Flora and Fauna Assessment

1-5 Rainbow Road, Mittagong

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East Coast Ecology

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GLOSSARY

Abbreviation	Definition
BAM	Biodiversity Assessment Method 2020
BC Act	*Biodiversity Conservation Act 2016* (NSW)
BDAR	Biodiversity Development Assessment Report
DBH	Diameter at Breast Height
DPE	Department of Planning and Environment (formerly DPIE)
DPI	Department of Primary Industries
DPIE	Department of Planning, Industry and Environment (now DPE)
ECE	East Coast Ecology
EP&A Act	*Environmental Planning & Assessment Act 1979* (NSW)
EPBC Act	*Environment Protection and Biodiversity Conservation Act 1999*
FFA	Flora and Fauna Assessment
ha	Hectares
km	Kilometres
LGA	Local Government Area
Locality	The same meaning when describing a local population of a species or local occurrence of an ecological community.
m	metres
mm	millimetres
NSW	New South Wales
PCT	Plant Community Type
SEPP	State Environmental Planning Policy
Subject Land	The proposed development within 1-5 Rainbow Road, Mittagong, NSW 2575
Subject Property	1-5 Rainbow Road, Mittagong, NSW 2575
TEC	Threatened Ecological Community

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1. INTRODUCTION

1.1 Project Overview

East Coast Ecology (ECE) was engaged by TBG Constructions to prepare a Flora and Fauna Assessment (FFA), for the proposed development of 1-5 Rainbow Road, Mittagong NSW 2575 (Lot 32/DP9299, Lot 142/DP531051, Lot 141/DP531051) (hereafter referred to as the 'Subject Property'). The proposed development includes the demolition of existing buildings, surfaces, infrastructure and tree removal and the construction of a multi-dwelling housing development, landscaping and ancillary infrastructure.

The proposed works are assessable under Part 4 of the *Environmental Planning and Assessment Act 1979* (NSW) (EP&A Act) and are subject to the local planning provisions of Wingecarribee Shire Council. The overarching objective of this report was to evaluate the ecological values that occur within the site and identify how the proposed development satisfies the relevant planning framework. This report discerns the likelihood of occurrence of any threatened entities (i.e., ecological communities and species) listed under the *Biodiversity Conservation Act 2016* (NSW) (BC Act) and the *Environmental Protection and Biodiversity Conservation Act 1999* (Commonwealth) (EPBC Act).

1.2 Site Context

The Subject Property is located within the suburb of Mittagong, in the Wingecarribee Local Government Area (LGA). It encompasses an area of approximately 0.64ha and is occupied by three existing, single-storey dwellings, surrounded by private open space and landscaped gardens. The Subject Property is surrounded by residential dwellings on the northern and western boundaries, the Chalybeate Spring site on the eastern boundary and Rainbow Road on the southern boundary. The area assessed as part of this FFA was the footprint derived from the Site Plans (Coble Stephens Architects, 2023) and is hereafter referred to as the 'Subject Land' (**Figure 1**).

1.2.1 Topography and Hydrology

The Subject Land is situated on a gentle north-facing slope, falling from 622m above sea level (asl) in the south to 619m asl in the north. The Subject Land does not contain any mapped watercourses or intersect with any riparian buffers. Chinamans Creek occurs approximately 350m west of the Subject Property.

Figure 1. The location of the Subject Land.

1.3 Scope of Assessment

The primary aim of this report was to assess impacts to native vegetation and threatened species and determine whether the proposed development satisfies the relevant sections of Wingecarribee Shire Council's Local Environment Plan and Development Control Plan. The ecological assessment and recommendations in this report are pursuant to the local planning provisions of Wingecarribee Shire Council, BC Act and EPBC Act. The full scope of the assessment included:

- Background research to determine the likelihood for NSW and/ or Commonwealth threatened biota to occur within the Subject Land during any point of their lifecycles
- Assess any potential impacts to species and/ or communities listed under the BC Act and EPBC Act
- Establishing the likelihood of occurrence of migratory species and threatened ecological communities as listed under the BC Act and/ or the EPBC Act
- Identifying and mapping the distribution of vegetation communities within the Subject Land
- Recording presence and the extent of any known or potential fauna habitat features such as nests, dreys, caves, crevices, culverts, pools, soaks, flowering trees, fruiting trees or hollow-bearing trees and provide recommendations for on-going management of these habitat features and any fauna present
- Recording presence and the extent of any priority weed infestations that require management by law
- Determining potential ecological impacts or risks that may result due to the proposed works, and
- Recommendation of any controls or additional actions to be taken to protect or improve environmental outcomes of the proposed works.

The FFA has been compiled in consultation with the Site Plans (Coble Stephens Architects, 2023), the Arboricultural Impact Assessment (Truth About Trees, 2023) and the Bushfire Risk Assessment (Bushfire Engineering, 2023).

1.4 Study Limitations

This study was not intended to provide a complete inventory of all flora and fauna species with potential to occur within the Subject Land. The timing of the survey may not have coincided with emergence times of some species of flora and fauna, such as seasonally flowering herbs, seasonal migratory fauna or nocturnal fauna. To account for those species that could not be identified during the site assessment, detailed habitat assessments were combined with desktop research and local ecological knowledge to establish an accurate prediction of the potential for such species to occur on or adjacent the Subject Land.

2. RELEVANT LEGISLATION AND POLICY

The legislation and policy that are addressed in this report are listed in **Table 1**.

Table 1. Legislative context for the report.

Legislation or Policy	Relevance to the project
Environmental Planning and Assessment Act 1979 (NSW)	The EP&A Act is the principal planning legislation for NSW, providing a framework for the overall environmental planning and assessment of development proposals. The EP&A Act places a duty on the determining authority to adequately address a range of environmental matters including maintenance of biodiversity and the likely impact to threatened species, populations or ecological communities (under the BC Act).
Biodiversity Conservation Act 2016 (NSW)	Impacts to threatened species and threatened ecological communities listed under the BC Act are required to be assessed in accordance with Section 7.3 of the BC Act. For assessments under Part 4 of the EP&A Act, the Biodiversity Offsets Scheme (BOS) threshold applies, as specified in section 7.2 (1b). As stated in the *Biodiversity Conservation Regulation 2017*, the threshold triggers for entry into the BOS are: • Clearing of native vegetation of an area declared by clause 7.2 as exceeding the threshold, or • the clearing of native vegetation, or other action prescribed by clause 6.1, on land included on the Biodiversity Values Map published under clause 7.3 Discussion of these threshold triggers is provided in **Section 2.1**. For a Part 4 assessment, if the conclusion of the Test of Significance is that there is potential for a significant impact on a threatened species or ecological community, then the proponent has to prepare a Biodiversity Development Assessment Report (BDAR). No BC Act listed Threatened Ecological Communities (TEC) were identified within the Subject Land. No BC Act listed threatened species were identified within the Subject Land, however several BC Act listed threatened species have the potential to occur within, or utilise, the Subject Land (**Appendix A**). The proposal will not result in a 'significant impact' to any threatened entities and therefore the Biodiversity Offset Scheme is not triggered. As such, a BDAR is not required.

Legislation or Policy	Relevance to the project
Environment Protection and Biodiversity Conservation Act 1999 (Commonwealth)	The Commonwealth EPBC Act aims to protect Matters of National Environmental Significance (MNES), including vegetation communities and species listed under the EPBC Act. If a development is likely to have a significant impact on MNES, it is likely to be considered a 'Controlled Action' by the Commonwealth and requires assessment and approval by the Commonwealth in order to proceed. No EPBC Act listed TECs or species were recorded within the Subject Land. Several EPBC Act listed threatened species have potential to utilise the Subject Land. The proposal will not result in a 'significant impact' on any MNES and a referral to the Australian Government Minister for the Environment is not required.
Biosecurity Act 2015 (NSW)	The *Biosecurity Act 2015* (NSW) provides a framework for the prevention, elimination and minimisation of biosecurity risks posed by an activity as a matter of biosecurity. As defined in Part 3, section 23 of the Act, any non-conformance by an individual is defined as guilty of an offence. No priority weeds for the South East region (DPI, 2023) were identified within the Subject Land.
State Environmental Planning Policy (Biodiversity and Conservation) 2021 – Chapter 3 Koala Habitat Protection 2020	The Subject Land does not occur within land zoned as RU1, RU2 or RU3, therefore this chapter does not apply.
State Environmental Planning Policy (Biodiversity and Conservation) 2021 – Chapter 4 Koala Habitat Protection 2021	The Subject Land is situated within an LGA specified in Schedule 2 of the SEPP. However, as the land has an area of less than 1 hectare (including adjoining land within the same ownership), this chapter does not apply.
State Environmental Planning Policy (Resilience and Hazards) 2021 – Chapter 2 Coastal Management	The Subject Land does not occur within land mapped within the 'Coastal Zone', therefore, this SEPP does not apply.

