ecoplanning
ecology | planning | offsets

Biodiversity Development Assessment Report

27 North Marshall Mount Road, Marshall Mount, NSW

Development Application as part of a Concept DA

Prepared for: Osborne Park Pty Ltd

30 August 2024 Version: 1.3 - Final

PROJECT NUMBER	2022-205			
PROJECT NAME	Biodiversity Development Assessment Report			
PROJECT ADDRESS	27 North Marshall Mount Road, Marshall Mount, NSW			
PREPARED FOR	Osborne Park Pty Ltd			
AUTHOR/S	Darren James, Nathan Storch, Geoffrey Coates			
REVIEW	**Technical**	**QA**	**Version**	**Date to client**
	Lucas McKinnon		1.1 - Final	22 March 2023
			1.2 - Final	6 August 2024
			1.3 - Final	30 August 2024
BDAR CERTIFICATION	This BDAR has been prepared by Lucas McKinnon, Accredited Assessor no. BAAS 17012, in accordance with the BC Act, Reg and BAM.			

LICENCES	**Scientific Licence**	SL101557
	BioNet Sensitive Species Data Licence	1115
	Animal Research Authority Ethics Licence	Fauna Surveys and Monitoring (16/346)

This report should be cited as: 'Ecoplanning (2024). Biodiversity Development Assessment Report– 27 North Marshall Mount Road, Marshall Mount, NSW. Prepared for Osborne Park Pty Ltd.'

Disclaimer: This report has been prepared by Ecoplanning Pty Ltd for Osborne Park Pty Ltd and may only be used for the purpose agreed between these parties, as described in this report. The opinions, conclusions and recommendations set out in this report are limited to those set out in the scope of works and agreed between these parties. Ecoplanning P/L accepts no responsibility or obligation for any third party that may use this information or for conclusions drawn from this report not provided in the scope of works or following changes occurring subsequent to the date that the report was prepared.

ECOPLANNING PTY LTD | 428 PRINCES HIGHWAY WOONONA NSW 2517 | P: (02) 4244 2736

Contents

Appendices

Figures

Tables

Glossary and abbreviations

Acronym	Description
*	Denotes exotic species
BAM	Biodiversity Assessment Method
BC Act	NSW *Biodiversity Conservation Act 2016*
BC Reg	NSW *Biodiversity Conservation Regulation 2017*
BDAR	Biodiversity Development Assessment Report
BSA	Biodiversity Stewardship Agreement
BVM	Biodiversity Values Map
CEEC	Critically endangered ecological community
CEMP	Construction Environmental Management Plan
DA	Development Application
DAWE	Commonwealth Department of Agriculture, Water and the Environment (now DCCEEW)
DCCEEW	Commonwealth Department Climate Change, Energy, the Environment and Water
DotE	Commonwealth Department of the Environment (now DCCEEW)
DoEE	Commonwealth Department of the Environment and Energy (now DCCEEW)
DPE	NSW Department of Planning and Environment
DPIE	NSW Department of Planning, Industry and Environment (now DPE)
EEC	Endangered Ecological Community
EES	NSW Environment, Energy and Science Group (formerly OEH)
EPBC Act	Commonwealth *Environment Protection and Biodiversity Conservation Act 1999*
IBRA	Interim Biogeographic Regionalisation of Australia
ILGW	Illawarra Lowlands Grassy Woodland
LGA	Local Government Area
PCT	Plant Community Type
SAII	Serious and Irreversible Impacts
SEPP	State Environmental Planning Policy
TBDC	Threatened Biodiversity Data Collection
TEC	Threatened Ecological Community

Acronym	Description
VI	Vegetation Integrity
VIS	Vegetation Information System
VMP	Vegetation Management Plan
WM Act	NSW *Water Management Act 2000*

1 Introduction

1.1 Background

Ecoplanning Pty Ltd (Ecoplanning) have been engaged by Osborne Park Pty Ltd to prepare a Biodiversity Development Assessment Report (BDAR) to accompany a Development Application (DA) relating to a proposed residential subdivision at 27 North Marshall Mount Road, Marshall Mount, NSW (**Figure 1.1** and **Figure 1.2**).

A BDAR is required and the Biodiversity Assessment Method (BAM) (DPIE 2020) is applied when any one of three Biodiversity Offset Scheme (BOS) thresholds for local development under Part 4 of the NSW *Environment Planning and Assessment Act 1997* (EP&A Act) are triggered:

- Exceeding the native vegetation clearing threshold (based on minimum lot size)
- Direct impacts occur on land included in the Biodiversity Values Map (BVM)
- Significant impact on threatened species, ecological communities (or their habitat).

The proposal requires the clearing of approximately 1.19 ha of native vegetation, which triggers the BOS. Specifically, the trigger is:

- Clearing >0.25 ha of native vegetation, on land with a minimum lot size of 1 ha or less.

This BDAR has been prepared in accordance with the BAM to document the predicted impacts to biodiversity and has been approved by Lucas McKinnon, an Accredited Assessor (#17012) under the BC Act and NSW *Biodiversity Conservation Regulation 2017* (BC Reg). The BDAR describes the outcome of the development assessment case (00037515/BAAS17012/23/00037516) conducted consistent with the BAM.

1.2 Location and site identification

The BAM defines the land to which the BDAR applies as the ***subject land*** which includes areas that are proposed to be directly impacted. For the purposes of this BDAR, the subject land includes approximately 24.08 ha of land within the yellow polygon shown in **Figure 1.2**. The study area includes land described as Lot 201 // DP803486. The broader study area is 37.10 ha.

The subject land is situated in the Wollongong Local Government Area (LGA) and is zoned under the *Wollongong Local Environmental Plan 2013* as C4 – Environmental Living, C3 – Environmental Management, C2 – Environmental Conservation and R2 – Low Density Residential. The subject land is located south-west of Wollongong approximately 7.0 km to the south-west of the Dapto railway station.

The subject land has been modified by past clearing and grazing, which continues on site. Much of the vegetation on site has been confirmed as supporting 'exotic grassland', with remnant native vegetation mostly consisting of disturbed, planted and scattered paddock shrub vegetation. The subject land is bound to the west by native vegetation, both within the broader study area and extending into adjacent lands and Marshall Mount. To the north, east and south grazing rural land is dominant with isolated scattered vegetation.

1.3 Proposed development

The ultimate proposal entails 245 residential lots (R2) and 13 environmental living (C4) large lots. With Stage 1 consisting of 185 R2 lots, 4 C4 lots and a superlot. See **Figure 1.3** for the proposed lot layout.

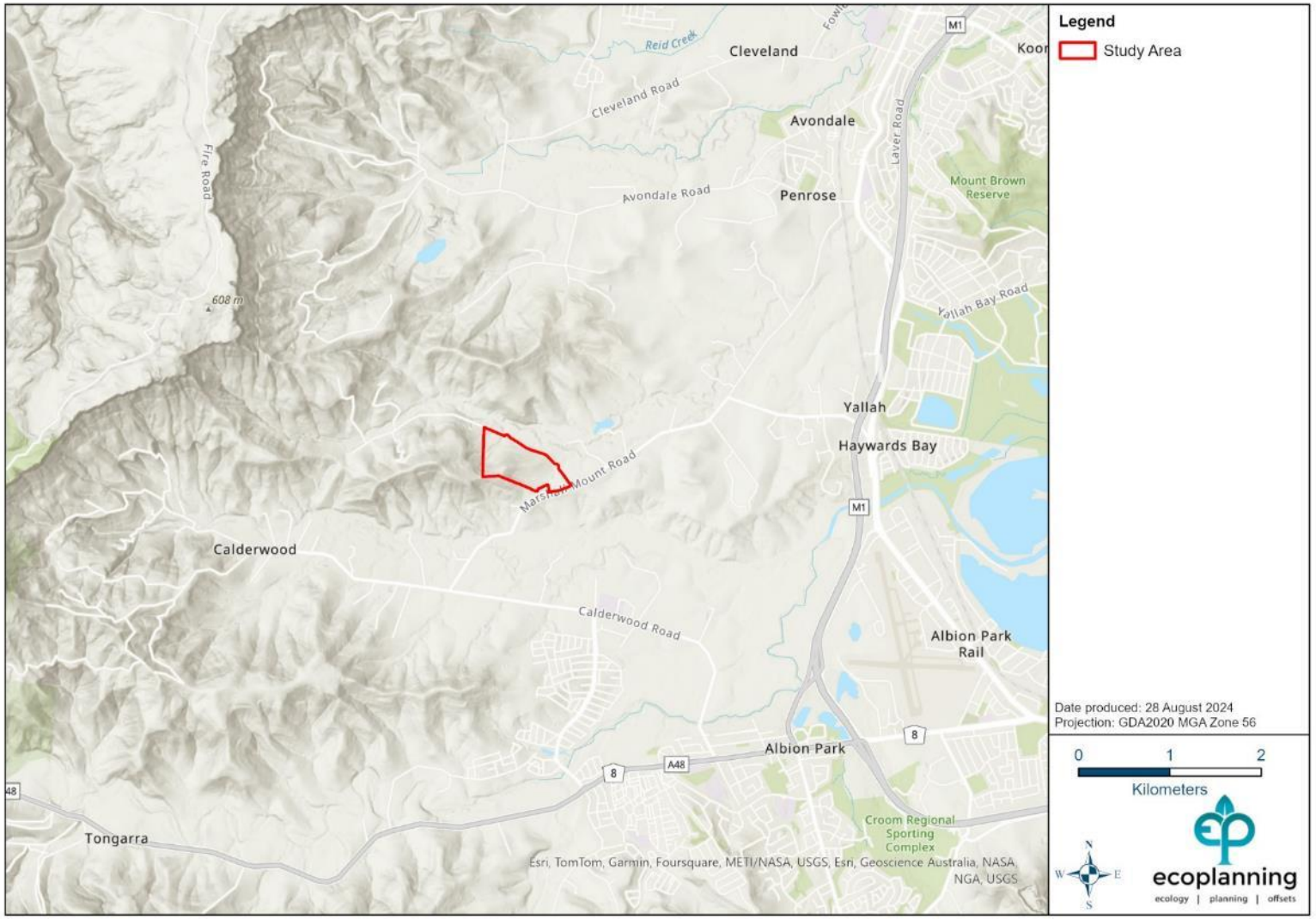

Figure 1.1: Location of the subject land.

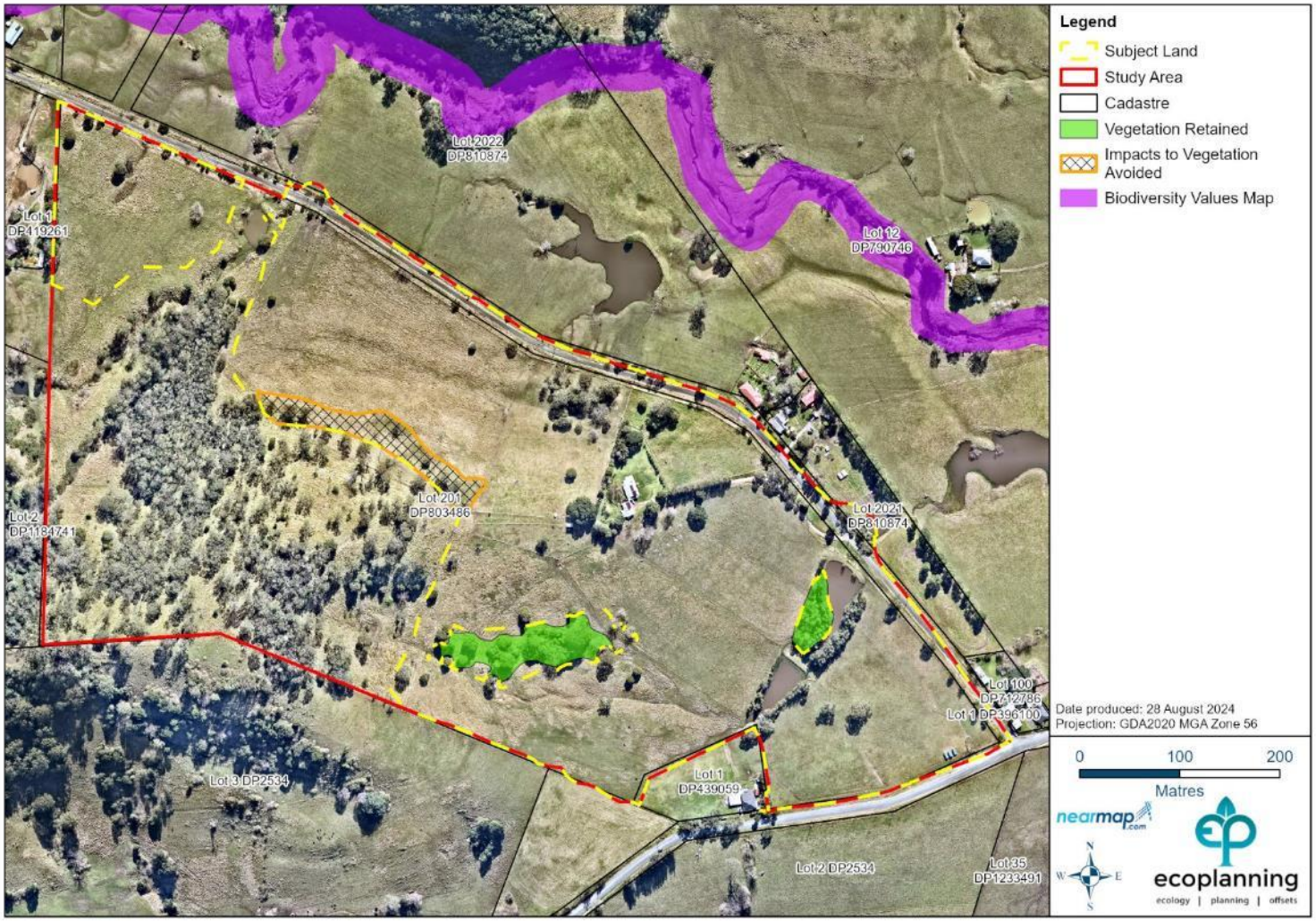

Figure 1.2: Site map showing subject land and biodiversity values mapping.

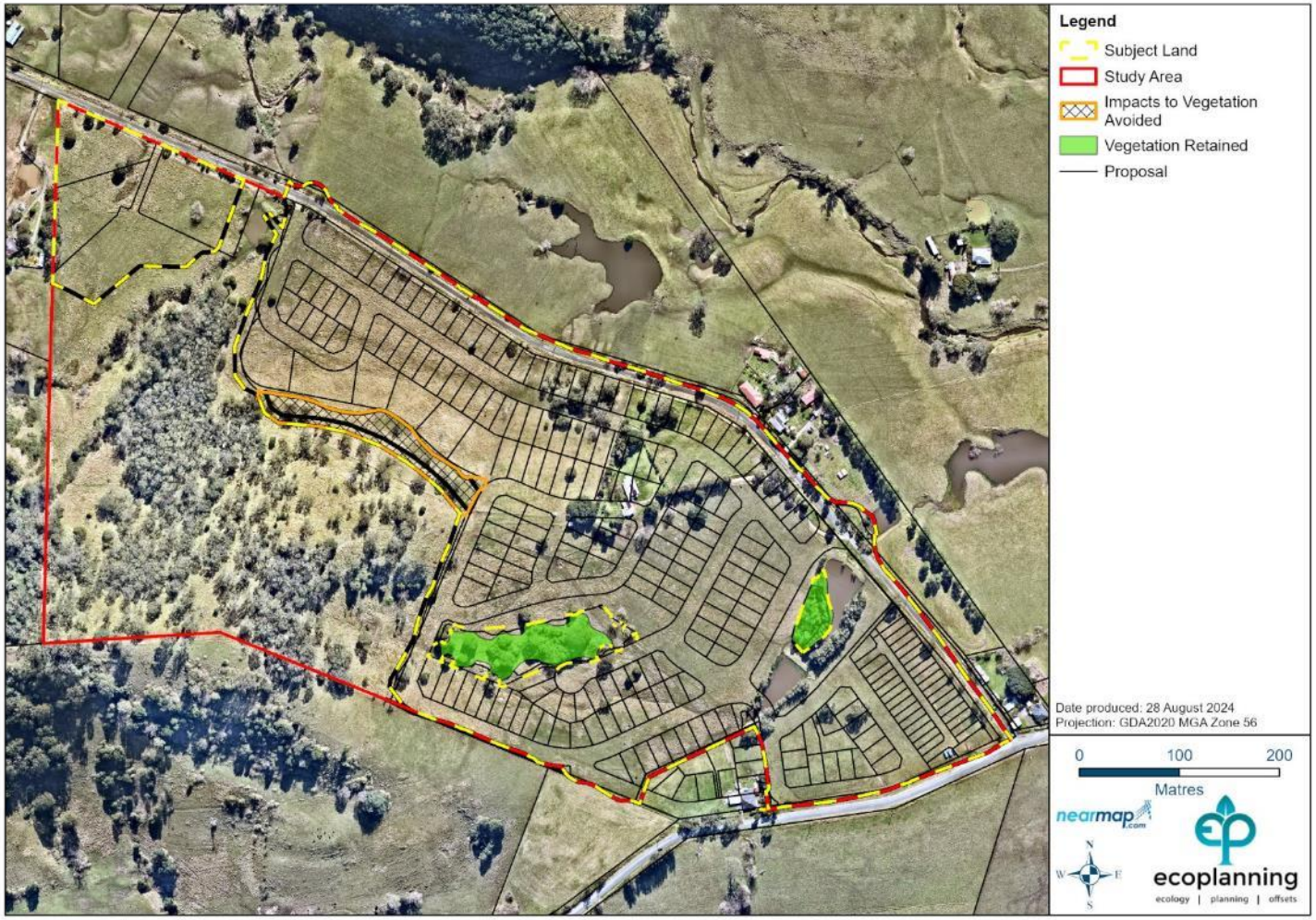

Figure 1.3 Proposed lot layout.

2 Landscape context

2.1 Identifying landscape features

In accordance with Section 3.1 of the BAM, several features are assessed within the subject land and a 1,500 m buffer area surrounding the subject land. Provided below are details related to the Interim Biogeographic Regionalisation of Australia (IBRA) (DoEE 2012) regions, its associated subregions and NSW landscapes (Mitchell Landscapes; DECC 2016). Other features, such as rivers, streams, estuaries, and wetlands, habitat connectivity, karst areas or areas of outstanding biodiversity value are considered, where appropriate. In accordance with Section 3.1.2 of the BAM, relevant features are shown in **Figure 2.1** unless otherwise stated.

2.1.1 IBRA regions and subregions

IBRA regions represent a landscape-based approach to classifying the land surface, including attributes of climate, geomorphology, landform, lithology, and characteristic flora and fauna species present. The subject land is located entirely within the Illawarra IBRA subregion (version 7.0) which is part of the Sydney Basin IBRA region (version 7.0; **Figure 2.1**). These attributes were entered into the BAM calculator.

2.1.2 NSW landscape regions (Mitchell Landscapes)

The subject land is located within the 'Dapto - Wollongong Coastal Slopes' landscape unit (Mitchell Landscapes v3.1; **Figure 2.1**). Within the 1,500 m assessment buffer the Kiama Coastal Slopes and Lake Illawarra Alluvial Plains landscapes also occur.

2.1.3 Other features

Rivers, streams, and estuaries

Rivers, streams and wetlands located within the 1,500 m buffer of the subject land, including the associated riparian corridors, are shown in **Figure 2.1**.

Three watercourses are mapped within the subject land, including two 1st order Strahler streams and one 2nd order Strahler stream. All streams within the subject land are unnamed. A Riparian Assessment completed for the subject land confirmed the absence of one of the 1st order streams, with a bed and bank for a segment of the other 1st order stream (**Figure** 2.1).

There are a large number of other mapped streams or watercourses outside the subject land within the 1,500 m buffer zone, including Duck Creek and Marshall Mount Creek.

Local and important wetlands

Under the BAM, a ***Local Wetland*** is identified as 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 dependant on, moist conditions for at least part of their life cycle (DPIE 2020). An ***Important Wetland*** is a wetland listed under the Directory of Important Wetlands of Australia (DIWA; Environment Australia 2001) or an area included under the State Environmental Planning Policy (Coastal Management) 2018 (SEPP CM).

Two Local Wetlands in the form of large farm dams are found in the eastern Vegetation Management Plan (VMP) area. No Important Wetlands or land relating to SEPP CM is found within the subject land. Some land relating to the SEPP CM is found within the 1,500 m buffer to the south of the subject land.

Habitat connectivity

The subject land forms part of the Illawarra BIO Map and is mapped as part of a regional corridor. Patches of remnant vegetation are found to the west of the subject land, with connectivity extending to Marshall Mount and Marshall Mount Creek. Remnant vegetation is also located approximately 200 m to the north of the subject land, across North Marshall Mount Road. This vegetation is contiguous with larger areas of intact native vegetation associated with the foot slopes of the Illawarra escarpment.

Areas of geological significance and soil hazard features

No other landscape features, including areas of geological significance (karst, caves, crevices, cliffs, etc.) or soil hazard features have been identified within the subject land and 1,500 m assessment buffer.

