligible	Appropriate controls will be utilised and maintained to manage exposed soil surfaces and stockpiles to prevent sediment discharge into waterways. Soil and erosion measures such as sediment fencing, clean water diversion must be in place prior the commencement of the construction work.	Erosion and sedimentation will be controlled	For the duration of construction works	Project Manager
Noise barriers or daily/seasonal timing of construction and operational activities to reduce impacts of noise	Minor	Negligible	Daily timing of construction activities is recommended in accordance with Table 1 of Interim Noise Guidelines (2009)	All noise limited to acceptable work hours	For the duration of construction works	Project Manager
Adaptive dust monitoring programs to control air quality	Minor	Negligible	Dust suppression measures will be implemented during construction works to limit dust on site	Mitigate dust created during construction activities	For the duration of construction works	Project Manager
Hygiene protocols to prevent the spread of weeds or pathogens	Moderate	Minor	Vehicles, machinery and building refuse associated with the development construction should remain only within construction footprint areas, avoiding weed or pathogen	Prevent spread of weeds or pathogens	For the duration of construction works	Project Manager

© ECO LOGICAL AUSTRALIA PTY LTD

Measure	Risk before mitigation	Risk after mitigation	Action	Outcome	Timing	Responsibility
between infected areas and uninfected areas			related impacts to vegetation outside of the development site			
Rubbish dumping	Minor	Negligible	Waste bins to be present on site. Covers to be used to prevent blown litter and the entry of pest animals or rain. Removal and appropriate disposal of general waste generated during the works.	Dumping of rubbish during construction prevented	For the duration of construction works	Project Manager
Staff training and site briefing to communicate environmental features to be protected and measures to be implemented	Minor	Negligible	All staff working on the development will undertake an environmental induction as part of their site familiarisation. This induction will include items such as: • Site environmental procedures (vegetation management, sediment and erosion control, exclusion fencing and weeds) • What to do in case of environmental emergency (chemical spills, fire, injured fauna) • Key contacts in case of environmental emergency.	All staff entering the Development Site are fully aware of the presence of native vegetation adjacent to the site what to do in case of any environmental emergencies	To occur for all staff entering/working at the development site. Site briefings should be updated based on phase of the work and when environmental issues become apparent.	Project Manager
Making provision for the ecological restoration, rehabilitation and/or ongoing maintenance of retained native vegetation habitat on or adjacent to the development site	Minor	Negligible	The retained vegetation would be managed to be kept in a natural undisturbed state as possible so that the traditional practices of the Kamilaroi People can be practiced/demonstrated within the school grounds (Refer to Section 7.2) . The management techniques for this area will be informed by the on-going 'Designing with Country' process that is currently in place, Weeds should be managed and controlled within the adjacent vegetation to be retained.	Retained vegetation to be managed via the traditional practices of the Kamilaroi People through the program 'Designing with Country'..	Following completion of construction activities.	Project Manager

© ECO LOGICAL AUSTRALIA PTY LTD

Measure	Risk before mitigation	Risk after mitigation	Action	Outcome	Timing	Responsibility
			Weed control targets are to be determined through the 'Designing With Country'. Slashing frequency is to be determined to allow for seed harvesting and the re-setting of seeds and the perpetual natural reseeding of the native grasses in the area.			

7.7. Mitigating prescribed impacts

The development does not have any prescribed biodiversity impacts.

© ECO LOGICAL AUSTRALIA PTY LTD

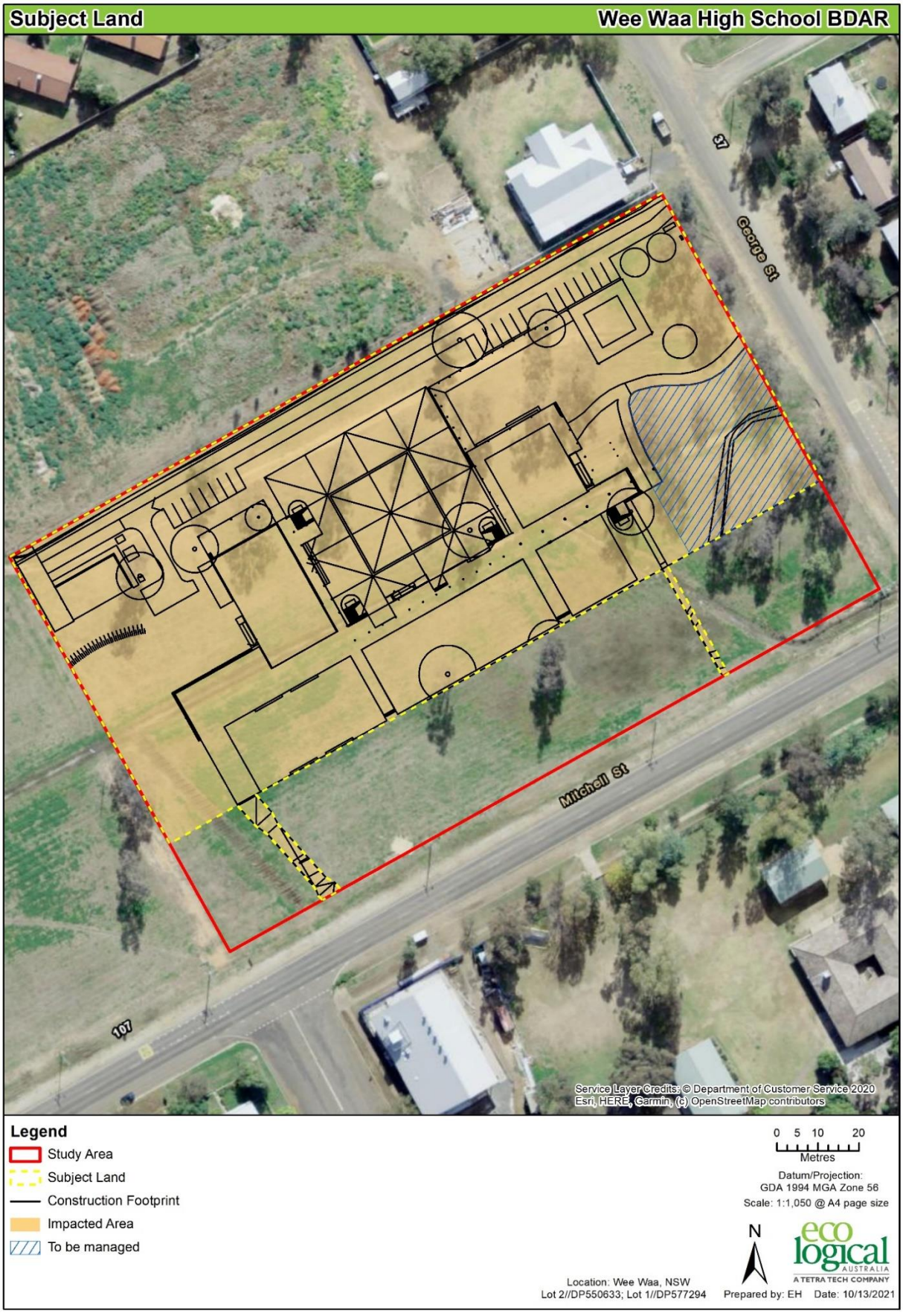


Figure 6: Final Subject Land including construction footprint

8. Impact summary

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

8.1. Serious and Irreversible Impacts (SAII)

The development does not have any Serious and Irreversible Impacts (SAII).

8.2. Impacts requiring offsets

The impacts of the development on native vegetation requiring offsets is outlined in Table 24 and shown on Figure 7. The impacts of the development on threatened species habitat requiring offsets is outlined in Table 25and species polygons are shown on Figure 8.

