



Mudgee Bunnings – 134 Lions Drive
Biodiversity Development Assessment Report

Bunnings Group Ltd

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Executive Summary

Eco Logical Australia Pty Ltd (ELA) was engaged by Bunnings Group Ltd (the Proponent) to prepare a Biodiversity Development Assessment Report (BDAR) to support a Development Application (DA) to Mid-Western Regional Council (MWRC) on Lot 2 DP 1079362 (proposed development site) on the corner of Castlereagh Highway and Lions Drive, Mudgee, known as 134 Lions Drive Mudgee. The proposed development involves the clearing of the site, earthworks, construction and operation of a Bunnings Warehouse including associated infrastructure.

The development site (5.1 ha) contains an area of remnant vegetation (0.4 ha), a house with a landscaped garden (0.7 ha) and small paddocks that have been used for stock grazing (4 ha). The development site contains areas mapped on the Biodiversity Values Map and the extent of clearing native vegetation is above the area clearing threshold, triggering the Biodiversity Offset Scheme (BOS). Therefore, this BDAR assesses the impacts of the proposed construction of the Bunnings Warehouse according to the NSW Biodiversity Assessment Method (BAM) established under Section 6.7 of the NSW *Biodiversity Conservation Act 2016* (BC Act). This report will be submitted to MWRC who are the consent authority.

The development site is located within the MWRC Local Government Area (LGA). The surrounding properties to the north are zoned B5 Business Development, and those immediately adjoining the site are zoned as RU4 Primary Production Small Lots or General Industrial (IN1), under the MWRC Environment Plan (LEP, 2012).

Historical imagery show that the development site was cleared of vegetation prior to 1965. A house, sheds and yards were established. Approximately 0.8 ha of garden was planted around the homestead consisting of both exotic and native species. Many of these plants were planted for landscaping, windbreaks and privacy screenings. A plant community type (PCT) could not be assigned to this vegetation community and the streamline assessment modal (Appendix D of the BAM 2020) was applied to this area.

Most of the development site consisted of exotic vegetation such as *Paspalum dilatatum* (Paspalum), *Hypericum perforatum* (St John's Wort) and *Rubus fruticosus* agg. (Blackberry) reflecting past use such as grazing; most likely by horses due to the presence of discarded horse rugs on fences. This area (4.1 ha) is mapped as exotic vegetation (PCT 0). A few scattered *Eucalyptus blakelyi* (Blakely's Red Gum) trees with a mix of both exotic and native grasses are located in the south western corner of the development site. Given the degraded nature of the site, determining the PCT was difficult, however, based on State Vegetation Mapping and field assessments, this area was assigned PCT 277- *Blakely's Red Gum – Yellow Box Grassy tall woodland of the NSW South Western Slopes Bioregion*, in low condition.

The total development footprint is estimated to be 5.1 ha which consists of:

- 0.23 ha of planted native vegetation

- 0.44 ha of PCT 277 which also meets the listing criteria for Endangered Ecological Communities (EEC) under the NSW *Biodiversity Conservation Act 1999* (BC Act)
- 4.3 ha of exotic vegetation.

Following the application of the BAM Credit Calculator, the vegetation integrity score was calculated for one vegetation zone:

- Vegetation Zone 1: PCT 277 Low – 0.44 ha : VI score = 20.5.

A total of 6 ecosystem credits are required to be retired to offset this PCT. No ecosystem credits are required for impacts to PCT 0 – exotic vegetation, nor are ecosystem credits required for the planted native vegetation.

Biodiversity impacts have been assessed through comprehensive survey, mapping and assessment completed in accordance with the BAM 2020. Six threatened flora species (*Acacia ausfeldii*, Ausfelds wattle; *Cullen parvum*, Small Scurf-pea; *Euphrasia arguta*, *Prasophyllum petilum*, Tarengo Leek Orchid; *Swainsona recta*, small purple-pea; and *Swainsona sericea*, silky swainson-pea) were identified from the BAMC and given the degraded condition of the site, none were deemed to have the potential to occur within the development site. No threatened flora has previously been recorded within the development site and none were found during field assessments undertaken in April and June 2022.

Thirteen threatened fauna species were identified from the BAMC as having the potential to occur within the development site. Of these, only *Anthochaera phrygia* (Regent Honeyeater) was identified as having potential to utilise habitat within the development site due to the area overlaying with Mapped Important Areas. This area was within the planted native vegetation which was assessed using the Streamlined Assessment Module and therefore no species credits are required for this species. Threatened fauna habitat was assessed, comprising mainly of four individual hollow-bearing trees to be removed. There were no large woody debris or rocks within the development site. No threatened species were recorded on the development site and given the degraded nature of the vegetation it is unlikely that suitable habitat exists for threatened species.

An initial assessment of potential Koala habitat was assessed in accordance with the *State Environmental Planning Policy – Koala Habitat Protection* (SEPP 2021). The impact area was not determined to be either potential or core Koala habitat in accordance with the SEPP due to the identification of only twelve individual feed trees (*Eucalyptus blakelyi*, *E. melliodora*, *E. camaldulensis*) and the development site being part of a non-contiguous patch. There are three historical records of Koalas observed within a 10 km radius of the development site (DPI 2020) with the most recent being 2006 within vegetation along the Cudgegong River approximately 2 km from the development site. There are no records of Koalas being recorded within the development footprint.

Serious and Irreversible Impacts (SII) values have been considered as part of this assessment. These values include the 'White Box Yellow Box Blakely's Red Gum Woodland' which is listed as a candidate SII. Given that there were no known published thresholds for this TEC, a threshold of 0 is assumed and therefore it is possible that SII could occur. Regent Honeyeaters are also SII entities and mapped important habitat for this species overlays the area of planted native vegetation within the development site consistent with the location of the planted *E. sideroxylon* trees.

Nine (9) Matters of National Environmental Significance (MNES) were identified as potentially adversely affected by the proposed development. An assessment of the Commonwealth Significant Impact Criteria (Commonwealth of Australia 2013) was applied to each of the nine threatened species listed under the EPBC Act, including one reptile *Anomalopus mackayi* (Five-clawed Worm-skink); three mammals, *Phascolarctos cinereus* (Koala), *Pteropus poliocephalus* (Grey-headed Flying Fox) and *Nyctophilus corbeni* (Corben's Long-eared Bat), three bird species, *Anthochaera phrygia* (Regent Honeyeater), *Grantiella picta* (Painted Honeyeater) and *Lathamus discolor* (Swift Parrot) and two threatened plants, *Thesium austral* (Austral Toadflax) and *Picris evae* (Hawkweed). The assessments concluded that the project would not have a significant impact on the above-mentioned species and a referral to the Commonwealth is not recommended.

Measures to minimize or mitigate impacts on the environment would include:

- pre-clearance surveys
- sensitive felling of trees to minimize harm to fauna
- timing of works to avoid critical life cycle events
- landscaped garden beds to incorporate feed trees for Regent Honeyeaters.

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Abbreviations

Abbreviation	Description
BAM	Biodiversity Assessment Method
BAMC	Biodiversity Assessment Method Credit Calculator
BC Act	NSW <i>Biodiversity Conservation Act 2016</i>
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 <i>Environmental Planning and Assessment Act 1979</i>
EPBC Act	Commonwealth <i>Environment Protection and Biodiversity Conservation Act 1999</i>
FM Act	NSW <i>Fisheries Management Act 1994</i>
GIS	Geographic Information System
GPS	Global Positioning System
IBRA	Interim Biogeographic Regionalisation for Australia
LGA	Local Government Area
LLS	Local Land Service
NSW	New South Wales
NOW	NSW Office of Water
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 <i>Water Management Act 2000</i>

Declarations

This Biodiversity Development Assessment Report (BDAR) has been prepared by Cheryl O’Dwyer, an Accredited Person (BAAS18153) 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 50 in case number 00033308/BAAS18153/22/00033309.

I certify that this report has been prepared based on the requirements of, and information provided under the Biodiversity Assessment Method and clause 6.15 of the Biodiversity Conservation Act 2016 (BC Act).



Dr. Cheryl O’Dwyer

Date: 31 May 2022

BAM Assessor Accreditation no: BAAS18153

This BDAR has been prepared to meet the requirements of BAM 2020.

Authors and contributors

Name	BAM Assessor Accreditation no (if relevant)	Position / Role	Task performed	Relevant qualifications
Cheryl O’Dwyer	BAAS18153	Senior Ecologist	BAM plot surveys PCT determination BAM-C data entry Report preparation	PhD, MSc, BSc
Emily Bathgate		Senior GIS specialist	Figure preparation Spatial analysis	
Meredith Henderson		Principal Ecologist	Report and data review	PhD

Conflict of Interest

I declare that I have considered the circumstances and there is no actual, perceived or potential conflict of interest. This declaration has been made in the interests of full disclosure to the decision-maker. Full disclosure has also been provided to the client.



Dr. Cheryl O’Dwyer

Date: 31 May 2022

BAM Assessor Accreditation no: BAAS18153

STAGE 1: BIODIVERSITY ASSESSMENT

1. Introduction

Eco Logical Australia Pty Ltd (ELA) was engaged by Bunnings Group Ltd (the Proponent) to prepare a Biodiversity Development Assessment Report (BDAR) to support a Development Application (DA) to Mid-Western Regional Council (MWRC) for the construction of a Bunnings Warehouse, on Lot 2 DP 1079362 on the corner of Castlereagh Highway and Lions Drive, Mudgee, known as 134 Lions Drive Mudgee. The proposed development involves clearing, earthworks, construction and operation of a Bunnings Warehouse including associated infrastructure.

This BDAR assesses the impacts of the proposed construction of the proposed Bunnings Warehouse development upon biodiversity according to the NSW Biodiversity Assessment Method (BAM) established under Section 6.7 of the NSW *Biodiversity Conservation Act 2016* (BC Act) and complies with the minimum requirements outlined in Table 25 of the BAM (DPE 2020).

The following terms are used in this document, as required for a BDAR:

- **Development footprint** – the area of land that is directly impacted on by the development proposal.
- **Development site** – the broader area of land that may be affected by the proposal and to which the BAM is applied. For the purposes of conducting this BDAR, the development site extends out from the development footprint.
- **Buffer area** – land extending 1500 m out from the development site used to assess native vegetation extent and other landscape features.

1.1. General description of the development site

The development site, approximately 5.1 ha, is located within the MWRC Local Government Area (LGA) and is zoned B5 Business Development under the MWRC Local Environment Plan (LEP, 2012). The surrounding properties to the north are zoned B5, and those immediately adjoining the site are zoned as RU4 Primary Production Small Lots or General Industrial (IN1).

Historical imagery show that the development site was cleared of vegetation prior to 1965. A house, sheds, yards and landscaped garden have since been established. Approximately 0.8 ha of garden was planted around the homestead consisting of both exotic and native species. Many of these plants were planted for landscaping, windbreaks and privacy screenings. The remaining 4.2 ha was used as a grazing paddock.

Given the degraded nature of the vegetation, determining PCTs was difficult. However, based on State Vegetation mapping and field assessments, the Plant Community Type (PCT) was assigned PCT 277 *Blakely's Red Gum – Yellow Box Grassy tall woodland of the NSW South Western Slopes Bioregion*. PCT 277 conforms to the Critically Endangered Ecological Community (EEC) 'White Box Yellow Box Blakely's

Red Gum Woodland', listed under the NSW BC Act. However, the area does not conform to the Critically Endangered Ecological Community (CEEC) *White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland*, listed under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act), due to the lack of inter-tussock herbs and forbs. Key features of the development site include scattered trees of which four contain hollows. This report includes two base maps, the Location Map (Figure 1) and the Site Map (Figure 2).

1.2. Brief description of the proposal

Bunnings Group Ltd propose to construct and operate a Bunnings Warehouse within the development site and provide for an additional three vacant parcels of business zoned land suitable for future development by others. In particular, the development features associated infrastructure such as carpark, access roadways, loading bays. It is proposed that the area along the southern boundary will be subdivided into three smaller industrial blocks ranging in size from 0.76 to 0.82 ha.

1.3. Development site footprint

The development footprint / development site covers an area of 5.1 ha of which 4.4 ha of exotic vegetation has been removed from the calculations. The landscaped garden consisted of confers, pines, street trees including *Liquidambar styraciflua* (Liquidamber), *Melaleuca* spp. (paperbarks) and planted eucalyptus species (*E. sideroxylon*, Mugga Ironbark; *E. melliodora*, Yellow Box; *E. cinerea*, Argyle Apple and *E. johnstoni*, Tasmanian Yellow Gum). A PCT could not be assigned to this area of the development site and therefore this area has been assessed under the Streamlined Module Appendix D of the BAM. The development footprint will impact upon 0.44 ha of native vegetation (PCT 277) which is in low condition and 0.23 ha of planted native vegetation.

The subject land boundary and final proposal footprint, including the construction footprint, are presented in Figure 2.

1.4. Information sources

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

- NSW OEH's Biodiversity Assessment Methodology (BAM) Calculator 2020
- BioNet Vegetation Classification (DPE 2022)
- Australia's IBRA Bioregions and sub-bioregions
- NSW Biodiversity Values Map and threshold tool (accessed April 2022)
- BioNet Atlas of NSW Wildlife (DPE 2022) covering an area from 10 km buffer around coordinates - (Datum GDA94)
- EPBC Protected Matters Search Tool (DotEE 2022) using a 10km buffer around coordinates -- (Datum GDA94)
- DPIE Threatened Species Profile Data Collection (DPE 2022)
- DPIE BAM Important Habitat (Accessed April 2022)
- NSW Central Resource for Sharing and Enabling Environmental Data (SEED) (accessed April 2022)
- NSW planning portal (accessed April 2022).

Aerial imagery of the development site and surrounds were also used to investigate the extent of vegetation cover and landscape features. In addition, relevant Geographic Information Systems (GIS) datasets (soils, geology, drainage) were reviewed to guide the field survey component.

The results of these searches were combined to produce a list of threatened species, populations and communities either previously recorded or considered to potentially occur within the study area. The likelihood of occurrences for threatened species, populations and communities in the study area was then determined based on location of database records, the likely presence or absence of suitable habitat in the study area, and knowledge of the species' ecology. This information informed the subsequent field assessment. After the field inspection had been completed, the likelihood of occurrence of each species, population or communities was re-assessed. This was based on the increase in knowledge about the extent and type of habitats and which species were present within the study area.

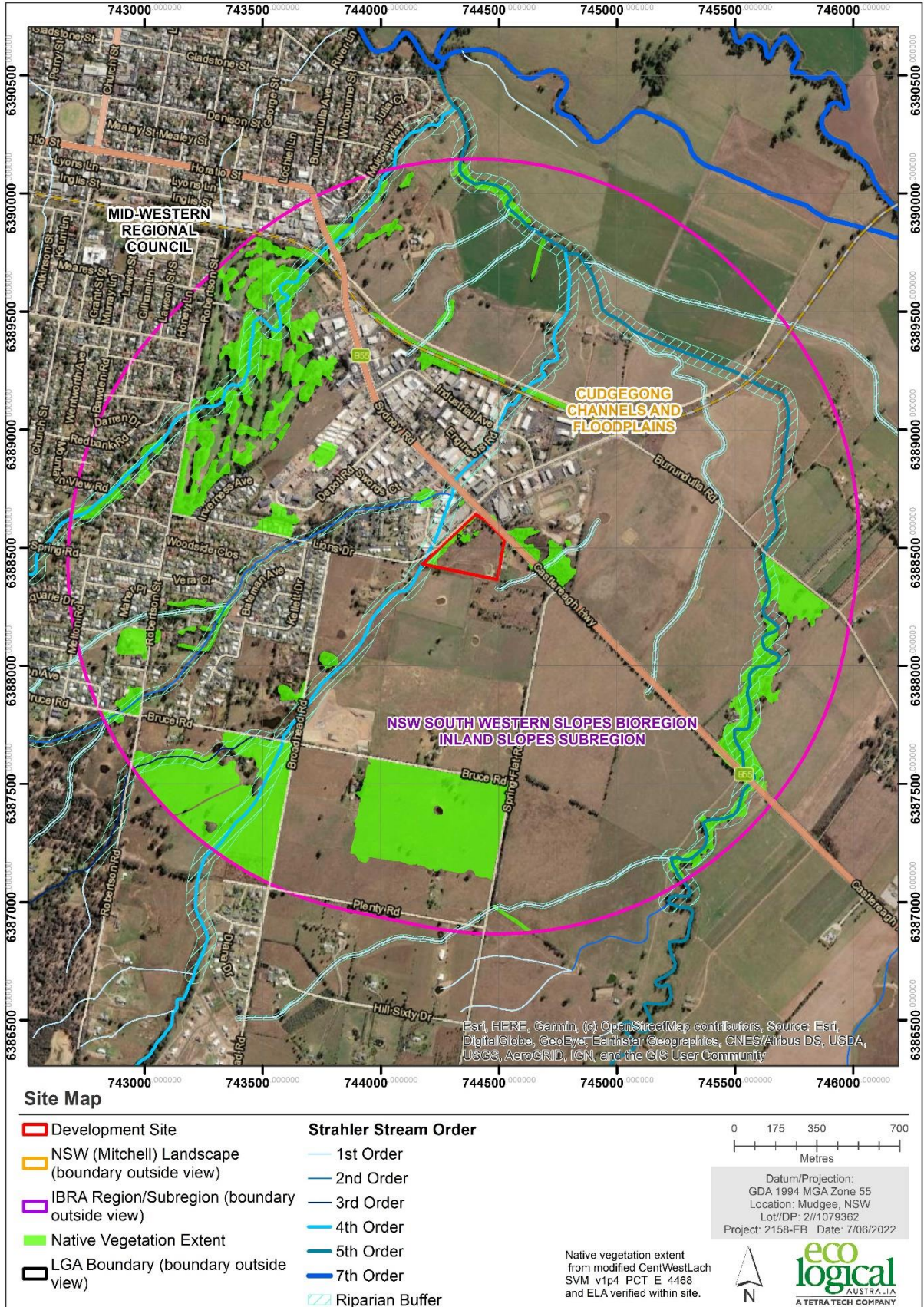


Figure 1: Location Map

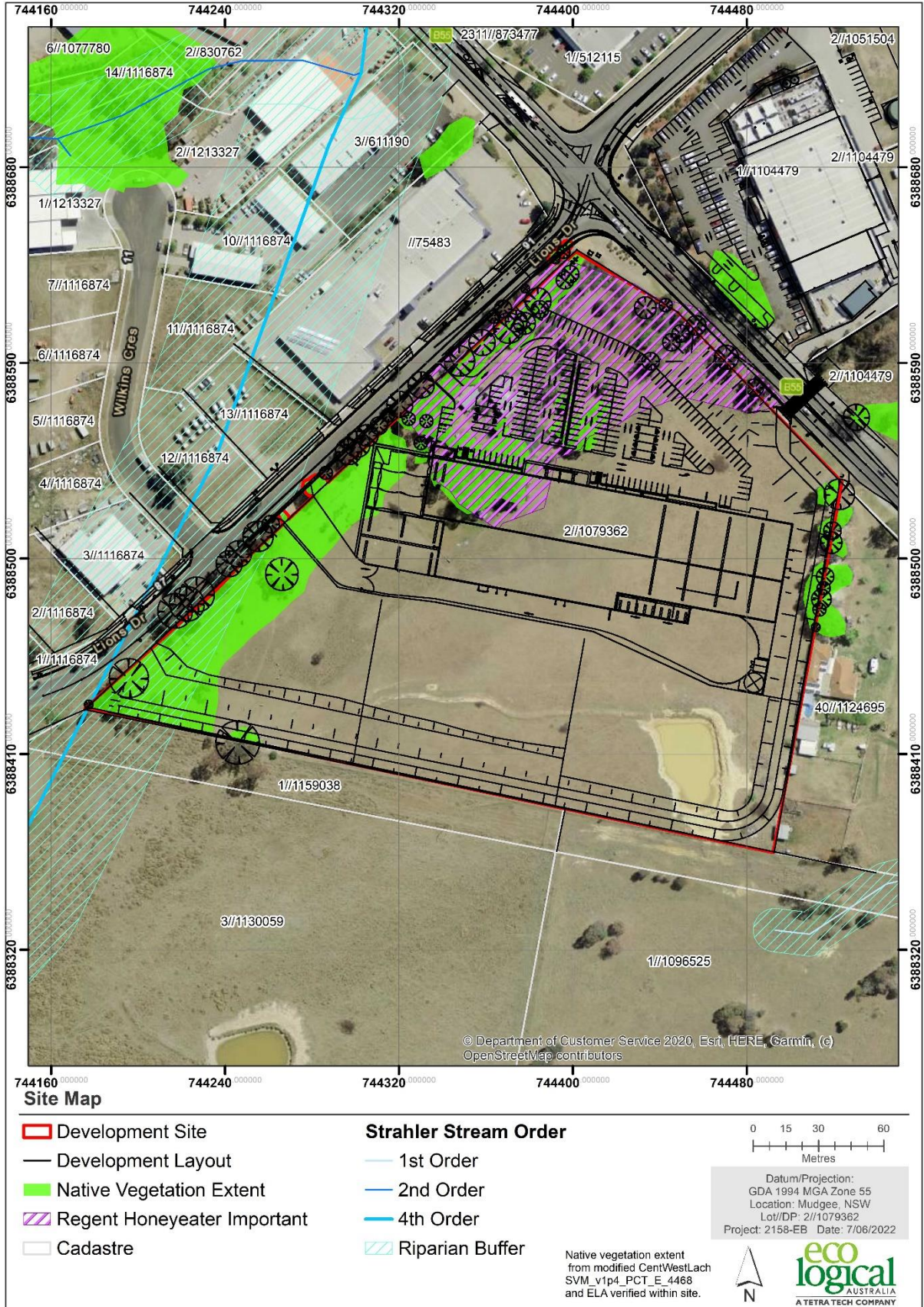


Figure 2: Site Map

1.5. Legislative context

Legislation relevant to the development site is outlined in Table 1.