2.1 Biodiversity Assessment Pathway

The requirements of the BC Act and *Biodiversity Conservation Regulation 2017* are mandatory for all Development Applications (DA) assessed pursuant to Part 4 of the EP&A Act submitted in the Wingecarribee LGA. The BC Act and its regulations stipulate clearing 'area threshold' values (**Table 2**) that determine whether a development is required to be assessed in accordance with the Biodiversity Offset Scheme (BOS). Minimum entry thresholds for vegetation clearing depend on the minimum lot size (i.e. 0.07ha in this case). Therefore, to avoid triggering the BOS, the proponent must avoid the clearing/ management of native vegetation in excess of 0.25ha.

Table 2. Entry thresholds for the Biodiversity Offset Scheme.

Minimum lot size associated with the property	Threshold for clearing
Less than 1ha	0.25ha or more
1ha to less than 40ha	0.5ha or more
40ha to less than 1000ha	1ha or more
1000ha or more	2ha or more

Dark border indicates relevant threshold.

The proposed development involves the removal of approximately 0.02ha of native vegetation, therefore the area clearing threshold is not exceeded and the BOS is not triggered (see **Section 7.1.1**).

In addition to the clearing area threshold, the Biodiversity Values (BV) Map (DPE, 2023d) identifies land with high biodiversity values that are particularly sensitive to impacts from development and clearing. The Subject Land has not been mapped as containing 'Biodiversity Values' on the BV Map at the time of writing this report. Developments that cause a significant impact to a threatened species or ecological community will trigger the BOS. It was determined that the proposed development will not significantly impact on any threatened species or ecological communities, therefore the BOS is not triggered.

3. PLANNING PROVISIONS

3.1 Wingecarribee Local Environmental Plan 2010

3.1.1 Zoning

The Subject Land is zoned 'R3 Medium Density Residential'. The objectives of this zone are:

- To provide for the housing needs of the community within a medium density residential environment.
- To provide a variety of housing types within a medium density residential environment.
- To enable other land uses that provide facilities or services to meet the day to day needs of residents.

A principal objective of this proposed development is to provide for the housing needs of the community. The proposed development satisfies the zone's objectives.

3.2 Mittagong Township Development Control Plan 2010

3.2.1 Chapter A3.2 Flora and Fauna Assessment Report

Objectives

a) Provide additional information to the controls identified in the WLEP clause 7.4 and 7.5.
b) Retain and protect individual remnant native species that are found scattered throughout the Shire.
c) To retain, enhance or reconstruct native vegetation and the ecological functions of wildlife corridors.
d) To protect and promote the recovery of threatened species, populations and endangered ecological communities.
e) To ensure development responds to its adjacent surroundings and helps preserve and enhance the natural qualities of the environment.

Controls

a) A Flora and Fauna Assessment Report is required to be lodged with a Development Application under the following circumstances and must address the requirements in the Wingecarribee Shire Council Flora, and Fauna Assessment Guidelines for Development Applications.

    i. if the proposed development site:

        - contains native vegetation, which is defined as, "any species of vegetation that existed in NSW before European settlement including trees, saplings, shrubs, scrub, understorey, groundcover or plants in a wetland";
        - contains remnant native trees;
        - is adjacent to native vegetation if the study area has been extensively cleared; and/or
        - contains sensitive environmental areas likely to contain important habitat resources for fauna such as watercourses, wetlands or swamps, and rocky outcrops, caves, cliffs.

- or

ii. if the proposed development:

- will directly or indirectly impact on native vegetation by clearing, runoff, waste-water irrigation, Bushfire Asset Protection
- contain natural features that sustain native species;
- may directly or indirectly have a significant impact on native vegetation or sensitive environmental areas that may contain habitat for threatened species, populations or ecological communities; and/or
- is likely to have a significant impact on matters of national environmental significance under the (Commonwealth) Environment Protection and Biodiversity Conservation Act 1999.

The potential occurrence of threatened species must be considered, even if the study area has been extensively cleared of native vegetation. If the study area is cleared, but lies adjacent to remnant native vegetation, survey work must be capable of assessing the site's actual or potential role as a corridor or linkage.

If the study area exceeds one (1) hectare, the Flora and Fauna Assessment needs to identify whether 'potential koala habitat' or 'core koala habitat' is present, as outlined in State Environmental Planning Policy No. 44 - Koala Habitat Protection (SEPP 44).

Comparison of requirement (A3.2) against the proposed development:

This report, a Flora and Fauna Assessment, has been commissioned by the proponent to accompany the DA. Consideration has been provided to all controls within Clause A3.2.

It is the opinion of East Coast Ecology, that this clause is satisfied by the proposed development.

4. METHODOLOGY

4.1 Desktop Review

A thorough literature review of local information relevant to the Wingecarribee LGA was undertaken. Searches using NSW Wildlife Atlas (BioNet) (DPE, 2023a) and the Commonwealth Protected Matters Search Tool (PMST) (DCCEEW, 2023) were conducted to identify all current threatened flora and fauna, as well as migratory fauna records within a 5km radius of the Subject Land. These data were used to assist in establishing the presence or likelihood of any ecological values as occurring on or adjacent the Subject Land and helped inform our Ecologist on what to look for during the site assessment.

Soil landscape and geological mapping, as well as existing vegetation mapping was examined to assist in determining whether any threatened flora or ecological communities could be present. Databases and vegetation mapping that were searched and/ or reviewed included:

- The State Vegetation Type Map (DPE, 2023f) , and
- Aerial imagery (Google Earth).

Species from both the BioNet and PMST online searches were combined to produce a list of threatened species, populations and communities that may occur within the Subject Land.

4.2 Ecological Site Assessment

A site assessment was undertaken by ECE Principal Ecologist, Alex Graham (BAAS19040), on the 1st September 2023. During the site assessment, the following activities were undertaken:

- Identification of the vegetation communities present on the Subject Land, with a focus on identifying any TECs
- Recording a list of flora species encountered on the Subject Land, with a focus on species diagnostic of TECs and priority weeds
- Identification of the locations of notable fauna habitat such as important nesting, roosting or foraging microhabitats
- Assessment of the connectivity and quality of the vegetation within the Subject Land and surrounding area
- Identification of the habitat of any threatened and regionally significant fauna including:
    - Tree hollows (habitat for threatened forest owls, parrots and mammals)
    - Caves and crevices (habitat for threatened reptiles and mammals)
    - Termite mounds (habitat for threatened reptiles)
    - Soaks (habitat for threatened frogs)
    - Wetlands and drainage lines (habitat for threatened fish, frogs and water birds)
    - Fruiting and flowering trees (food for threatened birds and mammals)
    - Trees and shrubs supporting nest structures (habitat for threatened birds and arboreal mammals)
    - Logs, bark and debris (habitat for threatened frogs, reptiles and snails).

4.2.1 Weather Conditions

Weather conditions recorded at the nearest weather station (Moss Vale AWS) prior to and during the general flora and fauna survey are provided in **Table 3** (BOM, 2023). The data reveal cool temperatures and moderate amounts of rainfall leading up to the survey.

Table 3. Weather observations recorded from Moss Vale AWS (station 068239).