Table 24: Impacts to native vegetation that require offsets

Vegetation Zone	PCT ID	PCT Name	Vegetation Class	Vegetation Formation	Direct impact (ha)
1 – No Canopy	40	*Coolibah open woodland wetland with chenopod/grassy ground cover on grey and brown clay floodplains*	North-west Floodplain Woodlands	KF_CH11A Semi-arid Woodlands (Grassy sub-formation)	0.53
2 - Moderate	40	*Coolibah open woodland wetland with chenopod/grassy ground cover on grey and brown clay floodplains*	North-west Floodplain Woodlands	KF_CH11A Semi-arid Woodlands (Grassy sub-formation)	0.94

Table 25: Impacts on threatened species and threatened species habitat that require offsets

Species	Common Name	Direct impact number of individuals / habitat (ha)	BC Act listing status	EPBC Act Listing status	Comment
Desmodium campylocaulon	Creeping Tick-trefoil	1.47	E	-	Assumed present due to survey period constraints
Digitaria porrecta	Finger Panic Grass	1.47	E	-	Assumed present due to survey period constraints
Homopholis belsonii	Belson's Panic	1.47	E	V	Assumed present due to survey period constraints
Lepidium monoplocoides	Winged Peppercress	1.47	E	E	Assumed present due to survey period constraints

8.3. Impacts not requiring offsets

All impacts within the subject land require offsets.

8.4. Areas not requiring assessment

Areas not requiring assessment include those areas identified outside of the subject land, but within the study area. This vegetation is within an area that is currently being investigated for stormwater and flooding works and is likely to be subject to another proposal. Areas not requiring assessment are shown on Figure 9.

8.5. Credit summary

The number of ecosystem credits required for the development are outlined in Table 26. The number of species credits required for the development are outlined in Table 27. A biodiversity credit report is included in Appendix E.

Table 26: Ecosystem credits required

Vegetation Zone	Management Zone	PCT ID	PCT Name	Credit Class	Direct impact (ha)	Credits required
1	-	40	*Coolibah open woodland wetland with chenopod/grassy ground cover on grey and brown clay floodplains*	Ecosystem Credits (No HBT Cr, TEC)	0.53	9
2	A	40	*Coolibah open woodland wetland with chenopod/grassy ground cover on grey and brown clay floodplains*	Ecosystem Credits (No HBT Cr, TEC)	0.81	25
2	B (to be managed)	40	*Coolibah open woodland wetland with chenopod/grassy ground cover on grey and brown clay floodplains*	Ecosystem Credits (No HBT Cr, TEC)	0.13	
				Total	1.47	34

Table 27: Species credit summary

Species	Common Name	Direct impact number of individuals / habitat (ha)	Credits required	Comment
Desmodium campylocaulon	Creeping Tick-trefoil	1.47	34	Assumed present
Digitaria porrecta	Finger Panic Grass	1.47	34	Assumed present
Homopholis belsonii	Belson's Panic	1.47	34	Assumed present

Species	Common Name	Direct impact number of individuals / habitat (ha)	Credits required	Comment
Lepidium monoplocoides	Winged Peppercress	1.47	34	Assumed present

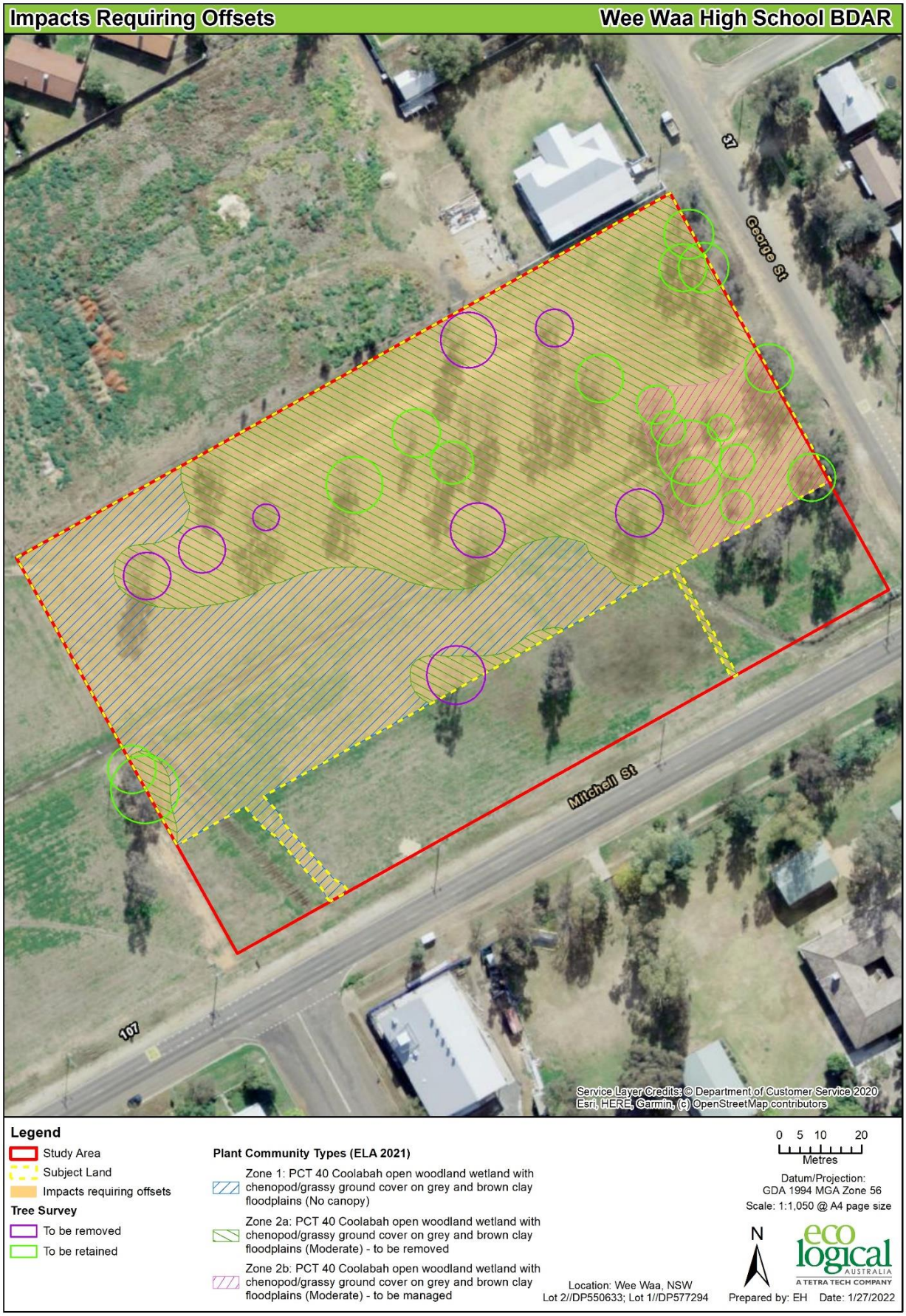


Figure 7: Impacts requiring offset

Figure 8 Species polygon for threatened flora

Figure 9: Areas not requiring assessment

9. Consistency with legislation and policy

Additional matters relating to impacts on flora and fauna which are not covered by the BC Act must also be addressed for the proposed development. Potential MNES in accordance with the EPBC Act have been addressed below.

1.1.1 *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act)

The EPBC Act establishes a process for assessing the environmental impact of activities and developments where MNES may be affected. Under the Act, any action which "has, will have, or is likely to have a significant impact on a matter of MNES" is defined as a "controlled action", and requires approval from the Commonwealth Department of Agriculture, Water and the Environment (DAWE), which is responsible for administering the EPBC Act.

The process includes conducting an Assessment of Significance for listed threatened species and ecological communities that represent a matter of MNES that will be impacted as a result of the proposed action. Significant impact guidelines (formerly Department of Environment and Energy (DotEE) 2014) that outline a number of criteria have been developed by the Commonwealth, to provide assistance in conducting the Assessment of Significance and help decide whether or not a referral to the Commonwealth is required.

A habitat assessment was undertaken and the following MNES were assessed in accordance with the Significant Impact Guidelines 1.1:

- Vulnerable species
    - *Dichanthium setosum* (Bluegrass)
- Endangered species
    - *Lepidium monoplocoides* (Winged Watercress)
- Endangered Ecological Community
    - EEC *Coolibah - Black Box Woodlands of the Darling Riverine Plains and the Brigalow Belt South Bioregions*

No significant impact is considered to occur for the above threatened entities based on the Assessment of Significance. The full assessment can be found in Appendix G.

10. Conclusion

Eco Logical Australia Pty Ltd was engaged by Schools Infrastructure c/- Ontoit to prepare a BDAR for a proposed State Significant Development and to accompany an Environmental Impact Statement at 105-107 Mitchell Street, Wee Waa (Lot 1 DP 577294 and Lot 2 DP 550633) in the Narrabri local government area. This report describes the biodiversity values within the development site, describes the impacts and outlines the measures to be taken to avoid, minimise and mitigate impacts to the vegetation and species habitat present within the development site.

