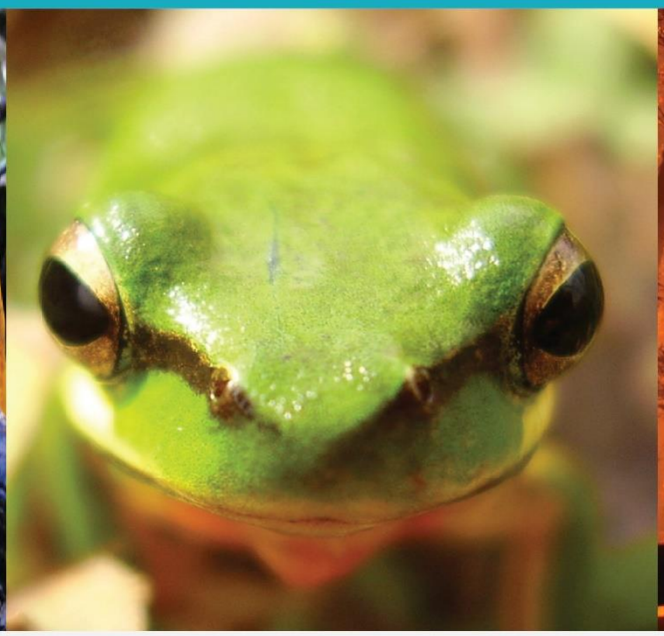
TRAVERS BUSHFIRE & ECOLOGY

A TBE ENVIRONMENTAL COMPANY



STREAMLINED BIODIVERSITY DEVELOPMENT ASSESSMENT REPORT

Proposed Development

Lot B, DP 370222

4 Forest Road

Warriewood

29 January 2025

(REF: BNM02.6)

STREAMLINED BIODIVERSITY DEVELOPMENT ASSESSMENT REPORT

Proposed Residential Development

Lot B, DP 370222, 4 Forest Road, Warriewood

BAM accredited author:	Lindsay Holmes B. Sc. – Principal Ecologist – Accredited Assessor no. BAAS17032
Contributors:	Lindsay Holmes B. Sc. – Principal Ecologist – Accredited Assessor no. BAAS17032 Anne-Cecile Colin B. Pl. Sc, M. Pl. Sc., PhD - Botanist Alana Parziani – M. App. Sc. – Fauna Ecologist Darren Hall – B. App. Sc. – Restoration Ecologist
BAMC case owner:	Lindsay Holmes B. Sc. – Principal Ecologist – Accredited Assessor no. BAAS17032
Flora survey:	Anne-Cecile Colin B. Pl. Sc, M. Pl. Sc., PhD - Botanist
Fauna survey:	Alana Parziani – M. App. Sc. – Fauna Ecologist Darren Hall – B. App. Sc. – Restoration Ecologist
Plans prepared:	Sandy Cardow B. Sc.- GIS analyst Wayne Davis B. Sc. – Marine Science, M. Sp. Sc. Tech – GIS Analyst
Approved by:	Michael Sheather-Reid B. Nat. Res. (Hons.) – Managing Director
Date:	28/01/25
File:	BNM02.6

Request an online quote 24/7

Certification

This Biodiversity Development Assessment Report (BDAR) has been prepared by Lindsay Holmes (BAAS 17032) who is an accredited person under the *BC Act,* with the assistance of those listed in Appendix 6.

I, Lindsay Holmes, certify this BDAR has been:

- prepared in accordance with the requirements of (and information provided under) the Biodiversity Assessment Method 2020
- prepared without any conflicts of interest

Finalisation of the BAM-C was undertaken on 28 January 2025. The proponent must lodge the BDAR with 14 days of finalising the BAM-C for compliance.

Date: 28 January 2025

Executive Summary

Travers bushfire & ecology was engaged by BMN Properties Pty Ltd to prepare a Biodiversity Development Assessment Report (BDAR) for the future subdivision and development on the subject land Lot B DP370222 at 4 Forest Road, Warriewood. The proposed development is for a 13-lot residential subdivision. The entire area bounded by Lot B, DP 370222, hereafter referred to as the 'study area', covers approximately 0.95 ha. The area of direct impact from the development will hereafter be referred to as the 'development footprint'.

The development proposal will see the impact of 0.43 ha of native vegetation, which includes the following Plant Community Types (PCTs):

- PCT 3595 Sydney Coastal Sandstone Gully Forest (0.22 ha)
- PCT 3595 Sydney Coastal Sandstone Gully Forest – Derived grassland (0.21 ha)

No Endangered Ecological Communities (EEC) or threatened flora were found on the development footprint.

Targeted ecological surveys and assessments have been undertaken during January 2025 but also rely on previous survey by Kingfisher Urban Ecology / Wetlands in October 2022 (survey less than 5 years old).

Two (2) threatened fauna species, Eastern Cave Bat (*Vespadelus troughtoni*) and Little Bent-winged Bat (*Miniopterus australis*), were recorded on site.

The data produced from the BAM plots was entered into the BAM-Calculator (BAM-C) and residual unavoidable impacts were calculated. The credits required to offset residual impacts are found in Tables A and B.

Table A – Requirement for ecosystem credits

Zone	Veg. zone name	Veg. integrity loss	Area (ha)	Sensitivity to loss	Sensitivity to gain	Biodiversity risk weighting	Potential SAII	Ecosystem credits
1	3595-moderate-good	57.3	0.22	Low	High	1.5	no	5
2	3595-DNG	26.4	0.21	Low	High	1.5	no	2
								Total: 7

Table B – Requirement for species credits

Veg. zone name	Veg. integrity loss	Area (ha) / count	Biodiversity risk weighting	Potential SAII	Species credits
Swift Parrot					
3595-moderate-good	57.3	0.01 ha	3	True	1
3595-DNG	26.4	0.06 ha	3	True	1
					Subtotal: 2
Eastern Cave Bat					
3595-moderate-good	57.3	0.22 ha	3	True	9
3595-DNG	26.4	0.21 ha	3	True	4
					Subtotal: 13

LIST OF ABBREVIATIONS

APZ	Asset Protection Zone
BAM	Biodiversity Assessment Method (2020)
BAR	Biodiversity Assessment Report
BC Act	*Biodiversity Conservation Act (2016)*
BC Reg	*Biodiversity Conservation Regulation (2017)*
BCAR	Biodiversity Certification Assessment Report
BDAR	Biodiversity Development Assessment Report
BOS	Biodiversity Offset Scheme
BPA	bushfire protection assessment
BSSAR	Biodiversity Stewardship Site Assessment Report
CEEC	Critically endangered ecological community
CM Act	*Coastal Management Act 2016*
DAWE	Department of Agriculture, Water and the Environment (superseded by DCCEEW)
DCCEEW (Cmlth)	Cmlth Department of Climate Change, Energy, the Environment and Water
DCCEEW (NSW)	NSW Department of Climate Change, Energy, the Environment and Water
DCP	development control plan
DEC	NSW Department of Environment and Conservation (superseded by DECC from April 2007)
DECC	NSW Department of Environment and Climate Change (superseded by DECCW from October 2009)
DECCW	NSW Department of Environment, Climate Change and Water (superseded by OEH from April 2011)
DEWHA	Commonwealth Department of Environment, Water, Heritage & the Arts (superseded by SEWPAC)
DNG	Derived Native Grassland
DOEE	Commonwealth Department of Environment & Energy (superseded by DAWE)
DPE	NSW Department of Planning and Environment (superseded by DCCEEW (NSW) from January 2024)
DPIE	NSW Department of Planning, Industry and Environment (superseded by DPE Dec 2021)
EEC	endangered ecological community
EPA	Environment Protection Authority
EP&A Act	*Environmental Planning and Assessment Act (1979)*
EPBC Act	*Environment Protection and Biodiversity Conservation Act (1999)*
FM Act	Fisheries Management Act
IBRA	Interim Biogeographic Regionalisation for Australia
LEP	local environmental plan
LGA	local government area
LLS Act	*Local Land Services Act (2013)*
NES	National Environmental Significance
NPW Act	*National Parks and Wildlife Act (1974)*
NRAR	Natural Resources Access Regulator (NSW)
NSW DPI	NSW Department of Industry and Investment
OEH	Office of Environment and Heritage (superseded by DPIE from August 2019)
PCT	plant community type
PFC	projected foliage cover
RFS	NSW Rural Fire Service
ROTAP	rare or threatened Australian plants
SAII	Serious And Irreversible Impacts
SEPP	State Environmental Planning Policy
SEWPAC	Commonwealth Dept. of Sustainability, Environment, Water, Population & Communities (superseded by DOEE)
SIS	species impact statement

SULE	safe useful life expectancy
TEC	threatened ecological community
TPZ	tree preservation zone
TSC Act	*Threatened Species Conservation Act (1995)* – superseded by the *Biodiversity Conservation Act (2016)*
VMP	vegetation management plan

TABLE OF CONTENTS

Figures

Tables

Appendices

STAGE 1: BIODIVERSITY ASSESSMENT

1. Introduction

Travers bushfire & ecology has been engaged to undertake a Streamlined Biodiversity Development Assessment Report (SBDAR) within Lot B, DP 370222, at 4 Forest Road, Warriewood within the Northern Beaches Council local government area (LGA).

With an area of approximately 0.95 ha and a proposed clearing below 1 ha, the development site requires a Streamlined BDAR according to the *Biodiversity Offsets Scheme* (BOS): This proposal shall be assessed under the *Biodiversity Conservation Act 2016* (*BC Act*).

The purpose of this SBDAR is to undertake assessment of impact on biodiversity, including threatened species, populations and ecological communities. This report has been prepared in accordance with the *Biodiversity Assessment Methodology 2020* (*BAM 2020*), as well as relevant legislation including the *Environmental Planning and Assessment Act 1979* (*EP&A Act*), the *BC Ac*, the *Environment Protection and Biodiversity Conservation Act 1999* (*EPBC Act*) and the *Biodiversity Conservation Regulation 2017* (*BC Reg.*).

The following tasks have been completed:

- Undertake botanical survey to describe the vegetation communities and their conditions
- Undertake fauna habitat survey for the detection and assessment of fauna and their potential habitats
- Complete targeted surveys for Serious And Irreversible Impact (SAII) species
- Undertake Koala habitat survey for assessment against the SEPP (Biodiversity and Conservation) 2021.

1.1 Streamlined assessment

The BAM contains three streamlined assessment modules (Appendices B, C and D of the *BAM 2020*). These streamlined assessment modules may be used where the proposal impacts on:

a) scattered trees (Appendix B of the *BAM 2020*)

b) a small area (Appendix C of the *BAM 2020*)

c) planted native vegetation, where the planted native vegetation was planted for purposes such as street trees and other roadside plantings, windbreaks, landscaping in parks and gardens, and revegetation for environmental rehabilitation (Appendix D of the *BAM 2020*)

The development proposal being under the threshold of the small area module can be assessed with a streamlined assessment. Table 1.1 justifies the examination of the development proposal under a streamlined BDAR.

The *BAM 2020* sets out the circumstances, and the specific assessment requirements, where each of the streamlined assessment modules can be used to assess a proposal. The complete process to assess a small area under a streamlined assessment is stated in Table 13 of the Appendix C of the *BAM 2020*. The key difference for a Streamlined BDAR under the small area module is the required assessment of habitat suitability and presence of SAII entities on

the subject land only. Candidate species credit species that are not at risk of an SAII and are not incidentally recorded on the subject land do not require further assessment.

The streamlined assessment module when preparing a BDAR will still require offsetting through the BOS.

Table 1.1 - Streamlined assessment modules

Streamlined assessment module	Criteria for application	Does the impacted vegetation meet this criterion?	Can this module be applied?
Scattered trees	Scattered trees are defined as species listed in the tree growth form group that: **a.** have a percent foliage cover that is less than 25% of the benchmark for tree cover for the most likely plant community type and are on category 2-regulated land and surrounded by category 1-exempt land on the Native Vegetation Regulatory Map under the LLS Act, or	no	no
	b. have a DBH of greater than or equal to 5 cm and are located more than 50 m away from any living tree that is greater than or equal to 5 cm DBH, and the land between the scattered trees is comprised of vegetation that are all ground cover species on the widely cultivated native species list, or exotic species or human-made surfaces or bare ground, or	no	
	c. are three or fewer trees that have a DBH of greater than or equal to 5 cm and are within a distance of 50 m of each other, that in turn, are greater than 50 m away from the nearest living tree that is greater than or equal to 5 cm DBH, and the land between the scattered trees is comprised of vegetation that are all ground cover species on the widely cultivated native species list, or exotic species or human-made surfaces or bare ground.	no	
Small area	Is the area of native vegetation clearing less than or equal to the thresholds (see Table 1.2, extracted from BAM 2020 Table 12)?	**Yes**: future minimum lot size is <1 ha, so clearing threshold of ≤1 ha applies. The site contains a total 0.51 ha native vegetation, so this threshold cannot be exceeded, and the criterion is met.	**Yes**
Planted native vegetation	Is any planted native vegetation impacted?	no	no

Table 1.2 – Small area module clearing limits

Minimum lot size associated with the property *	Maximum area clearing limit for application of the small area development module
Less than 1 ha	≤1 ha
Less than 40 ha but not less than 1 ha	≤2 ha
Less than 1000 ha but not less than 40 ha	≤3 ha
1000 ha or more	≤5 ha
*shown in the lot size maps made under the relevant local environmental plan (LEP), or actual lot size (where there is no minimum lot size provided for the relevant land under the LEP	

Figure 1.1 - Site map

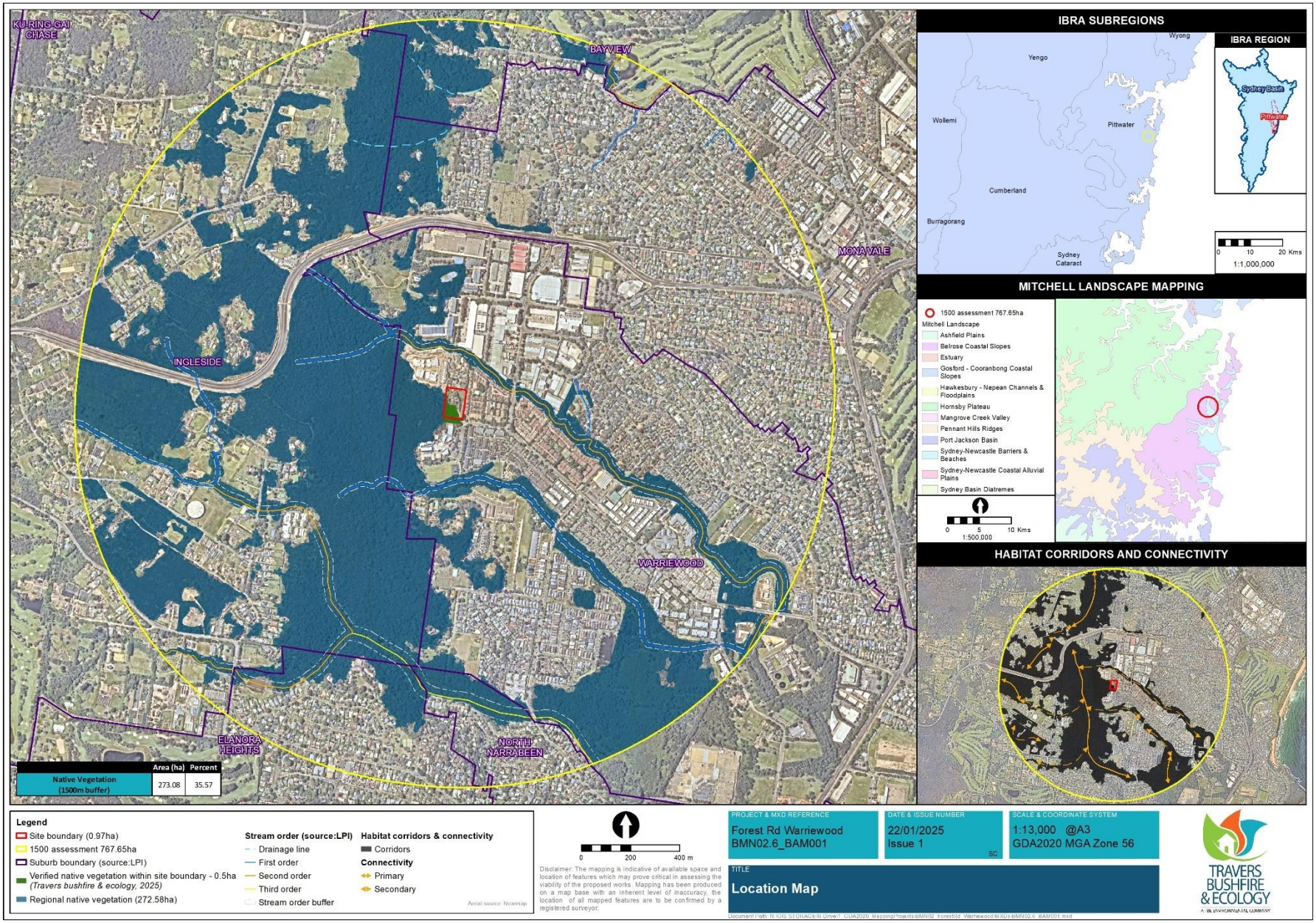


Figure 1.2 - Location map

Figure 1.3 - Development proposal

1.2 General description and development proposal

This BDAR was produced by *Travers bushfire & ecology* for Lot B, DP 370222, at 4 Forest Road, Warriewood within the Northern Beaches Council local government area (LGA). The extent of this entire lot is shown in Figure 1.3. The proposed development is for replacing an existing dwelling with a thirteen (13) lot subdivision. Road access to the lots as well as services will enter the site also along the existing clearance off Forest Road. The site is currently zoned R3 under the Pittwater Local Environmental Plan of 2014 which corresponds to a medium density residential area.

The area of land subject to direct impacts caused by the proposal; inclusive of roads, services, development envelopes, fences and Asset Protect Zones (APZs); will hereafter be referred to as the 'development footprint'. The larger area outside of the development area (development footprint) will hereafter be referred to as the 'study area'.

Table 1.3 provides an overview the planning, cadastral and topographical details of the study area and an overview of the site and surrounds is shown on Figure 1.1 and Figure 1.2 (site and location maps).

Table 1.3 – Site features

Location	Lot B, DP 370222; 4 Forest Road, Warriewood
Location description	The site is located at the end of Forest Road, North of the Mater Maria Catholic College. It is bordered by the Ingleside Chase Reserve to the West and recent housing development to the North and East. The site is located around 150m south of Narrabeen Creek.
Area	0.95 ha
Local government area	Northern Beaches Council
Zoning	R3 – Medium Density Residential
Grid reference MGA-56	341050E 6271750N
Elevation	21-50 m
Topography	The site is located on a gentle slope.
Catchment and drainage	There are no permanent watercourses on site or immediately adjacent to the proposed development. The Warriewood catchments include the Warriewood Valley catchment, the Narrabeen Lagoon catchment, and the Warriewood Wetland.
Existing land use	Dwelling with large garden.

1.3 Development site footprint

Whilst the entire site is approximately 0.95 ha, the amount of native vegetation is estimated at 0.5 ha. 0.43 ha will be directly impacted through the construction of internal roads, buildings, asset protection zones (APZs) and boundary fences between allotments. Where the proposed road is constructed that will enter the site from the south off Forest Road, there will be cut/fill requirements. The development footprint includes the road batter plus a 2m wide buffer to account for vehicle movements, trimming of overhanging vegetation and clearance for access.

Bushfire Compliance

For bushfire planning compliance, an Asset Protection Zone (APZ) will be in place surrounding the proposed buildings (see Figure 1.3) as per the Bushfire Protection Assessment (*Travers bushfire & ecology*).

Development history

Figure 1.4 below shows some of the site history through aerial photography. The area was used historically for agricultural lands. In 1951, approximately ¾ of the site had some degree of native vegetation, but by the mid-1980s, this was only present in the south-west corner of the site and looks to be heavily modified.

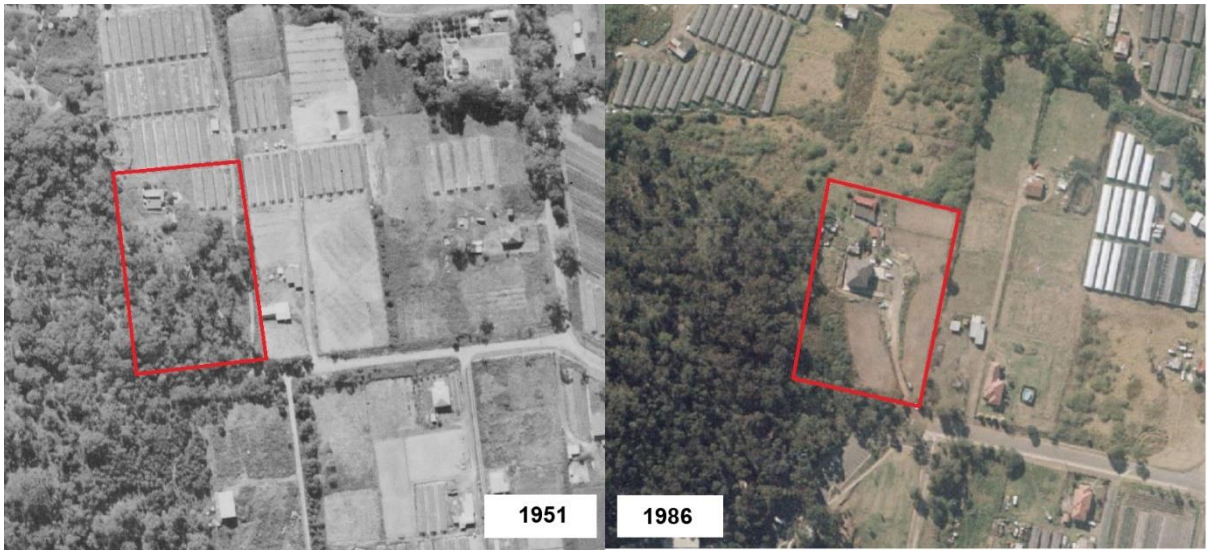


Figure 1.4 - Historical aerial photography

1.4 Information sources

Data and resources used or consulted in this assessment include:

- The Biodiversity Assessment Method (DPIE 2020)
- The Biodiversity Assessment Method Operational Manual – Stage 1 (DPIE 2020)
- The Biodiversity Assessment Method Operational Manual – Stage 2 (EES 2019a)
- BioNet Vegetation Classification
- BioNet Threatened Biodiversity Data Collection (TBDC)
- Biodiversity Assessment Method Calculator
- BioNet Threatened Species Profiles
- PlantNET NSW
- Biodiversity Offsets and Agreement Management System (BOAMS).

Spatial data used in this report has included data from the following sources:

- NSW Department of Finance and Services (via Six Maps)
- NSW Native Vegetation Extent v1.2
- IBRA Regions and Subregions (OEH 2016)
- NSW (Mitchell) Landscapes - Version 3.1 (OEH 2016)
- Directory of Important Wetlands in Australia (Department of the Environment and Energy)
- Fauna Corridors for North East NSW (OEH 2010)
- Acid Sulfate Soils Risk map (DPIE 2020/eSPADE)

The following documents, reports and information sources were utilised in the preparation of this report:

- Flora and Fauna Impact Assessment - *Ecological Consultants Australia Pty Ltd TA Kingfisher Urban Ecology and Wetlands* (July 2024)
- Bushfire Protection Assessment prepared by Travers bushfire & ecology
- Vegetation Management Plan prepared by Travers bushfire & ecology

Survey guidelines

- Survey guidelines for Australia's threatened bats (DEWHA. 2010)
- Koala (*Phascolarctos cinereus*) Biodiversity Assessment Method Survey Guide (DPE 2022)
- Matters of National Environmental Significance (Commonwealth of Australia 2013)
- Threatened Biodiversity Survey and Assessment: Guidelines for Developments and Activities 2004 (working draft), Department of Environment and Conservation (DEC)
- Region based guide to the echolocation calls of Microchiropteran bats (DEC 2004)
- Species credit threatened bats and their habitats (DPIE 2018)
- Field survey methods: Best practice field survey methods for environmental consultants and surveyors when assessing proposed development sites or other activities on sites containing threatened species, populations or ecological communities (OEH 2004)
- Surveying threatened plants and their habitats: NSW survey guide for the Biodiversity Assessment Method (DPIE 2020)

Mapping resources

- Aerial photographs (Google Earth Pro / Spatial Information Exchange / NearMap)
- Topographical maps (scale 1:25,000)
- LiDAR data for contours (Land and Property Information, est. 2015 estimated)
- ESpade tool for checking soil types

Threatened species records

- BioNet database which holds data from a number of custodians (2025 to 10 km)
- EPBC Protected Matters Search Tool – Cmlth DCCEEW (2025 to 10 km)

Vegetation mapping/resources:

- BioNet Vegetation Classification System
- DPE NSW State Vegetation Type Map
- Surveying threatened plants and their habitats: NSW survey guide for the Biodiversity Assessment Method (DPIE 2020)

1.5 Licences

Individual staff members of *Travers bushfire & ecology* are licensed under Clause 20 of the *National Parks and Wildlife (Land Management) Regulation 1995* and Sections 120 & 131 of the *National Parks and Wildlife Act 1974* to conduct flora and fauna surveys within service and non-service areas. NPWS Scientific Licence Numbers: SL100848.

Travers bushfire & ecology staff are licensed under an Animal Research Authority issued by the NSW Department of Primary Industries. This authority allows *Travers bushfire & ecology*

staff to conduct various fauna surveys of native and introduced fauna for the purposes of environmental consulting throughout New South Wales.

2. Landscape features

Table 2.1 examines the landscape features of the proposed development site in accordance with the BAM.

The study area is located on lands mapped as Biodiversity Values Land (refer to Figure 2.1) This area being above the threshold of 0.25 ha, offset is required.