Table 1: Legislative context

Name	Relevance to the project	Report Section
Commonwealth		
<i>Environmental Protection and Biodiversity Conservation Act 1999</i>	Matters of National Environmental Significance (MNES) have been identified on or near the development site. This report assesses impacts to MNES and concludes that the development is not likely to have a significant impact on MNES.	Section 11
State		
<i>Environmental Planning and Assessment Act 1979</i>	The EP&A Act is the principal planning legislation for NSW. It provides a framework for the overall environmental planning and assessment of development proposals. The proposed development requires consent under the MWRC Local Environmental Plan (LEP 2021) and is to be assessed under Part 4 of the EP&A Act.	This report
<i>Biodiversity Conservation Act 2016</i>	The proposed development exceeds the BAM threshold and there is an area within the development site that is mapped on the BV Map, therefore a Biodiversity Development Assessment Report is required. The minimum lot size is 2000 m which has a clearing threshold of 0.25 ha. The proposed development is impacting 0.44 ha of native vegetation.	This report
<i>Local Land Services Amendment Act 2016</i>	The <i>Local Land Services Act 2016</i> does not apply to development consent issued under Part 4 of the EP&A Act.	NA
<i>Fisheries Management Act 1994</i>	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.	NA
<i>Water Management Act 2000</i>	The project does not involve works on waterfront land. A Controlled Activity Approval under s91 of the WM Act is not required.	NA
Planning Instruments		
MWRC Local Environment Plan (LEP) 2012	The subject site is zoned B5 Business Development under the MWRC LEP.	Section 1

1.6. Biodiversity Offset Scheme Entry

Within the development site there is a small area of remnant native vegetation (0.44 ha) which would be cleared for the proposed development. This size of this area is above the area clearing threshold of 0.25 ha triggering the Biodiversity Offset Scheme (BOS). The development site also includes land mapped on the Biodiversity Values (BV) map as important habitat for a threatened species (Figure 3). This area also coincides with the area mapped as Important Habitat for *Anthochaera phrygia* (Regent Honeyeater).

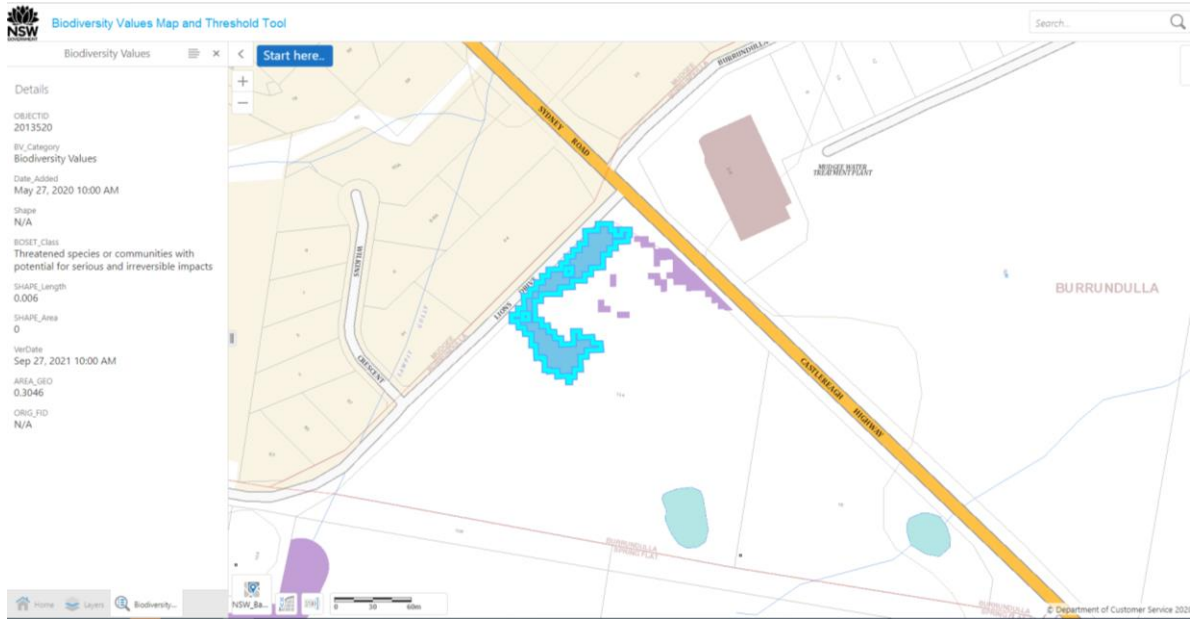


Figure 3: Biodiversity Values Mapping

2. Methods

2.1. Site context methods

2.1.1. Landscape features

The development site is described as flat with very little variation in topography. There is a small farm dam within the eastern section of the development site, and there is a discrete depression within which water is expected to pool. There is an ephemeral drainage line that runs through the development site, but it is highly degraded. The entire development site is highly modified, having been subject to the ongoing disturbance including clearing, grazing and weed invasion.

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/Development Site	Assessment Area	Data source
IBRA Region(s)	NSW South Western Slopes	NSW South Western Slopes	Interim Biogeographic Regionalisation for Australia, Version 7
IBRA subregion(s)	Inland Slopes	Inland Slopes	Interim Biogeographic Regionalisation for Australia, Version 7
Rivers and streams	There are no rivers or streams within the development site	There is a 4 th order drainage line within 50 m of the site and a 5 th order river within the assessment area	NSW LPI Waterway mapping
Estuaries and wetlands	There are no wetlands within the development site	There are no wetlands within the assessment area	NSW directory of important wetlands
Connectivity of different areas of habitat	The development site contains scattered trees within the paddock, planted trees around the house and planted trees along the road verge. The area is highly fragmented and there is no connectivity of habitat.	Within the assessment area there are a number of small remnant areas that could facilitate movement of threatened species (see Figure 1). The riparian vegetation along the Cudgegong river, Oaky Creek and Redbank Creek could provide corridors.	Aerial imagery
Geological features of significance and soil hazard features	There are no significant geological features	There are no significant geological features	Aerial imagery
Areas of Outstanding Biodiversity Value	There are no areas of AOBV	There are no areas of AOBV	Register of Declared Areas of Outstanding Biodiversity Value (DPIE 2020)

Landscape feature	Subject Land/Development Site	Assessment Area	Data source
NSW (Mitchell) Landscapes	Cudgegong Channels and Floodplains	Cudgegong Channels and Floodplains	NSW (Mitchell) Landscapes - version 3.1 (DPIE 2016)
Percent (%) native vegetation extent	0.44 ha	The assessment area is approximately 858.3 ha and contains approximately 107.3 ha of native vegetation (12.5%).	Calculated using aerial imagery and ArcGIS software

2.1.2. Native Vegetation cover

The extent of native vegetation on the development site and immediate surrounds was mapped using State Vegetation Mapping (SEED) with edits made to the layer where obvious changes to vegetation extent had occurred. As per the SEED, the majority of the site is mapped PCT 0 with a small patch of PCT 277 occurring in the north (Figure 4). Aerial imagery dating back to 1965 shows that the entire development site was cleared of vegetation, except for a few trees in the south west section of the Lot (Figure 4).

The area around the house has been planted with a variety of native plants consisting of *Eucalyptus sideroxylon* (Mugga Ironbark), *E. johnstoni* (Tasmanian Yellow Gum), *E. camaldulensis* (River Red Gum), *E. melliodora* (Yellow Box), and a variety of exotic plants including *Liquidamber styraciflua* (Liquid amber), *Prunus* sp., *Cupressus* sp., *Cotoneaster glaucophyllus* (Bright Bead Cotoneaster) and *Pinus halepensis* (Aleppo Pine). A PCT could not be assigned to this area, therefore this area was assessed using the Streamlined Assessment Module - Planted native vegetation (Appendix D of the BAM 2020).

Table 3 summarises the extent of native vegetation cover within the assessment area.

Table 3: Extent of native vegetation within the 1500 m buffer assessment area

Assessment area (ha)	Total area of native vegetation (ha)	Percentage of native vegetation cover (%)	Class (0-10, 10-30, 30-70, >70%)
858.3 ha	107.3 ha	12.5	>70

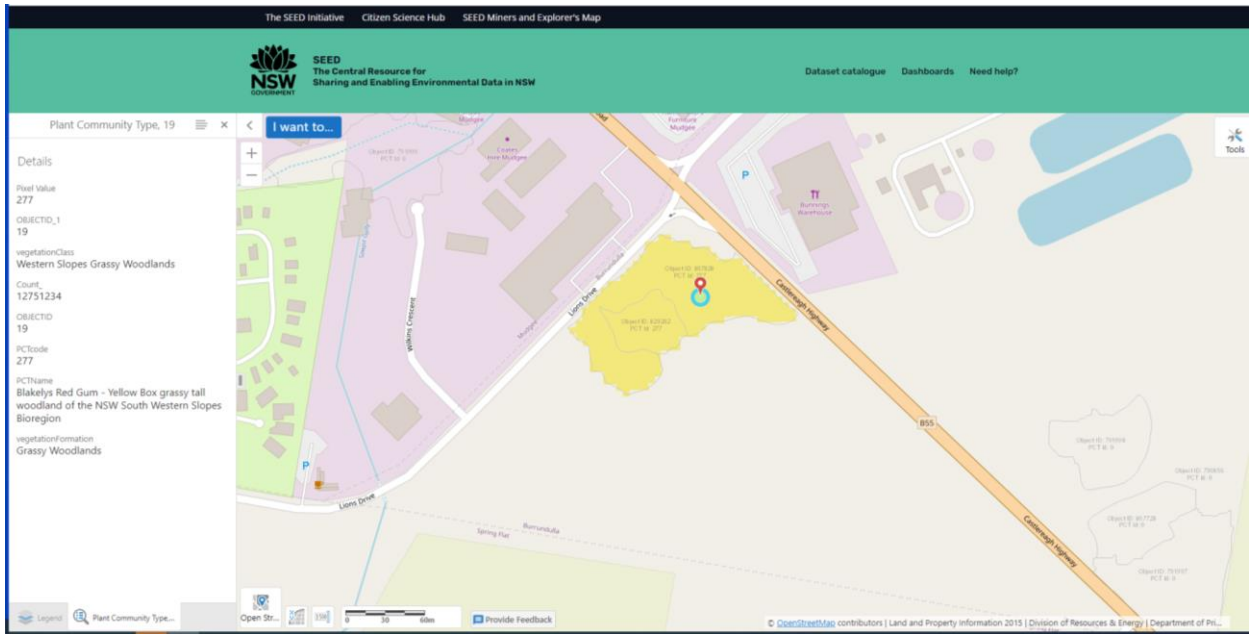


Figure 4 – Vegetation mapping as per State Vegetation Mapping (SEED)



Figure 5: Historical imagery 1965

3. Native vegetation, Threatened ecological communities and vegetation integrity methods

3.1.1. Existing information

Desktop assessments using State Vegetation Mapping (SEED), historical and current aerial imagery was used to identify possible PCTs and TECs on the development site. PCTs present were confirmed during on-site field inspection undertaken by Cheryl O'Dwyer on the 5 April 2022, Cheryl O'Dwyer, Rebecca Croake and Elise Keane on the 13 April 2022 and again by Cheryl O'Dwyer on the 29 April 2022.

3.1.2. Vegetation survey

Vegetation surveys were undertaken within the development site by Cheryl O'Dwyer and Jack O'Sullivan on 1 June 2022. Three full-floristic vegetation plots were surveyed (Table 4). Aerial imagery was used to broadly identify areas of different vegetation zones and each plot was randomly located within each zone. Plot 2 and 3 were the standard 20 m x 50 m plot formation in accordance with the BAM with full floristic surveys taken within the nested 20 m x 20 m subplot (0.04 ha). Litter plots were located 1 m from the 50 m midline, on alternative sides and at 5, 15, 25, 35 and 45 m from the midline start. To fit plot 1 within the PCT, the plot shape was modified extending 10 x 100 m with a nested 10 m x 40 m with litter plots located at 15, 25, 45, 65 and 85. The zone boundary and fence lines were close to the plot and could not be avoided. Threatened flora and fauna habitat was assessed, and opportunistic records of fauna were collected.

All field data collected at full-floristic and vegetation integrity plots is included in Appendix B and Appendix C.

Table 4: Full-floristic PCT identification plots

Vegetation Zone	PCT ID	PCT Name	Number of plots surveyed
1	277	<i>Blakely's Red Gum – Yellow Box Grassy tall woodland of the NSW South Western Slopes Bioregion</i>	2
2	0	Exotic dominated grassland	1
3		Planted native vegetation	0

3.2. Weather conditions

Weather conditions during field investigations are outlined in Table 4.

Table 4: Weather conditions (BOM Mudgee)

Date	Rainfall (mm)	Minimum temperature °C	Maximum temperature °C	Max Wind gusts (km)
5 April 2022	0	5.3	26.2	28
13 April 2022	0	13.5	21.6	41
29 April 2022	9.4	14.1	23.4	28
1 June 2022	5.2	4	10	54

3.3. Plant Community Types present

One PCT was identified on the development site of which 0.44 ha conforms to the TEC listed under the BC Act, *White Box-Yellow Box-Blakely's Red Gum Woodland* (listed as CEEC).

PCTs identified within the development site are presented in Table 5.

The development site also contained 0.23 ha of planted native vegetation and 4.33 ha of exotic vegetation, neither of which conformed to a native PCT.

Table 5: Plant Community Types

PCT ID	PCT Name	Vegetation Class	Vegetation Formation	Area (ha)	Percent cleared
277	<i>Blakely's Red Gum – Yellow Box Grassy tall woodland of the NSW South Western Slopes Bioregion</i>	Western Slopes Grassy Woodland	Grassy Woodland	0.44	94%
0	Exotic			4.33	
	Planted native vegetation			0.23	
	Dam			0.11	
TOTAL				5.11	

3.3.1.1. Plant Community Type selection justification

In determining the PCT for the development site, various attributes were considered in combination to assign vegetation to the best fit PCT. The PCT filter tool in BioNet Vegetation Classification database was used to select PCTs based on a variety of attributes including; IBRA region and sub-region, vegetation class and dominant species in each stratum and relative abundance, community composition, soils and landscape position. Reference was made to the PCT descriptions with BioNet Vegetation Classification and the final scientific determinations for TECs. Possible PCT options are provided in Table 6.

Table 6: Potential PCTs

PCT ID	PCT Name	Exclusion Justification
274	White-Box-Rough Barked Apple alluvial woodland on the NSW central western slopes including in the Mudgee region	This PCT is a tall woodland dominated by White Box (<i>E. albens</i>) and Rough-barked Apple (<i>Angophora floribunda</i>) with a sparse shrubby understory of <i>Acacia implexa</i> , <i>A. buxifolia</i> , <i>Olearia elliptica</i> and a grassy ground layer rich in herbs. There are no characteristic canopy species present within the development site.
276	Yellow Box Grassy tall woodland on alluvium or parma loams and clays on flats in NSW South Western Slopes Bioregion	This PCT is a tall grassy woodland dominated by Yellow Box (<i>E. melliodora</i>) without other canopy trees present. The ground layer is dense and dominated by grasses and forbs. Whilst this PCT is a potential fit, the presence of Blakely's Red Gum (<i>E. blakelyi</i>) within the development site it is more likely to be PCT 277.

PCT ID	PCT Name	Exclusion Justification
278	Riparian Blakey's Red Gum – box-shrub-sedge-grass tall open forest of the central NSW South Western Slopes Bioregion	This PCT is a tall open forest or woodland dominated by Blakey's Red Gum often with Yellow Box, Apple Box (<i>E. bridgesiana</i>) or Long-leaved Box (<i>E. goniocalyx</i>). The understory, although sparse contains a variety of <i>Acacias</i> , with <i>Leptospermum</i> (tea-tree) and <i>Dodonaea</i> (Hop bush). This PCT occurs on deep alluvial soils in gullies and along creek flats and often grades into PCT 277. Based on the species composition this PCT was excluded.
281	Rough-Barked Apple – red-gum – yellow box woodland on alluvial clay to loam soils on valley flats in the northern NSW South Western Slopes Bioregion and Brigalow Belt South Bioregion.	This PCT is a tall open forest or woodland with trees to 30 m high dominated by Rough-barked Apple with <i>E. blakelyi</i> and <i>E. melliodora</i> . There was no evidence of Rough-barked Apple being present on the development site so this PCT was excluded.
312	Yellow Box grassy tall woodland on valley flats in the upper slopes of the NSW South Western Slopes Bioregion and South Eastern Highlands Bioregion	This PCT is a tall grassy woodland dominated by <i>E. melliodora</i> with <i>E. blakelyi</i> . The grassy ground layer is herb rich occurring on orange-brown deep podzolic soils derived from granite or brown loam-clays derived from metasediments or sedimentary rocks in valley floors or on foot-slopes in the upper slopes. Due to landscape positioning and geology of the development site this PCT is unlikely.