This report has followed the BAM established under Section 6.7 of the BC Act.

Native vegetation within the development site was identified as *PCT 40 Coolibah open woodland wetland with chenopod/grassy ground cover on grey and brown clay floodplains* as listed in the table below. PCT 40 is an endangered ecological community under both the BC and EPBC Acts. The table below also outlines the associated ecosystem credit requirements to offset impacts to this vegetation.

Vegetation Zone	Management Zone	PCT ID	PCT Name	Credit Class	Direct impact (ha)	Credits required
1	-	40	Coolibah open woodland wetland with chenopod/grassy ground cover on grey and brown clay floodplains	Ecosystem Credits (No HBT Cr, TEC)	0.53	9
2	A	40	Coolibah open woodland wetland with chenopod/grassy ground cover on grey and brown clay floodplains	Ecosystem Credits (No HBT Cr, TEC)	0.81	25
2	B (to be managed)	40	Coolibah open woodland wetland with chenopod/grassy ground cover on grey and brown clay floodplains	Ecosystem Credits (No HBT Cr, TEC)	0.13	
				Total	**1.47**	**34**

This vegetation also provides habitat for four threatened flora species which were 'assumed present' within the subject land. The species credit requirements to offset impacts to habitat for these threatened species are outlined below.

Species	Common Name	Direct impact number of individuals / habitat (ha)	Credits required	Comment
Desmodium campylocaulon	Creeping Tick-trefoil	1.47	34	Assumed present
Digitaria porrecta	Finger Panic Grass	1.47	34	Assumed present
Homopholis belsonii	Belson's Panic	1.47	34	Assumed present
Lepidium monoplocoides	Winged Peppercress	1.47	34	Assumed present

Mitigation measures relating to direct, indirect and prescribed impacts are provided in Section 7.

The proposed development does not pose a risk of SAII to any entities.

Significant Impact Criteria were applied for relevant matters included in this assessment and listed as MNES under the EPBC Act. It was concluded that the proposed action would not result in a significant impact to either EPBC listed Vulnerable *Dichanthium setosum* or EEC *Coolibah - Black Box Woodlands of the Darling Riverine Plains and the Brigalow Belt South Bioregions.*

11. References

BAM Calculator (Version 36) Available at: https://www.lmbc.nsw.gov.au/bamcalc/home/AssessmentCal

BioNet 2020. NSW BioNet: Atlas of NSW Wildlife online search tool. Available: (http://www.bionet.nsw.gov.au/

BioNet Threatened Biodiversity profiles. https://www.environment.nsw.gov.au/NSWVCA20PRapp/default.aspx

BioNet Vegetation Classification. https://www.environment.nsw.gov.au/NSWVCA20PRapp/default.aspx

Bureau of Meteorology (2020). Past data and graphs. Available at http://www.bom.gov.au/climate/data/index.shtml?bookmark=136&zoom=3&lat=-32.5355&lon=147.74&layers=B00000TFFFFFFFTFFFFFFFFFFFFFFFFFFTTT&dp=IDC10002-d

Cropper, S.C. (1993) Management of Endangered Plants. CSIRO Australia, Melbourne

Department of Agriculture, Water and the Environment (DAWE) 2020a. Protected Matters Search Tool [online]. Available: http://www.environment.gov.au/epbc/protect/index.html (Accessed 12 October 2021).

Department of Agriculture, Water and the Environment (DAWE) 2020b. National Flying-fox monitoring viewer. Australian Government. Available: http://www.environment.gov.au/webgis-framework/apps/ffc-wide/ffc-wide.jsf (Accessed: 18 January 2021)

Department of Environment and Climate Change (DECC). 2002, 'Descriptions for NSW (Mitchell) Landscapes Version 2'. Sourced October 21 from: http://www.environment.nsw.gov.au/resources/conservation/landscapesdescriptions.pdf

Department of Planning, Industry and Environment (DPIE) 2020a. Threatened Species Database (5 km radius search). OEH Sydney, NSW. (Data viewed October 2021).

Department of Planning, Industry and Environment (DPIE) 2020b, Soil Landscapes of Central and Eastern NSW - v2.1, NSW Office of Environment and Heritage, Sydney.

Department of Planning, Industry and Environment (DPIE). 2020c. Biodiversity Values Map and Threshold Tool (online). Available: https://www.lmbc.nsw.gov.au/Maps/index.html?viewer=BOSETMap (Accessed 8 August 2021).

Department of the Environment (DotEE) 2013 Matters of National Environmental Significance Significant impact guidelines 1.1 Environment Protection and Biodiversity Conservation Act 1999.

NSW Seamless Geology Data Package 2020 (Colquhoun G.P., Huges K.S, Deyssing L., Ballard J.C, Folkes C.B, Phillips G., Troedson A.L and Fitzherbert J.A. 2020. New South Wales Seamless Geology dataset, version 2.0 [Digital Dataset]. Geological Survey of New South Wales, Department of Regional NSW, Maitland).

Appendix A Definitions

The following terminology has been used throughout this report for the purposes of describing the impacts of the proposal in the context of a biodiversity assessment in accordance with the NSW Biodiversity Assessment Method 2020. This terminology may or may not align with other technical documents associated with the proposed development.

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

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

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

Appendix B Vegetation Floristic Plot Data

Table B-1 Vegetation plot function

Family	Species	Common Name	Listing Status	ROTAP	Exotic	High Threat Weed	Growth Form Group	Plot 1			Plot 2		
								Stratum & Layer	Cover	Abundance	Stratum & Layer	Cover	Abundance
Malvaceae	*Abutilon oxycarpum*	Straggly Lantern-bush					Shrub (SG)						
Fabaceae (Mimosoideae)	*Acacia salicina*	Cooba					Tree (TG)	m	2	1			
Fabaceae (Mimosoideae)	*Acacia salicina*	Cooba					Tree (TG)						
Amaranthaceae	*Alternanthera angustifolia*						Forb (FG)	g	0.1	100			
Amaranthaceae	*Alternanthera spp.*	Joyweed					Forb (FG)						
Poaceae	*Aristida spp.*	A Wiregrass					Grass & grasslike (GG)						
Asteraceae	*Aster subulatus*	Wild Aster			*								
Chenopodiaceae	*Atriplex semibaccata*	Creeping Saltbush					Shrub (SG)						
Amaryllidaceae	*Crinum flaccidum*	Darling Lily					Forb (FG)						
Poaceae	*Bromus spp.*	A Brome					Grass & grasslike (GG)						
Asphodelaceae	*Bulbine bulbosa*	Bulbine Lily					Forb (FG)						
Asteraceae	*Calotis cuneata*	Mountain Burr-Daisy					Forb (FG)	g	0.1	1			
Asteraceae	*Calotis spp.*	A Burr-daisy					Forb (FG)	g	0.1	10			
Brassicaceae	*Capsella bursa-pastoris*	Shepherd's Purse			*				0.1	10			
Euphorbiaceae	*Chamaesyce drummondii*	Caustic Weed					Forb (FG)		0.1	4			
Poaceae	*Chloris gayana*	Rhodes Grass			*	1					g	3	200
Poaceae	*Chloris truncata*	Windmill Grass					Grass & grasslike (GG)	g	8	500		3	200

© ECO LOGICAL AUSTRALIA PTY LTD

Family	Species	Common Name	Listing Status	ROTAP	Exotic	High Threat Weed	Growth Form Group	Plot 1			Plot 2		
								Stratum & Layer	Cover	Abundance	Stratum & Layer	Cover	Abundance
Convolvulaceae	*Convolvulus graminetinus*						Other (OG)		0.1	10	g	1	20
Crassulaceae	*Crassula colorata var. acuminata*						Forb (FG)	g	0.1	10			
Fabaceae (Faboideae)	*Cullen tenax*	Emu-foot					Forb (FG)						
Poaceae	*Cynodon dactylon*	Common Couch					Grass & grasslike (GG)		1	20			
Cyperaceae	*Cyperus spp.*						Grass & grasslike (GG)	g	0.3	20			
Apiaceae	*Daucus glochidiatus*	Native Carrot					Forb (FG)	g	0.1	50	g	5	500
Poaceae	*Dichanthium sericeum subsp. sericeum*	Queensland Bluegrass					Grass & grasslike (GG)	g	10	500	g	5	200
Chenopodiaceae	*Einadia polygonoides*	Knotweed Goosefoot					Forb (FG)	g	0.1	10	g	0.5	50
Poaceae	*Eragrostis curvula*	African Lovegrass			*	1		g	6	100	g	5	200
Myoporaceae	*Eremophila debilis*	Amulla					Shrub (SG)				g	3	100
Poaceae	*Eriochloa procera*	Spring Grass					Grass & grasslike (GG)	g	0.5	10		5	500
Myrtaceae	*Eucalyptus coolibah subsp. coolibah*						Tree (TG)	u	20	8			
Asteraceae	*Gamochaeta spp.*				*								
Goodeniaceae	*Goodenia fascicularis*	Mallee Goodenia					Forb (FG)				g	0.5	100
Haloragaceae	*Haloragis glauca f. glauca*						Forb (FG)						
Asteraceae	*Lactuca serriola f. serriola*				*								
Lamiaceae	*Lamium amplexicaule*	Dead Nettle			*								