Areas of outstanding biodiversity values

No areas of outstanding biodiversity value have been identified within the subject land.

2.2 Determining site context

2.2.1 Assessing native vegetation cover

In accordance with Section 3.2 and Section 4.3.2 of the BAM, native vegetation cover must be assessed within a 1,500 m assessment buffer around the subject land for habitat suitability for threatened species. The extent of native vegetation on the subject land and immediate surrounds was mapped using vegetation mapping compiled by NSW DPE (2023a) as part of the State Vegetation Map (C1.1.M1) (DPE 2023a), with edits made to improve linework where obvious changes to vegetation extent had occurred using SIX Maps NSW Imagery (LPI 2023) (**Figure 2.1**).

The total area of the 1,500 m buffer around the subject land is 1,122.32 ha, with the area of native vegetation mapped within the buffer being 415.93 ha. This is a native vegetation cover of 37.05% (>10-30 % class as defined in the BAM). The value '37%' was entered into the BAM calculator.

2.2.2 Assessing patch size

Patch size is defined by the BAM as '*an area of native vegetation that:*

- *occurs on the development site or biodiversity stewardship, and*
- *includes native vegetation that has a gap of <100 m from the next area of native vegetation (or <30 m for non-woody ecosystems).*

Patch size may extend into adjoining land that is not part of the development site.

In assessing patch size, stands of native vegetation within 100 m of other areas of native vegetation, but which are separated by hard barriers (permanent artificial structures, wide roads, etc.) have been treated as separate patches. These highly modified breaks in

vegetation connectivity would significantly alter ecological function of these areas of native vegetation such that these areas warrant recognition as separate patches.

Patch size is required to be assessed as one of four classes per vegetation zone mapped, being <5 ha, 5-<25 ha, 25-100 ha, or ≥100 ha. Although fragmented and of low quality, the vegetation of the subject land is contiguous with areas of vegetation west of the subject land. As such, the vegetation patch associated with the subject land is >100 ha, and this has been entered into the BAM calculator for all vegetation zones.

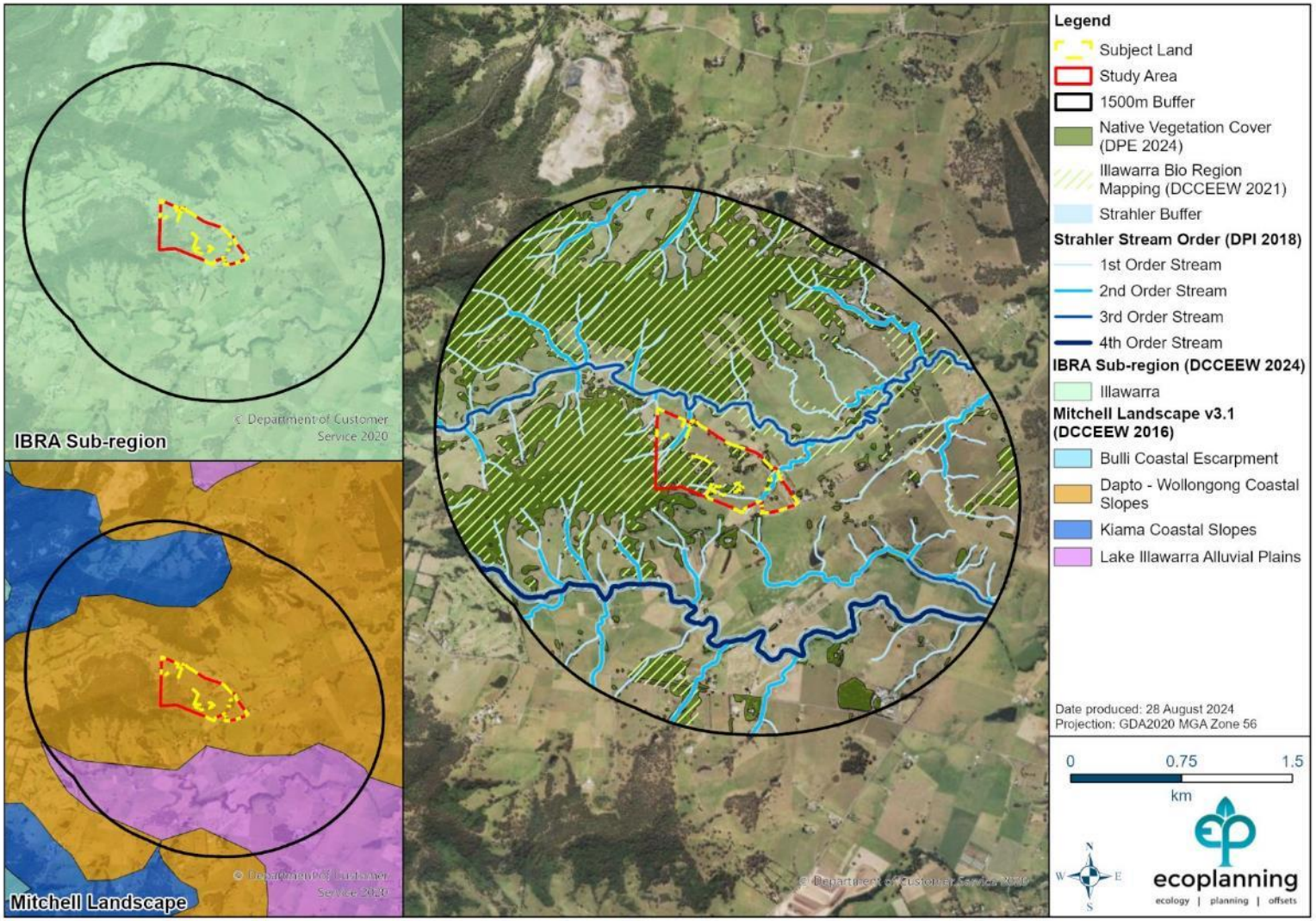

Figure 2.1: Landscape context map.

3 Native vegetation

3.1 Plant community types (PCTs) and threatened ecological communities

3.1.1 Regional vegetation mapping

In accordance with Section 4.1 of the BAM, existing information relevant to the native vegetation of the subject land and the 1,500 m assessment circle has been reviewed. Desktop assessment of vegetation mapped identified the following vegetation communities within the subject land (NPWS 2002 – VIS 3778):

- MU4 Lowland Dry-Subtropical Rainforest
- MU13 Moist Box-Red Gum Foothills Forest
- MU23 Coastal Grassy Red Gum Forest
- MU24 Lowland Woollybutt-Melaleuca Forest
- MU37 Riparian River Oak Forest
- MU54 Floodplain Wetland

Areas of Acacia Scrub, Weeds and Exotics, Modified Lands, Artificial Wetlands, Fig Trees and Cleared lands are also mapped.

Vegetation within the subject land was also assessed against the final determinations for Threatened Ecological Communities (TECs) listed under the BC Act and EPBC Act to determine whether the vegetation within the subject land formed part of a TEC. These communities and the equivalent Plant Community Types (PCTs) and TECs are listed in **Table 3.1.**

Table 3.1 Relationship between vegetation communities, PCTs and TECs.

Illawarra vegetation map (NPWS 2002, VIS 3778)	Plant Community Type (PCT) (DPE 2023b)		BC Act	EPBC Act
	Parent	Offspring		
Lowland Dry-Subtropical Rainforest (MU4)	PCT 1300 - Whalebone Tree - Native Quince dry subtropical rainforest on dry fertile slopes, southern Sydney Basin Bioregion	PCT 3078 - Illawarra Lowland Wet Vine Forest PCT 3077 - Illawarra Complex Dry Rainforest	Endangered Ecological Community (EEC)	-
Moist Box-Red Gum Foothills Forest (MU13)	PCT 1245 - Sydney Blue Gum x Bangalay - Lilly Pilly moist forest in gullies and on sheltered slopes, southern Sydney Basin Bioregion	PCT 3045 - South Coast Temperate Gully Rainforest PCT 3153 - Illawarra Escarpment Bangalay x Blue Gum Wet Forest	-	Critically Endangered Ecological Community (CEEC) (part)
Coastal Grassy Red Gum Forest (MU23)	PCT 838 - Forest Red Gum – Thin-leaved Stringybark grassy woodland on coastal lowlands, southern Sydney Basin Bioregion	PCT 3078 - Illawarra Lowland Wet Vine Forest PCT 3327 - Illawarra Lowland Red Gum Grassy Forest	Endangered Ecological Community (EEC)	Critically Endangered Ecological Community (CEEC)
Lowland Woollybutt-Melaleuca Forest (MU24)	PCT 1326 - Woollybutt - White Stringybark - Forest Red Gum grassy woodland on coastal lowlands, southern Sydney Basin Bioregion and South East Corner Bioregion	PCT 4049 - South Coast Floodplain Grassy Swamp Forest PCT 3330 - South Coast Lowland Woollybutt Grassy Forest	Endangered Ecological Community (EEC)	Critically Endangered Ecological Community (CEEC)

Illawarra vegetation map (NPWS 2002, VIS 3778)	Plant Community Type (PCT) (DPE 2023b)		BC Act	EPBC Act
	Parent	Offspring		
Riparian River Oak Forest (MU 37)	PCT 1105 - River Oak open forest of major streams, Sydney Basin Bioregion and South East Corner Bioregion	PCT 4035 - Far South Floodplain Wetland Paperbark Scrub PCT 3056 - Central Eastern Ranges Riparian Dry Rainforest PCT 4063 - Central and Southern Tableland River Oak Forest PCT 4064 - Central Eastern Ranges River Oak Forest PCT 4084 - Southern Escarpment River Oak Forest	-	-
Floodplain Wetland (MU54)	PCT 781 - Coastal freshwater lagoons of the Sydney Basin Bioregion and South East Corner Bioregion	PCT 3975 - Southern Lower Floodplain Freshwater Wetland PCT 3976 - Southern Sands Freshwater Lagoon Wetland PCT 3962 - Coastal Floodplain Phragmites Reedland PCT 3985 - Coastal Floodplain Swamp Paperbark Scrub PCT 4050 - South Coast Floodplain Wetland Paperbark Scrub	Endangered Ecological Community (EEC)	-

3.2 Native vegetation extent and field assessment

A number of field surveys have been completed to inform the various reports prepared for the site.

A field survey was undertaken within the study area Field Ecologists, Edwin Vaca and Nathan Storch, on 21 October 2022. Approximately 6.5 person hrs of survey were undertaken to inspect the mapped watercourses, with 7.5 person hrs on targeted *Chorizema parviflorum* (Illawarra Flame Pea) survey. The area was traversed on foot to assess the mapped riparian lands and watercourses, according to Wollongong Local Environmental plan (WLEP, 2009) and WM Act to determine the current condition of the mapped watercourses within the study area, as well as areas of potential habitat for *C. parviflorum*.

This work was undertaking to supplement previous field work completed by Lucas McKinnon (Principal Ecologist) on 2 December 2021 for the south-east watercourses within the study area. Lucas McKinnon has undertaken survey on this property on numerous occasions over the previous 10 years, including targeted flora and fauna surveys, and to provide advice on the BioBanking potential of the property (ELA 2012; ELA 2013a,b; ELA (undated); Ecoplanning 2014-2022). Additional surveys were completed for the preparation of the Biodiversity Development Assessment Report (BDAR) on 31 January 2023 and 13 February 2023.

A specific field assessment was undertaken by Sam Mullins (Field Ecologist) on 2 February 2023, as part of a VMP associated with this DA. The purpose of the field survey was to identify the ecological values and threats (such as priority weeds) within the VMP area, validate Plant Community Types (PCTs), and determine the overall native resilience of the VMP area and its capacity to respond to regeneration work. Survey effort is shown in **Figure 3.1**.

A total of 1.19 ha of the 24.08 ha subject land was identified as supporting native vegetation. The subject land was confirmed to be generally consistent with the regional mapping (NPWS 2002), as represented by Coastal Grassy Redgum Forest (**Figure 3.2**). This mapping was reviewed and updated during the preparation of this BDAR and mapped into PCTs and vegetation zones (**Figure 3.3** and **Table 3.1**).

The remainder of the subject land (22.89 ha) was mapped as ‘Exotic grassland’ (21.50 ha), ‘Planted native and exotic vegetation’ (0.60 ha), ‘Road’ (0.48 ha) or ‘Dam’ (0.31 ha) (**Figure 3.3**). These non-native vegetation units are not associated with any threatened species. Areas which are not native vegetation do not require further assessment, except where they represent habitat for threatened species. No further assessment of the vegetation within areas mapped as exotic grassland or planted vegetation has been undertaken. Details of VI plots are provided in **Section 3.3.1**.

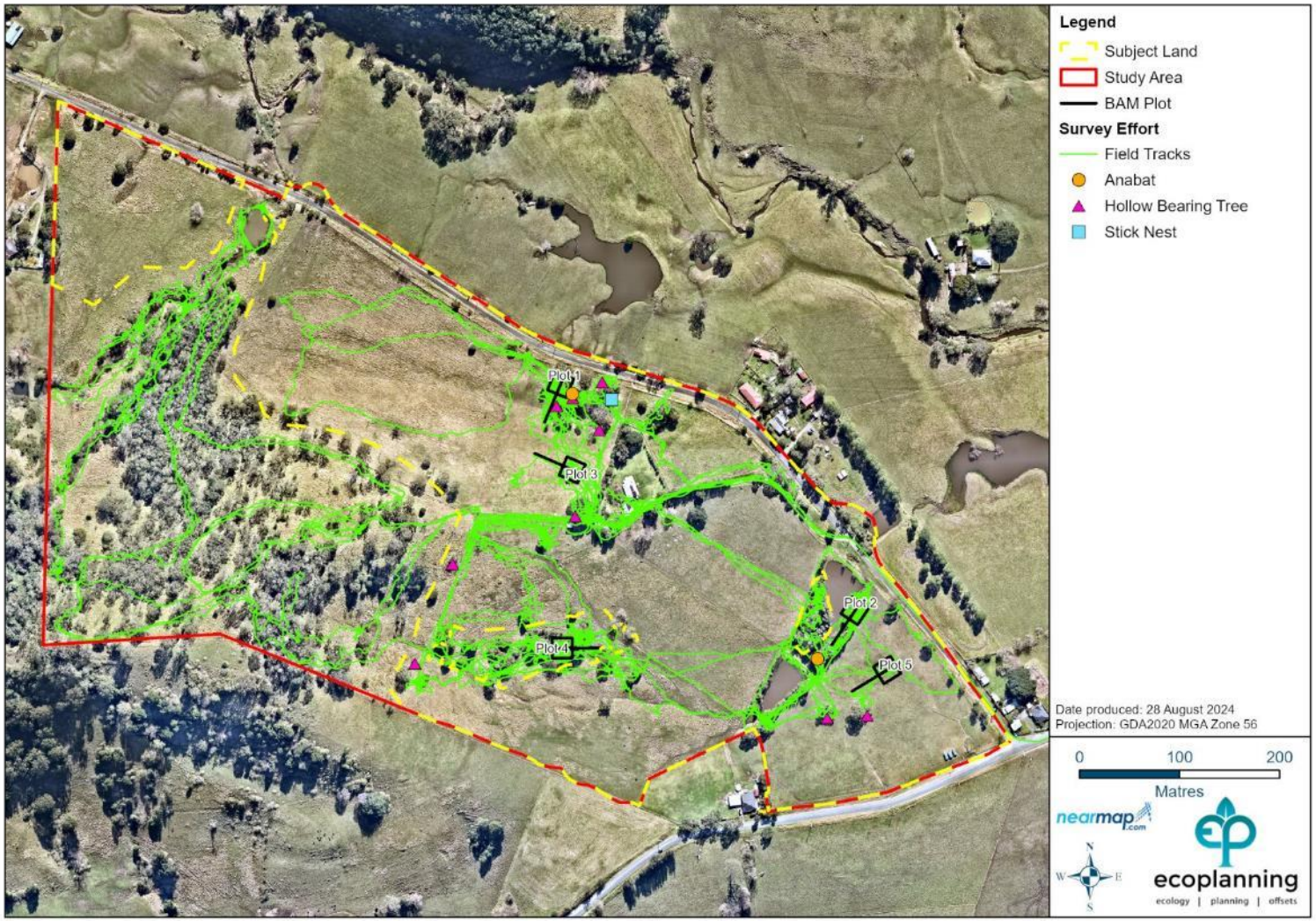

Figure 3.1: Survey effort including the location of VI plots and recorded tracks.

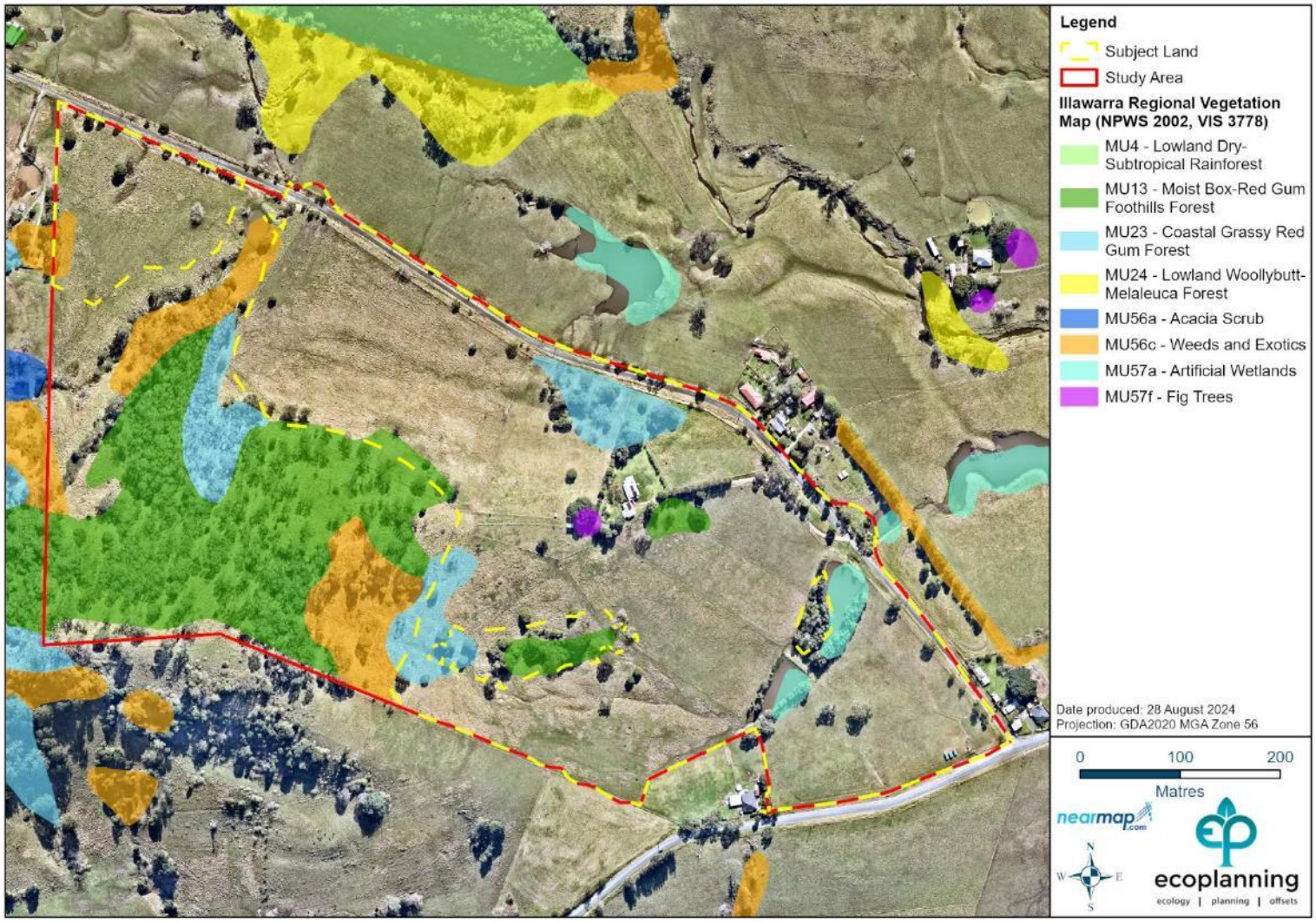

Figure 3.2: Regional vegetation mapping (NPWS 2002).