The development site contains one PCT of which there is one vegetation zone (low). The entirety of PCT 277 (0.44 ha) is equivalent to the BC Act listed CEEC 'White Box - Yellow Box - Blakey's Red Gum Grassy Woodland and Derived Native Grassland in the NSW North Coast, New England Tableland, Nandewar, Brigalow Belt South, Sydney Basin, South Eastern Highlands, NSW South Western Slopes, South East Corner and Riverina Bioregion' (hereafter referred to as Box-Gum Woodland, BGW).



Plate 1: PCT 277 Blakely's Red Gum – Yellow Box Grassy tall woodland of the NSW South Western Slopes Bioregion

3.3.1.2. Threatened Ecological Communities

BioNet VIS lists PCT 277 as comprising the Critically Endangered Ecological Community (CEEC) Box Gum Woodland listed under both the BC Act and EPBC Act (Table 7). Justification of Box Gum Woodland within the development footprint is based on a review of the NSW Scientific Committee Final Determination and the Federal Final Determination for the CEEC, presence of diagnostic species in the upper stratum, vegetation structure and characteristic soil of the community. Under the BC Act PCT 277 meets the threshold of CEEC due to the presence of *E. blakelyi* and *E. melliodora* either within the plot or in the surrounding area and a variety of native grasses and herbs within the understory.

While PCT 277 can also comprise part of the CEEC 'Box-Gum Woodland' listed under the Commonwealth EPBC Act, the condition of vegetation in the development footprint did not meet the minimum condition thresholds under the EPBC Act. There were less than twelve native understory species (excluding grasses) within the ground layer.

Table 7: Threatened Ecological Communities

PCT ID	BC Act			EPBC Act		
	Listing status	Name	Area (ha)	Listing status	Name	Area (ha)
277	CEEC	<i>White Box - Yellow Box - Blakely's Red Gum Grassy Woodland and Derived Native Grassland in the NSW North Coast, New England Tableland, Nandewar, Brigalow Belt South, Sydney Basin, South Eastern Highlands, NSW South Western Slopes, South East Corner and Riverina Bioregion</i>	0.44	CEEC	White Box - Yellow Box - Blakely's Red Gum Grassy Woodland and Derived Native Grassland	0

3.3.1.3. Planted native vegetation

A PCT was not able to be assigned to the area immediately surrounding the house and sheds. This area has been landscaped and planted using a variety of native (including non-local species) and exotic species. Sixteen *Eucalyptus sideroxylon* and five *E. melliodora* trees have been planted along the western boundary. These trees are feed trees for the Regent Honeyeater and this area has been included in the Important Habitat Mapping for Regent Honeyeaters on the Biodiversity Values Map. The streamlined assessment module – planted native vegetation of the BAM (see Appendix D of BAM 2020) has been applied to this area. Using the decision-making key outlined in BAM, the area could not be assigned a PCT, the area was not planted for the purpose of environmental rehabilitation or restoration, nor was it to replace or restore a threatened species habitat or PCT. Under this assessment the use of Chapters 4 and 5 of the BAM are not required to be applied, however, the assessor must still assess the suitability of the planted native vegetation for use by threatened species.

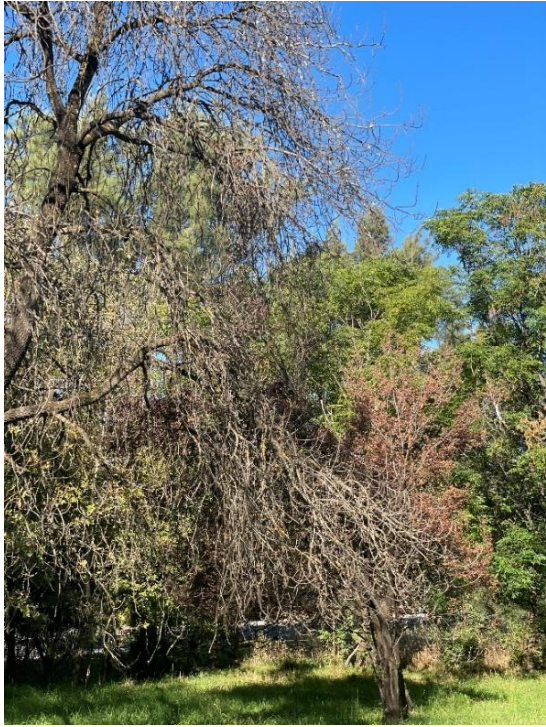


Plate 2: Planted vegetation around house



Plate 3: Planted vegetation around house

3.3.1.4. Exotic Vegetation

The area mapped as PCT 0 was dominated by exotic perennial grasses (*Paspalum dilatatum*, Paspalum; *Phalaris aquatica*, Phalaris) and high threat weeds (*Hypericum perforatum*, St John's Wort; *Rubus fruticosus* agg, Blackberry). This area is highly degraded and modified by grazing, weed incursion, and past clearing (Plate 5). There was a small patch (less than 0.04 ha) of *Sporobolus crebra* (Slender Rats Tail Grass) and *Cynodon dactylon* (Native Couch) near the dam, however cover was less than 20% and was mixed with *Conyza bonaerensis* (Fleabane), *Verbena bonariensis* (Purple top), *Eleusine indica* (Crowsfoot Grass), *H. perforatum*, *Setaria pumilo*, *P. dilatatum* and *P aquatica*. A plot was undertaken near the dam which identified that the ground cover was 80% exotic of which 25% was high threat weeds.



Plate 4: Exotic vegetation



4. Vegetation integrity assessment

4.1. Vegetation Zones

Three vegetation zones (Figure 6) were identified on the development site, one of which could be assigned a PCT:

- PCT 277 - *Blakely's Red Gum – Yellow Box Grassy tall woodland of the NSW South Western Slopes Bioregion*
- PCT 0 – *Exotic dominated pasture vegetation*
- *Planted native vegetation.*

A total of three vegetation integrity survey plots were collected on the development site, consistent with the BAM requirements.

4.1.1. Patch size

Patch size was calculated using available vegetation mapping for all patches of intact native vegetation on and adjoining the development site. Patch size was assigned to one of four classes (<5 ha, 5-24 ha, 25-100 ha or ≥100 ha). A patch size of 4 ha was determined for the development site.

Table 8: Zone 1 PCT 277

277 – Blakely's Red Gum – Yellow Box grassy tall woodland of the NSW South Western Slopes Bioregion	
Vegetation formation/class	Grassy Woodlands / Western Slopes Grassy Woodlands
Per cent cleared value (%)	94%
Extent within subject land (ha)	0.44 ha
Conservation status	NSW BC Act CEEC: White Box – Yellow Box- Blakely's Red Gum Grassy Woodland and Derived Native Grassland in the NSW North Coast, New England Tableland, Nandewar, Brigalow Belt South, Sydney Basin, South Eastern Highlands. EPBC Act CEEC: White Box – Yellow Box- Blakely's Red Gum Grassy Woodland and Derived Native Grassland in the NSW North Coast, New England Tableland, Nandewar, Brigalow Belt South, Sydney Basin, South Eastern Highlands.
Description	This community occurs in along the south western boundary of the development site. There are eleven remnant trees and regeneration with most individuals less than 30 cm diameter breast height (DBH). There are two large remnant trees with DBH > 50 cm. The midstorey is absent probably due to long-term grazing and weed incursion is high. However, there are a number of native grasses and herbs within the ground layer.
Characteristic canopy trees	<i>Eucalyptus blakelyi</i> , <i>E. melliodora</i>
Characteristic mid-storey	<i>Acacia dealbata</i> and <i>Hibbertia obtusifolia</i>
Characteristic groundcovers	<i>Themeda triandra</i> , <i>Bothriochloa macra</i> , <i>Aristida ramosa</i> , <i>Panicum effusum</i> , <i>Austrostipa scabra</i> , <i>Chrysocephalum apiculatum</i>
Mean native richness	15
Exotic species / HTW cover	<i>Hypericum perforatum</i> , <i>Rubus fruticosus</i> ,
Condition	Low
Variation and disturbance	Highly disturbed. Long-term grazed, most recently by horses.
No. sites sampled	2

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

Threatened flora species *Acacia ausfeldii*, *Cullen parvum*, *Euphrasia arguta*, *Prasophyllum petilum*, *Swainsona recta*, *S. sericea*. Habitat was considered too degraded to support these threatened species.

Fauna habitats Scattered trees that could provide foraging habitat for birds and bats. Amphibian habitat within low laying areas. Habitat is degraded. Two hollow bearing trees are present within this PCT in the development site. Contains Koala feed trees (*E. blakelyi*). There were no signs of nests for threatened birds.

Composition	Structure	Function	Vegetation Integrity Score
52.1	55.9	3	20.5



Table 9: PCT 0 – Exotic Vegetation

0 – Exotic Vegetation

Description PCT 0 covers the majority of the development site. All native trees have been cleared. *Eucalyptus cinerea* (Argyle Apple) has been planted along the eastern boundary and along Castlereagh Highway. *Schinus molle* (Peppercorn Tree) has been planted near the dam. The midstorey is absent, probably due to long-term grazing, and weed incursion is high. Native plant diversity was low.

A PCT was not assigned to this area due to the high level of disturbance.

Characteristic canopy trees	Absent
Characteristic mid-storey	<i>Ligustrum</i> sp. (Privet), <i>Rubus fruticosus</i>
Characteristic groundcovers	<i>Paspalum dilatatum</i> , <i>Phalaris aquatica</i> , <i>Setaria pumila</i>
Mean native richness	2 (<i>Sporobolus crebra</i> , <i>Cynodon dactylon</i>)
Exotic species / HTW cover	<i>Hypericum perforatum</i> , <i>Rubus fruticosus</i>

0 – Exotic Vegetation	
Condition	Low
Variation and disturbance	Highly disturbed. Long-term grazed, most recently by horses.
No. sites sampled	1
Threatened flora species	Habitat was considered too degraded to support threatened species.
Fauna habitats	Amphibian habitat within low laying areas and around dam. Habitat is degraded. There were no large woody debris or rocky areas.



Table 10: Planted native vegetation

Planted Native Vegetation	
Description	<p>Planted vegetation covers the northern section of the development site which incorporates the house and shed area. This area has been landscaped using a mix of both exotic and native trees and shrubs. Historical imagery dating back to 1965 shows this area is cleared of trees and vegetation.</p> <p>A PCT was not assigned to this area and no vegetation integrity plots were undertaken. All native trees were recorded.</p>
Characteristic canopy trees	<i>Eucalyptus sideroxylon</i> , <i>E. johnstonii</i> *, <i>E. cinerea</i> *, <i>E. melliodora</i>
Characteristic mid-storey	<i>Callistemon King Park Special</i> *, <i>Melaleuca armillaris</i> *, <i>Cotoneaster sp.</i> *
Characteristic groundcovers	<i>Cynodon dactylon</i> , <i>Kikuyu sp.</i> *
Mean native richness	4
Exotic species / HTW cover	<i>Rubus fruticosus</i> , <i>Conyza bonariensis</i>

Planted Native Vegetation	
Condition	Low
Variation and disturbance	Highly disturbed. Planted and landscaped.
No. sites sampled	0
Threatened flora species	Habitat was considered too degraded to support threatened species.
Fauna habitats	Foraging suitable for Regent Honeyeaters, probably due to the presence of <i>E. sideroxylon</i> and <i>E. melliodora</i> . This area is also mapped on the BV Map as habitat for threatened species.



*Non-local species

4.2. Assessing vegetation integrity (vegetation condition)

Two vegetation integrity plots were sampled in PCT 277, this is above the required number of plots as per BAM. A vegetation integrity assessment using the BAM Calculator (BAMC) was undertaken and the results are outlined in Table 11. Figure 7 shows the location of the VI plots.

Table 11: 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
1	277	Low		52.1	55.9	3	0	20.5

4.2.1. Use of local data

The use of local data is not proposed

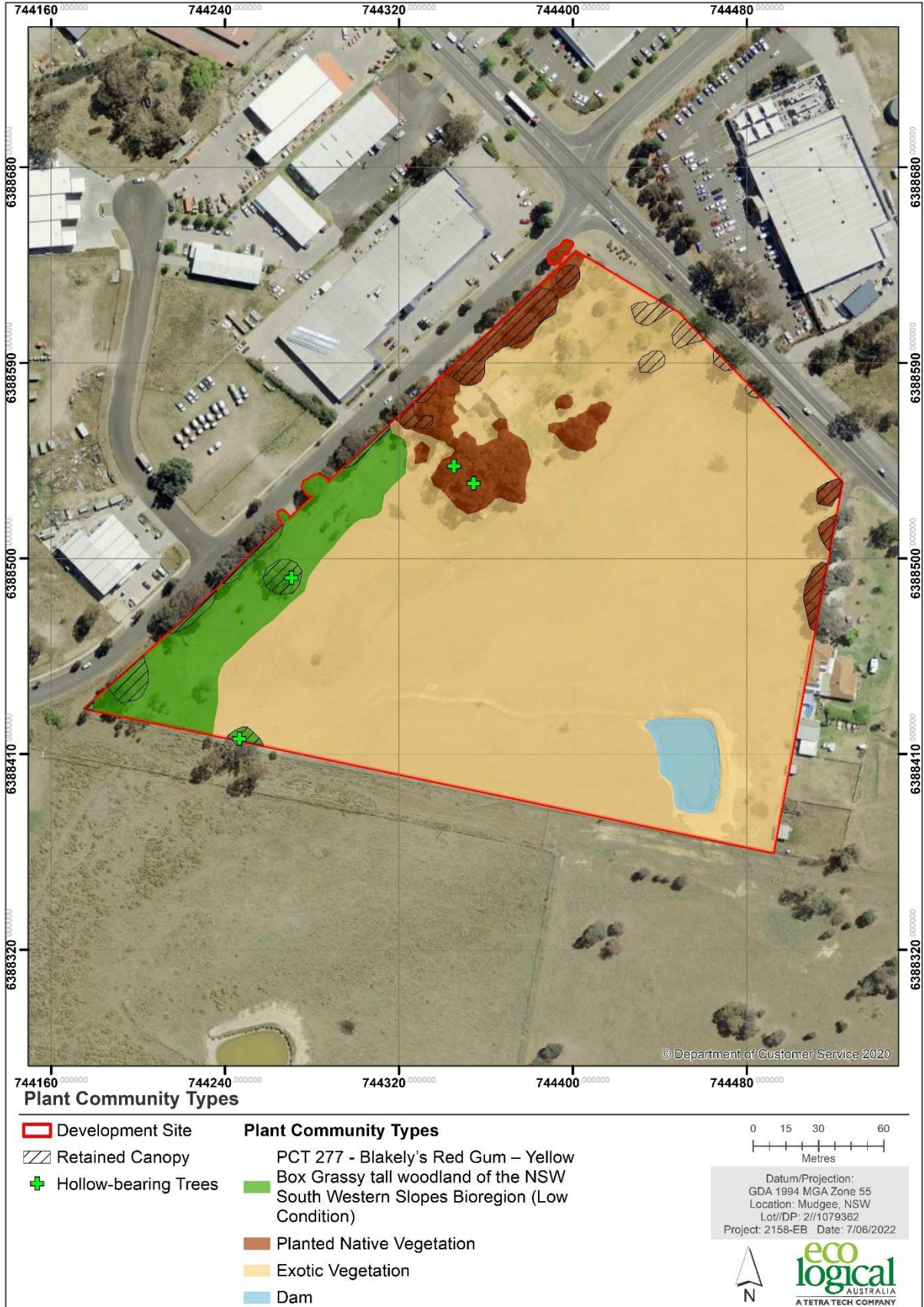


Figure 6: Plant Community Types

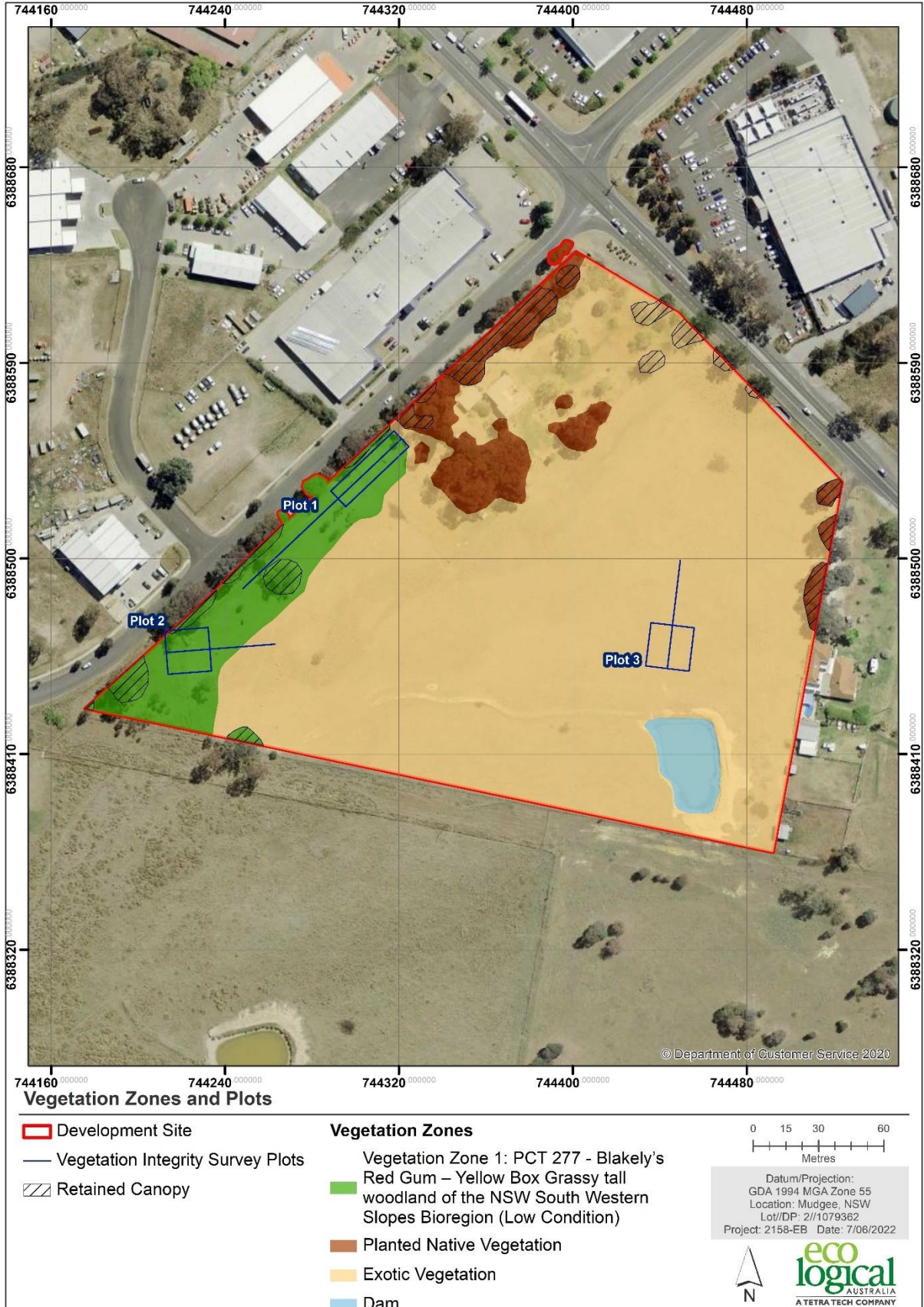


Figure 7: Vegetation zones and location of plots

5. Habitat suitability for threatened species

5.1. Identification of threatened species for assessment

5.1.1. Ecosystem credit species

Ecosystem credit species predicted to occur within the development site are generated by the BAMC following the input of VI data and the PCTs identified within Chapter 3. Ecosystem credit species predicted to occur at the development site, their associated habitat constraints, geographic limitations and sensitivity to gain class is included in Table 12. All ecosystem credit species have been included in the assessment.