© ECO LOGICAL AUSTRALIA PTY LTD

Family	Species	Common Name	Listing Status	ROTAP	Exotic	High Threat Weed	Growth Form Group	Plot 1			Plot 2		
								Stratum & Layer	Cover	Abundance	Stratum & Layer	Cover	Abundance
Asteraceae	*Leiocarpa panaetioides*	Wooly Buttons					Forb (FG)				g	0.1	20
Brassicaceae	*Lepidium africanum*	Common Peppercress			*						g	0.5	50
Campanulaceae	*Lobelia concolor*	Poison Pratia					Forb (FG)						
Solanaceae	*Lycium ferocissimum*	African Boxthorn			*	1							
Malvaceae	*Malva parviflora*	Small-flowered Mallow			*				0.2	10			
Marsileaceae	*Marsilea drummondii*	Common Nardoo					Fern (EG)	g	0.1	100			
Fabaceae (Faboideae)	*Medicago minima*	Woolly Burr Medic			*			g	0.2	100	g	10	1000
Myoporaceae	*Myoporum montanum*	Western Boobialla					Shrub (SG)						
Oxalidaceae	*Oxalis perennans*						Forb (FG)	g	0.1	10	g	3	100
Poaceae	*Panicum effusum*	Hairy Panic					Grass & grasslike (GG)	g	2	20			
Asteraceae	*Parthenium hysterophorus*	Parthenium Weed			*	1							
Poaceae	*Paspalidium distans*						Grass & grasslike (GG)				g	6	500
Poaceae	*Paspalum dilatatum*	Paspalum			*	1					g	5	500
Verbenaceae	*Phyla canescens*	Lippia			*	1		g	0.1	20	g	5	300
Polygonaceae	*Rumex spp.*	Dock					Forb (FG)						
Poaceae	*Rytidosperma bipartitum*	Wallaby Grass					Grass & grasslike (GG)	g	0.5	10			
Chenopodiaceae	*Salsola australis*						Shrub (SG)						
Chenopodiaceae	*Sclerolaena decurrens*	Green Copperburr					Shrub (SG)				g	0.2	100

© ECO LOGICAL AUSTRALIA PTY LTD

Family	Species	Common Name	Listing Status	ROTAP	Exotic	High Threat Weed	Growth Form Group	Plot 1			Plot 2		
								Stratum & Layer	Cover	Abundance	Stratum & Layer	Cover	Abundance
Chenopodiaceae	*Sclerolaena muricata var. muricata*	Black Rolypoly					Shrub (SG)						
Brassicaceae	*Sisymbrium irio*	London Rocket			*								
Brassicaceae	*Sisymbrium spp.*				*						g	3	100
Solanaceae	*Solanum nigrum*	Black-berry Nightshade			*						g	0.5	20
Asteraceae	*Sonchus oleraceus*	Common Sowthistle			*			g	0.1	50		0.1	20
Poaceae	*Sporobolus spp.*	Rat's Tail Couch					Grass & grasslike (GG)	g	2	50			
Aizoaceae	*Tetragonia tetragonioides*	New Zealand Spinach					Forb (FG)				g	1	100
Fabaceae (Faboideae)	*Trifolium glomeratum*	Clustered Clover			*								
Verbenaceae	*Verbena gaudichaudii*	Verbena					Forb (FG)	g	0.1	20		1	50
Campanulaceae	*Wahlenbergia spp.*	Bluebell					Forb (FG)				g	0.1	20

**indicates exotic species*

© ECO LOGICAL AUSTRALIA PTY LTD

Appendix C Vegetation Integrity Plot Data

Table C-1: Vegetation plot locations

Plot	PCT	Condition class	Zone	Easting	Northing
Plot 1	40	Mod	55	735081	6654085
Plot 2	40	No Canopy	55	734704	6654008

Table C-2: Vegetation plot structure

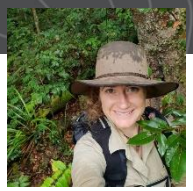
Plot	Composition					
	Tree	Shrub	Grass	Forbs	Ferns	Other
Plot 1	2	0	8	9	1	1
Plot 2	0.0	2	4	8	0	1

Plot	Structure (total cover %)					
	Tree	Shrub	Grass	Forbs	Ferns	Other
Plot 1	22.0	0.0	24.3	0.9	0.1	0.1
Plot 2	0.0	3.2	19.0	11.2	0.0	1.0

Table C-3: Vegetation plot function

Plot	Large trees	HBTs	Litter cover	Logs (m)	Stems (5 to 9) (0,1)	Stems (10 to 19) (0,1)	Stems (20 to 29) (0,1)	Stems (30 to 49) (0,1)	Stems (50 to 79) (0,1)	Regen	High threat exotic cover
Plot 1	3	0	36	5	1	1	1	1	0	0	6.1
Plot 2	0	0	39	0	0	0	0	0	0	0	18.0

Appendix D Staff CVs



Phoebe Smith **ECOLOGIST**

Phoebe joined the Eco Logical Australia (ELA) Coffs Harbour team in May 2021, bringing with her over five years' experience in the environmental industry with key skills in ecological survey including NSW Biodiversity Assessment Methodology (BAM), ecological restoration, bush regeneration, report production, project management and client relations. With project experience within the Greater Hunter, Phoebe has completed biodiversity assessments and monitoring projects in a variety of environments for various industries and stakeholders including private landholders, local councils, state government, housing development and infrastructure.

Phoebe has a good understanding of NSW biodiversity legislation with extensive experience in implementing the BAM (including the design and undertaking of on-ground field survey and report production), and Vegetation Management Plans in accordance with Council guidelines and the Biosecurity Act 2015.

Phoebe is experienced in the design and implementation of biodiversity monitoring programmes, particularly in accordance with the BAM for a variety of flora, fauna and ecological communities. Phoebe recently became a BAM Accredited Assessor (BAAS21011) in July 2021.

Phoebe's primary skills include planning, preparation, and implementation of surveys under the BAM, involving plot-based floristic surveys (BAM Plots), terrestrial and arboreal mammal surveys, Plant Community Type (PCT) and Vegetation Zone delineation mapping, targeted threatened species surveys and plot-based monitoring.

Other skills include; Nestbox installation/monitoring, spotter/catcher works, and report production including; Vegetation Management Plans (VMPs), Vegetation and Habitat Management Plans (VHMPs), Test of Significance (5-Part Test), Biodiversity Development Assessment Reports (BDARs), and preliminary works for Biodiversity Stewardship Site Assessment Reports

QUALIFICATIONS

- Bachelor of Environmental Science & Management (Honours) – Southern Cross University, 2013
- Master of Environmental Management & Sustainability (Natural Systems Management) – University of Newcastle, 2017
- BAM Assessor Accreditation, 2021
- First Aid Certificate, 2020
- Chainsaw Operations – Basic Tree Felling, 2016
- Occupational Health and Safety Construction Induction (White Card), 2015
- Working with Children Check, 2016
- Working Safely at Heights, 2017

PROJECT EXPERIENCE

Developments

- BDARs – Project Ecologist for several major and small BDAR assessments in and around the Hunter, NSW region.
- Ecological Advice/Constraints & Opportunities – Project Manager and Team Leader for numerous sites within the Sydney, Hunter, MidCoast and Port Stephens Regions.