Date	Day	Min. temp. (°C)	Max. Temp (°C)	Rainfall (mm)
26/08/2023	Saturday	-1.9	15.4	0.2
27/08/2023	Sunday	3.1	18.0	-
28/08/2023	Monday	2.7	18.3	0
29/08/2023	Tuesday	6.0	18.9	5.4
30/08/2023	Wednesday	4.4	19.8	0
31/08/2023	Thursday	2.5	15.9	3.2
01/09/2023	Friday	2.5	13.8	0

Dark border indicates date of survey.

5. RESULTS: NATIVE VEGETATION

5.1 Historically Mapped Vegetation Communities

One Plant Community Type (PCT) has been mapped as occurring within the Subject Property (**Figure 2**):

- PCT 3614: Southern Highlands Sandstone Peppermint Forest.

Plant Community Type 3614 is not associated with any TEC.

5.2 Field-validated Vegetation Communities

Plant Community Type selection for native vegetation was undertaken using information and databases provided in the BioNet Vegetation Classification System (DPE, 2023c). The following selection criteria were used in the PCT Filter Tool to develop a PCT shortlist:

- IBRA Bioregion (IBRA Subregion): Sydney Basin (Moss Vale)
- Vegetation Formation: Dry Sclerophyll Forests
- County: Wingecarribee
- Dominant Species: *Eucalyptus sclerophylla, Eucalyptus globoidea*

This process delivered a selection of nine PCTs that occur within the Wingecarribee LGA, the Moss Vale IBRA Subregion (and Sydney Basin Bioregion) and that has the diagnostic species:

- 3614: Southern Highlands Sandstone Peppermint Forest
- 3667: Southern Highlands Enriched Sandstone Forest
- 3579: Blue Mountains Scribbly Gum Swamp Woodland
- 3588: Shoalhaven Foothills Bloodwood Heathy Forest
- 3589 Southern Highlands Escarpment Peppermint Gully Forest
- 3598: Woronora Plateau Scribbly Gum Woodland
- 3625: Wingecarribee Sandstone Shrub Forest
- 3668: Southern Highlands Scribbly Gum Forest, and
- 3689 Shoalhaven Escarpment Peppermint-Silvertop Ash Forest.

A detailed analysis of each PCT to determine 'best-fit' was not possible owing to a lack of diagnostic native vegetation within the Subject Property. As PCT 3614 has been mapped in the adjoining property (DPE, 2023f) and is listed as containing *E. sclerophylla*, this PCT has been adopted as 'best-fit'.

All non-native vegetation has been assigned to a novel community type:

- Urban Exotic Vegetation.

This vegetation is detailed in **Table 4** and displayed in **Figure 3**.

Table 4. Description of PCT 3614 within the Subject Land.

PCT 3614: Southern Highlands Sandstone Peppermint Forest	
	
Vegetation Formation/Keith Class	Grassy Woodlands (Southern Tableland Grassy Woodlands)
Extent within Subject Land (approximate)	0.01ha
Description of the Vegetation within the Subject Land	
Within the Subject Land, this vegetation type was comprised of, and limited to a single *Eucalyptus sclerophylla* located within the front of 5 Rainbow Road, Mittagong and one small Callistemon spp. planted within a garden bed. One *E. globoidea* was located within the road reserve outside the Subject Land.	
Description of PCT 3614 in BioNet	

PCT 3614: Southern Highlands Sandstone Peppermint Forest	
A tall to very tall dry shrubby sclerophyll open forest associated with semi sheltered and elevated quartz rich sandstones of the Southern Highlands. The tree canopy almost always has a high cover of *Eucalyptus piperita*, commonly with *Eucalyptus sieberi* or stringybark species (of which *Eucalyptus globoidea*, *Eucalyptus agglomerata* and *Eucalyptus sparsifolia* are most frequent), and only occasionally are other species such as *Corymbia gummifera* are recorded. The mid-stratum has a sparse cover of dry shrubs which are typical of sandstone, that very frequently includes *Persoonia linearis*, *Banksia spinulosa*, *Leucopogon lanceolatus* and *Lomatia silaifolia*. Other common species are *Persoonia levis*, *Podolobium ilicifolium* and *Leptospermum trinervium*, occasionally with *Acacia terminalis*. The ground layer is comprised of a low cover of grasses, graminoids and ferns. The most frequent species are *Entolasia stricta, Dianella caerulea, Pteridium esculentu*m and *Lomandra longifolia*. This PCT is common on Hawkesbury sandstone at the elevated southern ends of the Woronora and Nattai Tablelands and on the spatially disjunct Lacys Tableland in the Burragorang Valley. It occurs on residual harder Hawkesbury sandstone above the Wingecarribee Gorge, and on mapped Permian sediments east of Penrose. This community typically occurs on upper sheltered to semi sheltered slopes, shallow gullies or near drainage lines and occasionally crests on deeper soils. It grades into a woodland or forest PCT 3625 on exposed sandstone crests and slopes, an open grassy forest PCT 3667 on deeper transitional sandy soils on the gentle relief of the Southern Highlands plateau, taller shrub forests PCT 3266 in deeper protected sandstone gullies and into PCT 3589 in gullies of the wet eastern escarpment.	
Justification of Vegetation Assignment	**Characteristic Flora Species** Although highly modified, the vegetation within the Subject Land contained one characteristic tree species, *E. sclerophylla.*
BC Act 2016 Status	Not Listed.
EPBC Act 1999 Status	Not Listed.
References	Connolly, D., Binns, D., Turner, K., Hager, T., Lyons, M., Magarey, E. (in prep.) A revised classification of Plant Community Types for eastern New South Wales. NSW DPIE, Parramatta

Table 5. Description of Urban Exotic Vegetation within the Subject Land.

Urban Exotic Vegetation	
	
Description of the planted Urban Exotic Vegetation within the Subject Land	
This vegetation is primarily composed of planted exotic trees with a groundcover now wholly comprised of exotic landscaped grasses or common annual weeds. Canopy species included *Cupressus spp., Prunus spp., Cedrus deodara, Schinus areira*, *Magnolia grandifolia, Ulmus parviflora*. A full list of species can be found in the Tree Schedule of the Arboricultural Impact Assessment (Truth about Trees, 2023). The groundcover (lawn) was typically dominated by exotic pasture grasses such as *Pennisetum clandestinum*.	
Extent within Subject Land (approximate)	0.35ha
BC Act 2016 Status	Not listed
EPBC Act 1999 Status	Not listed

Figure 2. The State Vegetation Type Map(DPE, 2023f) within the Subject Land.

Figure 3. Field-validated vegetation communities.

6. RESULTS: THREATENED SPECIES/ COMMUNITIES

6.1 Threatened Ecological Communities

No TECs were identified within the Subject Land.

6.2 Threatened Flora

No threatened flora were identified within the Subject Land at the time of the site assessment.

Database searches revealed nine threatened flora occur, or have potential to occur, within a ~5km radius of the Subject Land (**Table 6**). Species were assessed for their potential to occur within the Subject Land (**Appendix A**).

Table 6. Threatened flora with potential to occur within the Subject Land.

Scientific Name	Common Name	BC Act	EPBC Act	Records within 5km
Helichrysum calvertianum	-	V	-	59
Acacia bynoeana	Bynoe's Wattle	E	V	1
Eucalyptus macarthurii	Paddys River Box	E	E	201
Diuris aequalis	Buttercup Doubletail	E	V	1
Pterostylis ventricosa	-	E	-	1
Grevillea raybrownii	-	V	-	21
Persoonia glaucescens	Mittagong Geebung	V	V	662
Persoonia mollis subsp. revoluta	-	V	-	8
Persoonia oxycoccoides	-	E	-	5

V – Vulnerable; E – Endangered; EP – Endangered Population; CE – Critically Endangered

The closest threatened flora record (2016) occurs approximately 300m north of the Subject Land. Each species would have been easily identified during the September 2023 survey (at least to genus level). As the Subject Land has been heavily modified and severely disturbed, it is considered highly unlikely that habitat for any of these species would persist.