Table 12: Predicted ecosystem credit species

Species	Common Name	Habitat Constraints	Geographic limitations	Sensitivity to gain class	BC Act listing status	EPBC Act Listing status
<i>Anthochaera phrygia</i>	Regent Honeyeater	-	-	High	CE	CE
<i>Artamus cyanopterus cyanopterus</i>	Dusky Woodswallow	-	-	Moderate	V	NL
<i>Callocephalon fimbriatum</i>	Gang-gang Cockatoo	-	-	Moderate	V	NL
<i>Chthonicola sagittata</i>	Speckled Warbler	-	-	High	V	NL
<i>Circus assimilis</i>	Spotted Harrier	-	-	High	V	NL
<i>Climacteris picumnus victoriae</i>	Brown Treecreeper (eastern subspecies)	-	-	High	V	NL
<i>Daphoenositta chrysoptera</i>	Varied Sittella	-	-	Moderate	V	NL
<i>Dasyurus maculatus</i>	Spotted-tailed Quoll	-	-	High	V	E
<i>Falco subniger</i>	Black Falcon	-	-	Moderate	V	NL
<i>Glossopsitta pusilla</i>	Little Lorikeet	-	-	High	V	NL
<i>Grantiella picta</i>	Painted Honeyeater	Mistletoe present at a density >5 / ha		Moderate	V	V
<i>Haliaeetus leucogaster</i>	White-bellied Sea-Eagle	Water bodies Within 1 km of rivers, lakes, large dams		High	V	NL
<i>Hieraaetus morphnoides</i>	Little Eagle	-	-	Moderate	V	NL
<i>Hirundapus caudacutus</i>	White-throated Needletail	-	-	High	NL	V
<i>Lathamus discolor</i>	Swift Parrot	-	-	Moderate	E	CE
<i>Melanodryas cucullata cucullata</i>	Hooded Robin (south-eastern form)	-	-	Moderate	V	NL
<i>Miniopterus orianae oceanensis</i>	Large Bent-winged Bat	-	-	High	V	NL
<i>Neophema pulchella</i>	Turquoise Parrot	-	-	High	V	NL

Species	Common Name	Habitat Constraints	Geographic limitations	Sensitivity to gain class	BC Act listing status	EPBC Act Listing status
<i>Ninox connivens</i>	Barking Owl	-	-	High	V	NL
<i>Petroica boodang</i>	Scarlet Robin	-	-	Moderate	V	NL
<i>Petroica phoenicea</i>	Flame Robin	-	-	Moderate	V	NL
<i>Polytelis swainsonii</i>	Superb Parrot	-	-	Moderate	V	V
<i>Pomatostomus temporalis</i>	Grey-crowned Babbler (eastern subspecies)	-	-	Moderate	V	NL
<i>Pteropus poliocephalus</i>	Grey-headed Flying-fox	-	-	High	V	V
<i>Saccolaimus flaviventris</i>	Yellow-bellied Sheath-tail-Bat	-	-	High	V	NL
<i>Stagonopleura guttata</i>	Diamond Firetail	-	-	Moderate	V	NL
<i>Tyto novaehollandiae</i>	Masked Owl	-	-	High	V	NL
*CE= Critically endangered, E = Endangered, V = Vulnerable, NL = Not Listed						

5.1.2. Species credit species

Species credit species predicted to occur at the development site (i.e. candidate species), their associated habitat constraints, geographic limitations and sensitivity to gain class is included in Table 13. An assessment of those species credit species has been undertaken to determine the likelihood they occur based on the presence/absence of necessary habitat components or habitat constraints, in accordance with BAM sections 6.4.1.10 and 6.4.1.17. For those species that have been excluded, the justification is also provided (Table 14).

Table 13: Candidate species credit species

Species	Common Name	Habitat Constraints	Geographic limitations	Sensitivity to gain class	BC Act listing status	EPBC Act Listing status
<i>Anthochaera phrygia</i>	Regent Honeyeater	As per mapped areas		High	CE	CE
<i>Acacia ausfeldii</i>	Ausfeld's Wattle	Footslopes and low rises on sandstone		High	V	NL
<i>Ammobium craspedioides</i>	Yass Daisy		South of Cowra	High	V	V
<i>Aprasia parapulchella</i>	Pink-tailed Legless Lizard	Rocky areas or within 50 m of rocky areas		High	V	V
<i>Burhinus grallarius</i>	Bush Stone-curlew	Fallen/ standing dead timber including logs		High	E	NL

<i>Species</i>	Common Name	Habitat Constraints	Geographic limitations	Sensitivity to gain class	BC Act listing status	EPBC Act Listing status
<i>Callocephalon fimbriatum</i>	Gang-Gang Cockatoo	HBT. Hollows > 9 cm DBH		High	V	E
<i>Cercartetus nanus</i>	Eastern Pygmy-possum			High	V	NL
<i>Chalinolobus dwyeri</i>	Large-eared Pied Bat	Cliffs. Within 2 km of rocky areas containing caves, overhangs or escarpments		Very High	V	V
<i>Cullen parvum</i>	Small Scurf-pea			High	E	NL
<i>Delma impar</i>	Striped Legless Lizard			Moderate	V	V
<i>Euphrasia arguta</i>	Euphrasia arguta			High	CE	CE
<i>Haliaeetus leucogaster</i>	White-bellied Sea-Eagle	Living or dead mature trees with suitable vegetation within 1km of river or lakes		High	V	NL
<i>Hieraetus morphnoides</i>	Little Eagle	Nest trees		Moderate	V	NL
<i>Keyacris scurra</i>	Keys Matchstick Grasshopper			High	E	NL
<i>Lathamus discolor</i>	Swift Parrot	As per mapped area		Moderate	E	CE
<i>Litoria booroolongensis</i>	Booroolong Frog			High	E	E
<i>Lophoictinia isura</i>	Square-tailed Kite	Nest trees		Moderate	V	NL
<i>Miniopterus orianae oceanensis</i>	Large Bent-winged Bat	Caves, tunnels mines or roosts		Very High	V	NL
<i>Ninox connivens</i>	Barking Owl	HBT. Hollows >20cm DBH and >4 m above the ground		High	V	NL
<i>Petaurus norfolcensis</i>	Squirrel Glider			High	V	NL
<i>Petaurus norfolcensis - endangered population</i>	Squirrel Glider in the Wagga Wagga Local Government Area		Wagga Wagga LGA	High	E	NL

Species	Common Name	Habitat Constraints	Geographic limitations	Sensitivity to gain class	BC Act listing status	EPBC Act Listing status
<i>Phascogale tapoatafa</i>	Brush-tailed Phascogale			High	V	NL
<i>Phascolarctos cinereus</i>	Koala	Areas identified as important habitat		High	E	E
<i>Polytelis swainsonii</i>	Superb Parrot	Hollow bearing trees with hollows greater than 5cm and 4m above the ground in trees with DBH > 30cm		High	V	V
<i>Prasophyllum petilum</i>	Tarengo Leek Orchid		East of Binalong. Southeast of Boorowa	High	E	E
<i>Prasophyllum sp. Wybong</i>	Prasophyllum sp. Wybong			Moderate	NL	CE
<i>Pteropus poliocephalus</i>	Grey-headed Flying-fox	Breeding camps		High	V	V
<i>Swainsona recta</i>	Small Purple-pea			Moderate	E	E
<i>Swainsona sericea</i>	Silky Swainson-pea			High	V	NL
<i>Synemon plana</i>	Golden Sun Moth	Wallaby grasses, Nassella sp.		Moderate	E	CE
<i>Tyto novaehollandiae</i>	Masked Owl	HBT. Hollows > 20cm DBH		High	V	NL

CE = Critically endangered, E = Endangered, V= Vulnerable, NL = Not Listed

5.2. Habitat constraints assessment

Field investigations to identify potential habitat for threatened species was undertaken across the development site on the 5, 13 and 29 May and on the 1 June 2022. Four hollow bearing trees (see Figure 6) were recorded; two paddock trees within PCT 277 (*E. blakelyi*) and two planted house trees (*E. johnstoni*; Tasmanian Yellow Gum). There were no rocks or large woody debris suitable to provide significant shelter for ground dwelling fauna. Due to the degraded site conditions all candidate species were excluded from the BAMC assessment, except for *Anthochaera phrygia* (Regent Honeyeater) which is included due to the overlap of Important Habitat Mapping for this species. Justification for excluding candidate species is given below Table 14.

Table 14: Justification of exclusion of candidate species

Species	Common Name	Justification for exclusion of species
<i>Acacia ausfeldii</i>	Ausfeld's Wattle	This species is found on footslopes and low rises on sandstone. The species was not located during field investigations.
<i>Ammobium craspedioides</i>	Yass Daisy	This species is located south of Cowra and therefore can be excluded as it is outside its geographical range.
<i>Aprasia parapulchella</i>	Pink-tailed Legless Lizard	This species requires rocky areas or area within 50 m of rocky areas. There were no rocks or areas deemed suitable habitat for this species.
<i>Burhinus grallarius</i>	Bush Stone-curlew	This species requires fallen / standing dead timber including logs. There is no suitable habitat was found within the development site.
<i>Callocephalon fimbriatum</i>	Gang-gang Cockatoo	Nest trees contain hollows that are at least 9 m above the ground that are 10 cm or larger in diameter. There is only one <i>E. blakelyi</i> that has the right size hollow but this is below the required height. No individuals have been sighted within a 10 km radius of the development site.
<i>Cercartetus nanus</i>	Eastern Pygmy Possum	This species requires a shrubby understory with numerous hollow bearing trees. There were no shrubs or understory within PCT 277. There are two hollow bearing trees within the planted native vegetation, however the habitat is deemed too degraded to support this species.
<i>Chalinolobus dwyeri</i>	Large-eared Pied Bat	This species roosts in caves, crevices and cliffs within well timbered areas containing gullies. There is no suitable habitat found within the development site for this species.
<i>Cullen parvum</i>	Small Scurf-pea	This species is recorded from Young and further south near the Victorian boarder and whilst they are found in Box Gum Woodlands, weed invasion is deemed to be a threatening process. Given that the development site has been cleared before 1965 and long-term grazed, most recently by horses, the habitat is highly disturbed and is likely to be unsuitable for this species.
<i>Delmar impar</i>	Striped Legless Lizard	This species requires perennial tussock grasses and cracking clays. No suitable habitat was found within the development site.
<i>Euphrasia arguta</i>	Euphrasia arguta	This species is an erect annual herb ranging in height from 20-35 cm tall and is often associated with dry sclerophyll forests, woodlands or grasslands, or meadows near rivers. Historically it has only been recorded from Sydney to Bathurst, but it was recorded from Barrington Tops in 2012. Over-grazing and clearing are listed as threatening processes for this species. Given that the development site has been cleared before 1965 and is long-term grazed, most recently by horses, the habitat is highly disturbed and is likely to be unsuitable for this species.
<i>Haliaeetus leucogaster</i>	White-bellied Sea-Eagle	This species is highly restricted in nesting locations. Breeding habitat consists of mature tall open forest close to foraging habitat. Nest trees are typically large eucalypts with emergent dead branches. Large stick nests within tree canopy within 1 km of rivers and lakes. Whilst the Cudgegong River is close by there were no signs of nests or potential nest trees within the development site.
<i>Hieraaetus morphnoides</i>	Little Eagle	This species nests in tall trees within remnant patches where pairs build a large stick nest. There were no signs of nests within the development site.
<i>Keyacris scurra</i>	Key's Matchstick Grasshopper	This species is often associated with <i>Themeda triandra</i> and known food plants (Asteraceae). It has been found around Orange and further south. Overgrazing and weed invasion are known threats and it appears to be

Species	Common Name	Justification for exclusion of species
		absent from sites that are disturbed. Given that the development site has been cleared before 1965 and long-term grazed, most recently by horses, the habitat is highly disturbed and is likely to be unsuitable for this species.
<i>Lathamus discolor</i>	Swift Parrot (breeding)	The presence of this species was not identified, and it was determined that the habitat is substantially degraded such that this species is unlikely to utilise the development site. Breeding is not known to occur within the area. This species is only known to breed in Tasmania during Spring. The development site does not contain areas that are mapped as significant habitat for this species.
<i>Litoria booroolongensis</i>	Booroolong Frog	The Booroolong frog is a medium sized tree frog and is predominately restricted to western flowing streams of the Great Dividing Range. They live in permanent streams with fringing vegetation and cobble rocky banks. The development site contains low laying areas and a farm dam. No suitable stream habitat for this species exists within the development site.
<i>Lophoictinia isura</i>	Square-tailed Kite	This species nests in in tree canopies within large forks or on large horizontal limbs generally located along watercourses. Whilst the Cudgegong River is close by there were no signs of nests or potential nest trees within the development site.
<i>Miniopterus orianae oceanensis</i>	Large Bentwing-bat (breeding)	This is a dual credit species, and only a species credit species when specific habitat constraints are present for breeding. The development site does not contain breeding habitat such as caves, overhangs or culverts that are suitable for the species to breed within the development site.
<i>Ninox connivens</i>	Barking Owl	This species occupies partially cleared farmland and requires hollow bearing trees in association with tall midstorey. Only two trees within the planted native vegetation had hollows that were large (>20 cm) but neither were 4 m above the ground. They are also unlikely to nest in paddock trees if separated from a larger patch of vegetation by more than 400 m. The area around the development site is highly fragmented and would not provide suitable foraging areas. Given that the development site has been cleared before 1965 and long-term grazed, most recently by horses, the habitat is highly disturbed and is likely to be unsuitable for this species.
<i>Petaurus norfolcensis</i>	Squirrel Glider	This species requires large old trees with hollows for breeding and nesting and trees need to be closely connected (< 50 m) with an Acacia shrubby understorey. The development site contains two hollow bearing trees which are greater than 50 m apart and there is no shrub layer. The habitat within the development site is highly degraded such that no suitable habitat for this species exists.
<i>Petaurus norfolcensis</i>	Squirrel Glider (WWLGA)	This extent of the endangered population is located within the Wagga Wagga Local Government Area. The development site is outside the geographical boundary.
<i>Phascogale tapoatafa</i>	Brush-tailed Phascogale	The Brush-tailed phascogale is a tree dwelling marsupial often preferring dry sclerophyll open forest with multiple hollow bearing tree with entrances 2.5 – 4 cm wide. Two trees (<i>E. blakelyi</i>) within the development site contained trees with potential sized hollows for this species. However, these the habitat was deemed significantly disturbed such that the species is unlikely to occur within the development site.

Species	Common Name	Justification for exclusion of species
<i>Phascolarctos cinereus</i>	Koala	Koalas are found within eucalypt forests and woodlands in association with their preferred feed trees. Four species of feed trees (<i>E. blakelyi</i> , <i>E. sideroxylon</i> , <i>E. camaldulensis</i> and <i>E. melliodora</i>) occur within the development site. Whilst there is a recent record (2006) of a Koala sighting within 2 km (along river) of the development site, the surrounding area is highly fragmented with no vegetation corridors to allow movement to the site. No Koalas were observed during field investigations.
<i>Polytelis swainsonii</i>	Superb Parrot	Superb parrots are distinctive large, bright green parrots. The species is found throughout inland NSW, breeding in Box-Gum Woodlands and River Red Gum Forests. The species is known to use Blakely's Red Gum and Yellow Box and may forage up to 10 km from nesting sites. There is often more than one nest in a single tree. There are only two trees within the development site with suitable sized hollows. There is one record (2018) within 10 km of the development site located near the Avisford Nature Reserve. The habitat within the development site is deemed significantly disturbed such that the species is unlikely to occur.
<i>Pteropus poliocephalus</i> (Breeding)	Grey-headed Flying-fox	This is a dual credit species, and only a species credit species when specific habitat constraints are present for breeding. Breeding sites are generally in gullies, close to water or in vegetation with a dense canopy. The development site does not contain breeding habitat.
<i>Prasophyllum petilum</i> and <i>Prasophyllum sp. Wybong</i>	Leek Orchid	This orchid grows in grasslands often dominated by <i>Themeda triandra</i> (Kangaroo Grass). Overgrazing and weed incursion are noted threats to the species survival. The development site has been cleared and long termed grazed degrading the habitat to unsuitable for this species.
<i>Swainsona recta</i>	Small Purple Pea	This species occurs within grassy woodlands and open forests dominated by <i>E. blakelyi</i> and <i>E. melliodora</i> in association with <i>Themeda triandra</i> , <i>Austrostipa</i> spp, and <i>Poa</i> spp. Overgrazing and weed incursion are noted threats to the species survival. The development site has been cleared and long termed grazed degrading the habitat to unsuitable for this species.
<i>Swainsona sericea</i>	Silky Swainson-pea	This species is found in temperate grasslands and Box-Gum Woodlands and there are several sites within the MWRC LGA. Overgrazing and weed incursion are noted threats to the species survival. The development site has been cleared and long termed grazed degrading the habitat to unsuitable for this species.
<i>Synemon plana</i>	Golden Sun Moth	This species is restricted to grasslands dominated by perennial tussock grasses particularly <i>Rytidosperma</i> spp. The larvae feed underground on the grass roots so the tussocks need to be close together and covering at least 40% of the site to be suitable habitat (O'Dwyer and Attiwill 1999). The development is significantly degraded such that the species is unlikely to occur.
<i>Tyto novaehollandiae</i>	Masked Owl	This is a forest owl that hunts along the edge of forests including roadsides feeding on rats. It roosts and breeds in moist eucalypt forested gullies in large hollows. Only two trees within the planted native vegetation had hollows that were large (>20 cm). The area around the development site is highly fragmented and would not provide suitable foraging areas. Given that the development site has been cleared before 1965 and long-term grazed, most recently by horses, the habitat is highly disturbed and is considered unsuitable for this species.

5.2.1. Candidate species requiring further assessment

Mapping of Important Areas for Regent Honeyeater habitat occurs within the northern section of the development site (Figure 8). This candidate species is the only species requiring further consideration.



Figure 8: BAM Important Areas for Regent Honeyeater

5.3. Threatened species surveys

Due to the degraded nature of the development site no targeted surveys for species credit species were undertaken.

5.4. Expert reports

Expert reports have not been used in place of targeted survey.

5.5. Species polygon

Regent Honeyeaters are a dual credit species and mapped important areas are a species credit. These areas do not require survey and any impact from development may be potentially serious and irreversible and requires an offset at a minimum. Important habitat maps identify land that is considered important to support critical life stages of the species. Part to the development site is mapped important habitat which overlays the planted vegetation around the house (see Figure 8 above). All exotic vegetation including *Pinus halepensis*, *Liquidambar styraciflua* and *Cypress* sp. have been excluded from the species polygon (Figure 9).

Regent Honeyeaters are also listed as Critically Endangered under the EPBC Act. Assessment under Commonwealth Legislation is provided in Section 11.