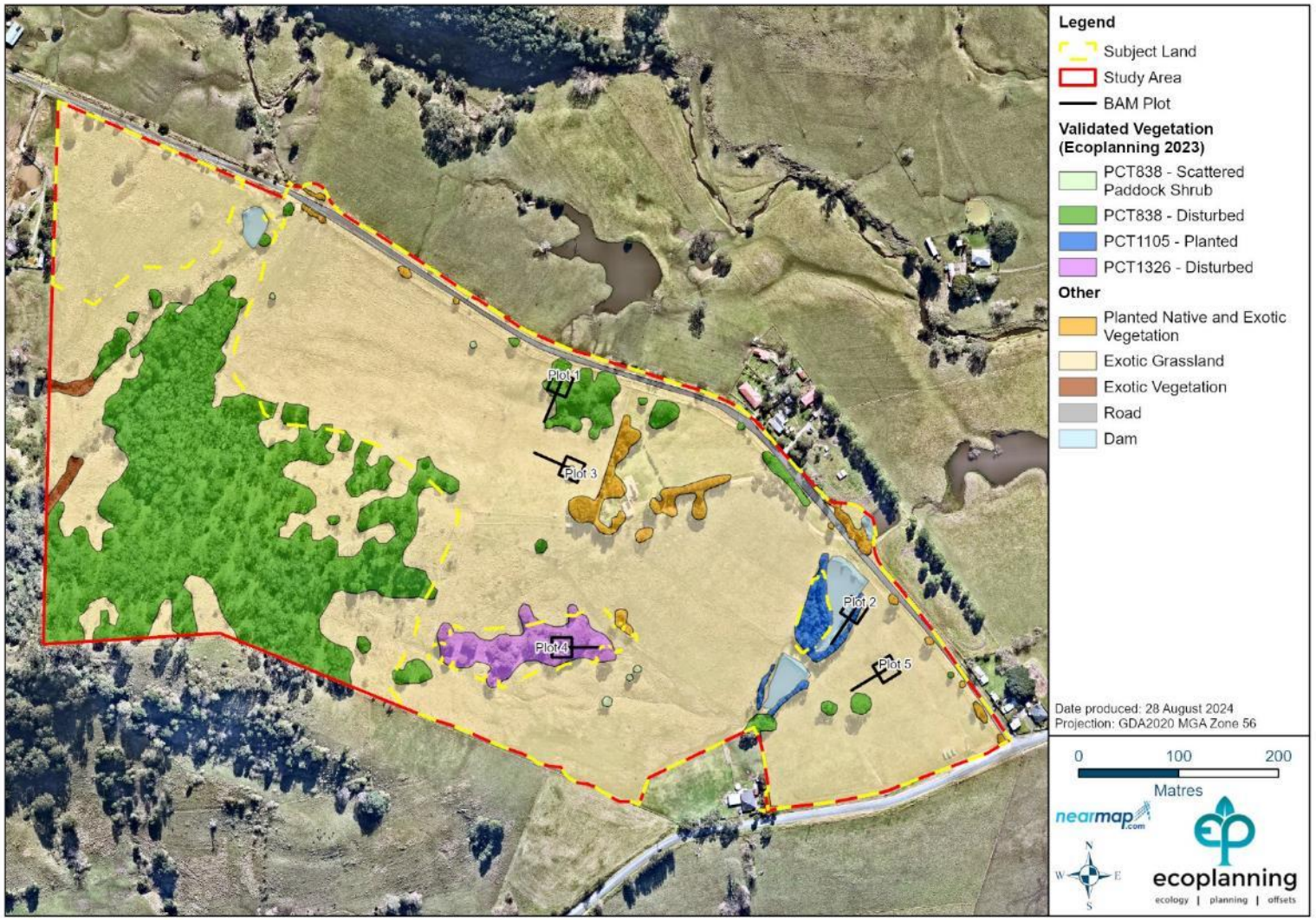

Figure 3.3: Field validated vegetation within the subject land (Ecoplanning 2023).

3.2.1 Plant Community Type selection and descriptions

A summary of the PCT and vegetation zones within the subject land is provided in **Table 3.2**. A description of the vegetation community, including justification for the assigned PCT and vegetation zone, is provided in the following sections.

In determining the PCT for the subject land, various attributes were considered in combination to assign vegetation to the best fit PCT. Attributes included (but are not limited to) consideration of IBRA subregion, dominant species in each stratum and relative abundance, community composition, previous vegetation mapping, soils and landscape position. Reference was made to the PCT descriptions in the BioNet Vegetation Classification Database (DPE 2023b).

Based on the floristic composition of the vegetation in the subject land, three native vegetation communities were identified in four condition classes as shown in **Table 3.2**.

Table 3.2: Details of PCT within the subject land

Plant Community Type (PCT)	Vegetation formation & class	Condition class	Area (ha)*
PCT 838 - Forest Red Gum – Thin-leaved Stringybark grassy woodland on coastal lowlands, southern Sydney Basin Bioregion	Grassy Woodlands / Coastal Valley Grassy Woodlands	Disturbed	0.86
PCT 838 - Forest Red Gum – Thin-leaved Stringybark grassy woodland on coastal lowlands, southern Sydney Basin Bioregion	Grassy Woodlands / Coastal Valley Grassy Woodlands	Scattered paddock shrub (SPS)	0.03
PCT 1105 - River Oak open forest of major streams, Sydney Basin Bioregion and South East Corner Bioregion	Forested Wetlands/ Eastern Riverine Forests	Planted	0.19
PCT 1326 - Woollybutt - White Stringybark - Forest Red Gum grassy woodland on coastal lowlands, southern Sydney Basin Bioregion and South East Corner Bioregion	Grassy Woodlands/ Coastal Valley Grassy Woodlands	Disturbed	0.11
		Total native vegetation	**1.19**
-	Planted native and exotic vegetation	-	0.60
-	Exotic grassland	-	21.50
-	Dam	-	0.31
-	Road	-	0.48
		Total other	**22.89**

*subject to rounding errors.

The identification of PCTs for each vegetation community was undertaken in accordance with the NSW PCT classification as described in the NSW Vegetation Classification Database (DPE 2023b). The NSW PCT classification system was revised in July 2022 and is currently in a transitional period where old PCTs (hereafter 'parent' PCTs) have been decommissioned, however new PCTs (hereafter 'offspring' PCTs) have not been adopted for the purpose of the BAM and BAM-C. This BDAR refers to the offspring PCTs where appropriate (as these more accurately reflect the vegetation observed within the subject land); however, it also refers to the parent PCTs to retain backward compatibility with the BAM-C.

PCT 838 - Forest Red Gum - Thin-leaved Stringybark grassy woodland on coastal lowlands, southern Sydney Basin Bioregion

Field assessment determined that PCT 838 - *Thin-leaved Stringybark grassy woodland on coastal lowlands, southern Sydney Basin Bioregion* (**Figure 3.3**) occurs in small scattered patches across most of the subject land. A summary of the PCT 838 profile from the BioNet Vegetation Classification Database (DPE 2023b) and justification for its selection is provided in **Table 3.3**.

Within the subject land, PCT 838 occurs in two condition classes; 'disturbed' (**Figure 3.4**) and 'scattered paddock shrub (SPS)' (**Figure 3.5**). PCT 838 in a 'disturbed' condition class (0.86 ha) occurs in several scattered patches and is characterised by a widely spaced canopy of small to large sized *Eucalyptus tereticornis* (Forest Red Gum). The middle stratum has been mostly removed, with occasional small shrubs such as *Acacia maidenii* (Maiden's Wattle), *Melaleuca styphelioides* (Prickly-leaved Paperbark) and *Pittosporum undulatum* (Sweet Pittosporum) remaining. The groundlayer is a mix of native and exotic species with *Microlaena stipoides* (Weeping Grass), *Dichondra repens* (Kidney Weed), *Oplismenus imbecillis* (Basket Grass), *Cenchrus clandestinus** (Kikuyu Grass) and *Axonopus fissifolius** (Narrow-leaved Carpet Grass) being prevalent. PCT 838 in a 'disturbed' condition class has been subject to land clearing in the past and is presently being grazed by horses.

PCT 838 in an 'SPS' condition class (0.03 ha) comprises of individual occurrences of medium sized *Melaleuca styphelioides* (Pricky-leaved Paperbark) within paddocks dominated by exotic pasture grasses; *Cenchrus clandestinus** (Kikuyu Grass) and *Axonopus fissifolius** (Narrow-leaved Carpet Grass). PCT 838 in a 'SPS' condition class is the result of historical land clearing, which has selectively retained individual *Melaleuca styphelioides* (Prickly-leaved Paperbark) for the purpose of providing shade for livestock.

While not further assessed in this BDAR, it is noted that the vegetation mapped as PCT 838 within the subject land is most likely to be commensurate with the 'offspring' PCT 3327 *Illawarra Lowland Red Gum Grassy Forest* when changes to the 'PCT master list' come into effect.

Figure 3.4: PCT 838 in a 'disturbed' condition class in the subject land.

Figure 3.5: PCT 838 in a 'scattered paddock shrub' condition class in the subject land.

Table 3.3 BioNet Vegetation Classification Database PCT profile (DPE 2023b) - Forest Red Gum - Thin-leaved Stringybark grassy woodland on coastal lowlands, southern Sydney Basin Bioregion. Species found within the subject land are in bold.

Plant community type (PCT)	Forest Red Gum - Thin-leaved Stringybark grassy woodland on coastal lowlands, southern Sydney Basin Bioregion
PCT and BioMetric veg type (BVT) ID	PCT 838 / SR545 offspring PCT equivalent is likely PCT 3327
Percent cleared	85
Vegetation formation	Grassy Woodlands
Vegetation class	Coastal Valley Grassy Woodlands
Conservation status	BC Act: *Illawarra Lowlands Grassy Woodland in the Sydney Basin* EEC. EPBC Act: N/A does not meet the criteria for listing as *Illawarra and South Coast Lowlands Forest and Woodland* CEEC.
Subject land description	
Description and occurrence	PCT 838 occurs in two vegetation zones; 'disturbed' and 'SPS'. The 'disturbed' zone consists of an open canopy dominated by *Eucalyptus tereticornis* (Forest Red Gum) with a mixed native and exotic understorey. The 'SPS' zone comprises of individual occurrences of *Melaleuca styphelioides* (Prickly-Leaved Paperbark) located in paddocks dominated by exotic pasture grasses. PCT 838 occurs in small and scattered patches across most of the subject land.
Upper stratum	***Eucalyptus tereticornis* (Forest Red Gum)**, *Eucalyptus eugenioides* (Thin-leaved Stringybark)
Middle stratum	*Breynia oblongifolia* (Coffee Bush), *Eustrephus latifolius* (Wombat Berry), *Geitonoplesium cymosum* (Scrambling Lilly), *Myrsine variabilis, Pandorea pandorana* (Wonga Wonga Vine), ***Pittosporum undulatum* (Sweet Pittosporum)**
Ground stratum	***Carex longebrachiata* (a Sedge)**, ***Commelina cyanea* (Native Wandering Jew),** *Desmodium gunnii* (Slender Tick-trefoil), ***Dichondra repens* (Kidney Weed)**, ***Microlaena stipoides* var. *stipoides* (Weeping grass),** ***Oplismenus imbecillis***, *Poa labillardierei* var. *labillardierei* (Tussock grass), ***Lobelia purpurascens* (Whiteroot)**, *Themeda triandra* (Kangaroo Grass)
PCT justification and selection	PCT 838 was selected based on the location of the subject land on the coastal slopes of the Illawarra Coastal Plain below the foot slopes of the Illawarra Escarpment and on heavier soils. This meets the scientific description for this community in BioNet Vegetation Classification Database (DPE 2023b). Furthermore, 7 diagnostic species for this community were recorded during field survey. This is considered a significant number of diagnostic species given the degraded condition of PCT 838 in the subject land. Portions of PCT 838 within the subject land lacks diagnostic tree or shrub species which form the community, for example *Melaleuca styphelioides*

	(Prickly-leaved Paperbark), which constitutes the SPS condition class. PCT 838 was still selected in these areas based on the presence of *Eucalyptus tereticornis* (Forest Red Gum) in nearby stands of trees and the position in the local landscape. It should be noted that *Melaleuca styphelioides* (Prickly-leaved Paperbark) is known to occur frequently in PCT 3327. Other PCTs considered for selection included PCT 1326 - *Woollybutt - White Stringybark - Forest Red Gum grassy woodland on coastal lowlands, southern Sydney Basin Bioregion and South East Corner Bioregion*. PCT 1326 was identified in the subject land and study area, where its occurrence is restricted to gullies and watercourses. As such, it considered suitable for other areas of the subject land. Areas mapped as 'exotic grassland' may have contained any of the above PCTs at one time, but due to the extent of disturbance and modification and the resulting low cover and species richness of native groundcovers, the areas mapped as 'exotic grassland' have not been assessed as representative of any PCT. For the purposes of verifying that the VI score for 'exotic grassland' is below the threshold for offsetting, one Vegetation Integrity survey plot (Plot 5) was completed in this area and the plot data was entered in the BAM-C under PCT 838. However, the choice of PCT for this exercise was based only on proximity to areas within the subject land assessed as PCT 838.
Landscape position	Occurs on lower slopes in coastal rainshadow valleys, below 350 m ASL, from Wollongong to Milton and west to Yalwal.

PCT 1105 – River Oak open forest of major streams, Sydney Basin Bioregion and South East Corner Bioregion

Field assessment determined that native vegetation adjoining the two farm dams in the east of the subject land is consistent with PCT 1105 - *River Oak open forest of major streams, Sydney Basin Bioregion and South East Corner Bioregion* (0.19 ha) (**Figure 3.3**). A summary of the PCT 1105 profile from the BioNet Vegetation Classification Database (DPE 2023b) and justification for its selection is provided in **Table 3.4**.

Within the subject land PCT 1105 occurs in a 'planted' condition class. According to the original landholder, the community was planted approximately 20 years ago. PCT 1105 in a 'planted' condition is characterised by dense stands of small to medium sized *Casuarina cunninghamiana* (River Oak) which is interspersed with occasional *Eucalyptus* spp. (eucalypt trees). The *Eucalyptus* spp. (eucalypt trees) could not be identified because they are planted and immature; meaning they do not bear buds and fruit, which is essential for identification to a species level. The middle stratum is also dominated by juvenile and suckering *C. cunninghamia* (River Oak) and includes the occasional juvenile *Acacia* spp. (Wattle) and *Melaleuca quinquenervia* (Broad-leaved Paperbark), the latter of which is not indigenous to the Illawarra, with a southern limit of north Sydney. The understorey is covered in *C. cunninghamiana* (River Oak) needles and supports a mix of native and exotic species which is dominated by *Cynodon dactylon* (Couch Grass), *Microlaena stipoides* subsp. *stipoides*

(Weeping Grass), *Oplismenus imbecillis* (Basket Grass), *Chloris gayana** (Rhodes Grass) and *Sida rhombifolia** (Paddy's Lucerne).

While not further assessed in this BDAR, it is noted that the vegetation mapped as PCT 1105 within the subject land is most likely to be commensurate with the 'offspring' PCT 4084 – *Southern Escarpment River Oak Forest* when changes to the 'PCT master list' come into effect.

Figure 3.6: PCT 1105 in a 'planted' condition class in the subject land

Table 3.4: BioNet Vegetation Classification Database PCT profile (DPE 2023b) - River Oak open forest of major streams, Sydney Basin Bioregion and South East Corner Bioregion. Species found within the subject land are in bold.

Plant community type (PCT)	River Oak open forest of major streams, Sydney Basin Bioregion and South East Corner Bioregion
PCT and BioMetric veg type (BVT) ID	PCT 1105 / SR606 offspring PCT equivalent is likely PCT 4084
Percent cleared	40
Vegetation formation	Forested Wetlands
Vegetation class	Eastern Riverine Forests
Conservation status	N/A
Subject land description	
Description and occurrence	PCT 1105 occurs in one vegetation zone (planted), which is found adjoining the two farm dams in the east the subject land. The upper and middle stratum is dominated by *Casuarina cunninghamiana* (River Oak). The middle stratum lacks diagnostic species, presumably because the community is planted. The understorey is covered in *Casuarina cunninghamiana* (River Oak) needles and comprises of a mixture of exotic and native species.
Upper stratum	***Casuarina cunninghamia* (River Oak)**
Middle stratum	*Acacia floribunda* (White Sally), *Acacia mearnsii* (Black Wattle), *Pandorea pandorana* (Wonga Wonga Vine), *Stephania japonica* (Snake Vine), *Urtica incisa* (Stinging Nettle), *Hymenanthera dentata* (Tree Violet)
Ground stratum	***Dichondra repens* (Kidney Weed)**, *Lomandra longifolia* (Spiney-headed Mat-Rush), ***Microlaena stipoides* var. *stipoides* (Weeping Grass)**, ***Oplismenus aemulus* (Basket Grass)**
PCT justification and selection	PCT 1105 was selected based on species composition and in accordance with Appendix D of the BAM (DPIE 2020). Four diagnostic species for this community were recorded during field survey, including the only upper stratum species and most of the ground stratum species. Under Appendix D of the BAM (DPIE 2020), planted native vegetation must be allocated to the best-fit PCT and the BAM applied when planted native vegetation occurs within an area that contains a mosaic of planted and remnant native vegetation and which can be reasonably assigned to a PCT known to occur in the same IBRA subregion as the proposal. PCT 1105 in the subject land occurs in proximity to remnant stands of PCT 838 and the community occurs in the Illawarra IBRA subregion and is also mapped in Marshall Mount (DPE 2023b). Other PCTs considered for selection included PCT 1232 - Swamp Oak floodplain swamp forest, Sydney Basin Bioregion and South East Corner Bioregion. This PCT was not considered suitable because it is dominated by *Casuarina glauca* (Swamp Oak) and is often associated with brackish water. Given the small patch sizes and linear nature of PCT 1105, part of the VI survey plot was located along the edge of the vegetation zone which adjoins 'exotic

	grassland'. This was unavoidable and represents a limitation in the survey of the vegetation zone.
Landscape position	Occurs on river banks of major rivers or banks of swift flowing streams and rivers.

PCT 1326 - Woollybutt - White Stringybark - Forest Red Gum grassy woodland on coastal lowlands, southern Sydney Basin Bioregion and South East Corner Bioregion

Field assessment determined that native vegetation associated with the gully in the relative centre of the subject land is consistent with PCT 1326 - *Woollybutt - White Stringybark - Forest Red Gum grassy woodland on coastal lowlands, southern Sydney Basin Bioregion and South East Corner Bioregion* (0.11 ha) (**Figure 3.3**). A summary of the PCT 1326 profile from the BioNet Vegetation Classification Database (DPE 2023b) and justification for its selection is provided in **Table 3.5**.

The upper stratum of PCT 1326 in the subject land is dominated by high cover of *Eucalyptus longifolia* (Woollybutt) and *Melaleuca Styphelioides* (Prickly-Leaved Paperbark). The middle stratum is a mixture of native mesophyll and sclerophylla native shrubs and trees as well as woody weeds. Dominant species in the middle stratum include *Backhousia myrtifolia* (Grey Myrtle), *Ficus rubiginosa* (Port Jackson Fig), *Streblus brunonianus* (Whalebone) and the exotic species *Lantana camara** (Lantana) is also present. The groundlayer is predominantly exotic, with *Chloris gayana** (Rhodes Grass) and *Ehrharta erecta** (Panic Veldtgrass) having high cover. However, native grasses, forbs, vines and ferns are still relatively abundant, particularly *Carex longebrachiata* (a Sedge), *Pseuderanthemum variable* (Pastel Flower), *Pandorea pandorana* (Wonga Wonga Vine) and *Adiantum aethiopicum* (Maidens Hair Fern). It is likely that the middle stratum of the community has been cleared in the past resulting in weed invasion. Grazing by cattle and horses has also impacted the groundlayer and is causing erosion along the gully.

While not further assessed in this BDAR, it is noted that the vegetation mapped as PCT 1105 within the subject land is most likely to be commensurate with the 'offspring' PCT 3330 – *South Coast Lowland Woollybutt Grassy Forest* when changes to the 'PCT master list' come into effect.

Figure 3.7: PCT 1326 in a 'disturbed' condition class in the subject land

Table 3.5: BioNet Vegetation Classification Database PCT profile (DPE 2023b) - Woollybutt - White Stringybark - Forest Red Gum grassy woodland on coastal lowlands, southern Sydney Basin Bioregion and South East Corner Bioregion. Species found within the subject land are in bold.

