11 Spencer Street Moruya

Biodiversity Development Assessment Report

Final Report

Prepared for Illawarra Retirement Trust

20 March 2026

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Biosis acknowledges the Aboriginal and Torres Strait Islander peoples as Traditional Custodians of the land on which we live and work.

We pay our respects to the Traditional Custodians and Elders past and present and honour their connection to Country and ongoing contribution to society.

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Definitions

Assessment Area	All land within 1500 m of a site based development
BAM	NSW Biodiversity Assessment Method 2020
BAM-C	BAM Calculator
BC Act	*Biodiversity Conservation Act 2016*
BDAR	Biodiversity Development Assessment Report
Biosecurity Act	*Biosecurity Act 2015*
BOS	Biodiversity Offsets Scheme
BV Map	NSW Biodiversity Values Map and Threshold Tool (NSW DCCEEW 2025a)
CEEC	Critically Endangered Ecological Community
CEMP	Construction Environmental Management Plan
CM Act	*Coastal Management Act 2016*
CoC	Conditions of Consent
Cth DCCEEW	Australian Commonwealth Department of Climate Change, Energy, the Environment and Water
DBH	Diameter at Breast Height
DCDB	Digital cadastral database
Development footprint	The area of land that is directly impacted by the proposal
Development site	The broader area in which the subject land is located
DoIW	Directory of Important Wetlands
DP	Deposited Plan
DPI	NSW Department of Primary Industries
DTDB	Digital topographic databases
Ecosystem credits	A measurement of the value of EECs, CEECs and threatened species habitat for species that can be reliably predicted to occur with a PCT. Ecosystem credits measure the loss in biodiversity values at a development
Ecosystem credit species	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.
EEC	Endangered Ecological Community
EP&A Act	*Environmental Planning and Assessment Act 1979*
EPBC Act	Commonwealth *Environment Protection and Biodiversity Conservation Act 1999*
GDE	Groundwater Dependent Ecosystem
GIS	Geographic Information System
IBRA	Interim Biogeographic Regionalisation of Australia
LEP	Local Environmental Plan

LGA	Local Government Area
Locality	Area located within 10 km radius from the subject land
LPI	NSW Land and Property Information
MNES	Matters of National Environmental Significance protected by a provision of Part 3 of the *EPBC Act*
NSW DCCEEW	NSW Department of Climate Change, Energy, the Environment and Water
PCT	Plant Community Type
SAII	Serious and Irreversible Impact
SALIS	NSW Soil and Land Information System
SEARs	Secretary's Environmental Assessment Requirements
SEPP	NSW State Environmental Planning Policy
SIS	Species Impact Statement
Species credits	A class of biodiversity credits required for the impact on threatened species that cannot be reliably predicted to use an area of land based on habitat surrogates
Species credit species	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. Alternatively, the proponent may elect to assume the species is present for development/clearing projects only.
SSD	State Significant Development
SSDA	State Significant Development Application
Subject land	The areas within or the combined areas of the development site, and any indirect and prescribed impacts.
TEC	Threatened Ecological Community
TBDC	Threatened Biodiversity Data Collection
TPZ	Tree Protection Zone
WM Act	*Water Management Act 2000*
WHS	Work Health and Safety

Summary

Biosis was commissioned by Illawarra Retirement Trust (IRT) to undertake a biodiversity assessment for a proposed seniors housing development at 11 Spencer Street Moruya (Lot 11 DP1008755) in New South Wales (NSW) (Figure 1). The development will involve the construction of a seniors housing development along with associated infrastructure such as roads, parking lots, Asset Protection Zones (APZs), landscaping and stormwater structures within the subject land.

The proposed development satisfies the definition of State Significant Development (SSD) pursuant to Part 2.2 (State significant development) and Schedule 1 Clause 28 (Seniors housing) of State Environmental Planning Policy (Planning Systems) 2021 (Planning Systems SEPP), as the development has an estimated value of more than $20,000,000 and has a residential care facility component. As such a State Significant Development Application (SSDA) will be lodged to the NSW Department of Planning, Housing and Infrastructure (DPHI), which requires the support of an Environmental Impact Statement (EIS) in accordance with Section 4.12(8) of the NSW *Environmental Planning and Assessment Act 1979* (EP&A Act).

As entrance to the Biodiversity Offset Scheme (BOS) is mandatory for SSDAs, a Biodiversity Development Assessment Report (BDAR) is required to be prepared for the project by an Accredited Assessor in accordance with the NSW Biodiversity Assessment Method (BAM) (DPIE 2020a) and the NSW *Biodiversity Conservation Act 2016* (BC Act). This BDAR has been overseen by Accredited Assessors Jake Schwebel (BAAS25013) and Rebecca Goodwin (BAAS17067), to accompany the SSDA, and describes the outcome of the development assessment case (00055723) conducted consistent with the BAM.

Field investigation undertaken in accordance with the BAM recorded 19.91 hectares of native vegetation within the subject land, representing three threatened ecological communities (TECs) listed under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) and/or the NSW BC Act. TECs recorded included:

- *Illawarra and south coast lowland forest and woodland ecological community* (Critically Endangered Ecological Community [CEEC], EPBC Act).
- *Lowland Grassy Woodland in the South East Corner Bioregion* (Endangered Ecological Community [EEC], BC Act).
- *Swamp Sclerophyll Forest on Coastal Floodplains of the New South Wales North Coast, Sydney Basin and South East Corner bioregions* (EEC, BC Act).

Avoidance of native vegetation, TECs and waterways have been undertaken to restrict direct impacts to a total of 13.64 hectares of native vegetation within the development footprint comprised of the following:

- 0.28 ha of moderate condition Plant Community Type (PCT) 4052, including 0.24 ha assessed as total loss and 0.04 ha assessed as partial loss.
- 0.93 ha of low condition PCT 4052.
- 3.59 ha of Derived Native Grassland (DNG) condition PCT 4052.
- 8.75 ha of Non-offsetable Grassland (NOG) condition PCT 4052.
- 0.10 ha of low condition PCT 4009.

Several significant habitat trees will also be avoided and retained within the proposed development design, restricting impacts to 8 hollow bearing trees, 1 tree with a stick nest and 2 stag trees.

Consideration has been given to avoiding and minimising impacts to biodiversity where possible during the assessment and preliminary design, while still facilitating the development of the seniors housing development. Mitigation and management measures will be put in place to adequately address impacts associated with the proposal, including direct, indirect and prescribed impacts.

Native vegetation consisting of three TECs and threatened species habitat (species assumed present until targeted surveys are undertaken) were recorded within the subject land, and the vegetation integrity (VI) score of the vegetation to be impacted was calculated as between 7.0 to 78.5. As such, in accordance with Section 10 of the BAM, the following offsets are required to be secured for the proposed development:

- 40 credits for direct impacts to 1.21 ha of PCT 4052 *South Coast Low Hills Red Gum Grassy Forest* in low and moderate conditions.

One threatened species listed as a species credit species was assumed present within the subject land: Southern Myotis *Myotis macropus* (Vulnerable, BC Act). Four additional threatened microbat species were detected incidentally during targeted surveys, Large (Eastern) Bent-winged Bat *Miniopterus orianae oceanensis* – foraging habitat (Vulnerable, BC Act), Greater Broad-nosed Bat *Scoteanax rueppellii* (Vulnerable, BC Act), Eastern Coastal Free-tailed Bat *Micronomus norfolkensis* (Vulnerable, BC Act) and Eastern False Pipistrelle *Falsistrellus tasmaniensis* (Vulnerable, BC Act). The additional four microbats incidentally detected do not have breeding habitat on site, and as the proposed impacts will be restricted to foraging resources, no offsets are required.

Credits for the following species that were assumed present within the subject land are required and include:

- 32 credits for impacts to 1.31 ha of potential habitat for Southern Myotis.

Offsets are not required for impacts to the following vegetation zones due to a low VI score which was below the threshold required for offsetting:

- DNG PCT 4052.
- NOG PCT 4052.
- Low condition PCT 4009.

There are two creeks within the subject land: a 3rd order creek mapped as Key Fish Habitat under the *Fisheries Management Act 1994* (FM Act) and a 1st order creek. There are two waterway crossings proposed within the 3rd order creek: a culvert and footbridge, and footpaths proposed within the riparian corridor of this creek. Riparian corridor buffers of 5 metres for the 1st order creek and 15 metres for the 3rd order creek (measured on both sides of the creeks from the mapped top of banks) have been applied, with the exception of the above-described structures, and will be managed and rehabilitated under a proposed VMP. The potential impacts of the footbridge, culvert and paths cannot be assessed at this stage as no detailed designs have been prepared for the project. The designs of these structures will be prepared during the detailed design phase of the SSD, and the BDAR will be updated with the potential impacts of these structures.

The project is not considered likely to result in a significant impact to species or communities listed under the EPBC Act, and as such a referral to the Minister of the Environment and Water is not required.

Certification and declarations

I certify that this report has been prepared based on the requirements of, and information provided under the Biodiversity Assessment Method (DPIE 2020a) and s6.15 of the *Biodiversity Conservation Act 2016*.

In preparing this assessment I have acted in accordance with the Accredited BAM Assessor Code of Conduct.

I declare that I have considered the circumstances and there is no actual, perceived or potential conflict of interest

Signature:	
Date:	20/03/2026
BAM Assessor Accreditation Number:	BAAS25013

Stage 1 – Biodiversity assessment

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1 Introduction

Biosis Pty Ltd was commissioned by IRT to undertake a biodiversity assessment to accompany a SSDA (SSD-81932463) for a proposed seniors housing development located at 11 Spencer Street Moruya (Lot 11 DP1008755) in New South (Figure 1).

The proposed development satisfies the definition of SSD pursuant to Part 2.2 (State significant development) and Schedule 1 Clause 28 (Seniors housing) of the Planning SEPP, as the seniors housing development has an estimate cost of more than $20,000,000 and the seniors housing component includes a residential care facility. As such a SSDA will be lodged to the DPHI, which requires the support of an EIS in accordance with Section 4.12(8) of the EP&A Act.

As entrance to the BOS is mandatory for SSD applications, a BDAR is required to be prepared for the project by an Accredited Assessor in accordance with the BAM (DPIE 2020a) and the BC Act. This BDAR has been prepared by Accredited Assessors, Jake Schwebel (BAAS25013) and Rebecca Goodwin (BAAS17067) to accompany the SSDA. This BDAR describes the outcome of the development assessment case (00055723) conducted consistent with the BAM. The BDAR is to be submitted to the DPHI as part of a SSDA, under Part 4 of the EP&A Act, for the proposed development.

The NSW BC Act requires that the BAM (DPIE 2020a) be applied to all proposals that trigger the BOS, and that a BDAR is required to be submitted to the approval authority.

1.1 Project description

IRT proposes to develop 11 Spencer Street Moruya (Figure 1) as a seniors housing development. The development will involve the construction and development consent for the following:

- Construction of multiple dwellings including:
  - 120-bed residential aged care facility (with at-grade car parking).
  - 252 independent living units including:
    - 4 four-storey apartment buildings along Spencer Street (including basement car parking).
    - 4 three-storey apartment buildings (including under croft car parking).
    - 86 single storey villas.
    - 7 manor houses including 14 one-bedroom independent living units at ground level and 14 one-bedroom units at first floor level for essential works.
  - 36 one-bedroom cabins for essential workers.
- Construction of internal roads, car parking, landscaping and public domain works.
- Ancillary community facilities including roads, paths, culverts, footbridges and APZs.
- Demolition of existing structure and clearing of native and non-native vegetation.
- Bulk earthworks and site re-grading.
- Installation of internal drainage and services.
- Construction and management of APZs.

Biosis was previously engaged by IRT to prepare a biodiversity constraints assessment in 2023 (Biosis 2023). This report identified a number of biodiversity values within the study area, including potential habitat for

threatened flora, fauna or ecological communities (entities) listed under the EPBC Act, the BC Act, and waterways listed as Key Fish Habitat under the NSW *Fisheries Management Act 1994* (FM Act).

1.2 Purpose of this assessment

This BDAR is one of a number of technical documents that informs the project's EIS. The purpose of this report is to apply the BAM (DPIE 2020a) to the proposed development, and assess the potential impacts on biodiversity. Specifically, the BDAR will:

- Address the BAM (DPIE 2020a) and the BOS.
- Identify how the proponent has avoided and minimised impacts to biodiversity.
- Identify any potential impact that could be characterised as serious and irreversible.
- Describe the offset obligations required to compensate for any unavoidable biodiversity impacts resulting from the proposed development.
- Consider and assess the proposal in accordance with other relevant legislation such as the Commonwealth EPBC Act.

All biodiversity assessments have been undertaken in accordance with the BAM (DPIE 2020a), and this BDAR has been prepared by Rosie Gray (Senior Botanist), Joel Nicholson (Senior Zoologist – Field coordinator) and Ruby Adams (Graduate Ecologist) and overseen by Accredited Assessors Jake Schwebel (BAAS25013) and Rebecca Goodwin (BAAS17067). This BDAR describes the outcome of the development assessment case (00055723) conducted consistent with the BAM (DPIE 2020a).

1.3 The subject land, development footprint and assessment area

The terms subject land, development footprint and assessment area are used throughout this BDAR and are defined below.

- The development footprint comprises the area of direct impact associated with the proposed development. This includes all areas including proposed landscaping areas, and any areas of proposed demolition of existing buildings, construction of new buildings, APZs where direct impacts are expected, detention basins and vegetation clearance. The total area of the development footprint is 14.39 hectares.
- The development site, or otherwise known as the subject site, is located at 11 Spencer Street, Moruya within the Eurobodalla Local Government Area (LGA) and is legally described as Lot 11 DP1008766. The lot is located approximately 500 m southwest of the Princes Highway and approximately 1.5 km south of the Moruya township. The site's primary frontage is to Spencer Street along the northern boundary for approximately 635 m. A secondary frontage to Dwyer's Creek Road is located along the western boundary, for a length of approximately 180 m. A third frontage to Francis Street is located along the eastern boundary, for a length of 320 m. The southern boundary does not have road or street frontage but backs onto a road reserve. The development site is the same as the subject site described in Section 1.1, however 'development site' is the accepted terminology for use under the BAM. The total area of the development site is 18.28 ha.
- The subject land includes the entire development site and development footprint with a buffer of 20 m to account for indirect impacts of the proposed works such as fragmentation or soil erosion and provides adjacent site context. The subject land extends south into residential land encompassing predominantly planted and exotic vegetation amongst houses. The subject land also extends east, north and west into the road reserves encompassing the roads, native vegetation and the downstream section

of the 3rd order creek and downstream sections of the 1st order creek. The subject land also extends to the west into Lot 10 DP1008766 encompassing predominantly cleared grassland. The subject land is wholly within the Eurobodalla LGA and the South East Local Land Services (LLS) region. The subject land is zoned as R2 Low Density Residential in the southern half and R3 Medium Density Residential in the northern half under the *Eurobodalla Local Environmental Plan 2012* (LEP). The total area of the subject land is 23.92 ha.

- The assessment area includes the subject land and the area of land within the 1500 m buffer zone surrounding the subject land, as required for assessment under the BAM (DPIE 2020a).

1.4 Sources of information

Sources of information used in the assessment included relevant databases, spatial data, literature and previous site reports. In order to provide a context for the assessment area, records of flora and fauna from within 10 kilometres (the locality) were collated from the following databases and datasets were reviewed:

- Australian Commonwealth Department of Climate Change, Energy, the Environment and Water (Cth DCCEEW) Protected Matters Search Tool for matters protected by the EPBC Act.
- NSW BioNet - the database for the Atlas of NSW Wildlife, NSW Department of Climate Change, Energy, the Environment and Water, for species, populations and ecological communities listed under the BC Act.
- NSW BAM Calculator (BAM-C).
- Biodiversity values map (NSW DCCEEW 2026a).
- Native vegetation regulatory map (NSW DCCEEW 2026b).
- BAM Important Areas maps (NSW DCCEEW 2026c).
- PlantNET (The Royal Botanic Gardens and Domain Trust).
- BirdLife Australia, the New Atlas of Australian Birds 1998-2015.
- Fisheries NSW Spatial Data portal (DPI 2025).

Other sources of biodiversity information relevant to the assessment area were sourced from:

- The NSW PCTs, as held within the BioNet Vegetation Classification database (NSW DCCEEW 2025b).
- Relevant vegetation mapping, such as the NSW State Vegetation Type Map (SVTM C2.0M2.2) (NSW DCCEEW 2025c).

The following reports were also reviewed and relied on to provide additional information:

- *Biodiversity constraints assessment for 11 Spencer Street, Moruya* (Biosis 2023).
- *Riparian advice letter for 11 Spencer Street Moruya* (Biosis 2025).
- *Seniors Housing Development, Moruya (SSD-81932463)* (Ethos Urban 2025).
- *Bushfire Hazard Assessment (SSD081932463) Seniors Housing at 11 Spencer Street, Moruya, Prepared for IRT Group* (Black Ash Bushfire Consulting 2025).
- *Spencer Moruya. Drainage and Grading Plan* (WSP 2025).
- *Arboricultural Impact Assessment Report for the site address Lot 11 (DP 1008755) Spencer and Francis Street, Moruya, NSW* (Allied Tree Consultancy 2025).

Basemap data was obtained from NSW Land and property information (LPI) 1:25,000 digital topographic databases (DTDB), with cadastral data obtained from LPI digital cadastral database (DCDB).

The following spatial datasets were utilised during the development of this report:

- Catchment Boundaries of New South Wales dataset.
- Mitchell Landscapes Version 3.0.
- Interim Biogeographic Regionalisation of Australia (IBRA) Version 7.
- Directory of Important Wetlands (DoIW).
- NSW Soil and Land Information System (SALIS).
- Mapping has been produced using a Geographic Information System (GIS). The following maps and data have been provided:
  - Digital mapping with aerial photography showing 1:1000 or finer.
  - Site map as described in subsection 3.1.1 of the BAM (DPIE 2020a).
  - Location map as described in subsection 3.1.2 of the BAM (DPIE 2020a).
  - Landscape map with features including 1,500 metre buffer, as described in section 3.1.3 of the BAM (DPIE 2020a).

1.5 Legislative requirements

The project has been assessed against relevant biodiversity legislation and government policy, including:

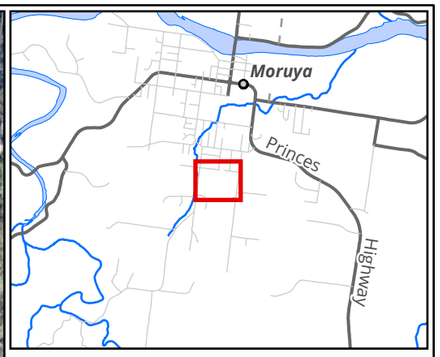
- *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act).
- *Environmental Planning and Assessment Act 1979* (EP&A Act).
- *Biodiversity Conservation Act 2016* (BC Act).
- *Water Management Act 2000* (WM Act).
- *Fisheries Management Act 1994* (FM Act).
- *Biosecurity Act 2015* (Biosecurity Act).
- State Environmental Planning Policy (Resilience and Hazards) 2021 (Resilience and Hazards SEPP).
- State Environmental Planning Policy (Biodiversity and Conservation) 2021 (Biodiversity and Conservation SEPP).
- State Environmental Planning Policy (Planning Systems) 2021 (Planning SEPP).
- *Eurobodalla Local Environmental Plan 2012* (LEP).

This report has been prepared in response to the requirements contained within the SEARs for SSD-81932463 and directly responds to the relevant SEARs outlined in Table 1 below.

Table 1 SEARs in relation to biodiversity

Reference	SEARs requirement	Report section
1	*Biodiversity: An assessment of the proposal's biodiversity impacts in accordance with the Biodiversity Conservation Act 2016, including the preparation of a BDAR where required under the Act, except where a waiver for preparation of a BDAR has been granted.*	This BDAR has been prepared, in accordance with the BAM (DPIE 2020a), with consideration to the EPBC Act and BC Act, as well as

Reference	SEARs requirement	Report section
		the legislation outlined above, to support this requirement.



Legend

- Subject land
- Development footprint
- Development site
- APZ
- Trees to be removed
- Trees to be retained
- Dam
- Riparian corridor buffers
- Top of Bank - Rygate Surveyors

Strahler stream order

- 1
- 3
- 4

Figure 1 Subject land

0 100

Metres

N

Scale: 1:2,200 @ A3

Coordinate System: GDA2020 MGA Zone 56

biosis

APEM Group

Matter: 42335, Date: 17 March 2026
Prepared for: RG, Prepared by JB, Last edited by: jbeckius
Location: P:\42300s\42335\Mapping\42335_SpencerStMoruya_BDAR.aprx
Layout: 42335_F1_SubjectLand

2 Landscape context

This chapter describes the landscape and site context of the subject land, describing the landscape features present within the subject land and within the 1500 metre buffer assessment area, as required by the BAM (DPIE 2020a). Figure 2 and Figure 3 show the location of the subject land and landscape features within the assessment area.

2.1 Subject land description

The subject land is located approximately 500 metres southwest of the Princes Highway, south of the Moruya township within the Eurobodalla LGA. The subject land was previously used as rural grazing land, has been subjected to extensive clearing and consists of predominantly cleared grassy vegetation with small patches of remnant native vegetation. Scattered patches of regenerating native canopy species occur within the cleared grassland, some of which has been planted and some is naturally regenerating, typically adjacent to the remnant patches of vegetation. The main patches of vegetation occur in the northeastern corner of the subject land, along a first order creek, and extend along the northern and eastern boundaries of the lot. The remainder of the remnant vegetation includes scattered mature native paddock trees throughout the cleared grassland. The remnant patches of vegetation likely provide low quality refuge and dispersal corridors for mobile fauna species. There is one house located within the subject land and one dirt road leading from Frances Street to the dwelling. There are two unnamed creeks that intersect the subject land and one farm dam.

The subject land is located within an area that has been subjected to extensive clearing for agriculture and residential areas. The landscape consists of large swathes of cleared pasture grassland and a mosaic of small, isolated patches of remnant vegetation. The closest high quality dense vegetation is located approximately 1 kilometre to the west of the subject land that connects to vegetation further west within the Deua National Park.

2.1.1 Native vegetation cover

Vegetation within the assessment area was assessed using aerial photographic interpretation, field survey results and existing vegetation mapping.

The total area of the 1500 metre buffer around the subject land is 1040.05 hectares, with the area of native vegetation mapped within the buffer being 371.16 hectares. This is a native vegetation cover of 35.69% (30–70% class as defined in Section 3.2.3 of the BAM (DPIE 2020a)) and this value was entered into the BAM-C.

Cleared areas within the assessment area includes 668.90 hectares.

2.1.2 IBRA Bioregions and subregions

The assessment area occurs within the South East Corner Interim Biogeographic Regionalisation for Australia (IBRA) bioregion and the Bateman IBRA subregion. The South East Corner bioregion covers the south east coast of NSW and encompasses an area of approximately 2,532,053 hectares, 1,206,479 hectares of which occurs within NSW. The remainder occurs within Victoria. It occupies about 1.63% of NSW and within NSW it extends from Batemans Bay in the North to Eden near the Victorian border in the south. The bioregion is bordered by the Sydney Basin bioregion in the north and the South East Highlands in the west. This bioregion

supports a diverse range of flora and fauna species and is characterised by coastal heathlands and dunes in the east and grassy woodlands, temperate rainforests, wet and dry sclerophyll forests and rare acacia dry scrub communities within the Snowy River Valley further inland (New South Wales National Parks and Wildlife Service 2003).