Figure 2.1 – Biodiversity Land Map (purple) relative to the study area

(Source: https://www.lmbc.nsw.gov.au/Maps/index.html?viewer=BosetMap)

Table 2.1 – Landscape features

CATEGORY	Information	References
Patch size	>100 ha	Figure 2.2
IBRA region and subregions	Sydney Basin bioregion – Pittwater subregion	Figure 1.1
NSW landscape region and area (ha)	Sydney – Newcastle Barriers and Beaches	Figure 1.1
Native vegetation extent in the buffer area (1500 m)	273 ha approx. and 36% Cover classes: 0–10%, 10–30%, **30–70%** and >70%	Figure 1.2
Cleared areas	The majority of the site has been cleared. Native vegetation only remains near the south-west corner of the site	Figure 3.1
Evidence to support differences between mapped vegetation extent and aerial imagery	Mapped vegetation closely matches aerial imagery. Unmapped vegetation is exotic.	Figure 1.2
Rivers and streams classified according to stream order	A first order stream (Narrabeen Creek) is located 150m North and south of the study area.	Figure 1.2
Wetlands within, adjacent to and downstream of the site, including important wetlands	No wetlands were found in proximity to the site.	Figure 1.2
Connectivity features	The connectivity to the development footprint is moderate. There is existing residential development to the north, south and east, while the Ingleside Conservation area is located west of the site. The location map shows an overview of the extent of native vegetation in the locality.	Figure 1.2
Geology and soils	The site is located on the edge of the Hawkesbury Sandstone geological unit, sitting adjacent to the Narrabeen Group Newport Formation. Soils – Erina Soil Landscape	Online resources
Geological features	There are no areas of geological significance near the site.	-
Outstanding biodiversity	There are no areas of outstanding biodiversity value occurring on or near the site.	-
Identification of method applied (i.e. linear or site-based)	Site based assessment	-

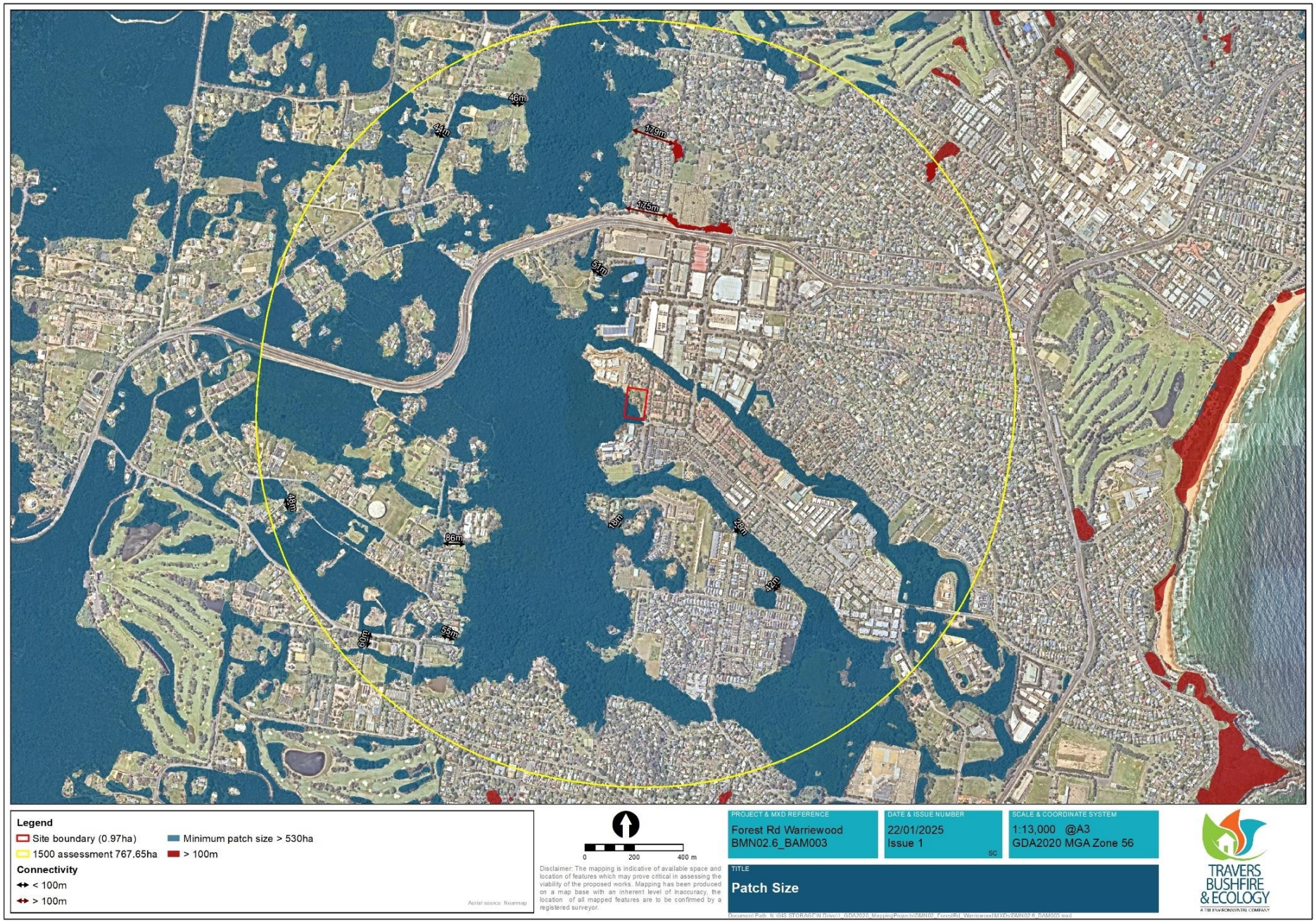


Figure 2.2 - Patch size

3. Native vegetation

3.1 Vegetation description

The local vegetation of Warriewood in the Northern Beaches typically comprises dry sclerophyll forests dominated by a variety of eucalypts - Sydney Red Gums (*Angophora costata*), Dward Apple (Angophora hispida), Sydney Peppermints (*Eucalyptus piperita*), Grey Gums (*Eucalyptus punctata*), Broad-leaved White Mahoganies (*Eucalyptus umbra*) and Red Bloodwoods (*Corymbia gummifera*).

Most of the subject land has been cleared of its native tree and shrub vegetation strata. The site retains good connectivity to broader areas of contiguous dry sclerophyll forest communities to the western side (Ingleside Conservation area). The northern and eastern boundaries are bordered by adjacent residential areas (Figure 1.2). The amount of native vegetation on the subject land was estimated at 0.5 ha with 0.43 ha to be impacted by the development footprint.

Most of the subject land does not contain native vegetation. The grassy area located from lot 1 to lot 10 comprises exotic invasive species such as the common Lantana (*Lantana camara*), couch grass (*Elymus repens*), hitch hikers (*Bidens Pilosa*) and moth vine (*Araujia sericifera*). This area has been previously cleared into a garden area and the exotic vegetation is left unmaintained (approximately 0.44 ha; Pictures 1 to 5 below). The land found south of the current house (lots 12 and 13) is covered by a mix of exotic and native grasses and seedlings spread from the surrounding native woodland (approximately 0.26 ha; Picture 6). The road leading to the house is bordered by a mix of exotic trees and palm trees with occasional native species.

The species list in Appendix 1x 8 provides an exhaustive list of native, exotic and invasive plant species recorded on site from the site survey in January 2025.

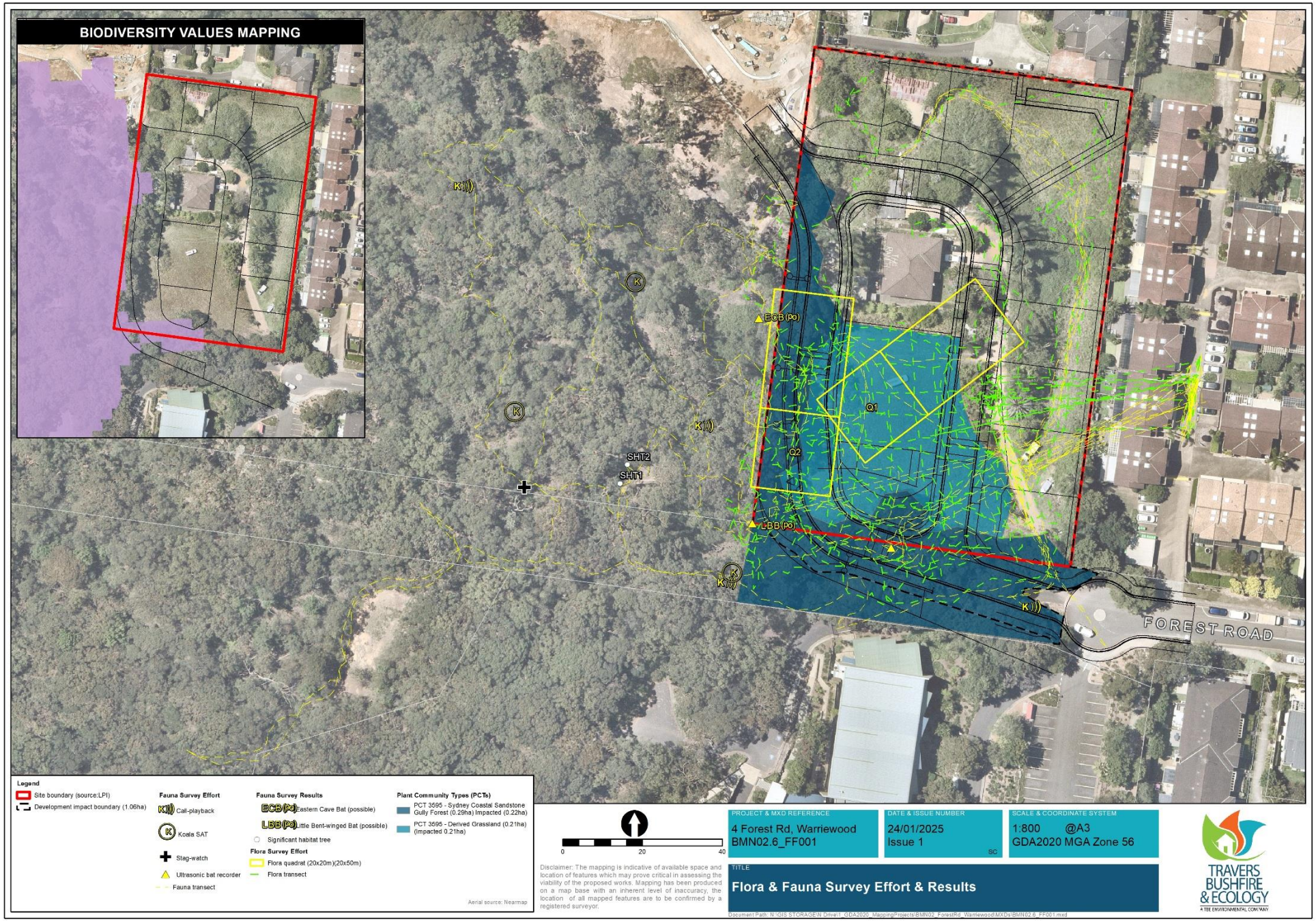


Figure 3.1 – Flora and fauna survey effort and results

Picture 3.1: The centre part of the subject land bordering the path is a mix of exotic shrubs, vines and palm trees.

Picture 3.2: The grassy area north-east of the subject land is covered with about 60cm of couch grass.

Picture 3.3: Common Lantana is found throughout the subject land and grows dense bordering the grassy area north-east.

Picture 3.4: *Bidens pilosa* is found growing in dense patches.

Picture 3.5: Close up picture of the dense cover of couch grass covering the area.

Picture 3.6: Grassland with native vegetation in the south-western area.

3.2 Plant Community Types

Previous surveys reviewed

A previous desktop assessment of the Plant Community Types (PCTs) has been performed for 4 Forest Road, Warriewood:

- Flora and Fauna Impact Assessment - *Ecological Consultants Australia Pty Ltd TA Kingfisher Urban Ecology and Wetlands* (July 2024).

The report identified three PCTs on the subject land (see Figures 3.1 a-c of Ecological Consultants Australia Pty Ltd. 2024 Flora and Fauna Impact Assessment):

- 1250 – *Sydney Peppermint – Smooth-barked Apple – Red Bloodwood shrubby open forest on slopes of moist sandstone gullies, eastern Sydney Bioregion* (superseded by PCT 3595 according to the Systematic ecological revision of 2022*)* on the southern border of the development footprint.
- *PCT 1776 - Smooth-barked Apple - Red Bloodwood open forest on enriched sandstone slopes around Sydney and the Central Coast* (superseded by PCT 3595 according to the Systematic ecological revision of 2022) on a portion of the western boundary of the subject land.
- *PCT 1841 - Smooth-barked Apple - Turpentine - Blackbutt tall open forest on enriched sandstone slopes and gullies of the Sydney region* (superseded by PCT 3592 according to the Systematic ecological revision of 2022)

No Threatened Ecological Community or threatened flora were identified by *Kingfisher Urban Ecology and Wetland*.

The current vegetation mapping on the subject land according to BioNet is shown in Figure 3.2.

Figure 3.2 - Current vegetation mapping on the subject land

Vegetation assessment effort

The native vegetation extent within the subject land has been ground-truthed following BAM 2020 requirements for field surveys. Stratified survey using the BAM was undertaken at each of the two (2) survey plots (summary in Table 3.1). The location of the vegetation integrity plots assessed in the subject land is shown in Figure 3.1.

All plot data utilised for the BAM calculator are provided in Appendix 3, along with the PCT description from BioNet. Photos of the plots are provided in Photos 3.7 and 3.8 below.

Table 3.1 – PCT determination survey effort

Veg zone no.	Area (ha)	Minimum plots required	Plot sampled	Plot identifier	Plot size (m)	Easting at 0 m	Northing at 0 m	Bearing
1	0.22	1	1	Q2	20x50	341023 E	6271733 N	7
2	0.21	1	1	Q1	20x50	341043 E	6271745 N	53

The vegetation assessment results were inputted in the BioNet Vegetation Classification tool for vegetation formations in the Pittwater IBRA subregion to provide a short list of potential PCTs (Table 3.2; PCT in bold was selected to use in the BAMC). The final PCT was assigned based on a 'best fit' identification basis according to floristic characteristics and landscape occurrence as per the BioNet Vegetation Classification tool. Justification for inclusion or exclusion of each shortlisted PCT is provided bellow.

The following PCT was identified on site:

- *3595: Sydney Coastal Sandstone Gully Forest*

PCT 3595 was the primary vegetation community found on site with an estimated extent of 0.50 ha and accounting for all extant native vegetation. The site has been significantly cleared resulting in absent upper and mid strata species and the presence of non-native vegetation that have not been included in the BDAR. This significant degradation of the area resulted in the absence of key dominant species for PCT determination (particularly for Plot 1).

Two vegetation communities were identified within the native vegetation of the development footprint:

- Vegetation Community Zone 1 – Sydney Coastal Sandstone Gully Forest (0.22 ha)
- Vegetation Community Zone 2 – Sydney Coastal Sandstone Gully Forest – Derived grassland (0.21 ha)

The PCTs are described in Table 3.3, mapped in Figure 3.1 and illustrated below in Photos 3.7 and 3.8. All plot sheets utilised for the BAMC and the BioNet description of the identified PCTs on site are in Appendix 3.

Table 3.2 - PCT shortlist and justification

Plot	Condition	Dominant species	Vegetation formation and class (from BAM-C)	Shortlisted PCTs
2 (Zone 1)	moderate - good	Trees:*Angophora costata, Corymbia gummifera, Eucalyptus piperita* Shrubs: *Dodonaea triquetra, Platysace lanceolata, Pultenaea flexilis* Groundcover: *Themeda triandra, Entolasia stricta, Lomandra longifolia*	**Dry Sclerophyll Forests (Shrubby sub-formation) -** Sydney Coastal Dry Sclerophyll Forests	**3595: Sydney Coastal Sandstone Gully Forest** 3592: Sydney Coastal Enriched Sandstone Forest 3593: Sydney Coastal Sandstone Bloodwood Shrub Forest 3586: Northern Sydney Scribble Gum Woodland
1 (Zone 2)	derived native grassland	Trees: *absent* Shrubs: *Hibbertia aspera, Acacia longissima, Banksia integrifolia* Groundcover: *Themeda triandra, Pomax umbellata, Entolasia stricta*	**Dry Sclerophyll Forests (Shrubby sub-formation) -** Sydney Coastal Dry Sclerophyll Forests	**3595: Sydney Coastal Sandstone Gully Forest** 3592: Sydney Coastal Enriched Sandstone Forest 3593: Sydney Coastal Sandstone Bloodwood Shrub Forest 3586: Northern Sydney Scribble Gum Woodland

First, the identification of the most suitable PCT was based upon filtering for PCTs with the dominant strata species listed in Table 3.2 within the Pittwater IBRA subregion. Then the PCT list was reduced to the corresponding vegetation class of Sydney Coastal Dry Sclerophyll Forest. Vegetation with the wrong landscape features (e.g. foreshores forest and hunter coast foothills) were excluded to obtain the shortlisted PCTs (Table 3.2).

Finally, they were scrutinised based on vegetation composition. The identified PCT on site had an upper stratum composition of *Angophora costata* and *Eucalyptus piperita* primarily with some *Corymbia gummifera*. The mid stratum was dense in *Dodonaea triquetra* due to regrowth post understorey clearing. The shrub and ground strata showed the common composition of PCT 3595. This composition was observed consistently in the woodland past the site boundaries. PCTs 3593 and 3586, which are dominated by *C. gummifera* and *Eucalyptus haemastoma* respectively, were excluded based on wrong tree strata composition and abundance.

PCT 3595 was considered as being most representative of the vegetation within Zones 1 and 2. PCT 3595 – *Sydney Coastal Sandstone Gully Forest* was found in poor condition in Zone 1 and moderate-good in Zone 2 with clearing, dumping and the presence of exotic plant species including high threat weeds (i.e. *Lantana camara* and *Bidens pilosa*). The PCT is summarised in Table 3.3 and the BioNet description can be found below.

Table 3.3 - Summary of Plant Community Types

PCT ID	Species relied upon	Vegetation formation	Vegetation class	% Cleared	Area within development site (ha)	TEC status
3595 – Sydney Coastal Sandstone Gully Forest	*A. costata* *E. piperita* *C. gummifera*	Dry Sclerophyll Forest (Shrubby sub-formation)	Sydney Coastal Dry Sclerophyll Forest	14.56	0.43 to be impacted	None

BioNet Vegetation Classification - Community Profile Report

Plant Community Type ID (PCT ID): 3595

PCT Name: Sydney Coastal Sandstone Gully Forest
Classification Confidence Level: 1-Very High
Total Number of Replicates: 222
Number of Primary Replicates: 216
Number of Secondary Replicates: 6
Vegetation Description: A tall to very tall heathy sclerophyll open forest associated with Hawkesbury Sandstone gullies found along the eastern extent of the Sydney sandstone plateaus. The tree canopy very frequently includes a high cover of Eucalyptus piperita and Angophora costata with Corymbia gummifera occurring less frequently and with a lower cover. The mid-stratum includes a sparse small tree layer that very frequently includes Ceratopetalum gummiferum and Banksia serrata. A mid-dense to dense tall shrub layer covers steep to gentle slopes across rocky benches and frequent outcrops. The shrub layer very frequently includes Acacia terminalis, Persoonia levis, Lomatia silaifolia, Platysace linearifolia, Leptospermum trinervium and Dillwynia retorta. Other common shrubs include Acacia suaveolens and Banksia ericifolia Persoonia levis are frequently recorded. The ground layer is comprised of a mix of graminoids, climbers, grasses and ferns that very frequently or commonly include Lomandra longifolia, Smilax glyciphylla, Entolasia stricta and Pteridium esculentum. The large lily Doryanthes excelsa is common to the south of Sydney . This PCT is widespread north of the Appin road on the Woronora Plateau, extending onto the Hornsby Plateau at Lane Cove and Ku-ring-gai, Brisbane Water and Dharug national parks. It occurs at elevations of 40-410 metres asl, and in higher coastal rainfall zones of over 1000 mm mean annual rainfall. On ridges and exposed slopes, it is replaced by sandstone heathy woodlands PCT 3590 south of Sydney and by PCT 3586 north of Sydney.
Vegetation Formation: Dry Sclerophyll Forests (Shrubby sub-formation);
Vegetation Class: Sydney Coastal Dry Sclerophyll Forests;
IBRA Bioregion(s): Sydney Basin;
IBRA Sub-region(s): Cumberland; Pittwater; Sydney Cataract; Wyong; Yengo;
LGA: CAMPBELLTOWN; CENTRAL COAST; GEORGES RIVER; HORNSBY; KU-RING-GAI; LIVERPOOL; NORTHERN BEACHES; CITY OF PARRAMATTA; RYDE; SUTHERLAND SHIRE; WINGECARRIBEE; WOLLONDILLY; WOLLONGONG;
Elevation (m) (Min, Median, Max): 16.4 109.6 406.3
Annual Rainfall (mm) (Min, Median, Max): 927 1218 1533
Annual Mean Temperature (deg C) (Min, Median, Max): 14.26 16.41 17.11
Median Native Species Richness per plot: 53
TEC Assessed: No associated TEC
TEC List:
TEC Comments:
PCT Percent Cleared: 14.56
PCT Definition Status: Approved

Photo 3.7: Plot 1 (facing north) - PCT 3595 in the south-western part of the study area.

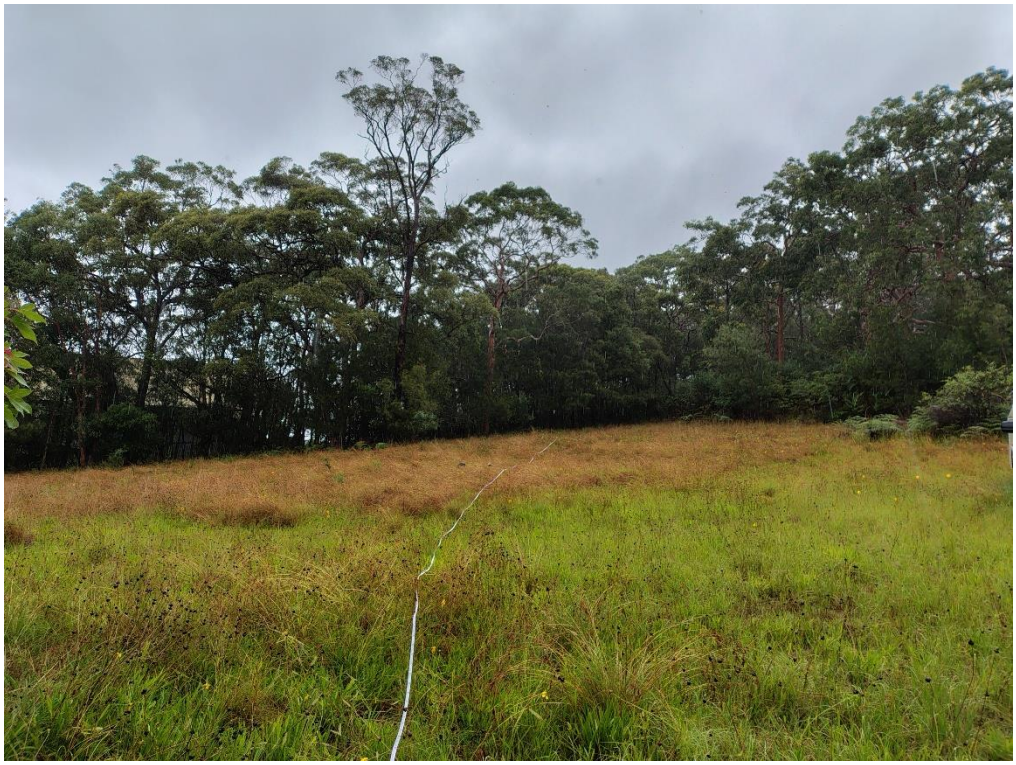


Photo 3.8: Plot 2 (facing south) - Derived PCT 3595 in the mixed exotic and native grassland.

3.3 Threatened Ecological Communities

No Threatened Ecological Community has been identified within the development footprint.

3.4 Vegetation Integrity

The vegetation integrity assessment data was undertaken per survey plot using the BAMC and summarised in Table 3.4. The breakdown of PCTs and zones is shown on Figure 3.1 Impacted areas (the development footprint) are shown cross-hatched in Figure 1.1.

Table 3.4 – Vegetation integrity score

Zone	Vegetation zone name	Area (ha)	Composition condition score	Structure condition score	Function condition score	Vegetation integrity score
1	3595_moderate_good	0.22	23.8	95.8	82.2	57.3
2	3595_DNG	0.21	25.7	28.3	30	26.4

4. Threatened species

4.1 Introduction

For determining threatened species presence, the BAM-C references two key types of species:

- "*Ecosystem Credit Species are threatened species whose occurrence can generally be predicted by vegetation surrogates and/or landscape features, or that have a low probability of detection using targeted surveys. A targeted survey is not required to identify or confirm the presence of ecosystem credit species.*" – BAM 2020
- "*Species Credit Species are threatened species for which vegetation surrogates and/or landscape features cannot reliably predict the likelihood of their occurrence or components of their habitat. A targeted survey or an expert report is required to confirm the presence of these species on the subject land.*" – BAM 2020

The Threatened Biodiversity Data Collection (TBDC) identifies the threatened species assessed for ecosystem credits and species credits. The BAM 2020 outlines three options for the assessor to use for determining species presence: targeted survey, expert report and assuming presence.

Targeted survey:

The objective of the species survey is to determine, with a high level of confidence, the presence of the species on the subject land and, if present, the number of individuals or area of suitable habitat. The species survey aims to minimise 'false negatives' and can provide additional information on habitat use and distribution of the species across the subject land.

The assessor must undertake a targeted threatened species survey using a scientifically robust, fit-for-purpose and repeatable method. Species surveys must be conducted at the optimum time for detection. Appropriate survey months are automatically populated in the BAM-C. The assessor may adjust survey timing according to species biological characteristics, natural, climatic and ground disturbances. The technique, effort and timing of targeted surveys for each species must be documented and justified in the BDAR.

Exclusions based on habitat features and distributional constraints:

Candidate species can be excluded (*BAM 2020*; Section 5.1) from further consideration if:

- The distribution of the species does not include the IBRA subregion within which the subject land is located
- the subject land is outside any geographic limitations of the species distribution based on information from the threatened biodiversity profile search webpage. If no geographic limitations are listed for the species, then this step is not applicable
- none of the habitat constraints for the species as provided in the TBDC are present in a vegetation zone or subject land.
- the species is a vagrant in the IBRA subregion.

After carrying out a field assessment, a candidate species can also be excluded if:

- the microhabitats required by a species are absent from the subject land (or specific vegetation zone).
- the habitat constraints or microhabitats are degraded to the point that the species is unlikely to use the subject land (or specific vegetation zones).

If a candidate species cannot be excluded based on the above criteria, targeted survey must be undertaken, the species assumed present or an expert report obtained that states that the species is unlikely to be present on the subject land or specific vegetation zones.

Expert report:

Where the target species is cryptic and therefore difficult to identify via survey, or the optimal survey time is passed, an accredited expert opinion can be solicited for determining the likelihood of a species presence and location, or absence, in the subject land. The expert must be identified as well as their qualifications and Departmental approval of expert status. The use of an expert report must be justified in the BDAR.

If it has been determined by the expert that the species is absent, no further investigation is required for the BDAR. If the expert report confirms that the species is present, the species must be assessed further, and the expert must prepare the species polygon on the subject land.

Assuming presence:

Alternatively, an assessor may choose to assume a species is present on the subject land. Assuming species' presence may be appropriate where:

- the target species is cryptic and therefore difficult to identify via survey
- the optimal survey time for the species has been missed (e.g. where the assessor would prefer that an expert report be prepared rather than wait for the appropriate survey season)

4.2 Habitat suitability assessment

4.2.1 Flora

The subject land was assessed to identify the resources and habitat of threatened flora species by importing the vegetation data in the BAM-C. The field survey conducted for the PCT determination in Section 3 demonstrated that there is suitable habitat for the threatened species described in Table 4.6.

The results of the field survey also determined that some candidate species credit species can be excluded from the targeted survey. The excluded species and the justification for exclusion are described in Table 4.5.

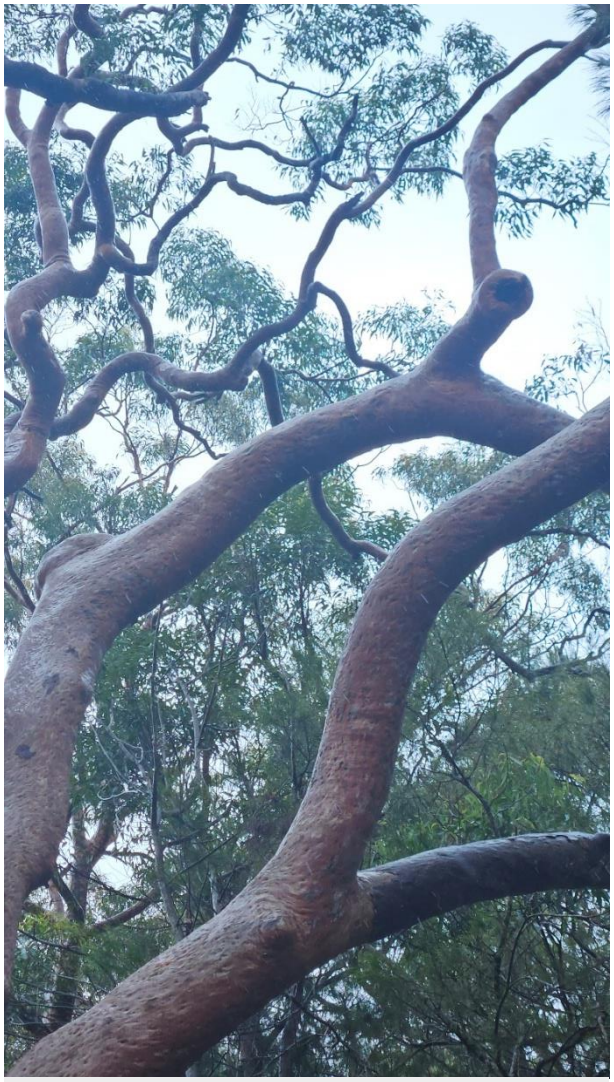
4.2.2 Fauna

Fauna habitat suitability assessment includes the identification of significant habitat trees on site. They are defined as trees containing large hollows suitable for use by owls and/or containing several good quality hollows typically consisting of more than one medium (10-30 cm) sized hollow. A tree may also be considered significant where evidence of use by select fauna is found such as Yellow-bellied Glider sap feed tree, raptor nest, or owl roost.