Plant community type (PCT)	Woollybutt - White Stringybark - Forest Red Gum grassy woodland on coastal lowlands, southern Sydney Basin Bioregion and South East Corner Bioregion
PCT and BioMetric veg type (BVT) ID	PCT 1326 / SR669 offspring PCT equivalent is likely PCT 3330
Percent cleared	95
Vegetation formation	Grassy Woodlands
Vegetation class	Coastal Valley Grassy Woodlands
Conservation status	BC Act: *Illawarra Lowlands Grassy Woodland in the Sydney Basin* EEC. EPBC Act: N/A does not meet the criteria for listing as *Illawarra and South Coast Lowlands Forest and Woodland* CEEC.
Subject land description	
Description and occurrence	PCT 1326 occurs in one vegetation zone ('disturbed'), which is found along a gully in the relative centre of the subject land. The upper stratum comprises of *Eucalyptus longifolia* (Woollybutt) and *Melaleuca styphelioides* (Prickly-leaved Paperbark). The middle stratum is a mixture of native and exotic shrubs, particularly *Backhousia myrtifolia* (Grey Myrtle), *Streblus brunonianus* (Whalebone) and *Lantana camara** (Lantana). The groundlayer is predominantly composed of exotic grasses, however, native grasses, forbs, vines and ferns are also prevalent.
Upper stratum	*Eucalyptus globoidea* (White Stringybark), ***Eucalyptus longifolia* (Woollybutt)**, *Eucalyptus tereticornis* (Forest Red Gum), *Corymbia maculata* (Spotted Gum).
Middle stratum	*Glycine clandestina* (Twinning Glycine), *Glycine tabacina* (Variable Glycine), *Leucopogon juniperinus* (Prickly Beard-heath), *Melaleuca decora* (Snow in Summer), *Ozothamnus diosmifolius* (White Dogwood), *Pittosporum undulatum* (Sweet Pittosporum)
Ground stratum	*Cheilanthes sieberi* subsp. *sieberi* (Rock Fern), *Cymbopogon refractus* (Barbed Wire Grass), *Dianella longifolia* (Blue Berry Lily), ***Dichondra repens* (Kidney Weed)**, ***Echinopogon caespitosus* (Bushy Hedgehog-grass),** *Entolasia stricta* (Wiry Panic), *Eragrostis leptostachya* (Paddock Lovegrass); *Lepidosperma laterale* (Variable Sword-sedge), ***Microlaena stipoides* var. *stipoides* (Weeping grass)**, ***Pratia purpurascens* (Whiteroot),** *Themeda australis* (Kangaroo Grass), *Veronica plebeia* (Trailing Speedwell), *Imperata cylindrica* var. *major* (Blady Grass), *Lagenifera stipitata* (Blue Bottle-daisy)
PCT justification and selection	PCT 1326 was selected based on the presence of *Eucalyptus longifolia* (Woollybutt) which is representative of the community. The community

	occupies a gully within the subject land, which is compatible with the scientific description in BioNet Vegetation Classification Database (DPE 2023b). Other PCTs considered for selection include PCT 838. This PCT was not considered appropriate because it does not include *Eucalyptus longifolia* (Woollybutt). Furthermore, PCT 838 is generally found in higher positions in the local landscape with less impeded drainage.
Landscape position	Restricted to flats below 100 m ASL with sandy loam soils and partially impeded drainage mainly between the Illawarra and Moruya.

Planted native and exotic vegetation

Planted native and exotic vegetation is found predominantly around the dwelling and in scattered patches along North Marshall Mount Road (0.60 ha) (**Figure 3.3**). These areas comprise of planted trees such as *Ficus* sp. (Fig), *Brachychiton acerifolius* (Illawarra Flame Tree), *Erythrina* x sykesii* (Coral Tree), *Casuarina* spp. (She-oak) and fruit trees (**Figure 3.8**). Although this vegetation zone contains a considerable amount of native vegetation, some of which is endemic, the assemblage of species is not compatible with any PCT in the IBRA subregion, it is essentially garden plantings and offsetting is not considered required.

Figure 3.8: Planted native and exotic vegetation in the subject land

Exotic grassland

A large proportion of the subject land was found to contain 'exotic grassland' (21.50 ha) (**Figure 3.3**). This land was dominated by exotic pasture grasses such *Axonopus fissifolius** (Narrow-leaved Carpet Grass), *Cenchrus clandestinus** (Kikuyu Grass), *Chloris gayana** (Rhoades Grass) and *Paspalum dilatatum** (Paspalum).

Given the highly modified state of this vegetation zone and the lack of native vegetation, this vegetation zone was not assigned to a PCT under the BAM. One VI plot (Plot 5) was completed in an area of 'exotic grassland' which included discernible cover of native vegetation. This plot was used to confirm that all areas mapped as 'exotic grassland' are of a VI score <15 and, therefore, do not require offsetting. Plot 5 was entered into the BAM-C under PCT 838 due to the proximity of PCT 838 vegetation to the plot location.

Figure 3.9: Exotic grassland in the subject land

3.2.2 Threatened Ecological Communities

PCT 838 - Forest Red Gum - Thin-leaved Stringybark grassy woodland on coastal lowlands, southern Sydney Basin Bioregion

Within the subject land, PCT 838 identified in a 'disturbed' and 'SPS' condition class is characteristic of the *Illawarra Lowlands Grassy Woodland in the Sydney Basin Bioregion* EEC (ILGW EEC) listed under the BC Act (NSW TSSC 1999) (**Figure 4.1**).

Under the BC Act an EEC is defined as 'an assemblage of species in a particular area'. Whilst the subject land is within the particular area of ILGW EEC (NSW TSSC 1999), only 4 native species of 72 'characteristic species' were recorded in the BAM survey plot, all of which are common in exotic pastures of the Illawarra Coastal Plain and Escarpment (*M. styphelioides, Glycine* sp., *Eragrostis* sp., and *Carex longebrachiata*). The assemblage of species is considered highly depauperate, however this may be considered to constitute an 'assemblage' consistent with the list in the Final Determination, and therefore the SPS zone has been included within the area considered to be ILGW EEC.

PCT 838 also forms part of the EPBC Act CEEC *Illawarra and South Coast Lowland Forest and Woodland*. The Conservation Advice (Commonwealth TSSC 2016) for *Illawarra and South Coast Lowlands Forest and Woodland* (ISCLFW) provides condition thresholds for when a patch of TEC retains sufficient conservation value to be considered as a Matter of National Environmental Significance (MNES) under the EPBC Act, this is provided within **Table 3.6**.

In accordance with the Conservation Advice, the community present within the subject land does not meet the minimum condition thresholds to warrant consideration under the EPBC Act. In particular, the community present does not have 'at least 30% of total perennial understorey vegetation cover is comprised of native species' (**Table 3.6**).

Areas of PCT 838 which are outside of the subject land have not been assessed against the criteria for *Illawarra and South Coast Lowland Forest and Woodland* under the EPBC Act in this BDAR.

PCT 1105 – River Oak open forest of major streams, Sydney Basin Bioregion and South East Corner Bioregion

PCT 1105 is not associated with any TECs under the BC Act or the EPBC Act.

PCT 1326 - Woollybutt - White Stringybark - Forest Red Gum grassy woodland on coastal lowlands, southern Sydney Basin Bioregion and South East Corner Bioregion

Within the subject land, PCT 1326 identified in a 'disturbed' condition class qualifies as the EEC *Illawarra Lowlands Grassy Woodland in the Sydney Basin Bioregion* listed under the BC Act (NSW TSSC 1999). As outlined above, the EEC includes small and fragmented remnants consisting of regrowth after clearing or other disturbances.

PCT 1326 also forms part of the EPBC Act CEEC *Illawarra and South Coast Lowland Forest and Woodland*. The Conservation Advice (Commonwealth TSSC 2016) for *Illawarra and South Coast Lowlands Forest and Woodland* (ISCLFW) provides condition thresholds for when a patch of TEC retains sufficient conservation value to be considered as a Matter of

National Environmental Significance (MNES) under the EPBC Act, this is provided within **Table 3.6**

In accordance with the Conservation Advice, the community present within the subject land does not meet the minimum condition thresholds to warrant consideration under the EPBC Act. In particular, the community present does not have 'at least 30% of total perennial understorey vegetation cover is comprised of native species (**Table 3.6**).

PCT 1326 is also associated with the EEC *River-Flat Eucalypt Forest on Coastal Floodplains of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions* under the BC Act. This EEC was not considered appropriate for PCT 1326 in the subject land because it does not occur on river flats on coastal floodplains (NSW TSSC 2004).

Similarly, PCT 1326 is associated with the CEEC *River-flat eucalypt forest on coastal floodplains of southern New South Wales and eastern Victoria* listed under the EPBC Act. This community was not considered appropriate for PCT 1326 in the subject land because it does not occur on 'alluvial landforms related to coastal river floodplains' (Commonwealth TSSC 2020).

Table 3.6: Condition categories, rationale and thresholds for *Illawarra and south coast lowland forest and woodland* under the EPBC Act (Commonwealth TSSC 2016).

<table>
<tr><th>Category and rationale</th><th>Patch size thresholds</th><th colspan="3">Biotic thresholds</th></tr>
<tr><td rowspan="2">A. High condition class
A larger patch with good quality native understorey and/or many very large trees</td><td rowspan="2">≥2 ha</td><td colspan="3">50% of its total understorey vegetation cover* is comprised of native species (exotic annuals are excluded from this assessment)
AND</td></tr>
<tr><td>At least 6 native plant species per 0.5
ha in the ground layer</td><td>OR</td><td>The patch has at least ten trees that are either very large (at least 60cm diameter at breast height dbh)
OR
have hollows.</td></tr>
<tr><td>B. High condition class
A patch with very good quality native understorey with a species rich ground layer</td><td>≥0.5 ha</td><td colspan="3">At least 70% of the understorey vegetation cover* is comprised of native species (exotic annuals are excluded from this assessment)
AND
with at least 10 native plant species per 0.5 ha in the ground layer</td></tr>
<tr><td>C. Moderate condition class
A patch with good quality native understorey</td><td>≥0.5 ha</td><td colspan="3">At least 50% of its total understorey vegetation cover* is comprised of native species (exotic annuals are excluded from this assessment) and with at least 6 native plant species per 0.5 ha in the ground layer</td></tr>
</table>

<table>
<tr><th>Category and rationale</th><th>Patch size thresholds</th><th colspan="3">Biotic thresholds</th></tr>
<tr><td rowspan="2">D. Moderate condition class
A patch that makes other important ecological contributions</td><td rowspan="2">≥0.5 ha</td><td colspan="3">At least 30% of total perennial understorey vegetative cover is comprised of native species
AND</td></tr>
<tr><td>the patch is contiguous** with another patch of native vegetation ***
(at least 1 ha in area)</td><td>OR</td><td>the patch has at least one large locally indigenous tree (at least 50 cm diameter at breast height (dbh),
OR
at least one tree with hollows.</td></tr>
<tr><td colspan="5">Notes:
*Perennial understorey vegetation cover includes vascular plant species of both the ground layer and the shrub layer (where present) with a life-cycle of more than two growing seasons. The ground layer includes herbs (graminoids and forbs) and low (≤0.5 m) shrubs, but does not include annuals, cryptogams, leaf litter or exposed soil.
**Contiguous with another patch of native vegetation means the patch is continuous with or in close proximity (within 100 m) to another area of native vegetation.
***‘Native vegetation’ refers to areas where ≥50% of the perennial vegetation cover is comprised of native plant species.</td></tr>
</table>

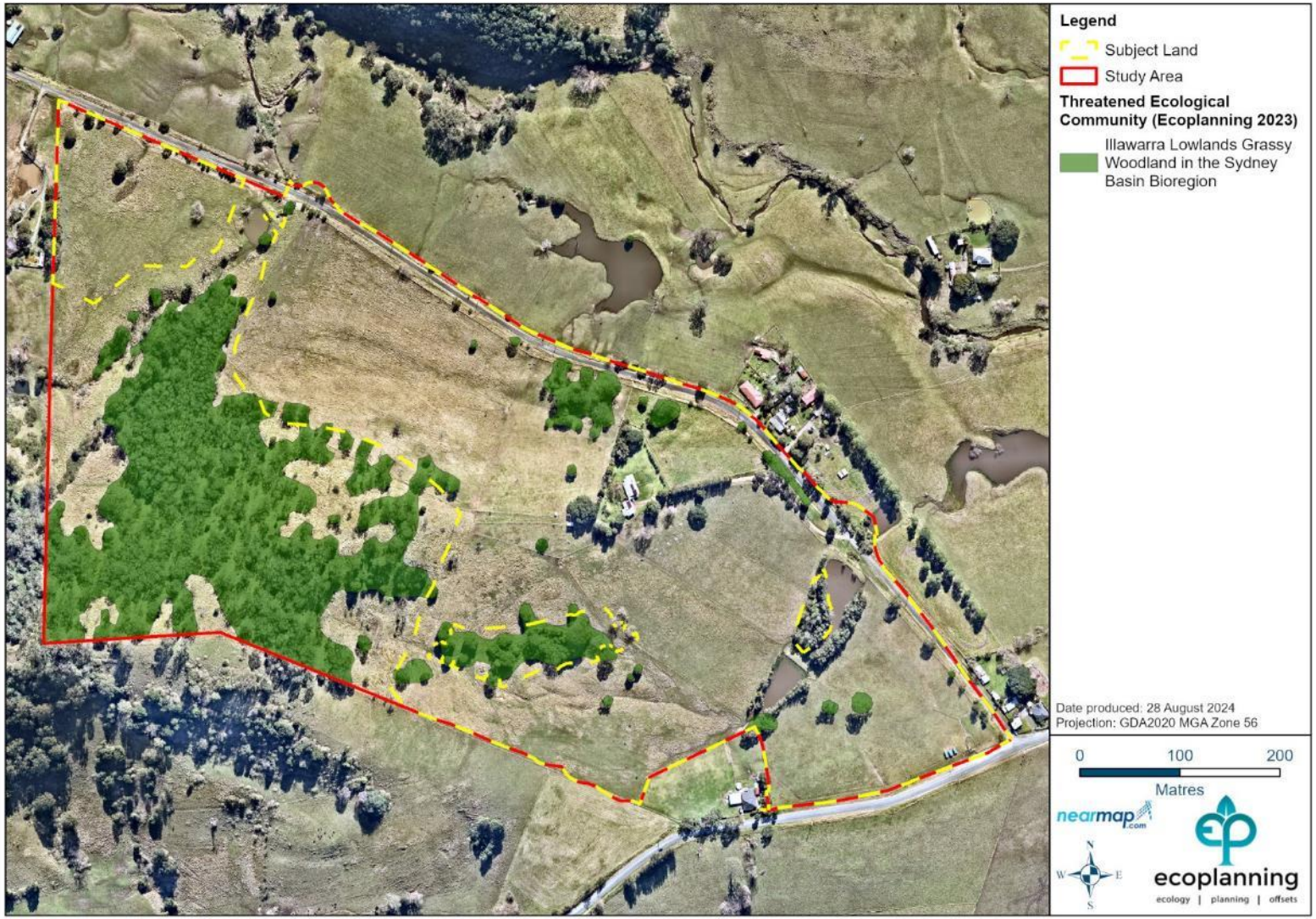

Figure 3.10: Threatened Ecological Communities and PCTs associated with the study area.

3.3 Vegetation zones

3.3.1 Vegetation integrity (VI) survey plots

Five VI plots were completed, one in each mapped native vegetation zone and one in the large area of 'Exotic grassland' to meet the requirements of Table 3 the BAM (refer **Figure 3.1** and **Table 3.7**). Plots were not completed in the 'Planted native and exotic' vegetation zone. Given the small size of the vegetation zones, plots were oriented as best as possible to capture the most representative parts of each zone and to avoid ecotones, zone boundaries and disturbances such as tracks. However, this was not always possible.

The plot in 'Exotic grassland' was located in an area which appeared to contain the highest proportion of native groundcover. The purpose of this plot was to verify that all areas which have been mapped as 'Exotic grasses/cleared land' have a VI score of less than 15 and are therefore below the threshold for offsetting if the vegetation were determined to be representative of an EEC or a CEEC.

Table 3.7: Number of VI plots required for each vegetation zone based on their respective sizes

PCT name	Vegetation zone	Area in Subject Land	# plots required (completed)
838 - Forest Red Gum - Thin-leaved Stringybark grassy woodland on coastal lowlands, southern Sydney Basin Bioregion	Disturbed	0.86	1 (1)
	Scattered paddock shrub	0.03	1 (1)
1105 - River Oak open forest of major streams, Sydney Basin Bioregion and South East Corner Bioregion	Planted	0.19	1 (1)
1326 - Woollybutt - White Stringybark - Forest Red Gum grassy woodland on coastal lowlands, southern Sydney Basin Bioregion and South East Corner Bioregion	Disturbed	0.11	1 (1)
Exotic grassland	N/A	21.5	0 (1)
Total		**22.69**	**4 (5)**

Planted native vegetation totals 0.47 ha

3.3.2 Current and future vegetation integrity scores

Vegetation integrity scores were calculated based on the VI plots collected for each vegetation zone where possible. Data collected for each plot is included in **Table 3.8** and **Appendix A**. The VI scores for each vegetation zone are representative of a condition score / class out of 100 and shown in **Table 3.8**. The VI scores of both PCT 838 - Forest Red Gum - Thin-leaved Stringybark grassy woodland on coastal lowlands, southern Sydney Basin Bioregion (Scattered paddock shrub) and exotic grassland is < 15 and therefore an offset is not required for these impacts.

Table 3.8: Vegetation Integrity Scores.

Veg zone	PCT	Condition class	Area impacted (ha)	Vegetation Integrity Score	
				Before development	After development
1	838	Disturbed	0.86	28.4	0
2	1105	Planted	0.19	42.2	0
3	838	SPS	0.03	1.7	0
4	1326	Disturbed	0.11	54.8	0
5	838	Exotic grassland	21.50	0.8	0

Planted native vegetation totals 0.60 ha

4 Threatened species

Section 5 of the BAM details the process for determining the habitat suitability for threatened species. Under the BAM, threatened species are separated into two classes, 'ecosystem' and 'species' credit species. Those threatened species where the likelihood of occurrence of a species or elements of the species' habitat can be predicted by vegetation surrogates and landscape features, or for which a targeted survey has a low probability of detection, are identified a 'ecosystem' credit species. Targeted surveys are not required for ecosystem species and potential impacts to these species are assessed with impacts to PCTs.

Threatened species where the likelihood of occurrence of a species or elements of suitable habitat for the species cannot be confidently predicted by vegetation surrogates and landscape features and can be reliably detected by survey are identifiable as species credit species. A targeted survey or an expert report is required to confirm the presence or absence of these species on the subject land.

For some threatened species, they are identifiable as both ecosystem and species credit species, with different aspects of the habitat and life cycle representing different credit types. Commonly, threatened fauna species foraging habitat is classed as an ecosystem credit, while their breeding habitat represents a species credit.

The following sections outline the process for determining the habitat suitability for threatened species within the subject land, and the results of the targeted surveys for candidate threatened species.

4.1 Threatened species for assessment

Threatened species that require assessment are initially identified based upon the following criteria:

- the distribution of the species including the IBRA subregion in which the subject land occurs (Sydney Basin IBRA subregion),
- the species is associated with any of the PCTs identified within the subject land,
- the native vegetation cover within the assessment area including the 1,500 m assessment circle around the subject and is equal to or greater than the minimum required for the species,
- the patch size that each vegetation zone is part of is equal to or greater than the minimum required for that species,
- the species is identified as an ecosystem or species credit species in the Threatened Biodiversity Data Collection.

The process for identifying threatened species which meet the above criteria is completed through the BAM calculator. The PCT identified within the subject land, patch size, and native vegetation cover, as outlined in **Section 3**, were entered into the BAM calculator and a preliminary list of ecosystem and species credit species was tabulated below (**Table 4.1**).

4.2 Ecosystem credit species

A review of the predicted ecosystem credit species was conducted to determine the likelihood of species occurring on the subject land. The review considers whether necessary habitat components are present as described above (**Table 4.1**). It is acknowledged that the BAM-C uses a precautionary approach to predict the presence of ecosystem credit species potentially located within the study area. Nevertheless no ecosystem credit species were excluded from the assessment based on habitat constraints.

It is noted that forest owls have recently been moved to being a species credit species for all habitat. However, at the time of submission of this development application forest owls were 'split' species, with foraging and breeding habitat split between ecosystem and species credit types. These credit types have been maintained for this assessment due to the species status at the time of submission.

Table 4.1: Assessment of habitat constraints and geographic limitations of ecosystem credits species.

Scientific name/ Common name	Habitat constraints	Geographic limitations	Maintained as an Ecosystem Credit Species
Anthochaera phrygia Regent Honeyeater (Foraging)	-	-	Included
Artamus cyanopterus cyanopterus Dusky Woodswallow	-	-	Included
Botaurus poiciloptilus Australasian Bittern	Waterbodies Brackish or freshwater wetlands	-	Included
Callocephalon fimbriatum Gang-gang Cockatoo (Foraging)	-	-	Included
Calyptorhynchus lathami Glossy Black-Cockatoo (Foraging)	Presence of Allocasuarina and Casuarina species	-	Included
Circus assimilis Spotted Harrier	-	-	Included
Daphoenositta chrysoptera Varied Sittella	-	-	Included
Dasyurus maculatus Spotted-tailed Quoll	-	-	Included
Falsistrellus tasmaniensis *Eastern False Pipistrelle*	-	-	Included
Glossopsitta pusilla Little Lorikeet	-	-	Included

Scientific name/ Common name	Habitat constraints	Geographic limitations	Maintained as an Ecosystem Credit Species
Haliaeetus leucogaster White-bellied Sea-Eagle (Foraging)	Waterbodies Within 1km of a rivers, lakes, large dams or creeks, wetlands and coastlines	-	Included
Hieraaetus morphnoides Little Eagle (Foraging)	-	-	Included
Hirundapus caudacutus White-throated Needletail	-	-	Included
Hoplocephalus bungaroides Broad-headed Snake (Foraging)			
Ixobrychus flavicollis Black Bittern	Waterbodies Land within 40 m of freshwater and estuarine wetlands, in areas of permanent water and dense vegetation	-	Included
Lathamus discolor Swift Parrot (Foraging)	-	-	Included
Lophoictinia isura Square-tailed Kite (Foraging)	-	-	Included
Micronomus norfolkensis Eastern Coastal Free-tailed Bat	-	-	Included
Miniopterus australis Little Bent-winged Bat (Foraging)	-	-	Included
Miniopterus orianae oceanensis Large Bent-winged Bat (Foraging)	-	-	Included
Neophema pulchella Turquoise Parrot	-	-	Included
Ninox connivens Barking Owl (Foraging)	-	-	Included

Scientific name/ Common name	Habitat constraints	Geographic limitations	Maintained as an Ecosystem Credit Species
Ninox strenua Powerful Owl (Foraging)	-	-	Included
Pandion cristatus Eastern Osprey (Foraging)	-	-	Included
Petaurus australis Yellow-bellied Glider	-	-	Included
Petroica boodang Scarlet Robin	-	-	Included
Petroica phoenicea Flame Robin	-	-	Included
Pteropus poliocephalus Grey-headed Flying-fox (Foraging)	-	-	Included
Saccolaimus flaviventris Yellow-bellied Sheathtail-bat	-	-	Included
Scoteanax rueppellii Greater Broad-nosed Bat	-	-	Included
Stagonopleura guttata Diamond Firetail	-	-	Included
Tyto novaehollandiae Masked Owl (Foraging)	-	-	Included
Varanus rosenbergi Rosenberg's Goanna	-	-	Included

4.3 Identify candidate species (species credit species)

In accordance with Section 5.2.1 of the BAM, a predicted candidate species can be considered unlikely to occur within the subject land (or specific vegetation zones) where habitat is substantially degraded (based on microhabitat features) to the point the species is unlikely to use the area, or where an expert report identifies that the species is unlikely to be present within the subject land (or a vegetation zone within the subject land). A predicted candidate species credit species that is not considered to have suitable habitat on the subject land (or specific vegetation zones) in accordance with Section 5.2.3 of the BAM does not require further assessment on the subject land (or specific vegetation zones). The reasons and justifications for determining that a predicted species credit species is unlikely to have suitable habitat on the subject land (or specific vegetation zones) and, therefore, has been excluded from further assessment is provided in **Table 4.2**.