- Watagan Park, Cooranbong – Ongoing field surveys, habitat assessments (ecological pre-clearance surveys and clearing supervision), targeted threatened flora surveys, threatened flora translocation, nestbox installation and monitoring, compliance monitoring, and on-ground environmental restoration.
- Huntlee, North Rothbury NSW - Vegetation Management Plans, Weed Density Map and a Creek Rehabilitation Management Plan. Biannual nest box installation and monitoring, targeted threatened species monitoring, pre-clearance surveys and tree felling supervision, and prepared and delivered multiple Biodiversity Assessment Reports involving high detailed flora and fauna surveys, threatened species surveys and vegetation community mapping.

Rehabilitation/Conservation

- VMPs - Project Ecologist for both fieldwork and author of various VMPs within the Hunter Region including Newcastle, Lake Macquarie, MidCoast, Cessnock, Maitland and Central Coast City Council's. VMP reports and fieldwork area guided by Council guidelines and the Water Management and Biosecurity Acts.
- Pindimar/Bundabah, NSW - Ecological Restoration Plan developed in response to the illegal clearing of 17.3ha of native vegetation. Assisted in undertaking targeted threatened flora survey that resulted in a large population (over 200) of *Cryptostylis hunteriana* being recorded. Other species recorded include *Angophora inopina, Grevillea parviflora* subsp. *parviflora, Melaleuca groveana* and *Tetratheca juncea*. Biodiversity Assessments, which involved both flora and fauna surveys within a large contiguous tract of native vegetation.
- Watagan Park, Cooranbong - Report writing including the production of a Rehabilitation Plan for two Environmental Conservation Areas for the implementation and delivery of approximately 120 hectares of conservation land to Lake Macquarie City Council in accordance with an EPBC approval as part of a major residential development. Monitoring and reporting of restoration works undertaken in accordance with the approved Rehabilitation Plan.
- Office of Environment & Heritage (SoS Program)
    - Undertake systematic threatened species surveys (electric blanket) for several parcels of land in the North Rothbury area that is the known location of the Critically Endangered *Persoonia pauciflora*.
    - Assist with threatened species surveys under the Save Our Species program for the Vulnerable *Asperula asthenes* in the MidCoast area (Willi Willi National Park, Goonook Nature Reserve, Bachelor State Forest, New England National Park and Forster). Produce SoS Management Site Report detailing the species preferred habitat including vegetation communities, landforms, aspect, elevation, hydrology and disturbance
- BSSAR – Preliminary on-ground field work for a potential BSSAR sites in the Lake Macquarie LGA. Vegetation delineation, BAM Plots, PCT identification, targeted threatened species surveys, preliminary BAM calculator data entry.

Ronald Hill **ECOLOGIST**

Ronald is an ecologist who joined Eco Logical Australia in 2017. With over two years of experience in terrestrial and aquatic ecology, he has successfully completed studies and reporting in a variety of projects. He possesses a thorough understanding of the ecology in the Northern Tablelands, North Coast and Western Slopes regions. Ronald is involved in many aspects of ecological consultancy.

This includes the collection of data, reporting, quoting and client communication. Ronald has contributed to many development applications including Biodiversity Assessment Reports, Flora and Fauna Assessments, and Review of Environmental Factors. He has also assisted in a variety of research projects, which have involved vegetation mapping, targeted threatened species searches and studying the responses of ecological health indicators to environmental flows.

Prior to ELA, Ronald completed his Bachelor of Environmental Science at the University of New England 2016, and had developed over one year of bush regeneration and ecological restoration experience within the North Coast Region.

QUALIFICATIONS

- Bachelor of Environmental Science – University of New England, 2016
- Chemical Accreditation (AQF-3), 2017
- First Aid Certificate, 2018
- Work Safely in the Construction Industry (White Card), 2015

PROJECT EXPERIENCE

- Armidale Regional Council biodiversity stewardship assessment – Field surveys and report writing
- Bundarra Road REF – Field survey and report writing
- Clarrie Hall Dam Environmental flow assessment – Aquatic fauna survey and water quality analysis
- Darling Northern Connectivity Event - Water quality assessment and report writing Gwydir and Warrego-Darling LTIM Stage 2 (Years 3, 4 and 5) - Field surveys, data analysis and report writing for vegetation diversity
- Grafton correctional facility dam de-watering – Planning, supervision and evacuation of fauna during dam de-watering
- Koree Island Aquatic Assessment - Aquatic fauna survey, water quality analysis, data analysis and report writing
- Malpas Dam Power Supply Upgrade REF – Field survey and report writing
- Narrabri South Baseline surveys – Field surveys
- Narrabri Coal Annual monitoring – Flora/fauna field surveys and report writing
- Southgate Solar Farm preliminary biodiversity assessment – Project management, field surveys and reporting
- Sundown Solar farm EIS – Targeted threatened species searches
- Rockvale Rd Subdivision biodiversity assessment – field surveys and report writing
- Tamworth Organic Recycling Facility FFA – Field survey and report writing

© ECO LOGICAL AUSTRALIA PTY LTD

- Wright College UNE redevelopment BDAR – proposal preparation and project planning
- Ruby Hills Wind Farm – Field surveys and scoping study

Matthew Elsley **ENVIRONMENTAL SCIENTIST**

Matt is an Environmental Scientist who joined Eco Logical in July 2018. Prior to ELA, Matt completed his Bachelor of Science (Environmental Science), Bachelor of Geoscience (Mineral Deposits) and Bachelor of Arts (Archaeology and Palaeoanthropology) whilst gaining experience at ELA as a casual employee.

Matt is capable in fieldwork, study design, data analysis, scientific report writing and risk assessment. He has experience in; terrestrial and aquatic fauna surveys (trapping, handling, fauna ID, incl. avian and aquatic), flora and ecological communities monitoring and survey and soils and environmental chemistry surveying. Matt has undertaken extensive fieldwork withing the Narrabri and Pilliga region covering threatened species surveys, fauna trapping and monitoring, ecological assessment and vegetation monitoring, landscape ecology and riverinee assessment.

QUALIFICATIONS

- Bachelor of Science (Environmental Science), University of New England (UNE), 2014-2017
- Bachelor of Geoscience (Mineral Deposits), UNE, 2014-2017
- Bachelor of Arts (Archaeology & Palaeoanthropology), UNE, 2014-2017
- National OHS Construction Induction Training (White Card) – 2019
- Lyssavirus Vaccinated - 2019
- Advanced First Responder First Aid – 2019
- Various AFQ Level Qualifications in Emergency Management and Rescue – 2019
- Remote Pilots Licence (UAV operator, sub 25kg, night operations)- 2020

PROJECT EXPERIENCE

IMPACT ASSESSMENTS

- Narrabri Mines Biodiversity Offset area and Rehabilitation Monitoring, Impact Assessment (Whitehaven)
- Tarrawonga Mine Environmental Monitoring (Whitehaven)
- Santos Gas Pipeline Environmental Assessments (Santos)
- Toorale NP Infrastructure REF (Office of Environment and Heritage)

TARGETED FAUNA SURVEYS, HANDLING AND CLEARANCE SUPERVISION

- Microbat Tracking and Range Assessment – (Whitehaven).
- Rapid Response Riverine Aquatic Fish Kill Assessments Board (Water NSW, DPIE)
- Targeted Fauna Surveys in the Pilliga State Forest (Whitehaven)
- Kenna Spring Fauna Surveys (Whitehaven)
- Tarrawonga Clearance Supervision and Fauna Relocation (Whitehaven)
- Narrabri Mines Bird Surveys, Targeted Search (Whitehaven)
- Pilliga State Forest Targeted Bird Searches (Santos)

© ECO LOGICAL AUSTRALIA PTY LTD

- Targeted Search for Threatened Bat Species, Pilliga State Forest (Santos)

ENVIRONMENTAL MONITORING

- Warrego-Darling Long Term Intervention Monitoring (NSW Office of Environmental Water)
  - Surveys for birds (woodland and wetland) and amphibians in Toorale National Park
  - Aquatic environmental chemistry sampling and macroinvertebrate sampling
  - Spatial data analysis extracting inundation patterns and extent
- Barwon-Darling Water Assessment and Monitoring (NSW Office of Environmental Water)
- Rocglen Mine Monitoring (Narrabri Coal Operations)
- Canyon Mine Monitoring, Soil and Earth Surveys (Whitehaven)
- Tarrawonga Mine Monitoring (Whitehaven)
- Narrabri Mine Monitoring, Channel Stability (Whitehaven)

TARGETED FLORA SURVEY

- Pillage State Forest Targeted Orchid Surveys (Santos)
- Targeted Surveys for Threatened and Vulnerable Flora Species (Whitehaven)

VEGETATION MONITORING

- SCAT Tree stand monitoring and Assessment, Flora Plot Analysis and Habitat Assessments (Murray Darling Basin Authority)
- Walgett Pilot Biodiversity Assessment Method EEC Flora Mapping (Western Local Land Services)
- Rocglen Mine Monitoring, Flora Assessments (Whitehaven)
- Narrabri Mine Vegetation Monitoring (Whitehaven)

Appendix E Biodiversity credit report

Appendix F EPBC Act Likelihood of Occurrence

An assessment of likelihood of occurrence was made for threatened and migratory species identified from the database search. Five terms for the likelihood of occurrence of species are used in this report. This assessment was based on database or other records, presence or absence of suitable habitat, features of the proposal site, results of the site inspection and professional judgement.