The subject land was assessed to identify the resources and habitat of threatened fauna species. A complete assessment of the location of habitat trees and the size of hollows within was undertaken as part of surveys.

Table 4.2 provides hollow-bearing tree data and other habitat features recorded. Figure 3.1 provides locations of habitat trees.

Picture 4.1: Hollow-bearing tree (*Angophora costata*) located west of the subject land.



Picture 4.2: Hollow-bearing tree (*Angophora costata*) located west of the subject land.

Picture 4.3: Termite nest located west of the subject land.

Picture 4.4: Potential bat breeding habitat on the subject land.

Picture 4.5: Potential bat breeding habitat on the subject land.

Picture 4.6: Potential bat breeding habitat on the subject land.

Hollow-bearing Tree Surveys

Hollow bearing trees are important habitat features for a wide range of birds, mammals, amphibians and reptiles including several threatened species which may occur in the locality.

Surveys of hollow-bearing trees were undertaken using through meandering transects throughout the study area beyond the designated Asset Protection Area (APZ) and immediate surrounds with each hollow-bearing tree observed marked using a GPS. Two (2) hollow bearing trees were recorded onsite as *Angophora costata* with hollows within branches <20cm in diameter (Pictures 4.1 and 4.2).

The most notable habitat features and resources for threatened fauna species include:

- Medium hollow (10-30cm) particularly those with use by Yellow-bellied Glider
- Small hollows (<10cm)
- Seeding Allocasuarina trees
- Ephemeral drainages (dry during January 2025 survey)
- Diverse seasonal flowering opportunities for nectivorous species.

The fauna habitats present within the site are identified within the following table.

Table 4.1 – Observed fauna habitat

Topography				
Flat	Gentle	Moderate ✓	Steep	Drop-offs
Vegetation structure				
Closed Forest	Open Forest ✓	Woodland ✓	Heath	Grassland ✓
Disturbance history				
Fire	Under-scrubbing ✓	Cut and fill works		
Tree clearing ✓	Grazing			
Soil landscape				
DEPTH:	Deep	Moderate ✓	Shallow	Skeletal
TYPE:	Clay	Loam ✓	Sand ✓	Organic ✓
VALUE:	Surface foraging	Sub-surface foraging	Denning/burrowing	
WATER RETENTION:	Well Drained ✓	Damp / Moist	Water logged	Swamp / Soak
Rock habitat				
CAVES:	None			
CREVICES:	None			
ESCARPMENTS:	Not applicable			
OUTCROPS:	None			
SCATTERED / ISOLATED:	High Surface Area Hides	Med. Surface Area Hides	Low Surface Area Hides ✓	
Feed resources				
FLOWERING TREES:	Eucalypts ✓	Corymbias ✓	Melaleucas	
	Banksias ✓	Acacias		
SEEDING TREES:	Allocasuarinas ✓	Conifers		
WINTER FLOWERING EUCALYPTS:	None			
FLOWERING PERIODS:	Autumn	Winter	Spring ✓	Summer ✓
OTHER:	Mistletoe	Figs / Fruit	Sap / Manna	Termites ✓
Foliage protection				
UPPER STRATA:	Dense	Moderate	Sparse ✓	
MID STRATA:	Dense	Moderate ✓	Sparse	

PLANT / SHRUB LAYER:	Dense		Moderate ✓		Sparse	
GROUNDCOVERS:	Dense ✓		Moderate		Sparse	
Hollows / logs						
TREE HOLLOWS:	Large		Medium		Small ✓	
TREE HOLLOW TYPES	Spouts / branch ✓	Trunk	Broken Trunk	Basal Cavities	Stags ✓	
GROUND HOLLOWS:	None					
Vegetation debris						
FALLEN TREES:	Large		Medium		Small ✓	
FALLEN BRANCHES:	Large		Medium		Small ✓	
LITTER:	Deep		Moderate ✓		Shallow	
HUMUS:	Deep		Moderate		Shallow ✓	
Drainage catchment						
WATER BODIES	Wetland(s)	Soak(s)	Dam(s)	Drainage line(s) ✓	Creek(s)	River(s)
RATE OF FLOW:	Still ✓		Slow		Rapid	
CONSISTENCY:	Permanent		Perennial ✓		Ephemeral	
RUNOFF SOURCE:	Urban / Industrial	Parkland		Grazing	Natural ✓	
RIPARIAN HABITAT:	None					
Artificial habitat						
STRUCTURES:	Sheds ✓		Infrastructure		Equipment	
SUB-SURFACE	Pipe / culvert(s)		Tunnel(s)		Shaft(s)	
FOREIGN MATERIALS:	Sheet		Pile / refuse ✓			

Table 4.2 – Habitat tree data

Tree no	Scientific name	Common name	DBH (cm)	Height (m)	Spread (m)	Vigour (%)	Hollows & other habitat features recorded
SHT1	*A. costata*	Smooth-barked Apple	81	17	20	80	1 x 10cm branch
SHT2	*A. costata*	Smooth bark apple	68	17	20	80	1 x 20 – 30cm spout
Stag	-	-	30	15	-	0	1 x 10cm spout Termite mound on trunk with 10cm opening

4.2.3 Koalas

State Environmental Planning Policy (Biodiversity and Conservation) 2021 – Koala Habitat Protection

Chapter 4 of State Environmental Planning Policy (Biodiversity and Conservation) 2021 (Koala Habitat Protection) applies to land within LGAs listed under Schedule 2 of the Policy. As the study area falls under the Northern Beaches LGA, it is considered that Koala SEPP 2021 applies to this development proposal.

Land to which this policy applies in accordance with Section 4.4 of the SEPP 2021 is as follows:

(1) This Chapter applies to each local government area listed in Schedule 2.
(2) The whole of each local government area is—
(a) in the koala management area specified in Schedule 2 opposite the local government area, or

(b) if more than 1 koala management area is specified, in each of those koala management areas.

(1) Despite subsection (1), this Chapter does not apply to—

(a) land dedicated or reserved under the National Parks and Wildlife Act 1974, or acquired under Part 11 of that Act, or

(b) land dedicated under the Forestry Act 2012 as a State forest or a flora reserve, or

(c) land on which biodiversity certification has been conferred, and is in force, under Part 8 of the Biodiversity Conservation Act 2016, or

*(d) land in the following land use zones, or an equivalent land use zone, unless the zone is in a local government area marked with an * in Schedule 2—*

(i) Zone RU1 Primary Production,

(ii) Zone RU2 Rural Landscape,

(iii) Zone RU3 Forestry.

The land is listed in **Schedule 2 Northern Beaches LGA and is zoned R3 – Medium Density Residential**, therefore SEPP 2021 applies. Please Note that SEPP 2020 applies in lands zoned as RU1, RU2 and RU3 in accordance with SEPP 2020.

There is currently no approved Koala Plan of Management (KPoM) for the LGA that this site is located in. Therefore, before council may grant consent to a development application for consent to carry out development on the land, the council must assess whether the development is likely to have any impact on Koalas or Koala habitat.

If the council is satisfied that the development is likely to have low or no impact on koalas or Koala habitat, the council may grant consent to the development application. If the council is satisfied that the development is likely to have a higher level of impact on Koalas or Koala habitat, the council must, in deciding whether to grant consent to the development application, take into account a Koala assessment report for the development.

Chapter 4 (Part 4.3) states that:

(*2) A Koala Plan of Management must be prepared—*

(a) on behalf of a council by a suitably qualified and experienced person, and

(b) having regard to a survey of the land for core koala habitat conducted by a suitably qualified and experienced person.

(4) Land may be identified in a koala plan of management if—

(a) the land is identified on the Site Investigation Area for Koala Plans of Management Map as an area where this Chapter applies, and

(b) the land is core koala habitat.

Under Chapter 4 Core Koala habitat protection SEPP 2021, Part 4.1 Koala Habitat' is defined as:

(a) an area of land which has been assessed by a suitably qualified and experienced person as being highly suitable koala habitat and where koalas are recorded as being present at the time of assessment of the land as highly suitable koala habitat, or

(b) an area of land which has been assessed by a suitably qualified and experienced person as being highly suitable koala habitat and where koalas have been recorded as being present in the previous 18 years.

In Chapter 4 of SEPP 2021, the term "Potential Koala Habitat" in SEPP 2021 refers back to the specific definition provided in SEPP 2020, as outlined below:

Under Part 3.2 of SEPP 2020 Potential Koala Habitat' is defined as:

> *"areas of native vegetation where trees of the types listed in Schedule 1 constitute at least 15% of the total number of trees in the upper or lower strata of the tree component."*

There are no tree specimens recorded in the study area which are considered to be Koala feed tree species under Schedule 1 of SEPP 2021. Under Schedule 2 of SEPP 2021, Northern Beaches LGA falls within the Central Coast Koala Management Area. Six (6) tree species were recorded in the study area which are considered to be Koala use tree species within this Management Area under Schedule 3 of Koala SEPP 2021.

- *Allocasuarina littoralis* (Black She-oak)
- *Angophora costata* (Smooth-barked Apple)
- *Corymbia gummifera* (Red Bloodwood)
- *Eucalyptus piperita* (Sydney Peppermint)
- *Eucalyptus umbra* (Broad-leaved White Mahogany)
- *Syncarpia glomulifera* (Turpentine)

As there are no Koala feed trees recorded on site, it is considered that this study area does not qualify as potential Koala habitat under all relevant definitions as the area of native vegetation where trees of the types listed in Schedule 1 (koala feed trees) do not constitute at least 15% of the total number of trees in the upper or lower strata of the tree component.

As of January 2025, there have been 24 recorded Koala observations within 10km radius from the study site within the last 18 years. The nearest Koala record to the study area was a record in 2020 approximately 3.6 km to the north-west of site along a fire trail within Ku-ring-gai Chase National Park. No Koalas have been historically recorded in the Ingleside Conservation area.

No Koalas were observed during either the nocturnal or diurnal surveys, and no evidence of Koala activity was recorded during Spot Assessment Technique (SAT) survey, spotlighting and call playback survey. Given there are few sightings in the surrounding area and lack of feeding resources on site it is unlikely that Koala are utilising the site, and it is not considered that this study area comprises Core Koala Habitat.

As a result of the lack of utilisation within the site by Koalas, the development is likely to have low or no impact on koalas or koala habitat. Koalas or its habitat is unlikely to be significantly impacted.

4.3 Ecosystem credit species

The threatened fauna species list in Table 4.3 was considered as predicted species for ecosystem credit calculation. This list is created based upon the BAM calculator and field surveys to date. The justification for species exclusion is given below.

Ecosystem credit species have not been subjected to targeted surveys.

Excluded species justification:

Black Bittern: *The* subject land is not located within 40m of any waterbody or in areas of permanent water and dense vegetation (TBDC).

Table 4.3 – Predicted ecosystem credit species

Common name	Species	Listing status		Habitat constraints	Geographic limitation	Sensitivity to gain class	Confirmed predicted species	Associated PCT
		BC Act	EPBC Act					
Black Bittern	*Ixobrychus flavicolis*	V	NL	Waterbodies; Land within 40m of freshwater and estuarine wetlands, in areas of permanent water and dense vegetation	-	Moderate		-
Black-chinned Honeyeater	*Melithreptus gularis subsp. gularis*	V	NL		-	Moderate	✓	3595
Brown Treecreeper (eastern subspecies)	*Climacteris picumnus subsp. victoriae*	V	V		-	High	✓	3595
Dusky Woodswallow	*Artamys cyanopterus subps. cyanopterus*	V	NL		-	Moderate	✓	3595
Eastern Coastal Free-tailed Bat	*Micronomus norfolkensis*	V			-	High	✓	3595
Eastern False Pipistrelle	*Falsistrellus tasmaniensis*	V	NL		-	High	✓	3595
Eastern Osprey (foraging)	*Pandion cristatus*	V	NL		-	Moderate	✓	3595
Flame Robin	*Petroica phoenicea*	V	NL		-	Moderate	✓	3595
Gang-gang Cockatoo (foraging)	*Callocephalon fimbriatum*	V	E		-	Moderate	✓	3595
Glossy Black-Cockatoo (foraging)	*Calyptorhynchus lathami lathami*	V	V	Presence of Allocasuarina and Casuarina species	-	High	✓	3595
Golden-tipped Bat	*Phoniscus papuensis*	V	NL		-	High	✓	3595
Greater Broad-nosed Bat	*Scoteanax rueppellii*	V	NL		-	High	✓	3595
Grey-headed Flying-fox (foraging)	*Pteropus poliocephalus*	V	V		-	High	✓	3595
Little Bent-winged Bat (foraging)	*Miniopterus orianae subsp. oceanensis*	V	NL		-	High	✓	3595
Little Eagle (foraging)	*Hieraaetus morphnoides*	V	NL		-	Moderate	✓	3595
Little Lorikeet	*Glossopsitta pusilla*	V	NL		-	High	✓	3595
New Holland Mouse	*Pseudomys novaehollandiae*	NL	V			High	✓	3595

Common name	Species	Listing status		Habitat constraints	Geographic limitation	Sensitivity to gain class	Confirmed predicted species	Associated PCT
		BC Act	EPBC Act					
Regent Honeyeater (foraging)	*Anthochaera phyrgia*	CE			-		✓	3595
Rosenberg's Goanna	*Varanus rosenbergi*	V	NL		-	High	✓	3595
Scarlet Robin	*Petroica boodang*	V	NL		-	Moderate	✓	3595
Spotted Harrier	*Circus assimilis*	V			-		✓	3595
Spotted-tailed Quoll	*Dasyurus maculatus*	V	E		-	High	✓	3595
Square-tailed Kite (foraging)	*Lophoictinia isura*	V	NL		-	Moderate	✓	3595
Swift Parrot (foraging)	*Lathamus discolor*	E			-	Moderate	✓	3595
Turquoise Parrot	*Neophema pulchella*	V	NL		-	High	✓	3595
Varied Sittella	*Daphoenositta chrysoptera*	V	NL		-	Moderate	✓	3595
White-bellied Sea Eagle (foraging)	*Halieaeetus leucogaster*	V	NL		-	High	✓	3595
White-throated Needletail	*Hirundapus caudacutus*	V	V		-	High	✓	3595
Yellow-bellied Sheathtail-bat	*Saccolaimus flaviventris*	V	NL			High	✓	3595

V Vulnerable;
E Endangered;
CE Critically Endangered;
NL Not listed.

4.4 Species credit species

The species credit species were determined based on their presence in the Pittwater subregion of the Sydney Basin IBRA bioregion and in association with the mapped PCTs on the subject land according to the NSW BioNet database. A review of the *Atlas of NSW Wildlife* (DCCEEW 2025) was undertaken prior to the site visit to determine threatened species previously recorded within 10 km of the subject land (see Section 1.5).

The list of candidate threatened species credit species is reported in Table 4.4 based upon the BAM calculator and vegetation field surveys undertaken. Justification for the exclusion of species credit species is given in Table 4.5. Targeted surveys for flora and fauna species credit species have been undertaken on the subject land (unless species are assumed present on site). The targeted survey efforts and results are described in the sections below.

Table 4.4 - Species credit species

Species	Common Name	Associated PCT	Habitat constraints	Geographic limitations	Confirmed candidate species	Sensitivity to gain class	Listing	
							BC Act	*EPBC Act*
Asterolasia elegans*	Asterolasia elegans	3595	--	--	Yes	Moderate	E	E
Astrotricha crassifolia*	Thick-leaf Star-hair	3595	--	--	Yes	Very High	V	V
Chalinolobus dwyeri*	Large-eared Pied Bat	3595	Cliffs;Within two kilometres of rocky areas containing caves, overhangs, escarpments, outcrops, or crevices, or within two kilometres of old mines or tunnels	--	Yes	Very High	E	E
Deyeuxia appressa*	Deyeuxia appressa	3595	--	--	No	High	E	E
Microtis angusii*	Angus's Onion Orchid	3595	--	--	Yes	Moderate	E	E
Genoplesium baueri*	Bauer's Midge Orchid	3595	--	--	Yes	Very High	E	E
Grevillea caleyi*	Caley's Grevillea	3595	Other; Laterite soils located on ridgetops or within 100 m	East of Pacific Highway, south of Broken Bay	No	High	CE	CE
Grevillea shiressii*	Grevillea shiressii	3595	--	Central Coast LGA	No	Moderate	V	V
Haloragodendron lucasii*	Haloragodendron lucasii	3595	Other; Seepage zone or within 100 m	East of the Pacific Highway and South of Broken Bay	No	Very High	E	E

Species	Common Name	Associated PCT	Habitat constraints	Geographic limitations	Confirmed candidate species	Sensitivity to gain class	Listing	
							BC Act	*EPBC Act*
Hibbertia spanantha*	Julian's Hibbertia	3595	--	--	Yes	High	CE	CE
Lathamus discolor*	Swift Parrot (Breeding)	3595	Other;As per Important Habitat Map	--	Yes	Moderate	E	CE
Melaleuca deanei*	Deane's Paperbark	3595	--	--	Yes	Very High	V	V
Microtis angusii*	Angus's Onion Orchid	3595	-	-	Yes	Moderate	E	E
Miniopterus australis*	Little Bent-winged Bat (Breeding)	3595	Caves;Cave, tunnel, mine, culvert 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 numbers of individuals >500; or from the scientific literature	--	No	Very High	V	NL
Miniopterus orianae* subsp. *oceanensis*	Large Bent-winged Bat (Breeding)	3595	Caves;Cave, tunnel, mine, culvert or other structure known or suspected to be used for breeding including species records with microhabitat code "IC - in cave;" observation type code "E nest-roost;" with numbers of individuals >500	--	No	Very High	V	NL

Species	Common Name	Associated PCT	Habitat constraints	Geographic limitations	Confirmed candidate species	Sensitivity to gain class	Listing	
							BC Act	*EPBC Act*
Prostanthera marifolia*	Seaforth Mintbush	3595	--	South of Broken Bay	Yes	High	CE	CE
Rhizanthella slateri*	Eastern Australian Underground Orchid	3595	--	--	Yes	High	V	E
Rhodamnia rubescens*	Scrub Turpentine	3595	--	--	Yes	Very High	CE	CE
Vespadelus troughtoni*	Eastern Cave Bat	3595	Caves;Within two kilometres of rocky areas containing caves, overhangs, escarpments, outcrops, crevices or boulder piles, or within two kilometres of old mines, tunnels, old buildings or sheds	-	Yes	Very High	V	NL

Species names denoted with an asterisk (*) are Serious And Irreversible Impact (SAII) entities. CE, Critically Endangered; E, Endangered; V, Vulnerable; NL, Not Listed.

Table 4.5 - Justification for the inclusion/exclusion of Species Credit Species

Species name	NSW listing	EPBC listing	Revision	Justification
Grevillea shiressii	E	E	Exclusion	Restricted to the Central Coast LGA (DCCEEW species profile). The subject land is therefore outside the distribution of these species.
Grevillea caleyi	CE	CE	Exclusion	TBDC species profile states that this species habitat is restricted to lateritic soils (rich in iron and aluminium). However, the subject land is located on yellow podzolic soils (acidic soil in poorly drained areas such as footslopes with a sandy loam topsoil), therefore lacking the required habitat to support this species.
Deyeuxia appressa	E	E	Exclusion	This species lacks potential habitat within most of the subject land. The native vegetation, especially within the grassland is too degraded to provide suitable habitat and lacks the required mesophilic conditions to support this species.
Haloragodendron lucasii	E	E	Exclusion	According to the TBDC species profile, *H. lucasii* is located within 100m of a seepage zone which does not feature on or around the subject land.
Miniopterus australis and Miniopterus orianae subsp. oceanensis	V	V	Exclusion	The TBDC (DCCEEW 2025) identifies the breeding habitat constraints for these species as '*cave, tunnel, mine, culvert or other structure known or suspected to be used for breeding*; *with numbers of individuals >500; or from the scientific literature'*. Whilst both of these species were recorded, there are no such potential breeding habitat present in the study area that may be utilised by either species.
Genoplesium baueri	E	E	Inclusion	According to TBDC, the survey time for *Genoplesium baueri* is February to March. However, specimens of this species have been found flowering in the area during the time of the survey according to trusted sources. Therefore, as an SAII entity, Bauer's Midge Orchid was added to the list of species credit species to survey.
Vespadelus troughtoni	V	NL	Inclusion	Eastern Cave Bat was added manually as it was recorded during survey.

4.4.1 Survey methodology

The following threatened species guidelines have been implemented:

- Species credit threatened bats and their habitats (DPIE 2018)
- Surveying threatened plants and their habitats (DPIE 2020)
- Koala BAM survey guide (DCCEEW 2025)

(a) Targeted threatened flora

Flora survey was undertaken on the 16th of January 2025. The requirements for species surveys and the relevant target searches undertaken are described in Table 4.6 and Table 4.7 respectively. Targeted threatened flora surveys were undertaken within the western part of the lot (refer to Figure 3.1). The targeted surveys were extended outside the development footprint on the western and southern boundaries, where the grassland of mixed exotic and native species transitioned into more suitable habitat for threatened flora.

Additionally, previous threatened targeted surveys were undertaken for 4 Forest Road, Warriewood by *Ecological Consultants Australia Pty Ltd TA Kingfisher Urban Ecology and Wetlands* (see survey efforts in Figure 4.1 below). The threatened species surveyed include *Hibbertia spanantha*, *Rhizanthella slateri* and *Microtis angusii*. As this survey was undertaken during the required survey period for these species, they remain compliant as of the time of this BDAR reporting. Hence, *H. spanantha*, *R. slateri* and *M. angusii* have been assessed as not on site.

Figure 4.1 - Survey efforts undertaken by Ecological Consultants Australia: May 2022 (blue), October 2022 (green), Feb 2024 (yellow) and June 2024 (orange)

Table 4.6 – Threatened flora species survey requirements

Scientific name	Associated PCT	Survey Adequacy		
		Required survey period	Actual survey period	Survey compliant
Asterolasia elegans	3595_moderate-good	Sept-Oct	16th Jan 2025	No*
Astrotricha crassifolia	3595_moderate-good	Jul-Dec	16th Jan 2025	No*
Genoplesium baueri	3595_moderate-good	Feb-March	16th Jan 2025	Yes (see Table 4.5)
Rhodamnia rubescens	3595_moderate-good	All months	16th Jan 2025	Yes
Hibbertia spanantha	3595_moderate-good	Oct–Nov	Oct 2022	Yes
Melaleuca deanei	3595_moderate-good	All months	16th Jan 2025	Yes
Prostanthera marifolia	3595_moderate-good	All months	16th Jan 2025	Yes
Rhizanthella slateri	3595_moderate-good	Sept-Nov	Oct 2022	Yes
Microtis angusii	3595_moderate-good	Oct	Oct 2022	Yes
*Justification for non-compliant surveys is given below.				

Non-compliant surveys:

Asterolasia elegans: The survey undertaken on the 16th of January is not compliant with the required survey periods for this species according to the TBDC. However, *A. elegans* has recognisable vegetative morphological features that can be clearly discerned from the expected native vegetation onsite. For this reason, the species was added for the targeted surveys. Additionally, *A. elegans* is unlikely to occur in the Warriewood area, it is usually found in the Hawkesbury area, between the upper Colo and lower Hawkesbury.

Astrotricha crassifolia: The survey undertaken on the 16th of January is not compliant with the required survey periods for this species according to the TBDC. However, also according to TBDC, this species occurs in dry sclerophyll woodland on sandstone which corresponds to the 3595_moderate-good native vegetation zone determined on site. Similarly to *A. elegans*, *A. crassifolia* above ground morphology has recognisable features that differentiates this species to other shrub species of the local flora. For this reason, the species was added for the targeted surveys.

Table 4.7 – Summary of flora survey efforts for threatened species

Date	Surveyor(s)	Search type	Effort	Target species
16 Jan 2025	Anne-Cecile Colin	5m transects + opportunistic searches	1h	*Asterolasia elegans, Astrotricha crassifolia, Genoplesium baueri, Rhodamnia rubescens* and *Hibbertia spanantha*
16 Jan 2025	Anne-Cecile Colin	5m transects + opportunistic searches	1h	*Melaleuca deanei, Prostanthera marifolia, Rhizanthella slateri* and *Microtis angusii*
Oct 2022	Geraldene Dalby-Ball	General target flora transects	not specified	*Microtis angusii, Hibbertia spanantha, Rhizanthella slateri*

(b) Targeted threatened fauna

Diurnal birds

Opportunistic fauna surveys involved observations of bird activity, habitat surveys and searches for indirect and direct evidence of avian fauna.

Specific searches were conducted for habitats or resources of relevance for those threatened fauna species known from the locality, or species, which might be anticipated to occur in the study area given the vegetation communities and habitats present. These resources included potential feed trees, foraging resources such as high nectar producing plants, hollow-bearing trees, understorey sheltering resources and water sources. Opportunistic records of all fauna species observed were retained throughout the survey period, and an account was compiled of all species recorded during the current field surveys.

Stag-watching survey and nesting assessments for hollow-dependant fauna

One (1) medium sized stag was identified during habitat assessments along with two (2) hollow bearing trees within the study area away from the Asset Protection Zone (APZ). Opportunistic stag-watching surveys were used to assess breeding or sheltering use of hollows by fauna during the survey period. Stag-watching commenced at dusk and continued for one to 1.25 hours. During this period hollows were observed with the aid of binoculars and spotlights where necessary.

Koala call playback, nocturnal spotlighting and listening surveys

Call playback techniques were used to survey for presence of *Phascolarctos cinereus* (Koala) and pre-recorded digital calls were broadcast over three (3) separate stations for a period of 3 to 5 minutes each, followed by a listening period of 10 minutes. Listening for vocalisations continued during the subsequent spotlighting surveys. Spotlighting transects were undertaken throughout the study area with a range of spotlights to illuminate nocturnal mammals, birds and amphibians.

Listening surveys were also undertaken for the opportunistic calls of mammals, birds and amphibians.

Koala Spot Assessment Technique (SAT)

The following koala use trees were found on site as part of the habitat suitability assessment:

- *Allocasuarina littoralis* (Black She-oak)
- *Angophora costata* (Smooth-barked Apple)
- *Corymbia gummifera* (Red Bloodwood)
- *Eucalyptus piperita* (Sydney Peppermint)
- *Eucalyptus umbra* (Broad-leaved White Mahogany)
- *Syncarpia glomulifera* (Turpentine)

Given the presence of koala use trees on site, three (3) koala Spot Assessment Techniques (SAT) was undertaken on the western side of the subject land (see Figure 3.1) as described by *Phillips & Callaghan* (2008). The SAT survey method was undertaken in accordance with NSW BAM survey guidelines to determine Koala ‘activity’. In this case, the proportion of trees showing signs of Koala use is calculated and the location and density of droppings found were documented.

Bats

Micro-chiropteran bats were surveyed by echolocation using three (3) passive ultrasonic recording stations and nocturnal spotlighting survey undertaken 18/01/2025.

A thorough search for suitable habitat was undertaken including a search within three (3) abandoned structures onsite. This included diurnal searches and spotlighting surveys for bats to rule out the presence of the species (Picture 4.4 to 4.6).

Detailed searches of the sandstone rocky slopes beyond the APZ and throughout the rest of the study area to determine suitable habitats was undertaken on the 18/01/2025. No suitable overhangs and small caves with dark crevices in the ceiling were located with a spotlight for

the presence of any roosting bats or piles of guano on the floor indicating previous roosting directly above.

Table 4.8 – Survey adequacy for species credit species (fauna)

Common name	*BC Act*	Potential to occur (presence status) / Habitat	Preferred survey period (DPE)	Actual survey period	Survey sufficient to rule out presence
Large-eared Pied Bat	V	✓	Nov-Jan	Jan 2025	✓

Large-eared Pied Bat survey effort is adequate given that a total of 16 nights recording as determined by the BAM Survey Guide (OEH 2018) has been achieved.

Other fauna classes

The on-site habitat assessment undertaken during survey has concluded that the development footprint is not likely to impact on any threatened owl, terrestrial or arboreal mammals, frogs, reptiles or invertebrates. Subsequent target survey methods were not deployed or considered necessary as part of further works.