Table 15: Candidate species requiring offsetting

Common Name	Scientific Name	Risk weighting	SAIL entity	Habitat constraints	Abundance	Extent (ha) of suitable habitat	TBDC recommendations	Habitat condition (VI score)
Regent Honeyeater	<i>Anthochaera phrygia</i>	3.0	Yes	Mapped Important Areas	0 No individuals have been recorded on the development site. The most recent record (2003) was within Avisford Nature Reserve.	0.05 ha	If the subject land is within a mapped area, no survey is required, and it is assumed present. The important habitat map forms the species polygon used to generate species credits	NA VI scores were not calculated as the area is planted native vegetation and assessed under the streamline module

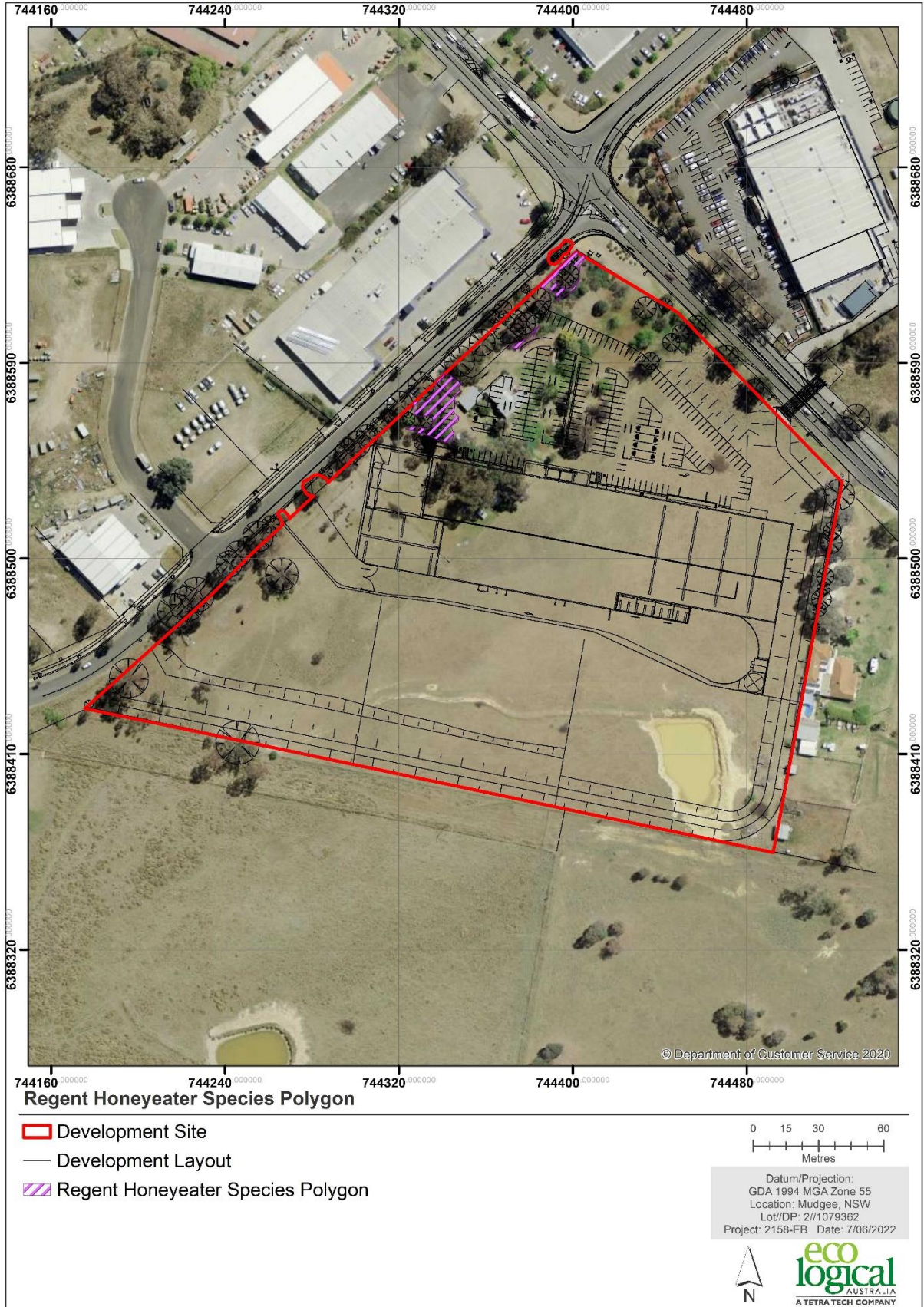


Figure 9: Regent Honeyeater Species Polygon

6. Identifying prescribed impacts

Prescribed additional biodiversity impacts (prescribed impacts) must be assessed as part of the BOS, as per Clause 6.1 of the BC Regulation. Such prescribed impacts (including direct and indirect impacts) are impacts upon the habitat of threatened entities, on areas connecting threatened species habitat, that affect water quality and hydrological process, and on threatened species from turbine strikes or vehicle strikes.

The following impacts have been considered in this BDAR and are summarised in Table 16 below.

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

There are no karst, caves, cliffs, rocks or other geological features of significance within the development site.

6.1.2. Human-made structures and non-native vegetation

The planted garden within the northern section of the development site contains a variety of native and exotic species including conifers, pines, and Liquidambers, none of which provide foraging resources for threatened fauna. A row of *Cotoneaster glaucophyllus* is planted along the northwest fenceline near the house. Whilst these produce an abundance of red berries which are eaten by birds they are not considered to be a food source for threatened fauna in the area. It is unlikely that the proposed development would impact any human-made structures or non-native vegetation that is considered as potential habitat for threatened entities as outlined in 6.1.2 of the BAM 2020.

6.1.3. Habitat connectivity

The development site is located within a highly fragmented landscape. Whilst there are a few scattered trees on site it is unlikely that the proposed development will reduce habitat connectivity.

6.1.4. Water bodies, water quality and hydrological processes

There is a small farm dam within the development site which will be reclaimed. The dam is surrounded by exotic vegetation and bare ground and there is no potential habitat for threatened species. There is also a low-lying drainage area that runs through the southern section of the development site. The area consists of exotic grass species such as *Phalaris aquatica* and *Paspalum dilatatum*. It is unlikely that the proposed development would impact upon water bodies and associated water quality, or hydrological processes that could potentially impact threatened species as outlined in section 6.1.4 of the BAM 2020.

6.1.5. Vehicle strikes

Given the low biodiversity value of the development site it is unlikely that the proposed development would result in increased vehicle strikes on threatened fauna, or animals that are part of a TEC, as outlined in 6.1.6 of the BAM 2020

Table 16: Prescribed impacts within the development site

Feature	Present	Description	Threatened entity
Karst, caves, crevices, cliffs, rocks or other geological features of significance	No	NA	NA

Feature	Present	Description	Threatened entity
Human-made structures	Yes	There is dwelling in the northern section of the development site with a two-car garage and small shed. These are less than 40 years old and have only recently been unoccupied. They are in relatively good condition.	NA
Non-native vegetation	Yes	A landscape garden surrounds the house consisting of both exotic and native vegetation. The exotic vegetation is mainly <i>Cypress</i> sp. (Cypress Pines), <i>Pinus halepensis</i> , and Liquidamber that provide little in the way of foraging resources for threatened species.	NA
Habitat connectivity	No	The development site is within a highly fragmented landscape and is not considered to provide any significant connectivity in its current state.	NA
Waterbodies, water quality and hydrological processes	Yes	A small farm dam is located within the south eastern corner. There is no fringing vegetation or partially submerged logs that provide habitat for threatened species.	NA
Vehicle strikes	No	NA	NA

STAGE 2 IMPACT ASSESSMENT

7. Avoiding and Minimising Impacts on Biodiversity Values

7.1. Avoid and minimise direct and indirect impacts

7.1.1. Project location

The proposed development is located within the Industrial Estate south Mudgee. The development site has been highly modified through historical clearing and grazing which is reflected by the low biodiversity values within the development site. An estimated 85% of the development footprint is within exotic vegetation.

Historical aerial imagery dating back to 1965 show that the development site has been cleared of all trees except for a few scattered trees within the south western corner. Less than 0.44 ha can be assigned to a PCT which is in poor condition given the low vegetation integrity score of 20.5.

7.1.2. Project design

The proposed development has been designed to retain all but four of the planted *E. sideroxylon* trees and two *E. melliodora* trees within the northwest. Many of the trees will be retained within the buffer planting area as required by MWRC. Two of the *E. sideroxylon* trees are within the road verge on the corner of Lions Drive and Castlereagh Highway and will need to be removed to enable vehicles to safely navigate the turn as per MWRC requirements. The other two *E. sideroxylon* trees are within the proposed access areas. Two planted *E. melliodora* trees are located near the proposed entrance. All six trees have been regularly pruned as they are adjacent to overhead powerlines and are in poor health.

An on-site meeting was held on 29 April 2022 with representatives from MWRC and Bunnings Pty Ltd to discuss site constraints, difficulties assigning PCTs and possible avoidance and mitigation measures. It was identified that the trees earmarked for removed were in poor health.

7.2. Avoid and minimise prescribed impacts

Prescribed impacts were not identified within the development site

7.3. Other measures considered

The proponent has developed a planting plan to landscape the surrounding carpark area and along boundaries which include planting *E. melliodora* and *E. sideroxylon* which are Regent Honeyeater feed trees. As per MWRC requirements native tree removal will be replaced at a ratio of 3:1 to mitigate the removal of six trees. However, the total number of trees exceeds this requirement with over 100 trees incorporated within the planting design. In addition, the selection of plant species to be incorporated within the garden beds will include species aligned to PCT 277 (C. Liney, Environmental Co-ordinator, MWRC pers comm) with a variety of native grasses including *Themeda triandra* (Kangaroo grass), *Rytidosperma racemosum* (Wallaby Grass), *Bothriochloa macra* (Red Grass) and *Austrostipa verticillata* (Slender Bamboo Grass). A mix of native shrubs will be planted in accordance with the planting plan including a variety of *Acacia* species, (*A. buxifolia*, *A. dealbata*, *A. decora*) with *Bursaria spinosa*, *Dodonaea viscosa*, *Leptospermum polygalifolium* and *Melaleuca thymifolia*.

7.4. Summary of measures to avoid and minimise impacts

Table 16 below summarises measures that will be implemented to avoid and minimise impacts.

Table 16: Summary of measures to avoid and minimise impacts

Approach	How addressed	Justification
Locating the project in areas where there are no biodiversity values	Areas with reduced biodiversity values have been utilised within the development footprint.	The footprint will not impact on areas deemed suitable critical habitat. The area is degraded due to previous management. Although there are 10 remnant <i>Eucalyptus blakelyi</i> on site, only 2 are considered habitat trees due to the presence of significant sized hollows. An estimated 85% of the development site is exotic vegetation.
Locating the project in areas where the native vegetation or threatened species habitat is in the poorest condition	The development site is highly degraded and by choosing this location other areas of potentially higher quality vegetation and species habitat is avoided.	The development site is already located in habitat within poor condition. Weeds dominate the site, particularly <i>Phalaris aquatica</i> , <i>Paspalum dilatatum</i> , with large patches of <i>Rubus fruticosus</i> sp. agg (Blackberry), <i>Verbena bonariensis</i> (Purple Top) and <i>Hypericum perforatum</i> (St John’s Wort).
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 development site avoids areas of higher quality vegetation and species habitat.	0.44 ha of the development site conform to NSW State legislation CEEC White Box Grassy Woodland, but it is in poor condition (VIS 20.5). There are only 10 remnant <i>Eucalyptus blakelyi</i> trees on site, all other trees have been planted, many of which are non-indigenous. The ground layer is highly disturbed and lacks diversity.
Locating the project such that connectivity enabling movement of species and genetic material between areas of adjacent or nearby habitat is maintained	The development site avoids impediments to connectivity.	The development site contains limited habitat connectivity and is largely located within a fragmented landscape. Lands directly adjoining the development site are heavily grazed or backs on to residential or industrial areas. The development will not impact on the movement of species and genetic material between areas of nearby habitat.
Providing structures to enable species and genetic material to move across barriers or hostile gaps	Given the degraded nature of the site it is unlikely to be critical habitat to facilitate the movement of species as it is already isolated from other patches. However, Regent Honeyeater feed trees such as <i>E. melliodora</i> and <i>E. sideroxylon</i> will be planted on site to provide foraging habitat for this species.	There are no existing corridors off-site allowing for the movement of species and genetic material.

Approach	How addressed	Justification
Making provision for the demarcation, ecological restoration, rehabilitation and/or ongoing maintenance of retained native vegetation habitat on the development site.	Most of the planted <i>E. sideroxylon</i> trees within the northwest corner of the development site will be retained.	Whilst these trees have been planted this area has been mapped as Important Habitat for Regent Honeyeaters.
Efforts to avoid and minimise impacts through design must be documented and justified	There are no impacts to threatened species. The development site is already on degraded vegetation and habitat.	The development site is dominated by weeds.

7.4.1. Direct and indirect impacts

The development site (5.1 ha) is located in a highly disturbed landscape (12.5% native vegetation) and 85% of the footprint is within exotic vegetation including high threat weeds such as *Rubus fruticosus* sp. agg. (Blackberry) *Hypericum perforatum* (St. John’s Wort) and *Ligustrum* sp. (Privet). Only 0.44 ha of native vegetation could be assigned a PCT, which is in low condition (VI = 20.5). Nevertheless, the proponent will retain the native trees that occur along the edge of development site as part of the planted garden bed surrounding the proposed car park.

7.4.2. Prescribed biodiversity impacts

Prescribed impacts were not identified within the development site.

8. Impact Assessment

8.1. Direct impacts

The direct impacts of the development on:

- native vegetation and threatened ecological communities are outlined in Table 17
- threatened species and threatened species habitat is outlined in Table 17

Direct impacts including the final project footprint (construction and operation) are shown on Figure 10.

Table 17: Direct impacts to native vegetation

Direct Impact	TEC or Species	BC Act listing	EPBC Act listing	SAIL entity	Direct impact (ha)
PCT 277	<i>Blakely’s Red Gum – Yellow Box Grassy tall woodland of the NSW South Western Slopes Bioregion</i>	CE	Area does not conform to the listed community	Yes	0.44 ha
	Regent honeyeater	CE	CE	Yes	0.05 ha

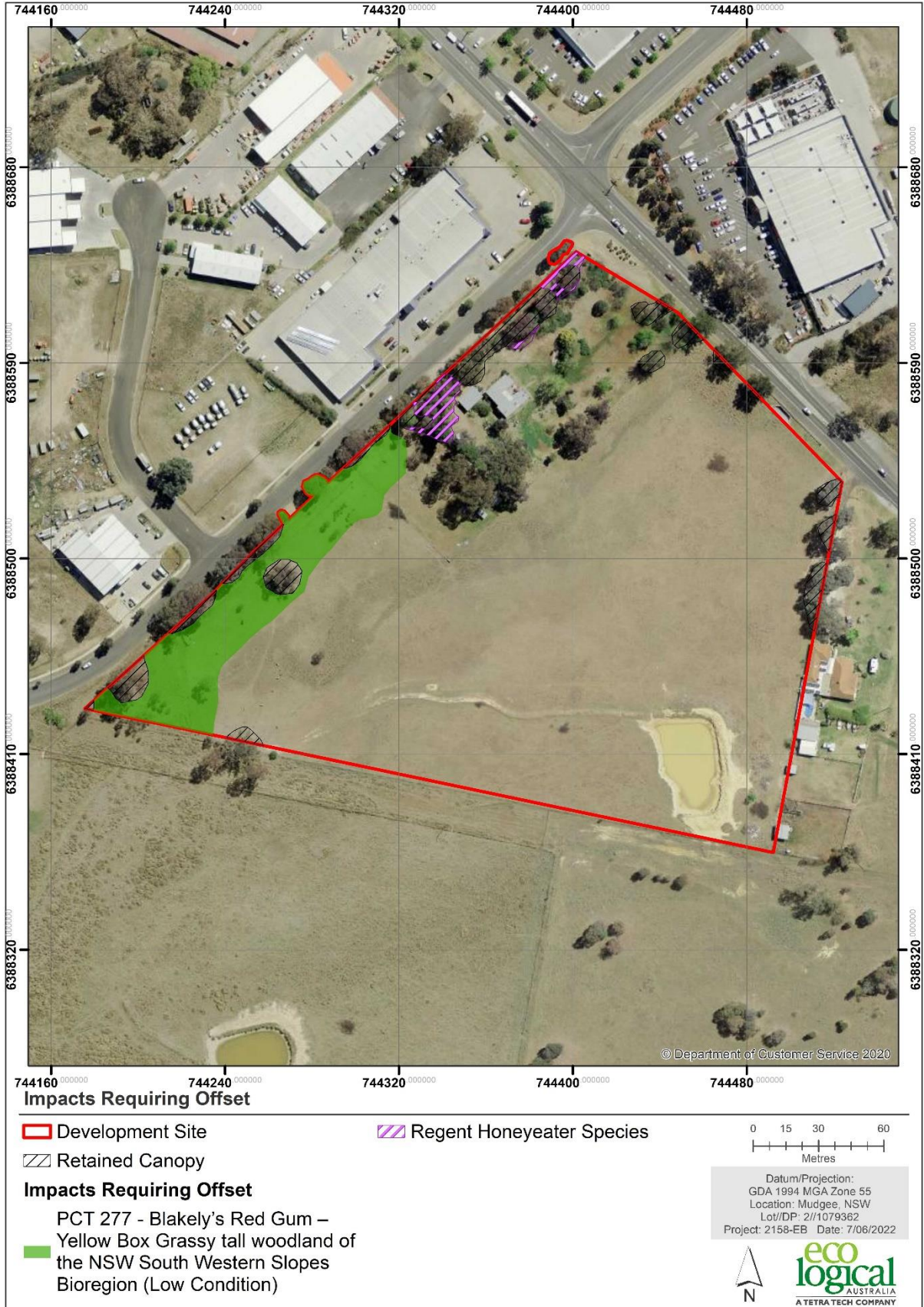


Figure 10: Impacts requiring offsets

8.1.1. Change in vegetation integrity

The change in vegetation integrity as a result of the development is outlined in Table 18.

Table 18: Change in vegetation integrity

Veg Zone	PCT ID	Condition	Area (ha)	Current vegetation integrity score	Future vegetation integrity score	Change in vegetation integrity
1	277	Low	0.44	20.5	0	-20.5

8.2. Indirect impacts

The indirect impacts of the development are outlined in Table 19.

Table 19: Indirect impacts

Indirect impact	Description (nature, extent and frequency)	Biodiversity affected	Duration/ Timing	Consequence
Inadvertent impacts on adjacent habitat or vegetation including sedimentation and erosion	Possible during the construction phase	There is no adjacent native vegetation adjoining the development site	Throughout construction and operation	Short-term impacts
Reduced viability of adjacent habitat due to edge effects	Possible during the construction phase	There is no adjacent native vegetation adjoining the development site	Throughout construction and operation	Short-term impacts
Reduced viability of adjacent habitat due to noise, dust or light spill	Possible during the construction phase. Noise and dust created from machinery	There is no adjacent native vegetation adjoining the development site	Throughout construction and operation	Short-term impacts during construction
Transport of weeds and pathogens from the site to adjacent vegetation	Possible during construction phase through the spread of weed seeds and pathogens from machinery and equipment	Potential for weeds to spread into nearby neighbouring properties and along roadsides	Daily, during construction and operational phases	Potentially long-term impacts
Loss of breeding habitat	Construction / operation	The habitat is substantially degraded that the vegetation is unlikely to provide significant breeding habitat for any threatened species.	Daily, during construction and operational phases	Short-term impacts

Indirect impact	Description (nature, extent and frequency)	Biodiversity affected	Duration/ Timing	Consequence
Trampling of threatened flora species	Construction / operation	No threatened flora was identified throughout the development site	NA	NA
Inhibition of nitrogen fixation and increased soil salinity	Construction Runoff during construction works	Sedimentation and runoff into nearby dams and neighboring properties	During heavy rainfall or storm events	Short term impacts
Rubbish dumping	Construction / operation Illegal dumping by workers / customers	Potential for rubbish to spread into areas outside Development Site	Throughout life of project	Potentially long-term impacts
Wood collection	Construction / operation	There is no wood in adjacent paddocks	NA	NA
Removal and disturbance of rocks including bush rock	Construction / operation	There are no rocks in adjacent paddocks	NA	NA
Increase in predators	Construction / operation	The development site is already degraded and it's unlikely that predators would increase	NA	NA
Increase in pest animal populations	Construction / operation	Potential to increase if food scraps/rubbish is left on site	During construction and operation	Short-term impacts

8.3. Prescribed biodiversity impacts

The development does not have any prescribed biodiversity impacts.