6.3 Threatened Fauna

Database searches revealed 26 threatened fauna occur, or have potential to occur, within a ~5km radius of the Subject Land (**Table 7**). Species were assessed for their potential to occur within the Subject Land (**Appendix A**).

Table 7. Threatened fauna with potential to occur within the Subject Land.

Scientific Name	Common Name	BC Act	EPBC Act	Records within 5km
Hirundapus caudacutus	White-throated Needletail	-	V	1
Hieraaetus morphnoides	Little Eagle	V	-	2
Lophoictinia isura	Square-tailed Kite	V	-	1
Callocephalon fimbriatum	Gang-gang Cockatoo	V	E	83
Calyptorhynchus lathami lathami	Glossy Black-Cockatoo	V	V	70
Lathamus discolor	Swift Parrot	E	CE	1
Ninox connivens	Barking Owl	V	-	1
Ninox strenua	Powerful Owl	V	-	13
Tyto novaehollandiae	Masked Owl	V	-	1
Pycnoptilus floccosus	Pilotbird	-	V	7
Daphoenositta chrysoptera	Varied Sittella	V	-	33
Pachycephala olivacea	Olive Whistler	V	-	1
Artamus cyanopterus cyanopterus	Dusky Woodswallow	V	-	35
Petroica boodang	Scarlet Robin	V	-	32
Petroica phoenicea	Flame Robin	V	-	7
Dasyurus maculatus	Spotted-tailed Quoll	V	E	5
Phascolarctos cinereus	Koala	E	E	156
Cercartetus nanus	Eastern Pygmy-possum	V	-	1
Petaurus australis	Yellow-bellied Glider	V	V	3
Petaurus norfolcensis	Squirrel Glider	V	-	2
Petauroides volans	Southern Greater Glider	E	E	37
Pteropus poliocephalus	Grey-headed Flying-fox	V	V	43
Falsistrellus tasmaniensis	Eastern False Pipistrelle	V	-	5
Scoteanax rueppellii	Greater Broad-nosed Bat	V	-	3
Miniopterus australis	Little Bent-winged Bat	V	-	1
Miniopterus orianae oceanensis	Large Bent-winged Bat	V	-	6

V – Vulnerable; E – Endangered; EP – Endangered Population; CE – Critically Endangered

No threatened fauna species were identified within the Subject Land however, this does not rule out the potential for threatened species to still exist within the Subject Land, particularly highly-mobile species. Given the minor nature of the vegetation impacts, the level of human-made disturbance within and directly adjoining the Subject Land and large areas of potential habitat in the surrounding locality (**Figure 4**), it was determined that the proposed works are not likely to significantly impact upon any threatened fauna. Details of the threatened fauna habitat recorded within the Subject Land are included in and presented in **Table 6**.

Table 6. Fauna habitat values identified within the Subject Land.

Habitat component	Subject Land
Coarse woody debris	Absent.
Rock outcrops and bush rock	Absent.
Caves, crevices and overhangs	Absent.
Culverts, bridges, mine shafts, or abandoned structures	Absent. Three dwellings and sheds are present, however were recently occupied and are unlikely to provide suitable habitat for microbats.
Nectar/lerp-bearing Trees	Present. *Eucalyptus* spp. were recorded within the Subject Land. These trees may provide intermittent nectar sources for highly-mobile nectarivores.
Nectar-bearing shrubs	Absent.
Koala Use Trees	Present. One (1) Koala use tree (*Eucalyptus sclerophylla*) was present within the Subject Land, however Koalas are unlikely to access this tree given its proximity to an existing dwelling (5 Rainbow Road).
Large stick nests	Absent.
Sap and gum sources	Absent.
She-oak fruit	Absent.
Seed-bearing trees and shrubs	Present. One *Eucalyptus sclerophylla* tree was recorded within the Subject Land. These trees may provide intermittent foraging sources for highly-mobile seed-eating parrots.
Soft-fruit-bearing trees/shrubs	Absent.
Dense shrubbery and leaf litter	Absent.
Tree hollows	Absent.
Decorticating bark	Absent.
Wetlands, soaks, and streams	Absent.
Open water bodies	Absent.
Estuarine, beach, mudflats, and rocky foreshores	Absent.

6.3.1 Migratory Species

Database searches revealed seven migratory terrestrial species, or their habitat, are known to occur within the Subject Land (**Table 7**). These species do not breed in Australia.

Table 7. Migratory terrestrial species with potential to occur in the Subject Land.

Species	EPBC Act Status
Cuculus optatus (Oriental Cuckoo)	Migratory, CAMBA, JAMBA, ROKAMBA
Hirundapus caudacutus (White-throated Needletail)	Vulnerable, Migratory, CAMBA, JAMBA, ROKAMBA
Monarcha melanopsis (Black-faced Monarch)	Migratory, Bonn
Monarcha trivirgatus (Spectacled Monarch)	Migratory, Bonn
Motacilla flava (Yellow Wagtail)	Migratory, CAMBA, JAMBA, ROKAMBA
Myiagra cyanoleuca (Satin Flycatcher)	Migratory, Bonn
Rhipidura rufifrons (Rufous Fantail)	Migratory, Bonn

CAMBA = China-Australia Migratory Bird Agreement, JAMBA = Japan-Australia Migratory Bird Agreement, ROKAMBA = Republic of Korea-Australia Migratory Bird Agreement and Bonn = Convention on the Conservation of Migratory Species of Wild Animals.

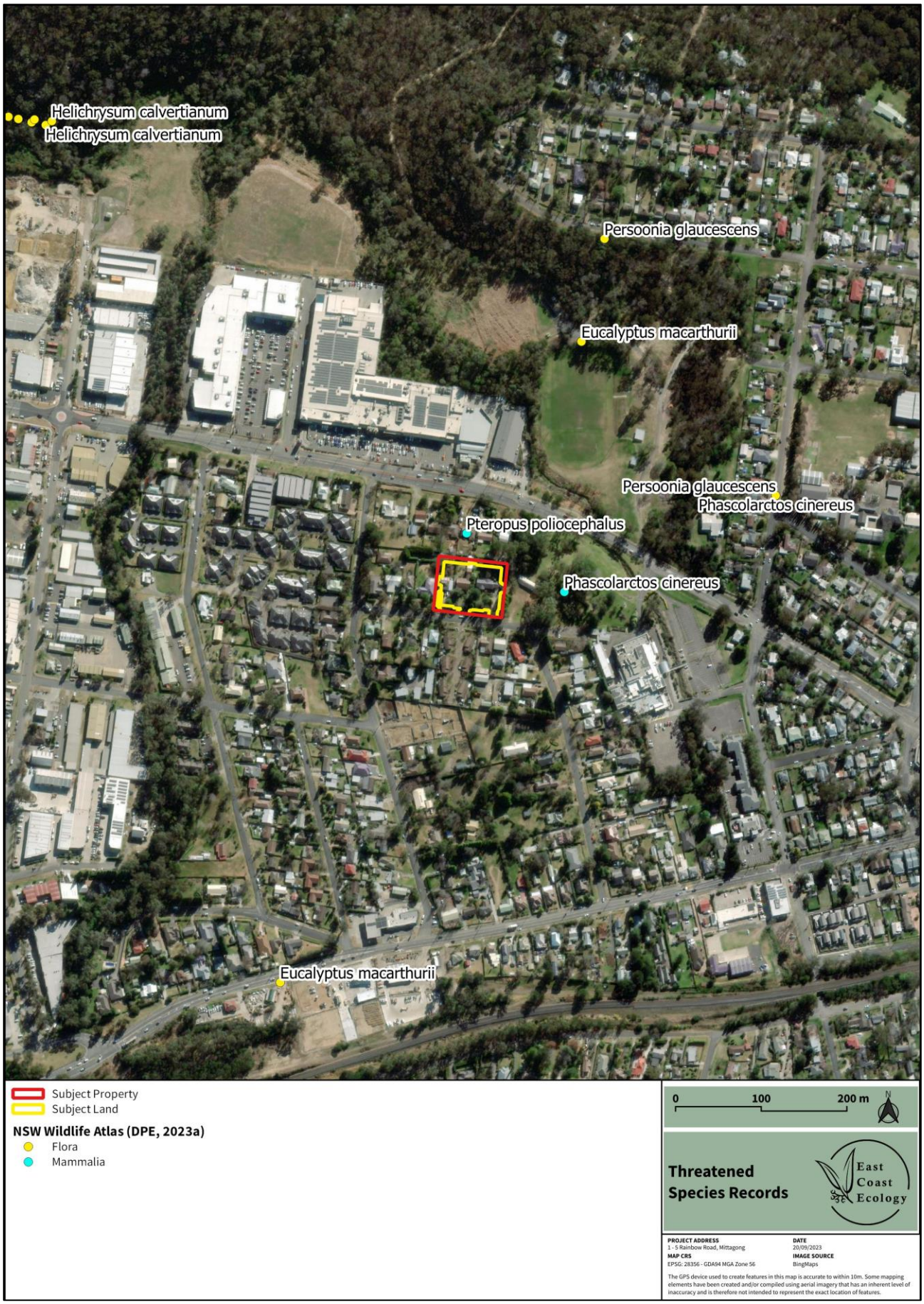

Figure 4. Threatened species records (historical) within proximity to the Subject Land.