Table 4.9 - Fauna survey efforts

Fauna group	Surveyor	Date	Weather conditions	Survey technique(s)	Time effort (24hr)
Diurnal birds	DH	16/1/25	8/8 cloud, 45km/h S wind, rain, temp 21°C	Diurnal	2hrs
Arboreal mammals	DH	16/1/25	8/8 cloud, 45km/h S wind, light rain, temp 21°C	Koala Call back x 3 stations Spotlighting	2hrs 2000 - 2200
	DH	28/1/25	1/8 cloud, 17km/h WNW wind, light to no rain, temp 38°C	3 x Koala SATs	4hrs 700-1100
Bats	DH	28/2/11	8/8 cloud, 45km/h S wind, light rain, temp 21°C	3 x Anabats	16 nights

4.4.2 Survey results

Targeted threatened flora

The targeted surveys undertaken did not detect the selected candidate threatened flora species. No species polygon maps are required.

Targeted threatened fauna

The targeted surveys for the threatened fauna identified four (4) species credit species present on the subject land. Species polygons for both the Eastern Cave Bat and Swift Parrot are equivalent to the extent of PCT 3595 as mapped on Figure 4.2.

4.4.3 Local data

Local data has not been used in this case.

4.4.4 Expert reports

Expert reports have not been utilised for flora on this project.

Table 4.10 - Species credit species (fauna)

Common name	Associated PCTs	IBRA subregion / geographic restriction	Habitat constraint (Bionet - January 2025)	Habitat degraded or micro habitats absent	Confirmed candidate Species (yes / no)	Survey adequacy			Presence / absence
						Required survey effort and period	Actual survey effort and period	Survey compliant (yes / no)	
Eastern Cave Bat	3595_moderate-good 3595_DNG	-	-	-		-	18 x recorder nights Anabat survey during Jan 2025	Yes	Present (survey)
Koala** (not required in the BAM-C but added for SEPP compliance)	3595_moderate-good 3595_DNG	-	☑ Areas identified via survey as important habitat (see comments)	-	Yes	Survey (All months)	3 x Koala SATs, spotlighting and call playback during Jan 25	Yes	Absent (survey)
Large-eared Pied Bat	3595_moderate-good 3595_DNG	-	☐ Within two kilometres of rocky areas containing caves, overhangs, escarpments, outcrops, or crevices, ☐ or within two kilometres of old mines or tunnels	-	No	16 x recorder nights Anabat survey (Nov-Jan)	18 x recorder nights Anabat survey during Jan 2025	-	Absent (survey)
Large Bent-winged Bat (breeding)	3595_moderate-good 3595_DNG	-	☐ Cave, tunnel, mine, culvert 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 numbers of individuals >500 ☐ or from the scientific literature		No	-	-	-	Absent (no breeding habitat)
Little Bent-winged Bat (breeding)	3595_moderate-good 3595_DNG	-	☐ Cave, tunnel, mine, culvert 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 numbers of individuals >500; ☐ or from the scientific literature		No	-	-	-	Absent (no breeding habitat)
Swift Parrot (breeding)	-	-	☑ as per mapped areas ☐ Other		Yes	-	-	-	Present (within mapped area)

Figure 4.2 – Species credit species polygons

4.4.5 Survey limitations

It is important to note that field survey data collected during the survey period is representative of species occurring within the development footprint for that occasion. The prolonged rainfall overlapping with the time of survey may have decreased the species frequency or richness occurring within the development footprint outside during this nominated period. Habitat assessments based on the identification of micro-habitat features for various species of interest, including regionally significant and threatened species, have been used to minimise the implications of this survey limitation.

Flora survey limitations

The species list does not include all household or exotic garden / landscaping species and those species which could not be identified at the time of the survey past genus level. Cryptic species not flowering at the time of the survey may not be observed during survey outside of peak flowering periods. Likewise cryptic orchid species are generally only recognisable when flowering.

Fauna survey limitations

Microbat survey was undertaken during a prolonged rainfall event when activity is typically low. However, the survey period coincided with nesting season for the surveyed Large-eared Pied bat. Eastern Cave Bat activity was still recorded on site showing that bat activity was not heavily hampered by the weather conditions at the time of the survey. Additionally, all structures potentially supporting microbat nesting were carefully investigated on site for bat activity, reducing the risk of this survey limitation.

Koala survey call back was also undertaken during the rainfall event. However, to compensate for this survey limitation, the koala Spot Assessment Technique (SAT) was employed to assess koala's presence onsite.

5. Watercourses, GDEs & Wetlands

5.1 Endangered wetland communities

No endangered wetland communities were present within the development footprint and therefore a referral to NRAR is not required for impacts on waterfront land.

5.2 Groundwater dependent ecosystems (GDEs)

GDEs were not observed within the development footprint and therefore the policy does not require any further consideration. A referral to NRAR is not required for impacts on waterfront land.

5.3 Watercourses

The nearest watercourse is Narrabeen Creek, a first order watercourse, running approximately 150m away from the subject land. The proposed development is not impeding over a riparian buffer therefore it will not impact on watercourses or drainage lines. A referral to NRAR is not required for impacts on waterfront land.

6. Stage 2: Impact Assessment

6.1 Introduction

This second stage of the BDAR provides guidance and outlines requirements to apply the hierarchy of avoid, minimise and offset for assessing direct, indirect or prescribed impacts on biodiversity values. The impacts on TECs, threatened species and their habitat must be assessed. The first section focuses on avoiding or minimising impacts when planning the proposal, and the second section focuses on assessing the unavoidable impacts.

The number and class of biodiversity credits required to offset the residual impacts on biodiversity values are given at the end of Stage 2.

6.2 Avoiding and minimising impacts

The following strategies and actions have been undertaken to either avoid or minimise impacts on biodiversity values:

6.2.1 Direct and indirect impacts

The proposal has been located to avoid or minimise direct and indirect impacts on native vegetation, threatened species, threatened ecological communities and their habitat by the following:

- Retaining vegetation along the western and southern boundary that is of the highest quality on site. Although this part of the site will be managed as an APZ, selected trees have been nominated for retention, and parts of the understorey can be retained also. A Vegetation Management Plan will be enacted to cover off habitat maintenance and mitigation measures, APZ management requirements, weed control and regeneration / revegetation on site within areas not requiring full vegetation removal.
- The VI score of the grassland vegetation was only just over the threshold for offsetting. It was considered that the habitat was too degraded in this zone for the SAII flora species to occur, given the ongoing maintenance of this grassland area that would likely deplete the seedbank more and more over time.
- The majority of the site is devoid of native vegetation and likely habitat for threatened entities. Around the existing house and outbuildings is non-native landscaping, the north-eastern grassland area is dominated by non-native species also.
- No hollow-bearing trees are required for removal.
- Remnant vegetation has been intensively surveyed by transects to ensure that it meets the requirements of threatened flora survey guidelines. Although some of the larger threatened species may require survey in an alternate time period to what was undertaken in January 2025, we felt that the survey was more than adequate to rule out that species, e.g. *Asterolasia elegans,* where it would not likely be confused with another species or overlooked, as the access to remnant vegetation on site was not hindered. For the other threatened flora species that remained as candidate species, *Kingfisher Urban Ecology & Wetlands* had undertaken satisfactory transect survey for threatened flora in October (2022) and *Travers bushfire & ecology* undertook target surveys in January (2024).
- The proposal will not impact on any known threatened flora species.

- The proposal avoids impacts to known Koala habitat.
- Whilst biodiversity values for Swift Parrot are mapped on a small portion of the site, they only represent an area of approximately 0.06 ha within the development footprint. Within the site, there are no significant stands of winter flowering resources, e.g. Swamp Mahogany. In addition, the Swift Parrot does not breed in NSW.
- The proposal avoids impacts to local connectivity and will not fragment or isolate areas of remnant bushland.
- The proposal avoids impacts to vegetation with a high biodiversity risk weighting. The vegetation in the development footprint is not associated with any TEC, and it is not listed as an SAII.
- The proposal is located outside of the buffer area around breeding habitat features such as nest trees or caves.

We have allowed for a precautionary two (2) metre clearance outside the construction footprint as a potential impact area for the purposes of the biodiversity credit assessment caused by trampling and edge effects off the western side of the proposed batter to the road. Other impact areas used in calculating the impact on vegetation and habitat include proposed roads, dwelling sites and asset protection zones (APZs).

6.2.2 Prescribed impacts

The proposal has been located and / or designed to avoid or minimise prescribed biodiversity impacts:

- location of surface works to avoid direct impacts on the habitat features identified in Chapter 6 of the BAM Methodology document, with the majority of the development within existing cleared areas, areas of landscaping and grassland areas with low VI score.
- location of the proposal to avoid severing or interfering with corridors connecting different areas of habitat
- locate the proposal to avoid impacts on water bodies or hydrological processes.

Vegetation corridors and connectivity

The vegetation within the development footprint is part of an extensive area of partially fragmented natural vegetation which extends into Ingleside Chase Reserve. The development footprint does not comprise an important part of the habitat connectivity within the locality that connects vegetation remnants together for fauna movement.

Vegetation connectivity to the site from the west is not guaranteed in the future because the adjoining land zoning as RU2 which may allow for future development. There has been some degree of underscrubbing on the adjoining land in recent years which is evident in aerial photography.

The local connectivity values come from Ingleside Chase Reserve and are directed in a south-east direction towards the lowlands of Warriewood – Warriewood Wetlands, via local creek lines (Narrabeen and Fern Creek).

The proposal will not dissect these local corridors causing further fragment or isolation of remnant habitats for local flora and fauna, or impact on movement corridors for threatened species.

Local connectivity values are shown on Figure 6.1.

Figure 6.1 – Local connectivity

6.2.3 Other measures considered

Additional avoidance and minimisation actions have been undertaken:

- Development has been located taking advantage of the disturbed zones.
- Parts of the access roads are located on existing tracks or through existing cleared zones.
- Development will not impact on waterbodies, wetlands or riparian zones. No referrals to NRAR are required.
- A Vegetation Management Plan has been prepared to manage habitat and vegetation on site from pre-construction through to a 5-year maintenance period.
- Areas on site outside of the development footprint will be restored but managed as an APZ. Weed control works shall be undertaken, and there will be restoration of PCT 3595 outside of the development footprint.
- Clearing of vegetation will not occur on steep land where there could be significant erosion and runoff issues.
- Undertake feral pest management including control of foxes, cats, pigs, goats, avian pests, horses and any other miscellaneous species as required
- Vegetation removal in the APZ will be limited. Several trees have been nominated for retention in the APZ.
- Integrated weed management and control of high threat exotics through the Vegetation Management Plan.
- Adaptive management will be undertaken.

6.3 Assessment of Impacts

6.3.1 Direct Impacts

Table 6.1 – Direct impact assessment

Direct impact	*BC Act* status	SAII entity	Project phase/timing of impact	Extent (ha, number of individuals)
Removal or impacts upon PCT 3595	Not listed	No	Demolition / clearing	0.43 ha
Impacts upon Important Habitat Mapping for Swift Parrot	E1	No	Demolition / clearing	0.06 ha
Removal or impacts on native vegetation that may be associated with the Eastern Cave Bat	E1	Yes	Demolition / clearing	0.43 ha
Removal or impacts to potential foraging habitat on native vegetation for a number of threatened fauna entities	Various	No	Demolition / clearing	0.43 ha

No detrimental effect on water quality, water quantity or any direct impacts upon threatened fish species habitat from the proposed action. The proposed activity is not located in an area identified as critical habitat under the *FM Act*.

6.3.2 Indirect Impacts

The indirect impacts of the proposal are discussed in Table 6.2

Table 6.2 – Indirect impact assessment

Indirect impact	Impacted entities (PCT, species, TEC)	Frequency	Duration	Timing	Likelihood	Short-term / long-term consequences
Edge effects	All retained vegetation within c. 10 m of development	Constant	Lifetime of development	Clearing, construction and ongoing	• Very likely	• Increased soil nutrients from changes to runoff that may provide further opportunities for weeds. • Spill-over from noise, activity, scent and lighting effects • Inappropriate use of remaining native vegetation areas such as additional clearing, dumping of materials and waste.
Concentrated stormwater runoff from solid surfaces and subsequent increased flows	All retained vegetation, watercourses and habitat downslope of the development	During rainfall events	Lifetime of development	Clearing, construction and ongoing	• Low	• There are no watercourses on site or adjacent to the site, however the runoff rates after vegetation clearance will increase. The additional of hard surfaces will also cause more runoff to be directed off site. The impacts of this can be managed to a degree through sediment fencing applying jute or some form of groundcover to protect denuded soils before construction. Infiltration zones of lawns post construction assist greatly in slowing down the runoff. • The affection to local watercourses from increased runoff and soil erosion is expected to be minimal.
Reduced inter-site connectivity	Small bird species, arboreal mammals	Constant	Lifetime of development	Clearing, construction and ongoing	• Very unlikely	• Reduced cross-site movements by local and transient fauna because of roads, fencing and similar barriers.

Indirect impact	Impacted entities (PCT, species, TEC)	Frequency	Duration	Timing	Likelihood	Short-term / long-term consequences
Inadvertent impacts on adjacent habitat or vegetation	PCT 3595 and potential threatened flora or fauna habitat	Ongoing	Lifetime of development	Clearing, construction and ongoing	• Very likely	• Refer to the response under 'edge effects'.
Reduced viability of adjacent habitat due to edge effects	PCT 3595 and potential threatened flora or fauna habitat	Ongoing	Lifetime of development	Clearing, construction and ongoing	• Low likelihood	• Reduced viability of adjacent habitat is more likely to come from the site being partially under scrubbed by that owner / tenant, not from edge effects caused by this proposal.
Reduced viability of adjacent habitat due to noise, dust or light spill	All ecosystem and species credit fauna species listed in section 4	Constant	Lifetime of development	Clearing, construction and ongoing	• High likelihood	• Noise and dust can be controlled through a degree in the construction process and guidelines. • Ongoing noise will likely be greater post development due to the presence of more occupants on the land that what is there currently. • Light spill be greater due to a perimeter road, however light pollution and impacts on native fauna will be minimised through the planning documentation, and the Vegetation Management Plan.

Indirect impact	Impacted entities (PCT, species, TEC)	Frequency	Duration	Timing	Likelihood	Short-term / long-term consequences
Transport of weeds and pathogens from the site to adjacent vegetation	Variable and difficult to predict	Constant	Lifetime of development	Clearing, construction and ongoing	• Low-moderate	• Weeds have the ability to reduce the VI score making it less viable for use by threatened species, however a Vegetation Management Plan will be enacted to minimise the risk of weed plumes in remnant PCT 3595 vegetation. • Vehicles coming into and out of the site during the clearing and construction phase of works should be cleaned regularly to reduce the potential for pathogens to be spread.
Increased risk of starvation or exposure, and loss of shade or shelter	Not likely to be an issue				• Very low	

Indirect impact	Impacted entities (PCT, species, TEC)	Frequency	Duration	Timing	Likelihood	Short-term / long-term consequences
Loss of breeding habitat	Not likely to be an issue for the species credit species being assessed. No habitat trees are being removed, and there are no areas of geological significance being impacted. No burrows were noted during the surveys and the site does not constitute part of an important or notable movement corridor.				• Very low	
Trampling of threatened flora species	No threatened flora species have been detected to date.				• Very low	
Inhibition of nitrogen fixation and increased soil salinity	PCT 3595	Constant	Lifetime of development	Clearing, construction and ongoing	• Negligible	• Minimal potential changes in soil salinity due to changes in local infiltration and runoff may cause stress on some remnant vegetation.
Fertiliser drift					• Nil expected	

Indirect impact	Impacted entities (PCT, species, TEC)	Frequency	Duration	Timing	Likelihood	Short-term / long-term consequences
Rubbish dumping	PCT 3595	Constant	Lifetime of development	Clearing, construction and ongoing	• Moderate	• There is increased risk of rubbish dumping in remnant bushland areas. This could be minimised through surveillance cameras (unlikely), fencing to limit access and signage.
Wood collection	PCT 3595	Constant	Lifetime of development	Clearing, construction and ongoing	• Low	• Loss of on-ground refugia for insects, small mammals, and reptiles for example. • Minimal impacts expected due to the size of the remnant vegetation and lack of large remnant trees losing limbs that are viable for firepits, campfires, etc.
Removal and disturbance of rocks, including bush rock	Very deep rock elements that protrude only slightly in selected locations, but do not contain features suitable for any species credit species being assessed.				• Very high	• Minimal consequence to fauna species.
Increase in predators	Likely to be a decrease because the current 'hiding' or 'refuge' places for predators will be removed.				• Unlikely	

Indirect impact	Impacted entities (PCT, species, TEC)	Frequency	Duration	Timing	Likelihood	Short-term / long-term consequences
Increase in pest animal populations	No change expected.				• Unlikely	
Changed fire regimes	No change expected.				• Unlikely	
Disturbance to specialist breeding and foraging habitat (e.g. beach nesting for shorebirds)	No change expected.				• Unlikely	

6.3.3 Future Vegetation Integrity

The future integrity score in the development footprint is set at zero (0). Whilst vegetation may be retained within the APZ and trees have been nominated for retention, the APZ will be subject to edge effects, and the ongoing maintenance that will over time, reduce the capacity for natural regeneration. Given the small area of impact, it was not considered suitable to split the PCT(s) into separate management zones and set targets for the future VI score at Zero (0) as the likelihood for failure (risk) was considered too high.

6.3.4 Prescribed impacts

Table 6.3 – Prescribed impacts

Feature	Present (yes / no)	Description of feature characteristics and location	Threatened species or community using or dependent on feature	Potential impact	Predicted consequences and justification
Karst, caves, crevices, cliffs, rocks or other geological features of significance	No	There are none of these features present within or immediately adjacent to the development footprint.	Nil	Nil	Nil
Human-made structures or non-native vegetation	Yes	Planted non-native trees and shed / outbuilding in the central and northern parts of the site.	Grey-headed Flying Fox foraging habitat and potential microbat habitat in the she / outbuilding.	Removal of minor flowering, fruiting and seeding resources (planted vegetation). Removal of potential roosting habitat. The shed / outbuilding is not currently being utilised by any microbat species (refer to photos in Appendix 1).	The Grey-headed Flying Fox, a threatened species with potential to occur, is known to utilise non-native vegetation for foraging. However, this habitat is well represented within the surrounding locality. The proposal will not hinder the foraging behaviour of the Grey-headed Flying Fox, therefore there will be no consequences of these impacts. The development footprint does not contain any breeding habitat for the species. The nearest known breeding colony is within the Warriewood Wetlands, approximately 1.3 km south-east.
Habitat connectivity	No	The development footprint is not part of an existing corridor that may be fragmented or isolated by the proposal.	n/a	n/a	n/a

Feature	Present (yes / no)	Description of feature characteristics and location	Threatened species or community using or dependent on feature	Potential impact	Predicted consequences and justification
Waterbodies, water quality and hydrological processes	Unlikely to be of any significance	There are no watercourses within or near the development footprint. No referral to NRAR is required by this proposal.	n/a	n/a	n/a
Wind farm development	No	n/a	n/a	n/a	n/a
Vehicle strikes	Yes	Internal roads	Terrestrial mammals and frogs as well as birds in flight.	Collision leading to injury or death	The proposal will increase internal vehicle traffic, which could potentially lead to an increase in vehicle collisions with native fauna. All internal roads will have a low-speed limit and as such collisions are very unlikely for most species.

6.3.5 Serious & Irreversible Impacts (SAIIs)

An impact is to be regarded as serious and irreversible if it is likely to contribute significantly to the risk of a threatened species or ecological community most at risk of extinction. Threatened species and communities that are potential for SAII are identified in the BioNet TBDC, and a list is provided on the DCCEEW webpage (https://www.environment.nsw.gov.au/topics/animals-and-plants/biodiversity-offsets-scheme/local-government-and-other-decision-makers/serious-and-irreversible-impacts-of-development). The principles for determining serious and irreversible impacts are set out under Section 9.1 of the BAM.

SAII entities recorded or with potential to occur within the study area include:

Table 6.4 –SAII species recorded or with potential to occur

Species	Potential to occur	SAII assessment requirement?
Asterolasia elegans	Unlikely based on known distribution	No – survey was adequate to rule out presence
Astrotricha crassifolia	Low	No – survey was adequate to rule out presence
Deyeuxia appressa	Nil – Microhabitats considered to be absent and the site is too degraded	No – habitat was considered to be not suitable
Genoplesium baueri	Low	No – survey was adequate to rule out presence
Grevillea shiressii	Nil - Site is not located within the Central Coast LGA	No – outside of the distribution of the species
Haloragodendron lucasii	Nil – Microhabitats considered to be absent	No – habitat was considered to be not suitable
Hibbertia spanantha	Unlikely based on known distribution	No – survey was adequate to rule out presence
Melaleuca deanei	Low	No – survey was adequate to rule out presence
Microtis angusii	Unlikely	No – survey was adequate to rule out presence
Prostanthera marifolia	Low	No – survey was adequate to rule out presence
Rhizanthella slateri	Low	No – survey was adequate to rule out presence
Rhodamnia rubescens	Unlikely	No – survey was adequate to rule out presence
Large-eared Pied-Bat	✓	No – survey was adequate to rule out presence
Swift Parrot	Low	Yes – the proposal impacts a small area mapped on the important habitat mapping for the species
Large Bent-winged Bat	✓	No – the SAII element is specifically related to the breeding element being impacted. This will not occur
Little Bent-winged Bat	✓	No – the SAII element is specifically related to the breeding element being impacted. This will not occur

Species	Potential to occur	SAII assessment requirement?
Eastern Cave Bat	✓	Yes – additional assessment is required because the species has been recorded

Species:

The SAII assessment provisions for threatened species are outlined under Section 9.1.2 of the BAM (2020) and have been applied to the recorded Swift Parrot and Eastern Cave Bat within Appendix 1 of this report.

Communities:

PCT 3595 is not a potential SAII entity.

6.4 Mitigation measures

The following mitigation measures are recommended to avoid, minimise or ameliorate the above potential ecological impacts, address threatening processes and to guide a more positive ecological outcome for threatened species and their associated habitats.

Fuel loads within the APZ are to be maintained so they do not exceed 4t/ha (inner protection area standards).

Trees are to be maintained to ensure;

- Canopy cover does not exceed 15%
- Trees (at maturity) do not touch or overhang the building
- Tree canopies (at maturity) should be well spread out and not form a continuous canopy
- Lower limbs should be removed up to a height of 2 m above ground
- Preference should be given to smooth barked and evergreen trees.

Shrubs are to be maintained to ensure;

- Large discontinuities or gaps in vegetation
- Shrubs should not be located under trees
- Shrubs should not form more than 10% of ground cover
- Clumps of shrubs should be separated from exposed windows and doors by a distance of at least twice the height of vegetation.

Grass is to be maintained to ensure:

- A height of 10 cm or less
- Leaves and debris are removed.

Other specific measures are detailed below. Most of these can be enforced through the provision of the Vegetation Management Plan (VMP).

Table 6.5 – Measures to mitigate & manage impacts

Action / Technique	*Outcome*	*Timing / Frequency*	*Responsibility*
Preparation of a Vegetation Management Plan (VMP)			
Protection and conservation of PCT 3595 along the western boundary adjacent to the road, and within the road corridor along the southern boundary either side of the school entrance road	Prevent indirect impacts on conserved habitats	Prior to any clearing works. Ongoing	Project ecologist
Tree protection of retained trees around the site's perimeter as per the arborist report requirements (Naturally Trees, December 2024)	Maintain and protect trees in close proximity to the construction footprint. Signage will be placed on the fencing to inform workers that the tree is marked for retention, access is restricted, and no works are to be conducted which could impact the health of the tree without consulting the project arborist.	Pre-construction tree protection to be erected and maintained until all construction works have been completed	Project arborist / project ecologist
Active restoration along the western and southern boundary to include revegetation of PCT 3595, however, this will need to be compliant with APZ standards	Revegetation works will assist in internally offsetting vegetation losses on site, and reduce edge effects.	Post construction and including 5 years of ongoing management	Project ecologist with bushland regenerators

Action / Technique	*Outcome*	*Timing / Frequency*	*Responsibility*
Weed control to be undertaken by qualified bushland regeneration company across retained vegetation areas in the APZ and revegetation area on / adjacent to the road batter in the road corridor	Minimise impacts of high threat weeds to adjoining areas of retained bushland	Ongoing for the duration of the VMP (5 years minimum). Bushland regeneration team to undertake manual removal of spraying of weeds. Primary and secondary weeding to be undertaken monthly (approximately), and maintenance weeding to be undertaken every 2 or 3 months subject to weed growth.	Bush regenerator, overseen by project ecologist. Reporting to be provided to Council annually on the progress and how the restoration targets are met.
Standard Phytophthora cinnamomi protocol applies to the cleaning of all plant, equipment, hand tools and work boots prior to delivery onsite to ensure that there is no loose soil or vegetation material caught under or on the equipment and within the tread of vehicle tyres. Any equipment onsite found to contain soil or vegetation material is to be cleaned in a quarantined work area or wash station and treated with fungicides.	Minimise the risk of spread of pathogens either to or from the site	Demolition and construction period	Project or construction manager
Sediment and erosion control measures in accordance with Managing Urban Stormwater: Soils and Construction (Landcom 2004) to minimise impact of possible sedimentation to local drainage lines.	Maintain integrity of retained and adjoining habitat, and minimise the runoff rates across the site when the ground is bare	Prior to any clearing works. Ongoing during all exposed soil stages until landscaping is completed	Project Ecologist / Contractors
Installation and monitoring of nest boxes and relocated hollows	Ensure hollow integrity is maintained	Each year for 5 years	Project Ecologist

6.5 Impact summary

6.5.1 Serious And Irreversible Impacts (SAII)

An assessment of impacts to SAII entities has been undertaken in Appendix 1 (species) and 2 (communities).

The proposal does not impact breeding habitat (the SAII) for Little and Large Bent-winged Bats, nor does it impact that specific breeding habitat and buffers for Eastern Cave Bat.

The proposal impacts on mapped important areas for the Swift Parrot by 0.06 ha. This is a buffer to known records and the site is located on the edge of the buffer. The Swift Parrot does not breed in NSW, and patches of winter flowering resources which are vital for their feeding will not be impacted. Three (3) immature (<10m tall *Eucalyptus robusta*) trees will be impacted by the proposal that may be considered as potential feeding habitat, however this is not part of a patch of winter flowering resources. The winter flowering resources locally are centralized on the Warriewood Wetland and creek lines on the floodplain.

The proposal does not impact on any potential SAII entity communities.

6.5.2 Impacts requiring offset

The following impacts will require offsetting:

- 0.43 ha of impact upon PCT 3595 – Sydney Coastal Sandstone Gully Forest and the associated ecosystem species (predicted species) utilising this habitat
- 0.07 ha (rounded up in the BAM-C) of mapped important habitat area for Swift Parrot
- 0.43 ha of impact for Eastern Cave Bat

Locations of the abovementioned communities within the development footprint are shown on Figure 3.1.

6.5.3 Impacts not requiring offset

The following impacts do not require offset:

- Impacts on non-native vegetation
- Indirect impacts on remaining native vegetation areas in the southern road corridor not affected by the proposed entry road outside of the road batter, with a 2m buffer.

All areas of native vegetation impact will require offsetting and have been accounted for in the BAM calculator. All of the zones had a vegetation integrity score above the minimum requirements.

6.5.4 Areas not requiring assessment

Native vegetation that has not been directly impacted by this proposal, both within the study area and beyond, do not require credit assessment.

Table 6.6 – Requirement for ecosystem credits

Zone	Veg. zone name	Veg. integrity loss	Area (ha)	Sensitivity to loss	Sensitivity to loss justification	Sensitivity to gain	Biodiversity risk weighting	Potential SAII	Ecosystem credits
1	3595_moderate-good	57.3	0.22	PCT Cleared – 15%	PCT Cleared - 67%	High	1.50	no	5
2	3595_DNG	26.4	0.21	PCT Cleared – 15%	PCT Cleared - 67%	High	1.50	no	2
									Total: 7

Table 6.7 – Requirement for species credits

Vegetation zone name	Habitat condition (vegetation integrity) loss	Area / Count	Sensitivity to loss	Sensitivity to loss(Justification)	Sensitivity to gain	Sensitivity to gain(Justification)	Biodiversity risk weighting	Potential SAII	Species credits
Swift Parrot									
3595_moderate-good	57.3	0.01 ha	Very high	EPBC Act listing statue	Moderate	Effectiveness of management in controlling threats	3	True	1
3595_DNG	26.4	0.06 ha	Very high	EPBC Act listing statue	Moderate	Effectiveness of management in controlling threats	3	True	1
									Subtotal: **2**
Eastern Cave Bat									
3595_moderate-good	57.3	0.22 ha	Moderate	BC Act listing statue	Very high	Species dependent on habitat attributes	3	True	9
3595_DNG	26.4	0.21 ha	Moderate	BC Act listing statue	Very high	Species dependent on habitat attributes	3	True	4
									Subtotal: **13**

6.6 Legislative compliance

In respect of matters required to be considered under the *Environmental Planning and Assessment Act 1979* and relating to the species / provisions of the *Biodiversity Conservation Act 2016*, no threatened flora and TECs, and no endangered populations were recorded or will be impacted by the proposal. Recorded threatened fauna included Eastern Cave Bat and Little Bent-winged Bat.