Opportunistic and targeted surveys were undertaken as part of the field assessments, including surveys for the threatened flora species which are known to occur in the area. The habitat present is extremely modified with the majority of native vegetation within the subject land in a degraded condition, having been cleared and grazed in the past and largely lacking a shrub layer and subject to an infestation of exotic and/or high threat weeds.

An assessment of available habitat for predicted candidate species within the subject land is further detailed in **Section 4.4** of this report.

Table 4.2: Assessment of habitat constraints and geographic limitations of candidate species credit species.

Scientific name/ Common name	Habitat constraints	Geographic limitations	Maintained as a Candidate Species Credit
Anthochaera phrygia Regent Honeyeater (Breeding)	• Other • As per mapped areas	-	Excluded: The subject land is not part of the species Important Habitat Area Map.
Burhinus grallarius Bush Stone-curlew	• Fallen/standing dead timber including logs	-	Excluded: based on habitat constraints. The subject land is dominated by exotic grasses. Very little fallen timber or logs are found anywhere within the subject land. The subject land lacks required habitat and is also substantially degraded. This species is considered a former resident of the Illawarra, which is no longer present due to the spread of settlements and foxes (Chafer and Brandis 2012).
Callocephalon fimbriatum Gang-gang Cockatoo (Breeding)	• Hollow bearing trees • Eucalypt tree species with hollows greater than 9 cm diameter	-	Included
Calyptorhynchus lathami Glossy Black-Cockatoo (Breeding)	• Hollow bearing trees • Living or dead tree with hollows greater than 15 cm diameter and greater than 8 m above ground	-	Included
Cercartetus nanus Eastern Pygmy-possum	-	-	Excluded: suitable habitat is not present on the subject land. This species is found in a broad range of habitats from rainforest through to sclerophyll forest and woodland to heath, but in most areas woodlands and heath appear to be preferred. Feeds largely on nectar and pollen collected from banksias, eucalypts, and bottlebrushes; an important

Scientific name/ Common name	Habitat constraints	Geographic limitations	Maintained as a Candidate Species Credit
			pollinator of heathland plants such as banksias; soft fruits or insects are eaten when flowers are unavailable. In accordance with Section 5.2.3, 2 (a ii) of the BAM - the subject land has been subject to considerable disturbance and modification, being regularly grazed in the past and with a groundcover dominated by exotic grasses. This species requires dense shrub cover in a variety of habitats, however the mid-storey and ground layer woody vegetation across the subject land has been removed or with very little cover or shelter offered by the disturbed / reduced structure of the vegetation. The subject land contains a low abundance and cover of potential food trees (trees producing fruits or nectar on which this species may forage) and few hollows amongst the remnant trees.
Chalinolobus dwyeri Large-eared Pied Bat	• Cliffs • Within 2 km of rocky area containing caves, overhangs, escarpments, outcrops, or crevices, or within 2 km of old mines or tunnels	-	Excluded: based on habitat constraints. The subject land is not within 2 km of old mines, tunnels, cliffs or other rocky areas which could provide potential roost sites.
Chorizema parviflorum - endangered population Chorizema parviflorum Benth. in the Wollongong and Shellharbour Local Government Areas	-	Shellharbour and Wollongong LGAs	Included

Scientific name/ Common name	Habitat constraints	Geographic limitations	Maintained as a Candidate Species Credit
Cynanchum elegans White-flowered Wax Plant	-	-	Excluded: suitable habitat is not present on the subject land. This is a rare plant species recorded in rainforest gullies and scree slopes from the Gloucester district to the Wollongong area and inland to Mt Dangar. It is considered unlikely that a soil seed bank for this species exists and the subject land does not contain rainforest gullies or scree slopes. Based on the above and the highly disturbed nature of the site, *C. elegans* has been removed as a candidate species. Furthermore, targeted field surveys of this conspicuous species in remnant areas of native vegetation did not record any individuals.
Haliaeetus leucogaster White-bellied Sea-Eagle (Breeding)	• Other • Living or dead mature trees within suitable vegetation within 1 km of a river, lake, large dam or creek, wetlands and coastlines	-	Excluded: based on habitat constraints. The subject land does not contain suitable waterbodies and is not within 1 km of suitable waterbodies. All the dams within 1 km of the subject land are small farm dams.
Haloragis exalata subsp. exalata Square Raspwort	• Waterbodies • Edges of coastal lakes after flooding has removed other vegetation, creek banks within flood zone, areas close to these features subject to human disturbance including road verges and powerline easements or within 100m	-	Excluded: based on habitat constraints. On the South Coast, *Haloragis exalata* subsp. *exalata* occurs on the margins of coastal water bodies, such as lakes and lagoons, primarily those which are closed to the sea for lengthy periods (Miles 2008 cited in NSW TSSC 2014). These habitat features are not present on the subject land.

Scientific name/ Common name	Habitat constraints	Geographic limitations	Maintained as a Candidate Species Credit
Heleioporus australiacus Giant Burrowing Frog	-	-	Excluded: suitable habitat is not present on the subject land. The subject land is characterised by clay-based soils. This soil type is not inhabited by the species.
Hieraaetus morphnoides Little Eagle (Breeding)	• Other • Nest trees – live (occasionally dead) large old trees within vegetation	-	Included
Hoplocephalus bungaroides Broad-headed Snake (Breeding)	• Rocky areas • Including escarpments, outcrops and pogodas within the Sydney Sandstone geologies	-	Excluded: based on habitat constraints. The subject land does not contain rocky areas such as escarpments, outcrops and pagodas which are utilised by this species.
Lathamus discolor Swift Parrot (Breeding)	• Other • As per mapped areas -	-	Excluded: The subject land is not part of the species Important Habitat Area Map.
Lespedeza juncea subsp. *sericea* - *endangered population* *Lespedeza juncea* subsp. *sericea* in the Wollongong Local Government Area	-	Wollongong LGA	Excluded: habitat degraded and suitable habitat not present on the subject land. This species is known from one population which is located in open forest dominated by *Eucalyptus tereticornis* (Forest Red Gum) and *Eucalyptus longifolia* (Woollybutt). The site where it is found in the Wollongong LGA is on Budgong sandstone. While this species is known from disturbed sites, remnant native vegetation was searched and no shrubs with a similar growth habitat and vegetative parts to this species were found. This species has been ruled out on the basis of the largely cleared and exotic mid-storey and understorey

Scientific name/ Common name	Habitat constraints	Geographic limitations	Maintained as a Candidate Species Credit
			vegetation lacking any native species with vegetative structures of similar appearance to this species.
Litoria aurea Green and Golden Bell Frog	• Semi-permanent/ephemeral wet areas • Within 1km of wet areas | Swamps • Within 1km of swamp | Waterbodies • Within 1km of waterbody	-	Excluded: suitable habitat is not present on the subject land. The subject land is hydrologically disconnected from the known population at Port Kembla. This species typically inhabits waterbodies with intact macrophyte coverage and the thin strip of macrophytes fringing the farm dams are unlikely to support the species.
Lophoictinia isura Square-tailed Kite (Breeding)	• Other • Nest trees	-	Included
Miniopterus australis Little Bent-winged Bat (Breeding)	• Caves • Caves, tunnels, mines, culverts, or other structure known or suspected to be used for breeding including species records in BioNet with microhabitat code 'IC – in cave' • Observation type code 'E nest-roost' • With roost number of individuals >500 • or from the scientific literature	-	Excluded: based on a lack of habitat features. This species was recorded during acoustic monitoring targeting Southern Myotis (*Myotis macrocarpus*) as part of this BDAR. This microbat occurs in coastal NSW and forms discrete populations that are centred around maternity roosts. These maternity roosts are found in caves, derelict mines, stormwater tunnels, abandoned buildings, and other manmade structures. As the subject land and 1,500 m buffer does not contain any structure that could be utilised as breeding roosts, this species has been removed from the candidate species credit species list (Section 5.2.3 2 (a i) of the BAM).

Scientific name/ Common name	Habitat constraints	Geographic limitations	Maintained as a Candidate Species Credit
Miniopterus orianae oceanensis Large Bent-winged Bat (Breeding)	• Caves • Caves, tunnels, mines, culverts, or other structure known or suspected to be used for breeding including species records in BioNet with microhabitat code 'IC – in cave' • Observation type code 'E nest-roost' • With roost number of individuals >500	-	Excluded: based on a lack of habitat features. This species was recorded during acoustic monitoring targeting Southern Myotis (*Myotis macrocarpus*) as part of this BDAR. As the subject land and 1,500 m buffer does not contain any structure that could be utilised as breeding roosts, this species has been removed from the candidate species credit species list (Section 5.2.3 2 (a i) of the BAM).
Mixophyes balbus Stuttering Frog	-	-	Excluded: suitable habitat is not present on the subject land. The species is found in rainforest and wet, tall open forest and breeding habitat includes permanent or ephemerally flowing streams with permanent pools. The subject land contains grassy woodland communities, and the streams are highly degraded due to grazing and lack permanent pools.
Myotis macropus Southern Myotis	• Hollow bearing trees • Within 200 m of riparian zone • Bridges, caves, or artificial structures within 200 m of riparian zone • Waterbodies; this includes rivers, creeks, billabongs,	-	Included

Scientific name/ Common name	Habitat constraints	Geographic limitations	Maintained as a Candidate Species Credit
	lagoons, dams, and other waterbodies 200 m of the site		
Ninox connivens Barking Owl (Breeding)	• Hollow bearing trees • Living or dead trees with hollows greater than 20 cm diameter and greater than 4 m above the ground	-	Excluded: based on habitat constraints. Trees with suitable hollows are not present within the subject land.
Ninox strenua Powerful Owl (Breeding)	• Hollow bearing trees • Living or dead trees with hollow greater than 20cm diameter	-	Excluded: suitable habitat is not present on the subject land. One tree with a 25 cm hollow was identified on the subject land. This hollow was 2 m high, and inspection found no evidence of inhabitation by any fauna species. The hollow is exposed and is unlikely to be suitable for Powerful Owl.
Pandion cristatus Eastern Osprey (Breeding)	• Other • Presence of stick-nests in living and dead trees (>15m) or artificial structures within 100m of a floodplain for nesting)	-	Excluded: based on habitat constraints. One stick nest identified on the subject land. The height of the stick nest is <15 m. Field surveys were undertaken during breeding months and the species would have been identified if breeding on the subject land. Furthermore, the subject land is not within 100 m of a floodplain.
Petauroides volans Greater Glider	-	-	Excluded: suitable habitat is not present on the subject land. This species shelters in tree hollows, with a preference for large hollows in large, old growth trees. These habitat features are not represented within the subject land.
Petaurus norfolcensis Squirrel Glider	-	-	Excluded: suitable habitat is not present on the subject land. Inhabits Blackbutt-Bloodwood forest with heath understorey in coastal areas

Scientific name/ Common name	Habitat constraints	Geographic limitations	Maintained as a Candidate Species Credit
			and requires abundant tree hollows for refuge and nest sites. These habitat features are not represented in the subject land. .
Phascogale tapoatafa Brush-tailed Phascogale	-	-	Excluded: suitable habitat is not present on the subject land. No records of species within locality.
Phascolarctos cinereus Koala	• Other • Presence of koala use trees - refer to Survey Comments field in TBDC	-	Excluded: habitat degraded and suitable habitat not present on the subject land. The site is outside the species' known range. Only one Koala has been recorded within a 5 km radius around the subject land in the last 20 years (BioNet; DPE 2023c), despite many surveys for development impact assessment occurring in this area during this period. While Koala use trees such as *Eucalyptus tereticornis* (Forest Red Gum) are present within the subject land, the Koala Likelihood Map (DPIE 2019), which is referenced in the *Koala (Phascolarctos cinereus): Biodiversity Assessment Method Survey Guide* (DPE 2022), maps the subject land as having a likelihood of Koala occurrence of '0.00 – 0.25', with the confidence in this estimate being 'High'. While the BAM-C predicts this species based on its association with the PCT and the IBRA region, this does not reflect the results of finer scale survey and modelling (DPIE 2019b). Additionally, all native vegetation containing trees within the subject land was inspected during field survey, and no Koalas were detected.
Pimelea curviflora var. curviflora	-	-	Included

Scientific name/ Common name	Habitat constraints	Geographic limitations	Maintained as a Candidate Species Credit
Pimelea curviflora var. curviflora			
Pimelea spicata Spiked Rice-flower	-	Within 5 km of coast	Excluded: based on geographic constraints. The subject land is not within 5 km of the coast.
Pteropus poliocephalus Grey-headed Flying-fox (GHFF) (Breeding)	• Other • Breeding camps	-	Excluded: The GHFF is the largest of Australia's bats and is found within 200 km of NSW coast. Roosting camps are commonly found in areas within a dense canopy that are close to gullies, and within 20 km of regular food sources. No breeding camps were identified on the subject land from the field assessments. While this species is associated with PCTs of the subject land, due to the nature of the past disturbance within the subject land and lack of breeding camps the species has been excluded.
Pterostylis gibbosa Illawarra Greenhood	-	-	Excluded: habitat degraded, and suitable habitat is not present on the subject land. The groundcover and lower stratum vegetation is dominated by a high cover of exotic species. The subject land is also impacted by grazing. Due to past land use practices and the current degraded condition of vegetation within the subject land, suitable habitat is not present, and this species has been excluded as a candidate species.
Tyto novaehollandiae Masked Owl (Breeding)	• Hollow bearing trees • Living or dead trees with hollows greater than 20 cm diameter	-	Excluded: suitable habitat is not present on the subject land. One tree with a 25 cm hollow was identified on the subject land. This hollow was 2 m high, and inspection found no evidence of inhabitation by any fauna species. The hollow is exposed and is unlikely to be suitable for Masked Owl.

Scientific name/ Common name	Habitat constraints	Geographic limitations	Maintained as a Candidate Species Credit
Zieria granulata Illawarra Zieria	-	-	Excluded: suitable habitat is not present on the subject land. The preferred landform of *Zieria granulata* is dry ridge tops and rocky outcrops with shallow, volcanic soils of both sedimentary and igneous origin. The species is less frequently found on the moist slopes of the Illawarra escarpment and in low lying areas on Quaternary sediments. This species is known from one site in the Wollongong LGA at Kanahooka. Whilst this species is known to occur within the associated PCT of the subject land, the subject land lacks the appropriate microclimate for the species such as ridge tops and rocky outcrops. Furthermore, the highly disturbed nature of the subject land with high cover of exotic species indicates the species is unlikely to occur. Targeted survey of remnant native vegetation patches did not record this conspicuous species. Therefore, the study area does not contain potential habitat for this species and therefore has been rejected as a candidate species.

4.4 Determine presence or absence of candidate species credit species

Confirmed candidate species were assessed consistent with Section 5.2.3 of the BAM. Targeted surveys for species credit species were undertaken in accordance with Section 5.3 of the BAM, in accordance with *Surveying threatened plants and their habitats* (DPIE 2020). The survey effort, timing and locations for threatened flora are outlined in the following sections.

Species not identified as candidate species for further assessment do not require targeted threatened species survey, however, informal survey was opportunistically conducted whilst surveying for other threatened species and general field assessments.

4.4.1 Targeted field surveys – flora

Two threatened flora species have been identified as candidate species based on habitat. These species include *Chorizema parviflorum* (Eastern Flame Pea) and *Pimelea curviflora* var. *curviflora*. Targeted surveys for both candidate species were conducted by Nathan Storch (Ecologist) and Edwin Vaca (Ecologist) on 21 October 2022.

Targeted surveys initially involved identification of areas of potential habitat for candidate threatened flora species within the subject land. Areas of suitable habitat were then surveyed along parallel field-traverses with approximately 5 m separation, consistent with the requirements of the DPIE 2020. Areas of 'Cleared land' and dams were not assessed as of potential habitat for threatened flora, hence were not surveyed in accordance with the DPIE 2020. Survey effort is shown in **Figure 3.1**.

The nominated survey period for all candidate threatened flora species is shown in **Table 4.3**. The timing of the flora survey (October 2022) is in accordance with the survey requirements for *Chorizema parviflorum* (Eastern Flame Pea) and *Pimelea curviflora* var. *curviflora*. Suitable habitat is not considered present on the subject land for *Pimelea spicata* (Spiked Rice-flower), *Pterostylis gibbosa* (Illawarra Greenhood), *Zieria granulata* (Illawarra Zieria) and *Lespedeza juncea* subsp. *sericea* (**Table 4.2**). However, these species may also be confirmed as absent based on surveys which were undertaken in the appropriate month (October).

While it is acknowledged that several individuals of *Cynanchum elegans* (White-flowered Wax Plant) have been found within the locality and within PCT838, it was considered that there was inadequate habitat for this species within the study area , leading to its exclusion as a candidate species. Furthermore, targeted surveys for this species did not find any individuals.

Table 4.3: Nominated survey months for candidate threatened flora species

Candidate species	Survey period (BAM Calculator)											
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Chorizema parviflorum - endangered population									Y	Y	Y	

Candidate species	Survey period (BAM Calculator)											
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Chorizema parviflorum Benth. in the Wollongong and Shellharbour Local Government Areas*												
Cynanchum elegans White-flowered Wax Plant*	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Haloragis exalata subsp. *exalata* Square Raspwort	Y	Y	Y	Y	Y	Y	Y	Y	Y		Y	Y
Lespedeza juncea subsp. *sericea* - *endangered population* *Lespedeza juncea* subsp. *sericea* in the Wollongong Local Government Area*	Y	Y	Y							Y		
Pimelea curviflora var. *curviflora**	Y	Y	Y							Y	Y	Y
Pimelea spicata Spiked Rice-flower	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Pterostylis gibbosa *Illawarra Greenhood*									Y	Y		
Zieria granulata Illawarra Zieria	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y

Blue column indicates month survey undertaken.

4.4.2 Targeted field surveys – fauna

Targeted surveys for candidate threatened fauna species requiring further assessment and their associated survey periods are outlined for each of the candidate threatened fauna species below (**Table 4.4**).

Targeted surveys were undertaken by Nathan Storch (Ecologist) and Edwin Vaca (Ecologist) on 21 October 2022, and Nathan Storch and Jarrah May-Stubbles (Ecologist) on 25 January 2023 and 14 February 2023.

The field survey only consisted of targeted searches for evidence of large stick nests that may have been constructed by raptors and monitoring of hollows for evidence of occupation by breeding cockatoos. Two Titley Chorus™ devices (ultrasonic bat detector) were placed in suitable Southern Myotis (*Myotis macrocarpus*) habitat within the subject land from 25 January to 14 February 2023.

Table 4.4: Nominated survey months for candidate threatened fauna species

Candidate species	Survey period (BAM Calculator)											
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Callocephalon fimbriatum Gang-gang Cockatoo	Y									Y	Y	Y
Calyptorhynchus lathami Glossy Black-Cockatoo	Y	Y	Y	Y	Y	Y	Y	Y	Y			
Hieraaetus morphnoides Little Eagle								Y	Y	Y		
Lophoictinia isura Square-tailed Kite	Y								Y	Y	Y	Y
Myotis macropus Southern Myotis	Y	Y	Y							Y	Y	Y

Blue column indicates month survey undertaken

Cockatoos – Gang-gang Cockatoo *(Callocephalon fimbriatum*) and Glossy Black-Cockatoo (*Calyptorhynchus lathami*),

Two cockatoo species were identified as candidate threatened fauna species, Gang-gang Cockatoo (*Callocephalon fimbriatum*) and Glossy Black-Cockatoo (*Calyptorhynchus lathami*) for breeding. Both species are included as an ecosystem credit species for foraging habitat. Breeding habitat for the species includes hollow bearing trees with hollows greater than 7 cm diameter at least 3 m above the ground for Gang-gang Cockatoo (*Callocephalon fimbriatum*) and hollows greater than 15 cm diameter, and more than 8 m above the ground for Glossy Black-Cockatoo (*Calyptorhynchus lathami*) (DPE 2023c). Several hollow bearing trees within the subject land represent suitable habitat for these species.