7. IMPACT SUMMARY

7.1 Avoidance and Minimisation

When assessing the biodiversity impacts of a project there are three key considerations. These three approaches are listed in a descending order of best biodiversity outcomes:

- Avoid: measures taken by a proponent such as careful site selection, or actions taken through the design, planning, construction and operational phases of the development to completely prevent impacts on biodiversity values, or certain areas of biodiversity
- Minimise: a process applied throughout the development planning and design life cycle that seeks to reduce the residual impacts of development on biodiversity values
- Compensate: measures in a proposed development to compensate for the biodiversity values lost. This can be achieved through offsets (financial or not).

The primary avoidance measure adopted by the proposed development has been to site all built form outside of the Tree Protection Zones of significant vegetation (*Eucalyptus spp.*) in the adjoining property to the west of the Subject Property. Other options to avoid impacts and achieve the objectives of the proposed development are limited, in part by the small size of the lot, however, are also considered unnecessary given most trees are exotic and provide only limited foraging habitat for native fauna species. There is opportunity to implement an overall net-gain in biodiversity value, subject to appropriate replacement plantings along the western boundary of the Subject Property, subject to proper implementation and management.

7.1.1 Calculating the Area of Native Vegetation Clearing

The following ruleset is applied to the calculation of the area clearing threshold for partially exotic groundcover in heavily disturbed landscapes (DPE, 2023g):

- Where there is greater than 75% native vegetation in the ground cover then treat the vegetation as 100% native and assess the area to be cleared accordingly
- Where the proportion of exotic to native vegetation in the ground cover is between 15-75% - the calculation of native vegetation extent is adjusted by multiplying the proportion (%) of native cover by the total area to be cleared, and
- Where there is less than 15% native ground cover all vegetation can be considered exotic and the area clearing threshold will not be exceeded.

This advice does not apply in the following circumstances:

- The primary community type is naturally a grassland plant community
- The vegetation meets the definition of a TEC according to the scientific description in the final determination published by the Threatened Species Scientific Committee
- The vegetation meets the definition of a threatened ecological community or habitat for a species listed under the EPBC Act, and
- The assessment of Category 1-exempt land or land categories under the *Local Land Services Act 2013.*

Areas of grassland within vegetation mapped as within Urban Exotic Vegetation is not a natural grassland plant community, nor does it meet the definition of a TEC.

One 20x20m floristic plot was established within the Subject Property, which determined that the only native species recorded, *Cynodon dactylon* (Couch Grass), covered less than 10% of the plot in September 2023 and therefore can be considered exotic for the purposes of the area clearing threshold. On this basis, the development is expected to result in impacts to 0.01ha of native vegetation, therefore the BOS is not triggered.

7.2 Impacts to Threatened Species and Communities

No TECs will be impacted by the proposed development. For the proposed development, the following potential threatened species habitats will be impacted:

- Foraging habitats:
    - One *Eucalyptus globoidea* (Tree 4) - tree in poor health, recommendation for removal unrelated to DA.

Recommendations to minimise any potential impacts to fauna and their habitats are detailed in **section 8**. A likelihood of occurrence table for threatened flora and fauna species within the Subject Land is presented in **Appendix A**. No threatened flora or fauna species will be significantly impacted by the proposed development.

8. RECOMMENDATIONS

8.1 Impact Mitigation and Minimisation Recommendations

This section of the report details recommended efforts to avoid and minimise impacts on biodiversity values associated with the proposed development. Measures to be implemented before, during, and post construction are detailed in **Table 8**.

Table 8. Measures to be implemented before, during, and after construction to avoid and minimise the impacts of the proposed development.

Action	Outcome	Timing	Responsibility
Tree Protections	Australian Standard 4970 (2009) Protection of Trees on Development Sites (AS-4970) outlines that a Tree Protection Zone (TPZ) is the principal means of protecting trees on construction sites. It is an area isolated from construction disturbance so that the tree remains viable. Ideally, works should be avoided within the TPZ.A Minor Encroachment is less than 10% of the TPZ and is outside the structural root zone (SRZ). A Minor Encroachment is considered acceptable by AS-4970 when it is compensated for elsewhere and contiguous within the TPZ. A Major Encroachment is greater than 10% of the TPZ or inside the SRZ. Major Encroachments generally require root investigations undertaken by non-destructive methods or the use of tree sensitive construction methods. Temporary tree protection fencing should be installed prior to the commencement of works.	Pre-construction phase	Proponent Arborist
No Weeds imported on to the Subject Land	No priority or environmental weeds are to be imported on to the site prior to or during construction works.	During Construction	Construction Contractor
Erosion and Sedimentation	Appropriate erosion and sediment control must be erected and maintained at all times during construction in order to avoid the potential of incurring indirect impacts on biodiversity values. As a minimum, such measures should comply with the relevant industry guidelines such as 'the Blue Book' (Landcom, 2004).	Construction phase	Proponent Construction Contractor

9. CONCLUSION

This assessment demonstrates that the relevant provisions of the *Environmental Planning and Assessment Act 1979, Biodiversity Conservation Act 2016, Biodiversity Conservation Regulation 2017,* the *Environment Protection and Biodiversity Act 1999* and the Wingecarribee Shire Council's environmental planning instruments have been satisfied. If the appropriate recommendations in this report are followed, the proposed development will not have a significant impact to any threatened ecological community or species.

10. REFERENCES

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11. APPENDICES

Appendix A. Assessment of likely occurrence of threatened species within the Subject Land. Survey conducted in September 2023.

Appendix B. Landscape Plans

Appendix A. Assessment of likely occurrence of threatened species within the Subject Land. Survey conducted in September 2023.

Scientific name	Status		Distribution and habitat	Number of records (BioNet)	Likelihood of occurrence
	BC Act	EPBC Act			
Acacia bynoeana	E	V	Grows mainly in heath and dry sclerophyll forest in sandy soils. Mainly south of Dora Creek-Morisset area to Berrima and the Illawarra region, west to the Blue Mountains, also recorded from near Kurri Kurri in the Hunter Valley and from Morton National Park.	1	Low. Suitable habitat for the species is absent from the Subject Land. No further assessment is required.
Diuris aequalis	E	V	Recorded in Kanangra-Boyd National Park, Gurnang State forest, towards Wombeyan Caves, the Taralga - Goulburn area, and the ranges between Braidwood, Tarago and Bungendore. Grows in forest, low open woodland with grassy understorey and secondary grassland on the higher parts of the Southern and Central Tablelands.	1	Low. Suitable habitat for the species is absent from the Subject Land. No further assessment is required.
Eucalyptus macarthurii	E	E	A moderately restricted distribution, recorded from the Moss Vale District to Kanangra Boyd National Park. In the Southern Highlands it occurs mainly on private land, often as isolated individuals in, or on the edges, of paddocks. Isolated stands occur in the north west part of the range on the Boyd Plateau. The only known record in the conservation estate is within	201	Low. This species was absent from the Subject Land. No further assessment is required.