Ecological survey and assessment have been undertaken in accordance with relevant legislation including the *Environmental Planning and Assessment Act 1979*, the *Biodiversity Conservation Act 2016*, the commonwealth *Environment Protection and Biodiversity Conservation Act 1999* and the *Fisheries Management Act 1994*.

Offsetting under the Biodiversity Offsets Scheme (BOS) is required for the proposal as:

- The study area is located on lands mapped as Biodiversity Values Land.

A streamlined BDAR (Small Area Module) can be applied because the impact is below the clearing threshold of 1 ha.

Serious or Irreversible Impacts (SAII) on threatened biodiversity most at risk of extinction have been completed for the relevant entities in Appendix 1 or 2.

As an outcome of the SEPP (Biodiversity and Conservation) 2021 (Koala Habitat Protection) no Koala Assessment Report is required for the proposal to satisfy Sections 3.2 & 3.3 of the *Koala Habitat Protection Guideline*.

In respect of matters required to be considered under the *Environment Protection and Biodiversity Conservation Act 1999*, no species listed under this Act have been recorded utilising the site that will be impacted. As such a referral to Department of Climate Change, Energy, the Environment and Water (Federal) is not required.

In respect of matters relative to the *Fisheries Management Act 1994*, no suitable habitat for threatened marine or aquatic species was observed within the development footprint and there are no matters requiring further consideration under this Act.

6.7 Ecosystem credit classes

Table 6.8 – Ecosystem credit summary

PCT	TEC	Area (ha)	HBT credits	No HBT credits	Total credits
3595 - Sydney Coastal Sandstone Gully Forest	Not a TEC	0.43	0	7	7

Table 6.9 – Credit classes for PCT 3595 - Like for like options

PCT	Vegetation Class	Trading group	TEC	Containing hollow-bearing trees?	Credits
3595	Sydney Coastal Dry Sclerophyll Forests	Sydney Coastal Dry Sclerophyll Forests - < 50% cleared group (including Tier 4 or higher).	No	No	Pittwater, Cumberland, Sydney Cataract, Wyong and Yengo. or Any IBRA subregion that is within 100 kilometres of the outer edge of the impacted site.

6.8 Species credit classes

Table 6.10 – Species credit summary

Species	Area (ha)	Credits
Swift Parrot	0.07	2
Eastern Cave Bat	0.43	13
	Total	**15**

All above-listed species need to be offset with the same species but anywhere in NSW.

7. Conclusion

Travers bushfire & ecology has been engaged to undertake a BDAR at 4 Forest Road Warriewood within the Northern Beaches Council local government area for a proposed residential development. The proposal requires a BDAR as the impacts will occur on an important habitat mapped area for Swift Parrot and native vegetation will be impacted. However a streamlined assessment (small area) can be applied as the impacts are less than 1ha.

The proposal will impact an estimated 0.43 ha of native vegetation of PCT 3595 – Sydney Coastal Sandstone Gully Forest, all of which requires offsetting because the vegetation integrity score is greater than 20.

Following the site survey, the outcome of the BAM assessment found that species credits were required Eastern Cave Bat and Swift Parrot. These are potential SAII entities, therefore an assessment has been carried out in Appendix 1.

The BAM C Outputs are attached to this report and summarised in the executive summary.

8. Bibliography

Barker, J., Grigg, G. C. & Tyler, M. J. (1995) *A Field Guide to Australian Frogs.* Surrey Beatty & Sons.

Bennett, A. F. (1990a) *Habitat Corridors: Their Role in Wildlife Management and Conservation*. Department of Conservation and Environment, Victoria).

Bennett, A. F. (1990b) Habitat corridors and the conservation of small mammals in a fragmented forest environment. *Landscape Ecology.* 4: 109-122.

Carnegie, A. J., Kathuria, A., Pegg, G. S., Entwistle, P., Nagel, M., Giblin, F. R. (2016) Impact of the invasive rust *Puccinia psidii* (myrtle rust) on native Myrtaceae in natural ecosystems in Australia. *Biological Invasions* 18, 127–144.

Churchill, S. (2008) *Australian Bats*, 2nd Ed., Jacana Books, Crows Nest, Sydney.

Cogger, H. G. (1996) *Reptiles and Amphibians of Australia*. Reed Books, Australia.

Cropper, S. (1993) *Management of endangered plants.* CSIRO Publications, Melbourne.

DCCEEW (2025) *Atlas of NSW Wildlife* (BioNet).

DCCEEW (2025) *Environmental Protection and Biodiversity Conservation Act 1999 - Protected Matters Search Tool* - http://www.environment.gov.au/webgis-framework/apps/pmst/pmst-coordinate.jsf

DEC (2004) Threatened Species Survey and Assessment: Guidelines for developments and activities (working draft), New South Wales Department of Environment and Conservation, Hurstville, NSW.

DECCW & Water NSW (2010) *NSW Wetlands Policy* – NSW Department of Environment, Climate Change.

DEWHA (2010) *Survey guidelines for Australia's threatened bats*. Department of Environment Water Heritage and Arts.

DPE (2002) *Rhizanthella slateri (an underground orchid - vulnerable species listing*. NSW Scientific Committee - Final Determination. NSW Department of Planning and Environment

DPE (2019) *Biodiversity Assessment Method Operational Manual: Stage 2.* State of NSW and Department of Planning, Industry and Environment.

DPE (2020a) *Biodiversity Assessment Method.* State of NSW and Department of Planning, Industry and Environment.

DPE (2020b) *Biodiversity Assessment Method Operational Manual: Stage 1.* State of NSW and Department of Planning, Industry and Environment.

DPE (2020c) *Surveying threatened plants and their habitats NSW survey guide for the Biodiversity Assessment Method.* State of NSW and Department of Planning, Industry and Environment.

DPE (2020d) *NSW Survey Guide for Threatened Frogs - A guide for the survey of threatened frogs and their habitats for the Biodiversity Assessment Method.* State of NSW and Department of Planning, Industry and Environment.

Ecological Consultants Australia Pty Ltd trading as Kingfisher Urban Ecology / Wetlands (2024) *Ecology Assessment 4 Forest Rd, Warriewood NSW 2102* (unpublished).

Griffiths, K. (1997) *Frogs and Reptiles of the Sydney Region.* University NSW Press.

Harden, G. (1993) *Flora of New South Wales.* University NSW Press.

Hoser, R. (1989) *Australian Reptiles and Frogs.* Pierson & Co.

Klaphake, V. (2002) *Key to the grasses of Sydney.* Van Klaphake, Byabarra.

Klaphake, V. (2010) *Eucalypts of the Sydney Region. 2nd Ed.* Van Klaphake, Byabarra.

Lamp, C. & Collett, F. (1996) *A Field Guide to Weeds in Australia.* Inkata Press.

Lunney, D., Urquhart, C. A. & Reed, P. (1988) *Koala Summit,* NPWS.

Marchant, S., & P. J. Higgins (Eds) (1990) *Handbook of Australian, New Zealand and Antarctic Birds.* Volumes 1-7 Oxford University Press, Melbourne.

Morrison, R. G. B. (1981) A Field Guide to the Tracks & Traces of Australian Animals. Rigby.

Murphy, C. L. & Tille, P. J. (1993) *Soil Landscapes of the Sydney 1:100,000 Sheet.* Department of Conservation & Land Management.

OEH (2016) The Native Vegetation of the Sydney Metropolitan Area. Version 3.0. NSW Office of Environment and Heritage, Sydney.

OEH (2018) 'Species credit' threatened bats and their habitats, NSW survey guide for the Biodiversity Assessment Method

OEH (2018) Biodiversity Assessment Method Operational Manual – Stage 1.

Parnaby, H. (1992) An interim guide to identification of insectivorous bats of south-eastern Australia. The Australian Museum, Sydney, Technical Report, No. 8.

Pennay, M., Law, B., Reinhold, L. (2004). Bat calls of New South Wales: Region based guide to the echolocation calls of Microchiropteran bats. NSW Department of Environment and Conservation, Hurstville.

Phillips, S. & Callaghan, J. (2008) The *Spot Assessment Technique*: a tool for determining levels of localised habitat use by Koalas *Phascolarctos cinereus*. Aust. Koala Foundation. Manuscript submitted to: Ecological management and Restoration

Phillott, A. D, Skerratt, L. F., McDonald, K. R., Speare, R., Hines, H. B., Meyer, E., Cashins, S. D, Mendez, D. & Berger, L. (2010) Minimising exposure of amphibians to pathogens during field studies. Inter-research. Diseases of Aquatic Organisms, *Contribution to DAO Special 4: 'Chytridiomycosis: an emerging disease'*

Pizzey, G. & Knight, F. (1997) *A Field Guide to the Birds of Australia.* Angus & Robertson.

Reader's Digest (1976) Complete Book of Australian Birds.

Richardson, F. J., Richardson, R. G. & Shepherd, R. C. H (2011) *Weeds of the South-East: an Identification Guide for Australia.* Everbest Printing Co. Pty. Ltd. China.

Robinson, L. (2003) Field Guide to the Native Plants of Sydney. 3rd ed. Simon & Shuster.

Robinson, M. (1996) A Field Guide to Frogs of Australia. Reed.

Schodde, R. and Tidemann, S. (Eds) (1986) *Readers Digest complete book of Australian Birds.* Second Edition. Reader's Digest Services Pty Ltd, Sydney.

Simpson & Day (1996) Field Guide to the Birds of Australia. Viking.

Triggs, B. (1996) Tracks, Scats & Other Traces: A Field Guide to Australian Mammals. Oxford University Press, Melbourne.

Trounson, Donald & Molly (1998) *Australian Birds Simply Classified*. Murray David Publishing Pty Ltd, NSW.

Van Dyke, S. and Strahan, R. (Eds) (2008) *The Mammals of Australia* (3rd Edn). Reed New Holland. Sydney.

Wilson, K. W. and Knowles, D. G. (1988) Australia's Reptiles - A Photographic Reference to the Terrestrial Reptiles of Australia. Cornstalk Publishing.

9. STATUTORY ASSESSMENT REQUIREMENTS

Environmental Planning and Assessment Act 1979 (*EP&A Act*)

Prior to any development taking place in New South Wales a formal assessment needs to be made of the proposed work to ensure it complies with relevant planning controls and, according to its nature and scale, confirm that it is environmentally and socially sustainable. State, regional and local planning legislation indicates the level of assessment required, and outlines who is responsible for assessing the development. The development assessment and consent system is outlined in Part 4 and the infrastructure and environmental impact assessment system is outlined in Part 5 of the *EP&A Act*.

Biodiversity Conservation Act 2016 (*BC Act*)

The *BC Act* repeals the *Threatened Species Conservation Act 1995*, the *Nature Conservation Trust Act 2001* and the animal and plant provisions of the *National Parks and Wildlife Act 1974*.

The *BC Act* and the *BC Reg* establish a regulatory framework for assessing and offsetting impacts on biodiversity values due to proposed developments and clearing. It establishes a framework to avoid, minimise and offset impacts on biodiversity from development through the Biodiversity Offsets Scheme. Where development consent is granted, the authority may impose as a condition of consent an obligation to retire a number and type of biodiversity credits determined under the new Biodiversity Assessment Method (BAM).

The BOS applies to:

- local development (assessed under Part 4 of the *Environmental Planning and Assessment Act 1979*) that triggers a BOS threshold or is likely to significantly affect threatened species based on the test of significance in section 7.3 of the *Biodiversity Conservation Act 2016*
- state significant development and state significant infrastructure projects, unless the Secretary of the Department of Planning, Industry and Environment and the environment agency head determine that the project is not likely to have a significant impact
- biodiversity certification proposals
- clearing of native vegetation in urban areas and areas zoned for environmental conservation that exceeds a BOS threshold and does not require development consent
- clearing of native vegetation that requires approval by the Native Vegetation Panel under the *Local Land Services Act 2013*
- activities assessed and determined under Part 5 of the *Environmental Planning and Assessment Act 1979* (generally, proposals by government entities) if proponents choose to 'opt in' to the Scheme.

Proponents will need to supply evidence relating to the triggers for the BOS thresholds and the test of significance (where relevant) when submitting their application to the consent authority.

Development consent cannot be granted for non-State significant development under Part 4 of the *EP&A Act* if the consent authority is of the opinion it is likely to have serious and

irreversible impacts (SAII) on biodiversity values. The determination of SAII is to be made in accordance with principles prescribed section 6.7 of the *BC Regulation 2017*. The principles have been designed to capture those impacts which are likely to contribute significantly to the risk of extinction of a threatened species or ecological community in New South Wales.

The threatened species test of significance is used to determine if a development or activity is likely to significantly affect threatened species or ecological communities, or their habitats. It is applied as part of the Biodiversity Offsets Scheme entry requirements and for Part 5 activities under the *Environmental Planning and Assessment Act* (*EP&A Act*), 1979.

The test of significance is set out in s.7.3 of the *BC Act.* If the activity is likely to have a significant impact, or will be carried out in a declared area of outstanding biodiversity value, the proponent must either apply the Biodiversity Offsets Scheme or prepare a species impact statement (SIS).

The environmental impact of activities that will not have a significant impact on threatened species will continue to be assessed under the *EP&A Act.*

Fisheries Management Act 1994 (FM Act)

The *FM Act* provides a list of threatened aquatic species that require consideration when addressing the potential impacts of a proposed development. Where a proposed activity is located in an area identified as critical habitat, or such that it is likely to significantly affect threatened species, populations, ecological communities, or their habitats, an SIS is required to be prepared.

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

The *EPBC Act* requires that Commonwealth approval be obtained for certain actions. It provides an assessment and approvals system for actions that have a significant impact on matters of *National Environmental Significance* (NES). These may include:

- World Heritage Properties and National Heritage Places
- Wetlands of International Importance protected by international treaty
- Nationally listed threatened species and ecological communities
- Nationally listed migratory species
- Commonwealth marine environment

Actions are projects, developments, undertakings, activities, and series of activities or alteration of any of these. An action that needs Commonwealth approval is known as a controlled action. A controlled action needs approval where the Commonwealth decides the action would have a significant effect on an NES matter.

Where a proposed activity is located in an area identified to be of NES, or such that it is likely to significantly affect threatened species, ecological communities, migratory species or their habitats, then the matter needs to be referred to the Commonwealth Department of Climate Change, Energy, the Environment and Water (DCCEEW) for assessment. In the case where no listed federal species are located on site then no referral is required. The onus is on the proponent to make the application and not the Council to make any referral.

A threshold criterion applies to specific NES matters which may determine whether a referral is or is not required, such as for the *EPBC*-listed ecological communities Cumberland Plain Woodland and Shale-Gravel transition Forest. Consultation with DCCEEW may be required to determine whether a referral is or is not required. If there is any doubt as to the significance

of impact or whether a referral is required, a referral is generally recommended to provide a definite decision under the *EPBC Act* thereby removing any further obligations in the case of 'not controlled' actions.

A significant impact is regarded as being:

> *important, notable, or of consequence, having regard to its context or intensity and depends upon the sensitivity, value, and quality of the environment which is impacted and upon the duration, magnitude, and geographical extent of the impacts. A significant impact is likely when it is a real or not a remote chance or possibility.*

Source: EPBC Policy Statement

Guidelines on the correct interpretation of the actions and assessment of significance are located on the department's web site http://www.environment.gov.au/epbc/publications.

Coastal Management Act 2016 (CM Act)

The *Coastal Management Act* (*CM Act,* 2016) establishes the framework and overarching objects for coastal management in New South Wales. The Act commenced on 29 June 2018 and replaces the previous *Coastal Protection Act* (1979).

The purpose of the *CM Act* is to manage the use and development of the coastal environment in an ecologically sustainable way, for the social, cultural and economic well-being of the people of New South Wales.

The *CM Act* also supports the aims of the *Marine Estate Management Act 2014*, as the coastal zone forms part of the marine estate.

The *CM Act* defines the coastal zone, comprising four (4) coastal management areas:

1. coastal wetlands and littoral rainforests area; areas which display the characteristics of coastal wetlands or littoral rainforests that were previously protected by SEPP 14 and SEPP 26
2. coastal vulnerability area; areas subject to coastal hazards such as coastal erosion and tidal inundation
3. coastal environment area; areas that are characterised by natural coastal features such as beaches, rock platforms, coastal lakes and lagoons and undeveloped headlands. Marine and estuarine waters are also included
4. coastal use area; land adjacent to coastal waters, estuaries and coastal lakes and lagoons.

The *CM Act* establishes management objectives specific to each of these management areas, reflecting their different values to coastal communities.

10.GLOSSARY

Throughout this report the terms development footprint and study area are used. It is important to have a thorough understanding of these terms as they apply to the assessment.

Development footprint means the area directly affected by the proposal. It has the same meaning as “subject land” defined below.

Study area is the portion of land that encompasses all surveys undertaken and is usually all land contained within the designated property boundary. The study area extends as far as is necessary to assess all important biodiversity values known and likely to occur within the subject land and includes the development footprint and any additional areas which are likely to be affected by the proposal, either directly or indirectly.

Subject land is land to which the BAM is applied in Stage 1 to assess the biodiversity values. It includes land that may be a development site, clearing site, proposed for biodiversity certification or land that is proposed for a biodiversity stewardship agreement. In this case, it refers to the area designated as the development footprint / subject land, and has the same meaning for the purposes of this report. The terms “subject land” and “development footprint” are interchangeable in this regard.

Direct impacts are those that directly affect the habitat and individuals. They include, but are not limited to, death through clearing, predation, trampling, poisoning of the animal/plant itself and the removal of suitable habitat. When applying each factor, consideration must be given to all of the likely direct impacts of the proposed activity or development.

Indirect impacts occur when project-related activities affect species, populations or ecological communities in a manner other than direct loss. Indirect impacts can include loss of individuals through starvation, exposure, predation by domestic and/or feral animals, loss of breeding opportunities, loss of shade/shelter, deleterious hydrological changes, increased soil salinity, erosion, inhibition of nitrogen fixation, weed invasion, fertiliser drift, or increased human activity within or directly adjacent to sensitive habitat areas. As with direct impacts, consideration must be given, when applying each factor, to all of the likely indirect impacts of the proposed activity or development

Appendix 1.
SAII Impact Assessment - Species

The additional impact assessment provisions for threatened species to determine a Serious and Irreversible Impact (SAII) are outlined under Section 9.1.2 of the BAM (2020) and have been applied to the recorded Little Bent-winged Bat and Eastern Cave Bat as follows below. An assessment has also been undertaken for Large Bent-winged Bat and Large-eared Pied Bat as prompted by the BAM calculator. The study area does also contribute to Important Mapped Areas for Swift Parrot and therefore SAII assessment provisions has also been applied to this species below.

Measures taken to avoid the direct and indirect impact on species at risk of SAII are outlined in Section 6.2. We have consulted the Threatened Biodiversity Data Collection (TBDC) and other sources to enable the application of the four principles set out in clause 6.7 of the *BC Reg*. For the species considered this is summarized as follows:

Common Name	Principle				Justification	Reference
	1	2	3	4		
Large Bent-winged Bat				✓	The species is dependent on non-responding attribute (breeding habitat only)	TBDC
Little Bent-winged Bat				✓	The species is dependent on non-responding attribute (breeding habitat only)	TBDC
Swift Parrot	✓				Data from listing determination.	Final Determination
Large-eared Pied Bat				✓	The species is dependent on non-responding attribute (breeding habitat only)	TBDC
Eastern Cave Bat				✓	The species is dependent on non-responding attribute (breeding habitat only)	TBDC

The criteria as specified in Section 9.1.2.4 of the BAM required to be considered for candidate SAII species nominated is with respect to Principles 1–3 only. As these do not apply to the recorded microbat species a summary is provided below:

Large Bent-winged Bat & **Little Bent-winged Bat** – These species are allocated to species credit class for breeding habitat only. Species sensitivity to loss is indicated by the TBDC as 'moderate'. Species sensitivity to potential gain for breeding is 'very high'. Species sensitivity to potential gain for foraging is 'high'.

'Potential breeding habitat' as defined by *The BAM Bat Guide* for these species includes "caves, tunnels, mines or other structures known or suspected to be used". No such habitat exists within the study area or nearby and the buffers applied to the breeding attributes, which constitute a potential SAII are not encroached by the proposal.

Large-eared Pied Bat - Insufficient information is available on the species' distribution and ecology to guide effective management (DCCEEW – Saving Our Species Strategies). This is a species credit species. Species sensitivity to loss is indicated by the TDBC as 'moderate'. Species sensitivity to potential gain is 'very high'.

The Large-eared Pied Bat has not been recorded within the study area during surveys to date. Surveys are however limited in the last five years and require update to satisfy assessment requirements.

The *'Species credit' threatened bats and their habitats – NSW survey guide for the Biodiversity Assessment Method (The BAM Bat Guide)* outline how to define presence of important 'breeding habitat'. Species polygons for offsetting calculations have also been generated in accordance with Table 1 of this guide.

Potential breeding habitat for this species is defined by *The BAM Bat Guide* as "The PCTs associated with the species (as per the TBDC) within 100m of rocky areas containing caves, or overhangs or crevices, cliffs or escarpments, or old mines, tunnels, culverts, derelict concrete buildings."

No overhangs are located within 100m of the proposed development footprints, and the 50m buffer radius to apply around breeding habitat (as defined by the *BAM Bat Guide*) is all predominantly contained within this 100m.

The Large-eared Pied Bat breeding period is commonly in November, overlapping with the required survey period for this species (Nov-Jan).

During detailed searches of the abandoned structure no microbats or bat activity were recorded during the January 2025 survey period. All available access point were able to be well viewed by torchlight during these inspections. The abandoned structures, whilst providing potential temporary roosting opportunity for this species, are not currently expected to provide breeding habitat.

Despite this conclusion, excerpts from *The BAM Bat Guide* suggests the following:

- *Breeding habitat is cryptic and therefore roost searches should only be combined with other techniques to determine breeding habitat;*
- *Breeding habitat is considered present if there is 1) potential breeding habitat, and 2. Breeding individuals of the target species on the subject land*. Note: It does not say that breeding individuals need to be in the potential breeding habitat.
- *If presence is assumed, species habitat should be mapped in accordance with Table 1. If breeding habitat is assumed breeding habitat should be mapped in accordance with Table 2*.
- *All surveys for bats where breeding habitat must be identified require an assessment of the sex, age and reproductive condition of any bats observed to identify breeding bats, unless the species is assumed to be present (development and biocertification sites only), in which case breeding habitat is also assumed, and mapped accordingly. Any bats of the target species observed (or previously recorded) that are pregnant, carrying pups, lactating, juveniles (i.e. less than six months old) should be considered positive confirmation of breeding habitat, which is to be mapped in accordance with Table 2.* Note: Trapping guides the decision of breeding habitat more so than habitat searches. This reasoning is not explained in *The BAM Bat Guide*.
- *If acoustic detectors are the only survey method used and the target species is detected, breeding must be assumed and mapped in accordance with Table 2.*

In conclusion, *Travers bushfire & ecology* find that there is no breeding habitat on site or within 100m of the proposed development footprint that may contribute to a SAII for this species.

Eastern Cave Bat

Addressing the Principle 4 items against Eastern Cave Bat

2. The assessor must consult the TBDC and/or other sources to report on the current population of the species including:

d. Evidence that the species is unlikely to respond to management (Principle 4, clause 6.7(2)(d) BC Regulation) because:

i. known reproductive characteristics severely limit the ability to increase the existing population on, or occupy new habitat (e.g. species is clonal) on, a biodiversity stewardship site

ii. the species is reliant on abiotic habitats which cannot be restored or replaced (e.g. karst systems) on a biodiversity stewardship site, or

iii. life history traits and/or ecology is known but the ability to control key threatening processes at a biodiversity stewardship site is currently negligible (e.g. frogs severely impacted by chytrid fungus).

The proposal is not a biodiversity stewardship site.

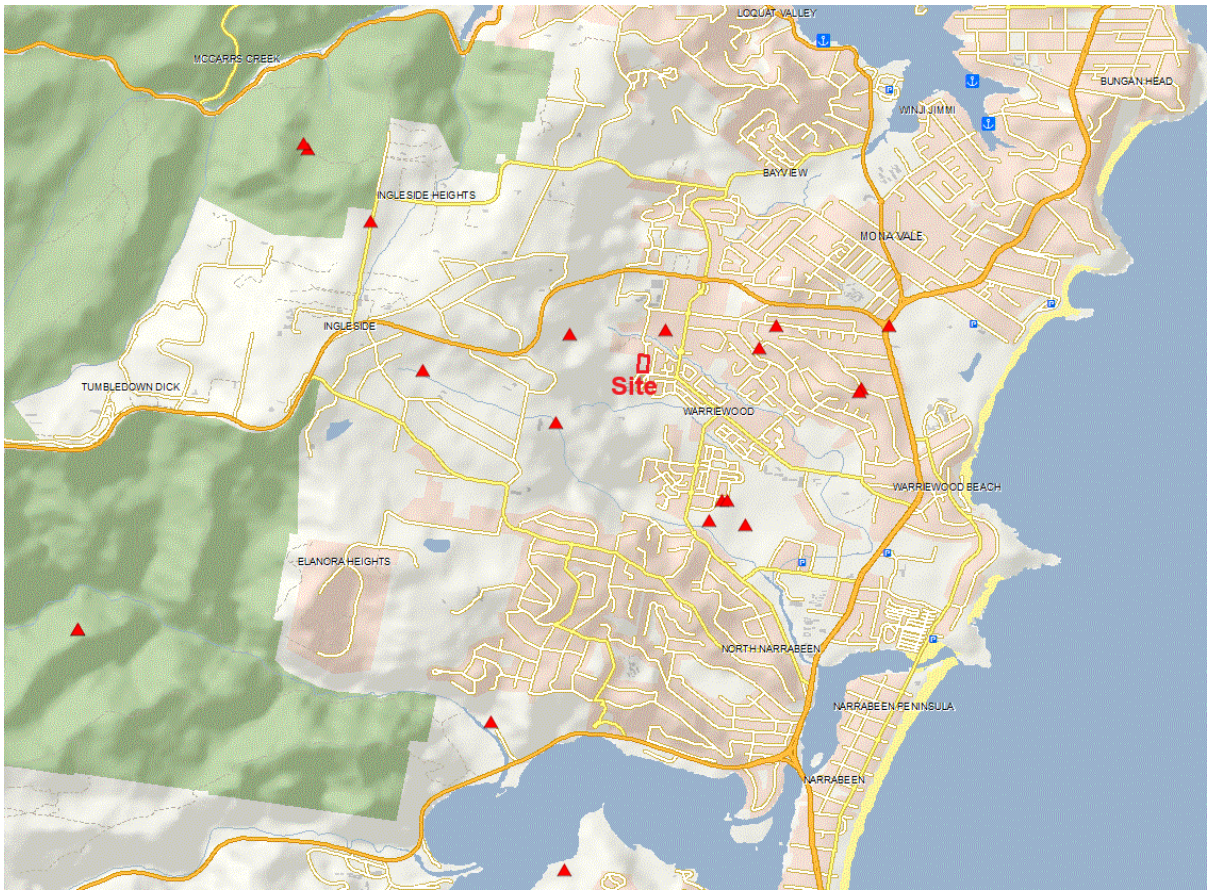
Breeding habitat is not impacted by the proposal, including any areas within 100m of rocky areas, caves, overhangs, crevices, cliffs and escarpments, or old mines or tunnels, old buildings and sheds with the potential habitat. All outbuildings were thoroughly checked for microbat use and no evidence of such use was observed. Section 4.2.2 of the main document contains photographs depicting the outbuildings on site that were surveyed.