- 'known' = the species was or has been observed on the site
- 'likely' = a medium to high probability that a species uses the site
- 'potential' = suitable habitat for a species occurs on the site, but there is insufficient information to categorise the species as likely to occur, or unlikely to occur
- 'unlikely' = a very low to low probability that a species uses the site
- 'no' = habitat within the study area and in the vicinity is unsuitable for the species.

A test of significance was conducted for threatened species or ecological communities that were recorded within the subject land or had a higher likelihood of occurring and were not recorded during the site visit. It is noted that some threatened fauna species that are highly mobile, wide ranging and vagrant may use portions of the study area intermittently for foraging. For these fauna species, the habitat present and likely to be impacted is not considered to be important to the threatened species, particularly in relation to the amount of similar habitat remaining in the surrounding landscape. As such, a test of significance in reference to State or Commonwealth legislation was not considered necessary.

The records column refers to the number of records occurring within 5 km of the study area, as provided by the BioNet Atlas and Protected Matters Search Tool database search.

Information provided in the habitat associations' column has primarily been extracted (and modified) from the Commonwealth Species Profile and Threats Database and the NSW Threatened Species Data

: Threatened ecological communities likelihood table

Community Name	EPBC Act status	Description	Habitat	Likelihood of occurrence	Impact Assessment Required (Yes/No) & Justification for inclusion/exclusion based on habitat distribution and impacts.
Grey Box (Eucalyptus microcarpa) Grassy Woodlands and Derived Native Grasslands of South-eastern Australia	E	Woodland to open forest with a canopy dominated by *Eucalyptus microcarpa* (Grey Box). Other tree species are often present and may be co-dominant with Grey Box at some sites, including *Allocasuarina luehmannii* (Buloke), *Brachychiton populneus* (Kurrajong), *Callitris glaucophylla* (White Cypress Pine), *Eucalyptus albens* (White Box), *E. camaldulensis* (River Red Gum), *E. conica* (Fuzzy Box), *E. leucoxylon* (Yellow Gum), *E. melliodora* (Yellow Box) and *E. populnea* (Bimble Box). The understorey is characterised by a moderately dense to sparse shrub layer, and a ground layer of perennial and annual native forbs and graminoids, dominated by tussock grasses. The community includes patches of derived grassland, where the tree canopy and mid layer has been removed to less than 10% crown cover but the native ground layer remains largely intact.	Flat to undulating plains, low slopes and rises and, to a lesser extent, drainage depressions and flats. May extend to more elevated hillslopes on the fringes of its range. Often occurs on productive soils derived from alluvial or colluvial materials.	None	No - TEC was not identified to occur within the subject land during field surveys.
White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland	CE	Characterised by a species-rich understorey of native tussock grasses, herbs and scattered shrubs, and the dominance, or prior dominance, of *Eucalyptus albens* (White Box), *E. melliodora* (Yellow Box) and *E. blakelyi* (Blakely's Red Gum). In the Nandewar Bioregion, *Eucalyptus microcarpa or E. moluccana* (Grey Box) may also be dominant or co-dominant. The tree-cover is generally discontinuous and consists of widely spaced	Areas where rainfall is between 400 and 1200 mm per annum, on moderate to highly fertile soils at altitudes of 170 m to 1200 m.	None	No - TEC was not identified to occur within the subject land during field surveys.

© ECO LOGICAL AUSTRALIA PTY LTD

Community Name	EPBC Act status	Description	Habitat	Likelihood of occurrence	Impact Assessment Required (Yes/No) & Justification for inclusion/exclusion based on habitat distribution and impacts.
		trees of medium height in which the canopies are clearly separated.			
Weeping Myall Woodlands	E	Open woodlands to woodlands, generally 4-12 m high, in which Acacia pendula (Weeping Myall) trees are the sole or dominant overstorey species. Other vegetation may include *Alectryon oleifolius subsp. elongatus* (Western Rosewood), *Eucalyptus populnea* (Poplar Box) *or Eucalyptus largiflorens* (Black Box*). Amyema quandang* (Grey Mistletoe) commonly occurs on the branches of Weeping Myall trees. The understorey often includes an open layer of shrubs above an open ground layer of grasses and herbs, though the ecological community can exist naturally either as a shrubby or a grassy woodland.	Generally, occur on flat areas, shallow depressions or gilgais on raised (relict) alluvial plains. Occurs on black, brown, red-brown or grey clay or clay loam soils.	None	No - TEC was not identified to occur within the subject land during field surveys.

© ECO LOGICAL AUSTRALIA PTY LTD

Community Name	EPBC Act status	Description	Habitat	Likelihood of occurrence	Impact Assessment Required (Yes/No) & Justification for inclusion/exclusion based on habitat distribution and impacts.
Natural grasslands on basalt and fine-textured alluvial plains of northern New South Wales and southern Queensland	CE	Temperate grasslands are typically dominated by tussock grasses in the genera *Austrodanthonia, Austrostipa, Bothriochloa, Chloris, Enteropogon*, or *Themeda*. Representatives of these genera, as well as temperate grassland forbs, are present to some extent throughout the ecological community. The shrub cover is typically a very minor component of the grassland however in some areas the cover of shrubs, such as *Acacia farnesiana* (Mimosa), can be quite thick. Other shrubs that may be present include *Pittosporum phylliraeoides, Pimelea spp. and Sclerolaena spp*. A tree canopy is typically absent to sparse.	Mainly associated with fine textured, often cracking clay soils derived from either basalt or alluvium. Typically occurs on flat to very low slopes.	None	No - TEC was not identified to occur within the subject land during field surveys.
Coolibah - Black Box Woodlands of the Darling Riverine Plains and the Brigalow Belt South Bioregions	E	Semi-arid to humid subtropical woodland where *Eucalyptus coolibah subsp. coolibah* (Coolibah) and/or *Eucalyptus largiflorens* (Black Box) are the dominant canopy species and where the understorey tends to be grassy. Other tree species may occur in the tree canopy but are not dominant, including *Acacia salicina* (Cooba), *Acacia stenophylla* (River Cooba), *Casuarina cristata* (Belah), *Eremophila bignoniiflora* (Eurah), *Eucalyptus camaldulensis* (River Red Gum) and *Eucalyptus populnea* (Bimble Box). The mid or shrub layer may or may not be present. Ground cover lifeforms typically comprise native graminoids, other herbs, chenopods and other low shrubs that are typically under 50 cm tall.	Found on the grey, self-mulching clays of periodically waterlogged floodplains, swamp margins, ephemeral wetlands, stream levees, drainage depressions and gilgai.	Known	Yes - TEC was identified to occur within the subject land during field surveys.

© ECO LOGICAL AUSTRALIA PTY LTD

Community Name	EPBC Act status	Description	Habitat	Likelihood of occurrence	Impact Assessment Required (Yes/No) & Justification for inclusion/exclusion based on habitat distribution and impacts.
Brigalow (Acacia harpophylla dominant and co-dominant)	E	Characterised by the presence of *Acacia harpophylla* (Brigalow) as one of the three most abundant tree species. Brigalow is usually either dominant in the tree layer or co-dominant with other species such as Casuarina cristata (Belah), other species of Acacia, or Eucalyptus. The structure of the vegetation ranges from open forest to open woodland. The height of the tree layer varies from about 9 m in low rainfall areas to around 25 m in higher rainfall areas. A prominent shrub layer is usually present.	In NSW, occurs on undulating plains or sandplains in the western areas and on flat or gentle rises on alluvial plains or undulating peneplains in eastern areas. It is associated with red, brown and grey clays, red and grey earths and red-brown earths.	None	No - TEC was not identified to occur within the subject land during field surveys.