The Bateman subregion occurs along the coast of NSW stretching from inland of Ulladulla in the north to Wallaga Lake in the south within the South East Corner bioregion (DCCEEW 2023). This subregion is characterised by steep hills below the escarpment and lines of hills becoming increasingly lower in altitude towards the coast. Vegetation is dominated by Red Bloodwood *Corymbia gummifera* and Spotted Gum *Corymbia maculata* forests near the coast, then Yellow Stringybark *Eucalyptus muelleriana*, Grey Ironbark *Eucalyptus paniculata* and Woollybutt *Eucalyptus longifolia* up to 550 metres in altitude and Brown Barrel *Eucalyptus fastigata*, Sydney Peppermint *Eucalyptus piperita*, Large-fruited Mahogany *Eucalyptus pellita*, Sydney Blue Gum *Eucalyptus saligna* and Monkey Gum *Eucalyptus cypellocarpa* up to 900 metres in altitude.

2.1.3 Rivers and streams

The development site is located within the South East Local Land Services Region and the Moruya catchment. The closest major waterbody is Moruya River, a 7th order perennial river that supports estuarine ecological communities and is mapped as Key Fish Habitat (DPI 2013). This watercourse is located approximately 1.8 kilometres north of the subject land. The closest river-mouth is the Moruya River located approximately 6.7 kilometres northeast of the subject land.

There are two unnamed creeks and one dam located within the development site (Figure 1). One 3rd order non-perennial tributary of Racecourse Creek flows northwest from the southern boundary to the western boundary through the development site. Key Fish Habitat is mapped along this 3rd order creek within the development site (DPI 2013). The confluence between Racecourse Creek and this unnamed creek is located just outside the development site. A 1st order non-perennial tributary of Racecourse Creek is also located within the northeastern corner of the development site, flowing from the eastern boundary to the northern boundary.

Both creeks have fringing native riparian vegetation and planted native vegetation, however the riparian vegetation along the 3rd order creek is highly degraded and disturbed due to historical clearing and agricultural grazing. The aquatic vegetation within the 3rd order creek was in good condition with a variety of native macrophyte species recorded. The riparian vegetation adjacent to the 1st order creek is of higher quality, although still displaying signs of disturbance such as weeds and past clearing.

The artificial dam is small in size and is located along the eastern boundary of the development site, has minimal native vegetation within it, and is not influenced by any natural watercourses.

2.1.4 Wetlands

No areas of the subject land, or the development footprint, are mapped as a Wetland in the Directory of International Wetlands (DoIW) of Australia (Cth DCCEEW 2019).

The two watercourses within the development site flow downstream into Racecourse Creek which then flows into the Moruya River. The Moruya River is mapped as an estuarine wetland under NSW Wetlands (OEH 2010) and Racecourse Creek is mapped as the Moruya River Estuary Saltmarshes under the DoIW (Cth DCCEEW 2019). The subject land is located approximately 3.7 kilometres upstream of the important wetland Moruya River Estuary Saltmarshes and the Moruya River estuarine wetland.

2.1.5 Connectivity

Overall, the habitat connectivity between the development site and surrounding landscape is poor due to the broadscale historical clearing for agriculture and residential land uses within the area. There is limited direct connectivity to terrestrial natural habitats. The most significant faunal connectivity associated with the subject land relates to highly mobile bird species. Vegetation within the subject land is limited and consists mainly of scattered mature paddock trees and planted native vegetation with limited connectivity for non-mobile species. Higher-quality remnant vegetation is concentrated along the northern and eastern boundaries, where it provides a potential refuge for mobile fauna species. These movement corridors are sparsely linked to scattered vegetation in adjacent lots which has also undergone historical clearing and consists of isolated scattered patches of remnant native vegetation.

The vegetation along the northern boundary provides sparse and semi-connected habitat corridors to the west towards Racecourse Creek and to the east towards other patches of scattered remnant paddock vegetation. The vegetation along the eastern boundary also provides sparse connectivity to scattered vegetation to the south. These habitat corridors are bounded by cleared grazing land and roads which impede upon the quality of the connectivity to adjacent vegetation and exist as barriers for many ground dwelling fauna species that are dependent on continuous cover. These scattered patches of vegetation provide poor but important connectivity for highly mobile species that move between large patches of vegetation, including between high quality habitat within Deua National Park to the west and Eurobodalla National Park to the east.

The waterways within the subject land provide limited connectivity for aquatic species. The 3rd order creek had a riparian corridor consisting of juvenile planted native vegetation and significant weed coverage (particularly Blackberry *Rubus fruiticosus* sp. aggregate) and consisted of both shallow and deep pools that were generally disconnected by areas with no standing water. Similarly, the 1st order creek also consisted of disconnected pools of water, although with native remnant vegetation comprising the riparian corridor. These creeks both flow into Racecourse Creek (4th order creek) outside of the subject land, providing aquatic connectivity to larger creeks, estuaries and wetlands downstream, and ultimately Moruya River and the Pacific Ocean. Both creeks flow outside the development site through culverts under the adjacent roads, providing connectivity (although of poor quality) downstream. Therefore, during normal conditions these creeks provide limited connectivity for true aquatic species such as freshwater fish, but moderate connectivity for mobile semi-aquatic species such as frogs, turtles, eels and crayfish, as well as aquatic flora species.

Although the habitat connectivity is generally poor, the waterways and the scattered remnant vegetation contributes to the patchy connectivity within the surrounding landscape that has been historically subjected to habitat fragmentation and extensive clearing. The habitat connectivity for both waterways and vegetation is displayed in Figure 4.

2.1.6 Geological features of significance

There were no recorded karst, caves, crevices, cliffs or other areas of geological significance within the development site or within the assessment area.

2.1.7 Areas of outstanding biodiversity value

There are no areas of outstanding biodiversity or biodiversity values mapped within the development site (NSW DCCEEW 2024a).

2.1.8 NSW (Mitchell) Landscape

The development site occurs within the Moruya Granite Basins Mitchell Landscape (DECC NSW 2002). The Moruya Granite Basins landscape is characterised by rounded hills with a general elevation of between 50 to 300 metres (DECC NSW 2002). The landscape group consists of dendritic drainage on Carboniferous granodiorite and diorite stocks with rounded granite tors on ridges and crests (DECC NSW 2002). Soils consist of red and yellow sandy soils and vegetation is dominated by Red Bloodwood, Yellow Stringybark, White Stringybark *Eucalyptus globoidea,* Mountain Grey Gum, Silvertop Ash *Eucalyptus sieberi,* Blackbutt *Eucalyptus pilularis* and Spotted Gum with Burrawang *Macrozamia* sp. (DECC NSW 2002).

2.1.9 Additional landscape features

No additional landscape features were identified within the subject land.

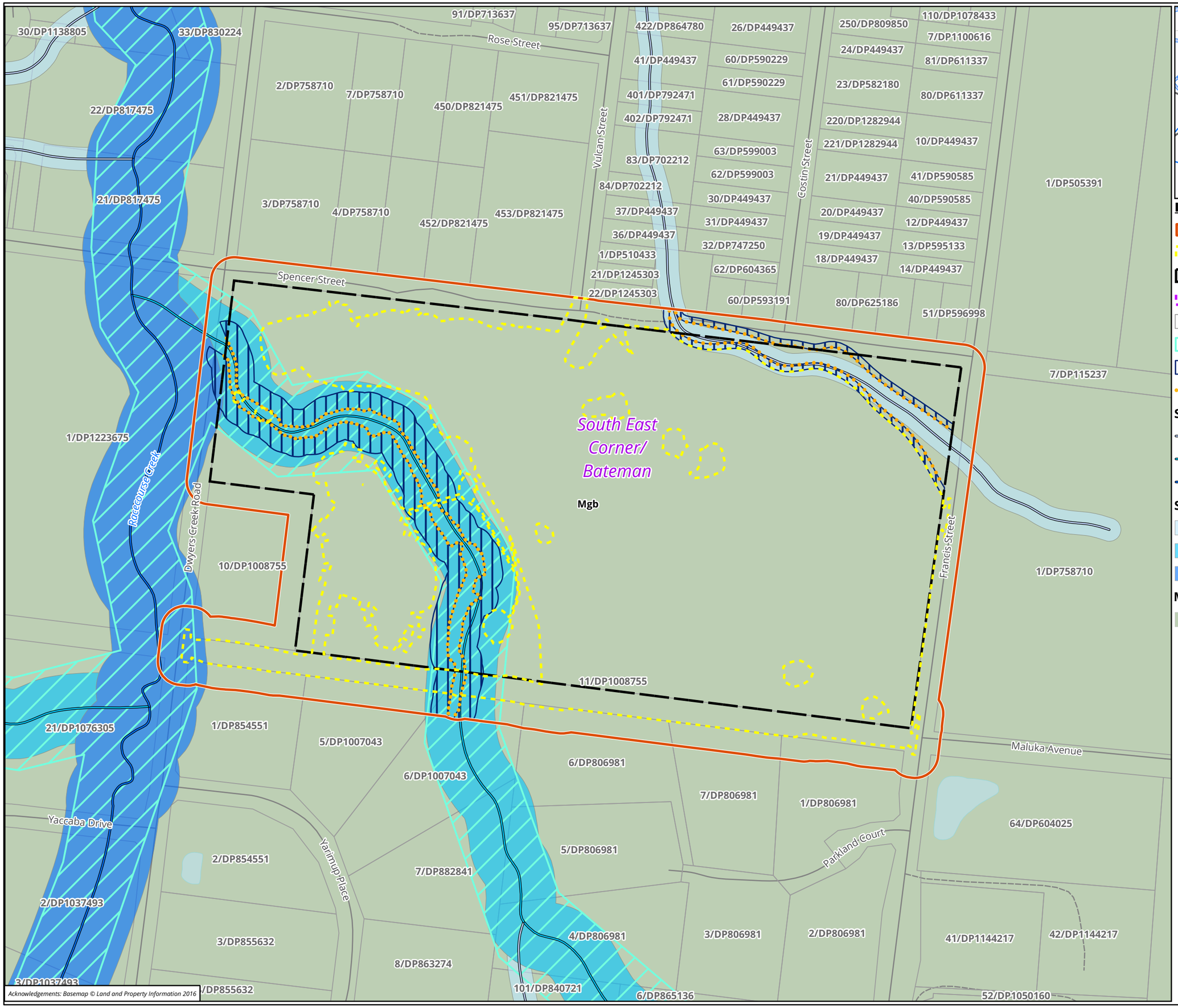
2.1.10 Hydrology

The site is not mapped as having Groundwater Vulnerability (Eurobodalla LEP).

Groundwater Dependent Ecosystems (GDEs) are defined by NSW DCCEEW Water as ecosystems that require access to groundwater to meet all or some of their water requirements so as to maintain their communities of plants and animals, ecological processes and ecosystem services. The subject land is not mapped as supporting GDEs associated with an aquifer in Appendix 8 of the Risk Assessment Guidelines for Groundwater Dependent Ecosystems (DPI 2012). There is a low potential Terrestrial GDE mapped directly to the south of the development site that is likely associated with the 3rd order creek.

2.1.11 Mapped Important Area

The subject land is not within a mapped Important Area (NSW DCCEEW 2024b).



Legend

- Subject land
- Development footprint
- Development site
- IBRA Region/Sub-region
- Lot
- Key fish habitat
- Riparian corridor buffers
- Top of Bank - Rygate Surveyors

Strahler stream order

- 1
- 3
- 4

Strahler stream order buffers

- 1
- 3
- 4

Mitchell landscapes

- Mgb,Moruya Granite Basins

Figure 2 Site map

0 100

Metres

Scale: 1:3,000 @ A3

Coordinate System: GDA2020 MGA Zone 56

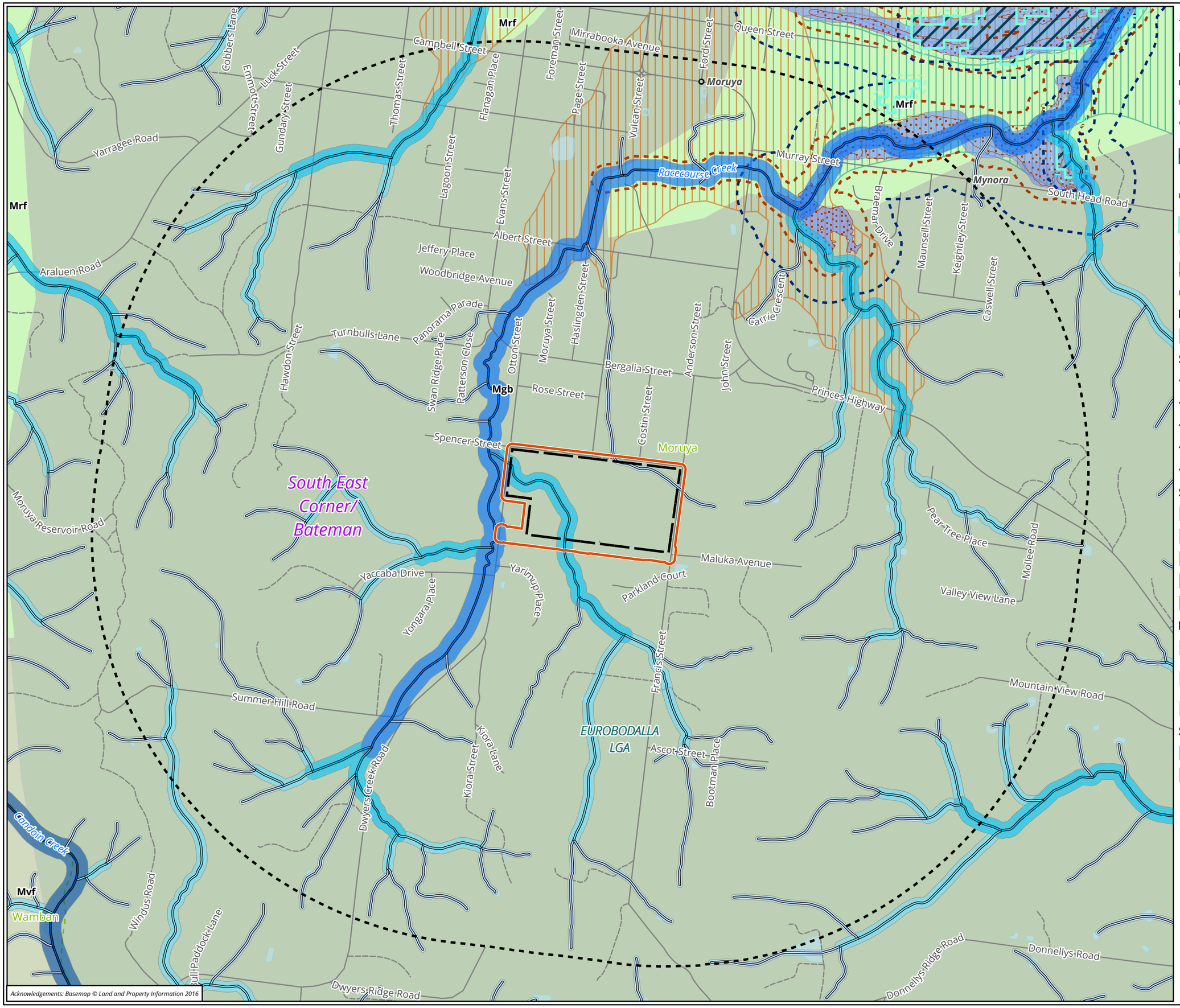
N

biosis

APEM Group

Matter: 42335, Date: 17 March 2026
Prepared for: RG, Prepared by: JB, Last edited by: jbeckius
Location: P:\42300s\42335\Mapping\42335_SpencerStMoruya_BDAR.aprx
Layout: 42335_F2_Sitemap

Acknowledgements: Basemap © Land and Property Information 2016



Acknowledgements: Basemap © Land and Property Information 2016

Legend

- Subject land
- Development site
- Assessment area
- IBRA Region/Sub-region

Wetlands /estuaries

- Directory of Important Wetlands of Australia (DIWA)
- Riparian buffers - Important wetlands
- Local wetlands
- Riparian buffers - Local wetlands
- Estuaries
- Riparian buffers - Estuaries

Resilience and Hazards SEPP

- Coastal Wetlands

Strahler stream order

- 1
- 2
- 3
- 4
- 5

Strahler stream order buffers

- 1
- 2
- 3
- 4
- 5

Mitchell landscapes

- Mgb,Moruya Granite Basins
- Mrf,Moruya Channels and Floodplains
- Mvf,Moruya Valley Foothills

Soil hazard

- High probability of occurrence
- Low probability of occurrence

Figure 3 Location map

0 100 200 300 400 500

Metres

Scale: 1:13,000 @ A3

Coordinate System: GDA2020 MGA Zone 56

N

biosis APEM Group

Matter: 42335, Date: 17 March 2026
Prepared for: RG, Prepared by: JB, Last edited by: jbeckius
Location: P:\42300s\42335\Mapping\42335_SpencerStMoruya_BDAR.aprx
Layout: 42335_F3_Location

3 Native vegetation

The subject land is approximately 23.92 hectares in size and supports 19.91 hectares of native vegetation with varying levels of disturbance. The subject land also includes 0.31 hectares of non-native vegetation, 1.44 hectares of planted native vegetation, one small farm dam, two unnamed creeks, and one residential dwelling and associated driveway. The native vegetation condition types range from derived to moderate due to historical agricultural land use. Most of the vegetation is patchy across the subject land with scattered native patches among cleared grassland. The vegetation along the northern and eastern boundaries of the development site is of a higher quality than the rest of the subject land, although still subject to disturbance and edge effects.

3.1 Native vegetation and habitat assessment

3.1.1 Native vegetation extent

The extent of native vegetation, TECs, and vegetation integrity within the subject land was determined using the results of site investigations, previous studies undertaken at the development site (Biosis 2023) and Section 4 of the BAM (DPIE 2020a).

Figure 4 provides a map of the native vegetation extent recorded within the subject land, as assessed during field investigations undertaken in June and July 2025. The figure includes all areas of native vegetation (native ground cover and areas with canopy) within the subject land. Areas not shown as native vegetation cover within Figure 4, are considered cleared or non-native vegetation, and are addressed further below.

3.1.2 Review of existing information

Existing information regarding native vegetation was reviewed to inform field investigations including:

- NSW State Vegetation Type Map (NSW DCCEEW 2024c).
- Compilation map: Biometric vegetation types of the Shoalhaven, Eurobodalla and Bega Valley local government areas (VIS_ID 3900) (DPIE 2013).
- Existing site reports including *Biodiversity constraints assessment for 11 Spencer Street, Moruya* (Biosis 2023).

Based on the results of the background review and the requirements of the BAM with respect to this BDAR, appropriate surveys were designed for the subject land and development footprint.

3.1.3 Field investigation of biodiversity values

A systematic biodiversity assessment was conducted in June 2025 to January 2026 under the terms of Biosis' Scientific Licence issued by NSW DCCEEW under the BC Act (SL100758, expiry date 30 June 2026). Fauna survey was conducted under the Secretary's Animal Care & Ethics Committee Approval (TRIM 17.892, expiry date 31 January 2028).

Assessment in accordance with the BAM was overseen by the Accredited Assessors Jake Schwebel of Biosis (BAAS25013) and Rebecca Goodwin (Ecology Consulting) (BAAS17067).

The development site was surveyed in accordance with the BAM (DPIE 2020a), which involved:

- The identification and mapping of PCTs according to the structural definitions held in the BioNet Vegetation Classification database (NSW DCCEEW 2025b), with reference to information provided in NSW State Vegetation Type Map (NSW DCCEEW 2024c).
- Undertaking floristic plots within each vegetation zone in accordance with Section 4 of the BAM (DPIE 2020a), considering varying condition states and avoidance of ecotones, areas of disturbance, and edges.
- The identification of native and exotic plant species, according to the Flora of NSW (Harden 2002, 1993, 2000, 2002) with reference to recent taxonomic changes.
- Targeted searches for plant species of conservation significance according to *Surveying Threatened Plants and Their Habitats* (DPIE 2020b).
- Incidental observations using the "random meander" method (Cropper 1993).
- Identification of previous and current factors threatening the ecological function and survival of native vegetation within and adjacent to the development site.
- An assessment of the natural resilience of the vegetation of the site.
- Identifying and mapping fauna habitats (e.g., hollow-bearing trees, rock outcropping etc.), assessing their condition and value to threatened fauna species, and considering threatened species' habitat constraints.
- Observations of animal activity and searches for indirect evidence of fauna (such as scats, nests, burrows, hollows, tracks, scratches and diggings).
- Targeted surveys for threatened fauna species.

The conservation significance of plant species and plant communities was determined according to:

- BC Act for significance within NSW
- EPBC Act for significance within Australia.

Detailed field mapping and collection of GPS point locations were conducted using hand-held (uncorrected) tablet units (Samsung Galaxy Tab X) running the ArcGIS Field Maps application, using the inbuilt GPS, and aerial photo interpretation. Spatial locations are therefore considered to have an accuracy of generally ±5 metres.

Areas of native vegetation for which a PCT could validly be assigned were identified and delineated in the field, and their condition determined and assigned. Identification of PCTs within the subject land was confirmed with reference to the community profile descriptors (and diagnostic species tests) held within the NSW State Vegetation Type Map (NSW DCCEEW 2025c) and NSW BioNet Vegetation Classification database (NSW DCCEEW 2025b). Locations of floristic plots surveyed are shown on Figure 6.

Further details of targeted survey for threatened flora and fauna species are provided in Section 4.2.1.

3.1.4 Local data

Under Section 1.4.2 of the BAM (DPIE 2020a), an assessor may use local appropriate data from relevant published sources or appropriate local reference site to develop a benchmark for a PCT. The assessor may also use more appropriate local data (instead of data from the Threatened Biodiversity Data Collection [TBDC]) when assessing the habitat suitability for threatened species, as detailed in Section 5 of the BAM. No local data has been used for either the benchmarking of PCTs or the threatened species assessment.

3.1.5 Non-native vegetation

A total of 0.31 hectares of the subject land was mapped as non-native vegetation and comprised of exotic vegetation which met the definition of non-native vegetation (Figure 5).

Areas of non-native vegetation which do not provide habitat for threatened species, are not included for further assessment in accordance with Section 5.1.1.5 of the BAM (DPIE 2020a). Non-native vegetation which does provide habitat for threatened species is required to be assessed. A description of non-native vegetation areas within the subject land is provided in Table 2 below.

Table 2 Exotic vegetation

Exotic vegetation	
Extent within subject land	0.31 ha
Description	This vegetation type consisted of a large patch of planted exotic Monterey Pine *Pinus radiata* and two Weeping Willows *Salix babylonica* on the western side of the unnamed 3rd order creek. The ground layer was comprised of predominantly exotic species including Kikuyu *Cenchrus clandestinus,* Paddy's Lucerne *Sida rhombifolia* and Panic Veldtgrass *Ehrharta erecta.*
Survey effort	One BAM plot (B14) was collected over the course of the field assessment (Figure 6).
Photo	**Photo 1 Exotic vegetation within the subject land**

3.1.6 Plant community types

The following PCTs were assessed as present within the subject land:

- PCT 4052 – *South Coast Low Hills Red Gum Grassy Forest* (Table 3).
- PCT 4009 – *Shoalhaven Lowland Flats Wet Swamp Forest* (Table 4).

In addition to the above, planted native vegetation was recorded within the subject land. This includes vegetation that could not be reasonably assigned to a PCT, but comprises of plants native to NSW, as per the NSW *Local Land Services Act 2013* (LLS Act). This definition states that "*A plant is native to New South Wales if it*

was established in New South Wales before European settlement". This planted native vegetation has been described in Table 5, and its value as habitat discussed further in Section 3.1.8.

Table 3 and Table 4 provide detailed descriptions of the two PCTs recorded within the subject land. PCTs recorded within the subject land are shown on Figure 5.