There are no other requirements for Principle 4.

Swift Parrot – This species sensitivity to loss is indicated by the TDBC as 'very high'. Species sensitivity to potential gain for breeding and foraging are both 'moderate'.

Swift Parrot was not recorded present during survey and does not breed on the mainland of Australia, however the species credit value for breeding is in accordance with important mapped areas identified by DCCEEW. As outlined by the TBDC, these mapped areas do not require survey as it is presumed that the species is present. Any impact from development could potentially be serious and irreversible.

The figure below shows previous Swift Parrot records from Bionet that have been recorded in the locality.



Whilst the records are indicative of the location where they have been previously recorded, the majority in the Warriewood area have been recorded in Warriewood Wetland, in riparian

areas or low-lying areas. There may be some opportunistic records from mature planted native winter-flowering street trees in the urban areas.

This species feeds mainly on nectar and lerp from eucalypt flowers, particularly Blue Gum (*Eucalyptus globulus*). On the mainland, the Swift Parrot congregates where winter flowering species occur such as Red Ironbark (*Eucalyptus sideroxylon*), White Box (*Eucalyptus albens*), Yellow Gum (*Eucalyptus leucoxylon*) and Swamp Gum (*Eucalyptus ovata*) (Brown, 1989). This species also occurs within Swamp Mahogany (*Eucalyptus robusta*) or Spotted Gum (*Corymbia maculata*) dominated communities along the coast. The Swift Parrot is a migratory species that breeds in Tasmania and its offshore islands in summer. In late March almost the entire population migrates to mainland Australia spreading from Victoria through to central and coastal NSW and southeast Queensland (Schodde and Tidemann, 1986).

For Swift Parrot, the SAII principle relates to "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." Currently there is no threshold advising at what point or what amount of impact will constitute the SAII.

Assessment and context for Swift Parrot

Approximately 0.06 ha of the proposed development will impact important mapped habitat for the Swift Parrot and is therefore included as species credits for offsetting, although entered as 0.07 ha in the calculator due to rounding of impacts between vegetation zones.

No winter flowering tree species were recorded within the lot or within the BAM plots, however the Arborist Assessment (*Naturally Trees,* December 2024 revision D) denotes Tree 29, 30, 33 and 37 as being a Swamp Mahogany which is a winter flowering tree in the road reserve in the southern edge of the development footprint where the proposed entry road will be built.

Tree 29 is a mature tree measuring 18m in height. This specimen will be retained insitu.

Tree 30, 33 and 37 are proposed for removal. All trees are juvenile, below 10m in height although all are in good health. Being low in the canopy and immature, below more mature species of *Angophora costata* predominately at that location, their flowering would be minimal and masked by the upper canopy.

Section 6.2 of the main document describes avoidance and minimisation measures imposed for the proposed works, noting that the arborist report advises trees within the site that will be retained, and despite there being an APZ over the development, there will be regeneration and revegetation works primarily on the south-western edge of the site that will assist in minimising edge effects.

The vegetation being impacted has very minimal winter-flowering resources. These are centred more on the floodplain areas in the locality where *Eucalyptus robusta* is a dominant canopy species. Impacts of 0.06-0.07 ha of mapped important habitat area that is degraded (review historical aerial photographs in section 1), is not likely to be central to the core of maintaining a viable local habitat for the species.

The proposal will not impact on local fragmentation, connectivity or contribute to isolation of habitat for Swift Parrot.

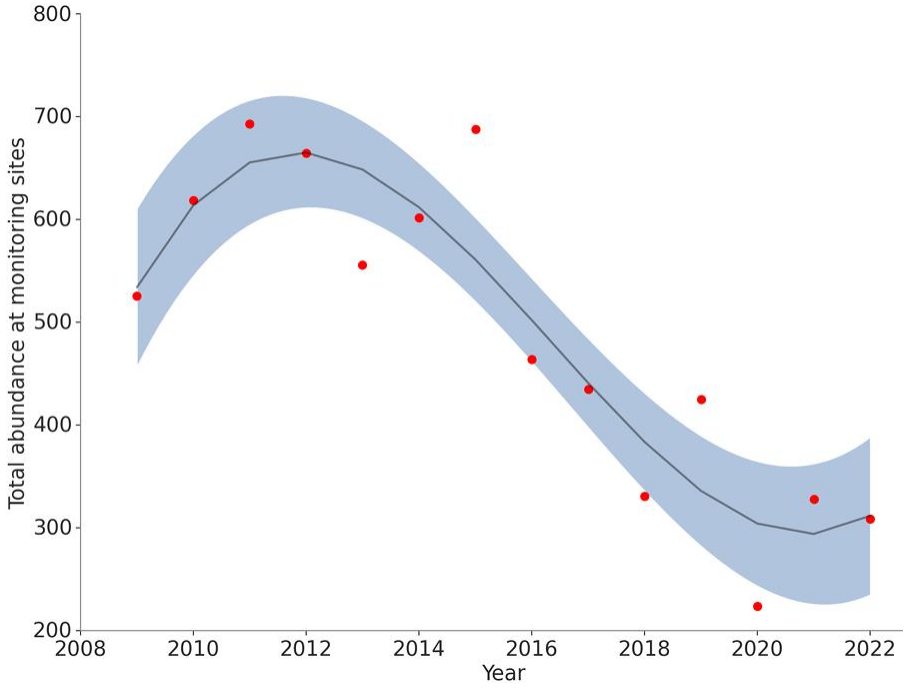
Addressing the Principle 1 items against Swift Parrot

The assessor must consult the TBDC and/or other sources to report on the current population of the species including: a. evidence of rapid decline (Principle 1, clause 6.7(2)(a) BC Regulation) presented by an estimate of the:

i. decline in population of the species in NSW in the past 10 years or three generations (whichever is longer), or

ii. decline in population of the species in NSW in the past 10 years or three generations (whichever is longer) as indicated by: an index of abundance appropriate to the species; decline in geographic distribution and/or habitat quality; exploitation; effect of introduced species, hybridisation, pathogens, pollutants, competitors or parasites

The Landscape Recovery Foundation has undertaken a population analysis in Tasmania to estimate the number of individuals over the span of 2009-2022 as shown below. The results indicate a declining population of near 50% of this timeframe.



https://nre.tas.gov.au/Documents/Swift%20Parrot%20Monitoring%20and%20Trend%20Analysis%202009-2022.PDF

As the species is nomadic between the mainland for foraging in the cooler months, it is assumed that population for NSW is equivalent to the population measured for TAS.

Whilst general geographic distribution of feeding and breeding resources has not significantly changed, the quality of habitat may have been reduced or fragmented, particularly where there has been logging in the breeding locations.

In relation to the impacts from the proposal on the species at risk of an SAII, the assessor must include data and information on:

a. the impact on the species' population (Principles 1 and 2) presented by:

- *i. an estimate of the number of individuals (mature and immature) present in the subpopulation on the subject land (the site may intersect or encompass the subpopulation) and as a percentage of the total NSW population, and*
- *ii. an estimate of the number of individuals (mature and immature) to be impacted by the proposal and as a percentage of the total NSW population, or*
- *iii. if the species' unit of measure is area, provide data on the number of individuals on the site, and the estimated number that will be impacted, along with the area of habitat to be impacted by the proposal*

Populations of Swift Parrot in Australia are very low, in 2024 the population of Swift Parrots is estimated to be fewer than 500 (*BirdLife Australia*), with the Australian National University suggesting the population could be as low as 300 (according to their 2020 study). The nomadic

lifestyle makes the species difficult to count, and the ongoing logging in Tasmania, where the species breed, is continuing to put pressures on the population.

Estimating a direct impact on species individuals is not possible. The proposal has minimal impact on any likely feeding resources for the species which could be measured as either a loss or impact to important habitat (as mapped by DCCEEW) of 0.06-0.07 ha, or the loss of 3 immature winter-flowering Swamp Mahogany trees.

b. impact on geographic range (Principles 1 and 3) presented by:

i. the area of the species' geographic range to be impacted by the proposal in hectares, and a percentage of the total AOO, or EOO within NSW

ii. the impact on the subpopulation as either: all individuals will be impacted (subpopulation eliminated); OR impact will affect some individuals and habitat; OR impact will affect some habitat, but no individuals of the species will be directly impacted

iii. to determine if the persisting subpopulation that is fragmented will remain viable, estimate (based on published and unpublished sources such as scientific publications, technical reports, databases or documented field observations) the habitat area required to support the remaining population, and habitat available within dispersal distance, and distance over which genetic exchange can occur (e.g. seed dispersal) and pollination distance for the species

iv. to determine changes in threats affecting remaining subpopulations and habitat if the proposed impact proceeds, estimate changes in environmental factors including changes to fire regimes (frequency, severity); hydrology, pollutants; species interactions (increased competition and effects on pollinators or dispersal); fragmentation, increased edge effects, likelihood of disturbance; and disease, pathogens and parasites. Where these factors have been considered elsewhere in relation to the target species, the assessor may refer to the relevant sections of the BDAR or BCAR.

AOO and EOO are not reported in the Bionet TBDC.

The proposal may impact some habitat, however no individuals of the species will likely be directly impacted given the immaturity of the winter flowering resources proposed for removal.

The population or sub-population that inhabits the Warriewood area for feeding during the cooler months will not have its available habitat fragmented or isolated by this proposal. No data is available that estimates the habitat area required to support the remaining population.

Factors that most likely could contribute to the decline of the species locally would be the removal of winter foraging habitat, and fragmentation of the remnants in urban areas that make them not viable for use. Again, noting that there is only 1 tree on site that is mature and it will not be impacted, and 3 immature trees that likely have limited potential use for the species that will be removed.

The loss of winter flowering resources may be considered in the landscaping plans that include street tree planting of species such as Swamp Mahogany, Spotted Gum and Forest Red Gum that predominately flower between May and September when the species is most likely to occur in the locality.

Appendix 2.
SAII impact assessment - communities

The additional impact assessment provisions for threatened ecological communities (TECs) to determine a Serious and Irreversible Impact (SAII) are outlined under Section 9.1.1 of the BAM (2020).

There will be no impacts on communities listed as a potential SAII by this proposal.

Appendix 3.
Vegetation survey data

(a) Plot datasheets

-This document has not been endorsed or approved by Office of Environment and Heritage or Muddy Boots Environmental Training-

BAM Site – Field Survey Form | Site Sheet no: 1 of 2

		Survey Name	Zone ID	Recorders			
Date	16/01/25	Warrawood		Anne - Cecile Colin			
Zone	Datum	Plot ID	Q1	Plot dimensions		Photo #	
Easting -33.682446	Northing 151.285086	IBRA region	In m	Midline bearing from 0 m	Magnetic °		
Vegetation Class						Confidence: H M L	
Plant Community Type				EEC: tick		Confidence: H M L	

Record easting and northing at 0 m on midline. Dimensions (Shape) of 0.04 ha base plot.

BAM Attribute (400 m² plot)		Sum values
Count of Native Richness	Trees	1
	Shrubs	5
	Grasses etc.	4
	Forbs	5
	Ferns	1
	Other	1
Sum of Cover of native vascular plants by growth form group	Trees	1
	Shrubs	5
	Grasses etc.	98
	Forbs	14
	Ferns	1
	Other	1
High Threat Weed cover		0

BAM Attribute (1000 m² plot)		
DBH	# Tree Stems Count	# Stems with Hollows
80 + cm		
50 – 79 cm		
30 – 49 cm		
20 – 29 cm		
10 – 19 cm		
5 – 9 cm		
< 5 cm		n/a
Length of logs (m) (≥10 cm diameter, >50 cm in length)	Tally space	

Counts apply when the **number of tree stems** within a size class is ≤ 10. Estimates can be used when > 10 (eg. 10, 20, 30..., 100, 200, 300...). For a **multi-stemmed tree**, only the largest living stem is included in the count/estimate. **Tree stems must be living.**

For **hollows**, count only the presence of a stem containing hollows. For a **multi-stemmed tree**, only the largest stem is included in the count/estimate. **Stems may be dead and may be shrubs.**

BAM Attribute (1 x 1 m plots)	Litter cover (%)					Bare ground cover (%)					Cryptogam cover (%)					Rock cover (%)				
Subplot score (% in each)	95	100	95	100	100	a	b	c	d	e	a	b	c	d	e	a	b	c	d	e
Average of the 5 subplots	98																			

Litter cover is assessed as the average percentage ground cover of litter recorded from five 1 m x 1 m plots centred at 5, 15, 25, 35, 45 m along the plot midline. Litter cover includes leaves, seeds, twigs, branchlets and branches (less than 10 cm in diameter). Assessors may also record the cover of rock, bare ground and cryptogams.

Physiography + site features that may help in determining PCT and Management Zone (optional)

Morphological Type		Landform Element		Landform Pattern		Microrelief	
Lithology		Soil Surface Texture		Soil Colour		Soil Depth	
Slope		Aspect		Site Drainage		Distance to nearest water and type	

Plot Disturbance	Severity code	Age code	Observational evidence:
Clearing (inc. logging)	3		open grassland of native species
Cultivation (inc. pasture)			
Soil erosion			
Firewood / CWD removal			
Grazing (identify native/stock)			
Fire damage			
Storm damage			
Weediness			
Other			

Severity: 0=no evidence, 1=light, 2=moderate, 3=severe

Age: R=recent (<3yrs), NR=not recent (3-10yrs), O=old (>10yrs)

400m² plot Sheet of	Survey Name	Plot Identifier	Recorders
Date 16/01/25	Warrewood	Q1	Anne-Cecile Colin

GF	Top 3 natives in each GF. Full species name mandatory. All others where practicable	N	E	HTE	Cover %	Abund	voucher
GG	1 Themeda triandra	/			95	1000	
FG	2 Coreopsis lanceolata	/	/		85	1000	
FG	3 Aquilegia umbellata	/			10	100	
EG	4 Pteridium esculentum	/			1	5	
GG	5 Lepidosperma laterale	/			1	10	
GG	6 Lomandra longifolia	/			1	5	
SG	7 Hibbertia sp. (aspera)	/			1	10	
FG	8 Pseuderanthemum variabile	/			1	1	
FG	9 Plectranthus parviflorus	/			1	5	
GG	10 Entolasia stricta	/			1	50	
SG	11 Breynia oblongifolia	/			1	5	
TG	12 Banksia integrifolia	/			1	1	
SG	13 Acacia ulicifolia	/			1	1	
SG	14 Acacia longissima	/			1	1	
	15 Cantena Carnera		/		1	2	
V	16 Glycine clandestina	/			1	10	
SG	17 Platysace lanceolata	/			1	5	
FG	18 Commelina cyanea	/			1	5	
FG	19 Dianella sp.	/			1	2	
	20						
	21						
	22 OTHER SPECIES SPOTTED ON SITE:						
	23 Ageratina adenophora — Leptospermum flavescens						
	24 Platylobium formosum — Podocarpus spinulosus						
	25 Araujia sericifera — Angophora costata						
	26 Bidens pilosa — Acacia longifolia subsp. sophorae						
	27 Lomatia silaifolia						
	28 Gleichenia dicarpum						
	29 Eucalyptus affinis						
	30 Xylomelum pyriforme						
	31 Stephania japonica						
	32 Trachymene incisa						
	33 Lomandra obliqua						
	34 Lomandra filiformis						
	35 Lomandra multiflora						
	36 Platysace linearifolia						
	37 Asparagus aethiopicus						
	38 Banksia ericifolia						
	39 Hibbertia standeri						
	40 Elymus repens						
	41 Phyllanthus hirtellus						
	42 Gahnia clarkei						
	43 Passiflora subpeltata						
	44 Notelaea sp.						
	45 Eucalyptus affinis						
	46 Cayratia clematidea						
	47 Stellaria media						

GF Code: see growth form definitions in Appendix 1 N native, E exotic, HTE high threat exotic GF – circle code of 'top 3'
Cover: 0.1, 0.2, 0.3 ... 1, 2, 3 ... 10, 15, 20, 25 ... 100% (foliage cover) **Note:** *0.1% cover = 63 x 63 cm or a circle 71 cm across, 0.5% cover = 1.4 x 1.4 m, and 1% = 2.0 x 2.0 m, 5% = 4 x 5 m, 25% = 10 x 10m* **Abundance:** 1, 2, 3 ... 10, 20, 30 ... 100, 200 ... 1000.

BAM Site – Field Survey Form

Site Sheet no: 1 of ____

		Survey Name	Zone ID	Recorders			
Date	16/01/25	Ukarriewood		Anne-Cecile Colin			
Zone	Datum	Plot ID	Q2	Plot dimensions		Photo #	
Easting	Northing	IBRA region	In m	Midline bearing from 0 m	Magnetic °		
-33.682546	151.254935						
Vegetation Class						Confidence: H M L	
Plant Community Type				EEC: tick		Confidence: H M L	

Record easting and northing at 0 m on midline. Dimensions (Shape) of 0.04 ha base plot.

BAM Attribute (400 m² plot)		Sum values
Count of Native Richness	Trees	5
	Shrubs	4
	Grasses etc.	3
	Forbs	2
	Ferns	2
	Other	1
Sum of Cover of native vascular plants by growth form group	Trees	75
	Shrubs	57
	Grasses etc.	60
	Forbs	6
	Ferns	11
	Other	1
High Threat Weed cover		5

BAM Attribute (1000 m² plot)		
DBH	# Tree Stems Count	# Stems with Hollows
80 + cm	1 (1)	
50 – 79 cm	11 (7)	
30 – 49 cm	✓	
20 – 29 cm	✓	
10 – 19 cm	✓	
5 – 9 cm	✓	
< 5 cm	✓	n/a
Length of logs (m) (≥10 cm diameter, >50 cm in length)	10 m	Tally space

Counts apply when the **number of tree stems** within a size class is ≤ 10. Estimates can be used when > 10 (eg. 10, 20, 30…, 100, 200, 300…). For a **multi-stemmed tree**, only the largest living stem is included in the count/estimate. **Tree stems must be living.**

For **hollows**, count only the presence of a stem containing hollows. For a **multi-stemmed tree**, only the largest stem is included in the count/estimate. **Stems may be dead and may be shrubs.**

BAM Attribute (1 x 1 m plots)	Litter cover (%)					Bare ground cover (%)					Cryptogam cover (%)					Rock cover (%)				
Subplot score (% in each)	95	100	95	100	100	a	b	c	d	e	a	b	c	d	e	a	b	c	d	e
Average of the 5 subplots	98																			

Litter cover is assessed as the average percentage ground cover of litter recorded from five 1 m x 1 m plots centred at 5, 15, 25, 35, 45 m along the plot midline. Litter cover includes leaves, seeds, twigs, branchlets and branches (less than 10 cm in diameter). Assessors may also record the cover of rock, bare ground and cryptogams.

Physiography + site features that may help in determining PCT and Management Zone (optional)

Morphological Type		Landform Element		Landform Pattern		Microrelief	
Lithology		Soil Surface Texture		Soil Colour		Soil Depth	
Slope		Aspect		Site Drainage		Distance to nearest water and type	

Plot Disturbance	Severity code	Age code	Observational evidence:
Clearing (inc. logging)			
Cultivation (inc. pasture)			
Soil erosion			
Firewood / CWD removal			
Grazing (identify native/stock)			
Fire damage			
Storm damage			
Weediness			
Other			

Severity: 0=no evidence, 1=light, 2=moderate, 3=severe

Age: R=recent (<3yrs), NR=not recent (3-10yrs), O=old (>10yrs)

400m² plot: Sheet of	Survey Name	Plot Identifier	Recorders
Date			

GF		Top 3 natives in each GF: Full species name mandatory. All others where practicable	N	E	HTE	Cover %	Abund	voucher
T	1	Angophora costata	✓			30	7	
T	2	Allocasuarina littoralis	✓			~~40~~ 30	6	
O	3	Xanthorrhea media	✓			1	1	
S	4	Platysace lanceolata	✓			5	15	
E	5	Nephrolepis cordifolia	✓			10	50	
F	6	Dianella caerulea	✓			1	20	
S	7	Pultenaea flexilis	✓			1	1	
S	8	Acacia ulicifolia	✓			1	1	
S	9	Dodonaea triquetra	✓			~~25~~	200	
G	10	Lepidosperma laterale	✓			5	10	
G	11	Themeda triandra	✓			50	500	
F	12	Corcopsis lanceolata		✓		50	500	
G	13	Comesperma longifolia	✓			5	20	
S	14	Cantaga canlata		✓		30	50	
T	15	Eucalyptus piperita	✓			10	1	
T	16	Corymbia gummifera	✓			5	1	
F	17	Pomax umbellata	✓			5	30	
E	18	Pteridium esculentum	✓			1	3	
T	19	Banksia integrifolia	✓			1	1	
G	20	Bidens pilosa			✓	5	10	
	21							
	22							
	23							
	24							
	25							
	26							
	27							
	28							
	29							
	30							
	31							
	32							
	33							
	34							
	35							
	36							
	37							
	38							
	39							
	40							
	41							
	42							
	43							
	44							
	45							
	46							
	47							

GF Code: see growth form definitions in Appendix 1 N: native, E: exotic, HTE: high threat exotic GF – circle code of 'top 3'
Cover: 0.1, 0.2, 0.3..... 1, 2, 3 ..... 10, 15, 20, 25 .....100% (foliage cover): ***Note:*** *0.1% cover = 63 x 63 cm or a circle 71 cm across, 0.5% cover = 1.4 x 1.4 m, and 1% = 2.0 x 2.0 m, 5% = 4 x 5 m, 25% = 10 x 10m.* **Abundance:** 1, 2, 3...10, 20, 30....100, 200...1000...

(b) Bionet PCT description

BioNet Vegetation Classification - Community Profile Report

Plant Community Type ID (PCT ID): 3595

PCT Name: Sydney Coastal Sandstone Gully Forest
Classification Confidence Level: 1-Very High
Total Number of Replicates: 222
Number of Primary Replicates: 216
Number of Secondary Replicates: 6
Vegetation Description: A tall to very tall heathy sclerophyll open forest associated with Hawkesbury Sandstone gullies found along the eastern extent of the Sydney sandstone plateaus. The tree canopy very frequently includes a high cover of Eucalyptus piperita and Angophora costata with Corymbia gummifera occurring less frequently and with a lower cover. The mid-stratum includes a sparse small tree layer that very frequently includes Ceratopetalum gummiferum and Banksia serrata. A mid-dense to dense tall shrub layer covers steep to gentle slopes across rocky benches and frequent outcrops. The shrub layer very frequently includes Acacia terminalis, Persoonia levis, Lomatia silaifolia, Platysace linearifolia, Leptospermum trinervium and Dillwynia retorta. Other common shrubs include Acacia suaveolens and Banksia ericifolia Persoonia levis are frequently recorded. The ground layer is comprised of a mix of graminoids, climbers, grasses and ferns that very frequently or commonly include Lomandra longifolia, Smilax glyciphylla, Entolasia stricta and Pteridium esculentum. The large lily Doryanthes excelsa is common to the south of Sydney . This PCT is widespread north of the Appin road on the Woronora Plateau, extending onto the Hornsby Plateau at Lane Cove and Ku-ring-gai, Brisbane Water and Dharug national parks. It occurs at elevations of 40-410 metres asl, and in higher coastal rainfall zones of over 1000 mm mean annual rainfall. On ridges and exposed slopes, it is replaced by sandstone heathy woodlands PCT 3590 south of Sydney and by PCT 3586 north of Sydney.
Vegetation Formation: Dry Sclerophyll Forests (Shrubby sub-formation);
Vegetation Class: Sydney Coastal Dry Sclerophyll Forests;
IBRA Bioregion(s): Sydney Basin;
IBRA Sub-region(s): Cumberland; Pittwater; Sydney Cataract; Wyong; Yengo;
LGA: CAMPBELLTOWN; CENTRAL COAST; GEORGES RIVER; HORNSBY; KU-RING-GAI; LIVERPOOL; NORTHERN BEACHES; CITY OF PARRAMATTA; RYDE; SUTHERLAND SHIRE; WINGECARRIBEE; WOLLONDILLY; WOLLONGONG;
Elevation (m) (Min, Median, Max): 16.4 109.6 406.3
Annual Rainfall (mm) (Min, Median, Max): 927 1218 1533
Annual Mean Temperature (deg C) (Min, Median, Max): 14.26 16.41 17.11
Median Native Species Richness per plot: 53
TEC Assessed: No associated TEC
TEC List:
TEC Comments:
PCT Percent Cleared: 14.56
PCT Definition Status: Approved

Appendix 4.
EPBC Impact Criteria

Under the *EPBC Act* an action will require approval from the Australian Government Environment Minister if the action has, will have, or is likely to have, a significant impact on a matter of national environmental significance. The following significant impact criteria were sourced from the *EPBC Act* Policy Statement 1.1 (May 2006):

CRITICALLY ENDANGERED AND ENDANGERED SPECIES

Significant impact criteria

An action is likely to have a significant impact on a critically endangered or endangered species if there is a real chance or possibility that it will:

- Lead to a long-term decrease in the size of a population;
- Reduce the area of occupancy of the species;
- Fragment an existing population into two or more populations;
- Adversely affect habitat critical to the survival of a species;
- Disrupt the breeding cycle of a population;
- Modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline;
- Result in invasive species that are harmful to a critically endangered or endangered species becoming established in the endangered or critically endangered species' habitat;
- Introduce disease that may cause the species to decline; or
- Interfere with the recovery of the species.

What is a population of a species?

A 'population of a species' is defined under the *EPBC Act* as an occurrence of the species in a particular area. In relation to critically endangered, endangered or vulnerable threatened species, occurrences include but are not limited to:

- a geographically distinct regional population, or collection of local populations; or
- a population, or collection of local populations, that occurs within a particular bioregion.

What is an important population of a species?

An 'important population' is a population that is necessary for a species' long-term survival and recovery. This may include populations identified as such in recovery plans, and/or that are:

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

What is habitat critical to the survival of a species or ecological community?

'Habitat critical to the survival of a species or ecological community' refers to areas that are necessary:

- For activities such as foraging, breeding, roosting, or dispersal;
- For the long-term maintenance of the species or ecological community (including the maintenance of species essential to the survival of the species or ecological community, such as pollinators);
- To maintain genetic diversity and long term evolutionary development; or
- For the reintroduction of populations or recovery of the species or ecological community.

Such habitat may be, but is not limited to: habitat identified in a recovery plan for the species or ecological community as habitat critical for that species or ecological community; and/or habitat listed on the Register of Critical Habitat maintained by the Minister under the EPBC Act.

VULNERABLE SPECIES

Significant impact criteria

An action is likely to have a significant impact on a vulnerable species if there is a real chance or possibility that it will:

- lead to a long-term decrease in the size of an important population of a species;
- reduce the area of occupancy of an important population;
- fragment an existing important population into two or more populations;
- adversely affect habitat critical to the survival of a species;
- disrupt the breeding cycle of an important population;
- modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline;
- result in invasive species that are harmful to a vulnerable species becoming established in the vulnerable species' habitat;
- introduce disease that may cause the species to decline; or
- interfere substantially with the recovery of the species.

CRITICALLY ENDANGERED AND ENDANGERED ECOLOGICAL COMMUNITIES

Significant impact criteria

An action is likely to have a significant impact on a critically endangered or endangered ecological community if there is a real chance or possibility that it will:

- Reduce the extent of an ecological community;
- Fragment or increase fragmentation of an ecological community, for example by clearing vegetation for roads or transmission lines;
- Adversely affect habitat critical to the survival of an ecological community;
- Modify or destroy abiotic (non-living) factors (such as water, nutrients, or soil) necessary for an ecological community's survival, including reduction of groundwater levels, or substantial alteration of surface water drainage patterns;
- Cause a substantial change in the species composition of an occurrence of an ecological community, including causing a decline or loss of functionally important species, for example through regular burning or flora or fauna harvesting;
- Cause a substantial reduction in the quality or integrity of an occurrence of an ecological community, including, but not limited to:

    - assisting invasive species, that are harmful to the listed ecological community, to become established; or

    - causing regular mobilisation of fertilisers, herbicides or other chemicals or pollutants into the ecological community which kill or inhibit the growth of species in the ecological community; or

- Interfere with the recovery of an ecological community.