Yes: 'assessment of significance required', No: 'assessment of significance not required'.

© ECO LOGICAL AUSTRALIA PTY LTD

Table E2: Flora species likelihood table

Scientific Name	Common Name	EPBC Act Status	Distribution	Habitat	BioNet records (locality)	Likelihood of occurrence	Justification	Impact Assessment Required
Dichanthium setosum	Bluegrass	V	In NSW, found on the New England Tablelands, North West Slopes and Plains and the Central Western Slopes.	Cleared woodland, grassy roadside remnants and highly disturbed pasture, on heavy basaltic black soils and red-brown loams with clay subsoil.	0	Potential	The subject land contains cleared woodland with open native grasslands on black earths which presents habitat for this species.	Yes
Lepidium monoplocoides	Winged Peppercress	E	Semi-arid western plains regions of NSW. Large numbers of historical records (from Broken Hill, Bourke, Cobar, Urana, Lake Cargelligo, Balranald, Wanganella and Deniliquin) but few recent collections. (Hay Plain, south-eastern Riverina, and near Pooncarie).	Open woodland dominated by *Allocasuarina luehmannii* and/or eucalypts, wetland-grassland, or Maireana pyramidata shrubland. Occurs on seasonally moist to waterlogged sites, with heavy fertile soils.	0	Potential	The subject land contains seasonally moist sites with heavy fertile soils within a semi-arid western plain region.	Yes
Swainsona murrayana	Slender Darling Pea	V	Recorded in the Jerilderie and Deniliquin areas of the southern riverine plain, the Hay plain as far north as Willandra National Park, near Broken Hill and in various localities between Dubbo and Moree.	Bladder saltbush, black box and grassland communities, remnant native grasslands or grassy woodlands on heavy clay-based soils, on level plains, floodplains and depressions.	0	Unlikely	This species was not identified during targeted flora surveys.	No

Yes: 'assessment of significance required', No: 'assessment of significance not required'.

© ECO LOGICAL AUSTRALIA PTY LTD

Table E3: Fauna species likelihood table

Scientific Name	Common Name	EPBC Act Status	Distribution	Habitat	BioNet records (locality)	Likelihood of occurrence	Justification	Impact Assessment Required
Anomalopus mackayi	Five-clawed Worm-skink	V	Restricted to the North West Slopes and Plains of north-east NSW and south-east Qld, from the Ashford area west to Mungindi and Walgett in NSW and north to Dalby in Qld.	Grassy White Box woodland on moist black soils, and River Red Gum-Coolibah-Bimble Box woodland on deep cracking loose clay soils. Also grassland areas and open paddocks with scattered trees.	0	Unlikely	The subject land contains marginally suitable habitat with only minor cracking soils. Additionally, no records have been recorded within the locality.	No
Anthochaera phrygia	Regent Honeyeater	CE	Inland slopes of south-east Australia, and less frequently in coastal areas. In NSW, most records are from the North-West Plains, North-West and South-West Slopes, Northern Tablelands, Central Tablelands and Southern Tablelands regions; also recorded in the Central Coast and Hunter Valley regions.	Eucalypt woodland and open forest, wooded farmland and urban areas with mature eucalypts, and riparian forests of *Casuarina cunninghamiana* (River Oak).	0	None	The distribution of this species does not overlap with the subject land.	No
Chalinolobus dwyeri	Large-eared Pied Bat	V	Recorded from Rockhampton in Qld south to Ulladulla in NSW. Largest concentrations of populations occur in the sandstone escarpments of the Sydney basin and the NSW north-west slopes.	Wet and dry sclerophyll forests, Cyprus Pine dominated forest, woodland, sub-alpine woodland, edges of rainforests and sandstone outcrop country.	0	None	The distribution of this species does not overlap with the subject land.	No

© ECO LOGICAL AUSTRALIA PTY LTD

Scientific Name	Common Name	EPBC Act Status	Distribution	Habitat	BioNet records (locality)	Likelihood of occurrence	Justification	Impact Assessment Required
Grantiella picta	Painted Honeyeater	V	Widely distributed in NSW, predominantly on the inland side of the Great Dividing Range but avoiding arid areas.	Boree, Brigalow and Box-Gum Woodlands and Box-Ironbark Forests.	0	Unlikely	This species inhabits Boree/ Weeping Myall (*Acacia pendula*), Brigalow (*Acacia harpophylla*) and Box-Gum Woodlands and Box-Ironbark Forests which neither the vegetation types or their representative species are present across the subject land.	No
Leipoa ocellata	Malleefowl	V	Arid and semi-arid zones. In NSW, populations occur in the south west mallee centred on Mallee Cliffs NP and extending east to near Balranald; in the Scotia mallee west of the Darling River; and in the Goonoo forest near Dubbo. Recorded less recently in the Pilliga forests, around Cobar and Goulburn River NP.	Predominantly mallee communities. Less frequently found in other eucalypt woodlands, such as Inland Grey Box, Ironbark or Bimble Box Woodlands, or other woodlands dominated by Mulga or native Cypress Pine species.	0	None	The subject land does not contain habitat connectivity for this species to access, additionally its known distribution does not occur within the region.	No

© ECO LOGICAL AUSTRALIA PTY LTD

Scientific Name	Common Name	EPBC Act Status	Distribution	Habitat	BioNet records (locality)	Likelihood of occurrence	Justification	Impact Assessment Required
Nyctophilus corbeni	Corben's Long-eared Bat	V	Distribution coincides approximately with the Murray Darling Basin; the Pilliga Scrub region is the distinct stronghold for this species.	Mallee, *Allocasuarina luehmannii* (bulloke) and box eucalypt- dominated communities, especially box/ironbark/cypress-pine vegetation.	0	Unlikely	This species inhabits Mallee, *Allocasuarina luehmannii* (bulloke) and box eucalypt-dominated communities, especially box/ironbark/cypress-pine vegetation which neither these vegetation types or their representative species are present across the subject land.	No
Polytelis swainsonii	Superb Parrot	V	In NSW, occurs on inland slopes of the Great Divide and on adjacent plains, especially along the major river-systems.	Box-gum woodland, Box-Cypress-pine and Boree Woodlands and River Red Gum Forest.	0	Potential	The subject land may offer opportunistic foraging habitat however it is unlikely to be important for this species given the lack of preferred vegetation and nesting habitat across the site.	No

© ECO LOGICAL AUSTRALIA PTY LTD

Scientific Name	Common Name	EPBC Act Status	Distribution	Habitat	BioNet records (locality)	Likelihood of occurrence	Justification	Impact Assessment Required
Rostratula australis	Australian Painted Snipe	E	In NSW most records are from the Murray-Darling Basin. Other recent records include wetlands on the Hawkesbury River and the Clarence and lower Hunter Valleys.	Swamps, dams and nearby marshy areas.	0	None	The subject land does not adequate aquatic habitat for this species.	No

Yes: 'Assessment of Significance required', No: 'Assessment of Significance' not required'.

Appendix G EPBC Act Assessment of Significance

This section has been drafted to consider the impacts to any protected matters under the Commonwealth EPBC Act.

Species and TECs that have been assessed against the test of significance were identified through the development of the Likelihood of Occurrence (Appendix B). The following threatened species and TECs are assessed below:

- Vulnerable species*Dichanthium setosum* (Bluegrass)

- Endangered species
  - *Lepidium monoplocoides* (Winged Watercress)

- Endangered ecological communities
  - *Coolibah - Black Box Woodlands of the Darling Riverine Plains and the Brigalow Belt South Bioregions*

Under the EPBC Act, any potential impacts must be considered, and should a significant impact be likely the project must be referred to the Commonwealth Minister for the Environment. This section considers the impacts to these three MNES that may be impacted by the proposal.