8.4. Mitigating and managing residual impacts

When using the Streamlined Assessment Module – Planted Native Vegetation, the assessor must assess the suitability of the planted native vegetation for use by threatened species or evidence of threatened species using or inhabiting the planted native vegetation. If there is evidence of use the assessor must apply Section 8.4 of the BAM to mitigate and manage impacts. Species credits are not required of offset the proposed impacts.

To mitigate residual impacts to Regent Honeyeater habitat (0.05 ha), the proponent will include Regent Honeyeater feed trees was part of the planting plan required by Council for new builds. This has been highlighted in Section 7.3 above. Six feed trees will be removed during the proposed development and to offset these approximately 100 feed trees will be planted along the boundaries. Additional measures

proposed to mitigate and manage impacts at the development site before, during and after construction are outlined in Table 20.

Table 20: Measures proposed to mitigate and manage impacts

Measure	Risk before mitigation	Risk after mitigation	Action	Outcome	Timing	Responsibility
Timing works to avoid critical life cycle events such as breeding or nursing	Minor	Negligible	Avoid clearing works during breeding/nesting period	Impacts to fauna during breeding/nesting avoided. Regent Honeyeaters are not known to use the development site as breeding habitat.	During clearing works	Project Manager
Instigating clearing protocols including pre-clearing surveys, daily surveys and staged clearing, the presence of a trained ecological or licensed wildlife handler during clearing events	Minor	Negligible	Supervision by a qualified ecologist/licensed wildlife handler during vegetation disturbance and removal	Any fauna utilising habitat within the development site area will be identified and managed to ensure clearing works minimise the likelihood of injuring resident fauna.	During clearing works	Project Manager/ Ecologist
Clearing protocols that identify vegetation to be retained, prevent inadvertent damage and reduce soil disturbance; for example, removal of native vegetation by chain-saw, rather than heavy machinery, is preferable in situations where partial clearing is proposed	Major	Negligible	Demarcation barriers to be installed around native vegetation to be retained. Particularly around those native trees used as feed trees by Regent Honeyeaters.	Impacts to native vegetation avoided. This will reduce the impacts to potential Regent Honeyeater habitat.	During clearing works	Project Manager
Sediment barriers or sedimentation ponds to control the quality of water released from the site into the receiving environment	Moderate	Minor	Manage exposed soil surfaces Sediment and erosion control on works- silt nets downslope from workings	Control of erosion and sedimentation	Duration of the project	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	Noise impacts associated with the development will	For the duration of construction works	Project Manager

Measure	Risk before mitigation	Risk after mitigation	Action	Outcome	Timing	Responsibility
			accordance with Table 1 of Interim Noise Guidelines (2009) Monday to Friday 7.00am to 6.00pm Saturday 8.00am to 1.00pm No work on Sunday or public holidays	be managed in accordance with guidelines.		
Light shields or daily/seasonal timing of construction and operational activities to reduce impacts of light spill	Minor	Negligible	Operating times will only occur during daylight hours, and night lights will not be used	Light impacts associated with construction and operation will be avoided as works will occur during daylight hours	For the duration of the project	Project Manager
Adaptive dust monitoring programs to control air quality	Moderate	Minor	Dust suppression measures	Mitigate dust created during construction/operation	For the duration of the project	Project Manager
Programming construction activities to avoid impacts; for example, timing construction activities for when migratory species are absent from the site, or when particular species known to or likely to use the habitat on the site are not breeding or nesting	Minor	Negligible	Timing of construction works should be planned to occur outside of the summer/autumn breeding/nesting season, where possible.	Impacts to fauna during breeding/nesting avoided	During clearing works	Project Manager
Hygiene protocols to prevent the spread of weeds or pathogens between infected areas and uninfected areas	Moderate	Minor	All machinery/equipment cleaned prior to entering/exiting the Development Site	Prevent the spread of weeds or pathogens	Duration of project	Project Manager

Measure	Risk before mitigation	Risk after mitigation	Action	Outcome	Timing	Responsibility
Staff training and site briefing to communicate environmental features to be protected and measures to be implemented	Minor	Negligible	Demarcation barriers to be installed as no go zones for clearing	Loss of native vegetation avoided	During clearing works	Project Manager

9. Thresholds for assessing and offsetting the impacts of development

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

9.1. Assessment for Serious and Irreversible Impacts (SAII) on biodiversity values

The development has candidate Serious and Irreversible Impacts (SAII) values as outlined in Table 21. Detailed consideration of whether impacts on TECs that are serious and irreversible is included in Table 22 and further evaluated in Table 23; and on candidate species is included in Table 24 and Table 25.

Table 21: Serious and Irreversible Impacts Summary

Species / Community	Common Name	Principle	Direct impact individuals / area (ha)	Threshold
White box – Yellow box – Blakely’s red gum woodland	Box-Gum Woodland	Principle 1 and Principle 2	0.44	No threshold is currently available
<i>Anthochaera phrygia</i>	Regent Honeyeater	Principle 1 and Principle 2	0.05	No threshold is currently available

9.1.1. Additional impact assessment provisions for threatened ecological communities at risk of an SAII

Table 22: Determining which Principles apply to serious and irreversible TEC entities (Clause 6.7 of the BC Regulation)

Determining whether impacts are serious and irreversible	Assessment
Principle 1	
Does the proposal impact on a species, population or ecological community that is a candidate entity because it is in a rapid rate of decline?	Yes. The population has seen a reduction of >=80% in 10 years or three generations.
If yes, is the impact in excess of any threshold identified and therefore likely to be serious and irreversible?	There are no thresholds currently available.
Principle 2	
Does the proposal impact on a species that is a candidate entity because it has been identified as having a very small population size?	Yes. The extent of BGW within NSW has been reduced by 94%.
If yes, is the impact in excess of any threshold identified and therefore likely to be serious and irreversible?	There are no thresholds currently available.
Principle 3	
Does the proposal impact on the habitat of a species or an area of an ecological community that is a candidate entity because it has a very limited geographic distribution?	No
If yes, is the impact in excess of any threshold identified and therefore likely to be serious and irreversible?	NA
Principle 4	

Determining whether impacts are serious and irreversible	Assessment
Does the proposal impact on a species, a component of species habitat or an ecological community that is a candidate entity because it is irreplaceable?	No
b. If yes, is the impact in excess of any threshold identified and therefore likely to be serious and irreversible?	NA

Table 23: Evaluation of an impact on a TEC consistent with 9.1.1 of the BAM

Impact Assessment Provisions	Assessment
1. the action and measures taken to avoid the direct and indirect impact on the potential entity for an SAI	The proposed development will remove 0.44 ha of low quality Box Gum Woodland (BGW). The development site contains a two <i>E. blakelyi</i> greater than the large tree benchmark for this community (>50 cm DBH). The development site has been chosen due to its degraded nature (VI score = 20.5) and has recently been re-zoned Building Development. There are other locations within the MWRC that have higher quality vegetation.
2a. evidence of reduction in geographic distribution (Principle 1, clause 6.7(2)(a) BC Regulation) as the current total geographic extent of the TEC in NSW AND the estimated reduction in geographic extent of the TEC since 1970 (not including impacts of the proposal)	BGWs were once widespread, however the lower fertile footslopes and flats that support these woodlands were also the areas generally preferred for cropping, pasture and development. As a consequence, BGW are severely reduced in area, are highly isolated and fragmented. Remnants with a full range of flora and fauna species are rare. In the NSW south west slopes less than 4% remains. Much of the landscape consists of lands like that of the development site. These areas have been highly disturbed/grazed and have not been mapped by any vegetation mapping programs as a native vegetation community. Within 1500 m of the development site, native vegetation covers approximately 12.5% of the area.
2b. extent of reduction in ecological function for the TEC using evidence that describes the degree of environmental degradation or disruption to biotic processes (Principle 2, clause 6.7(2)(b) BC Regulation) indicated by: <ul style="list-style-type: none"> i. change in community structure ii. change in species composition iii. disruption of ecological processes iv. invasion and establishment of exotic species v. degradation of habitat, and vi. fragmentation of habitat 	<p>The proposed development will reduce the extant area of CEEC by 0.44 ha. This area has been mapped under the State Vegetation Mapping as PCT 0. The TEC is in low condition (VI score = 20.5) and has been regularly grazed.</p> <ul style="list-style-type: none"> i. Considering the very small area and reduced quality of the vegetation to be removed, it is considered that the development will have a negligible impact on the extant area and overall condition of the EEC on a broad scale. ii. The development will not impact characteristic and functionally important species outside of the proposed impact area. iii. The proposed development will not disrupt ecological processes iv. The development is unlikely to result in the spread of exotic species into vegetation adjacent to the development site. The surrounding areas are already either industrial / residential areas or grazed paddocks.

Impact Assessment Provisions	Assessment
	<p>v. The development will not have additional impacts to the quality and integrity of the occurrence of Box Gum Woodland outside of the proposed impact area.</p> <p>vi. The development will not cause direct or indirect fragmentation or isolation of any area of Box Gum Woodland. The development site does not provide a sole link between habitat or areas of vegetation.</p>
<p>2c. evidence of restricted geographic distribution (Principle 3, clause 6.7 (2) (c) BC Regulation), based on the TECs geographic range in NSW according to the:</p> <p>i. extent of occurrence</p> <p>ii. area of occupancy, and</p> <p>iii. number of threat-defined locations.</p>	<p>Detailed mapping of the local occurrence of the CEEC is not available. Much of the landscape consists of lands like that of the development site. These areas have been highly disturbed/grazed and have not been mapped by any vegetation mapping programs as a native vegetation community. Within 1500 m of the development site, native vegetation covers approximately 12.5% of the area.</p>
<p>2d. evidence that the TEC is unlikely to respond to management (Principle 4, clause 6.7 (2) (d) BC Regulation).</p>	<p>With intensive management it is possible for the TEC to recover. There are a variety of high threat and invasive weeds, eg <i>Hypericum perforatum</i> (St. John's Wort), <i>Rubus fruticosus</i> sp. agg. (Blackberry), <i>Phalaris aquatica</i>, <i>Paspalum dilatatum</i>, <i>Verbena bonariensis</i>) which would need to be controlled. Whilst there are a few small regenerating trees within PCT 277 it is unlikely that the soil seedbank would contain the variety of native grasses and herbs to be considered good quality. The area is highly fragmented, and it is unlikely to be used by threatened fauna.</p>
<p>3. Where the TBDC indicated that data is 'unknown' or 'data deficient' for a TEC for a criterion listed in subsection 9.1.1(2), the assessor must record this in the BDAR or BCAR.</p>	<p>NA</p>
<p>4a. the impact on the geographic extent of the TEC (Principles 1 and 3) by estimating the total area of the TEC to be impacted by the proposal:</p> <p>i. in hectares, and</p> <p>ii. as a percentage of the current geographic extent of the TEC in NSW.</p>	<p>The total area to be impacted by the proposed development is 0.44 ha. Approximately 94% of this PCT has been cleared within NSW (BAMC 2022).</p>
<p>4b. the extent that the proposed impacts are likely to contribute to further environmental degradation or the disruption of biotic processes (Principle 2) of the TEC by:</p> <p>i. estimating the size of any remaining, but now isolated, areas of the TEC; including areas of the TEC within 500 m of the development footprint or equivalent area for other types of proposals</p> <p>ii. describing the impacts on connectivity and fragmentation of the remaining areas of TEC measured by:</p> <ul style="list-style-type: none"> • distance between isolated areas of the TEC, presented as the average distance if the remnant is retained AND the average distance if the remnant is removed as proposed, and • estimated maximum dispersal distance for native flora species characteristic of the TEC, and 	<p>The proposed development is unlikely to further degrade or disrupt biotic processes as the area is surrounding the development site is highly degraded and fragmented. There is approximately 12.5% of native vegetation within the 1000 ha buffer assessment area.</p> <p>i. Within 500 m of the development site there is a planted area screening the Castlereagh highway within the Mudgee Water Treatment Plant. Most of these are young <i>E. blakelyi</i>. There are also scattered large trees within the Lions Drive Caravan Park. Within 1 km there are planted trees within the Mudgee Golf Course. The largest remnant patch is 2.5 km west of the development site, Colliers Hill which is part of Avisford Nature</p>

Impact Assessment Provisions	Assessment
<ul style="list-style-type: none"> • other information relevant to describing the impact on connectivity and fragmentation, such as the area to perimeter ratio for remaining areas of the TEC as a result of the development <p>iii. describing the condition of the TEC according to the vegetation integrity score for the relevant vegetation zone(s) (Section 4.3). The assessor must also include the relevant composition, structure and function condition scores for each vegetation zone.</p>	<p>Reserve. It is not known how much of these areas are BGW.</p> <p>ii. The development site is located within the Industrial Estate south Mudgee and is already highly disturbed and fragmented.</p> <p>iii. The vegetation within the development site consists of one PCT which is of low quality with a VI score of 20.5.</p> <p>Composition score = 52.1 Structure score = 55.9 Function score = 3</p>

9.1.2. Additional impact assessment provisions for threatened species at risk of an SAI

Table 24: Determining which Principles apply to serious and irreversible candidate entities (Clause 6.7 of the BC Regulation)

Determining whether impacts are serious and irreversible	Assessment Regent Honeyeater
Principle 1	
Does the proposal impact on a species, population or ecological community that is a candidate entity because it is in a rapid rate of decline?	Yes. The population has seen a reduction of >=80% in 10 years or three generations.
If yes, is the impact in excess of any threshold identified and therefore likely to be serious and irreversible?	Regent Honeyeaters have been observed feeding within <i>E. sideroxylon</i> and <i>E. melliodora</i> including those planted as street trees. Of the 16 <i>E. sideroxylon</i> and two <i>E. melliodora</i> trees within the development site, six trees are earmarked for removal (0.05 ha). These trees are deemed to be in poor health due to regular pruning as they are close to powerlines. It is unlikely that these individuals would provide copious quantities of nectar in their current condition. The majority of the area mapped as Important Habitat contains a variety of planted exotic coniferous trees such as <i>Cypress</i> sp. and <i>Pinus</i> sp. which do not provide foraging resources for Regent Honeyeaters (Figure 10).
Principle 2	
Does the proposal impact on a species that is a candidate entity because it has been identified as having a very small population size?	Yes. The NSW population is thought to be less than 250 individuals.
If yes, is the impact in excess of any threshold identified and therefore likely to be serious and irreversible?	Regent Honeyeaters have not been observed within the development footprint. The closest record was in 1999 in Lions Drive Caravan Park approximately 500 m away and at the local Golf Course. Both sites have large <i>E. melliodora</i> trees. There are only two known key breeding locations within NSW; Capertee Valley and the Bundarra-Barraba region. Regent Honeyeaters are dual credit species and mapped important areas are species credits which do not require survey.

Determining whether impacts are serious and irreversible Assessment Regent Honeyeater

Principle 3

Does the proposal impact on the habitat of a species or an area of an ecological community that is a candidate entity because it has a very limited geographic distribution? No

If yes, is the impact in excess of any threshold identified and therefore likely to be serious and irreversible? NA

Principle 4

Does the proposal impact on a species, a component of species habitat or an ecological community that is a candidate entity because it is irreplaceable? No

b. If yes, is the impact in excess of any threshold identified and therefore likely to be serious and irreversible? NA



Figure 11: Regent Honeyeater: Mapped Important Areas

Table 25: Evaluation of impacts on candidate species consistent with Section 9.1.2 of the BAM

Impact Assessment Provision	Assessment
<p>1. the action and measures taken to avoid the direct and indirect impact on the species at risk of an SAII. Where these have been addressed elsewhere the assessor can refer to the relevant sections of the BDAR or BCAR.</p>	<p>The area mapped as Important Habitat overlays the planted vegetation surrounding the house and sheds. Much of this vegetation is exotic consisting of Cypress and Pines. Only six trees (4 <i>E. sideroxylon</i> and 2 <i>E. melliodora</i>) are considered feed trees for Regent Honeyeaters. The removal of these trees is equivalent to 0.05 ha. The trees that will be removed are in poor condition due to regular pruning and unlikely to produce copious quantities of nectar as preferred by Regent Honeyeaters. Over 100 feed trees will be replanted within</p>

Impact Assessment Provision	Assessment
<p>2a. evidence of rapid decline (Principle 1, clause 6.7(2)(a) BC Regulation) presented by an estimate of the:</p> <ul style="list-style-type: none"> i. decline in population of the species in NSW in the past 10 years or three generations (whichever is longer), or ii. decline in population of the species in NSW in the past 10 years or three generations (whichever is longer) as indicated by: an index of abundance appropriate to the species; decline in geographic distribution and/or habitat quality; exploitation; effect of introduced species, hybridisation, pathogens, pollutants, competitors or parasites 	<p>the landscaped borders surrounding the carpark consisting of <i>E. sideroxylon</i> and <i>E. melliodora</i>.</p> <p>The Regent Honeyeater is listed as critically endangered due to its rapid decline mainly due to clearing, fragmentation and degradation of its habitat. Once extending from Adelaide through to the central coast in Queensland it is now limited to north eastern Victoria and a few valleys in NSW. There has been a contraction of its range with the species restricted to south of Brisbane, extinct in SA and it is only known from three key breeding locations. It is believed to have undergone a population decline of >80% within three generations (National Recovery Plan, 2016).</p>
<p>2b. evidence of small population size (Principle 2, clause 6.7(2)(b) BC Regulation) presented by:</p> <ul style="list-style-type: none"> i. an estimate of the species' current population size in NSW, and ii. an estimate of the decline in the species' population size in NSW in three years or one generation (whichever is longer), and iii. where such data is available, an estimate of the number of mature individuals in each subpopulation, or the percentage of mature individuals in each subpopulation, or whether the species is likely to undergo extreme fluctuations 	<p>The Regent Honeyeater comprises a single population with some exchange of individuals between regularly used areas. In 1980s it was estimated that the population was 1500 individuals. As of 2010 the total population size across Australia was estimated to be 350-400, which represents a significant decline.</p> <p>Within NSW the population is estimated to be about 200 adult birds. It is believed to have undergone a population decline of >80% within three generations (National Recovery Plan, 2016).</p>
<p>2c. evidence of limited geographic range for the threatened species (Principle 3, clause 6.7(2)(c) BC Regulation) presented by:</p> <ul style="list-style-type: none"> i. extent of occurrence ii. area of occupancy iii. number of threat-defined locations (geographically or ecologically distinct areas in which a single threatening event may rapidly affect all species occurrences), and iv. whether the species' population is likely to undergo extreme fluctuations 	<p>Regent Honeyeaters are only known from two breeding areas within NSW, the Capertee Valley (including Mudgee-Wollar area) and the Bundarra-Barraba area with subsidiary areas located within the Hunter Valley.</p>
<p>2d. evidence that the species is unlikely to respond to management (Principle 4, clause 6.7(2)(d) BC Regulation) because:</p> <ul style="list-style-type: none"> i. known reproductive characteristics severely limit the ability to increase the existing population on, or occupy new habitat (e.g. species is clonal) on, a biodiversity stewardship site ii. the species is reliant on abiotic habitats which cannot be restored or replaced (e.g. karst systems) on a biodiversity stewardship site, or iii. life history traits and/or ecology is known but the ability to control key threatening processes at a biodiversity 	<p>The objectives of the Regent Honeyeater recovery plan are to improve the extent and quality of the habitat through land covenants and state/national parks and to rehabilitate degraded areas previously used by Regent Honeyeaters. The development site contains an area mapped as Important Habitat, however this overlays area of planted exotic vegetation including Cypress and Pines which are not preferred feed trees.</p>