Monitoring of suitable hollows did not detect Gang-gang Cockatoo (*Callocephalon fimbriatum*) or Glossy Black-Cockatoo (*Calyptorhynchus lathami*) during field surveys undertaken in October 2022, and January and February 2023. These species are conspicuous and if present on the subject land, would have been detected during field survey.

Raptors – Little Eagle (*Hieraaetus morphnoides*) and Square-tailed Kite (*Lophoictinia isura*)

Two raptor species were identified as candidate threatened fauna species, Little Eagle (*Hieraaetus morphnoides*) and Square-tailed Kite (*Lophoictinia isura*) for breeding. These species are included as an ecosystem credit species for foraging habitat. Breeding habitat for these species includes live and dead large old trees within suitable vegetation and paddock tree can sometime provide nest trees. All trees were inspected within the subject land during field surveys undertaken in October 2022, and January and February 2023. One stick nest was identified on the subject land. Both species of raptor line nests with green leaves (Marchant and Higgins 1993). The stick nest did not contain green leaves and neither species was recorded during field survey.

Microbat - Southern Myotis (*Myotis macropus*)

Suitable habitat for Southern Myotis (*Myotis macropus*) is present within the subject land. Several hollow bearing trees within the subject land are located within 200 m of farm dams. Two Chorus devices were placed in suitable habitat (flyways between hollow bearing trees and waterbodies) from on 25 January 2023 to 14 February 2023.

Analysis of the monitoring data determined the possible presence of Southern Myotis (*Myotis macropus*). The recorded data was analysed by Angela Bibby (Consultant Ecologist) using the Anabat Insight Software. Taking a precautionary approach to the assessment, Southern Myotis (*Myotis macropus*) habitat was mapped on site based on the possible recording.

Southern Myotis (*Myotis macropus*) habitat was mapped on site consistent with the requirements for the BAM. In the first instance, a 200 m buffer was created around all dams in the locality. The amount of habitat within this buffer (and impacted by the development) was then mapped, including PCT 838, PCT 1105 and PCT 1326. The total impact to Southern Myotis habitat (*Myotis macropus*) is 0.81 ha. See **Table 4.5** and **Table 4.1**.

Table 4.5: Impacts on Southern Myotis (*Myotis macropus*) habitat

PCT name	Vegetation zone	Area of Southern Myotis habitat impacted (ha)*
838 - Forest Red Gum - Thin-leaved Stringybark grassy woodland on coastal lowlands, southern Sydney Basin Bioregion	Disturbed	0.62
	Scattered paddock shrub	0.03
1105 - River Oak open forest of major streams, Sydney Basin Bioregion and South East Corner Bioregion	Planted	0.14
1326 - Woollybutt - White Stringybark - Forest Red Gum grassy woodland on coastal lowlands, southern Sydney Basin Bioregion and South East Corner Bioregion	Disturbed	0.03
Total		**0.81**

*subject to rounding errors.

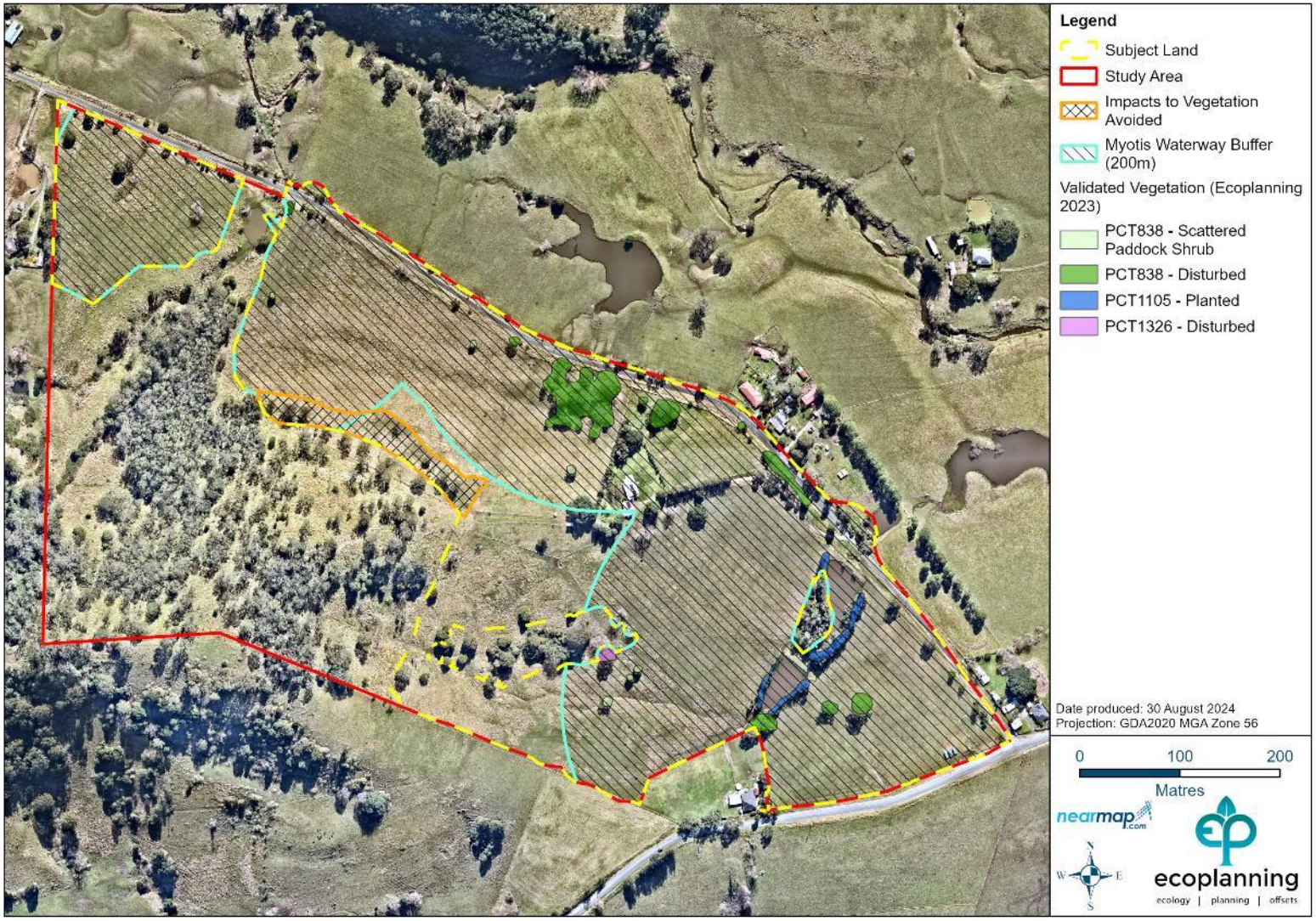

Figure 4.1: Impacted Southern Myotis habitat.

4.5 Identify potential prescribed biodiversity impacts on threatened species

The presence of biodiversity values prescribed by the BC Reg have been considered in context of the subject land **Table 4.6**.

Table 4.6: Prescribed Biodiversity Impacts

Prescribed Biodiversity Impacts	Presence within the Subject Land
(a) the impacts of development on the following habitat of threatened species or ecological communities: (i) karst, caves, crevices, cliffs and other geological features of significance, (ii) rocks, (iii) human made structures, (iv) non-native vegetation,	There are cliffs 3 km to the west of the subject land. No karst or cave systems were identified within the subject land. No prescribed impacts will occur to these geological features. Non-native vegetation within the subject land includes areas mapped as 'exotic vegetation'. Non-native vegetation within the subject land does not conform to any ecological community, nor is it likely to support any threatened species with the potential to occur. Hence, these areas do not constitute a prescribed biodiversity impact.
(b) the impacts of development on the connectivity of different areas of habitat of threatened species that facilitates the movement of those species across their range,	The subject land may facilitate the movement of threatened species across their range. However, the impact is considered 'low', as more intact vegetation outside the subject land is to be retained. This vegetation outside the subject land is of quality to facilitate the movement of threatened species across their range and into the surrounding native vegetation. In addition, the riparian corridor to be retained on the western side of the site will improve connectivity through, and off, the site.
(c) the impacts of development on movement of threatened species that maintains their lifecycle,	
(d) the impacts of development on water quality, water bodies and hydrological processes that sustain threatened species and threatened ecological communities (including from subsidence or upsidence resulting from underground mining or other development)	One first order watercourse has been mapped within the subject land, with first and second order watercourses mapped directly to the west of the subject land (but within the study area). Changes to drainage of the subject land may impact downstream ecosystems, but impacts will be mitigated if appropriate measures are enacted (see **Section 5**).
(e) the impacts of wind turbine strike on protected animals,	Not applicable.
(f) the impacts of vehicle strike on threatened species of animals or on animals that are part of a threatened ecological community.	Not applicable.

5 Avoiding and minimising impacts on biodiversity

5.1 Avoiding and minimising impacts on native vegetation and habitat during project planning

In accordance with Section 7 of the BAM, actions taken to avoid and minimise impacts through locating impacts associated with the project must be documented and justified in the BDAR. Additionally, Section 7 of the BAM states that in selecting a project location, the following should be addressed, as they apply to the project:

- An analysis of alternative modes or technologies that would avoid or minimise impacts on biodiversity values and justification for selecting the proposed mode or technology.
- An analysis of alternative routes that would avoid or minimise impacts on biodiversity values and justification for selecting the proposed route.
- An analysis of alternative locations that would avoid or minimise impacts on biodiversity values and justification for selecting the proposed location.
- An analysis of alternative sites within a property on which the project is proposed that would avoid or minimise impacts on biodiversity values and justification for selecting the proposed site.

The boundary of the proposed development area has been situated in a way that avoids impacts to land of highest biodiversity values within the study area. The development has optimised the location of impacts within areas of exotic vegetation including modifying the boundary of the development to avoid areas of more intact native vegetation and, to the greatest extent possible, watercourses. The proposed development was also adjusted following initial consultation with Wollongong City Council. The remnants of native vegetation within the impact area are generally small, fragmented, and subject to existing disturbance from grazing and weeds.

Within the 37.10 ha study area, 9.11 ha of native vegetation is mapped. This includes 8.80 ha of Illawarra Lowlands Grassy Woodland (both PCT 838 and PCT1326) (**Table 5.1**). Of this vegetation, 1.19 ha is proposed to be impacted by development, representing approximately 2% of the study area, and ~11% of the native vegetation on site.

The majority of the study area is composed of cleared land made up of exotic vegetation. The land has historically been used for agricultural purposes and grazing and thus is degraded. A plot within the areas mapped as 'exotic grasses/cleared land' was undertaken for confirmation of the VI score of these areas, and returned a VI score of 0.8. In its current location, the proposed development will impact 1.19 ha of native vegetation and 22.89 ha of cleared land, planted vegetation or other features like roads or dams.

A drainage swale is proposed to be constructed within land zoned as C2 – Environmental Conservation, around the boundary of the development. The swale has been designed and located in such a way that any substantial patches of vegetation will be avoided.

Table 5.1: Details of PCT within the subject land

Plant Community Type (PCT)	Vegetation formation & class	Condition class	Area in study area (ha)*	Area impacted (ha)*	Area retained in study area (ha)*
PCT 838 - Forest Red Gum – Thin-leaved Stringybark grassy woodland on coastal lowlands, southern Sydney Basin Bioregion	Grassy Woodlands / Coastal Valley Grassy Woodlands	Disturbed	8.09	0.86	7.23
	Grassy Woodlands / Coastal Valley Grassy Woodlands	Scattered paddock shrub (SPS)	0.03	0.03	0
PCT 1105 - River Oak open forest of major streams, Sydney Basin Bioregion and South East Corner Bioregion	Forested Wetlands/ Eastern Riverine Forests	Planted	0.31	0.19	0.12
PCT 1326 - Woollybutt - White Stringybark - Forest Red Gum grassy woodland on coastal lowlands, southern Sydney Basin Bioregion and South East Corner Bioregion	Grassy Woodlands/ Coastal Valley Grassy Woodlands	Disturbed	0.68	0.11	0.57
Total native vegetation			**9.11**	**1.19**	**7.92**
-	Planted native and exotic vegetation	-	0.71	0.60	0.11
-	Exotic grassland	-	26.34	21.50	4.84
-	Dam	-	0.45	0.31	0.14
-	Road	-	0.48	0.48	0
Total vegetation and other			**39.10**	**24.08**	**13.01**

*subject to rounding errors.

5.2 Avoiding and minimising prescribed biodiversity impacts during project planning

Prescribed biodiversity impacts are defined under Clause 6.1 of the BC Reg and include impacts on biodiversity values in addition to, or instead of, impacts from clearing vegetation and/or loss of habitat. Prescribed biodiversity impacts are outlined within **Section 4.5** including their relevance to the proposal. No prescribed biodiversity impacts are anticipated in relation to the proposal, and on this basis avoidance and minimisation of these impacts has been achieved.

6 Assessing and offsetting impacts

6.1 Assessment of impact

6.1.1 Assessing impacts to native vegetation and habitat

The proposed development will include direct impacts to:

- 0.86 ha of PCT 838 Forest Red Gum – Thin-leaved Stringybark grassy woodland on coastal lowlands, southern Sydney Basin Bioregion in disturbed condition
- 0.03 ha of PCT 838 Forest Red Gum – Thin-leaved Stringybark grassy woodland on coastal lowlands, southern Sydney Basin Bioregion in scattered paddock shrub condition
- 0.19 ha of PCT 1105 River Oak open forest of major streams, Sydney Basin Bioregion and South East Corner Bioregion in planted condition
- 0.11 ha PCT 1326 Woollybutt - White Stringybark - Forest Red Gum grassy woodland on coastal lowlands, southern Sydney Basin Bioregion and South East Corner Bioregion in disturbed condition

The direct clearing and subsequent development of the subject land would represent a permanent impact, and in accordance with Section 9.1.2 5) of the BAM, the future VI score for all vegetation within the subject land has been assigned a VI score of zero (0).

Due to recording a VI score <15, the impacts to 0.03 ha of PCT 838 Forest Red Gum – Thin-leaved Stringybark grassy woodland on coastal lowlands, southern Sydney Basin Bioregion in scattered paddock shrub condition does not require an offset. Impacts to the areas mapped as exotic grassland also do not require offset due to a VI score <15.

In addition 0.81 ha of Southern Myotis habitat is mapped within the subject land and will be impacted by the proposal. This impact will be offset consistent with BAM.

6.1.2 Assessing indirect impacts on native vegetation

It is difficult to quantify the indirect impacts associated with the project. Indirect impacts may include, but are not limited to, noise pollution, erosion and increased shading of vegetation associated with the construction of the proposed development. The project is considered unlikely to reduce viability of any adjacent native vegetation or habitat due to edge effects, noise, dust, or light spill as these impacts are already occurring within the area, as much of the area has been cleared and used for agricultural purposes and exists within a peri-urban landscape west of Albion Park.

It is possible that the project may lead to an increase in trampling of flora, rubbish dumping, firewood or bushrock collection, or introduce pests, weeds, or pathogens within adjacent areas of native bushland. However, these impacts will be managed across some areas of the site as part of the proposed VMP.

Changes to the drainage and hydrology of the subject land have the potential to impact on downstream habitats through erosion, sedimentation, and bank scour. These impacts are difficult to quantify, however, mitigation measures such as the preparation of a Vegetation

Management Plan (VMP) which includes management of some of the watercourses within the study area.

Indirect impacts will be managed through the development of a Construction Environmental Management Plan (CEMP), whereby sediment and erosion controls, and weed management will be put in place. Further information regarding mitigation measures which would aim to avoid any indirect impacts are included in **Section 6.3**.

6.2 Assessing prescribed biodiversity impacts

No prescribed biodiversity impacts are anticipated in relation to the proposal, and on this basis avoidance and minimisation of these impacts has been achieved. Impacts to habitat associated with native vegetation are calculated and included in **Section 7**.

6.3 Mitigating and managing impacts on biodiversity values

Multiple measures will be implemented to mitigate and manage direct and indirect impacts where possible, including preparation of a Construction Environmental Management Plan (CEMP), a VMP, and appropriate preclearance protocols. Details are provided in the following sections.

6.3.1 Pre-clearance protocols

Several non-threatened avian species were recorded within the subject land (**Appendix B**), and other common fauna species would be expected to utilise the subject land, such as Common Brushtail Possum (*Trichosurus vulpecula*), various frog species, and potentially Eels (*Anguilla* spp.) in the farm dams. Appropriate pre-clearance protocols are to be put in place at the time of vegetation clearing to mitigate and avoid potential harm or injury to these individuals. These protocols should include, as a minimum, dam-dewatering supervision where farm dams are to be removed.

6.3.2 Construction Environmental Management Plan (CEMP)

A site-specific CEMP will be developed prior to construction taking place and implemented over the life of the project. The CEMP will incorporate adaptive management principles. The CEMP will outline management actions to avoid inadvertently causing additional impacts to those described in this BDAR. Management actions will avoid and/or limit the potential for indirect offsite impacts and include an appropriate erosion and sedimentation control plan and weed control activities. Any management actions should follow best practice protocols such as Landcom (2004).

An appropriate pre-clearance and dam dewatering protocol, and unexpected finds procedure will be put in place at the time of construction to avoid and mitigate any potential harm or injury to non-threatened fauna species.

The CEMP will be required to span the pre, during, and post construction periods, and will include the above pre-clearance and fauna management protocols.

6.4 Adaptive management for uncertain impacts

Impacts associated with the proposal are largely certain and associated with the direct impacts due to vegetation clearing as documented in **Section 6.1**. Uncertain impacts associated with the proposal would be limited to potential impacts to downstream environments, although the risk of these impacts is relatively low and can be mitigated. The areas directly downstream of the subject land have been subjected to recent development impacts. During the construction phase of this project, the works should be undertaken in accordance with best practice sediment and erosion controls and in accordance with any license issued under the NSW *Protection of the Environment Operations Act 1997*.

Aside from the need for a CEMP, no additional adaptive management measures are proposed.

6.5 Thresholds for the assessment and offsetting of impacts of development

6.5.1 Serious and Irreversible Impacts (SAII)

This section documents the additional impact assessment provisions for species and ecological communities at risk of SAII (Section 9.1.2 of the BAM). For this BDAR the potential SAII PCTs are:

- PCT 838 – Forest Red Gum – Thin-leaved Stringybark grassy woodland on coastal lowlands, southern Sydney Basin Bioregion
- PCT 1326 - Woollybutt - White Stringybark - Forest Red Gum grassy woodland on coastal lowlands, southern Sydney Basin Bioregion and South East Corner Bioregion

Both communities have been classified as Illawarra Lowlands Grassy Woodland, and Endangered Ecological Community (EEC) under the BC Act 2016. The TEC is listed as a possible SAII entity under the BAM.

The vegetation integrity scores for the TEC are provided in **Table 6.1**. Detailed consideration of whether impacts on Illawarra Lowlands Grassy Woodland are serious and irreversible are included in **Table 6.2**. Consideration was given to the principles and criteria set out in the *Guidance to assist a decision-maker to determine a serious and irreversible impact* (DPIE 2019).

Table 6.1: Vegetation integrity scores for Illawarra Lowlands Grassy Woodland

Plant Community Types (PCTs)	Veg zones	Area impacted (ha)	Vegetation Integrity (VI) Score			
			Composition condition score	Structure condition score	Function condition score	Final VI Score
PCT 838 - Forest Red Gum – Thin-leaved Stringybark grassy woodland on coastal lowlands, southern Sydney Basin Bioregion	Disturbed	0.86	60.1	14	27.3	28.4
	SPS	0.03	21.5	7.4	0	1.7

Plant Community Types (PCTs)	Veg zones	Area impacted (ha)	Vegetation Integrity (VI) Score			
			Composition condition score	Structure condition score	Function condition score	Final VI Score
PCT 1326 - Woollybutt - White Stringybark - Forest Red Gum grassy woodland on coastal lowlands, southern Sydney Basin Bioregion and South East Corner Bioregion	Disturbed	0.11	72.7	33.7	67	54.8

Table 6.2: SAII assessment for PCT 838 (Illawarra Lowlands Grassy Woodland)

SAII (BAM [2020], Section 9.1.1)	Response*
1) The action and measures taken to avoid the direct and indirect impact on the potential entity for an SAII	The actions and measures taken to avoid direct and indirect impacts on Illawarra Lowlands Grassy Woodland (ILGW) and native vegetation more broadly are outlined in Section 5. The proposal has been located within large areas of cleared land and planted vegetation, and has been sited to avoid impacts to native vegetation. The effort to avoid native vegetation has resulted in the retention of 7.92 ha out of a total 8.80 ha of the EEC mapped within the study area, and approximately 39.11 ha is found in the area surrounding the subject land (500 m buffer) (**Figure 6.1**). The proposal has been located and designed to impact areas of non-native vegetation (over 95% of the subject land is non-native vegetation), which currently supports exotic grassland or planted vegetation. Avoidance of all ILGW within the subject land is not possible due to the siting of all elements of the proposal, including a viable lot layout and associated infrastructure. A CEMP will be implemented during the construction of the project to reduce the potential of indirect or inadvertent impacts outside of the development footprint.