Table 3 PCT 4052 *South Coast Low Hills Red Gum Grassy Forest*

PCT 4052 *South Coast Low Hills Red Gum Grassy Forest*	
Common name	South Coast Low Hills Red Gum Grassy Forest
Vegetation formation	Grassy Woodlands
Vegetation class	Coastal Valley Grassy Woodlands
Extent within subject land	18.93 ha including: • 1.78 ha of moderate condition. • 1.56 ha of low condition. • 4.93 ha of derived native grassland (DNG) condition. • 10.66 ha of non-offsetable grassland (NOG) condition.
Condition	This community at the subject land was recorded in moderate, low, DNG and NOG condition states.
Description	South Coast Low Hills Red Gum Grassy Forest typically exists as a tall open sclerophyll forest woodland with a sparse mid-storey and ground cover dominated by grasses with scattered vines and forbs. The upper stratum is dominated by Forest Red Gum *Eucalyptus tereticornis,* Rough-barked Apple *Angophora floribunda* and Coast Grey Box *Eucalyptus bosistoana* with scattered stringybark species such as White Stringybark *Eucalyptus globoidea* and Thin-leaved Stringybark *Eucalyptus eugenioides.* The mid-storey generally consists of scattered shrub species including Black Wattle *Acacia mearnsii,* Sweet Pittosporum *Pittosporum undulatum,* Native Blackthorn *Bursaria spinosa* subsp. *spinosa,* Prickly Beard-heath *Leucopogon juniperinus,* Coffee Bush *Breynia oblongifolia* and Native Raspberry *Rubus parvifolius.* The understorey typically consists of native grasses and graminoids including Weeping Grass *Microlaena stipoides* subsp. *stipoides,* Bushy Hedgehog Grass *Echinopogon caespitosus,* Paddock Lovegrass *Eragrostis leptostachya,* Kidney Weed *Dichondra repens,* Small-leaf Glycine *Glycine microphylla,* and *Carex longebrachiata.* South Coast Low Hills Red Gum Grassy Forest is associated with low-elevation foot slopes and low hills in coastal valleys, at elevations between 5-90 metres above sea level (asl). Within the subject land, vegetation can be described as existing in the following condition states: • **Moderate condition** PCT 4052 within the subject land was dominated by Forest Red Gum, Rough-barked Apple and Coast Grey Box with scattered stringybark species such as White Stringybark. The mid-storey was relatively sparse and consisted of small trees and shrubs with the dominant species being Black Wattle, Sweet Pittosporum, Native Blackthorn and Prickly Beard-heath. The understorey consisted of native grasses including Weeping Grass, Common Couch *Cynodon dactylon,* Bushy Hedgehog Grass and Paddock Lovegrass. Common vines and herbs that were scattered throughout the grasses included Small-leaf Glycine, Kidney Weed and Whiteroot *Lobelia purpurascens.* Groundcover exotic species were also common and included Narrow-leaved Carpet Grass, Sheep's Sorrel *Acetosella vulgaris* Catsear *Hypochaeris radicata,* Asparagus Fern *Asparagus aethiopicus,* Kikuyu and Cobbler's Pegs. • **Low condition** PCT 4052 had similar canopy species (although with lower abundance and coverage) and groundcover, however was missing key mid-storey shrub species, such

PCT 4052 *South Coast Low Hills Red Gum Grassy Forest*	
	as Prickly Beard-heath and Native Blackthorn, and had a higher coverage of groundcover weed species. • **DNG condition** PCT 4052 did not have a canopy or mid-storey and had a high coverage and moderately high diversity of native groundcover grass species including Weeping Grass, Paddock Lovegrass, Shorthair Plumegrass *Dichelachne micrantha,* Barbed Wire Grass *Cymbopogon refractus* and Common Couch amidst common exotic species such as Narrow-leaved Carpet Grass A*xonopus fissifolius*, Kikuyu and Paspalum *Paspalum dilatatum.* **NOG condition** was represented by areas that were dominated by exotic grass, with no canopy or mid-storey, and that had a significantly higher cover of exotic groundcover than native species compared to DNG condition. Dominant grass species present included Narrow-leaved Carpet Grass, Common Couch and Kikuyu. Less dominant species of exotic herbs and grasses included Purpletop *Verbena bonariensis*, Sheep Sorrel, Lamb's Tongues *Plantago lanceolata*, White Clover *Trifolium repens*, Spear Thistle *Cirsium vulgare*, Fireweed *Senecio madagascariensis,* Paspalum, Wild Carrot *Daucus carota* and Cobbler's Pegs. NOG was separated from DNG due to a noticeably lower diversity and coverage of native groundcover species compared to DNG and much lower VI score (Table 11). NOG would typically be classified as exotic grassland, however due to the minor presence of native grass species it has been included within PCT 4052 as a condition state. Common Couch was a dominant species in both DNG and NOG, and although Common Couch is a native species, this grass species is an opportunistic coloniser species that is able to thrive in disturbed conditions. Native groundcover species with less tolerance for disturbance than Common Couch, such as Weeping Grass, Kangaroo Grass, Shorthair Plumegrass, Barbed Wire Grass and Paddock Lovegrass were recorded within DNG and generally absent or with negligible cover in NOG, indicating DNG has been subjected to less disturbance than NOG. Therefore, due a higher diversity in native groundcover species and the ecology of the species recorded within DNG, DNG and NOG were assessed as separate condition zones. DNG was assessed, along with moderate and low, as potential habitat for associated threatened flora, whilst NOG was excluded from being assessed as potential habitat for threatened flora species due to its predominantly exotic cover and high previous disturbance and modification.
Survey effort	The following BAM plots (Figure 6) were collected per condition zone during the field investigations: • Moderate – two plots (B08 and B12). • Low – two plots (B07 and B13). • DNG – four plots (B04, B05, B06 and B09). • NOG – three plots (B01, B02 and B03).
Justification of PCT	PCT 4052 within the subject land meets the PCT description (NSW DCCEEW 2025b) via the following: • Soil - occurs on the Moruya Granite Basins soil landscape that is characterised by rounded hills with a general elevation of between 50 to 300 metres and red and yellow sandy soils (DECC NSW 2002). • Rainfall - average annual rainfall of 1010.5 mm which is within the range that this community typically grows in (900 – 1250mm). • Structure – tall open grassy woodlands with sparse mid-storey and grass dominated groundcover. • Dominant species - canopy dominated by Forest Red Gum and Rough-barked Apple with a mid-storey of Native Blackthorn, Sweet Pittosporum and Black Wattle over groundcover dominated by grasses, with scattered forbs, ferns and sedges. *Melaleuca decora,* which is a diagnostic mid-storey species of PCT 3330, is absent.

PCT 4052 *South Coast Low Hills Red Gum Grassy Forest*	
	• IBRA region and subregion – South East Corner bioregion and Bateman subregion. • asl – subject land is approximately 10m to 20m asl which is within the range that this community typically grows in (5m to 90m). • PCT 3330 is mapped within the subject land under the NSW State Vegetation Type Map (SVTM C2.0M2.0), however after ground truthing, this PCT was not determined to be present within the subject land and the vegetation was classified as PCT 4052. PCT 4052 and PCT 3330 often occur in a similar geographic locality and can contain a similar species assemblage, therefore it can be difficult to separate these PCTs with a high level of confidence when canopy trees are the primary aspect that remain. However, in this case, PCT 4052 has been assigned due to a low cover of Woollybutt *Eucalyptus longifolia* and absence of *Melaleuca decora,* which are dominant canopy and mid-storey species within PCT 3330. Additionally, PCT 3330 is typically present in low-lying waterlogged areas whilst PCT 4052 is generally located on low slopes and hills, such as is present within the subject land.
TEC Status	PCT 4052 is associated with three TECs: • *Illawarra and south coast lowland forest and woodland ecological community* (CEEC, EPBC Act). • *Illawarra Lowlands Grassy Woodland in the Sydney Basin Bioregion* (EEC, BC Act). • *Lowland Grassy Woodland in the South East Corner Bioregion* (EEC, BC Act). PCT 4052 in moderate, low and DNG conditions within the subject land are consistent with the listing requirements (NSW DCCEEW 2011) for the BC Act listed EEC *Lowland Grassy Woodland in the South East Corner Bioregion* due the subject land occurring within the South East Corner Bioregion and presence of diagnostic canopy and understory species within PCT 4052. NOG condition is not consistent with the BC Act EEC due to the absence of diagnostic groundcover species, high cover of exotic species and disturbed modified condition of this vegetation zone. The BC Act *Illawarra Lowlands Grassy Woodland in the Sydney Basin Bioregion* (EEC) is not consistent with PCT 4052 within the subject land due to it being located within the Sydney Basin IBRA bioregion, rather than the South Easter Corner IBRA Bioregion. The remnant patches of moderate condition PCT 4052 located along the northern and eastern boundaries of the subject land are consistent with the EPBC Act *Illawarra and south coast lowland forest and woodland ecological community* (CEEC). This patch meets the key diagnostic features and minimum condition threshold (Threatened Species Scientific Committee 2016) of this CEEC, including: • The patch is at least 0.5 ha. • The patch contains at least one tree per ha that has a hollow and is over 80 cm diameter at breast height. • The perennial native understory vegetative cover present is made up of >30% native species. Patches in low, DNG and NOG condition states did not meet condition thresholds outlined in the Listing Advice for the EPBC Act listed CEEC (Threatened Species Scientific Committee 2016). Derived grasslands or shrublands are not recognised as part of this CEEC (Threatened Species Scientific Committee 2016). State and Commonwealth TECs are mapped on Figure 8.
Estimate of percent cleared value of PCT (BioNet)	76.73% (NSW DCCEEW 2025b).

PCT 4052 *South Coast Low Hills Red Gum Grassy Forest*	
PCT 4052 – moderate condition	 **Photo 2 Moderate condition PCT 4052**
PCT 4052 – low condition	 **Photo 3 Low condition PCT 4052**

PCT 4052 *South Coast Low Hills Red Gum Grassy Forest*	
PCT 4052 – DNG condition	 **Photo 4 DNG condition PCT 4052**
PCT 4052 – NOG condition	 **Photo 5 NOG condition PCT 4052**

Table 4 PCT 4009 *Shoalhaven Lowland Flats Wet Swamp Forest*

PCT 4009 Shoalhaven Lowland Flats Swamp Forest	
Common name	Shoalhaven Lowland Flats Wet Swamp Forest
Vegetation formation	Forested Wetlands
Vegetation class	Coastal Swamp Forests

PCT 4009 Shoalhaven Lowland Flats Swamp Forest	
Extent within subject land	0.98 ha
Condition	This community within the subject land was recorded in a low condition state with native groundcover species, a lack of mid-storey or canopy and high weed coverage.
Description	Shoalhaven Lowland Flats Wet Swamp Forest typically exists as a mid-high swampy sclerophyll open forest with a dense mid-stratum of *Melaleuca* species and dense ground cover of sedges and rushes. This PCT is generally located on boggy low-lying flats and regularly inundated alluvial flats on the south coast, usually at low elevations less than 20 m asl. The canopy is generally dominated by Bangalay *Eucalyptus botryoides* or Swamp Mahogany *Eucalyptus robusta,* with the occasional Woollybutt *Eucalyptus longifolia.* The mid-storey typically consists of dense layered midstory dominated by Swamp Paperbark *Melaleuca ericifolia,* Flax-leaved Paperbark *Melaleuca linariifolia* and Swamp Oak *Casuarina glauca.* Drier shrub species are generally scattered throughout and include *Acacia longifolia* and Tantoon *Leptospermum polygalifolium.* The understorey typically consists of a dense layer of sedges with some scattered grasses, ferns and graminoids. Dominant species include Tall Saw-sedge *Gahnia clarkei,* Bare Twig-rush *Machaerina juncea,* Common Reed *Phragmites australis* and Tall Sedge *Carex appressa.* Within the subject land, vegetation can be described as existing in the following condition state: • **Low condition** PCT 4009 within the subject land occurred within the low-lying boggy riparian corridor of the third order creek. PCT 4009 adjacent to the creek was dominated by a monoculture of Tall Sedge *Carex appressa* (Photo 6) whilst within the channel of the creek more aquatic species such as Narrow-leaved Cumbungi *Typha domingensis, Carex gaudichaudiana,* River Buttercup *Ranunculus inundatus* and Slender Knotweed *Persicaria decipiens* were dominant (Photo 7). The canopy and mid-storey were non-existent and the PCT had high weed coverage, and signs of disturbance and modification. Other native groundcover species included *Juncus pallidus,* Common Couch, Water Ribbons *Cycnogeton procerum,* Swamp Millet *Isachne globosa* and Tall Spike Rush *Eleocharis sphacelata.* Groundcover exotic species had high coverage within this PCT and included Narrow-leaved Carpet Grass, Kikuyu, Cobbler's Pegs, Wild Carrot, White Clover, Paspalum and Curled Dock *Rumex crispus.*
Survey effort	Two BAM plots (B10 and B15) were collected over the course of the field assessment (Figure 6).
Justification of PCT	PCT 4009 within the subject land meets the PCT description (NSW DCCEEW 2025b) via the following: • Soil - occurs on the Moruya Granite Basins soil landscape that is characterised by rounded hills with a general elevation of between 50 to 300 metres and red and yellow sandy soils (DECC NSW 2002). • Structure – although the canopy and mid-storey were absent due to past disturbance and clearing, the groundcover is predominantly comprised of sedges and groundcover species that prefer waterlogged soil. • Dominant species – groundcover dominated by sedges including Tall Sedge. • IBRA region and subregion – South East Corner bioregion and Bateman subregion. • Landscape position – PCT located in a low lying, regularly inundated alluvial area, adjacent to a 3rd order creek and in an area less than 20 metres asl.
TEC Status	PCT 4009 is associated with one TEC: • *Swamp Sclerophyll Forest on Coastal Floodplains of the New South Wales North Coast, Sydney Basin and South East Corner bioregions* (EEC, BC Act). Low condition PCT 4009 in the subject land was consistent with the listing requirements (NSW Scientific Committee 2004) for the BC Act listed EEC listed above at the time of the field investigations due to the following reasons: • Characteristic species listed in the final determination (NSW Scientific Committee 2004) were present including Tall Sedge and Swamp Millet.

PCT 4009 Shoalhaven Lowland Flats Swamp Forest	
	• The EEC can exist as a reedland or sedgeland with no canopy or mid-storey, as recorded within the subject land. • Landscape position in low-lying alluvial waterlogged flats, as recorded along the riparian corridor of the 3rd order creek within the subject land. State TECs are mapped on Figure 8.
Estimate of percent cleared value of PCT (BioNet)	43.37% (NSW DCCEEW 2025b).
PCT 4009 Low condition	 **Photo 6 Low condition PCT 4009 adjacent to 3rd order creek**

PCT 4009 Shoalhaven Lowland Flats Swamp Forest	

Photo 7 **Low condition PCT 4009 within the channel of the 3rd order creek**

Table 5 Planted native vegetation

Planted native vegetation	
Extent within subject land	1.44 ha
Description	This vegetation type is associated with planted vegetation within the subject land that cannot be reasonably assigned to a PCT. Planted vegetation within the subject land that meets the above definition primarily includes a variety of species that are either not local to the area or are cultivated horticultural species. The canopy species within this vegetation zone were all recorded as juveniles and the dominant species included Coast Banksia *Banksia integrifolia* subsp. *integrifolia,* Paddy's River Box *Eucalyptus macarthurii,* Weeping Bottlebrush *Callistemon viminalis,* Wedge-leaved Wattle *Acacia pravissima,* Heath-leaved Banksia *Banksia ericifolia* and Crimson Bottlebrush *Callistemon citrinus.* Dominant understorey species included a variety of exotic species such as Narrow-leaved Carpet Grass, Kikuyu, Paspalum, Blackberry and Cocksfoot. Native groundcover species were less dominant and comprised of Weeping Grass and Common Couch. One planted threatened species was found in this community, Paddy's Riverbox (Endangered, EPBC Act and BC Act), which has a native distribution restricted to the Central and Southern Tablelands. This species is known to be often utilised as landscape plantings. Although the assemblage of species within this community is mostly native Australian species, many of the species present do not occur naturally in the Bateman IBRA subregion of the South East Corner IBRA region. Additionally, the juvenile canopy species were recorded to be growing in conspicuous lines along both creeks within the subject land and were all of similar age indicating this

Planted native vegetation	
	vegetation zone has been purposefully planted. Consequently, this community could not be reliably assigned to a PCT that occurs within this area.
Survey effort	One BAM plot (B011) was collected over the course of the field assessment (Figure 6).
Planted native vegetation	**Photo 8 Planted native vegetation**

3.1.7 Threatened ecological communities

Vegetation within the subject land was found to represent two TECs listed under the NSW BC Act, and one TEC listed under the Commonwealth EPBC Act, as outlined in Table 6 and Table 7 below and illustrated on Figure 8.

Table 6 Summary of BC Act TECs within the subject land

BC Act TEC	Listing status	Subject land (Ha)
Lowland Grassy Woodland in the South East Corner Bioregion	EEC	8.28
Swamp Sclerophyll Forest on Coastal Floodplains of the New South Wales North Coast, Sydney Basin and South East Corner bioregions	EEC	0.98

Table 7 Summary of EPBC Act TECs within the development footprint

EPBC Act TEC	Listing status	Subject land (Ha)
Illawarra and south coast lowland forest and woodland ecological community	CEEC	1.78

3.1.8 Planted native vegetation

Where only part of the subject land contains planted native vegetation, the streamlined assessment module provided in Appendix D of the BAM may be used to assess that part of the development.

Assessment of the planted native vegetation within the subject land in accordance with Appendix D of the BAM is provided in Table 8 below.

Table 8 Planted native vegetation - streamlined assessment

Decision Key		Assessment
1. Does the planted native vegetation occur within an area that contains a mosaic of planted and remnant native vegetation and which can be reasonably assigned to a PCT known to occur in the same IBRA subregion as the proposal?		No. The planted native vegetation occurs in lines along both creeks within the subject land and does not form mosaics of planted and remnant native vegetation. The species within the planted native vegetation are generally not known to occur within the IBRA subregion and would not occur within the PCTs present within the subject land. Go to question 2.
2. Is the planted native vegetation:	a. planted for the purpose of environmental rehabilitation or restoration under an existing conservation obligation listed in BAM Section 11.9(2.), and	No.
	b. the primary objective was to replace or regenerate a plant community type or a threatened plant species population or its habitat?	No – Go to 3.
3. Is the planted/translocated native vegetation individuals of a threatened species or other native species planted/translocated for the purpose of providing threatened species habitat under one of the following: a. a species recovery project b. Saving our Species project c. other types of government funded restoration project d. condition of consent for a development approval that required those species to be planted or translocated for the purpose of providing threatened species habitat e. legal obligation as part of a condition or ruling of court. This includes regulatory directed or ordered remedial plantings (e.g. Remediation Order for clearing without consent issued under the BC Act or the Native Vegetation Act) f. ecological rehabilitation to re-establish a PCT or TEC that was, or is carried out under a mine operations plan, or g. approved vegetation management plan (e.g. as required as part of a Controlled Activity Approval for works on waterfront land under the NSW Water Management Act 2000)?		No – the vegetation was not planted for any of the following reasons listed from a. to g. that IRT are aware of. Go to 4.
4. Was the planted native vegetation (including individuals of a threatened flora species) undertaken voluntarily for revegetation, environmental rehabilitation or restoration without a legal obligation to secure or provide for management of the native vegetation?		Yes – the vegetation is likely planted voluntarily for revegetation without a legal obligation. The vegetation must be assessed in accordance with Section D2 of the BAM (DPIE 2020a) - Assessment of planted native vegetation for threatened species habitat

Decision Key	Assessment
	(the use of Chapters 4 and 5 of the BAM are not required to be applied).
5. Is the native vegetation (including individuals of a threatened flora species) planted for functional, aesthetic, horticultural or plantation forestry purposes? This includes examples such as: windbreaks in agricultural landscapes, roadside plantings (including street trees, median strips, roadside batters), landscaping in parks, gardens and sport fields/complexes, macadamia plantations or Teatree farms?	N/A
6. Is the planted native vegetation a species listed as a widely cultivated native species on a list approved by the Secretary of the Department (or an officer authorised by the Secretary)?	N/A

In accordance with Section D2 (of Appendix D of the BAM), the assessor must assess the suitability of the planted native vegetation for use by threatened species and record any incidental sightings or evidence (e.g. scats, stick nests) of threatened species credit species using, inhabiting or being part of the planted native vegetation.

Section 8.4 of the BAM must be applied to mitigate and manage impacts on these species if there is evidence that threatened species are using the planted native vegetation as habitat. Species credits are not required to offset the proposed impacts.

Planted trees and shrubs were generally immature individuals with no evidence of nests or hollows observed. No evidence of use by species credit species was observed during any of the survey periods. The planted native vegetation is considered likely to be utilised as part of foraging movements by highly mobile threatened species, such as Southern Myotis. The planted native vegetation may also be utilised on occasion as part of foraging and dispersal movements by mobile ecosystem credit species listed in Section 4.1 of this report. Actions to avoid and minimise impacts to the threatened species, as well as retained vegetation and general fauna within the subject land are outlined in Section 7 of this BDAR.

3.2 Vegetation integrity assessment

3.2.1 Vegetation zones, management zones and patch size class

PCTs within the subject land were assessed and stratified, based on broad condition state, into vegetation zones in accordance with Section 4.3 of the BAM, and as described in Table 2 to Table 5 above. This resulted in seven vegetation zones identified within the development footprint. Table 9 describes each of these zones and provides details on the numbers of BAM floristic plots undertaken in each zone. In addition to the vegetation zones, management zones within moderate condition PCT 4052 were created to address the direct impact to this vegetation as 'partial loss', see further detail in section 3.2.3.

Patch size classes for each vegetation zone present within the subject land were assessed as per Section 4.3.2 of the BAM (DPIE 2020a) using a select process in ArcGIS. All native vegetation with a gap of less than 100 metres from the next area of native vegetation (or ≤30 metres for non-woody ecosystems), is considered a single patch, with a patch able to extend onto adjoining land.

Native vegetation within the subject land was mapped sequentially and it was found to form part of a large patch of connecting vegetation with an area of greater than 100 hectares. The connected vegetation comprises large semi-continuous patches extending east and west from the moderate condition vegetation along the northern and eastern boundaries, and south from the eastern boundary vegetation.

Patch size classes for each vegetation zone are also outlined in Table 9 below. The native vegetation patch is mapped on Figure 7.

Table 9 Vegetation zones within the subject land

Vegetation zone	Plant Community Type	Condition	BAM plots completed	Area (ha)	Max. patch size development footprint
4052_moderate	PCT 4052 – South Coast Low Hills Red Gum Grassy Forest	Moderate	2	1.78	>100 ha
4052_low	-	Low	2	1.56	>100 ha
4052_DNG	-	DNG	4	4.93	>100 ha
4052_NOG	-	NOG	3	10.66	>100 ha
4009_low	PCT 4009 – Shoalhaven Lowland Flats Wet Swamp Forest	Low	2	0.98	>100 ha
Planted native vegetation	Planted native vegetation	-	1	1.44	-
Exotic vegetation	Exotic vegetation	-	1	0.31	-

3.2.2 Vegetation integrity

Vegetation integrity, or condition, was assessed using data obtained from undertaking BAM plots within the vegetation zones, as per Section 4.3.4 of the BAM (DPIE 2020a). Plot data was collected via:

- A 20 metre x 50 metre quadrat and 50 metre transect for assessment of site attributes and function.
- A 20 metre x 20 metre quadrat, nested within the larger quadrat for full floristic survey to determine composition and structure of the PCT.

The minimum number of BAM plots per vegetation zone was determined using Table 3 of the BAM (DPIE 2020a). In total, 15 BAM plots have been completed within the vegetation zones present in the development footprint (Figure 6), details are provided in Table 10 and shown on Table 11. Five of these BAM pots included in the assessment are no longer located within the final development footprint as a result of design refinements over the course of the project. These plots have been retained for use in the assessment as they are still considered to be representative of the vegetation present within the development footprint.