Impact Assessment Provision	Assessment
<p>stewardship site is currently negligible (e.g. frogs severely impacted by chytrid fungus).</p>	
<p>3. Where the TBDC indicated that data is 'unknown' or 'data deficient' for a TEC for a criterion listed in subsection 9.1.1(2), the assessor must record this in the BDAR or BCAR.</p>	<p>NA</p>
<p>4a. the impact on the species' population (Principles 1 and 2) presented by:</p> <p>i. an estimate of the number of individuals (mature and immature) present in the subpopulation on the subject land (the site may intersect or encompass the subpopulation) and as a percentage of the total NSW population, and</p> <p>ii. an estimate of the number of individuals (mature and immature) to be impacted by the proposal and as a percentage of the total NSW population, or</p> <p>iii. if the species' unit of measure is area, provide data on the number of individuals on the site, and the estimated number that will be impacted, along with the area of habitat to be impacted by the proposal</p>	<p>i. Regent Honeyeaters have not been sighted within the development site. The most recent observation was in 2003 within the Avisford Nature Reserve over 2.5 km west of the development site.</p> <p>ii. The proposed development is unlikely to impact upon any individuals</p> <p>iii. Whilst the development site contains an area mapped as Important Habitat, six potential feed trees are likely to be impacted resulting in a reduction of 0.05 ha of potential habitat.</p>
<p>4b. impact on geographic range (Principles 1 and 3) presented by:</p> <p>i. the area of the species' geographic range to be impacted by the proposal in hectares, and a percentage of the total AOO, or EOO within NSW</p> <p>ii. the impact on the subpopulation as either: all individuals will be impacted (subpopulation eliminated); OR impact will affect some individuals and habitat; OR impact will affect some habitat, but no individuals of the species will be directly impacted</p> <p>iii. to determine if the persisting subpopulation that is fragmented will remain viable, estimate (based on published and unpublished sources such as scientific publications, technical reports, databases or documented field observations) the habitat area required to support the remaining population, and habitat available within dispersal distance, and distance over which genetic exchange can occur (e.g. seed dispersal) and pollination distance for the species</p> <p>iv. to determine changes in threats affecting remaining subpopulations and habitat if the proposed impact proceeds, estimate changes in environmental factors including changes to fire regimes (frequency, severity); hydrology, pollutants; species interactions (increased competition and effects on pollinators or dispersal); fragmentation, increased edge effects, likelihood of disturbance; and disease, pathogens and parasites. Where these factors have been considered elsewhere in relation to the target species, the assessor may refer to the relevant sections of the BDAR or BCAR.</p>	<p>i. Whilst the development site contains an area mapped as Important Habitat only six feed trees are likely to be impacted resulting in a reduction of 0.05 ha of potential habitat.</p> <p>ii. The proposed development will reduce potential habitat by 0.05 ha but is unlikely to directly impact individuals</p> <p>iii. It is unlikely that the proposed development will impact the species through fragmentation of habitat</p> <p>iv. It is unlikely that the proposed development will affect environmental factors relating to the species survival. The development site is within a highly fragmented landscape that is surrounded by industrial and residential areas.</p>

9.2. Determine offsets required for impacts

9.2.1. Impacts on native vegetation and TECs (ecosystem credits)

The impacts of the development requiring offset for native vegetation are outlined in Table 26 and shown on Figure 12. The impacts of the development requiring offset for species credit species and their habitat are outlined in Table 27 and Figure 12.

Table 26: Impacts to native vegetation that require offsets

Vegetation Zone	PCT ID	PCT Name	Vegetation Class	Vegetation Formation	Direct impact (ha)
1	277	<i>Blakely's Red Gum – Yellow Box Grassy tall woodland of the NSW South Western Slopes Bioregion</i>	Western Slopes Grassy Woodland	Grassy Woodland	0.44

9.2.2. Impacts on threatened species and their habitat

Table 27: 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
<i>Anthochaera phrygia</i>	Regent Honeyeater	0.05	CE	CE

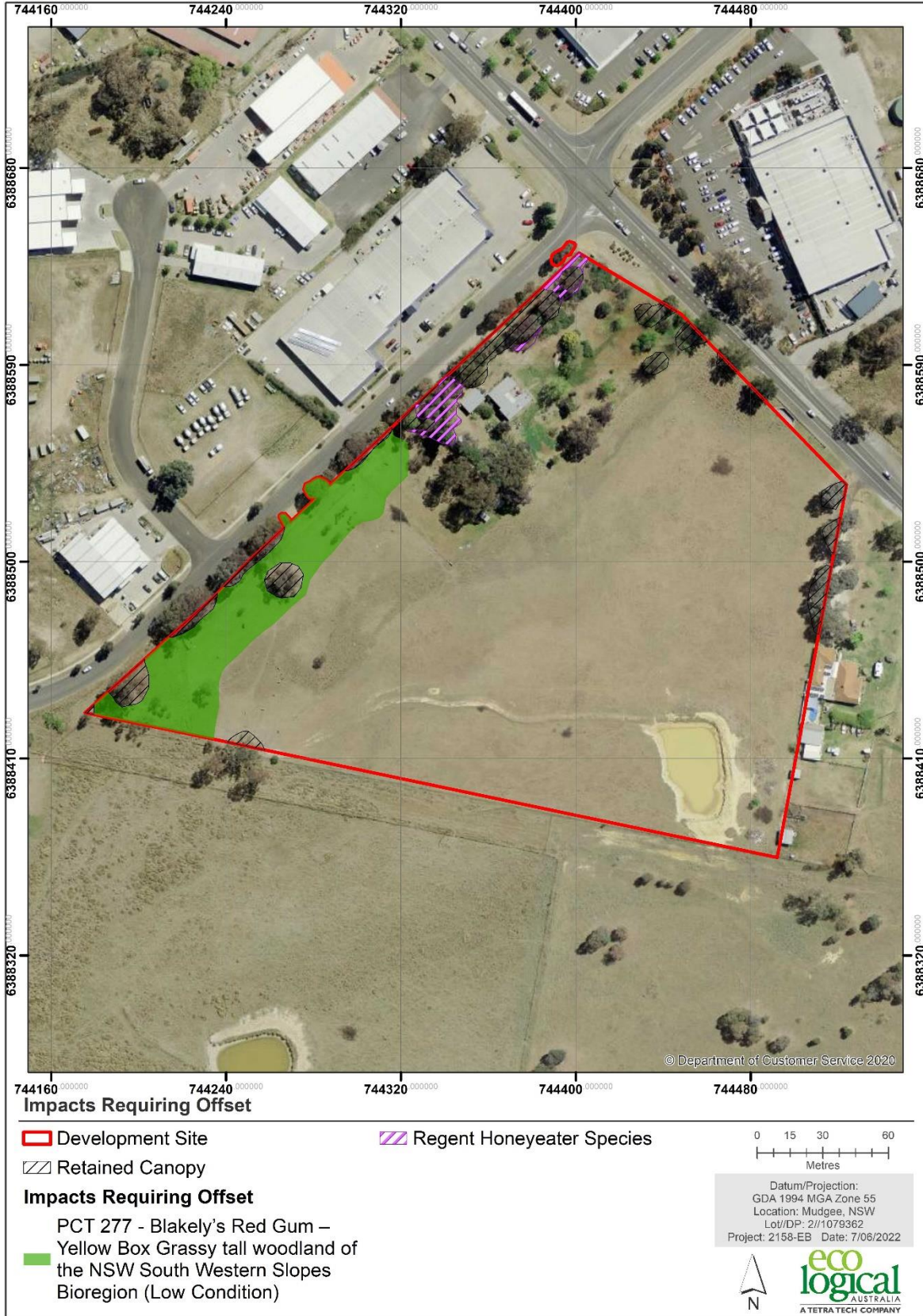


Figure 12: Impacts requiring offsets

9.3. Impacts that do not need further assessment

The impacts of the development not requiring offset for native vegetation are outlined in Table 28. No PCT could be assigned to this area as it was a landscaped garden consisting of both native and exotic vegetation. Many of the native species are not locally indigenous. This area was assessed under the Streamlined Assessment Module – Planted native vegetation. This module only requires the assessment of threatened species. Species credits are not required to offset the proposed impacts.

Table 28: Impacts to native vegetation that do not require offsets

PCT Name	Direct impact (ha)	Rationale
Planted native vegetation	0.23	No PCT could be assigned to this area as it was a landscaped garden with a variety of planted trees and shrubs.

9.4. Areas not requiring assessment

Areas that do not require further assessment are areas identified as cleared or exotic vegetation. Within the development site there is 4.33 ha of vegetation and 0.11 ha of dam that could not be assigned a PCT due to the dominance of weeds including Paspalum, Phalaris and Verbena with Blackberry and St John's Wort scattered throughout. The areas not requiring assessment are shown in Figure 12.

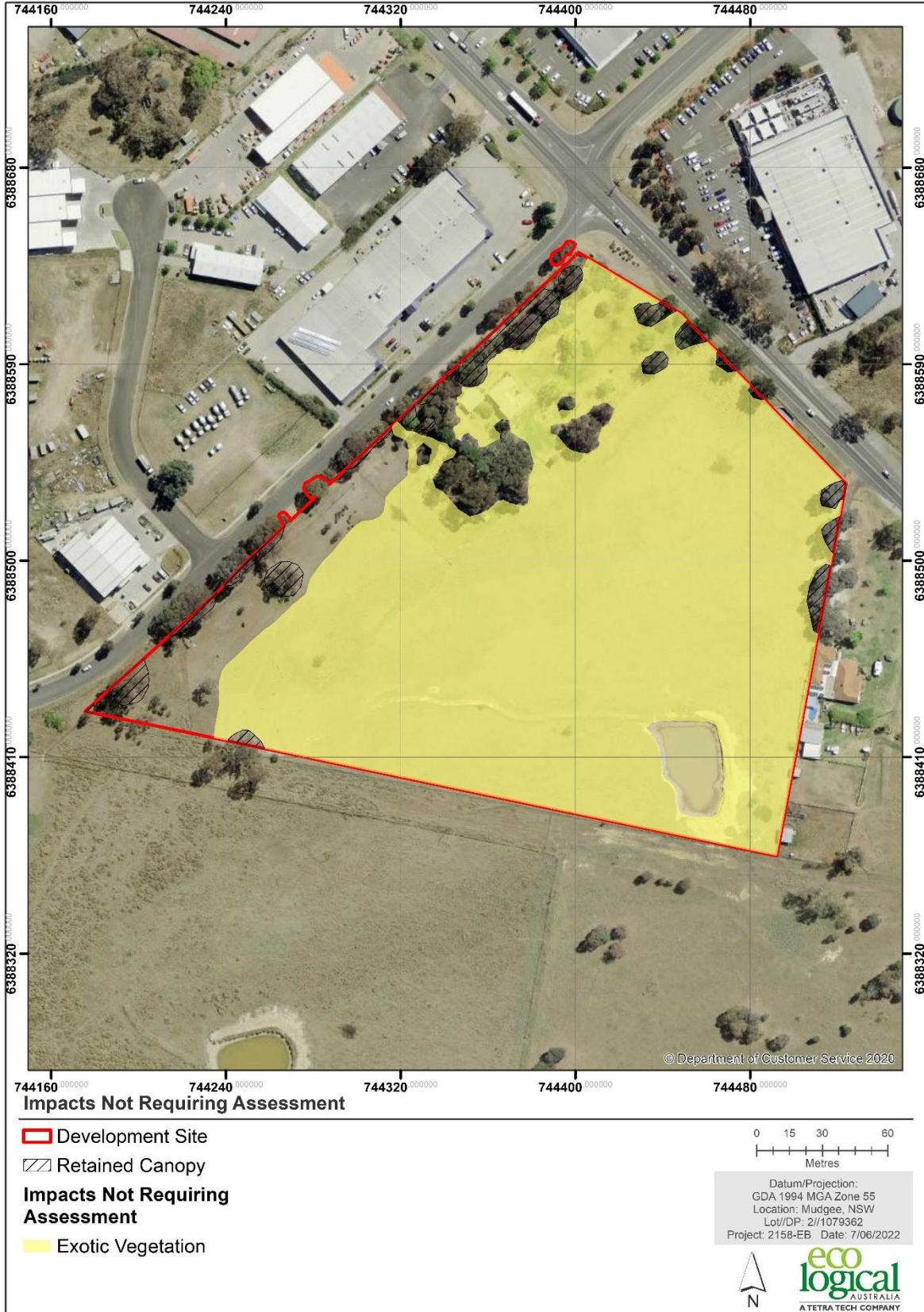


Figure 13: Impacts not requiring assessment

10. Applying the no net loss standard

10.1. Calculating offset requirement for direct impacts

The number of ecosystem credits required for the development are outlined in Table 29. The number of species credits required for the development are outlined in Table 30. A biodiversity credit report is included in Appendix E.

10.1.1. Ecosystem and Species Credits

Table 29: Ecosystem credits required

Vegetation Zone	PCT ID	PCT Name	Credit Class	Direct impact (ha)	Credits required
1	277	Blakely's Red Gum_ Yellow Box grassy tall woodland of the NSW South Western Slopes Bioregion	TEC	0.44	6

Table 30: Species credit summary

Species	Common Name	Direct impact number of individuals / habitat (ha)	Credits required
<i>Anthochaera phrygia</i>	Regent Honeyeater	0.05	Not Required (Assessed under Streamlined Module – Planted native vegetation as a PCT could not be assigned).

11. Legislation

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 impacts on Matters of National Environmental Significance (MNES) in accordance with the EPBC Act have been addressed below.

11.1.1. 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 the Environment (DotE), which is responsible for administering the EPBC Act (DotE 2013).

The process includes conducting an Assessment of Impact for listed threatened species and ecological communities that represent a MNES that will be impacted as a result of the proposed action. Significant impact guidelines (DotE 2013) 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.

One MNES was assessed under the EPBC Act:

1. Regent Honeyeater - listed as critically endangered under the EPBC Act.

11.1.1.1. *Anthochaera Phrygia* (Regent Honeyeater)

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:

- **lead to a long-term decrease in the size of a population**

The proposed development will only remove a small area (0.05 ha) of potential habitat comprising woodland. Whilst Regent honeyeaters have not been sighted with the development site they have been observed within higher quality vegetation north and east of Mudgee. Given the high mobility of the species, the proposed works are unlikely to lead to a long-term decrease in the size of an important population of the species.

- **reduce the area of occupancy of the species**

The proposed works will remove a small area of occupancy of the species and a larger area of potential habitat will remain undisturbed and will be managed to support continuation of potential remaining populations. Areas of undisturbed potential habitat for this species will remain outside of the proposed works footprint.

- **fragment an existing population into two or more populations**

The proposed development will not increase fragmentation of the existing population given that the species is highly mobile.

- **adversely affect habitat critical to the survival of a species**

Review of the Department of the Environment and Energy Species Profile and Threats Database showed that critical habitat registered for this species is any breeding or foraging habitat in areas where the species is likely to occur. Key areas in NSW are Mudgee-Wollar and the Capertee Valley, Bundarra-Barraba, Pilliga Woodlands and the Hunter Valley areas.

- **disrupt the breeding cycle of a population**

Due to the species being highly mobile it is unlikely that disturbance to potential foraging habitat will disrupt the breeding cycle of an important population. The species is not known to occur within the development site and it is unlikely to be breeding habitat.

- **modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline**

The proposed development will impact upon only a small area of potential foraging habitat for this species. Due to the species being highly mobile it is unlikely the clearing will modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline.

Areas of intact equivalent habitat will remain outside of the study area, undisturbed by the development site.

- **result in invasive species that are harmful to a critically endangered or endangered species becoming established in the endangered or critically endangered species' habitat**

The proposed development will not result in invasive species that are harmful to a vulnerable species becoming established in the species' habitat.

- **introduce disease that may cause the species to decline, or**

The proposed development will not introduce disease that may cause the species to decline or interfere substantially with the recovery of the species.

- **interfere with the recovery of the species.**

The long-term objectives of the Regent Honeyeater Recovery Plan were to:

- ensure that the species persists in the wild
- to achieve a down-listing from nationally endangered to vulnerable by stabilising the population decline and securing habitat extent and quality in the main areas of occupancy
- to achieve increasing reporting rates (5% per annum) in areas previously used regularly.

As no records of this species have been made within the clearing area, and limited suitable habitat is going to be removed, no impact is expected on any individuals or populations of Regent Honeyeater. It is therefore believed that the action proposed remains consistent with the objectives of the recovery plan for this species.

12. Conclusion

This BDAR has been prepared to meet the guidelines of the BAM 2020 established under Section 6.7 of the BC Act. This BDAR considers 0.44 ha of disturbance on native vegetation for a proposed Bunnings Warehouse development and associated infrastructure, and three small industrial lot developments. The 0.44 ha assessed in the BDAR was assigned one PCT:

PCT 277 (Low) – *Blakely's Red Gum – Yellow Gum tall woodland of the NSW South Western Slopes Bioregion*.

All of the 0.44 ha of PCT 277 meets the criteria for CEEC listed under the BC Act. No sections of this PCT meet the CEEC listing criteria under the EPBC Act.

In addition, 0.23 ha of planted native vegetation was assessed under Appendix D of the BAM 2020 as the Streamlined Assessment Module – planted native vegetation. A PCT could not be assigned to this area and therefore only threatened species and potential habitat need to be assessed. Species credits are not required for these proposed impacts. The majority of the development site is located within exotic vegetation (4.33 ha).

No threatened flora or fauna species were identified during the field surveys. Threatened fauna habitat was assessed, comprising mainly four individual hollow-bearing trees to be removed within the development site. The development site was determined to be substantially degraded that it is unlikely to support populations of threatened species.

Mapped Important Area for Regent Honeyeaters overlays the planted vegetation, much of which is exotic and provides little value in terms of foraging requirements. 0.05 ha of native vegetation was considered to provide potential foraging habitat. This area was part of the planted native vegetation assessed under the Streamline Assessment Module (Appendix D of the BAM 2020) and no species credits are required.

SAll values have been considered as part of this assessment. These values include '*White Box Yellow Box Blakely's Red Gum Woodland*'. A threshold of 0 is assumed and therefore it is possible that SAll could occur. Regent Honeyeaters are also SAll entities and, whilst they have never been recorded on site, there are feed trees present (*E. melliodora* and *E. sideroxylon*) that have been planted within the development site. To mitigate impacts to Regent Honeyeaters, most of these trees will be retained and additional trees will be planted within the garden beds surrounding the carpark incorporating a replacement ratio of 3:1.