Scientific name	Status		Distribution and habitat	Number of records (BioNet)	Likelihood of occurrence
	BC Act	EPBC Act			
			Kanangra Boyd National Park. Occurs on grassy woodland on relatively fertile soils on broad cold flats.		
Grevillea raybrownii	V	-	Generally occurs on ridgetops and, less often, slopes and benches of Hawkesbury Sandstone and Mittagong Formation. It occurs in Eucalyptus open forest and woodland with a shrubby understorey on sandy, gravelly loam soils derived from sandstone that are low in nutrients.	21	Low. Suitable habitat for the species is absent from the Subject Land. No further assessment is required.
Helichrysum calvertianum	V	-	Helichrysum calvertianum is endemic to New South Wales where it is currently only known from the Wingecarribee Shire. It occurs in dry sclerophyll forest and heathland with rock outcrops, predominantly on Hawkesbury sandstone soils.	59	Low. Suitable habitat for the species is absent from the Subject Land. No further assessment is required.
Persoonia glaucescens	E	V	The Mittagong Geebung grows in woodland to dry sclerophyll forest on clayey and gravely laterite. The preferred topography is ridge-tops, plateaux and upper slopes. Aspect does not appear to be a significant factor.	662	Low. Suitable habitat for the species is absent from the Subject Land. No further assessment is required.

Scientific name	Status		Distribution and habitat	Number of records (BioNet)	Likelihood of occurrence
	BC Act	EPBC Act			
Persoonia mollis subsp. revoluta	V	-	Most populations occur between 600 and 800m a.s.l.,and with an average annual rainfall across the range of between 700 and 900 mm. Mainly on relatively deep sandy soils on broad ridgetops and upper slopes. Frequently on Hawkesbury Sandstone on Soapy Flat or Sandy Flat soil landscapes.	8	Low. Suitable habitat for the species is absent from the Subject Land. No further assessment is required.
Persoonia oxycoccoides	E	E	Heath to dry sclerphyll eucalypt forest, at 600 to 700 m altitude, on acid, sandy soils derived from sandstone. The species can also occur in the margins of montane swamps within wet heat.	5	Low. Suitable habitat for the species is absent from the Subject Land. No further assessment is required.
Pterostylis ventricosa	CE	-	Known from populations at St Georges Basin, Sussex Inlet and west of Nowra in the Shoalhaven and also near Tallong and Mittagong in the Southern Highlands. Predominantly found in more open areas of tall coastal eucalypt forest often dominated by one or more of the following tree species:- Terpentine, Spotted Gum, Grey Ironbark, Blackbutt, White Stringybark, Scribbly Gum and Sydney Peppermint.	1	Low. Suitable habitat for the species is absent from the Subject Land. No further assessment is required.

Scientific name	Status		Distribution and habitat	Number of records (BioNet)	Likelihood of occurrence
	BC Act	EPBC Act			
Callocephalon fimbriatum	V	E	In summer, occupies tall montane forests and woodlands, particularly in heavily timbered and mature wet sclerophyll forests. Also occur in subalpine snow gum woodland and occasionally in temperate or regenerating forest. In winter, occurs at lower altitudes in drier, more open eucalypt forests and woodlands, particularly in box-ironbark assemblages, or in dry forest in coastal areas. It requires tree hollows in which to breed.	83	Moderate. This highly mobile species may be an occasional visitor, but habitat similar to the Subject Land is widely distributed in the locality, meaning that the species is not dependent on habitats in the Subject Land. No breeding habitat was present within the Subject Land. No further assessment is required.
Calyptorhynchus lathami	V	-	Inhabits forest with low nutrients, characteristically with key Allocasuarina spp. Tends to prefer drier forest types with a middle stratum of Allocasuarina below Eucalyptus or Angophora. Often confined to remnant patches in hills and gullies. Breed in hollows stumps or limbs, either living or dead. Endangered population in the Riverina.	70	Moderate. This highly mobile species may be an occasional visitor, but habitat similar to the Subject Land is widely distributed in the locality, meaning that the species is not dependent on habitats in the Subject Land. No breeding habitat was present within the Subject Land. No further assessment is required.
Daphoenositta chrysoptera	V	-	Inhabits wide variety of dry eucalypt forests and woodlands, usually with either shrubby under storey or grassy ground cover or both, in all climatic zones of Australia. Usually in areas with rough-barked trees, such as stringybarks or	33	Low. This highly mobile species may be an occasional visitor, but habitat similar to the Subject Land is widely distributed in the locality, meaning that the species is not dependent on habitats in the Subject Land. No further assessment is required.

Scientific name	Status		Distribution and habitat	Number of records (BioNet)	Likelihood of occurrence
	BC Act	EPBC Act			
			ironbarks, but also in paperbarks or mature Eucalypts with hollows.		
Hieraaetus morphnoides	V	-	Most abundant in lightly timbered areas with open areas nearby. Often recorded foraging in grasslands, crops, treeless dune fields, and recently logged areas. May nest in farmland, woodland and forest in tall trees.	2	Low. This highly mobile species may be an occasional visitor, but habitat similar to the Subject Land is widely distributed in the locality, meaning that the species is not dependent on habitats in the Subject Land. No further assessment is required.
Hirundapus caudacutus	-	V	An aerial species found in feeding concentrations over cities, hilltops and timbered ranges.	1	Moderate. This highly mobile species may be an occasional visitor, but habitat similar to the Subject Land is widely distributed in the locality, meaning that the species is not dependent on habitats in the Subject Land. No further assessment is required.
Lathamus discolor	E	CE	The Swift Parrot occurs in woodlands and forests of NSW from May to August, where it feeds on eucalypt nectar, pollen and associated insects . The Swift Parrot is dependent on flowering resources across a wide range of habitats in its wintering grounds in NSW . This species is migratory, breeding in Tasmania and also nomadic, moving about in response to changing food availability.	1	Low. This highly mobile species may be an occasional visitor, but habitat similar to the Subject Land is widely distributed in the locality, meaning that the species is not dependent on habitats in the Subject Land. The Subject Land is mapped within the Important Areas Map. No further assessment is required.

Scientific name	Status		Distribution and habitat	Number of records (BioNet)	Likelihood of occurrence
	BC Act	EPBC Act			
Lophoictinia isura	V	-	Typically inhabits coastal forested and wooded lands of tropical and temperate Australia. In NSW it is often associated with ridge and gully forests dominated by Eucalyptus longifolia, Corymbia maculata, E. elata or E. smithii. Individuals appear to occupy large hunting ranges of more than 100km2. They require large living trees for breeding, particularly near water with surrounding woodland -forest close by for foraging habitat. Nest sites are generally located along or near watercourses, in a tree fork or on large horizontal limbs.	1	Unlikely. Species resides in coastal areas. No further assessment is required.
Ninox connivens	V	-	Generally found in open forests, woodlands, swamp woodlands and dense scrub. Can also be found in the foothills and timber along watercourses in otherwise open country.	1	Low. This highly mobile species may be an occasional visitor, but habitat similar to the Subject Land is widely distributed in the locality, meaning that the species is not dependent on habitats in the Subject Land. No breeding habitat was present within the Subject Land. No further assessment is required.
Ninox strenua	V	-	Occupies wet and dry eucalypt forests and rainforests. Can occupy both un-logged and lightly logged forests as well as undisturbed forests where it usually roosts on the limbs of dense trees in gully areas. It is most commonly	13	Moderate. This highly mobile species may be an occasional visitor, but habitat similar to the Subject Land is widely distributed in the locality, meaning that the species is not dependent on habitats in the Subject Land. No breeding habitat was present within the Subject Land.