Table 10 BAM plots completed within the subject land

BAM plot reference	Vegetation zone	BAM plot reference	Vegetation zone
42335.B01	4052_NOG	**42335.B08**	4052_Moderate
42335.B02	4052_NOG	**42335.B09**	4052_DNG
42335.B03	4052_NOG	**42335.B10***	4009_Low
42335.B04	4052_DNG	**42335.B11***	Planted native vegetation

BAM plot reference	Vegetation zone	BAM plot reference	Vegetation zone
42335.B05	4052_DNG	**42335.B12***	4052_Moderate
42335.B06	4052_DNG	**42335.B13**	4052_Low
42335.B07*	4052_Low	**42335.B14**	Exotic vegetation
42335.B15*	4009_Low		

** Plot is no longer located in development footprint.*

Assessment of vegetation integrity was undertaken using standard benchmark data as outlined in the BAM and held in the BioNet Vegetation Classification database (NSW DCCEEW 2025b). As BAM plots B14 and B11 did not conform to any PCTs, no further assessment of these plots is required. A list of flora species was compiled for each BAM plot completed and is included in Appendix 3. Records of all flora species will be submitted to NSW DCCEEW for incorporation into the Atlas of NSW Wildlife.

3.2.3 Vegetation integrity score

Plot data was entered into the BAM-C to determine vegetation integrity score. Plot data are presented in Appendix 3, with vegetation integrity scores for each vegetation zones provided in Table 11.

Table 11 Vegetation zone integrity scores

Vegetation zone	Composition score	Structure score	Function score	VI score*	HBTs present
4052_Moderate	72.6	76.6	87.1	78.5	Yes
4052_Low	36.2	62.1	54.6	49.7	Yes
4052_DNG	18.8	50.8	2.6	13.6	No
4052_NOG	21.3	16	0.3	7.0	No
4009_Low	37.1	58.1	0	12.9	No

**Benchmark (pristine) condition vegetation would receive a VI score of 100.*

As outlined in Section 9.2.1 of the BAM (DPIE 2020a), an offset is required for impacts on native vegetation where the vegetation integrity score is:

- ≥15 where the PCT is representative of an endangered or critically endangered ecological community.
- ≥17 where the PCT is associated with threatened species habitat (as represented by ecosystem credits) or is representative of a vulnerable ecological community.
- ≥20 where the PCT is not representative of a TEC or associated with threatened species habitat.

As such, ecosystem credit offsets are not required for the following vegetation zones:

- 4052_DNG
- 4052_NOG
- 4009_Low

Partial Loss

Partial loss is defined under the BAM (DPIE 2020a) as a method to assess and generate credits for direct impacts to vegetation that do not result in total loss of a vegetation zone. BAM plot data is manipulated to replicate the partial impacts to a vegetation zone or management zone and to generate a future VI score. The future VI score for this zone will be decreased compared to the original VI score but still be above 0 (the score which is used to represent 'total loss'). This is usually applied to vegetation that is located within proposed APZs where partial impacts may occur, such as removal of one stratum (e.g. mid-storey) or thinning of canopy species, instead of full removal.

Direct impacts to moderate condition PCT 4052 that is located within the APZ proposed along the eastern boundary (Black Ash Bushfire Consulting 2025) of the development footprint (Figure 1) will be assessed as 'partial loss' in accordance with the following guidelines:

- BAM Operational Manual – Stage 2 (DPE 2023a).
- BAM Calculator User Guide (NSW DCCEEW 2024d).
- Assessing partial loss of biodiversity values. BAM guide – consultation draft (NSW DCCEEW 2024e).

The APZ maintenance activities will likely consist of mowing and slashing that will impact upon ground and mid-storey but retain the canopy. Two separate management zones have been created within the 4052_moderate vegetation zone within the BAM-C to accurately account for partial impacts to this vegetation (Figure 6) and to differentiate between partial loss and total loss within 4052_moderate vegetation zone:

- 4052_pl– management zone where partial impacts are assessed.
- 4052_tl – management zone that includes the remainder of moderate condition PCT 4052 that is assessed as total loss.

To determine 'partial loss' for management zone 4052_pl the BAM plot data from B08 and B12, representing moderate condition PCT 4052, were altered (Table 12) within the BAM-C to reflect the estimated partial impacts and future VI score of that management zone. BAM plots B08 and B12 are not specifically located within the 4052_pl management zone, however, are suitable to use as they are considered representative for the PCT and condition.

The BAM plot data was altered to reflect the future management activities and future impacts to the vegetation. The canopy trees will be retained within this management zone, whilst APZ management activities such as mowing or slashing will likely impact groundcover species, mid-storey species, woody debris, regeneration, litter cover and tree stem size class 5-9 cm DBH. Although these elements will likely not be fully removed as part of the APZ management activities, due to the uncertainty surrounding the level of impact to these elements, these have been scored as 0 within the BAM-C and is reflected in the future VI score, as per the BAM guidelines (NSW DCCEEW 2024e). The remainder of the BAM plot data scores were retained including canopy composition and structure, number of large trees and high threat weed cover. The change in VI scores for this management zone is outlined in Table 12 and further detail is provided in section 6.1.

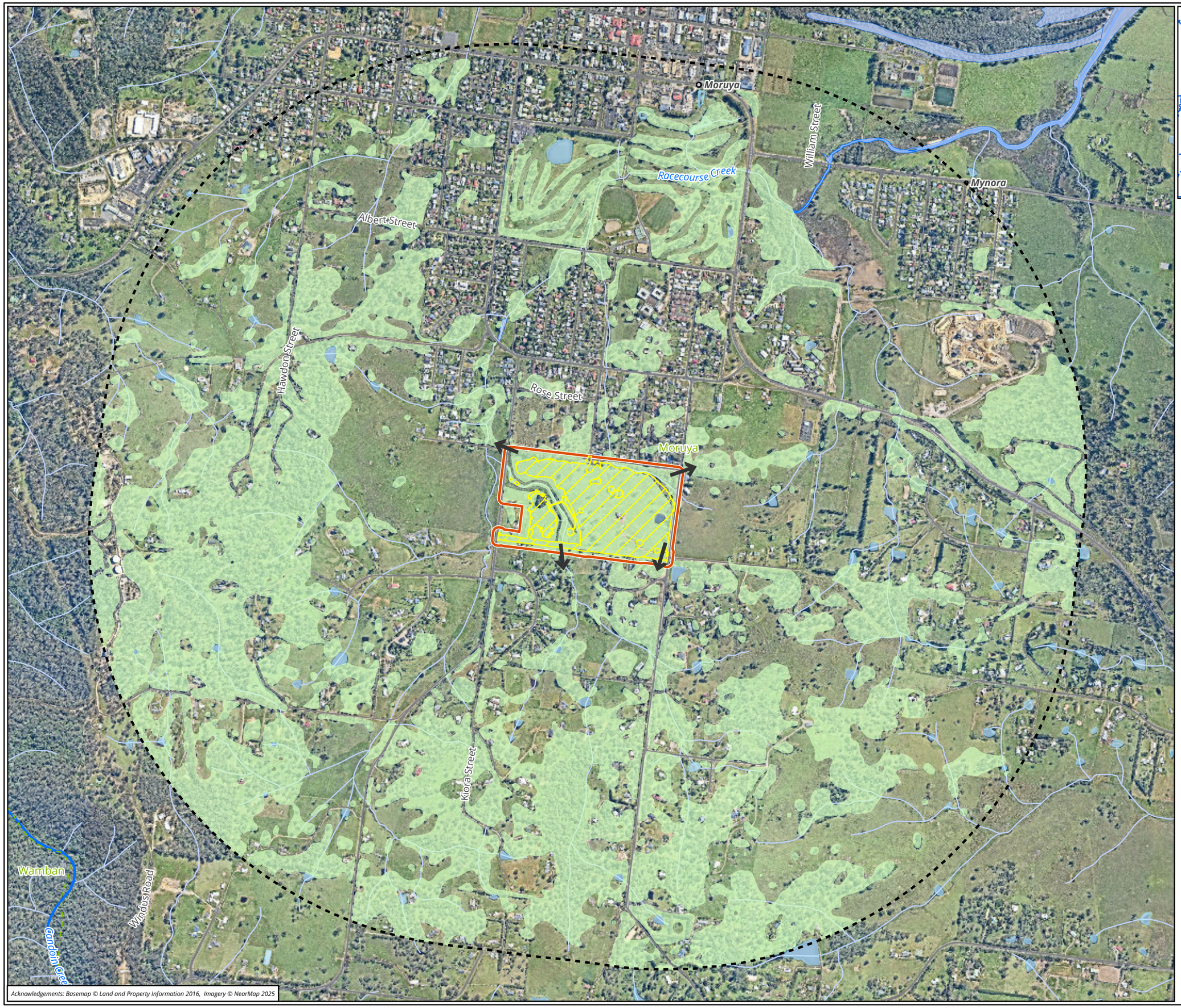
Table 12 Vegetation Integrity scores for management zone 4052_pl

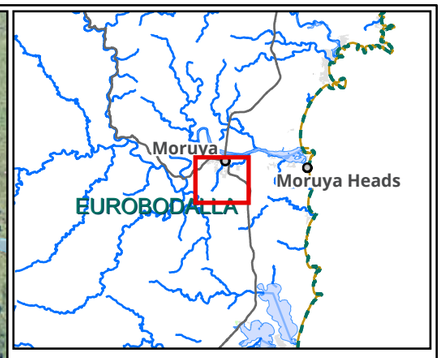
BAM plot data scores	Composition score	Structure score	Function score	VI score	Future VI score	HBTs present
Current scores	72.6	76.6	87.1	78.5	-	Yes

BAM plot data scores	Composition score	Structure score	Function score	VI score	Future VI score	HBTs present
Altered to predict future VI score	8.9	22.6	48.8	-	21.4	Yes

3.2.4 Scattered trees

No assessment of impacts to scattered paddock trees is included in the current assessment. No scattered trees, as defined by the BAM, occur within the subject land.





Legend

- Subject land
- Development footprint
- Assessment area
- Native vegetation
- Habitat connectivity

Figure 4 Native vegetation extent

0 100 200 300 400 500

Metres

N

Scale: 1:13,000 @ A3

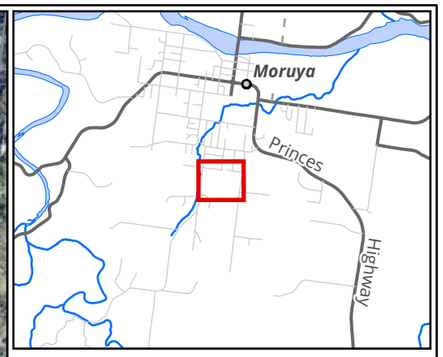
Coordinate System: GDA2020 MGA Zone 56

biosis

APEM Group

Matter: 42335, Date: 17 March 2026
Prepared for: RG, Prepared by JB, Last edited by: jbeckius
Location: P:\42300s\42335\Mapping\42335_SpencerStMoruya_BDAR.aprx
Layout: 42335_F4_NativeVeg

Acknowledgements: Basemap © Land and Property Information 2016, Imagery © NearMap 2025



Legend

- Subject land
- Development footprint
- Development site
- Cleared
- Hollow-bearing tree
- Stag
- Stick nest

Plant community type

- 4009 - Shoalhaven Lowland Flats Wet Swamp Forest
- 4052 - South Coast Low Hills Red Gum Grassy Forest
- Exotic Vegetation
- Planted Native Vegetation

Figure 5 Vegetation within the subject land

0 100
Metres

N

Scale: 1:2,200 @ A3
Coordinate System: GDA2020 MGA Zone 56

biosis
APEM Group

Matter: 42335, Date: 17 March 2026
Prepared for: RG, Prepared by JB, Last edited by: jbeckius
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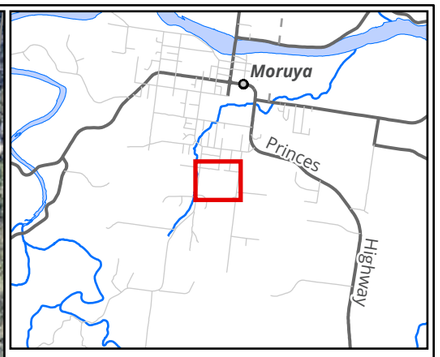

Legend

- Subject land
- Development footprint
- Development site
- BAM Plot

Vegetation zone

- VZ1 - 4052_Moderate
- VZ2 - 4052_Low
- VZ3 - 4052_DNG
- VZ4 - 4052_NOG
- VZ5 - 4009_Low
- Exotic Vegetation
- Planted Native Vegetation

Management zone

- 4052_pl
- 4052_tl

Figure 6 Vegetation zones, management zones and plot locations

0 100
Metres

N

Scale: 1:2,200 @ A3
Coordinate System: GDA2020 MGA Zone 56

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APEM Group

Matter: 42335, Date: 17 March 2026
Prepared for: RG, Prepared by JB, Last edited by: jbeckius
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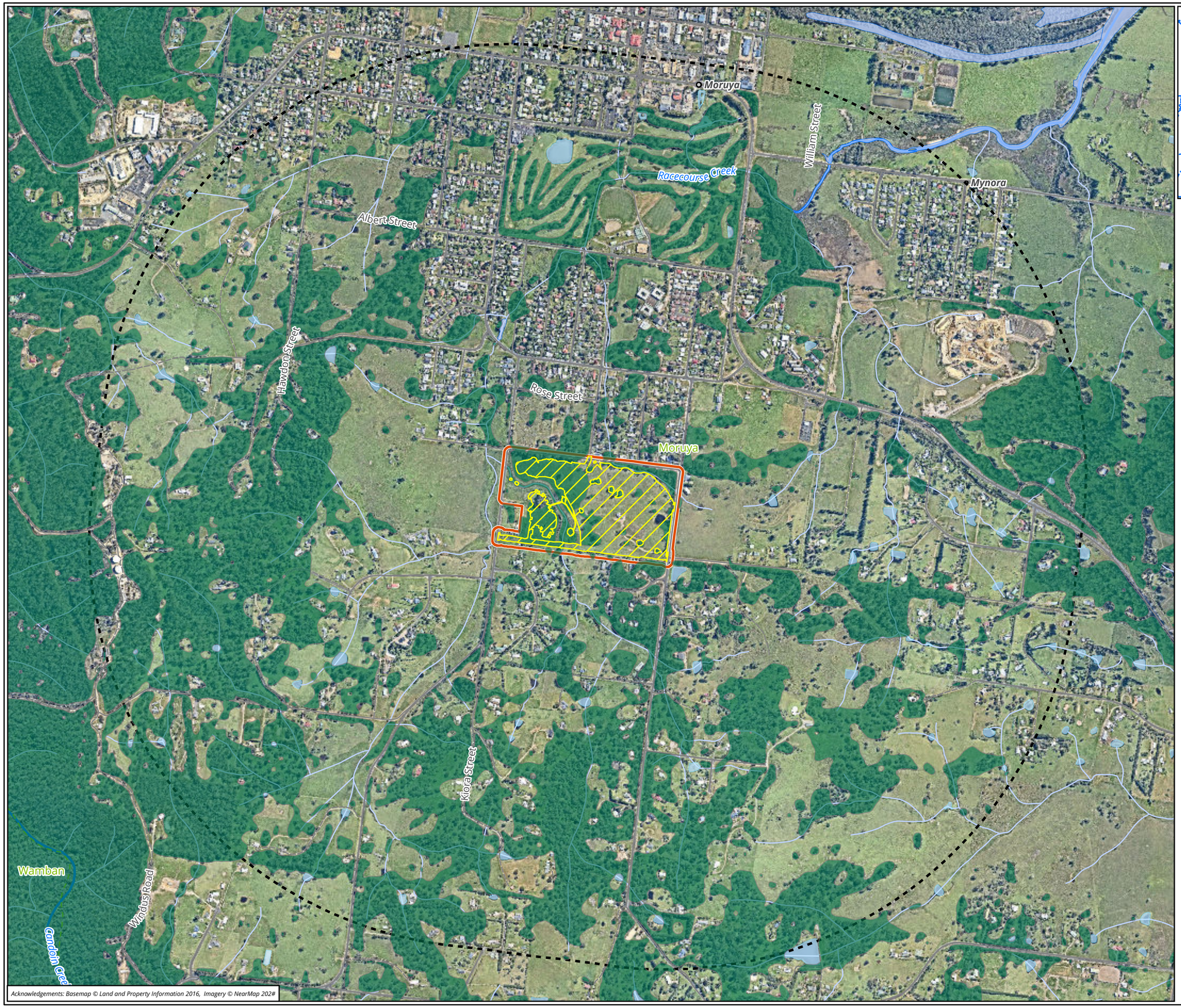
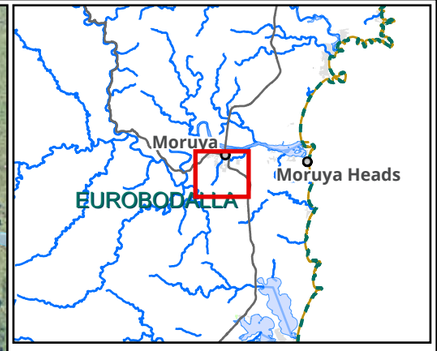




Legend

- Subject land
- Development footprint
- Assessment area

Patch size

- ≥100ha (VZ1-VZ5)

0 100 200 300 400 500

Metres

N

Scale: 1:13,000 @ A3

Coordinate System: GDA2020 MGA Zone 56

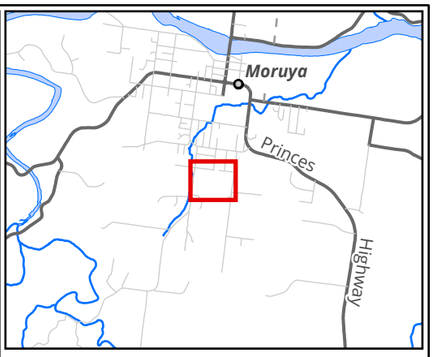
biosis

APEM Group

Matter: 42335, Date: 17 March 2026
Prepared for: RG, Prepared by JB, Last edited by: jbeckius
Location: P:\42300s\42335\Mapping\42335_SpencerStMoruya_BDAR.aprx
Layout: 42335_F7_PatchSize

Figure 7 Patch size locations

Acknowledgements: Basemap © Land and Property Information 2016, Imagery © NearMap 2025



Legend

- Subject land
- Development footprint
- Development site

Management zone

- 4052_pl
- 4052_tl

Threatened ecological community

- Swamp Sclerophyll Forest on Coastal Floodplains of the New South Wales North Coast, Sydney Basin and South East Corner bioregions (EEC, BC Act)
- Lowland Grassy Woodland in the South East Corner Bioregion (EEC, BC Act)
- Illawarra and south coast lowland forest and woodland ecological community (CEEC, EPBC Act)

Figure 8 Threatened ecological communities within the subject land

0 100

Metres

N

Scale: 1:2,200 @ A3

Coordinate System: GDA2020 MGA Zone 56

biosis

APEM Group

Matter: 42335, Date: 17 March 2026
Prepared for: RG, Prepared by JB, Last edited by: jbeckius
Location: P:\42300s\42335\Mapping\42335_SpencerStMoruya_BDAR.aprx
Layout: 42335_F8_TECs

4 Threatened species

4.1 Ecosystem credit species

A list of predicted species (ecosystem credit species) expected to occur within the subject land was generated as per Section 5 of the BAM (DPIE 2020a). Impacts to these species require assessment, however targeted survey is not required as these species are assumed to occur, based on the occurrence of the PCTs, habitat constraints, native vegetation cover in the landscape and calculated patch sizes. These species are identified as ecosystem credit species in the Threatened Biodiversity Data Collection (TBDC). Table 13 lists the ecosystem credit species that were generated by the BAM-C has having the potential to occur. No generated ecosystem credit species could be discounted, based on geographical restrictions or a lack of suitable habitat, from using the subject land on occasion.

These species were considered when prescribing management and mitigation measures for the project, and a number have been specifically considered as part of the assessment under the EPBC Act.

Table 13 Ecosystem credit species (predicted species) with potential to occur

Species name	Common name
Anthochaera phrygia	Regent Honeyeater
Artamus cyanopterus cyanopterus	Dusky Woodswallow
Botaurus poiciloptilus	Australasian Bittern
Calidris alba	Sanderling
Calidris canutus	Red Knot
Calidris ferruginea	Curlew Sandpiper
Calidris tenuirostris	Great Knot
Callocephalon fimbriatum	Gang-gang Cockatoo
Calyptorhynchus lathami lathami	South-eastern Glossy Black-Cockatoo
Charadrius leschenaultii	Greater Sand-plover
Charadrius mongolus	Lesser Sand-plover
Chthonicola sagittata	Speckled Warbler
Circus assimilis	Spotted Harrier
Climacteris picumnus victoriae	Brown Treecreeper (eastern subspecies)
Daphoenositta chrysoptera	Varied Sittella
Dasyurus maculatus	Spotted-tailed Quoll
Falsistrellus tasmaniensis	Eastern False Pipistrelle
Glossopsitta pusilla	Little Lorikeet
Haliaeetus leucogaster	White-bellied Sea-Eagle
Hieraaetus morphnoides	Little Eagle
Hirundapus caudacutus	White-throated Needletail

Species name	Common name
Ixobrychus flavicollis	Black Bittern
Lathamus discolor	Swift Parrot
Limosa lapponica baueri	Bar-tailed Godwit (baueri)
Lophoictinia isura	Square-tailed Kite
Micronomus norfolkensis	Eastern Coastal Free-tailed Bat
Miniopterus orianae oceanensis	Large Bent-winged Bat
Numenius madagascariensis	Eastern Curlew
Pachycephala olivacea	Olive Whistler
Pandion cristatus	Eastern Osprey
Petaurus australis	Yellow-bellied Glider
Petroica boodang	Scarlet Robin
Phoniscus papuensis	Golden-tipped Bat
Pteropus poliocephalus	Grey-headed Flying-fox
Pycnoptilus floccosus	Pilotbird
Saccolaimus flaviventris	Yellow-bellied Sheathtail-bat
Scoteanax rueppellii	Greater Broad-nosed Bat
Stagonopleura guttata	Diamond Firetail
Xenus cinereus	Terek Sandpiper

4.2 Species credit species

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. These candidate species are identified as species credit species in the TBDC. A targeted survey or an expert report is required to confirm the presence of these species on the subject land, or alternatively the species can be assumed to be present (DPIE 2020a).

Appendix 2 provides the lists of species credit species predicted to occur within the subject land based on the IBRA subregion within which the project occurs, the native vegetation cover present within the 1500 metre buffer area, the PCTs present within subject land, and patch sizes listed in Table 9.

The potential for a species to occur within the subject land was assessed in accordance with Section 5.2 of the BAM (DPIE 2020a) and species with geographical restrictions, or habitat constraints not present, were not required to be assessed. A total of 18 predicted species credit species have been excluded from occurring within the subject land based on a lack of suitable habitat, substantial degradation of existing potential habitat, lack of required microhabitat features and outside the geographical range and Important habitat mapping extent. Currently, any vegetation within the development footprint lacks complex structure and is consisting mainly of scattered trees with no midstory and a ground layer dominated by exotic weeds and grasses. The historical clearing contributed to the introduction and spread of invasive weed species, which have since proliferated, outcompeting native species, and further degrading the habitat. This lack of structural diversity, native understory, and habitat quality creates conditions unsuitable for most threatened species. Species credit species considered to potentially occur within the subject land, and thus considered 'candidate

species credit species' have been either assumed present, or the subject of targeted threatened species surveys.

A summary of excluded species is provided in Table 14 and further rationale for exclusion is detailed in Appendix 2.