MIGRATORY SPECIES

Significant impact criteria

An action is likely to have a significant impact on a migratory species if there is a real chance or possibility that it will:

- Substantially modify (including by fragmenting, altering fire regimes, altering nutrient cycles or altering hydrological cycles), destroy or isolate an area of important habitat for a migratory species;
- Result in an invasive species that is harmful to the migratory species becoming established in an area of important habitat for the migratory species; or

- Seriously disrupt the lifecycle (breeding, feeding, migration or resting behaviour) of an ecologically significant proportion of the population of a migratory species.

What is important habitat for a migratory species?

An area of 'important habitat' for a migratory species is:

(a) a) Habitat utilised by a migratory species occasionally or periodically within a region that supports an ecologically significant proportion of the population of the species; and/or

(b) b) Habitat that is of critical importance to the species at particular life-cycle stages; and/or

(c) c) Habitat utilised by a migratory species which is at the limit of the species range; and/or

(d) d) Habitat within an area where the species is declining.

What is an ecologically significant proportion??

Listed migratory species cover a broad range of species with different life cycles and population sizes. Therefore, what is an 'ecologically significant proportion' of the population varies with the species (each circumstance will need to be evaluated). Some factors that should be considered include the species' population status, genetic distinctiveness and species-specific behavioural patterns (for example, site fidelity and dispersal rates).

What is the population of a migratory species??

'Population', in relation to migratory species, means the entire population or any geographically separate part of the population of any species or lower taxon of wild animals, a significant proportion of whose members cyclically and predictably cross one or more national jurisdictional boundaries including Australia.

Appendix 5.
Microbat Call Analysis

Client Name: **BMN Properties Pty Ltd**	Project Name: Warriewood BDAR
Client Contact: **erin@bmnproperties.com.au**	TBE Quote Ref No: BMN02.6
Client Address: **4 Forest Road Warriewood**	Anabat Location:
	Date of Survey: 16/01 – 22/01/25 (6 nights / 18 recorder nights)

SUMMARY OF RESULTS

ID Method	Result	Threatened	ID Confidence (Probability low to high)	Recorder #
Characteristic low frequency of around 14 kHz.	*Austronomous australis*	No	High	1
characteristic frequency of around 32 kHz, curved tail with downward or no sweep, with consecutive alternating pulses	*Chalinolobus gouldii*	No	High	1
Characteristic frequency of 52 kHz, curved with down sweeping tails.	*Chalinolobus morio*	No	Medium	3
Characteristic frequency of 61 kHz. Has been separated from V. pumilus due to presence of curved, down-sweeping tail.	*Miniopterus australis*	Yes	Medium	1
Characteristic steep near vertical pulses with frequency around 65 to 80 kHz and drop between 35 to 47 kHz	*Nyctophilus geoffroyi* or *Nyctophilus gouldi*	No	Medium	3
Characteristic frequency around 50 kHz with up-sweeping tails (i.e., backwards 'J' shaped call).	*Vespadelus vulturnus* or *Vespadelus troughtoni*	Yes (troughtoni only)	High	3

METHOD DESCRIPTION

Three Anabat Swift (full-spectrum) with omnidirectional microphones were used to record bat calls. A filter that requires a file to have ≥ 4 bat pulses that meet the criteria of 1) 10-200kHz characteristic frequency, 2) 2-100ms duration, and 3) 5-1500 time between pulses (TBC) was used within the software Anabat Insight to automatically determine files containing bat calls. All non-bat files (i.e., files that did not meet the filter criteria) were deleted. All "Bat" files were run through a per-pulse decision tree in Anabat Insight, which automatically labelled files with either a species or species complex. The results were then manually verified and the call from each species/species complex that was most confidently identified was selected to be used as the image in the "Results" section of this

report. All images were taken from within Anabat Insight and shown in either compressed or uncompressed mode, depending on what image best highlighted the diagnostic features.

HABITAT & SURVEY CONDITIONS

The survey period had ~84.8 mm of rain ranging from 0-34.4mm per day (BoM 2025). Winds were highly variable and temperature ranged from 13.0 – 25.1°C.

CALL REFERENCE LIBRARY

Microbat echolocation calls were identified using “Bat Calls of NSW” by Pennay et al. (2004) regional guide, and Call metrics and ID features obtained from discussions with recognised bat experts including Michael Pennay, Brad Law, Chris Corben, and Greg Ford. The combination of these three sources results in a sufficient local reference-call library for identifying microbat species that occur in the Sydney Basin and beyond.

RESULTS

The calls of four species and two species complex were identified from the three Anabat recorders located at Warriewood. One threatened species (*Miniopterus australis*) and one species complex that contain a threatened species (*Vespadelus troughtoni)* were identified.

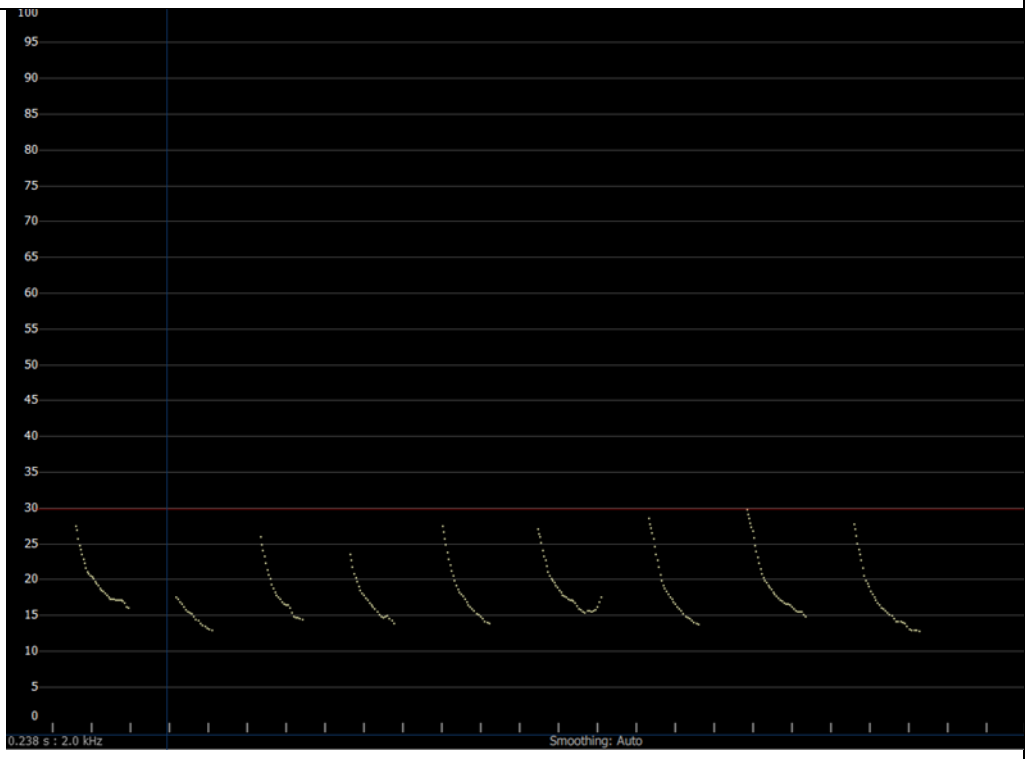


Figure 1 White-striped Free-tailed Bat (*Austronomous australis)* Identified with a high level of confidence.

This sequence was identified as an A. australis call due to the low frequency of around 14 kHz.

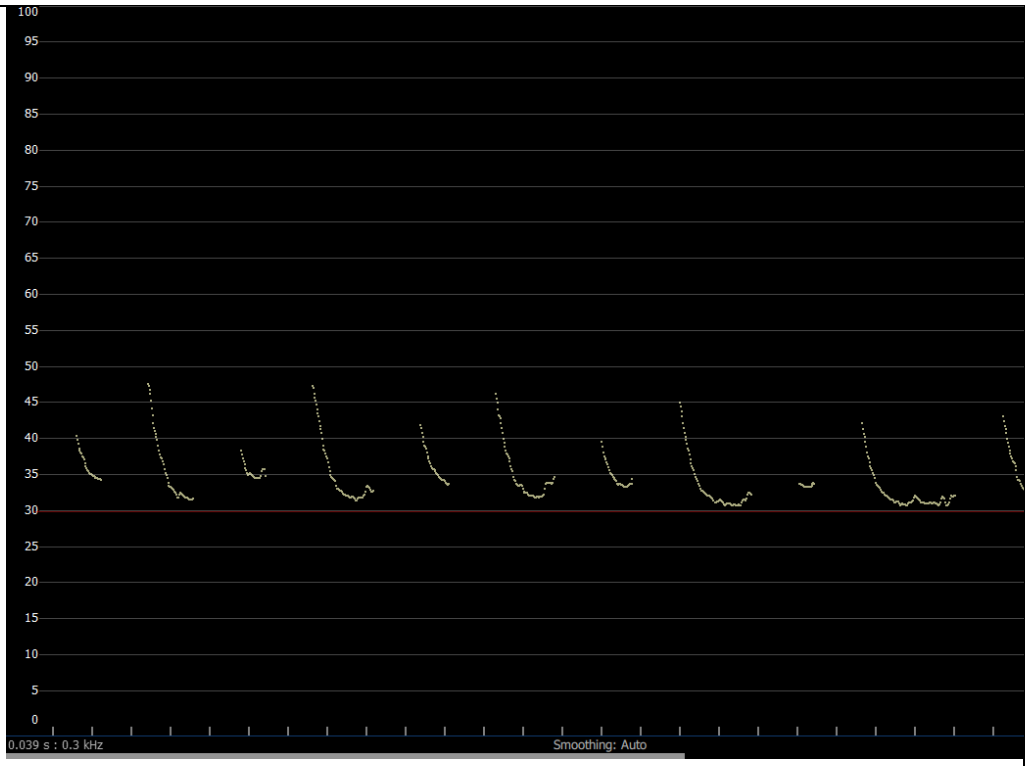
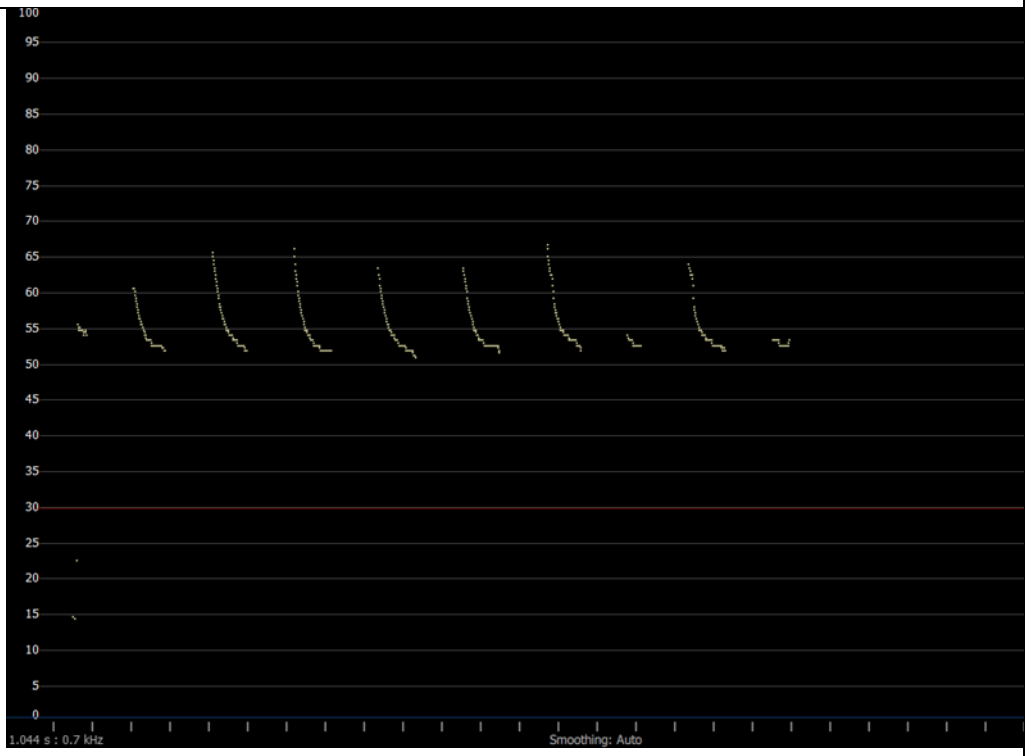
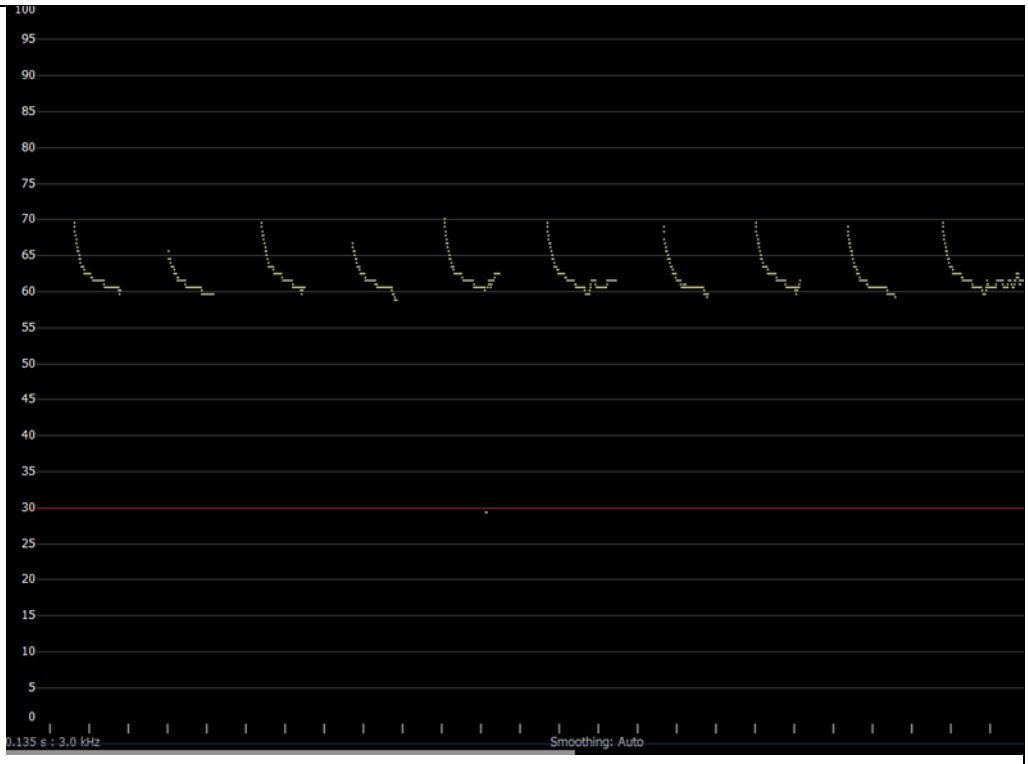
Figure 2 Goulds Wattled Bat (*Chalinobus gouldii)* Identified with a high level of confidence. This sequence was identified as an C. gouldii call due to the characteristic frequency of around 32 kHz, curved tail with downward or no sweep, with consecutive alternating pulses.	
Figure 3 Chocolate Wattled Bat (*Chalinolobus morio*) identified with a medium confidence. This sequence was identified as a *C. morio* call due to the characteristic frequency of 52 kHz, curved with down sweeping tails.	

Figure 4 Little Bent-winged Bat (*Miniopterus australis*) identified with a medium level of confidence. This sequence was identified as a *M. australis* due to characteristic frequency of 61 kHz. Has been separated from V. pumilus due to presence of curved, down-sweeping tail.	

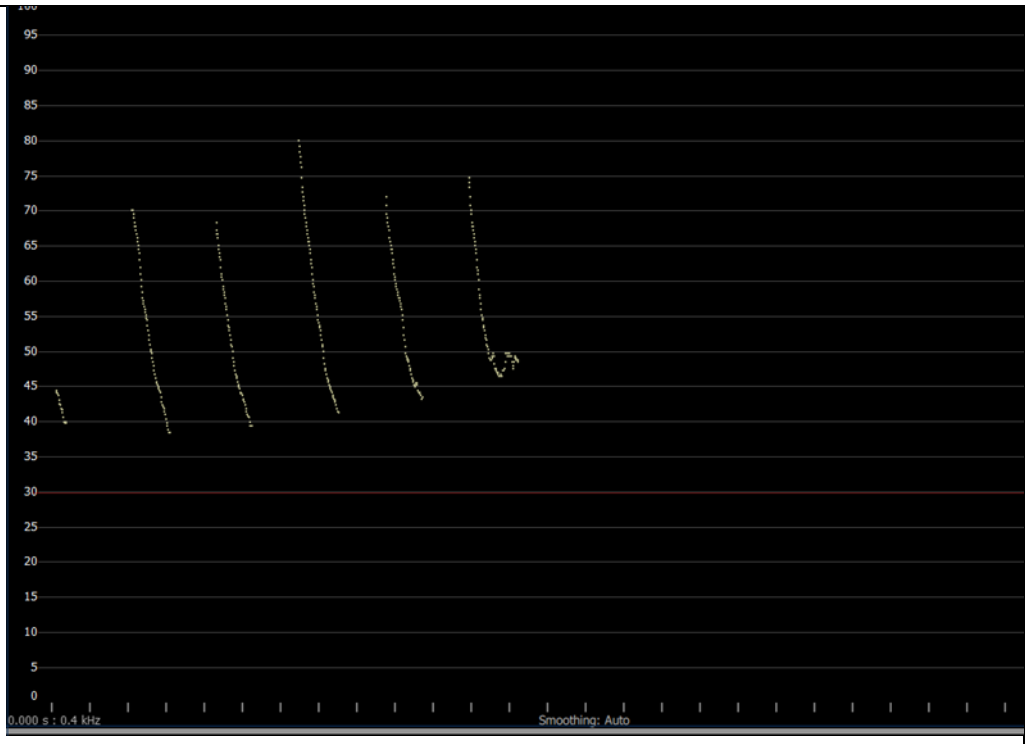


Figure 5 Lesser Long-eared Bat (*Nyctophilus geoffroyi)* or Gould's long-eared bat (*Nyctophilus gouldi*) identified with a medium level of confidence. This sequence was identified as a *N. geoffroyi or N. gouldi* call due to steep near vertical pulses with frequency around 65 to 80 kHz and drop between 35 to 47 kHz. Calls usually have two changes in the slope in the middle or lower half. The first section is longest and steepest followed by a flatter section and then a steeper tail.

Figure 6 Little Forest bat (*Vespadelus vulturnus*) or Eastern Cave Bat (*Vespadelus troughtoni*) identified with a high level of confidence. This sequence was identified as a *V. vulturnus* or *V. troughtoni* call due to the characteristic frequency around 50 kHz with up-sweeping tails (i.e., backwards 'J' shaped call).	

Appendix 6.
Staff qualifications and experience

Team member (role)	Accreditations and qualifications	Experience	Employment history	Skills and expertise
Michael Sheather-Reid (Managing Director)	• Bachelor of Natural Resources (Hons), University of New England • BioBanking and BAM Assessor • Engineering Assistant – CAD Drafting • MUSIC Modelling – Stormwater quality and quantity modelling (RMIT) • Bush Regeneration II Certificate, Ryde TAFE • NSW WorkCover OHS Construction Induction • Chemical Handling Certificate, Ryde TAFE	Michael has a wealth of experience in environmental consulting and on ground management of bushland, wetland and riparian habitats having undertaken environmental assessment, ecological consultancy, and restoration in both the private and public sectors for over 25 years.	• 2018-present: Owner and Managing Director, Travers bushfire & ecology • 2007-2018: Senior Ecologist, Travers bushfire & ecology • 2004 -2007: Senior Ecologist, Conacher Travers Pty Ltd • 2002-2004: Project Manager, Urban Bushland Management Projects Pty Ltd • 1999-2002: Project Manager Sustainable Vegetation Management Pty Ltd • 1995-1999: Managing Director Sheather-Reid & Associates Pty Ltd • 1996-1997: NSW Landcare Liaison Officer, Australian Conservation Foundation • 1992-1995: Environmental Officer, Dept. Land & Water Conservation • 1990-1992: Scientific Officer Dept. of Water Resources	• Court representation • Ecological assessment • Rezoning studies • Biodiversity offset planning. • Restoration management and coordination • Biotic and soil translocation • Watercourse assessment • Project ecologist services • *EPBC Act* referrals • Controlled Activity Approvals • Vegetation management plans
Lindsay Holmes (Principal Ecologist)	• Biodiversity Assessment Method (BAM) Assessor (BAAS17032) • Bachelor of Science – Biology, James Cook University, Qld • Bush Regeneration II Certificate, Ourimbah TAFE • NSW WorkCover OHS Construction Induction • Senior First Aid Certificate • BioBanking Assessor (No. 199)	Lindsay has 25 years of experience as a flora ecologist and bushland regeneration supervisor and has expertise in botanical survey, ecological analysis, maintain and improve analysis, biometric analysis and geo-plotting of ecological data.	• 2007- Current: Senior Botanist to Principal Ecologist, Travers bushfire & ecology • 2006-2007: Ecologist, Conacher Travers Pty Ltd • 1999-2006: Field Operations Manager, Microclimate.	• Highly experienced in botanical survey and ecological analysis • Vegetation management planning • Flora and fauna assessment • Species impact statement • Threatened species, ecological communities and endangered population surveys and analysis. • Preparation of BioBanking and Biodiversity Development Assessment Reports • Riparian, bushland, and wetland restoration • Habitat tree analysis and assessment • Noxious weed identification and control • SULE assessment.

Team member (role)	Accreditations and qualifications	Experience	Employment history	Skills and expertise
Darren Hall (Restoration Ecologist)	• Bachelor of Applied Science (Parks Recreation & Heritage) • Conservation & Land Management Certificate 3 • First Aid Certificate • 4wd drive offroad & Beach & recovery qualification • Working From Heights • Chainsaw Certificate cross cut and felling • AQF 3 chemcert	Darren has over 25 years' experience in natural area restoration in the environmental sector	• 1990-2001 Self Employed Horticultulist • 2001-2004 Total Earth Care • 2004-2007 Tentacle • 2007-2008 Dept Primary Industries (myrtle rust mapping) • 2010-1015 Wyong Council • 2015 -2019 Lake Macquarie Council • 2019 – 2023 Tollijooa Environmental Restoraion • 2023-2023 Anderson Environment & Planning	• Plant Identification and Taxonomy • Noxious Weed Identification and control • Vegetation Management Planning • Project Ecology • BAM plot surveys • Fauna survey techniques
Sara Peters (Botanist)	• Bachelor of Plant Science, University of New England • Horticulture Certificate II, OTEN NSW • First Aid Certificate	Sara is a botanist with 13 years' worth of experience in horticulture and farming management, with key skills in plant identification and taxonomy and weed management.	• 2023-Current: Botanist, Travers bushfire & ecology • 2010-Current: Farm Manager, Self-employed • 2009-2023: Greenlife Team member	• Botanical Survey and ecological analysis • Plant Identification and Taxonomy • Noxious Weed Identification and control • Vegetation Management Planning • Project Ecology • SULE Assessment • Habitat tree analysis and assessment • Threatened species, ecological communities and endangered population surveys and analysis.
Sandy Cardow (GIS officer)	• Bachelor of Science (Biological Sciences) (Macquarie University)	Sandy has over twenty years of experience in Spatial Information (Geographic Information Systems (GIS)), which includes preparation of mapping in local government roles and has completed a Bachelor of Science (Biological Sciences).	• 2017 – Current: GIS Officer, Travers bushfire & ecology • 2014 – 2017: GIS Consultant, Forestry Corp. NSW • 2005 – 2011: GIS Analyst, Forests NSW • 2002 – 2005: GIS Data Librarian, Forests NSW • 2000 – 2002: GIS Operator, Forests NSW • 2000 – 2002: GIS Data Import / Export Officer, Forests NSW • 1999 2000: GIS Project Officer DECC • 1998 – 1999: GIS Support Officer DECC • 1998 – 1999: Wildlife Atlas Data Entry Officer DECC	• Geographic Information Systems • Data management and analysis • Spatial databases and database administration • GPS • Cartography • Natural resource management • Client liaison

Team member (role)	Accreditations and qualifications	Experience	Employment history	Skills and expertise
Wayne Davis (GIS officer)	• Bachelor of Science (Marine Science) (University of Newcastle) • Master of Spatial Science Technology (Geographic Information Systems) (University of Southern Queensland) • FWPCOT2237 Maintain Chainsaws • FWPCOT2239 Trim and Cut Felled Trees • AHCPMG301A: Control Weeds • CPCCOHS1001A Work safely in the construction industry. • Open Water Diver • AQF3 Chemical Accreditation: AHCCHM307 - Prepare and apply chemicals to control pest, weeds and diseases, AHCCHM304 - Transport and store chemicals • HLTAID009 Provide cardiopulmonary resuscitation, HLTAID010 Provide basic emergency life support, HLTAID011 Provide first aid. • Microsoft Certified Azure Fundamentals	Wayne has over eighteen years of experience in IT which included roles as a senior systems designer with the CBA and data scientist with Catholic Schools NSW. Mapping projects for ecology, bushfire planning, student enrolments and demographics reporting. He has completed a Bachelor of Science (marine science), Master of Spatial Science Technology (GIS) and is a member of the Geospatial Council of Australia. Wayne also has 2 years bush regeneration supervisory experience. His Master's thesis involved using a machine learning approach to develop habitat suitability models for Piping Plovers.	• 2022 – Current: GIS Officer, Travers bushfire & ecology • 2022 – 2022: Spatial Data Analyst, Lotsearch • 2021 – 2022: Data Analyst - Strategic Data Analysis Unit, ACCC • 2018 – 2020: Data Scientist, Catholic Schools NSW • 2016 – 2018: Green Army Conservation Project Supervisor Central Coast Council, Ku-ring-gai Council, NPWS. • 2014 – 2014: Website Administrator, The Telecom Shop • 1997 – 2004 Senior Information Specialist, EDS • 1996 – 1997 Senior Systems Designer, CBA • 1989 – 1996 Analyst Programmer, CBA	• Geographic Information Systems • Spatial Data Science • Habitat Suitability Modelling • Predictive Analytics • Machine Learning • ArcGIS • Alteryx • Python
Alana Parziani (Fauna Ecologist / Assistant Project Manager)	• Master of Applied Science (Wildlife Health and Population Management) (University of Sydney, NSW) • Captive Animals Certificate III (Richmond TAFE, NSW) • NSW WorkCover OHS Construction Induction • Senior First Aid Certificate	Alana has over 10 years' experience working across various roles within the environmental sector specialising in fauna behaviour and ecology, sustainable land management and project management. She has experience working for government and fauna field experience ranging from Tasmania, New South Wales to Queensland.	• 2024 – Current: Fauna Ecologist / Assistant Project Manager, Travers Bushfire and Ecology, NSW • 2016-2024: Senior Project Officer / Wildlife Officer, Department of Environment and Science, QLD • 2015-2016: Ecological Consultant / Bush Regenerator / Project Assistant, Toolijooa Environmental and Narla Environmental, NSW • 2014-2015: Wildlife (Koala) Keeper, Featherdale Wildlife Park, NSW • 2013-2014: Australian Wildlife Keeper, Dreamworld, QLD • 2012-2013: Wildlife Keeper (Mammals and Birds), Australian Reptile Park, NSW	• Fauna survey, assessment identification, morphology, and behaviour • Sustainable land management • Scientific report writing • Legislative knowledge • Project Management • Stakeholder engagement
Anne-Cecile Colin (Botanist)	• Bachelor of Plant Science (University of Paul Sabatier, France)	Anne-Cecile is a flora ecologist with 5 years of experience in the Australian flora and its evolution with the environment with a focus on eucalypts.	• 2024: Botanist, Travers bushfire & ecology	• Scientific report writing • Botany, Phylogenetics and Taxonomy

Team member (role)	Accreditations and qualifications	Experience	Employment history	Skills and expertise
	• Master of Plant Biology, Environment and Agriculture (University of Tours, France) • PhD – Drought adaptation and diversification in Eucalyptus (Western Sydney University)		• 2019-2024: PhD Candidate, Western Sydney University – Hawkesbury Institute for the Environment	• Plant species identification • Flora assessment

Appendix 7. Recorded Fauna

Fauna species observed throughout the duration of fauna surveys are listed below.