Scientific name	Status		Distribution and habitat	Number of records (BioNet)	Likelihood of occurrence
	BC Act	EPBC Act			
			recorded within red turpentine in tall open forests and black she-oak within open forests. Large mature trees with hollows at least 0.5 m deep are required for nesting. Tree hollows are particularly important for the Powerful Owl because a large proportion of the diet is made up of hollow-dependent arboreal marsupials. Nest trees for this species are usually emergent with a diameter at breast height of at least 100 cm.		No further assessment is required.
Pachycephala olivacea	V	-	Mostly inhabit wet forests above about 500m. During the winter months they may move to lower altitudes. Forage in trees and shrubs and on the ground, feeding on berries and insects.	1	Low. This highly mobile species may be an occasional visitor, but habitat similar to the Subject Land is widely distributed in the locality, meaning that the species is not dependent on habitats in the Subject Land. No further assessment is required.
Petroica boodang	V	-	The Scarlet Robin is found from SE Queensland to SE South Australia and also in Tasmania and SW Western Australia. In NSW, it occurs from the coast to the inland slopes. The Scarlet Robin lives in dry eucalypt forests and woodlands. The understorey is usually open and grassy with few scattered shrubs.	32	Moderate. This highly mobile species may be an occasional visitor, but habitat similar to the Subject Land is widely distributed in the locality, meaning that the species is not dependent on habitats in the Subject Land. No further assessment is required.

Scientific name	Status		Distribution and habitat	Number of records (BioNet)	Likelihood of occurrence
	BC Act	EPBC Act			
Petroica phoenicea	V	-	Flame Robins are found in a broad coastal band from southern Queensland to just west of the South Australian border. The species is also found in Tasmania. The preferred habitat in summer includes eucalyptus forests and woodland, whilst in winter prefers open woodlands and farmlands. It is considered migratory. The Flame Robin breeds from about August to January.	7	Moderate. This highly mobile species may be an occasional visitor, but habitat similar to the Subject Land is widely distributed in the locality, meaning that the species is not dependent on habitats in the Subject Land. No further assessment is required.
Pycnoptilus floccosus	-	V	Pilotbirds are endemic to south-east Australia. Upland Pilotbirds occur above 600 m in the Brindabella Ranges in the Australian Capital Territory, and in the Snowy Mountains in New South Wales and north-east Victoria (Higgins & Peter 2002; Loyn et al. 2021). Lowland Pilotbirds occur in forests from the Blue Mountains west of Newcastle, around the wetter forests of eastern Australia, to Dandenong near Melbourne (Higgins & Peter 2002; Loyn et al. 2021). Pilotbirds are strictly terrestrial, living on the ground in dense forests with heavy undergrowth (Higgins & Peter 2002).	7	Low. This highly mobile species may be an occasional visitor, but habitat similar to the Subject Land is widely distributed in the locality, meaning that the species is not dependent on habitats in the Subject Land. No further assessment is required.

Scientific name	Status		Distribution and habitat	Number of records (BioNet)	Likelihood of occurrence
	BC Act	EPBC Act			
Tyto novaehollandiae	V	-	Inhabits a diverse range of wooded habitat that provide tall or dense mature trees with hollows suitable for nesting and roosting. Mostly recorded in open forest and woodlands adjacent to cleared lands. Nest in hollows, in trunks and in near vertical spouts or large trees, usually living but sometimes dead. Nest hollows are usually located within dense forests or woodlands. Masked owls prey upon hollow-dependent arboreal marsupials, but terrestrial mammals make up the largest proportion of the diet.	1	Low. This highly mobile species may be an occasional visitor, but habitat similar to the Subject Land is widely distributed in the locality, meaning that the species is not dependent on habitats in the Subject Land. No further assessment is required.
Cercartetus nanus	V	-	Inhabits rainforest through to sclerophyll forest and tree heath. Banksias and myrtaceous shrubs and trees are a favoured food source. Will often nest in tree hollows, but can also construct its own nest . Because of its small size it is able to utilise a range of hollow sizes including very small hollows. Individuals will use a number of different hollows and an individual has been recorded using up to 9 nest sites within a 0.5ha area over a 5 month period .	1	Unlikely. Suitable habitat for the species is absent from the Subject Land. No further assessment is required.

Scientific name	Status		Distribution and habitat	Number of records (BioNet)	Likelihood of occurrence
	BC Act	EPBC Act			
Dasyurus maculatus	V	E	Spotted-tailed Quoll are found on the east coast of NSW, Tasmania, eastern Victoria and north-eastern Queensland. Only in Tasmania is it still considered common. Recorded across a range of habitat types, including rainforest, open forest, woodland, coastal heath and inland riparian forest, from the sub-alpine zone to the coastline.	5	Unlikely. Suitable habitat for the species is absent from the Subject Land. No further assessment is required.
Falsistrellus tasmaniensis	V	-	Inhabit sclerophyll forests, preferring wet habitats where trees are more than 20 m high. Two observations have been made of roosts in stem holes of living eucalypts. There is debate about whether or not this species moves to lower altitudes during winter, or whether they remain sedentary but enter torpor . This species also appears to be highly mobile and records showing movements of up to 12 km between roosting and foraging sites .	5	Moderate. This highly mobile species may be an occasional visitor, but habitat similar to the Subject Land is widely distributed in the locality, meaning that the species is not dependent on habitats in the Subject Land. No further assessment is required.
Miniopterus australis	V	-	Coastal north-eastern NSW and eastern Queensland. Little Bent-wing Bat is an insectivorous bat that roost in caves, in old mines, in tunnels, under bridges, or in similar structures. They breed in large aggregations in a small number of known caves and may travel	1	Moderate. This highly mobile species may be an occasional visitor, but habitat similar to the Subject Land is widely distributed in the locality, meaning that the species is not dependent on habitats in the Subject Land. No further assessment is required.

Scientific name	Status		Distribution and habitat	Number of records (BioNet)	Likelihood of occurrence
	BC Act	EPBC Act			
			100s km from feeding home ranges to breeding sites. Little Bent-wing Bat has a preference for moist eucalypt forest, rainforest or dense coastal banksia scrub where it forages below the canopy for insects.		
Miniopterus orianae oceanensis	V	-	Eastern Bent-wing Bats occur along the east and north-west coasts of Australia. Caves are the primary roosting habitat, but also use derelict mines, storm-water tunnels, buildings and other man-made structures. Form discrete populations centred on a maternity cave that is used annually in spring and summer for the birth and rearing of young.	6	Moderate. This highly mobile species may be an occasional visitor, but habitat similar to the Subject Land is widely distributed in the locality, meaning that the species is not dependent on habitats in the Subject Land. No further assessment is required.
Petauroides volans	-	V	The Greater Glider occurs in eucalypt forests and woodlands. Utilise tree hollows	37	Low. Suitable habitat for the species is absent from the Subject Land. Minor habitat (e.g., foraging) may be present in the Subject Land for this species. However, this species is unlikely to be dependent on habitat within the Subject Land, particularly with the vast, superior habitat for this species in the surrounding locality. No further assessment is required.

Scientific name	Status		Distribution and habitat	Number of records (BioNet)	Likelihood of occurrence
	BC Act	EPBC Act			
Petaurus australis	V	-	Occur in tall mature eucalypt forest generally in areas with high rainfall and nutrient rich soils. forest type preferences vary with latitude and elevation; mixed coastal forests to dry escarpment forests in the north; moist coastal gullies and creek flats to tall montane forests in the south. Found along the eastern coast to the western slopes of the Great Dividing Range, from southern Queensland to Victoria.	3	Low. Suitable habitat for the species is absent from the Subject Land. Minor habitat (e.g., foraging) may be present in the Subject Land for this species. However, this species is unlikely to be dependent on habitat within the Subject Land, particularly with the vast, superior habitat for this species in the surrounding locality. No further assessment is required.
Petaurus norfolcensis	V	-	Generally occurs in dry sclerophyll forests and woodlands but is absent from dense coastal ranges in the southern part of its range . Requires abundant hollow bearing trees and a mix of eucalypts, banksias and acacias . There is only limited information available on den tree use by Squirrel gliders, but it has been observed using both living and dead trees as well as hollow stumps. Within a suitable vegetation community at least one species should flower heavily in winter and one species of eucalypt should be smooth barked. Endangered population in the Wagga Wagga LGA.	2	Low. Suitable habitat for the species is absent from the Subject Land. Minor habitat (e.g., foraging) may be present in the Subject Land for this species. However, this species is unlikely to be dependent on habitat within the Subject Land, particularly with the vast, superior habitat for this species in the surrounding locality. No further assessment is required.