Table 14 Excluded candidate species credit species

Common name	Scientific name	Exclusion rationale / justification
Birds		
Bar-tailed Godwit (baueri)	*Limosa lapponica baueri*	Habitat constraints - no mapped important habitat for this species occurs within the subject land.
Bush Stone-curlew	*Burhinus grallarius*	Habitat constraints - lack of fallen or standing dead timber.
Curlew Sandpiper (breeding)	*Calidris ferruginea*	Habitat constraints - no mapped important habitat for this species occurs within the subject land.
Eastern Curlew	*Numenius madagascariensis*	Habitat constraints - no mapped important habitat for this species occurs within the subject land.
Great Knot	*Calidris tenuirostris*	Habitat constraints - no mapped important habitat for this species occurs within the subject land.
Greater Sand-plover	*Charadrius leschenaultii*	Habitat constraints - no mapped important habitat for this species occurs within the subject land.
Lesser Sand-plover	*Charadrius mongolus*	Habitat constraints - no mapped important habitat for this species occurs within the subject land.
Orange Bellied Parrot	*Neophema chrysogaster*	Habitat degraded.
Red Knot	*Calidris tenuirostris*	Habitat constraints - no mapped important habitat for this species occurs within the subject land.
Regent Honeyeater	*Anthochaera phrygia*	Habitat constraints - no mapped important habitat for this species occurs within the subject land.
Sanderling	*Calidris alba*	Habitat constraints - no mapped important habitat for this species occurs within the subject land.
Swift Parrot	*Lathamus discolor*	Habitat constraints - no mapped important habitat for this species occurs within the subject land.
Terek Sandpiper	*Xenus cinereus*	Habitat constraints - no mapped important habitat for this species occurs within the subject land.
Mammals		
Grey-headed Flying-fox	*Pteropus poliocephalus*	Habitat constraints – no breeding camps have been previously recorded within the subject land.
Large Bent-winged Bat (breeding)	*Miniopterus orianae oceanensis*	Habitat constraints – subject land does not contain caves, tunnels, mines, culverts 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.

Common name	Scientific name	Exclusion rationale / justification
Large-eared Pied Bat	*Chalinolobus dwyeri*	Habitat constraints – not within two kilometres of rocky areas containing caves, overhangs, escarpments, outcrops, or crevices, or within two kilometres of old mines or tunnels.
Southern brown Bandicoot (eastern)	*Isoodon obesulus obesulus*	Habitat degraded.
White-footed Dunnart	*Sminthopsis leucopus*	Habitat degraded.
Frogs		
Giant Burrowing	*Heleioporus australiacus*	Habitat degraded.
Stuttering Frog	*Mixophyes balbus*	Habitat degraded.

A detailed assessment of potential for occurrence, and potential for impact, for all species credit species predicted to occur within the subject land is provided in Appendix 2. Species credit species considered to potentially occur within the subject land, and thus considered 'candidate species credit species' have been either assumed present, subject to an expert report, or the subject of the target of threatened species surveys. No additional species credit species were added to the assessment that were not predicted by the BAM-C or BioNet to occur within the subject land.

All candidate species credit species considered as part of this assessment, and their associated method of assessment, are listed in Table 15 (flora species) and Table 16 (fauna species).

Threatened flora

Habitats for threatened flora species within the subject land was largely considered degraded due to the high degree of management, grazing and clearing. Open areas are typically dominated by exotic pasture grasses and herbaceous exotics well suited to the low lying and typically damp habitat. This comprises the habitats associated with all of the PCT 4052 and PCT 4009 vegetation within the subject land. Habitats supported by the PCT 4052 moderate vegetation were considered to be of higher quality than either low or DNG as a result of the lower levels of disturbance present in the understorey and midstory, less weed coverage, denser mid-storey and the presence of mature canopy trees. This vegetation occurs as a linear patch along the northern and eastern boundaries of the development site that is subject to some edge effect disturbance such as weed incursion and trampling from human access adjacent to public roads and paths.

Exotic vegetation and 4052_NOG vegetation zone do not provide suitable habitat for threatened flora species, as these areas are highly disturbed and dominated by introduced species. Vegetation structure and composition have been substantially altered through historical clearing, ongoing disturbance and weed invasion, resulting in limited native floristic diversity and an absence of habitat features required to support threatened flora.

Planted native vegetation within the subject land also did not provide suitable habitat for threatened flora species due to its cultivated state and prior disturbance. The planted native vegetation does not need to be assessed against chapters 4 and 5 of the BAM (DPIE 2020a) as per section 3.1.8.

Table 15 provides a list of candidate flora species credit species considered in this assessment, each species' required survey period and the relevant method of assessment. Further detail of the targeted surveys undertaken are provided below.

Table 15 Candidate flora species credit species

Species name	Common name	Survey period	Method of assessment
Cryptostylis hunteriana	Leafless Tongue Orchid	November to January	Targeted survey: parallel line transects 5-10 metres
Haloragis exalata* subsp. *exalata	Square Raspwort	All year	Targeted survey: parallel line transects 5-10 metres
Rhodamnia rubescens	Scrub Turpentine	All year	Targeted survey: parallel line transects 5-10 metres
Wilsonia backhousei	Narrow-leafed Wilsonia	All year	Targeted survey: parallel line transects 5-10 metres

Threatened fauna

Fauna habitat assessment was undertaken to determine whether the vegetation to be impacted by the proposed development contained microhabitats suitable to support the candidate fauna species credit species, as outlined in Appendix 2.

Similar to threatened flora, habitats for threatened fauna species within the subject land are largely considered degraded due to the high degree of agricultural disturbance within the landscape. As such, much of the vegetated areas within the development footprint are comprised of exotic grasses and planted native vegetation, which generally do not provide habitat for threatened fauna. The highest quality vegetation within the subject land includes moderate condition PCT 4052 located along the northern and eastern boundaries of the development site, which will mostly be retained within the development site and not directly impacted by the proposed development. This vegetation also shows sign of disturbance and edge effects including the lack of vegetative structure and a moderate level of weed ingress. The remaining patches of native vegetation within the subject land consist of disturbed communities in a relatively poor condition, including DNG and low condition PCT 4052 and low condition PCT 4009. These areas, although highly disturbed, may provide habitat for threatened frogs, mammals and birds.

Although the vegetation is highly disturbed within the subject land, hollow-bearing trees, stags, creeks, one dam, stick nests and human-made structures have the potential to provide habitat for threatened fauna. There are numerous hollow-bearing trees of varying sizes and heights, and stags within the subject land which provide suitable breeding habitat for threatened arboreal mammals, birds and microbats. The two creeks within the subject land provide suitable breeding and foraging habitat for threatened frogs and microbats. The dam, although not located along a natural watercourse and having minimal native macrophytes, may provide marginal dispersal or foraging habitat for threatened frogs or microbats. The residential dwelling which is proposed to be demolished is unlikely to provide habitat for threatened microbats due to the absence of suitable crevices, cracks or openings.

Table 16 provides a list of candidate fauna species credit species considered in this assessment, each species' required survey period and the relevant method of assessment. Further detail of the targeted surveys undertaken are provided below.

Table 16 Candidate fauna species credit species

Species name	Common name	Survey period	Method of assessment
Callocephalon fimbriatum	Gang-gang Cockatoo	October - January	• Dawn/dusk transect surveys

Species name	Common name	Survey period	Method of assessment
Calyptorhynchus lathami lathami	South-eastern Glossy Black-Cockatoo	April - August	• Dawn/dusk transect surveys
Cercartetus nanus	Eastern Pygmy-possum	October - March	• Arboreal remote camera trapping • Spotlighting
Myotis macropus	Southern Myotis	October - March	• Ultrasonic bat detector deployment
Haliaeetus leucogaster	White-bellied Sea-Eagle	July - December	• Stick nest searches
Hieraaetus morphnoides	Little Eagle	August - October	• Stick nest searches
Litoria aurea	Green and Golden Bell Frog	November - March	• Aural-visual surveys
Lophoictinia isura	Square-tailed Kite	September - December	• Stick nest searches
Ninox connivens	Barking Owl	All year	• Nocturnal call playback surveys
Ninox strenua	Powerful Owl	All year	• Nocturnal call playback surveys
Pandion cristatus	Eastern Osprey	April - November	• Stick nest searches
Petauroides volans	Southern Greater Glider	All year	• Arboreal remote camera trapping • Spotlighting
Petaurus norfolcensis	Squirrel Glider	All year	• Arboreal remote camera trapping • Spotlighting
Phascogale tapoatafa	Brush-tailed Phascogale	December - June	• Arboreal remote camera trapping • Spotlighting
Phascolarctos cinereus	Koala	All year	• Spot Assessment Technique (SAT) surveys • Spotlighting
Tyto novaehollandiae	Masked Owl	All year	• Nocturnal Call playback surveys

4.2.1 Threatened species survey details

Two rounds of targeted flora surveys were completed in June and December 2025 to inform the current assessment and threatened fauna surveys were undertaken from July 2025 to January 2026.

Weather observations for each survey date are shown in Table 17, using information from the Australia Government Bureau of Meteorology website for the local Moruya Heads Pilot Station (069018).

Table 17 Weather observations during targeted flora and fauna surveys (Moruya Heads Pilot Station, 069018)

Survey undertaken	Survey date	Temperature (°C)		Rain (mm)
		Min.	Max.	
• **Threatened Flora surveys (June)**	20/06/25	4.6	15.9	0
• **Cockatoo surveys**	07/07/25	9.0	17.8	13.8

Survey undertaken	Survey date	Temperature (°C)		Rain (mm)
		Min.	Max.	
• Cockatoo surveys • OWL CPB • Spotlighting	8/07/25	7.3	16.7	2.2
• Cockatoo surveys • OWL CPB • Spotlighting	9/07/25	7.1	17.3	0
• Cockatoo surveys • SAT Surveys • Arboreal Remote Camera trapping	10/07/25	8.0	15.5	0
• Arboreal Remote Camera trapping	11/07/25	6.1	19.8	0
• Arboreal Remote Camera trapping	12/07/25	6.6	16.5	0
• Arboreal Remote Camera trapping	13/07/25	5.7	16.5	0
• Arboreal Remote Camera trapping	14/07/25	7.0	17.2	0
• Arboreal Remote Camera trapping	15/07/25	6.8	16.9	0
• Arboreal Remote Camera trapping	16/07/25	4.6	17.5	0
• Arboreal Remote Camera trapping	17/07/25	5.0	15.5	0
• Arboreal Remote Camera trapping	18/07/25	5.2	15.6	0
• Arboreal Remote Camera trapping	19/07/25	5.2	17.2	0
• Arboreal Remote Camera trapping	20/07/25	4.3	17.0	0
• Arboreal Remote Camera trapping • Owl CPB	21/07/25	6.5	16.8	0
• Arboreal Remote Camera trapping • Owl CPB	22/07/25	8.1	19.0	0
• Arboreal Remote Camera trapping • Owl CPB	23/07/25	8.2	17.2	0.4
• Arboreal Remote Camera trapping • Owl CPB • SAT Surveys	24/07/25	4.0	16.4	0
• Stick Nest Searches • SAT Surveys	8/09/25	14.7	27.5	0
• Threatened Flora surveys (December)	18/12/25	16.1	25.7	0
• Cockatoo surveys (dusk) • Ultrasonic bat detector deployment • Arboreal Remote Camera trapping	12/01/2026	16.7	22.1	0
• Cockatoo surveys (dusk) • Spotlighting • Ultrasonic bat detector deployment • Arboreal Remote Camera trapping	13/01/2026	17.5	24.6	0
• Cockatoo surveys (dawn) • Frog aural visual surveys	14/01/2026	16.5	23.5	5.2

Survey undertaken	Survey date	Temperature (°C)		Rain (mm)
		Min.	Max.	
• Spotlighting • Ultrasonic bat detector deployment • Arboreal Remote Camera trapping				
• Cockatoo surveys (dawn) • Frog aural visual surveys • Ultrasonic bat detector deployment • Arboreal Remote Camera trapping	15/01/2026	18.4	21.8	9.2
• Ultrasonic bat detector deployment • Arboreal Remote Camera trapping	16/01/2026	17.9	22.0	30.6
• Arboreal Remote Camera trapping	17/01/2026	16.8	19.9	101.2
• Arboreal Remote Camera trapping	18/01/2026	15.7	21.8	0.2
• Arboreal Remote Camera trapping	19/01/2026	17.2	22.0	0.6
• Arboreal Remote Camera trapping	20/01/2026	15.8	22.7	0.4
• Arboreal Remote Camera trapping	21/01/2026	16.6	22.8	0
• Arboreal Remote Camera trapping	22/01/2026	17.6	22.7	0
• Arboreal Remote Camera trapping	23/01/2026	11.9	22.2	0
• Arboreal Remote Camera trapping	24/01/2026	16.8	24.6	0
• Arboreal Remote Camera trapping	25/01/2026	15.8	27.9	0
• Arboreal Remote Camera trapping	26/01/2026	17.5	24.5	0
• Frog aural visual survey • Arboreal Remote Camera trapping	27/01/2026	17.1	24.8	0
• Frog aural visual surveys • Arboreal Remote Camera trapping	28/01/2026	17.5	25.9	0
• Arboreal Remote Camera trapping	29/01/2026	17.6	25.5	0
• Arboreal Remote Camera trapping	30/01/2026	20.2	26.2	1.0
• Arboreal Remote Camera trapping	31/02/2026	20.1	26.2	0
• Arboreal Remote Camera trapping	1/02/2026	21.4	22.0	0.6
• Arboreal Remote Camera trapping	2/02/2026	11.2	21.0	3.6
• Arboreal Remote Camera trapping	3/02/2026	12.3	21.9	0
• Arboreal Remote Camera trapping	4/02/2026	15.6	25.2	0
• Arboreal Remote Camera trapping	5/02/2026	18.0	25.0	0
• Arboreal Remote Camera trapping	6/02/2026	16.3	24.5	0
• Arboreal Remote Camera trapping	7/02/2026	18.0	25.2	0
• Arboreal Remote Camera trapping	8/02/2026	18.1	22.5	0.2
• Arboreal Remote Camera trapping	9/02/2026	19.1	26.8	2.4
• Arboreal Remote Camera trapping	10/02/2026	17.8	25.2	0
• Arboreal Remote Camera trapping	11/02/2026	19.1	27.2	0

Details of surveys undertaken as part of the current assessment are provided below.

Threatened flora

An initial assessment was undertaken on 20 June 2025 to confirm mapping of broad scale vegetation types that was undertaken previously by Biosis on 7 July 2023 (as part of the constraints assessment). Targeted threatened flora surveys were undertaken in areas of suitable habitat by two ecologists over two survey periods on 20 June and 18 December 2025. Weather observations for these survey dates are shown above in Table 17.

Survey method and effort

A team of two ecologists walked through all suitable habitat for each target species at a 5-10 metre transect spacing over 6 person hours. The transect spacing is consistent with the spacing described within the *NSW Surveying threatened plants and their habitats* (DPIE 2020b). Figure 9 shows the targeted flora survey effort.

Justification of survey method and effort

Survey guidelines followed included:

- Section 5 of the BAM to determine the potential for threatened species identified under the BAM as 'ecosystem credit species' and 'species credit species' to occur (DPIE 2020a).
- *Threatened Biodiversity Survey and Assessment: Guidelines for Developments and Activities* (DEC 2004b).
- *Surveying threatened plants and their habitats NSW survey guide for the Biodiversity Assessment Method* (DPIE 2020b).

Survey effort was considered adequate for the area of potential habitat within the subject land and development footprint.

Timing of survey

Survey was conducted in relation to requirements in the TBDC survey guides.

Survey personnel and relevant experience

Targeted flora surveys were undertaken by the Biosis ecologists listed in Table 18.

Table 18 Targeted flora survey personnel and relevant experience

Staff member	Role	Relevant experience
Paul Price	Principal Botanist	Over 20 years' experience undertaking targeted flora surveys in New South Wales.
Rosie Gray	Senior Botanist	Over 4 years' experience undertaking targeted flora surveys in New South Wales.
Todd Horton	Botanist	Over 3.5 years' experience undertaking targeted flora surveys in New South Wales.

Results

Table 19 provides a summary of the results of the targeted flora surveys completed.

Table 19 Summary of targeted flora survey method and results

Species name	Common name		Survey results	Species Polygon (ha)
Cryptostylis hunteriana	Leafless Tongue Orchid	5-10 m wide parallel field traverses in suitable habitat	Not recorded during targeted surveys	Not required
Haloragis exalata* subsp. *exalata	Square Raspwort	5-10 m wide parallel field traverses in suitable habitat	Not recorded during targeted surveys	Not required
Rhodamnia rubescens	Scrub Turpentine	5-10 m wide parallel field traverses in suitable habitat	Not recorded during targeted surveys	Not required
Wilsonia backhousei	Narrow-leafed Wilsonia	5-10 m wide parallel field traverses in suitable habitat	Not recorded during targeted surveys	Not required

Paddy's River Box *Eucalyptus macarthurii,* listed as Endangered under both the EPBC Act and the BC Act, was recorded in a planted line of 17 juvenile individuals on the western side of the 3rd order creek during the targeted surveys. However, this species naturally occurs on the Central and Southern Tablelands between the Blue Mountains and Goulburn and does not naturally occur within the South East Corner IBRA bioregion (NSW DCCEEW 2025d). The subject land does not occur within its natural distribution, therefore the species' presence within the subject land is attributed to landscaping plantings, and of horticultural value only. Therefore, offsets for impacts to this species and further assessment is not required.

Limitations

No limitations were recorded while conducting the targeted flora surveys in June and December 2025. The weather was fine and sunny (no rainfall) and the vegetation within the subject land was very open, with no dense vegetation that may impede upon the ecologists' ability to spot threatened flora species. The Leafless Tongue Orchid was confirmed to be flowering at a site 50 kilometres north of the subject land in early December, and this population is considered a suitable reference population for the subject land.

Fauna habitat assessments

Fauna habitat assessment was undertaken to determine the presence of microhabitats and other critical habitat components (habitat constraints) suitable for all fauna species outlined in Table 16 and Appendix 2. Habitat assessments focussed on the presence of the following features within the subject land:

- Habitat trees including large and/or hollow-bearing trees, stick nests, availability of flowering shrubs and canopy/understorey feed tree species.
- Soil type and presence of cliffs, overhangs and other rocky areas.
- Human-made infrastructure such as buildings, culverts and sheds.
- Condition and type of native vegetation and the presence of exotic species.
- Presence and condition of pools, dams and waterways.
- Quantity of ground litter and woody debris.

- Searches for indirect evidence of fauna (i.e. feathers, tracks and scats).
- General degradation of the site as a result of past and current disturbances such as vegetation clearing and industrial land management practices.
- Topography and landscape morphology.

Several habitat features with potential to support threatened species credit species were identified during these habitat assessments. These features have been summarised in Table 20.

Table 20 Habitat features with potential to support threatened species credit species

Habitat feature	Presence within the development footprint
Hollow-bearing trees	Habitat trees supporting hollows of a variety of size classes from small (<50 mm diameter) through to large (> 150 mm diameter) were present across the subject land. These trees have the potential to provide breeding resources for a range of native fauna species including threatened cockatoos (South-eastern Glossy Black-Cockatoo and Gang-gang Cockatoo), owls (Barking Owl, Masked Owl, and Powerful Owl), arboreal mammals and microbats. Many of the hollow-bearing trees will be retained within the development design and are not expected to be impacted.
Stag trees	There were nine stag trees recorded within the subject land that may provide habitat for threatened birds and mammals. Many of these stag trees will be retained within the proposed development design.
Stick Nests	One large stick nest (likely a raptor nest) and numerous large mature trees suitable to house stick nests were recorded within the subject land during initial surveys. Although the stick nest appeared abandoned and old, threatened bird species that require stick nests for breeding habitat, such as the Little Eagle or White-bellied Sea Eagle, are likely to use the subject land as breeding habitat.
Feed tree species	A variety of tree species identified as Koala use trees within the South Coast Koala management area, which includes the subject land, were detected during the assessment. Trees and shrubs providing food resources for smaller mammals such as Eastern Pygmy-possum, Squirrel Glider, Brush-tailed Phascogale and Southern Greater Glider were also recorded. Feed trees for Gang-gang Cockatoo and South-eastern Glossy Back-cockatoo were also present within this vegetation. However, this vegetation was recorded as either disturbed linear strips of edge effected vegetation or scattered mature paddock trees.
Major and minor watercourses and waterbodies (i.e. dams)	Two creeks are present within the subject land; a 3rd order creek within the western section of the subject land and a 1st order creek within the north-eastern corner of the subject land. The creeks were recorded in generally poor condition with no flowing water and consisted of isolated turbid pools. There were native aquatic flora species recorded within these creeks which would provide habitat for threatened fauna. Due to the poor aquatic connectivity and riparian corridors of these ephemeral creeks, it is likely that these creeks do not provide habitat for true aquatic threatened species (e.g. Australian Grayling *Prototroctes maraena*) but provide suitable habitat for semi-aquatic species such as threatened frogs. One artificial waterbody (farm dam) was identified within the subject land, along the eastern boundary. The dam is considered to be in a degraded state due to historical agricultural practices. The dam contains very little native bank and emergent aquatic vegetation and is not located along a natural watercourse. The creeks and farm dam provide foraging habitat for microbats such as the Southern Myotis.
Human-made structures	There is one residential dwelling and three culverts within the subject land. The house did not have suitable cracks, crevices or openings that may provide roosting habitat for threatened microbats. Additionally, the chimney opening was covered preventing

Habitat feature	Presence within the development footprint
	threatened microbats, as well as other fauna, from entering the house. The culvert that allows the 3rd order creek to flow under Dwyers Creek Road was filled with water (thereby preventing roosting by microbats). The culvert that allows the 1st order creek to flow under Francis Street was newly constructed and did not have any cracks, crevices or openings that might provide roosting habitat for threatened microbats. Therefore, it is unlikely that threatened microbats are occupying the house or the culverts within the subject land. The house will be demolished as part of the proposed works, whereas the culverts will not be directly impacted.
Woody debris and leaf litter	Woody debris and leaf litter was limited throughout the subject land due to high levels of prior disturbance and clearing, providing poor habitat for threatened bird and frog species that rely on vegetative debris.
Rocky outcrops, sandstone crevices and caves	The surface geology within the subject land does not support rocky outcrops, sandstone crevices, or caves. Therefore, threatened birds or mammals (such as the Large Bent-winged Bat or Large-eared Pied-bat) that require these habitat features are unlikely to be utilising the subject land on any permanent basis.
Grey-headed flying fox camps	Grey-headed Flying-fox camps were not observed within the subject land during any of the surveys.

Field capture of detailed fauna habitat information allowed for confirmation of habitat features and microhabitats for a range of candidate threatened species across surveyed portions of the development footprint. Fauna habitat assessments were captured using ArcGIS polygons attributed with specific habitat criteria that allowed for planning of further targeted survey for select species, or the exclusion of the potential for occurrence of various candidate species from the subject land.

Nocturnal birds

Survey method and effort

Nocturnal bird surveys were undertaken to target the following species:

- Powerful Owl *Ninox strenua.*
- Barking Owl *Ninox connivens.*
- Masked Owl *Tyto novaehollandiae.*

Surveys were repeated over six nights in July 2025 and included:

- Call playback surveys were completed over 6 nights spread across two separate weeks (as recommended by TBDC guidelines) on the following dates: two nights from the 8 – 9 July 2025 and four nights from the 21-24 July 2025. See Figure 10 for the location of the call playback survey locations.
- Call play back was undertaken at two locations within the subject land; one in the western section and one in the eastern section of the study area. The two call playback sites were positioned approximately 500 metres apart, adjacent to suitable habitat. The guidelines within the TBDC (NSW DCCEEW 2025e) state that call playback locations should be located approximately 1000 metres apart. Two call playback points were undertaken, providing sufficient survey effort in accordance with the TBDC guidelines.
- Call playback surveys were undertaken at night during calm conditions (wind less than 29-38 hm/hr) and dry weather.