The BAMC generated a VI score of 20.5 and 6 credits are required to offset the removal of 0.44 ha of PCT 277. Given the lack of suitable habitat, and no threatened species were identified during field surveys no species credits were required to be calculated.

An assessment of the Commonwealth Significant Impact Criteria (Commonwealth of Australia 2013) was applied to one threatened species listed under the EPBC Act, Regent Honeyeater. The assessments concluded that the project would not have a significant impact on the above-mentioned species. A referral to the Commonwealth is not recommended.

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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 development site, or on land to be biodiversity certified, or that sets out the number and class of biodiversity credits that are created at a biodiversity stewardship site.
BioNet Atlas	The BioNet Atlas (formerly known as the NSW Wildlife Atlas) is the OEH database of flora and fauna records. The Atlas contains records of plants, mammals, birds, reptiles, amphibians, some fungi, some invertebrates (such as insects and snails) and some fish.
Broad condition state:	Areas of the same PCT that are in relatively homogenous condition. Broad condition is used for stratifying areas of the same PCT into a vegetation zone for the purpose of determining the vegetation integrity score.
Connectivity	The measure of the degree to which an area(s) of native vegetation is linked with other areas of vegetation.
Credit Calculator	The computer program that provides decision support to assessors and proponents by applying the BAM, and which calculates the number and class of biodiversity credits required to offset the impacts of a development or created at a biodiversity stewardship site.
Development	Has the same meaning as development at section 4 of the EP&A Act, or an activity in Part 5 of the EP&A Act. It also includes development as defined in section 115T of the EP&A Act.
Development footprint	The area of land that is directly impacted on by a proposed development, including access roads, and areas used to store construction materials.
Development site	An area of land that is subject to a proposed development that is under the EP&A Act.
Ecosystem credits	A measurement of the value of EECs, CEECs and threatened species habitat for species that can be reliably predicted to occur with a PCT. Ecosystem credits measure the loss in biodiversity values at a development site 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.

Terminology	Definition
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.
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 development site or biodiversity stewardship site, and b) includes native vegetation that has a gap of less than 100 m from the next area of native vegetation (or ≤ 30 m for non-woody ecosystems). Patch size may extend onto adjoining land that is not part of the development site 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 development site, clearing site, proposed for biodiversity certification or land that is proposed for a biodiversity stewardship agreement.

Terminology	Definition
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.
Vegetation Benchmarks Database	A database of benchmarks for vegetation classes and some PCTs. The Vegetation Benchmarks Database is published by OEH and is part of the BioNet Vegetation Classification.
Vegetation zone	A relatively homogenous area of native vegetation on a development site, 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

Percentage cover of species in each plot. Those marked * are exotic species.

Species	Common Name	Plot 1	Plot 2	Plot 3
<i>Acacia dealbata</i> subsp. <i>dealbata</i>	Silver Wattle	0.1		
<i>Alternanthera pungens</i> *	Khaki Weed	5		
<i>Austrostipa scabra</i> subsp. <i>scabra</i>	Speargrass	2	20	
<i>Bidens pilosa</i> var. <i>pilosa</i>	Cobblers Pegs	0.1	0.1	
<i>Bothriochloa macra</i>	Red Grass	0.1	1	
<i>Bromus molliformis</i> *	Soft Brome		0.1	3
<i>Calotis cuneifolia</i>	Purple Burr-daisy	0.2	0.1	
<i>Calotis lappulacea</i>	Yellow Burr-daisy	0.1	0.1	
<i>Cassinia sifton</i>	Sifton Bush	0.1	0.1	
<i>Cheilanthes sieberi</i> subsp. <i>sieberi</i>	Poison Rock Fern		0.1	
<i>Chloris truncata</i>	Windmill Grass	0.1		
<i>Chrysocephalum apiculatum</i>	Common Everlasting		1	
<i>Cineraria lyratiformis</i> *	African Marigold	0.1	0.1	
<i>Cirsium vulgare</i> *	Spear Thistle		0.1	
<i>Conyza bonariensis</i> *	Flaxleaf Fleabane	1	0.1	1
<i>Cynodon dactylon</i>	Bermudagrass	5	2	5
<i>Echium plantagineum</i> *	Paterson's Curse			0.1
<i>Eleusine indica</i> *	Crowsfoot Grass		0.1	10
<i>Elymus scaber</i>	Wheatgrass	0.1		
<i>Eragrostis brownii</i>	Brown's Lovegrass	0.2		
<i>Eragrostis leptostachya</i>	Paddock Lovegrass	15		
<i>Eucalyptus blakelyi</i>	Blakely's Red Gum			
<i>Eucalyptus melliodora</i>	Yellow Box		1	
<i>Eucalyptus sideroxylon</i>	Mugga Ironbark			
<i>Gamochaeta</i> spp.*		0.1		
<i>Geranium molle</i> subsp. <i>molle</i>	Cranesbill Geranium		1	0.1
<i>Hypericum perforatum</i>	St John's Wort	2	5	15
<i>Hypochaeris radicata</i> *	Catsear	0.1	0.1	0.1
<i>Lactuca serriola</i> f. <i>serriola</i> *	Prickly Lettuce		0.1	
<i>Lepidium africanum</i> *	Common Peppergrass	0.5		
<i>Marrubium vulgare</i> *	White Horehound	0.1		
<i>Oxalis perennans</i>	Yellow Wood-sorrel	2	0.1	0.1
<i>Panicum effusum</i>	Hairy Panic		0.1	

Species	Common Name	Plot 1	Plot 2	Plot 3
<i>Paspalidium distans</i>	Shortgrass	0.1		
<i>Paspalum dilatatum*</i>	Paspalum		0.1	10
<i>Phalaris aquatica*</i>	Phalaris		0.1	10
<i>Plantago lanceolata</i>	Lamb's Tongues	0.5	0.1	0.2
<i>Rubus spp.*</i>	Blackberry			
<i>Rytidosperma caespitosum</i>	Ringed Wallaby Grass	0.5		
<i>Rytidosperma racemosum</i> var. <i>racemosum</i>	Striped Wallaby Grass	0.2		
<i>Schoenus apogon</i>	Common Bog-rush		0.1	
<i>Setaria pumila*</i>	Pale Pigeon Grass	2	0.2	5
<i>Solanum nigrum*</i>	Black-berry Nightshade	0.1		
<i>Sporobolus creber</i>	Western Rat's Tail Grass	0.1	0.5	15
<i>Themeda triandra</i>	Kangaroo Grass		5	
<i>Trifolium subterraneum*</i>	Subterranean Clover	0.1		
<i>Verbena bonariensis*</i>	Purple Top Vervain	0.1	1	0.5
<i>Wahlenbergia communis</i>	Tufted Bluebell		0.1	

Plot location Data

Plot No.	PCT	Vegetation Zone	Condition	Easting	Northing	Bearing
1	277	1	Low	744319	6388552	225
2	277	1	Low	744213	6388456	90
3	Exotic	-	-	744442	638848	0

Appendix C Vegetation Integrity Plot Data

Composition (number of species)

PCT	Plot No	Tree	Shrub	Grass	Forb	Fern	Other
PCT 277	1	1	0	11	3	0	0
PCT 277	2	1	0	7	5	1	0
Exotic	3	0	0	2	1	0	0

Structure (Total cover)

PCT	Plot No	Tree	Shrub	Grass	Forb	Fern	Other
PCT 277	1	0.1	0	23.4	2.3	0	0
PCT 277	2	1	0	28.7	1.4	0.1	0
Exotic	3	0	0	20.0	0.1	0	0

Function

PCT	Plot No	Large Trees	HBTs	Litter	LWD	Tree stem	Tree stem	Tree stem	Tree stem	Tree stem	Tree Regen	HTW cover
						5-9	10-19	20-29	30-49	50-79		
PCT 277	1	0	0	16	0	0	0	0	0	0	0	7
PCT 277	2	0	0	14	0	1	0	0	0	0	0	5.1
Exotic	3	0	0	37	0	0	0	0	0	0	0	25

Appendix D Staff CVs



Dr Cheryl O' Dwyer SENIOR ECOLOGIST

Cheryl joined ELA in Feb 2018 and brings with her over 30 years professional experience as an Ecologist, Lecturer, and manager working across Victoria, Northern Territory and the top end of Western Australia. Cheryl has worked with a variety of Government and Non-Government agencies developing conservation programs and threatened species management plans. She has also worked alongside Indigenous rangers on Country incorporating traditional ecological knowledge to deliver environmental outcomes. Cheryl has also been a University lecturer / researcher for 10 years delivering Degree programs in Ecology including Conservation and wildlife management, Sustainable catchment management and Biology. She has been the principal researcher on many projects and has published research findings in scientific journals. She has well developed skills in the areas of environmental management, impact assessments, plant identification, restoration management and weed control techniques. Cheryl has experience in the design, planning and execution of flora and fauna surveys, she has developed and managed numerous field projects, has experience in collecting and analysing data and is skilled in the instruction and management of staff and volunteers in environmental programs.

Cheryl is an Accredited NSW BAM Assessor and has experience in executing flora and fauna surveys using this methodology and the implementation of the Biodiversity Offset scheme (BOS).

QUALIFICATIONS

- Ph.D Botany/Zoology, University of Melbourne 2010. Insect ecology in fragmented Grey Box Grassy Woodlands in North Central Victoria
- Master of Science, University of Melbourne. Restoration of a native grassland inhabited by *Synemon plana* (Lepidoptera)
- Bachelor of Science, Major in Botany and Zoology, University of Melbourne
- Certificate IV Workplace Training and Assessment (TAE40110 + LLN Upgrade)
- Certificate IV Conservation and Land Management
- BEN301 Environmental Assessment
- Certificate IV Occupational Health and Safety BSB41407
- Certificate II Medical Service First Response HLT21015
- Certificate III Basic Health Care
- NSW Accredited BAM Assessor

PROJECT EXPERIENCE

State Significant Development and State Significcate Infrastructure

- Biodiversity Stewardship Site Assessment Report (BSSAR) Glen Maye (CWP Renewables 2022)
- Biodiversity Stewardship Site Assessment Report (BSSAR) Gilgal (Yancoal, 2022)
- Crudine Ridge Wind Farm Bird and Bat utilisation surveys (2021)
- Epuron Windfarm Environmental Impact Statement (2021)
- Epuron Windfarm Biodiversity and habitat assessments (2020)
- Crudine Ridge Wind Farm Habitat assessments (Zenviron 2020)
- Crudine Ridge Wind Farm Biodiversity Development Assessment Report (BDAR) Aarons Pass Road (CWP Renewables 2019)

- Moolarben Coal Mine Biodiversity Development Assessment Report (BDAR) Modification (Yancoal 2018)
- Ungula Wind Farm (CWP Renewables 2018)

Monitoring Programs

- Wilpinjong Coal Mine, Flora and Fauna monitoring (Peabody 2022)
- MCO Flora and fauna monitoring (Yancoal 2022)
- Ulan Coal Mine Subsidence monitoring (Glencore 2022)
- Narrabri Coal Mine Flora and fauna monitoring (Whitehaven Coal 2018)

Management Plans

- Glen Maye Weed Management Plan (CWP Renewables 2020)
- Wilpinjong Coal Mine Weed Management Plan for BOA's (Peabody 2020)
- Crudine Ridge Wind Farm Biodiversity Management Plan (CWP Renewables 2018)
- Flying Fox Management Plan (Bathurst City Council 2018)

Environmental Impact Assessments

- Mulwala EIA (2022)
- Dappo Road Subdivision (Narromine Shire Council 2020)
- Dappo Road Subdivision (Trimbrebongie House 2020)
- Wollar Road Upgrade (Mid-Western Regional Council 2019)
- Moorlarben Coal Mine Flora and Fauna assessments at OC4 (Yancoal 2019)
- Inverell subdivision BDAR (Bunnings Group Ltd 2018)

Initial Constraints / Due Diligence Assessments

- Brooklyn Fields Estate (2022)
- Crudine Ridge Wind Farm Targeted surveys (CWP Renewables 2020)
- Moolarben Coal Mine Targeted surveys (Yancoal 2019)
- Bunnings Group Ltd 2019 Inverell
- Urban subdivision (Bathurst Regional Council 2019)
- Hill End Rd Subdivision – (Petrovski 2018)

Flora and Fauna Assessments

- Narromine Aerodrome Flora and Fauna Assessment (2022)
- Crudine Ridge Wind Farm Monitoring of threatened species (CWP Renewables 2020)
- Flirtation Hill (Mid Western Regional Council 2019)
- Hargraves (Rural Fire Services 2019)
- Ungula Wind Farm (CWP Renewables 2019)

ADDITIONAL PROJECTS

- Fauna Surveys to assess for PFAS, Darwin NT
- Ghost net monitoring program. Dhimurru and Yirralka Rangers, East Arnhem Land NT

- Gove Crow Butterfly Monitoring and management plan. Dhimurru Rangers, East Arnhem Land NT
- Biodiversity survey at Lake Evella, Gapuwiyak Homeland School, East Arnhem Land, NT
- Buffalo and feral pig surveying, Yirralka Rangers, East Arnhem Land, NT.
- Weed management and monitoring, Dhimurru and Yirralka Rangers, East Arnhem Land, NT
- Flora and Fauna surveys Rio Tinto Mining Lease, Dhimurru Rangers, East Arnhem Land, NT
- Fauna surveys in the Kimberley. Cane Toad Management Team Department of Environment.
- Golden Sun Moth, monitoring and mapping. Biosis Consultancy Vic
- Grazing and weed control trial Ulupna Island, Barmah State Park, Parks Vic.
- Distribution of feral olives, Dookie Campus University of Melbourne
- Restoration of a native grassland. Victoria's Open Range Zoo.
- Golden Sun Moth Recovery Team, DSE, Vic

PEER REVIEWED PUBLICATIONS

Ayre, M.L., Yunupingu, D., Wearne, J., **O'Dwyer, C.**, Vernes, T., and Marika, M. (2021). Accounting for Yolgnu ranger work in the Dhimurru Indigenous Protected Area, Australia. *Ecology and Society*, Vol 26 (1). 24-42

Hamilton, S., Minotti, T., **O'Dwyer, C** and Brodie, G. (2011). A case study of feral olive (*Olea europaea*) dispersal in northern Victoria. 1. Plant age and growth habit characteristics. *Plant protection quarterly*, Vol 26 (1). 17-21

Gilmore, D. Koehler, S. **O'Dwyer C.** and Moore, W. (2008). Golden Sun Moth, *Synemon plana*, (Lepidoptera: Castniidae): results of a broad survey around Melbourne. *Victorian Naturalist*, 125 (2) 39-46

Hamilton, S.D., Brodie, G., and **O'Dwyer, C.** (2005) Allometric relationships for estimating biomass in Grey Box *Eucalyptus microcarpa*. *Australian Forestry*, **68** (4) 267-273.

Hamilton S.D., **O'Dwyer C.**, Dettmann P.D. and Curtis A.L. (2004) The habitat quality of private land Box-Ironbark remnant vegetation in southern Australia. *Journal of Sustainable Agriculture*, **25** (1) 19-42.

Hamilton, S.D., Hunter, D., Costello, K., **O'Dwyer, C.**, and Jones, S. (2002). Vascular flora and vertebrate fauna of the Dookie Bushland Reserve, Victoria. *Proceedings of the Royal Society of Victoria* **114**(1): 1-20.

O'Dwyer, C., Hamilton, S. and Clarke, G. (2002). *The value of remnants on farms for invertebrate biodiversity: a preliminary study*. In: Rural Land-Use Change. Yes! But will biodiversity be okay (Ed Crosthwaite, J., Farmer-Bowers, Q., and Hollier, C.). Proceedings of a conference at Attwood, Victoria. August 2002. Department of Sustainability and Environment, Melbourne (CD ROM).

O'Dwyer, C. and Attiwill, P.M. (2000). Restoration of a native grassland as habitat for the Golden Sun Moth *Synemon plana* Walker (Lepidoptera; Castniidae;) at Mount Piper, Australia. *Restoration Ecology* 8 (2), 170-174.

Clarke, G.M. and **O'Dwyer, C.** (2000) Genetic variability and population structure of the endangered Golden Sun Moth, *Synemon plana* (Walker). *Biological Conservation* 92. 371-381.

O'Dwyer, C. and Attiwill, P.M. (1999). A comparative study of the habitats of *Synemon plana* Walker (Lepidoptera; Castniidae): Implications for restoration. *Biological Conservation* 89, 131-141.

O'Dwyer, C. (1999). Germination and sowing depth of *Austrodanthonia eriantha*: techniques to maximise restoration efforts. *Victorian Naturalist*, 116 (6) 202-209.

PUBLIC CONSULTANCY REPORTS

Furphy, G. and **O'Dwyer, C.** (2008). Threatened Species Report Golden Sun Moth (*Synemon plana*) in the Goulburn Broken 2007-2008. Internal report for Department of Sustainability and Environment.

O'Dwyer, C. (2008). Surveys of grasslands and grassy woodlands within the Goulburn Broken Catchment for the endangered Golden Sun Moth, *Synemon plana*. A draft summary report prepared for the Goulburn Broken Catchment Management Authority. University of Melbourne, Dookie Campus.

O'Dwyer, C. (2006). Surveys throughout Victoria's northern plains grasslands for the Endangered Golden Sun Moth, *Synemon plana* and the endangered Pale Sun Moth, *Synemon selene*. A report prepared for Trust for Nature.

O'Dwyer, C. (2005). Surveying the population of the Golden Sun Moth (*Synemon plana* Walker; Lepidoptera) at Mount Piper, Broadford, Victoria; a protocol. Prepared for Department of Sustainability and Environment.

Hamilton, S. and **O'Dwyer, C.** (2004) Interim report to Parks Victoria. Barmah State Park. Ulupna Island grazing and weed control trial and Machonicies Ridge grazing trial. A report prepared for Parks Victoria. Dookie Campus, University of Melbourne.

Hamilton, S. and **O'Dwyer, C.** (2002). Monitoring the impacts of cattle grazing in the Barmah State Park: A proposed methodology. A report prepared for Parks Victoria. Dookie College, University of Melbourne.

Clarke Geoff. M. and **O'Dwyer Cheryl.** (1999). Further survey in southeastern New South Wales for the Endangered Golden Sun Moth, *Synemon plana*. A report prepared for the Threatened Species Unit, NSW National Parks and Wildlife Service, southern zone. CSIRO, Canberra.

Clarke Geoff.M. and **O'Dwyer Cheryl.** (1998). Genetic analysis of populations of the endangered Golden Sun Moth, *Synemon plana*. A report prepared for the Threatened Species Unit, NSW National Parks and Wildlife Service, southern zone, and the Wildlife Research and Monitoring Unit, Environment ACT. Entomology, CSIRO, Canberra.

CONFERENCE PROCEEDINGS

O'Dwyer, C. (2009). Insect Assemblages in Grey Box Grassy Woodlands. Darwin 200 Evolution and Biodiversity 9th Invertebrate biodiversity and conservation conference. Darwin 25-28th September 2009. *Award for best spoken paper.*

O'Dwyer, C. (2008). Does habitat quality reflect insect diversity? ESA conference, Interactions in science, interactions in nature. Sydney University 1-5th Dec 2008.

O'Dwyer, C. (2007). Management of the grassy woodland for the Golden Sun Moth *Synemon plana* Walker (Lepidoptera: Castniidae) at Mount Piper Nature Conservation Reserve, Broadford, Victoria. Invertebrates Biodiversity Conference, Brisbane University Dec 4th 2007.

Appendix E Biodiversity credit report