Under the Matters of National Environmental Significance – Significant Impact Guidelines 1.1 (CoA, 2013), an 'important population' is a population that is necessary for a species' long-term survival and recovery. This may include populations identified as such in recovery plans, and/or that are:

- key source populations either for breeding or dispersal
- populations that are necessary for maintaining genetic diversity, and/or
- populations that are near the limit of the species range.

Any potential occurrence of any of these species within the site is unlikely to be an important population, as any individuals that may occur are:

- Not a key source for breeding or dispersal given the minor scale of the habitat to be affected within a highly isolated patch of potential habitat. Larger areas of more suitable habitat would occur outside of the township.
- Given that the subject land occurs isolated within the town of Wee Waa, and no populations or individuals occurring within a 5km radius, a potential population is unlikely to contain genetic diversity that is important for this species survival.
- No population of this species that would occur here is near the limit of its range within the Darling Riverine Plains - Castlereagh Barwon Bioregion.

VULNERABLE SPECIES

One threatened species listed as Vulnerable under the EPBC Act are known or likely to use the subject land:

- *Dichanthium setosum* (Bluegrass)

Criterion	Question	Response
An action is likely to have a significant impact on a vulnerable species if there is a real chance or possibility that it will:		
1)	lead to a long-term decrease in the size of an important population of a species	No important populations occur on-site. This species was not identified within the subject land during targeted surveys nor are there any records within a 5km BioNet search of the study area.
2)	reduce the area of occupancy of an important population	No important populations occur on-site and no known populations or individuals are known to occur within 5km of the Study Area. This species was not identified within the subject land during targeted surveys nor are there any records within a 5km BioNet search of the study area. Although marginal potential habitat occurs within the subject land only 1.47ha is to be affected of which 0.13ha will be retained.
3)	fragment an existing important population into two or more populations	The subject land occurs within a small, isolated patch of native vegetation with very limited connectivity to adjacent vegetation. No known populations or individuals are known to occur within a 5km of the Study Area.
4)	adversely affect habitat critical to the survival of a species	No critical habitat for these species occurs on-site (Refer to 1, 2 and 3).
5)	disrupt the breeding cycle of an important population	No important populations occur on-site. The study area occurs within a small, isolated patch, no known populations occur within 5km of the study area. Therefore, there is very little chance of genetic exchange occurring within the locality.
6)	modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline	Unlikely. Direct impacts are minimal (1.47ha) and not considered likely to decrease the availability of habitat to the extent that these species is likely to decline.
7)	result in invasive species that are harmful to a vulnerable species becoming established in the vulnerable species' habitat	Unlikely. Weeds that are not already present within the subject land are unlikely to be introduced to the site as a result of the proposal due to recommended weed management within the retained area ('to be managed').
8)	introduce disease that may cause the species to decline, or	Unlikely. Pathogens that are not already present within the subject land are unlikely to be introduced to the site as a result of the proposal.
9)	interfere substantially with the recovery of the species.	Unlikely. The prescribed impacts are insignificant, and no important populations occur.
Conclusion	**Is there likely to be a significant impact?**	**No**

ENDANGERED – LEPIDIUM MONOPLOCOIDES

The species below are listed as endangered under the EPBC Act.

- *Lepidium monoplocoides* (Winged Watercress)

Criterion	Question	Response
An action is likely to have a significant impact on a critically endangered or endangered species if there is a real chance or possibility that it will:		
1)	Lead to a long-term decrease in the size of a population	No records or populations of these species have been identified within the subject land during the current extensive targeted surveys. Although this species was surveyed outside of its recommended survey period and 'assume presence' was required, no *Lepidium* spp. individuals were found during VI plot surveys or targeted flora surveys. The proposal will not lead to a long-term decrease of a population given the small scale of the proposed works of which 1.47ha will be affected and 0.13ha is to be predominately retained.
2)	Reduce the area of occupancy of the species	As above, the removal of habitat for these species is considered negligible given the small-scale of the proposed works.
3)	Fragment an existing population into two or more populations	The subject land occurs within a small, isolated patch of native vegetation with very limited connectivity to adjacent vegetation. No known populations or individuals are known to occur within a 5km of the Study Area.
4)	Adversely affect habitat critical to the survival of a species	No critical habitat for these species occurs on-site.
5)	Disrupt the breeding cycle of a population	No. No known populations occur on-site. The study area occurs within a small, isolated patch, no known populations occur within 5km of the study area. Therefore, there is very little chance of genetic exchange occurring within the locality.
6)	Modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline	Unlikely. Direct impacts are minimal (1.47ha) and not considered likely to decrease the availability of habitat to the extent that these species is likely to decline.
7)	Result in invasive species that are harmful to a critically endangered or endangered species becoming established in the endangered or critically endangered species' habitat	Unlikely. Weeds that are not already present within the subject land are unlikely to be introduced to the site as a result of the proposal due to recommended weed management within the retained area ('to be managed').
8)	Introduce disease that may cause the species to decline	Unlikely. Pathogens that are not already present within the subject land are unlikely to be introduced to the site as a result of the proposal.
9)	Interfere with the recovery of the species	Unlikely. The prescribed impacts are insignificant, and no important populations occur.
Conclusion	**Is there likely to be a significant impact?**	**No**

ENDANGERED ECOLOGICAL COMMUNITIES

One TEC listed as Endangered under the EPBC Act was known to occur within the subject land:

- *Coolibah - Black Box Woodlands of the Darling Riverine Plains and the Brigalow Belt South Bioregions*

Criterion	Question	Response
An action is likely to have a significant impact on a critically endangered or endangered ecological community if there is a real chance or possibility that it will:		
1)	reduce the extent of an ecological community	Marginally. The total extent to be impacted is up to 0.53 ha of which 0.13ha will only be partially impacted.
2)	fragment or increase fragmentation of an ecological community, for example by clearing vegetation for roads or transmission lines	Negligible. The areas to be impacted are very small and will not result in a significant increase in fragmentation given that the TEC that occurs within the subject land is already highly fragmented and isolated. Furthermore, 0.13ha retention of the canopy and a level of groundcover is proposed in areas mapped as 'to be managed'.
3)	adversely affect habitat critical to the survival of an ecological community	No habitat critical to the survival of the ecological community refers to areas that are necessary: for activities such as foraging, breeding, roosting or dispersal, for the long-term maintenance of the ecological community (including the maintenance of species essential to the survival of the ecological community, such as pollinators), to maintain genetic diversity and long term evolutionary development or for the reintroduction of populations or recovery of the species or ecological community. The proposed action is not considered critical to the survival of the ecological community as it is currently disturbed and isolated from other areas. Furthermore, the proposal is considered to have minimal impacts due to the small area proposed for removal (0.54ha).
4)	modify or destroy abiotic (non-living) factors (such as water, nutrients, or soil) necessary for an ecological community's survival, including reduction of groundwater levels, or substantial alteration of surface water drainage patterns	No. The proposed development is unlikely to modify or destroy abiotic factors necessary for the ecological community's survival due to the small area (0.54ha) proposed for removal.
5)	cause a substantial change in the species composition of an occurrence of an ecological community, including causing a decline or loss of functionally important species, for example through regular burning or flora or fauna harvesting	No. The proposed action is unlikely to cause substantial change in the species composition for this occurrence of the community as some areas containing functionally important species will be partially retained (0.13ha) and only a small area is to be removed (0.54ha).
6)	cause a substantial reduction in the quality or integrity of an occurrence of an ecological community, including, but not limited to: - assisting invasive species, that are harmful to the listed ecological community, to become established, or - causing regular mobilisation of fertilisers, herbicides or other chemicals or pollutants into the ecological	- No. The subject land currently contains exotic species in the form of invasive exotic grass species, and their extent is unlikely to increase due to their removal, such that a substantial reduction in the quality or integrity of an occurrence of an ecological community will occur. - No. The proposed action is unlikely to introduce chemicals or pollutants to the patches of TEC that exist within the subject land, that would result in a substantial reduction in the quality or integrity of the TEC.

Criterion	Question	Response
	community which kill or inhibit the growth of species in the ecological community, or	
7)	interfere with the recovery of an ecological community.	Negligible. The community is unlikely to recover in the area to the extent that it would be important for the recovery of the TEC, given its isolation to nearby native vegetation and past land use such as clearing and likely grazing.
Conclusion	**Is there likely to be a significant impact?**	**No**

ecological AUSTRALIA
A TETRA TECH COMPANY

1300 646 131
www.ecoaus.com.au