- Call playback and detection (spotlighting) included an initial 10-minute listening and observation period prior to broadcasting. Pre-recorded calls were then broadcasted for a period of 15 seconds, followed by a 30 second listening period. This process was repeated for a 15-minute period for each of the target owl species. The volume of each broadcast was increased from 20% of natural volume to 200% of natural volume with each repeated broadcast. This method was repeated for each owl species (3 times). Followed by fifteen minutes of listening and spotlighting in an area of approximately 1 hectare to search for any owls drawn in by the calls.
- At each survey location, owl calls were played in a sequence from Powerful Owl, Barking Owl, to Masked Owl in that order.

Justification of survey method and effort

Survey guidelines followed included:

- NSW BioNet Threatened Biodiversity Profile data collection (NSW DCCEEW 2025e).
- *BAM survey guidelines for Large Forest Owls* (NSW DCCEEW 2024f).
- *Survey guidelines for Australia's threatened birds* (DPIE 2020b).
- *Threatened Biodiversity Survey and Assessment - Guidelines for Developments and Activities* (DEC 2004b).

Survey effort was considered more than adequate for the area of potential habitat within the subject land and development footprint.

Timing of survey

Survey was conducted in relation to requirements in the TBDC survey guides.

Survey personnel and relevant experience

Nocturnal bird surveys were undertaken by the Biosis ecologists outlined in Table 21.

Table 21 Targeted nocturnal bird survey personnel and relevant experience

Staff member	Role	Relevant experience
Joel Nicholson	Senior Zoologist – Field Coordinator	Over five years' experience undertaking nocturnal bird surveys.
Rosie Gray	Senior Botanist	Over four years' experience undertaking nocturnal bird surveys.

Results

Table 22 provides a summary of the results of the nocturnal bird surveys completed. No nocturnal threatened birds were detected during surveys. Incidental records of non-threatened birds were also recorded and included an Owlet Nightjar *Aegotheles cristatus* which was heard calling during surveys.

Table 22 Summary of nocturnal bird survey method and results

Species name	Common name	Survey method	Survey results	Species Polygon (ha) or count
Ninox connivens	Barking Owl	Six nights call playback at two different call playback locations	Not recorded during targeted surveys	Not required

Species name	Common name	Survey method	Survey results	Species Polygon (ha) or count
		and spotlighting (transects) in areas of suitable habitat.		
Ninox strenua	Powerful Owl	Six nights call playback at two different call playback locations and spotlighting (transects) in areas of suitable habitat.	Not recorded during targeted surveys	Not required
Tyto novaehollandiae	Masked Owl	Six nights call playback at two different call playback locations and spotlighting (transects) in areas of suitable habitat.	Not recorded during targeted surveys	Not required

Limitations

No limitations were recorded while conducting the targeted nocturnal bird surveys in July 2025. The weather was fine and there was no clouds, fog, strong wind or rainfall that may impede upon the ecologists' ability to identify threatened bird species or cause the threatened species to alter their normal behaviour.

Diurnal birds

Survey method and effort

Targeted surveys for diurnal species listed in Table 16 include:

- Dusk/dawn transects surveys from 7 to 9 July 2025 for South-eastern Glossy Black-cockatoo.
- Stick nest searches in September 2025.
- Dusk/dawn transect surveys from 12 January to 15 for Gang-gang Cockatoo.
- Opportunistic daytime searches for species feeding within the subject land in June, July, September and December 2025, and in January 2026.

Further detail for the survey method and effort is provided in Table 24.

The focus of the diurnal bird survey is to determine potential nesting of South-eastern Glossy Black-cockatoo or Gang-gang Cockatoo within the subject land and to detect large stick nests which may indicate breeding of Little Eagle, White-bellied Sea-Eagle, Eastern Osprey and Square-tailed Kite.

Dusk/dawn searches were completed by two ecologists for three hours per day to detect any threatened diurnal birds within the subject land and observe if they are nesting on site. Searches consisted of searching for signing of breeding pairs or feeding (dropping of Black Sheoak *Allocasuarina litoralis*). Transects were undertaken with observers walking approximately two kilometres per hour. All species encountered were recorded, a fauna species list is provided in Appendix 4.

Stick nest surveys were completed by an ecologist walking the subject land searching for nests in trees, occupied nests, or mating displays by raptor species.

Justification of survey method and effort

Survey guidelines followed included:

- NSW BioNet Threatened Biodiversity Profile data collection (NSW DCCEEW 2025e).
- *Survey guidelines for Australia's threatened birds* (DPIE 2020b).
- *Threatened Biodiversity Survey and Assessment - Guidelines for Developments and Activities* (DEC 2004b).

NSW DCCEEW is developing survey guidance for many threatened bird species (DPE 2023b). Methods employed as part of this assessment included:

- Cockatoo dusk/dawn surveys:
  - Survey for the presence of eucalypts containing hollows that are at least 9 m above the ground, and with hollow diameter of 10 cm or larger.
  - Survey for signs of feeding (dropping of Black Sheoak seeds).
  - Survey for signs of breeding birds.
  - Survey for signs of roosting and dispersal within the subject land.
- Stick nest searches:
  - Survey for the presence of nest trees supporting large stick nests, confirm if in use. Search for evidence of use including prey remains and feathers below the nest.
  - Survey for the presence of breeding pairs displaying breading behaviours (souring, diving, chasing or male in flight and a female begging from a tree), any adult with nesting material or an individual on a large stick nest.

Currently, the TBDC stipulates a staged approach for the detection of breeding. This includes the identification of signs of breeding (presence of the species during breeding season) and potential nest trees (suitable hollow-bearing trees).

Timing of survey

Survey was conducted in relation to requirements in the TBDC survey guides.

Survey personnel and relevant experience

Diurnal bird surveys were undertaken by the Biosis ecologists outlined in Table 23.

Table 23 Targeted diurnal bird survey personnel and relevant experience

Staff member	Role	Relevant experience
Joel Nicholson	Senior Zoologist – Field Coordinator	Over five years' experience undertaking diurnal bird surveys including stick nest surveys, habitat tree identification and cockatoo searches.
Rosie Gray	Senior Botanist	Over four years' experience undertaking diurnal bird surveys including stick nest surveys, habitat tree identification and cockatoo searches.
Jemma Giuliano	Graduate Ecologist	Over one years' experience undertaking diurnal bird surveys including stick next surveys, habitat tree identification and cockatoo searches.

Results

Table 24 provides a summary of the results of the diurnal bird surveys completed. No diurnal threatened birds were recorded during surveys. Numerous non-threatened diurnal birds were incidentally recorded during surveys; a list of all birds recorded within the subject land is found in Appendix 4.

Table 24 Summary of diurnal bird survey method and results

Species Name	Common name	Survey method	Survey results	Species Polygon (ha) or count
Calyptorhynchus lathami lathami	South-eastern Glossy Black-cockatoo	Dusk/dawn searches for nesting in areas identified with potential nest trees on the 7th, to 9th July 2025.	Not recorded during surveys	Not required
Callocephalon fimbriatum	Gang-gang Cockatoo	Dusk/dawn searches for nesting in areas identified with potential nest trees on the 12th, to 15th January 2026.	Not recorded during surveys	Not required
Haliaeetus leucogaster	White-bellied Sea-Eagle	Visual searches for large stick nests in September 2025.	Not recorded during surveys	Not required
Hieraaetus morphnoides	Little Eagle	Visual searches for large stick nests in September 2025.	Not recorded during surveys	Not required
Lophoictinia isura	Square-tailed Kite	Visual searches for large stick nests in September 2025.	Not recorded during surveys	Not required
Pandion cristatus	Eastern Osprey	Visual searches for large stick nests in September 2025.	Not recorded during surveys	Not required

Limitations

No significant limitations were recorded while conducting the targeted diurnal bird surveys in July and September 2025 and January 2026. The weather was generally fine and sunny with no fog or clouds that may impede upon the ecologists' ability to identify threatened bird species or cause the threatened species to alter their normal behaviour. Rainfall was recorded on the 7 and 8 of July 2025 (Table 17), however did not occur within the subject land during the cockatoo surveys. Rainfall was also recorded on the 14 and 15 of January 2026, however only consisted of light showers during the cockatoo surveys during these two days. The cockatoo surveys conducted on the 12 and 13 of January were undertaken during optimal sunny conditions with no rainfall.

Mammals

Survey method and effort

Targeted surveys for the mammal species listed in Table 16 include:

- Spotlighting was undertaken for four nights in total (8 - 9 July 2025 and 13 – 14 January 2026) to determine presence of mammals within the development footprint.
- Arboreal Camera trapping was undertaken over 14 nights from 10 July 2025 to 24 July 2025 and over one month from the 12 January to 11 February 2026.
- Three Koala Spot Assessment Techniques (SAT) surveys were undertaken to detect presence and use of feed trees within the subject land.

Further detail for the survey method and effort for each survey is provided in the corresponding sections below.

Arboreal Baited Remote Camera trapping

The surveys in July 2025 included the deployment of seven baited remote cameras, mounted to target arboreal species and deployed for a minimum of two weeks. The surveys in January to February 2026 included the deployment of 12 baited remote cameras, mounted to target arboreal species and deployed for a minimum of one month. Arboreal cameras were mounted to trees at a height greater than 1.5 metres from the ground, facing a bait station mounted on an adjacent tree between one and four metres away. During the January and February 2026 surveys, the camera trap baits were replaced after two weeks.

Seven arboreal cameras were deployed throughout the subject land from 10 July 2025 to 24 July 2025 and 12 arboreal cameras were deployed from 12 January to 11 February 2026. The location of camera traps are shown on Figure 10.

Spotlighting

Four spotlight transect surveys of two hours each, over a two kilometre transect were undertaken within the subject land. The spotlight survey effort was undertaken for arboreal mammals and was conducted in addition to incidental/general observations which may be made as ecologists move around the subject land during diurnal bird transect surveys, nocturnal owl and frog call playback surveys.

Spotlighting surveys were undertaken for a total of four nights on 8 and 9 July 2025 and 13 and 14 January 2026. Spotlighting transects are shown on Figure 10.

Koala Spot Assessment Techniques (SAT) surveys

SAT surveys are the Commonwealth recommended survey method used to determine the presence/absence of Koalas across the assessment area, the activity levels to determine resident aggregation and/or transient sites, the population density and size, and habitat availability. Searches are undertaken to identify direct/indirect evidence of activity of Koala including evidence of scats or characteristic, scratches on the trunks of trees. Preferred Koala feed trees were recorded during flora surveys and during the habitat feature surveys.

SAT survey points are located at the intersection of grid lines with a 150 metre spacing between lines. Where the grid intersections do not fall within the alignment, the point will be shifted across to fall within properties which have land access agreements. A feed tree is selected as close as possible to the proposed SAT location

and the 29 closest trees are searched. Each tree is inspected for signs of Koala use (urine stains, scratches, Koala present) followed by a search of the area surrounding the tree for koala scat. A radius of one metre around the tree is searched for Koala scat and trees are searched for an average of two minutes each, noting larger trees will require a longer search time than smaller trees.

Three Spot Assessment Technique (Phillips & Callaghan 2011) survey points (SAT surveys) were undertaken to determine activity levels for Koala in well-timbered areas.

The data collected and photos of the focal tree for each of the three SAT surveys are provided in Appendix 6. The location of each Koala SAT surveys is provided on Figure 10.

Justification of survey method and effort

Survey guidelines followed include:

- *Threatened Biodiversity Survey and Assessment: Guidelines for Developments and Activities* (DEC 2004a).
- *Survey Guidelines for Australia's Threatened Mammals* (DEWHA 2011).
- *Koala* (*Phascolarctos cinereus) Biodiversity Assessment Method Survey Guide* (DPE 2022a).

Timing of survey

Survey was conducted in relation to requirements in the TBDC survey guides.

Survey personnel and relevant experience

Arboreal mammal surveys were undertaken by the Biosis ecologists outlined in Table 25.

Table 25 Targeted mammal survey personnel and relevant experience

Staff member	Role	Relevant experience
Joel Nicholson	Senior Zoologist – Field Coordinator	Over five years' experience undertaking mammal surveys including remote camera set up, nocturnal spotlighting and Koala SAT surveys.
Rosie Gray	Senior Botanist	Over four years' experience undertaking mammal surveys including remote camera set up, nocturnal spotlighting and Koala SAT surveys.
Jemma Giuliano	Graduate Ecologist	Over one years' experience undertaking mammal surveys including remote camera set up, nocturnal spotlighting and Koala SAT surveys.

Results

Table 26 provides a summary of the results of the mammal surveys completed. No threatened mammals were detected during spotlighting, arboreal camera trapping or Koala SAT surveys.

Table 26 Summary of mammal survey method and results

Species name	Common name	Survey method	Survey results	Species Polygon (ha) or count
Cercartetus nanus	Eastern Pygmy-possum	• Arboreal Remote camera trapping • Spotlighting	Not recorded during surveys	Not required

Species name	Common name	Survey method	Survey results	Species Polygon (ha) or count
Petauroides volans	Southern Greater Glider	• Arboreal Remote camera trapping • Spotlighting	Not recorded during surveys	Not required
Petaurus norfolcensis	Squirrel Glider	• Arboreal Remote camera trapping • Spotlighting	Not recorded during surveys	Not required
Phascogale tapoatafa	Brush-tailed Phascogale	• Arboreal Remote camera trapping • Spotlighting	Not recorded during surveys	Not required
Phascolarctos cinereus	Koala	• SAT surveys • Spotlight	Not recorded during surveys	Not required

Several of the hollow-bearing trees were recorded to be occupied by non-threatened Common Brushtail Possums *Trichosurus vulpecula* (Photo 9) during nocturnal spotlighting surveys and recorded on the camera traps. The prevalence of the Common Brushtail Possum throughout the subject land and within many of the hollow-bearing trees indicates that most of the breeding habitat for other arboreal mammals is unavailable for use at the time of the surveys. The non-threatened Sugar Glider *Petaurus breviceps* and Brown Antechinus *Antechinus stuartii* were also recorded on the camera traps during the January to February 2026 survey period. Numerous Eastern Grey Kangaroos *Macropus giganteus* were detected during day surveys, spotlighting surveys and recorded on the camera traps.

Photo 9 Common Brushtail Possum detected during nocturnal surveys

Limitations

No limitations were recorded while conducting the targeted mammal surveys in July 2025 and January and February 2026. The weather was fine, with generally no rainfall, clouds, fog or strong winds, that may impede upon the ecologists' ability to identify threatened mammal species or cause the threatened species to alter their normal behaviour. Furthermore, most of the vegetation within the subject land is thinned and not overly dense, allowing good visibility for spotting mammals.

Amphibians

Survey method and effort

Detailed habitat assessments were undertaken for waterways and other waterbodies considered to potentially provide habitat to the candidate frog species, Green and Golden Bell Frog. Suitable habitat included the two creeks and the farm dam and these habitats were targeted during the surveys.

Targeted survey was undertaken with call playback and detection on the following dates; 14 to 15 and 27 to 28 January 2026. These dates allow for the required minimum 14 day period between the first and last survey as per the BAM frog guidelines (DPIE 2020c).

The following methodology was implemented during each targeted survey:

- An initial five-minute period of passive listening, at the start of the transect, to detect and identify calling frogs present at the site.
- At each 50 m interval along a 500 m transect (or pro rata length transect) a five minute passive listening period (call detection) was completed followed by two minutes of call playback and an additional two minutes of listening for each of the target species.
- Each interval was followed by a slow walking visual spotlighting inspection for five minutes where suitable habitat was searched with torches.
- Tadpole searches were ruled out due to the presence of Eastern Mosquitofish *Gambusia holbrooki* which are known predators of Green and Golden Bell Frog tadpoles (DPIE 2020c).

Justification of survey method and effort

Survey guidelines followed include:

- *Survey Guidelines for Australia's Threatened Frogs* (DEWHA 2010).
- *NSW Survey Guide for Threatened Frogs: A Guide for the Survey of Threatened Frogs and their Habitats for the Biodiversity Assessment Method* (DPIE 2020c).

Timing of survey

Survey was conducted in January 2026, which is consistent with the requirements in the TBDC survey guides.

Survey personnel and relevant experience

Amphibian surveys were undertaken by the Biosis ecologists outlined in Table 27.

Table 27 Targeted frog survey personnel and relevant experience

Staff member	Role	Relevant experience
Joel Nicholson	Senior Zoologist – Field Coordinator	Joel has over five years' experience conducting frog surveys, and specifically Green and Golden Bell Frog surveys.
Rosie Gray	Senior Botanist	Rosie has over four years' experience conducting frog surveys, and specifically Green and Golden Bell Frog surveys.
Jemma Giuliano	Graduate Ecologist	Jemma has over one year of experience conducting frog surveys, and specifically Green and Golden Bell Frog surveys.

Results

Table 28 provides a summary of the results of the amphibian surveys completed. No Green and Golden Bell Frogs or any other threatened frog species were detected during the aural visual surveys. Furthermore, Eastern Mosquitofish were recorded to be abundant in the 3rd order creek. The presence of this invasive fish decreases the likelihood of Green and Golden Bell Frog being present within the subject land as this species is a known predator of Green and Golden Bell Frog tadpoles and Green and Golden Bell frog are unlikely to breed in habitats where the Eastern Mosquitofish is present (DPIE 2020c). The Common Eastern Froglet *Crinia signifera,* Spotted Marsh Frog *Limnodynastes tasmaniensis*, Peron's Tree Frog *Litoria peronii*, Whistling Tree Frog *Litoria verreauxii* and Eastern Dwarf Tree Frog *Litoria fallax*, were incidentally recorded within the subject land during these surveys. These species are all common frog species that are typically found in urban creeks and dams. Non-threatened native fauna species recorded within the farm dam during frog surveys included the Southern Short-finned Eel *Anguilla australis* and Eastern Snake-necked Turtle *Chelodina longicollis.*

Table 28 Summary of amphibian survey method and results

Species name	Common name	Survey method	Survey results	Species Polygon (ha) or count
Litoria aurea	Green and Golden Bell Frog	• Aural visual surveys	Not recorded during surveys	Not required

Limitations

No limitations were recorded while conducting the targeted amphibian surveys in January 2026. The weather was fine, with some light rainfall, which is favourable for detecting Green and Golden Bell Frog as they are known to call and be active during rainfall events.

Microbats

Survey method and effort

Ultrasonic call analysis was undertaken using Anabat Insight software and relevant published reference call guides (Pennay et al. 2004). Analysis was run through custom filters/a decision tree to remove noise (frequencies below 7kHz) and files/passes with less than three pulses. The custom decision tree/filter was then run using characteristic frequency and duration to identify calls to genus, or species level where possible.

Any calls identified by the system as significant or uncommon species were checked manually against the NSW reference calls, by visual comparison of sonograms with published reference calls by an experienced bat expert, to ensure accurate results. In addition, calls were chosen for manual vetting from each species/genus grouping for quality assurance of data.

Justification of survey method and effort

Targeted survey for the threatened microbat species included the use of four ultrasonic detectors over four nights (12 – 16 January 2026). The total survey effort of 16 nights meets the survey requirements specified in *'Species credit' threatened bats and their habitats* (OEH 2018). The detectors were set to record 30 minutes before sunset and stop 30 minutes after dawn. Units were placed in a position that maximised the likelihood of recording bats in accordance with the guidelines (along waterways, dams and in flyways).

Timing of survey

Survey was conducted in January 2026, which is consistent with the requirements in the TBDC survey guides.

Survey personnel and relevant experience

Microbat surveys were undertaken by the Biosis ecologists outlined in Table 27.

Table 29 Targeted microbat survey personnel and relevant experience

Staff member	Role	Relevant experience
Felicity Wiliams	Senior Zoologist (Bat Ecology)	Over nine years' experience in undertaking threatened microbat surveys and bat call identification.
Joel Nicholson	Senior Zoologist – Field Coordinator	Joel has over five years' experience in undertaking threatened microbat surveys, including set up of ultrasonic detectors.
Jemma Giuliano	Graduate Ecologist	Jemma has over one year of experience in undertaking threatened microbat surveys, including set up of ultrasonic detectors.

Results

Table 30 provides a summary of the results of the microbat surveys completed. A complete report of the microbat survey can be found in Appendix 7.

Table 30 Summary of microbat survey method and results

Species name	Common name	Survey method	Survey results	Species Polygon (ha) or count
Myotis macropus	Southern Myotis	• Ultrasonic recording devices • 12- 16 January 2026	Recorded (assumed present). Southern Myotis was recorded as part of a species group within the study area. Calls for these species are difficult to separate from the common Long-eared Bats	Total impact is 1.31 ha: • 1.07 ha full loss • 0.24 ha partial loss

Species name	Common name	Survey method	Survey results	Species Polygon (ha) or count
			(Nyctophilus spp.) and in the absence of diagnostic features, calls couldn't be confirmed to species level. However, given that there is suitable foraging and roosting habitat present at the site (hollow-bearing trees, the farm dam and the two creeks), as well as possible calls, Southern Myotis is likely to be utilising the study area and has been assumed present based off this information.	

Limitations

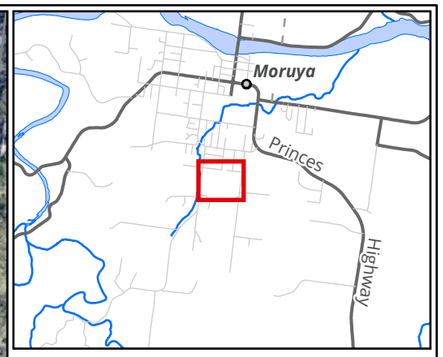
The Microbat Assessment Report in Appendix 7 discusses limitations.

4.2.2 Incidental flora and fauna surveys

Over 100 Grey-headed Flying-fox individuals were recorded flying over the subject land during dusk diurnal bird surveys on the 12 January 2026 and during amphibian surveys on 27 January 2026. One individual was incidentally recorded foraging and dispersing through the subject land, however they are likely from the mapped camp located approximately 6 kilometres east of the subject land and were travelling away from their camp to forage for the night. No Grey-headed Flying-fox breeding camps were observed within the subject land.

No other threatened fauna species were incidentally recorded within the subject land.

There was no threatened flora, other than Paddy's River Box, recorded incidentally during surveys.



Legend

- Subject land
- Development footprint
- Development site

Targeted flora survey tracks

- June 2025
- December 2025

Figure 9 Targeted flora species

0 100

Metres

N

Scale: 1:2,200 @ A3

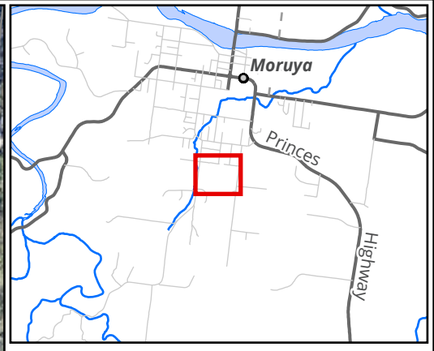
Coordinate System: GDA2020 MGA Zone 56

biosis

APEM Group

Matter: 42335, Date: 17 March 2026
Prepared for: RG, Prepared by: JB, Last edited by: jbeckius
Location: P:\42300s\42335\Mapping\42335_SpencerStMoruya_BDAR_Part2.aprx
Layout: 42335_F9_TrgFlora

Acknowledgements: Basemap © Land and Property Information 2016, Imagery © NearMap 2025



Legend

- Subject land
- Development footprint
- Development site

Fauna surveys

- Koala SAT survey

Arboreal mammals

- Camera trap - July 2025
- Camera trap - January 2026
- Spotlighting transect - July 2025
- Spotlighting transect - January 2026

Diurnal birds

- Stick nest search - daytime transect
- Gang-gang Cockatoo - dusk/dawn surveys
- South-eastern Glossy Black-cockatoo - dusk/dawn surveys

Frogs

- Call playback point
- Call playback transect

Microbats

- Ultrasonic detector

Owls

- Call playback point

Figure 10 Targeted fauna species

0 100

Metres

N

Scale: 1:2,200 @ A3

Coordinate System: GDA2020 MGA Zone 56

biosis

APEM Group

Matter: 42335, Date: 17 March 2026
Prepared for: RG, Prepared by: JB, Last edited by: jbeckius
Location: P:\42300s\42335\Mapping\42335_SpencerStMoruya_BDAR_Part2.aprx
Layout: 42335_F10_TrgFauna

Acknowledgements: Basemap © Land and Property Information 2016, Imagery © NearMap 2025

4.2.3 Local data

Under Section 5 of the BAM (DPIE 2020a), an assessor may use local appropriate data from relevant published sources (instead of data from the TBDC) when assessing the habitat suitability for threatened species. No such local data has been used for either the benchmarking of PCTs or the threatened species assessment.