Scientific name	Status		Distribution and habitat	Number of records (BioNet)	Likelihood of occurrence
	BC Act	EPBC Act			
Phascolarctos cinereus	V	E	Inhabits eucalypt forests and woodlands. The suitability of these forests for habitation depends on the size and species of trees present, soil nutrients, climate and rainfall .	156	Low. Suitable habitat for the species is absent from the Subject Land. Minor habitat (e.g., foraging) may be present in the Subject Land for this highly mobile species. However, this species is unlikely to be dependent on habitat within the Subject Land, particularly with the vast, superior habitat for this species in the surrounding locality. No further assessment is required.
Pteropus poliocephalus	V	V	This species is a canopy-feeding frugivore and nectarivore of rainforests, open forests, woodlands, melaleuca swamps and banksia woodlands. Bats commute daily to foraging areas, usually within 15 km of the day roost although some individuals may travel up to 70 km.	43	Low. Suitable habitat for the species is absent from the Subject Land. Minor habitat (e.g., foraging) may be present in the Subject Land for this species. However, this species is unlikely to be dependent on habitat within the Subject Land, particularly with the vast, superior habitat for this species in the surrounding locality. No further assessment is required.
Scoteanax rueppellii	V	-	Prefer moist gullies in mature coastal forests and rainforests, between the Great Dividing Range and the coast. They are only found at low altitudes below 500 m. In dense environments they utilise natural and human-made opening in the forest for flight paths. Creeks and small	3	Moderate. This highly mobile species may be an occasional visitor, but habitat similar to the Subject Land is widely distributed in the locality, meaning that the species is not dependent on habitats in the Subject Land.

Scientific name	Status		Distribution and habitat	Number of records (BioNet)	Likelihood of occurrence
	BC Act	EPBC Act			
			rivers are favoured foraging habitat. This species roosts in hollow tree trunks and branches.		No further assessment is required.

V – Vulnerable; E – Endangered; EP – Endangered Population; CE – Critically Endangered

Appendix B. Landscape Plans (Space Landscape Designs, 2023).

DEEP SOIL CALCULATIONS

Deep Soil Area 1,850m²
Council requirement 1 large tree per 80m² 23 trees
Proposed large trees 45 trees

PROPOSED PLANT SCHEDULE - ZONE A

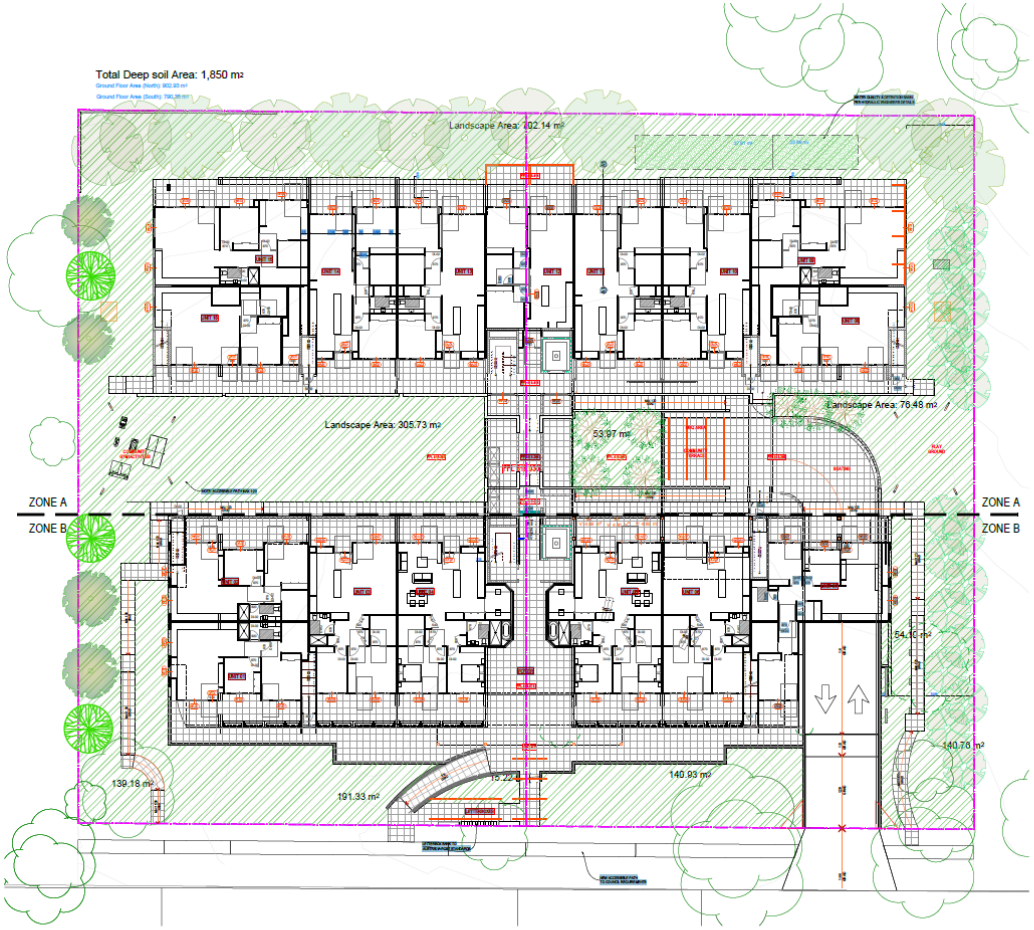
	KEY	BOTANICAL NAME	COMMON NAME	QTY	MATURE HGT	POT SIZE
		TREES				
	BP	BETULA PENDULA	SILVER BIRCH	1	8m	45Ltr
^	CM	CORYMBIA MACULATA	SPOTTED GUM	9	15m	45Ltr
^	EE	EUCALYPTUS ELATA	RIVER PEPPERMINT	6	20m	45Ltr
^	EM	EUCALYPTUS MELLICODRA	YELLOW BOX	6	25m	45Ltr
^	ES	EUCALYPTUS SCLEROPHYLLA	SCRIBBLY BARK	1	15m	45Ltr
^	ET	EUCALYPTUS TERETICORNIS	FOREST RED GUM	2	20m	45Ltr
^	WS	WATERHOUSIA FLORIBUNDA 'SWEEPER'	SWEEPER	7	10m	75Ltr

^ Denotes Large trees

PROPOSED PLANT SCHEDULE - ZONE B

	KEY	BOTANICAL NAME	COMMON NAME	QTY	MATURE HGT	POT SIZE
		TREES				
	AC	ACER PALMATUM 'SANGO KAKU'	RED CORAL BARK MAPLE	3	4m	45Ltr
	BP	BETULA PENDULA	SILVER BIRCH	1	8m	45Ltr
	OS	CERATOPETALUM GUMMIFERUM	NSW XMAS BUSH	2	7m	45Ltr
^	CM	CORYMBIA MACULATA	SPOTTED GUM	10	15m	45Ltr
^	ES	EUCALYPTUS SCLEROPHYLLA	SCRIBBLY BARK	2	15m	45Ltr
^	ET	EUCALYPTUS TERETICORNIS	FOREST RED GUM	2	20m	45Ltr
	MT	MAGNOLIA GRANDIFLORA 'TEDDY BEAR'	TEDDY BEAR MAGNOLIA	7	3m	45Ltr

^ Denotes Large trees



SPACE LANDSCAPE DESIGNS

Space Landscape Designs Pty Ltd

PROJECT: New Affordable Housing
SITE ADDRESS: 1-5 Rainbow Road Mittagong NSW 2575

CLIENT: Robeas Nominees Pty Ltd Bilgola Beach Pty Ltd
DRN: C.Wallace
SCALE: 1:100@A1
PROJECT NO: 221991

DRAWING TITLE: LANDSCAPE DEEP SOIL PLAN
DRAWING No: L-103
Rev: A

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