Table 10.1 – Fauna recorded within the study area

Common name	Scientific name	Method observed
Birds		Jan 2025
Australian Raven	*Corvus coronoides*	OW
Australian Wood Duck	*Chenonetta jubata*	OW
Black-faced Cuckoo-shrike	*Coracina novaehollandiae*	OW
Common Koel	*Eudynamys scolopacea*	OW
Eastern Rosella	*Platycercus eximius*	OW
Eastern Whipbird	*Psophodes olivaceus*	OW
Laughing Kookaburra	*Dacelo novaeguineae*	OW
Noisy Miner	*Manorina melanocephala*	OW
Sulphur-crested Cockatoo	*Cacatua galerita*	OW
Tawny Frogmouth	*Podargus strigoides*	OW
Mammals		
Chocolate Wattled Bat	*Chalinolobus morio*	U PO
Common Brushtail Possum	*Trichosurus vulpecula*	O
Eastern Cave Bat TS	*Vespadelus troughtoni*	U PO
Gould's Wattled Bat	*Chalinolobus gouldii*	U
Lesser Long-eared Bat	*Nyctophilus geoffroyii*	U PO
Gould's long-eared bat	*Nyctophilus gouldi*	U PO
Little Bent-winged Bat TS	*Miniopterus australis*	U PO
Little Forest Bat	*Vespadelus vulturnus*	U PO
Swamp Wallaby	*Wallabia bicolor*	O
White-striped Free-tailed Bat	*Austronomous australis*	U
Reptiles		
Eastern Blue Tongue Lizard	Tiliqua scincoides	O
Amphibians		
Striped Marsh Frog	Limnodynastes peronii	W

*Note: * indicates introduced species*

TS indicates threatened species

MS indicates Migratory species

All species listed are identified to a high level of certainty unless otherwise noted as:

PR indicates species identified to a 'probable' level of certainty – more likely than not

PO indicates species identified to a 'possible' level of certainty – low-moderate level of confidence

AR - Acoustic Recording *E - Nest/roost* *F- Tracks/scratchings* *FB - Burrow* *G - Crushed cones*	*H - Hair/feathers/skin* *K- Dead* *O - Observed* *OW- Obs & heard call*	*P - Scat* *Q- Camera* *T - Trapped/netted* *U- Anabat/ultrasound*	*W - Heard call* *X- In scat* *Y - Bone/teeth/shell* *Z- In raptor/owl pellet*

Appendix 8. Recorded Flora

Table A.10.2 - Flora recorded within the study area

Family	Scientific name	Common name
TREES		
Casuarinaceae	*Allocasuarina littoralis*	Black She-oak
Myrtaceae	*Angophora costata*	Smooth-barked Apple
Araucariaceae	*Araucaria cunninghamii*	Hoop Pine
Myrtaceae	*Corymbia gummifera*	Red Bloodwood
Sapindaceae	*Cupaniopsis anacardioides*	Tuckeroo
Cyatheaceae	*Cyathea australis*	Rough Tree-fern
Ebenaceae	*Diospyros kaki**	Persimmon
Malaceae	*Eriobotrya japonica**	Loquat
Myrtaceae	*Eucalyptus piperita*	Sydney Peppermint
Myrtaceae	*Eucalyptus umbra*	Broad-leaved White Mahogany
Euphorbiaceae	*Glochidion ferdinandi*	Cheese Tree
Moraceae	*Morus alba**	Mulberry
Oleaceae	*Notelaea longifolia*	Mock Olive
Lauraceae	*Cinnamomum camphora**	Camphor Laurel
Arecaceae	*Phoenix canariensis**	Canary Island Date Palm
Pittosporaceae	*Pittosporum undulatum*	Sweet Pittosporum
Bignoniaceae	*Jacaranda mimosifolia**	Jacaranda
Lythraceae	*Lagerstroemia indica**	Crepe Myrtle
Anacardiaceae	*Mangifera indica**	Mango
Araliaceae	*Schefflera actinophylla*	Umbrella Tree
Arecaceae	*Syagrus romanzoffiana**	Cocos Palm
Myrtaceae	*Syncarpia glomulifera*	Turpentine
Proteaceae	*Xylomelum pyriforme*	Woody Pear
SHRUBS		
Fabaceae	*Acacia longissima*	Long-leaf Wattle
Fabaceae	*Acacia ulicifolia*	Prickly Moses
Euphorbiaceae	*Breynia oblongifolia*	Coffee Bush
Solanaceae	*Cestrum parqui**	Chilean Cestrum
Sapindaceae	*Dodonaea triquetra*	Hop-bush
Hydrangeaceae	*Hydrangea macrophylla**	Hydrangea
Araceae	*Monstera deliciosa**	Fruit Salad Plant
Verbenaceae	*Lantana camara**	Lantana
Epacridaceae	*Leucopogon lanceolatus*	Lance-leaf Beard-heath
Oleaceae	*Ligustrum lucidum**	Large-leaved Privet
Proteaceae	*Lomatia silaifolia*	Crinkle Bush
FabaceaeCesalpinioideae	*Senna pendula**	-
Epacridaceae	*Monotoca scoparia*	Prickly Broom-heath
Solanaceae	*Solanum mauritianum**	Wild Tobacco
Apocynaceae	*Nerium oleander**	Oleander Bush
Proteaceae	*Persoonia levis*	Broad-leaved Geebung

Family	Scientific name	Common name
Proteaceae	*Persoonia linearis*	Narrow-leaved Geebung
Euphorbiaceae	*Phyllanthus hirtellus*	Thyme Spurge
Fabaceae	*Platylobium formosum*	Handsome Flat-pea
Apiaceae	*Platysace lanceolata*	Lance-leaf Platysace
Fabaceae	*Pultenaea flexilis*	Graceful Bush Pea
Podocarpaceae	*Podocarpus spinulosus*	Spiny-leaf Podocarp
GROUNDCOVERS		
Alliaceae	*Agapanthus praecox subsp. orientalis**	
Asteraceae	*Ageratina adenophora**	Crofton Weed
Asteraceae	*Bidens pilosa**	Cobbler's Pegs
Asparagaceae	*Asparagus aethiopicus**	Asparagus Fern
Poaceae	*Briza minor**	Shivery Grass
Poaceae	*Cenchrus clandestinus**	Kikuyu, Kikuyu Grass
Commelinaceae	*Commelina cyanea*	Scurvy Weed
Asteraceae	*Conyza bonariensis**	Flax-leaf Fleabane
Asteraceae	*Coreopsis lanceolata**	Coreopsis
Poaceae	*Paspalum dilatatum**	Paspalum
Plantaginaceae	*Plantago lanceolata**	Ribwort
Poaceae	*Cynodon dactylon*	Common Couch
Convolvulaceae	*Dichondra repens*	Kidney Weed
Poaceae	*Ehrharta erecta**	Panic Veldtgrass
Poaceae	*Entolasia stricta*	Wiry Panic
Poaceae	*Eragrostis curvula**	African Lovegrass
Poaceae	*Stenotaphrum secundatum**	Buffalo Grass
Dilleniaceae	*Hibbertia aspera*	Rough Guinea Flower
Poaceae	*Imperata cylindrica*	Blady Grass
Cyperaceae	*Lepidosperma laterale*	Variable Sword-sedge
Liliaceae	*Lilium formosanum**	Formosan Lily
Lomandraceae	*Lomandra longifolia*	Spiky-headed Mat-rush
Lomandraceae	*Lomandra multiflora subsp. multiflora*	Many-flowered Mat-rush
Loganiaceae	*Mitrasacme polymorpha*	Mitrewort
Davalliaceae	*Nephrolepis cordifolia*	Fish-bone Fern
Rubiaceae	*Pomax umbellata*	Pomax
Acanthaceae	*Pseuderanthemum variabile*	Pastel Flower
Dennstaedtiaceae	*Pteridium esculentum*	Bracken
Rubiaceae	*Richardia stellaris**	-
Uvulariaceae	*Schelhammera undulata*	Lilac Lily
Poaceae	*Themeda triandra*	Kangaroo Grass
Acanthaceae	*Thunbergia alata**	Black-eyed Susan
Fabaceae	*Trifolium repens**	White Clover
Verbenaceae	*Verbena bonariensis**	Purpletop
Xanthorrhoaceae	*Xanthorrhoea arborea*	Broad-leaf Grass Tree

Family	Scientific name	Common name
VINES		
Asclepiadaceae	*Araujia sericifera**	Mothvine
Asparagaceae	*Asparagus asparagoides**	Bridal Creeper
Luzuriagaceae	*Eustrephus latifolius*	Wombat Berry
Luzuriagaceae	*Geitonoplesium cymosum*	Scrambling Lily
Fabaceae	*Glycine clandestina*	Twining Glycine
Araliaceae	*Hedera helix**	English Ivy
Dilleniaceae	*Hibbertia scandens*	Climbing Guinea Flower
Bignoniaceae	*Pandorea pandorana*	Wonga Vine
Apocynaceae	*Parsonsia straminea*	Common Silkpod
Passifloraceae	*Passiflora suberosa**	Cork Passionflower
Basellaceae	*Anredera cordifolia**	Madeira Vine
**** denotes exotic species*** ***TS denotes threatened species***		

Appendix 9. BAM-C outputs

BAM Vegetation Zones Report

Proposal Details

Assessment Id
00054429/BAAS17032/25/00054430

Assessment name
sBDAR 4 Forest Road Warriewood

BAM data last updated *
28/10/2024

Assessor Name
Lindsay Holmes

Report Created
28/01/2025

BAM Data version *
Current classification (live - default) (80)

Assessor Number
BAAS17032

Assessment Type
Part 4 Developments (Small Area)

BAM Case Status
Open

Assessment Revision
0

BOS entry trigger
BOS Threshold: Biodiversity Values Map and area clearing threshold

Date Finalised
To be finalised

* 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.

Vegetation Zones

#	Name	PCT	Condition	Area	Minimum number of plots	Management zones
1	3595_moderate-good	3595-Sydney Coastal Sandstone Gully Forest	moderate-good	0.22	1	

2	3595_DNG	3595-Sydney Coastal Sandstone Gully Forest	DNG	0.21	1	

BAM Predicted Species Report

Proposal Details

Assessment Id	Proposal Name	BAM data last updated *
00054429/BAAS17032/25/00054430	sBDAR 4 Forest Road Warriewood	28/10/2024
Assessor Name	**Report Created**	**BAM Data version ***
Lindsay Holmes	28/01/2025	Current classification (live - default) (80)
Assessor Number	**Assessment Type**	**BAM Case Status**
BAAS17032	Part 4 Developments (Small Area)	Open
Assessment Revision	**BOS entry trigger**	**Date Finalised**
0	BOS Threshold: Biodiversity Values Map and area clearing threshold	To be finalised

* 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.

Threatened species reliably predicted to utilise the site. No surveys are required for these species. Ecosystem credits apply to these species.

Common Name	Scientific Name	Vegetation Types(s)
Black-chinned Honeyeater (eastern subspecies)	Melithreptus gularis gularis	3595-Sydney Coastal Sandstone Gully Forest
Brown Treecreeper (eastern subspecies)	Climacteris picumnus victoriae	3595-Sydney Coastal Sandstone Gully Forest
Dusky Woodswallow	Artamus cyanopterus cyanopterus	3595-Sydney Coastal Sandstone Gully Forest
Eastern Coastal Free-tailed Bat	Micronomus norfolkensis	3595-Sydney Coastal Sandstone Gully Forest
Eastern False Pipistrelle	Falsistrellus tasmaniensis	3595-Sydney Coastal Sandstone Gully Forest
Eastern Osprey	Pandion cristatus	3595-Sydney Coastal Sandstone Gully Forest
Flame Robin	Petroica phoenicea	3595-Sydney Coastal Sandstone Gully Forest
Gang-gang Cockatoo	Callocephalon fimbriatum	3595-Sydney Coastal Sandstone Gully Forest
Golden-tipped Bat	Phoniscus papuensis	3595-Sydney Coastal Sandstone Gully Forest

Greater Broad-nosed Bat	Scoteanax rueppellii	3595-Sydney Coastal Sandstone Gully Forest
Grey-headed Flying-fox	Pteropus poliocephalus	3595-Sydney Coastal Sandstone Gully Forest
Large Bent-winged Bat	Miniopterus orianae oceanensis	3595-Sydney Coastal Sandstone Gully Forest
Little Bent-winged Bat	Miniopterus australis	3595-Sydney Coastal Sandstone Gully Forest
Little Eagle	Hieraaetus morphnoides	3595-Sydney Coastal Sandstone Gully Forest
Little Lorikeet	Glossopsitta pusilla	3595-Sydney Coastal Sandstone Gully Forest
New Holland Mouse	Pseudomys novaehollandiae	3595-Sydney Coastal Sandstone Gully Forest
Rosenberg's Goanna	Varanus rosenbergi	3595-Sydney Coastal Sandstone Gully Forest
Scarlet Robin	Petroica boodang	3595-Sydney Coastal Sandstone Gully Forest
South-eastern Glossy Black-Cockatoo	Calyptorhynchus lathami lathami	3595-Sydney Coastal Sandstone Gully Forest
Spotted-tailed Quoll	Dasyurus maculatus	3595-Sydney Coastal Sandstone Gully Forest
Square-tailed Kite	Lophoictinia isura	3595-Sydney Coastal Sandstone Gully Forest
Swift Parrot	Lathamus discolor	3595-Sydney Coastal Sandstone Gully Forest
Turquoise Parrot	Neophema pulchella	3595-Sydney Coastal Sandstone Gully Forest
Varied Sittella	Daphoenositta chrysoptera	3595-Sydney Coastal Sandstone Gully Forest
White-bellied Sea-Eagle	Haliaeetus leucogaster	3595-Sydney Coastal Sandstone Gully Forest
White-throated Needletail	Hirundapus caudacutus	3595-Sydney Coastal Sandstone Gully Forest
Yellow-bellied Sheathtail-bat	Saccolaimus flaviventris	3595-Sydney Coastal Sandstone Gully Forest

Threatened species Manually Added

None added

Threatened species assessed as not within the vegetation zone(s) for the PCT(s)

Common Name	Scientific Name	Plant Community Type(s)
Black Bittern	Ixobrychus flavicollis	3595-Sydney Coastal Sandstone Gully Forest

BAM Predicted Species Report

Threatened species assessed as not within the vegetation zone(s) for the PCT(s)

Refer to BAR for detailed justification

Common Name	Scientific Name	Justification in the BAM-C
Black Bittern	Ixobrychus flavicollis	Habitat constraints

BAM Candidate Species Report

Proposal Details

Assessment Id 00054429/BAAS17032/25/00054430	Proposal Name sBDAR 4 Forest Road Warriewood	BAM data last updated * 28/10/2024
Assessor Name Lindsay Holmes	Report Created 28/01/2025	BAM Data version * Current classification (live - default) (80)
Assessor Number BAAS17032	Assessment Type Part 4 Developments (Small Area)	BAM Case Status Open
Assessment Revision 0	BOS entry trigger BOS Threshold: Biodiversity Values Map and area clearing threshold	Date Finalised To be finalised

* 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.

List of Species Requiring Survey

Name	Presence	Survey Months
Asterolasia elegans Asterolasia elegans	No (surveyed) *Survey months are outside of the months specified in Bionet.	☑ Jan ☐ Feb ☐ Mar ☐ Apr ☐ May ☐ Jun ☐ Jul ☐ Aug ☐ Sep ☐ Oct ☐ Nov ☐ Dec ☑ Survey month outside the specified months?
Astrotricha crassifolia Thick-leaf Star-hair	No (surveyed) *Survey months are outside of the months specified in Bionet.	☑ Jan ☐ Feb ☐ Mar ☐ Apr ☐ May ☐ Jun ☐ Jul ☐ Aug ☐ Sep ☐ Oct ☐ Nov ☐ Dec ☑ Survey month outside the specified months?

Chalinolobus dwyeri Large-eared Pied Bat	No (surveyed)	☑ Jan ☐ Feb ☐ Mar ☐ Apr ☐ May ☐ Jun ☐ Jul ☐ Aug ☐ Sep ☐ Oct ☐ Nov ☐ Dec ☐ Survey month outside the specified months?
Genoplesium baueri Bauer's Midge Orchid	No (surveyed) *Survey months are outside of the months specified in Bionet.	☑ Jan ☐ Feb ☐ Mar ☐ Apr ☐ May ☐ Jun ☐ Jul ☐ Aug ☐ Sep ☐ Oct ☐ Nov ☐ Dec ☑ Survey month outside the specified months?
Hibbertia spanantha Julian's Hibbertia	No (surveyed)	☐ Jan ☐ Feb ☐ Mar ☐ Apr ☐ May ☐ Jun ☐ Jul ☐ Aug ☐ Sep ☑ Oct ☐ Nov ☐ Dec ☐ Survey month outside the specified months?
Lathamus discolor Swift Parrot	Yes (assumed present)	☐ Jan ☐ Feb ☐ Mar ☐ Apr ☐ May ☐ Jun ☐ Jul ☐ Aug ☐ Sep ☐ Oct ☐ Nov ☐ Dec ☐ Survey month outside the specified months?
Melaleuca deanei Deane's Paperbark	No (surveyed)	☑ Jan ☐ Feb ☐ Mar ☐ Apr ☐ May ☐ Jun ☐ Jul ☐ Aug ☐ Sep ☐ Oct ☐ Nov ☐ Dec ☐ Survey month outside the specified months?
Microtis angusii Angus's Onion Orchid	No (surveyed)	☐ Jan ☐ Feb ☐ Mar ☐ Apr ☐ May ☐ Jun ☐ Jul ☐ Aug ☐ Sep ☑ Oct ☐ Nov ☐ Dec ☐ Survey month outside the specified months?

Prostanthera marifolia Seaforth Mintbush	No (surveyed)	☑ Jan ☐ Feb ☐ Mar ☐ Apr ☐ May ☐ Jun ☐ Jul ☐ Aug ☐ Sep ☐ Oct ☐ Nov ☐ Dec ☐ Survey month outside the specified months?
Rhizanthella slateri Eastern Australian Underground Orchid	No (surveyed)	☐ Jan ☐ Feb ☐ Mar ☐ Apr ☐ May ☐ Jun ☐ Jul ☐ Aug ☐ Sep ☑ Oct ☐ Nov ☐ Dec ☐ Survey month outside the specified months?
Rhodamnia rubescens Scrub Turpentine	No (surveyed)	☑ Jan ☐ Feb ☐ Mar ☐ Apr ☐ May ☐ Jun ☐ Jul ☐ Aug ☐ Sep ☐ Oct ☐ Nov ☐ Dec ☐ Survey month outside the specified months?
Vespadelus troughtoni Eastern Cave Bat	Yes (surveyed)	☑ Jan ☐ Feb ☐ Mar ☐ Apr ☐ May ☐ Jun ☐ Jul ☐ Aug ☐ Sep ☐ Oct ☐ Nov ☐ Dec ☐ Survey month outside the specified months?

Threatened species Manually Added

Common Name	Scientific Name
Eastern Cave Bat	Vespadelus troughtoni

Threatened species assessed as not on site

Refer to BAR for detailed justification

Common name	Scientific name	Justification in the BAM-C
Caley's Grevillea	Grevillea caleyi	Habitat constraints Geographic limitations
Deyeuxia appressa	Deyeuxia appressa	Habitat degraded
Grevillea shiressii	Grevillea shiressii	Refer to BAR

Haloragodendron lucasii	Haloragodendron lucasii	Habitat constraints Geographic limitations
Large Bent-winged Bat	Miniopterus orianae oceanensis	Habitat constraints
Little Bent-winged Bat	Miniopterus australis	Habitat constraints

BAM Biodiversity Credit Report (Variations)

Proposal Details

Assessment Id

00054429/BAAS17032/25/00054430

Proposal Name

sBDAR 4 Forest Road Warriewood

BAM data last updated *

28/10/2024

Assessor Name

Lindsay Holmes

Assessor Number

BAAS17032

BAM Data version *

Current classification (live - default) (80)

Proponent Name(s)

Report Created

28/01/2025

BAM Case Status

Open

Assessment Revision

0

BOS entry trigger

BOS Threshold: Biodiversity Values Map and area clearing threshold

Assessment Type

Part 4 Developments (Small Area)

Date Finalised

To be finalised

* 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
Nil		
Species		
Lathamus discolor / Swift Parrot		
Vespadelus troughtoni / Eastern Cave Bat		

Additional Information for Approval

PCT Outside Ibra Added

None added

BAM Biodiversity Credit Report (Variations)

PCTs With Customized Benchmarks

PCT
No Changes

Predicted Threatened Species Not On Site

Name
Ixobrychus flavicollis / Black Bittern

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

Name of Plant Community Type/ID	Name of threatened ecological community	Area of impact	HBT Cr	No HBT Cr	Total credits to be retired
3595-Sydney Coastal Sandstone Gully Forest	Not a TEC	0.4	0	7	7.00

3595-Sydney Coastal Sandstone Gully Forest

Like-for-like credit retirement options

Class	Trading group	Zone	HBT	Credits	IBRA region
Sydney Coastal Dry Sclerophyll Forests This includes PCT's: 1681, 3578, 3579, 3580, 3581, 3582, 3583, 3584, 3585, 3586, 3587, 3588, 3589, 3590, 3591, 3592, 3593, 3594, 3595, 3596, 3597, 3598	Sydney Coastal Dry Sclerophyll Forests <50%	3595_moderate-good	No	5	Pittwater,Cumberland, Sydney Cataract, Wyong and Yengo. or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.

Sydney Coastal Dry Sclerophyll Forests This includes PCT's: 1681, 3578, 3579, 3580, 3581, 3582, 3583, 3584, 3585, 3586, 3587, 3588, 3589, 3590, 3591, 3592, 3593, 3594, 3595, 3596, 3597, 3598	Sydney Coastal Dry Sclerophyll Forests <50%	3595_DNG	No	2	Pittwater,Cumberland, Sydney Cataract, Wyong and Yengo. or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.

Variation options

Formation	Trading group	Zone	HBT	Credits	IBRA region
Dry Sclerophyll Forests (Shrubby sub-formation)	Tier 4 or higher threat status	3595_moderate-good	No	5	IBRA Region: Sydney Basin, or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.
Dry Sclerophyll Forests (Shrubby sub-formation)	Tier 4 or higher threat status	3595_DNG	No	2	IBRA Region: Sydney Basin, or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.

Species Credit Summary

Species	Vegetation Zone/s	Area / Count	Credits
Lathamus discolor / Swift Parrot	**3595_moderate-good, 3595_DNG**	0.1	2.00
Vespadelus troughtoni / Eastern Cave Bat	**3595_moderate-good, 3595_DNG**	0.4	13.00

Credit Retirement Options

Like-for-like options

Lathamus discolor/ Swift Parrot	Spp		IBRA region
	Lathamus discolor/Swift Parrot		Any in NSW
	Variation options		
	Kingdom	Any species with same or higher category of listing under Part 4 of the BC Act shown below	IBRA region
	Fauna	Endangered	Pittwater, Cumberland, Sydney Cataract, Wyong and Yengo. or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.
Vespadelus troughtoni/ Eastern Cave Bat	Spp		IBRA region
	Vespadelus troughtoni/Eastern Cave Bat		Any in NSW
	Variation options		
	Kingdom	Any species with same or higher category of listing under Part 4 of the BC Act shown below	IBRA region

	Fauna	Vulnerable	Pittwater, Cumberland, Sydney Cataract, Wyong and Yengo. or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.

BAM Credit Summary Report

Proposal Details

Assessment Id 00054429/BAAS17032/25/00054430	Proposal Name sBDAR 4 Forest Road Warriewood	BAM data last updated * 28/10/2024
Assessor Name Lindsay Holmes	Report Created 28/01/2025	BAM Data version * Current classification (live - default) (80)
Assessor Number BAAS17032	BAM Case Status Open	Date Finalised To be finalised
Assessment Revision 0	BOS entry trigger BOS Threshold: Biodiversity Values Map and area clearing threshold	Assessment Type Part 4 Developments (Small Area)

* 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

Sydney Coastal Sandstone Gully Forest											
1	3595_moderate-good	Not a TEC	57.3	57.3	0.22	PCT Cleared - 15%	High Sensitivity to Gain			1.50	5
2	3595_DNG	Not a TEC	26.4	26.4	0.21	PCT Cleared - 15%	High Sensitivity to Gain			1.50	2
										Subtotal	**7**
										Total	**7**

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
Lathamus discolor / Swift Parrot (Fauna)									
3595_moderate-good	57.3	57.3	0.01	Environment Protection and Conservation Act listing status	Effectiveness of management in controlling threats	Endangered	Critically Endangered	True	1

3595_DNG	26.4	26.4	0.06	Environment Protection and Conservation Act listing status	Effectiveness of management in controlling threats	Endangered	Critically Endangered	True	1
								Subtotal	**2**
Vespadelus troughtoni / Eastern Cave Bat (Fauna)									
3595_moderate-good	57.3	57.3	0.22	Biodiversity Conservation Act listing status	Species dependent on habitat attributes	Vulnerable	Not Listed	True	9
3595_DNG	26.4	26.4	0.21	Biodiversity Conservation Act listing status	Species dependent on habitat attributes	Vulnerable	Not Listed	True	4
								Subtotal	**13**

BAM Biodiversity Credit Report (Like for like)

Proposal Details

Assessment Id
00054429/BAAS17032/25/00054430

Proposal Name
sBDAR 4 Forest Road Warriewood

BAM data last updated *
28/10/2024

Assessor Name
Lindsay Holmes

Assessor Number
BAAS17032

BAM Data version *
Current classification (live - default) (80)

Proponent Names

Report Created
28/01/2025

BAM Case Status
Open

Assessment Revision
0

BOS entry trigger
BOS Threshold: Biodiversity Values Map and area clearing threshold

Assessment Type
Part 4 Developments (Small Area)

Date Finalised
To be finalised

* 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
Nil		

Species
Lathamus discolor / Swift Parrot

Vespadelus troughtoni / Eastern Cave Bat

Additional Information for Approval

PCT Outside Ibra Added

None added

PCTs With Customized Benchmarks

PCT
No Changes

Predicted Threatened Species Not On Site

Name
Ixobrychus flavicollis / Black Bittern

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

Name of Plant Community Type/ID	Name of threatened ecological community	Area of impact	HBT Cr	No HBT Cr	Total credits to be retired
3595-Sydney Coastal Sandstone Gully Forest	Not a TEC	0.4	0	7	7

BAM Biodiversity Credit Report (Like for like)

3595-Sydney Coastal Sandstone Gully Forest

Like-for-like credit retirement options

Class	Trading group	Zone	HBT	Credits	IBRA region
Sydney Coastal Dry Sclerophyll Forests This includes PCT's: 1681, 3578, 3579, 3580, 3581, 3582, 3583, 3584, 3585, 3586, 3587, 3588, 3589, 3590, 3591, 3592, 3593, 3594, 3595, 3596, 3597, 3598	Sydney Coastal Dry Sclerophyll Forests <50%	3595_moderate-good	No	5	Pittwater, Cumberland, Sydney Cataract, Wyong and Yengo. or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.
Sydney Coastal Dry Sclerophyll Forests This includes PCT's: 1681, 3578, 3579, 3580, 3581, 3582, 3583, 3584, 3585, 3586, 3587, 3588, 3589, 3590, 3591, 3592, 3593, 3594, 3595, 3596, 3597, 3598	Sydney Coastal Dry Sclerophyll Forests <50%	3595_DNG	No	2	Pittwater, Cumberland, Sydney Cataract, Wyong and Yengo. or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.

Species Credit Summary

BAM Biodiversity Credit Report (Like for like)

Species	Vegetation Zone/s	Area / Count	Credits
Lathamus discolor / Swift Parrot	**3595_moderate-good, 3595_DNG**	0.1	2.00
Vespadelus troughtoni / Eastern Cave Bat	**3595_moderate-good, 3595_DNG**	0.4	13.00

Credit Retirement Options

Like-for-like credit retirement options

Lathamus discolor / Swift Parrot	Spp	IBRA subregion
	Lathamus discolor / Swift Parrot	Any in NSW
Vespadelus troughtoni / Eastern Cave Bat	Spp	IBRA subregion
	Vespadelus troughtoni / Eastern Cave Bat	Any in NSW