4.2.4 Expert reports

Sections 5.2 and 5.3 of the BAM outlines that an expert report may be obtained instead of undertaking a species survey for a project, where the expert report is prepared by a person who, in the opinion of the Environment Agency Head, possesses specialised knowledge based on training, study or experience to provide an expert opinion in relation to the biodiversity values to which an expert report relates (DPIE 2020a).

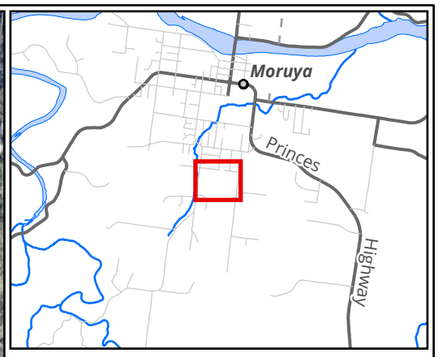
No expert reports were utilised for the current assessment.

4.2.5 Threatened species summary and polygons

Table 31 provides details of threatened species impacted by the project and outlines the attributes that comprise the threatened species polygons. It is to be noted that the species listed in Table 31 are currently assumed present within the subject land. The species polygons for these threatened species is illustrated in Figure 11.

Table 31 Threatened species (assumed present) polygons within the development footprint

Threatened species (assumed present)	Impact (ha)	Unit of measure	Biodiversity risk weighting	Polygon attributes
Southern Myotis	Total impact is 1.31 ha: • 1.07 ha full loss • 0.24 ha partial loss	Area	2.00	The species polygon was calculated by area of suitable wooded habitat, this includes PCT 4052 (low and moderate) and PCT 4009 (low) within 200 metres from the top of bank of the 1st order creek, 3rd order creek and farm dams. The vegetation within the management zone 4052_pl that is assessed as partial impacts has been included within the species polygon for this species as future impacts to the mid-storey and groundcover of this vegetation will likely decrease the quality of this vegetation as habitat. Therefore, the management zone 4052_pl has been assessed for partial loss,rather than total loss for the species polygon for the Southern Myotis.



Legend

- Subject land
- Development footprint
- Development site

Threatened species polygon

- Southern Myotis

Figure 11 Threatened species polygon

0 100

Metres

N

Scale: 1:2,200 @ A3

Coordinate System: GDA2020 MGA Zone 56

biosis

APEM Group

Matter: 42335, Date: 17 March 2026
Prepared for: RG, Prepared by JB, Last edited by: jbeckius
Location: P:\42300s\42335\Mapping\42335_SpencerStMoruya_BDAR_Part2.aprx
Layout: 42335_F11_TSP

Acknowledgements: Basemap © Land and Property Information 2016, Imagery © NearMap 2025

Stage 2 — Impact assessment (Biodiversity Values)

5 Avoid and minimise impacts

This section demonstrates the efforts to avoid and minimise impacts on biodiversity values (including prescribed impacts) associated with the subject land in accordance with BAM, including an analysis of alternatives:

- Modes or technologies that would avoid or minimise impacts on biodiversity values and justification for selecting the proposed mode or technology.
- Routes that would avoid or minimise impacts on biodiversity values and justification for selecting the proposed route.
- Alternative locations that would avoid or minimise impacts on biodiversity values and justification for selecting the proposed location.
- Alternative sites within a property on which the proposal is located that would avoid or minimise impacts on biodiversity values and justification for selecting the proposed site.
- Efforts to avoid and minimise impacts (including prescribed impacts) to biodiversity values through proposal design.
- Site constraints that have been considered in determining the location and design of the proposed development.

5.1 Actions to avoid/minimise project impacts

The principal means to reduce impacts on biodiversity values within the development site is to avoid and/or minimise the removal of native vegetation and fauna habitat. Impacts associated with the clearing of native vegetation and/or threatened species habitat can be said to be largely avoided and minimised by:

- Development site selection.
- The proposed development within areas that lacks significant biodiversity values.
- In areas where native vegetation and threatened species habitat is impacted, it is predominantly within sections that have low vegetation integrity scores (<40), and primarily disturbs areas of exotic vegetation and NOG.
- Avoids direct impacts to several of the identified hollow-bearing trees and several large trees (DBH).
- Minimises impacts to high biodiversity values including the moderate condition vegetation and two creeks.

The final development footprint displays all direct impacts to biodiversity values and is provided in Figure 12 and areas of avoidance within the development site to biodiversity values is provided in Figure 13. Further detail in the approaches utilised in the project to avoid and minimise impacts to biodiversity values is provided below.

Site selection

Site selection is a significant first step at the commencement of a project to avoid and minimise impacts to high biodiversity values and ensure the development site is suitable for development. From the beginning of the development, site attainment and design process, the proponent has exercised their due diligence by selecting a development site based on its existing degraded state and in consideration of its prior use. The

development site has been historically used agricultural purposes, as well as the surrounding landscape. Site selection consideration ensures that the proposed development aligns with the existing land use of the local setting, and avoids encroachment on previously unimpacted, high-quality natural habitats. The development site has been previously cleared of almost all high-quality vegetation and predominantly consists of cleared grasslands and pastures, making it relatively suitable for future development.

The decision for the proponent to purchase the development site was also influenced by the rezoning that occurred in 2012 by Council, from Urban Expansion 10 to R2: Low Density Residential and R3: Medium Density Residential, to accommodate future urban development in the area. The development site is also situated in close proximity (within 3 kilometres) to the new Eurobodalla Regional Hospital that is currently being built.

Development footprint design

The development footprint was designed with regard to the biodiversity values recorded within the development site. The proponent organised for a constraints assessment of the biodiversity values within the development site to provide guidance and advice during the development design phase. A constraints assessment completed by Biosis (2023) highlighted high biodiversity values to avoid and retain within the development site and areas of low biodiversity values that do not provide suitable habitat for any threatened entities that are more suitable for development. The proponent utilised this information within the design process and aimed to avoid and minimise impacts to high biodiversity values as much as possible. This included the avoidance and minimisation of impact to the following:

- TECs
- Natural waterways and associated riparian corridors
- Native vegetation
- Habitat trees

The process of designing the development footprint for the seniors housing development has been guided by Design with Country format that incorporates cultural ideas within the design process. A key focus of this design process is to retain and enhance the natural environment within the development design. Therefore, furthering the aim of the development to retain the natural elements and reduce impacts to the biodiversity values, as much as feasible whilst still facilitating the development, within the development design.

Throughout the design of the project, numerous options have been developed. The final development footprint was designed in consideration of the high ecological constraints recorded in the development site. Elements of the proposed development plan have been repositioned or removed from the design to avoid significant tree removal and to avoid significant impacts to the creeks and associated riparian corridors. An arborist report provided in late 2025 outlined that many of the significant habitat trees would be impacted by the current design. After consultation, the design was then altered slightly to retain many of these habitat trees throughout the seniors housing development by reducing the level of root encroachment on these trees, thereby reducing the amount of native vegetation to be impacted. During late 2025, additional impacts to the 3rd order creek, consisting of the lowering of sediment of the creek banks to aid in flood management was proposed. These proposed earthworks were expected to impact a large area of the creek, including PCT 4009 (consistent with Swamp Sclerophyll Forest [EEC, BC Act]), and were assessed as to potentially cause significant hydrological changes within the creek and further downstream. Therefore, this design feature was avoided after careful consultation. The final development footprint has undergone many revisions and currently avoids impacts to many of the high constraints within the development site.

Avoidance of TECs

Overall, the project will avoid direct impacts to 4.08 hectares of native vegetation within the development site. The design prioritised retention of moderate condition PCT 4052 (consistent with EPBC Act and BC Act listed TECs) that is located along the northern and eastern boundaries of the development site, providing a continuous habitat corridor for flora and fauna. Where avoidance measures were considered, and trees selected for retention, the design prioritised the retention of clusters of trees and canopy corridors, rather than isolated individual trees. This approach minimises impacts to habitat connectivity and protects the highest quality vegetation and habitat for threatened species within the subject land, maintaining species movement throughout the development site post-development. Although there will be minor clearing (0.04 hectares) of this vegetation and partial loss impacts to the management zone 4052_pl (0.24 hectares) within the vegetation along the eastern boundary, most of the moderate condition PCT 4052 and EPBC Act CEEC *Illawarra and south coast lowland forest and woodland ecological community* will not be impacted. Indirect and prescribed impacts to this retained vegetation will be minimised through mitigation measures, such as exclusion fencing and weed management, outlined in section 7 and in the proposed CEMP and VMP.

Avoidance of habitat trees

Significant habitat trees identified during field investigations undertaken as part of the constraints assessment and this biodiversity assessment were prioritised for retention and avoidance within the development design, where possible. A total of 18 hollow bearing trees and 7 stags will not be directly impacted within the subject land, which represents approximately 69% and 78% of hollow bearing trees and stag trees (respectively) avoided by the project. These hollows and stags provide potential breeding and roosting habitat for Southern Myotis, as well as non-threatened hollow dwelling fauna (birds and mammals). Where removal of hollow-bearing trees is deemed unavoidable, a two-stage process will be implemented to minimise potential impacts on hollow-dependent fauna. This process will involve an initial pre-clearance inspection to identify and mark hollows, followed by a staged removal where hollows are either left in place for 24-48 hours to allow fauna to self-relocate or are inspected and managed under the supervision of a qualified ecologist. This approach mitigates potential injury or displacement of fauna and aligns with best practice guidelines for hollow removal. Further detail is provided in Section 7.

Avoidance of waterways and associated riparian corridors

The two creeks will be mostly avoided and retained within the development design with a 15 metre riparian corridor for the 3rd order creek and a 5 metre riparian corridor for the 1st order creek. Consultation has been undertaken with the DPHI regarding the recommended riparian corridor widths and a riparian advice letter completed by Biosis (Biosis 2025) and a letter completed by Ethos Urban (Ethos Urban 2025) were reviewed by DPHI (further detail is provided in Sections 10.4.1 and 10.8). These riparian corridor buffers will retain the riparian connectivity and drainage throughout the subject land. All major proposed works will be restricted to outside of these protected riparian corridors to ensure impacts to the creeks are minimised. The riparian corridors of both creeks will be managed in accordance with a Vegetation Management Plan (VMP) and the NSW DCCEEW guidelines for VMPs on waterfront land (NSW DCCEEW 2025f). Both creeks will be rehabilitated and regenerated, to certain extents (the 3rd order creek will function as an APZ) with species associated with the local PCTs 4052 and 4009 which will improve the habitat for threatened and non-threatened flora and fauna. Although there are some structures (culvert, footbridge, paths) proposed within the riparian corridors and channels of these creeks, the bulk of the development will be restricted to outside of these protective buffers. Indirect and prescribed impacts to the two creeks will be managed in accordance with mitigation measures within the proposed Construction Environmental Management Plan (CEMP) and VMP. These measures are detailed further in Section 7 of this report.

Avoidance of native vegetation

The impacts to vegetation are mostly restricted to the historically cleared NOG and DNG, as well as exotic vegetation. NOG is not associated with a TEC or threatened species habitat and provides minimal ecological value. While DNG does align with a TEC, these modified patches of vegetation are highly degraded and missing significant stratums and structure (canopy and mid-storey) and therefore also provide minimal ecological value. The design process has focused on restricting most of the direct impacts to these areas to facilitate the seniors housing development, whilst also prioritising retaining and protecting areas of high biodiversity value.

Landscaping and regeneration within the development footprint

The land is proposed to be landscaped utilizing locally occurring native species that are characteristic of the PCTs identified within the subject land, including PCT 4052 and PCT 4009. These PCTs are also characteristic of the two BC Act listed EECs: *Lowland Grassy Woodland in the South East Corner Bioregion* and *Swamp Sclerophyll Forest on Coastal Floodplains of the New South Wales North Coast, Sydney Basin*, and landscaping with species associated with these PCTs will allow for an increase in patch size of these EECs.

The two creeks and associated riparian corridors will also be regenerated through planting of species associated with the local PCTs (PCTs 4009 and 4052) in accordance with a VMP to be completed for the subject land.

Construction decisions and technologies

Construction decisions and technologies are another key component to applying avoid and minimize measures to biodiversity values. The landscaping and site grading is to be completed to retain the bulk of the earthworks onsite and minimize the importation of fill from areas outside of the development site. This will reduce the possibility of introducing or increasing invasive weeds, pathogens or diseases within the subject land. Preventing the introduction of these harmful impacts and reducing their spread will minimize the potential impacts to TEC's and threatened species within the subject land. Appropriate hygiene practices will be outlined within the proposed CEMP which will aid in reducing these impacts, further detail is provided in Section 7.

Recommendations are provided in Section 7 of this BDAR which include measures to mitigate residual impacts after all measures to avoid and minimise impacts have been considered.

The final proposal footprint (including construction and operation) as well as demonstrating prescribed impacts and indirect impact zones where applicable is shown in Figure 14 and Figure 15.

Legend

- Subject land
- Development footprint
- Development site
- Hollow-bearing tree - To be removed
- Hollow-bearing tree - To be retained
- Stag - To be removed
- Stag - To be retained
- Stick nest

Threatened species polygon

- Southern Myotis

Management zone

- 4052_pl
- 4052_tl

Vegetation zone

- VZ1 - 4052_Moderate
- VZ2 - 4052_Low
- VZ3 - 4052_DNG
- VZ4 - 4052_NOG
- VZ5 - 4009_Low

Threatened ecological community

- Swamp Sclerophyll Forest on Coastal Floodplains of the New South Wales North Coast, Sydney Basin and South East Corner bioregions (EEC, BC Act)
- Lowland Grassy Woodland in the South East Corner Bioregion (EEC, BC Act)
- Illawarra and south coast lowland forest and woodland ecological community (CEEC, EPBC Act)

Figure 12 Final development footprint

0 100

Metres

N

Scale: 1:2,200 @ A3

Coordinate System: GDA2020 MGA Zone 56

biosis

APEM Group

Matter: 42335, Date: 17 March 2026
Prepared for: RG, Prepared by JB, Last edited by: jbeckius
Location: P:\42300s\42335\Mapping\42335_SpencerStMoruya_BDAR_Part2.aprx
Layout: 42335_F12_FinalDF

Acknowledgements: Basemap © Land and Property Information 2016, Imagery © NearMap 2025

Legend

- Subject land
- Development footprint
- Development site
- Areas of avoidance
- Hollow-bearing tree - To be removed
- Hollow-bearing tree - To be retained
- Stag - To be removed
- Stag - To be retained
- Stick nest

Management zone

- 4052_pl
- 4052_tl

Vegetation zone

- VZ1 - 4052_Moderate
- VZ2 - 4052_Low
- VZ3 - 4052_DNG
- VZ4 - 4052_NOG
- VZ5 - 4009_Low

Threatened ecological community

- Swamp Sclerophyll Forest on Coastal Floodplains of the New South Wales North Coast, Sydney Basin and South East Corner bioregions (EEC, BC Act)
- Lowland Grassy Woodland in the South East Corner Bioregion (EEC, BC Act)
- Illawarra and south coast lowland forest and woodland ecological community (CEEC, EPBC Act)

Figure 13 Areas of avoidance

0 — 100
Metres

N

Scale: 1:2,200 @ A3
Coordinate System: GDA2020 MGA Zone 56

biosis
APEM Group

Matter: 42335, Date: 17 March 2026
Prepared for: RG, Prepared by: JB, Last edited by: jbeckius
Location: P:\42300s\42335\Mapping\42335_SpencerStMoruya_BDAR_Part2.aprx
Layout: 42335_F13_Avoidance

6 Impacts that are unable to be avoided

Assessment of direct and indirect impacts unable to be avoided has been undertaken in accordance with the BAM (DPIE 2020a). The following direct and indirect impacts are unable to be avoided in progressing the proposed development.

6.1 Direct impacts

Direct impacts include vegetation clearing calculated from the area of proposed lot boundaries, roads and easements for service infrastructure.

Total Loss impacts arising from the project include:

- Removal of 13.64 ha of native vegetation comprised of the following vegetation zones:
  - 0.04 ha of moderate condition PCT 4052.
  - 0.93 ha of low condition PCT 4052.
  - 3.59 ha of DNG condition PCT 4052.
  - 8.75 ha of NOG condition PCT 4052.
  - 0.10 ha of low condition PCT 4009.
- The above removal of native vegetation results in the loss of:
  - 0.28 ha of *Illawarra and south coast lowland forest and woodland ecological community* (CEEC, EPBC Act) (includes partial loss of management zone 4052_pl).
  - 4.56 ha of *Lowland Grassy Woodland in the South East Corner Bioregion* (EEC, BC Act) (does not include partial loss of management zone 4052_pl).
  - 0.10 ha of *Swamp Sclerophyll Forest on Coastal Floodplains of the New South Wales North Coast, Sydney Basin and South East Corner bioregions* (EEC, BC Act).
- Removal of habitat for one threatened species including:
  - 1.07 ha of Southern Myotis habitat (does not include management zone 4052_pl).
- Removal of one farm dam.
- Removal of non-native vegetation and planted native vegetation including:
  - 0.20 ha of exotic vegetation.
  - 0.21 ha of planted native vegetation which could not be assigned a PCT.

Partial Loss impacts arising from the project include:

- Partial loss of 0.24 ha of native vegetation comprised as moderate condition PCT 4052 (management zone 4052_pl).
- Partial loss of 0.24 ha of Southern Myotis habitat (assumed present).

Total Loss impacts will be permanent and will occur from the outset of the development. Partial Loss impacts will gradually occur in the future as a result of APZ management activities. A Biodiversity Management Plan (BMP) may be required in accordance with the BAM partial loss guidelines (NSW DCCEEW 2024e) for the management zone 4052_pl to ensure the predicted future VI score is maintained. Mitigation measures outlined in Section 7 will help to minimise the potential impacts to biodiversity values that remain present within the subject land.

A summary of PCTs and zones directly impacted is demonstrated in Table 32. A summary of direct impacts to species credit species, all of which have been assumed present pending further targeted surveys in late 2025 and early 2026, is demonstrated in Table 33.

Table 32 Summary of direct impacts to vegetation

Zone	PCT	Management zone	TEC	Area within subject land (ha)	Area impacted (ha)	VI Score	Future VI Score
4052_Moderate	PCT 4052 South Coast Low Hills Red Gum Grassy Forest	4052_tl	Yes	1.78	0.04	78.5	0
		4052_pl	Yes		0.24	78.5	21.4
4052_Low		-	Yes	1.56	0.93	49.7	0
4052_DNG		-	Yes	4.93	3.59	13.6	0
4052_NOG		-	No	10.66	8.75	7.0	0
4009_Low	PCT 4009 Shoalhaven Lowland Flats Wet Swamp Forest	-	Yes	0.98	0.10	12.9	0
Planted Native Vegetation	-	-	No	1.44	0.21	-	-
Exotic Vegetation	-	-	No	0.31	0.20	-	-

Table 33 Summary of individuals that were assumed present within the subject land

Species	Sensitivity	Area (ha) or count
Southern Myotis	Moderate Sensitivity to Loss	1.31 ha total area: • 0.24 ha partial loss • 1.07 ha total loss

6.1.1 Loss of hollow bearing trees

The SSD proposes to remove 8 hollow bearing trees, 1 tree with a stick nest and 2 stag trees within the development footprint, whilst 18 hollow-bearing trees and 7 stags will not be directly impacted within the subject land (Figure 12). All hollow-bearing trees proposed to be removed will follow a staged tree-felling procedure to protect any fauna dwelling within the trees. A summary of the hollow-bearing trees to be removed and to be retained is provided in Table 34 and hollow-bearing trees are displayed on Figure 12.

Table 34 Summary of hollow-bearing trees to be removed and retained within the subject land

Number	HBT or Stag	DBH category (CM)	Extra Large (>40cm)	Large (16-40 cm)	Medium (5-15 cm)	Small (<5 cm)	Impact
1	HBT	Large Tree (50 – 100cm)	0	1	0	0	Retain
2	HBT	Large Tree (50 – 100cm)	0	0	2	2	Retain
3	HBT	Large Tree (50 – 100cm)	0	0	1	0	Remove

Number	HBT or Stag	DBH category (CM)	Extra Large (>40cm)	Large (16-40 cm)	Medium (5-15 cm)	Small (<5 cm)	Impact
4	HBT	Large Tree (50 – 100cm)	0	0	2	2	Remove
5	HBT	Large Tree (50 – 100cm)	0	0	1	0	Retain
6	HBT	Large Tree (50 – 100cm)	0	0	2	2	Retain
7	HBT	Large Tree (50 – 100cm)	0	0	0	2	Remove
8	HBT	Large Tree (50 – 100cm)	0	0	2	2	Remove
9	HBT	Large Tree (50 – 100cm)	0	0	1	3	Retain
10	HBT	Large Tree (50 – 100cm)	0	1	1	0	Retain
11	HBT	Large Tree (50 – 100cm)	0	1	1	2	Retain
12	HBT	Large Tree (50 – 100cm)	0	1	1	0	Retain
13	HBT	Large Tree (50 – 100cm)	0	0	3	0	Retain
14	HBT	Large Tree (50 – 100cm)	0	1	0	2	Retain
15	HBT	Large Tree (50 – 100cm)	0	1	0	2	Retain
16	HBT	Large Tree (50 – 100cm)	0	0	1	2	Retain
17	HBT	Large Tree (50 – 100cm)	0	0	1	2	Remove
18	HBT	Large Tree (50 – 100cm)	0	0	1	2	Retain
19	HBT	Large Tree (50 – 100cm)	0	0	0	2	Remove
20	HBT	Large Tree (50 – 100cm)	0	0	1	0	Remove
21	HBT	Large Tree (50 – 100cm)	0	1	0	0	Retain
22	HBT	Large Tree (50 – 100cm)	0	1	0	0	Retain
23	HBT	Large Tree (50 – 100cm)	2	0	1	0	Retain
24	HBT	Large Tree (50 – 100cm)	0	1	0	0	Remove
25	HBT	Large Tree (50 – 100cm)	0	0	0	3	Retain
26	HBT	Medium Tree (20 - 50cm)	0	1	0	0	Retain
27	Stag	Large Tree (50 – 100cm)	0	0	1	1	Retain
28	Stag	Medium Tree (20 - 50cm)	0	1	1	2	Retain
29	Stag	Medium Tree (20 - 50cm)	0	1	1	2	Retain
30	Stag	Large Tree (50 – 100cm	0	1	0	2	Retain
31	Stag	Medium Tree (20 - 50cm)	0	0	0	2	Remove
32	Stag	Very Large Tree (>100cm)	0	0	4	2	Remove
33	Stag	Medium Tree (20 - 50cm)	0	0	0	2	Retain
34	Stag	Medium Tree (20 - 50cm)	0	0	0	2	Retain
35	Stag	Medium Tree (20 - 50cm)	0	0	1	2	Retain

6.2 Indirect impacts

Potential indirect impacts arising from the project are outlined and addressed in Table 35.