SAII (BAM [2020], Section 9.1.1)	Response*
2) The assessor must consult the TBDC and/or sources to report on the current status of the TEC including: a) evidence of reduction in geographic distribution as the current total geographic extent of the TEC in NSW AND the estimated reduction in geographic extent of the TEC since 1970.	The TBDC lists the following under SAII Principles for ILGW: • Principle 1: The impact will cause a further decline of a species or ecological community that is currently observed, estimated, inferred or reasonably suspected to be in a rapid rate of decline • Principle 2: The impact will further reduce the population size of the species or ecological community that is currently observed, estimated, inferred or reasonably suspected to have a very small population size • Principle 3: The impact is made on the habitat of the species or ecological community that is currently observed, estimated, inferred or reasonably suspected to have a very limited geographic distribution The final determination (TSSC 2011) for the EEC listing states the following in relation to the current status and reduction in distribution: • *Large areas of Illawarra Lowlands Grassy Woodland have been cleared. Most remnants are small and fragmented and their long term viability is threatened. Some remnants consist of regrowth after clearing or other disturbances'; and,* • *No areas of Illawarra Lowlands Grassy Woodland are presently included in formal conservation reserves though some occur in small council reserves including Blackbutt Reserve and Croome Road Reserve in Shellharbour.*
b) extent of reduction in ecological function for the TEC using evidence that describes the degree of environmental degradation or disruption to biotic processes indicated by: i) change in community structure ii) change in species composition iii) disruption of ecological processes iv) invasion and establishment of exotic species v) degradation of habitat, and vi) fragmentation of habitat.	The proposed development will remove 1.00 ha of ILGW in various condition states (with VI scores of 28.4, 1.7 and 54.8). The removal of this TEC is unlikely to have an impact on the community structure, species composition, ecological process, or further degrade or fragment habitat across its range locally or in the broader landscape. The ILGW to be removed exists in disturbed or scattered paddock shrub condition states in smaller, isolated patches The removal of the TEC in the subject land will have a minimal effect on the function of the TEC within the locality. Across its range and locally, ILGW has been subject to considerable change in composition, structure, function, and connectivity due to the expansion of urban development and infrastructure, resulting in extensive areas being cleared and high levels of fragmentation locally. The scientific determination refers to evidence of a reduction in extent, fragmentation, ecological process and function, and an increase in degradation over time since European settlement (TSSC 2011).

SAII (BAM [2020], Section 9.1.1)	Response*
c) evidence of restricted geographic distribution, based on the TEC's geographic range in NSW according to the: i) extent of occurrence ii) area of occupancy iii) number of threat-defined locations	ILGW is restricted to the lower escarpment slopes and coastal rainshadow valleys below 350 m elevation from Wollongong to Milton and west to Yalwal (DPE 2022b). It occurs on relatively gently sloping to undulating lands less than 200 m elevation on Berry Siltstone, Budgong Sandstone and Quaternary Alluvium (TSSC 2011). The area of PCT 838 remaining within the NSW VIS is estimated to have been cleared by 85% of its previous extent. The area of PCT 1326 remaining within the NSW VIS is estimated to have been cleared by 95% of its previous extent. The TBDC refers to an area of occupancy of <10 km² and extent of occurrence of <100 km². Tozer et al 2010 maps the extent of this community within NSW as 2999.28 ha (**Figure 6.2**). No areas of ILGW are presently included in formal conservation reserves, though small council reserves including Blackbutt Reserve and Croome Road Reserve contain some ILGW.
d) evidence that the TEC is unlikely to respond to management.	The Saving Our Species (SoS) Strategy for ILGW lists a number of threats that can be managed at a site scale, including actions such as weed control, shooting feral herbivores, restricting site access to prevent damage from grazing animals and recreation activities (DPE 2022d); but, there is no data to address this matter. However, it is the experience of the author that ILGW has been the subject of assisted and natural regeneration with positive outcomes. Several reserves, Biobank sites, and actively managed remnants respond well to management providing suitable resources are allocated to vegetation management and restoration.
3) Where the TBDC indicates data is "unknown" or "data deficient" for a TEC for a criterion listed in Sub-section 9.1.2(2), the assessor must record this in the BDAR or BCAR	N/A

SAII (BAM [2020], Section 9.1.1)	Response*
4) In relation to the impacts from the proposal on the TEC at risk of an SAII, the assessor must include data and information on: a) the impact of geographic extent of the TEC by estimate the total area of the TEC to be impacted by the proposal: i) in hectares, and ii) as a percentage of the current geographical extent of the TEC in NSW. Data should include direct impacts and indirect impacts where partial loss of the TEC is likely as a result of the proposal.	The proposal will remove 1.00 ha of the ILGW. The area to be removed equates to 0.03% of the extent of the community within NSW as mapped by Tozer et al 2010. The occurrence ILGW within 500 m of the subject land is estimated to be 39.11 ha and 38.11 ha will be retained after clearing (**Figure 6.1**).
b) the extent that the proposed impacts are likely to contribute to further environmental degradation or the disruption of biotic processes of the TEC by: 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 proposal ii) describing the impacts on connectivity and fragmentation of the remaining areas of TEC. iii) describing the condition of the TEC according to the vegetation integrity score for the relevant vegetation zone. The assessor must also include the relevant composition, structure and function conditions scores for each vegetation zone.	Approximately 39.11 ha of ILGW occurs within 500 m of the Development Footprint (**Figure 6.1**). The removal of 1.00 ha of ILGW in disturbed and scattered paddock shrub condition, which is generally isolated, small patches, will not fragment or further isolate any patches of ILGW, nor will it prevent connectivity of ILGW within the locality. The proposal includes the retention of a large area of vegetation directly to the west of the subject land. This area contains a larger patch of ILGW and will be managed as part of a Vegetation Management Plan (VMP). Revegetation will also be completed as part of the VMP consistent with ILGW. The comprising ILGW had VI scores of 28.4, 1.7 and 54.8. These scores are reasonably low and represent a level of degradation of the vegetation within the subject lands. This is due to edge effects, weed invasion, and evidence of grazing. These pressures will continue without development to further degrade the vegetation. The development is not likely to have additional impacts to the quality and integrity of the occurrence of ILGW outside of the subject land ,and with the management of the land under the VMP is likely to improve the condition of adjacent ILGW.

SAII (BAM [2020], Section 9.1.1)	Response*
5.) The assessor may also provide new information to demonstrate that the principle identifying the TEC at risk of an SAII, is not accurate.	No new information is provided.
Conclusion	The impact to 1.00 ha of Illawarra Lowland Grassy Woodland within the subject land represents only 11% of the 8.80 ha of ILGW within the study area, 2.6% of the 39.11 ha within 500 m and 0.03% of the almost 3,000 ha mapped in NSW. Given the small area of Illawarra Lowland Grassy Woodland to be impacted within the subject land, and the degraded and isolated condition of the remnants found, the proposed development is considered unlikely to result in an SAII.

*TEC information from the BioNet Vegetation Classification (DPE 2022b) or NSW Scientific Committee – final determination (TSSC 2011) unless otherwise stated

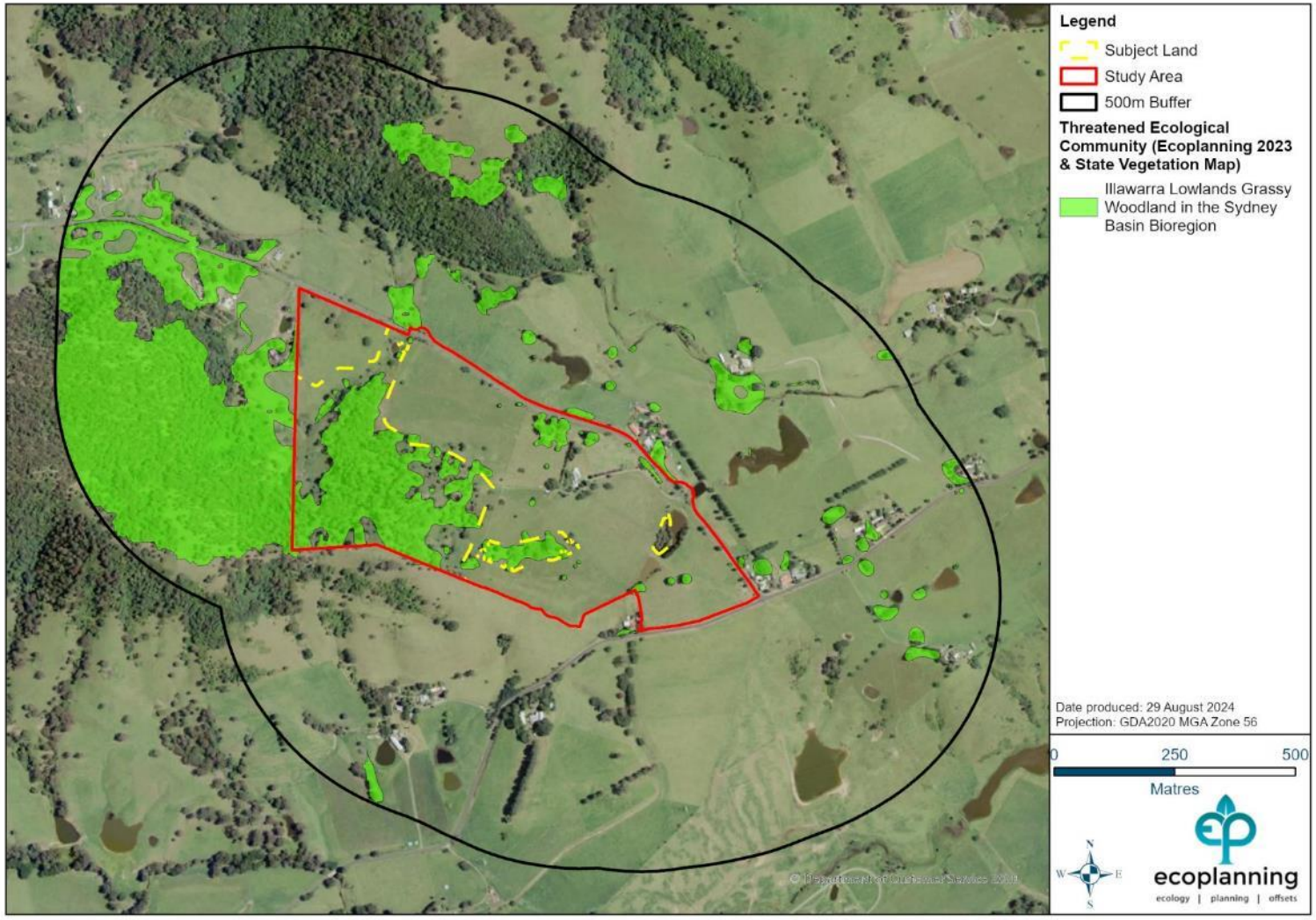

Figure 6.1: Mapped extent of Illawarra Lowlands Grassy Woodland in the Sydney Basin Bioregion within a 500 m buffer of the subject land (Ecoplanning 2023 and State Vegetation Map).

Figure 6.2: Mapped extent of Illawarra Lowlands Grassy Woodland in the Sydney Basin Bioregion within NSW (Tozer et al. 2010).

7 Offset requirements and credit calculations

A biodiversity offset requirement for residual impacts of a proposed development must be calculated in accordance with Section 10.1 and Section 10.2 of the BAM. The following section outlines the credit requirements for the development to achieve the 'no net loss standard' as established by the BAM.

7.1 Impacts which require an offset

Section 9.2.1 of the BAM indicates that the following vegetation zones require offsets:

- vegetation zones that have a vegetation integrity score ≥15[1] where the PCT is representative of an endangered (EEC) or critically endangered ecological community (CEEC)
- a vegetation zone that has a vegetation integrity score of ≥17 where the PCT is associated with threatened species habitat or is a vulnerable ecological community
- a vegetation zone that has a vegetation integrity score ≥20.

Areas are displayed in **Figure 7.1**.

7.1.1 Ecosystem credits

The proposal will remove 1.19 ha of native vegetation, 1.16 that requires offset. A total of 18 **ecosystem credits** are required to offset the impacts to vegetation within the subject land, see **Table 7.1**.

Table 7.1: Ecosystem credit summary

Veg zone number	Plant community type	Condition class	Total impact (ha)	Credits
1	838	Disturbed	0.86	12
2	1105	Planted	0.19	3
3	838	SPS	0.03	0
4	1326	Disturbed	0.11	3
5	838	Exotic grassland	21.50	0
Total				**18**

Planted native vegetation totals 0.47 ha; Blue requires offset as VI score < 15.

[1] This threshold is relevant to the vegetation within the subject land

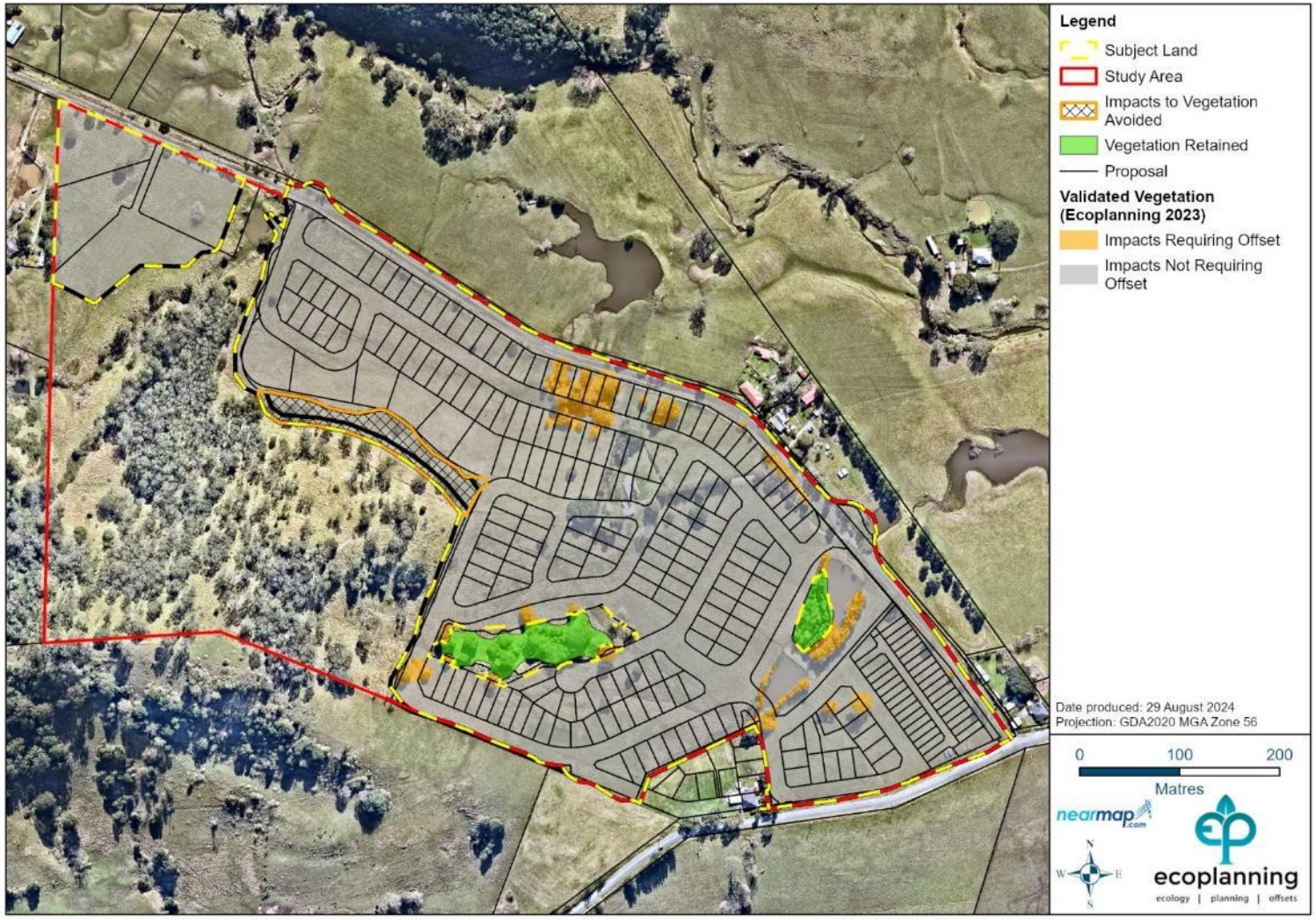

Figure 7.1: Impacted vegetation requiring offsets.

7.1.2 Impacts on threatened species

The proposed development impacts of mapped habitat for Southern Myotis (*Myotis Macropus*). A total of impact of 0.81 ha requires 15 species credits to be offset (see **Section 4.4**).

Table 7.2: Species credit summary (Southern Myotis)

Veg zone number	Plant community type	Condition class	Total impact (ha)	Credits
1	838	Disturbed	0.62	9
2	1105	Planted	0.14	3
3	838	SPS	0.03	1
4	1326	Disturbed	0.03	1
Total				**14**

7.2 Impacts which do not require an offset

As noted in **Table 7.1**, two zones have a VI score <15 and therefore do not require an offset. This includes the impacts to 0.03 ha of PCT 838 Forest Red Gum – Thin-leaved Stringybark grassy woodland on coastal lowlands, southern Sydney Basin Bioregion in SPS condition and impacts to the areas mapped as Exotic grassland.

7.3 Areas not requiring assessment

Impacts to non-native vegetation were assessed and do not require offset due to the vegetation integrity score being <15.

8 References

Commonwealth Department of the Environment (DotE 2013). *Matters of National Environmental Significance: Significant impact guidelines 1.1*. Commonwealth of Australia.

Chafer, C.J., and Brandis, C.C.P. (2012) Handbook of Birds found in the Illawarra, Shoalhaven and Adjacent Tablelands, 2nd edition. Illawarra Bird Observers Club, Wollongong.

Commonwealth Threatened Species Scientific Committee (Commonwealth TSSC) (2016). Approved conservation advice (incorporating listing advice) for the Illawarra and south coast lowland forest and woodland ecological community. Accessed at: https://www.environment.gov.au/cgi-bin/sprat/public/publicshowcommunity.pl?id=144.

Commonwealth Threatened Species Scientific Committee (Commonwealth TSSC) (2020). Conservation Advice for the River-flat eucalypt forest on coastal floodplains of southern New South Wales and eastern Victoria. Accessed at: https://www.environment.gov.au/cgi-bin/sprat/public/publicshowcommunity.pl?id=154&status=Critically+Endangered.

Eco Logical Australia (ELA) (2012). Ecological Sensitivity Analysis for Yallah – Marshall Mount. Prepared for Wollongong City Council.

Eco Logical Australia (ELA) (2013a). West Dapto Urban Release Area – Updated vegetation map, threatened species survey and Biodiversity Conservation options – Volume 1. Prepared for Wollongong City Council.

Eco Logical Australia (ELA) (2013b). West Dapto Urban Release Area – Updated vegetation map, threatened species survey and Biodiversity Conservation options – Volume 2 – flora-fauna inventory. Prepared for Wollongong City Council.

Environment Australia (2001). Directory of Important Wetlands.

Marchant, S., and Higgins, P.J. (1993) Handbook of Australian, New Zealand & Antarctic Birds, Volume 2. Oxford University Press, Melbourne.

NSW Department of Environment and Climate Change (DECC) (2016). NSW Mitchell Landscapes – version 3.1. Available online: https://datasets.seed.nsw.gov.au/dataset/nsw-mitchell-landscapes-version-3-1

NSW Department of Planning Industry and Environment (DPIE) (2019). *Guidance to assist a decision-maker to determine a serious and irreversible impact*. Published by Environment, Energy and Science (EES), Sydney.

NSW Department of Planning, Industry and Environment (DPIE) (2020). *Biodiversity Assessment Method*. Department of Planning, Industry and Environment, Sydney.

NSW Department of Planning and Environment (DPE) (2023a). NSW State Vegetation Type Map. Accessed at: https://www.environment.nsw.gov.au/topics/animals-and-plants/biodiversity/nsw-bionet/state-vegetation-type-map.

NSW Department of Planning and Environment (DPE) (2023b). BioNet Vegetation Classification Database. Accessed at: https://www.environment.nsw.gov.au/topics/animals-and-plants/biodiversity/nsw-bionet/about-bionet-vegetation-classification.

NSW Department of Planning and Environment (DPE) (2023c). BioNet – Atlas of NSW Wildlife. Accessed at: https://www.environment.nsw.gov.au/topics/animals-and-plants/biodiversity/nsw-bionet/about-bionet-atlas.

NSW Department of Planning and Environment (DPE) (2023d). NSW Biodiversity Values Map. Online database available at: https://www.lmbc.nsw.gov.au/Maps/index.html?viewer=BOSETMap, accessed 2023

NSW Department of Planning and Environment (DPE) (2022). Koala (*Phascolarctos cinereus*) Biodiversity Assessment Method Survey Guide. Accessed at: https://www.environment.nsw.gov.au/research-and-publications/publications-search/koala-phascolarctos-cinereus-biodiversity-assessment-method-survey-guide.

NSW Department of Planning, Industry and Environment (DPIE) (2019). NSW Koala Likelihood Map v2.0 (August 2019). Accessed at: https://datasets.seed.nsw.gov.au/dataset/koala-likelihood-map-v2-0-august-2019.

NSW Department of Planning, Industry and Environment (DPIE) (2020). *Surveying threatened species and their habitats.* Accessed at: https://www.environment.nsw.gov.au/research-and-publications/publications-search/surveying-threatened-plants-and-their-habitats-survey-guide-for-the-biodiversity-assessment-method.

NSW Land and Property Information (LPI) (2023). SIX Maps. Accessed at: https://maps.six.nsw.gov.au/.

NSW NPWS (2002) *Native Vegetation of the Illawarra Escarpment and Coastal Plain - Bioregional Assessment Study Part I*. NSW NPWS, Hurstville.

NSW Threatened Species Scientific Committee (NSW TSSC) (1999). Illawarra Lowlands Grassy Woodland in the Sydney Basin – endangered ecological community listing. Accessed at: https://www.environment.nsw.gov.au/topics/animals-and-plants/threatened-species/nsw-threatened-species-scientific-committee/determinations/final-determinations/1996-1999/illawarra-lowlands-grassy-woodland-sydney-basin-bioregion-endangered-ecological-community-listing.

NSW Threatened Species Scientific Committee (NSW TSSC) (2004). River-flat Eucalypt forest on coastal floodplains of the NSW North Coast, Sydney Basin, and South East Corner bioregions – Endangered ecological community. Accessed at: https://www.environment.nsw.gov.au/topics/animals-and-plants/threatened-species/nsw-threatened-species-scientific-committee/determinations/final-determinations/2004-2007/river-flat-eucalypt-forest-coastal-floodplains-endangered-ecological-community.

NSW Threatened Species Scientific Committee (NSW TSSC) (2014). *Haloragis exalata* subsp. *exalata* – rejection of delisting. Accessed at: https://www.environment.nsw.gov.au/topics/animals-and-plants/threatened-species/nsw-

threatened-species-scientific-committee/determinations/final-determinations/2013-2015/haloragis-exalata-subsp-exalata-rejection-of-delisting.

Tozer, M.G., Turner, K., Simpson, C., Keith, D.A., Beukers, P., MacKenzie, B., Tindall, D. & Pennay, C. (2006). *Native vegetation of southeast NSW: a revised classification and map for the coast and eastern tablelands*. NSW Department of Environment and Conservation & NSW Department of Natural Resources.

Tozer, M.G., Turner, K., Keith, D.A., Tindall, D., Pennay, C., Simpson, C., MacKenzie, B., Beukers, P. and Cox, S. (2010) *Native Vegetation of Southeast NSW: a Revised Classification and Map for the Coast and Eastern Tablelands*. Cunninghamia 11(3): 359-406.

Appendix A Plot data collected

Plot No.	PCT	Area (ha)	Condition class	Zone	Easting	Northing	Bearing
1	838	0.68	Disturbed	56	292981	6175559	190
2	1105	0.19	Planted	56	293277	6175333	195
3	838	0.03	SPS	56	292997	6175460	280
4	1326	0.11	Disturbed	56	292969	6175287	90
5	838	18.40	Exotic_grassland	56	293311	6175272	210

Plot No.	Composition					
	Tree	Shrub	Grass	Forb	Fern	Other
1	3	2	8	9	0	1
2	2	2	5	2	0	1
3	0	1	7	1	0	1
4	4	4	8	7	1	3
5	0	0	3	0	0	0

Plot No.	Structure					
	Tree	Shrub	Grass	Forb	Fern	Other
1	17.2	3.1	9.4	2.1	0.0	0.1
2	36.0	0.2	14.0	2.2	0.0	0.1
3	0.0	6.0	11.1	0.1	0.0	0.1
4	13.6	30.5	16.5	7.9	0.5	2.6
5	0.0	0.0	11.1	0.0	0.0	0.0

Plot No.	Function										
	Large trees	Hollow trees	Litter cover (%)	Fallen logs (m)	Tree stem 5-10 cm	Tree stem 10-20 cm	Tree stem 20-30 cm	Tree stem 30-50 cm	Tree stem 50-80 cm	Tree regen	High threat exotic
1	0	1	12.2	0.0	0	0	1	1	1	1	78.8
2	0	0	57.0	0.0	1	1	1	1	0	1	38.5
3	0	0	0.9	1.5	0	0	0	0	0	0	62.5
4	1	4	30.0	36.0	1	1	0	0	0	1	47.4
5	0	0	2.0	0.0	0	0	0	0	0	0	78.1

Appendix B Flora and fauna species inventories

Flora recorded on site

Species name	Native/Exotic	Plot 1	Plot 2	Plot 3	Plot 4	Plot 5
Acacia longissima	Native		X			
Acacia maidenii	Native	X				
Adiantum aethiopicum	Native				X	
Alphitonia excelsa	Native	X				
Alternanthera denticulata	Native	X				
Anredera cordifolia	Exotic				X	
Araujia sericifera	Exotic		X		X	
Aster subulatus	Exotic	X				
Axonopus fissifolius	Exotic	X	X	X	X	X
Backhousia myrtifolia	Native				X	
Bidens pilosa	Exotic	X			X	
Bothriochloa macra	Native	X		X		
Bromus catharticus	Exotic	X	X	X	X	
Carex inversa	Native	X	X	X	X	
Carex longebrachiata	Native	X		X	X	
Casuarina cunninghamiana subsp. cunninghamiana	Native		X			
Cenchrus clandestinus	Exotic	X	X			X
Chloris gayana	Exotic	X	X	X	X	X
Cirsium vulgare	Exotic	X	X		X	
Commelina cyanea	Native	X			X	
Conyza spp.	Exotic	X		X	X	
Cyathea spp.	Native				X	
Cyclospermum leptophyllum	Exotic	X		X		
Cynodon dactylon	Native	X	X	X	X	X
Cyperus brevifolius	Exotic	X	X	X		X
Cyperus eragrostis	Exotic					X
Cyperus laevis	Native	X			X	
Dactylis glomerata	Exotic				X	
Delairea odorata	Exotic				X	
Dichelachne spp.	Native					X
Dichondra repens	Native	X	X		X	
Echinopogon caespitosus	Native				X	
Ehrharta erecta	Exotic				X	
Einadia hastata	Native	X				
Einadia nutans	Native				X	
Eragrostis brownii	Native			X		
Eucalyptus longifolia	Native				X	
Eucalyptus tereticornis	Native	X				
Euphorbia peplus	Exotic	X	X	X	X	

Species name	Native/Exotic	Plot 1	Plot 2	Plot 3	Plot 4	Plot 5
Ficus rubiginosa	Native				X	
Ficus spp.	Exotic			X		
Fimbristylis dichotoma	Native	X				
Gamochaeta spp.	Exotic			X		
Geitonoplesium cymosum	Native				X	
Geranium solanderi	Native	X			X	
Glycine spp.	Native			X		
Glycine tabacina	Native	X				
Juncus usitatus	Native				X	
Lantana camara	Exotic		X		X	
Ligustrum sinense	Exotic	X	X			
Linum trigynum	Exotic	X				
Lobelia purpurascens	Exotic				X	
Lolium spp.	Exotic			X	X	
Lysimachia arvensis	Exotic	X		X	X	
Lythrum hyssopifolia	Native	X				
Melaleuca quinquenervia	Native		X			
Melaleuca styphelioides	Native	X		X	X	
Melia azedarach	Native				X	
Microlaena stipoides	Native		X	X	X	
Modiola caroliniana	Exotic				X	
Nyssanthes diffusa	Native	X				
Oplismenus aemulus	Native		X			
Oplismenus imbecillis	Native		X			
Oplismenus spp.	Native	X			X	
Oxalis perennans	Native	X	X	X	X	
Pandorea pandorana	Native				X	
Parsonsia straminea	Native		X			
Paspalum dilatatum	Exotic			X	X	X
Phalaris spp.	Exotic				X	
Phoenix canariensis	Exotic				X	
Phyllanthus spp.	Exotic				X	
Pittosporum multiflorum	Native				X	
Pittosporum undulatum	Native	X	X		X	
Plantago lanceolata	Exotic	X	X		X	
Pseuderanthemum variabile	Native				X	
Rumex brownii	Native	X				
Rumex spp.	Native				X	
Senecio madagascariensis	Exotic	X	X	X	X	
Senecio madagascariensis	Exotic	X	X	X	X	
Senna pendula var. glabrata	Exotic		X		X	
Setaria parviflora	Exotic	X	X	X		
Setaria pumila	Exotic					X
Sida rhombifolia	Exotic	X	X	X	X	

Species name	Native/Exotic	Plot 1	Plot 2	Plot 3	Plot 4	Plot 5
Solanum linnaeanum	Exotic	X				
Solanum mauritianum	Exotic	X	X		X	
Solanum nigrum	Exotic		X		X	
Solanum pseudocapsicum	Exotic		X		X	
Sonchus oleraceus	Exotic	X	X	X	X	
Sporobolus elongatus	Native	X		X		X
Streblus brunonianus	Native				X	
Taraxacum officinale	Exotic	X	X	X	X	X
Trifolium repens	Exotic			X		X
Trifolium spp.	Exotic	X				
Verbena bonariensis	Exotic			X		
Verbena rigida var. rigida	Exotic	X	X	X	X	
Vulpia spp.	Exotic		X			

Fauna recorded on site

Species	Common Name	Observed/Heard
Bats		
Austronomous australis	White-striped Freetail Bat	Heard (Titley Chorus™)
Chalinolobus gouldii	Gould's Wattled Bat	Heard (Titley Chorus™)
Falsistrellus tasmaniensis	Eastern Falsistrelle	Heard (Titley Chorus™)
Micronomus norfolkensis	Eastern Coastal Free-tailed Bat	Heard (Titley Chorus™)
Miniopterus australis	Little Bent-winged Bat	Heard (Titley Chorus™)
Miniopterus orianae oceanensis	Eastern Bent-winged Bat	Heard (Titley Chorus™)
Myotis macropus	Southern Myotis	Heard (possible) (Titley Chorus™)
Ozimops ridei	Ride's Free-tailed Bat	Heard (Titley Chorus™)
Scoteanax rueppellii	Greater Broad-nosed Bat	Heard (Titley Chorus™)
Vespadelus pumilus	Eastern Forest Bat	Heard (Titley Chorus™)
Vespadelus vulturnus	Little Forest Bat	Heard (Titley Chorus™)
Birds		
Chenonetta jubata	Australian Wood Duck	Seen
Coracina novaehollandiae	Black-faced Cuckoo-shrike	Seen

Species	Common Name	Observed/Heard
Corvus coronoides	Australian Raven	Seen
Dacelo novaeguineae	Laughing Kookaburra	Seen
Grallina cyanoleuca	Magpie-lark	Seen
Lopholaimus antarcticus	Topknot Pigeon	Seen
Manorina melanocephala	Noisy Miner	Seen
Platycercus eximius	Eastern Rosella	Seen
Rhipidura leucophrys	Willie Wagtail	Seen
Todiramphus sanctus	Sacred Kingfisher	Seen
Trichoglossus haematodus	Rainbow Lorikeet	Seen

Appendix C BAM Calculator Reports

BAM Biodiversity Credit Report (Like for like)

Proposal Details

Assessment Id 00037515/BAAS17012/23/00037516	Proposal Name 27 North Marshall Mount Road	BAM data last updated * 14/03/2024
Assessor Name Lucas McKinnon	Assessor Number BAAS17012	BAM Data version * 67
Proponent Names Cameron Beames	Report Created 30/08/2024	BAM Case Status Finalised
Assessment Revision 1	Assessment Type Part 4 Developments (General)	Date Finalised 30/08/2024
BOS entry trigger BOS Threshold: Area clearing threshold	* Disclaimer: BAM data last updated may indicate either complete or partial update of the BAM calculator database. BAM calculator database may not be completely aligned with Bionet.	

Potential Serious and Irreversible Impacts

Name of threatened ecological community	Listing status	Name of Plant Community Type/ID
Illawarra Lowlands Grassy Woodland in the Sydney Basin Bioregion	Endangered Ecological Community	838-Forest Red Gum - Thin-leaved Stringybark grassy woodland on coastal lowlands, southern Sydney Basin Bioregion
Illawarra Lowlands Grassy Woodland in the Sydney Basin Bioregion	Endangered Ecological Community	1326-Woollybutt - White Stringybark - Forest Red Gum grassy woodland on coastal lowlands, southern Sydney Basin Bioregion and South East Corner Bioregion

Species

NSW GOVERNMENT

BAM Biodiversity Credit Report (Like for like)

Nil

Additional Information for Approval

PCT Outside Ibra Added

None added

PCTs With Customized Benchmarks

PCT
No Changes

Predicted Threatened Species Not On Site

Name
No Changes

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

NSW GOVERNMENT

BAM Biodiversity Credit Report (Like for like)

Name of Plant Community Type/ID	Name of threatened ecological community	Area of impact	HBT Cr	No HBT Cr	Total credits to be retired
838-Forest Red Gum - Thin-leaved Stringybark grassy woodland on coastal lowlands, southern Sydney Basin Bioregion	Illawarra Lowlands Grassy Woodland in the Sydney Basin Bioregion	22.4	12	0	12
1105-River Oak open forest of major streams, Sydney Basin Bioregion and South East Corner Bioregion	Not a TEC	0.2	0	3	3
1326-Woollybutt - White Stringybark - Forest Red Gum grassy woodland on coastal lowlands, southern Sydney Basin Bioregion and South East Corner Bioregion	Illawarra Lowlands Grassy Woodland in the Sydney Basin Bioregion	0.1	3	0	3

838-Forest Red Gum - Thin-leaved Stringybark grassy woodland on coastal lowlands, southern Sydney Basin Bioregion

Like-for-like credit retirement options

Name of offset trading group	Trading group	Zone	HBT	Credits	IBRA region
Illawarra Lowlands Grassy Woodland in the Sydney Basin Bioregion This includes PCT's: 838, 1326, 3269, 3327, 3330, 4052	-	838_Disturbed	Yes	12	Illawarra, Ettrema, Jervis, Moss Vale, Sydney Cataract and Northern Basalts. or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.

Assessment Id
00037515/BAAS17012/23/00037516

Proposal Name
27 North Marshall Mount Road

Page 3 of 6

NSW GOVERNMENT

BAM Biodiversity Credit Report (Like for like)

	Illawarra Lowlands Grassy Woodland in the Sydney Basin Bioregion This includes PCT's: 838, 1326, 3269, 3327, 3330, 4052	-	838_SPS	No	0	Illawarra, Ettrema, Jervis, Moss Vale, Sydney Cataract and Northern Basalts. or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.
	Illawarra Lowlands Grassy Woodland in the Sydney Basin Bioregion This includes PCT's: 838, 1326, 3269, 3327, 3330, 4052	-	838_Exotic_grassland	No	0	Illawarra, Ettrema, Jervis, Moss Vale, Sydney Cataract and Northern Basalts. or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.

1105-River Oak open forest of major streams, Sydney Basin Bioregion and South East Corner Bioregion	**Like-for-like credit retirement options**					
	Class	Trading group	Zone	HBT	Credits	IBRA region

NSW GOVERNMENT

BAM Biodiversity Credit Report (Like for like)

	Eastern Riverine Forests This includes PCT's: 42, 84, 85, 485, 486, 1105, 1106, 1108, 1127, 1270, 1271, 1292, 1293, 1318, 1714, 3020, 4061, 4063, 4064, 4065, 4066, 4067, 4068, 4069, 4070, 4071, 4072, 4073, 4075, 4076, 4077, 4078, 4079, 4080, 4081, 4083, 4084, 4085, 4086, 4087, 4139	Eastern Riverine Forests <50%	1105_Planted	No	3	Illawarra, Ettrema, Jervis, Moss Vale, Sydney Cataract and Northern Basalts. or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.
1326-Woollybutt - White Stringybark - Forest Red Gum grassy woodland on coastal lowlands, southern Sydney Basin Bioregion and South East Corner Bioregion	**Like-for-like credit retirement options**					
	Name of offset trading group	Trading group	Zone	HBT	Credits	IBRA region
	Illawarra Lowlands Grassy Woodland in the Sydney Basin Bioregion This includes PCT's: 838, 1326, 3269, 3327, 3330, 4052	-	1326_Disturbed	Yes	3	Illawarra, Ettrema, Jervis, Moss Vale, Sydney Cataract and Northern Basalts. or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.

NSW GOVERNMENT

BAM Biodiversity Credit Report (Like for like)

1326-Woollybutt - White Stringybark - Forest Red Gum grassy woodland on coastal lowlands, southern Sydney Basin Bioregion and South East Corner Bioregion	

Species Credit Summary

Species	Vegetation Zone/s	Area / Count	Credits
Myotis macropus / Southern Myotis	**1326_Disturbed, 838_Disturbed, 1105_Planted, 838_SPS**	0.8	14.00

Credit Retirement Options

Like-for-like credit retirement options

Myotis macropus / Southern Myotis	Spp	IBRA subregion
	Myotis macropus / Southern Myotis	Any in NSW

NSW GOVERNMENT

BAM Credit Summary Report

Proposal Details

Assessment Id	Proposal Name	BAM data last updated *
00037515/BAAS17012/23/00037516	27 North Marshall Mount Road	14/03/2024
Assessor Name	Report Created	BAM Data version *
Lucas McKinnon	30/08/2024	67
Assessor Number	BAM Case Status	Date Finalised
BAAS17012	Finalised	30/08/2024
Assessment Revision	Assessment Type	BOS entry trigger
1	Part 4 Developments (General)	BOS Threshold: Area clearing threshold

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

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

Zone	Vegetation zone name	TEC name	Current Vegetation integrity score	Change in Vegetation integrity (loss / gain)	Area (ha)	Sensitivity to loss (Justification)	Species sensitivity to gain class	BC Act Listing status	EPBC Act listing status	Biodiversity risk weighting	Potential SAII	Ecosystem credits
Forest Red Gum - Thin-leaved Stringybark grassy woodland on coastal lowlands, southern Sydney Basin Bioregion												
1	838_Disturbed	Illawarra Lowlands Grassy Woodland in the Sydney Basin Bioregion	28.4	28.4	0.86	Geographic Distribution	High Sensitivity to Gain	Endangered Ecological Community	Not Listed	2.00	True	12

NSW GOVERNMENT

BAM Credit Summary Report

3	838_SPS	Illawarra Lowlands Grassy Woodland in the Sydney Basin Bioregion	1.7	1.7	0.03	Geographic Distribution	High Sensitivity to Gain	Endangered Ecological Community	Not Listed	2.00	True	0
5	838_Exotic_grassland	Illawarra Lowlands Grassy Woodland in the Sydney Basin Bioregion	0.8	0.8	21.5	Geographic Distribution	High Sensitivity to Gain	Endangered Ecological Community	Not Listed	2.00	True	0
											Subtotal	**12**
River Oak open forest of major streams, Sydney Basin Bioregion and South East Corner Bioregion												
2	1105_Planted	Not a TEC	42.2	42.2	0.19	PCT Cleared - 40%	High Sensitivity to Gain			1.50		3
											Subtotal	**3**
Woollybutt - White Stringybark - Forest Red Gum grassy woodland on coastal lowlands, southern Sydney Basin Bioregion and South East Corner Bioregion												
4	1326_Disturbed	Illawarra Lowlands Grassy Woodland in the Sydney Basin Bioregion	54.8	54.8	0.11	Geographic Distribution	High Sensitivity to Gain	Endangered Ecological Community	Not Listed	2.00	True	3
											Subtotal	**3**
											Total	**18**

Assessment Id
00037515/BAAS17012/23/00037516

Proposal Name
27 North Marshall Mount Road

Page 2 of 3

NSW GOVERNMENT

BAM Credit Summary Report

Species credits for threatened species

Vegetation zone name	Habitat condition (Vegetation Integrity)	Change in habitat condition	Area (ha)/Count (no. individuals)	Sensitivity to loss (Justification)	Sensitivity to gain (Justification)	BC Act Listing status	EPBC Act listing status	Potential SAII	Species credits
Myotis macropus / Southern Myotis (Fauna)									
1326_Disturbed	54.8	54.8	0.03	Biodiversity Conservation Act listing status	Species dependent on habitat attributes	Vulnerable	Not Listed	False	1
838_Disturbed	28.4	28.4	0.62	Biodiversity Conservation Act listing status	Species dependent on habitat attributes	Vulnerable	Not Listed	False	9
1105_Planted	42.2	42.2	0.14	Biodiversity Conservation Act listing status	Species dependent on habitat attributes	Vulnerable	Not Listed	False	3
838_SPS	1.7	1.7	0.03	Biodiversity Conservation Act listing status	Species dependent on habitat attributes	Vulnerable	Not Listed	False	1
								Subtotal	**14**

Assessment Id
00037515/BAAS17012/23/00037516

Proposal Name
27 North Marshall Mount Road

Page 3 of 3