Table 35 Assessment of indirect impacts

Indirect impact (Describe impact, e.g. transport of weeds and pathogens form the site to adjacent vegetation)	**Impacted entities** (PCT/threatened entity and their habitats and where relevant, EPBC Act listing)	**Extent within subject land** (ha or zone reference)	**Frequency**	**Duration** (long-term/ short-term/ medium-term)	**Project phase/ timing of impact** (e.g. construction, operation, rehabilitation)	**Likelihood and consequences**
Inadvertent impacts on adjacent habitat or vegetation	• *Illawarra and south coast lowland forest and woodland ecological community* (CEEC, EPBC Act). • *Lowland Grassy Woodland in the South East Corner Bioregion* (EEC, BC Act). • *Swamp Sclerophyll Forest on Coastal Floodplains of the New South Wales North Coast, Sydney Basin and South East Corner bioregions* (EEC, BC Act). • Southern Myotis.	Up to 6.55 ha of indirect impacts to native vegetation including: • Up to 1.78 ha of moderate condition PCT 4052. • Up to 0.64 ha of low condition PCT 4052. • Up to 1.35 ha of DNG condition PCT 4052. • Up to 1.91 ha of NOG PCT 4052 • Up to 0.88 ha of low condition PCT 4009.	Ongoing	Medium-term	Construction/ Operation	• Impacts to adjacent vegetation during construction and operational phase can be prevented or minimised through the implementation of a CEMP with subplan BMP detailing best practice environmental protection measures including appropriate exclusion fencing, signage, strict water quality practices and stormwater controls, and by ensuring any lighting is directed towards the developed area, rather than towards the adjacent retained habitats. • A VMP for the riparian corridors of both creeks will also ensure that indirect impacts to retained vegetation are minimised. • No Go Zones and fencing around retained native vegetation will minimise indirect impacts (trampling or accidental clearing) to these biodiversity values.
Inadvertent impacts on waterways and	Indirect impacts to the two creeks.	Indirect impacts to two creeks:	Ongoing	Medium-term	Construction/Operation	Indirect impacts to the two creeks within the subject land during the construction and operation will be prevented or

Indirect impact (Describe impact, e.g. transport of weeds and pathogens form the site to adjacent vegetation)	**Impacted entities** (PCT/threatened entity and their habitats and where relevant, EPBC Act listing)	**Extent within subject land** (ha or zone reference)	**Frequency**	**Duration** (long-term/ short-term/ medium-term)	**Project phase/ timing of impact** (e.g. construction, operation, rehabilitation)	**Likelihood and consequences**
aquatic habitat within the subject land		• Approximately 450 metres of the unnamed 3rd order creek. • Approximately 280 metres of the unnamed 1st order creek. • Downstream impacts for each creek.				minimised through the implementation of a CEMP and VMP detailing best practice environmental protection measures including: • Exclusion fencing around retained riparian corridors along both creeks. • Strict water quality practices outlined within the Drainage and Grading Plan (WSP 2025) including control of stormwater and runoff, water filtration and installation of swales and detention basins. • Weed management within riparian corridors of creeks. • Appropriate usage of chemical weed control near creeks. • Installation of erosion and sediment controls such as coir logs or silt fencing. • Revegetation of riparian corridors with native species associated with PCTs 4052 and 4009, with particular focus on species that increase bank stability in accordance with a VMP. • Dust management practices. • Applying relevant design guidelines for the proposed waterway crossing and culvert including the DPI

Indirect impact (Describe impact, e.g. transport of weeds and pathogens form the site to adjacent vegetation)	**Impacted entities** (PCT/threatened entity and their habitats and where relevant, EPBC Act listing)	**Extent within subject land** (ha or zone reference)	**Frequency**	**Duration** (long-term/ short-term/ medium-term)	**Project phase/ timing of impact** (e.g. construction, operation, rehabilitation)	**Likelihood and consequences**
						guidelines (DPI 2013) and NSW DCCEEW guidelines (NSW DCCEEW 2025g).
Reduced viability of adjacent habitat due to edge effects	• *Illawarra and south coast lowland forest and woodland ecological community* (CEEC, EPBC Act). • *Lowland Grassy Woodland in the South East Corner Bioregion* (EEC, BC Act). • *Swamp Sclerophyll Forest on Coastal Floodplains of the New South Wales North Coast, Sydney Basin and South East Corner bioregions* (EEC, BC Act). • Southern Myotis.	Up to 6.55 ha of indirect impacts to native vegetation including: • Up to 1.78 ha of moderate condition PCT 4052. • Up to 0.64 ha of low condition PCT 4052. • Up to 1.35 ha of DNG condition PCT 4052. • Up to 1.91 ha of NOG PCT 4052 • Up to 0.88 ha of low condition PCT 4009 Indirect impacts to the two creeks.	Ongoing	Medium-term	Construction/Operation	• Adjacent habitats are currently subject to a high degree of edge effects due to prior clearing and existing adjacent land uses (residential and agricultural). • Impacts to adjacent vegetation during construction and operational phase can be prevented or minimised through the implementation of a CEMP with subplan BMP detailing best practice environmental protection measures including appropriate exclusion fencing, strict water quality practices and stormwater controls, and by ensuring any lighting is directed towards the developed area, rather than towards the adjacent retained habitats. • Since little (4.92 ha, excluding 4052_NOG) native vegetation is to be removed or subjected to partial loss from the subject land, an increase to edge effects is not expected to occur to the remnant vegetation surrounding the subject land as a

Indirect impact (Describe impact, e.g. transport of weeds and pathogens form the site to adjacent vegetation)	**Impacted entities** (PCT/threatened entity and their habitats and where relevant, EPBC Act listing)	**Extent within subject land** (ha or zone reference)	**Frequency**	**Duration** (long-term/ short-term/ medium-term)	**Project phase/ timing of impact** (e.g. construction, operation, rehabilitation)	**Likelihood and consequences**
						result of the proposed development. This is primarily due to the already fragmented state of these isolated and linear vegetation patches. • The removal of vegetation from the development footprint will result in minimal new interfaces for the remaining vegetation patches from which edge effects may occur. • Additionally, the higher quality vegetation along the northern and eastern boundaries of the development site will mostly be retained within the current design and already exist in an edge effected and fragmented state. • An APZ and green spaces along the northeastern corner and eastern boundary will also inadvertently provide a degree of separation between the moderate condition PCT 4052 vegetation and the proposed development, reducing the impact of edge effects. • VMP for the riparian corridors of both creeks will improve the condition of the vegetation within these areas and provide a buffer between the

Indirect impact (Describe impact, e.g. transport of weeds and pathogens form the site to adjacent vegetation)	**Impacted entities** (PCT/threatened entity and their habitats and where relevant, EPBC Act listing)	**Extent within subject land** (ha or zone reference)	**Frequency**	**Duration** (long-term/ short-term/ medium-term)	**Project phase/ timing of impact** (e.g. construction, operation, rehabilitation)	**Likelihood and consequences**
						proposed development and the retained native vegetation and the two creeks (including Key Fish Habitat).
Reduced viability of adjacent habitat due to noise, dust or light spill	• *Illawarra and south coast lowland forest and woodland ecological community* (CEEC, EPBC Act). • *Lowland Grassy Woodland in the South East Corner Bioregion* (EEC, BC Act). • *Swamp Sclerophyll Forest on Coastal Floodplains of the New South Wales North Coast, Sydney Basin and South East Corner bioregions* (EEC, BC Act). • Southern Myotis.	Up to 6.55 ha of indirect impacts to native vegetation including: • Up to 1.78 ha of moderate condition PCT 4052. • Up to 0.64 ha of low condition PCT 4052. • Up to 1.35 ha of DNG condition PCT 4052. • Up to 1.91 ha of NOG PCT 4052 • Up to 0.88 ha of low condition PCT 4009. Indirect impacts to the two creeks.	Ongoing	Medium-term	Construction/Operation	• It is predicted that the adjacent habitat will be impacted in a small way by noise, dust and light spill, during construction and operation of the future development of the subject land. However, this will be managed via best practices outlined in a CEMP. • The moderate condition PCT 4052 vegetation along the northern boundary of the development site is already subjected to a degree of light and noise pollution from the adjacent residential areas and public roads. • VMP for the riparian corridors of both creeks will improve the condition of the vegetation within these areas and provide a buffer between the proposed development and the retained native vegetation and the two creeks (including Key Fish Habitat). • The CEMP will detail best practice environmental protection measures

Indirect impact (Describe impact, e.g. transport of weeds and pathogens form the site to adjacent vegetation)	**Impacted entities** (PCT/threatened entity and their habitats and where relevant, EPBC Act listing)	**Extent within subject land** (ha or zone reference)	**Frequency**	**Duration** (long-term/ short-term/ medium-term)	**Project phase/ timing of impact** (e.g. construction, operation, rehabilitation)	**Likelihood and consequences**
						including appropriate exclusion fencing, strict water quality practices and stormwater controls, and by ensuring any lighting is directed towards the developed area, rather than towards the adjacent retained habitats. • Indirect impacts to the waterways have been minimised through the implementation of the riparian corridor buffers and future regeneration of these areas, likely ultimately resulting in an improvement in condition and function of these waterways. Indirect impacts from the proposed footbridge and culvert across the 3rd order creek may occur, however will be minimised through the environmental protection measures in the proposed CEMP, BMP and VMP.
Transport of weeds and pathogens from the site to adjacent vegetation	• *Illawarra and south coast lowland forest and woodland ecological community* (CEEC, EPBC Act).	Up to 6.55 ha of indirect impacts to native vegetation including: • Up to 1.78 ha of moderate condition PCT 4052.	Ongoing	Medium-term	Construction/Operation	• Weeds occurring within the subject land are common with those occurring within adjacent vegetation and waterways to be retained. • Increased transport of pathogens and weeds is unlikely to occur but will

Indirect impact (Describe impact, e.g. transport of weeds and pathogens form the site to adjacent vegetation)	**Impacted entities** (PCT/threatened entity and their habitats and where relevant, EPBC Act listing)	**Extent within subject land** (ha or zone reference)	**Frequency**	**Duration** (long-term/ short-term/ medium-term)	**Project phase/ timing of impact** (e.g. construction, operation, rehabilitation)	**Likelihood and consequences**
	• *Lowland Grassy Woodland in the South East Corner Bioregion* (EEC, BC Act). • *Swamp Sclerophyll Forest on Coastal Floodplains of the New South Wales North Coast, Sydney Basin and South East Corner bioregions* (EEC, BC Act). • Southern Myotis.	• Up to 0.64 ha of low condition PCT 4052. • Up to 1.35 ha of DNG condition PCT 4052. • Up to 1.91 ha of NOG PCT 4052 • Up to 0.88 ha of low condition PCT 4009. Indirect impacts to the two creeks.				be managed by biosecurity measures outlined in the CEMP and in the VMP for the creeks. • The riparian corridors for both creeks will be managed in accordance with a VMP that will outline weed controls and management to be undertaken to ensure weed are controlled and reduced within these areas. • Stormwater measures (such as detention basins, swales and water filtration) will also ensure that weed or pathogen spread into the creeks and surrounding vegetation is minimised (WSP 2025). • The landscaping, earthworks and fill will be restricted and undertaken within the development site to minimise importation of fill and the potential to introduce new weeds or pathogens into the subject land. • The riparian corridor buffers and proposed regeneration of these areas will reduce the spread of weeds from the development area to the creeks, alongside the planned weed management practices in these areas.

Indirect impact (Describe impact, e.g. transport of weeds and pathogens form the site to adjacent vegetation)	**Impacted entities** (PCT/threatened entity and their habitats and where relevant, EPBC Act listing)	**Extent within subject land** (ha or zone reference)	**Frequency**	**Duration** (long-term/ short-term/ medium-term)	**Project phase/ timing of impact** (e.g. construction, operation, rehabilitation)	**Likelihood and consequences**
Increased risk of starvation, exposure and loss of shade or shelter	• *Illawarra and south coast lowland forest and woodland ecological community* (CEEC, EPBC Act). • *Lowland Grassy Woodland in the South East Corner Bioregion* (EEC, BC Act). • *Swamp Sclerophyll Forest on Coastal Floodplains of the New South Wales North Coast, Sydney Basin and South East Corner bioregions* (EEC, BC Act). • Southern Myotis.	Up to 6.55 ha of indirect impacts to native vegetation including: • Up to 1.78 ha of moderate condition PCT 4052. • Up to 0.64 ha of low condition PCT 4052. • Up to 1.35 ha of DNG condition PCT 4052. • Up to 1.91 ha of NOG PCT 4052 • Up to 0.88 ha of low condition PCT 4009. Indirect impacts to the two creeks.	Ongoing	Medium-term	Construction/Operation	• The habitat present in the subject land is considered marginal for most fauna species given the disturbed and fragmented condition of the vegetation. • The proposed future development will not result in a significant increase in the risk of starvation, exposure and loss of shade or shelter to native species due to the small total area of native vegetation that would provide foraging and shade/shelter habitat being removed (13.64 ha) and the very small proportion of commensurate habitats available in the immediate vicinity. • Additionally, the moderate condition PCT 4052 will largely be retained within the subject land, along with several of the trees listed as low condition PCT 4052, ensuring there are food resources and shelter available for vagrant species. • Many of the hollow-bearing trees and stags will not be directly impacted within the subject land (71% overall retention) retaining potential shelter and breeding habitat for Southern

Indirect impact (Describe impact, e.g. transport of weeds and pathogens form the site to adjacent vegetation)	**Impacted entities** (PCT/threatened entity and their habitats and where relevant, EPBC Act listing)	**Extent within subject land** (ha or zone reference)	**Frequency**	**Duration** (long-term/ short-term/ medium-term)	**Project phase/ timing of impact** (e.g. construction, operation, rehabilitation)	**Likelihood and consequences**
						Myotis and non-threatened native fauna species. • Additionally, the planned rehabilitation within the riparian corridors of the creeks in accordance with a VMP and landscaped plantings (Realm Studios 2025) will provide future food, shade and shelter resources for many fauna species. • Direct impacts to habitat for threatened species assumed present within the subject land has been assessed in section 6.1.
Loss of breeding habitats	• *Illawarra and south coast lowland forest and woodland ecological community* (CEEC, EPBC Act). • *Lowland Grassy Woodland in the South East Corner Bioregion* (EEC, BC Act). • *Swamp Sclerophyll Forest on Coastal Floodplains of the New South Wales North Coast, Sydney Basin and South East Corner*	Up to 6.55 ha of indirect impacts to native vegetation including: • Up to 1.78 ha of moderate condition PCT 4052. • Up to 0.64 ha of low condition PCT 4052. • Up to 1.35 ha of DNG condition PCT 4052. • Up to 1.91 ha of NOG PCT 4052	Ongoing	Medium-term	Construction/Operation	No specialist breeding habitat will be impacted by the proposed future development. Retained vegetation along the northern and eastern boundaries will continue to provide potential breeding habitat for non-threatened and threatened fauna. Direct impacts to breeding habitat for threatened species assumed present within the subject land has been assessed in section 6.1.

Indirect impact (Describe impact, e.g. transport of weeds and pathogens form the site to adjacent vegetation)	**Impacted entities** (PCT/threatened entity and their habitats and where relevant, EPBC Act listing)	**Extent within subject land** (ha or zone reference)	**Frequency**	**Duration** (long-term/ short-term/ medium-term)	**Project phase/ timing of impact** (e.g. construction, operation, rehabilitation)	**Likelihood and consequences**
	bioregions (EEC, BC Act). • Southern Myotis.	• Up to 0.88 ha of low condition PCT 4009. Indirect impacts to the two creeks.				
Trampling of threatened flora species	No threatened flora species were detected during surveys within the subject land.	Up to 6.55 ha of indirect impacts to native vegetation including: • Up to 1.78 ha of moderate condition PCT 4052. • Up to 0.64 ha of low condition PCT 4052. • Up to 1.35 ha of DNG condition PCT 4052. • Up to 1.91 ha of NOG PCT 4052 • Up to 0.88 ha of low condition PCT 4009.	Ongoing	Medium-term	Construction/operation	• No threatened flora species were found, or are considered likely to occur, within the subject land, and thus trampling of threatened flora species is unlikely. • Additionally, during construction, exclusion fencing will be erected to protect retained native vegetation whilst construction work occurs and thereby reducing trampling impacts. • The vegetation within the subject land is already subject to trampling, particularly along the borders of the development site, where there is evidence of human access into these areas due to the proximity of this vegetation to adjacent roads, paths and houses.
Inhibition of nitrogen fixation and increased soil salinity	Not applicable	Not applicable	Not applicable	Not applicable	Not applicable	• Any future excavations or soil disturbance resulting from the future development of the subject land would be largely restricted to areas having undergone significant previous disturbance through cattle

Indirect impact (Describe impact, e.g. transport of weeds and pathogens form the site to adjacent vegetation)	**Impacted entities** (PCT/threatened entity and their habitats and where relevant, EPBC Act listing)	**Extent within subject land** (ha or zone reference)	**Frequency**	**Duration** (long-term/ short-term/ medium-term)	**Project phase/ timing of impact** (e.g. construction, operation, rehabilitation)	**Likelihood and consequences**
						grazing. As such it is not considered likely that the future development of the subject land would result in substantial changes to the level of nitrogen fixation or soil salinity in the locality. • The two creeks will be retained within the development design and rehabilitated through a VMP, reducing the likelihood of changing to drainage paths and subsequent increase in soil salinity.
Fertiliser drift	• *Illawarra and south coast lowland forest and woodland ecological community* (CEEC, EPBC Act). • *Lowland Grassy Woodland in the South East Corner Bioregion* (EEC, BC Act). • Two creeks	Up to 6.55 ha of indirect impacts to native vegetation including: • Up to 1.78 ha of moderate condition PCT 4052. • Up to 0.64 ha of low condition PCT 4052. • Up to 1.35 ha of DNG condition PCT 4052. • Up to 1.91 ha of NOG PCT 4052 • Up to 0.88 ha of low condition PCT 4009.	Infrequent – during landscaping and regeneration	Short-term	Construction	• Widespread fertiliser use is not expected as part of the proposed project, except within initiation of newly landscaped or planted areas, and as such, works are not expected to significantly contribute to fertiliser drift into surrounding areas, as landscaped areas are designed to be low maintenance long-term. • The site has a long history of grazing over its total extent. Exotic species dominance and the evidence of past grazing indicate a pattern of pasture improvement. The proposal will cease these activities and not contribute to fertiliser drift into

Indirect impact (Describe impact, e.g. transport of weeds and pathogens form the site to adjacent vegetation)	**Impacted entities** (PCT/threatened entity and their habitats and where relevant, EPBC Act listing)	**Extent within subject land** (ha or zone reference)	**Frequency**	**Duration** (long-term/ short-term/ medium-term)	**Project phase/ timing of impact** (e.g. construction, operation, rehabilitation)	**Likelihood and consequences**
		Indirect impacts to the two creeks.				surrounding areas with future practices. • Fertiliser may be used for landscaping or regeneration and will be managed under a CEMP and/or VMP to ensure appropriate fertiliser use is undertaken.
Rubbish dumping	• *Illawarra and south coast lowland forest and woodland ecological community* (CEEC, EPBC Act). • *Lowland Grassy Woodland in the South East Corner Bioregion* (EEC, BC Act). • *Swamp Sclerophyll Forest on Coastal Floodplains of the New South Wales North Coast, Sydney Basin and South East Corner bioregions* (EEC, BC Act). • Southern Myotis.	Up to 6.55 ha of indirect impacts to native vegetation including: • Up to 1.78 ha of moderate condition PCT 4052. • Up to 0.64 ha of low condition PCT 4052. • Up to 1.35 ha of DNG condition PCT 4052. • Up to 1.91 ha of NOG PCT 4052 • Up to 0.88 ha of low condition PCT 4009. Indirect impacts to the two creeks.	Infrequent	Medium-term	Construction/Operation	• The proposed retirement village is unlikely to significantly increase rubbish dumping once complete and in use due to the nature of the project. • Standard environmental controls outlined within a CEMP for the development would ensure potential impacts are minimised. • Works would follow an approved Waste Management Plan. • Rubbish control will be implemented in the riparian corridors through the proposed VMP.

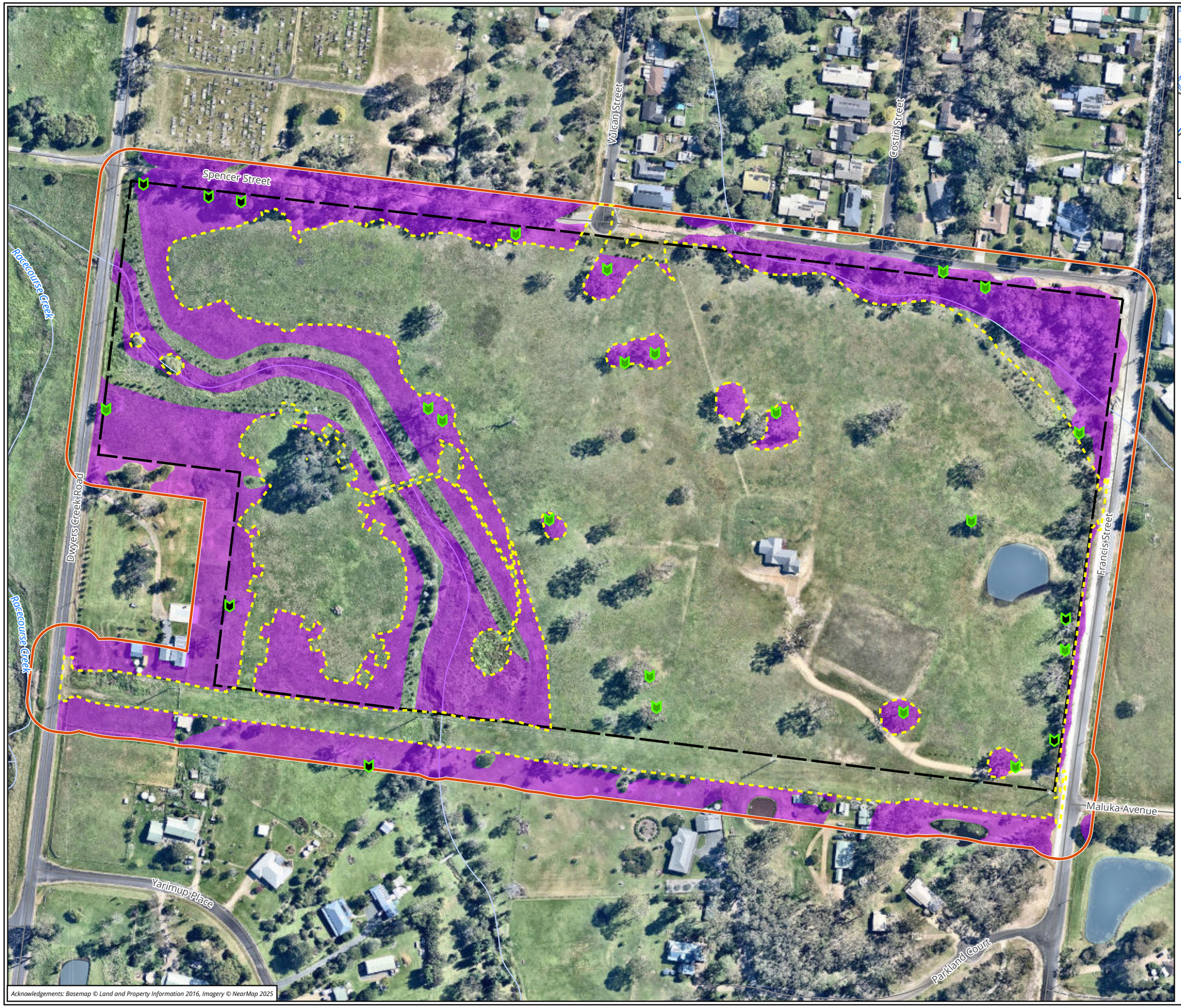
Indirect impact (Describe impact, e.g. transport of weeds and pathogens form the site to adjacent vegetation)	**Impacted entities** (PCT/threatened entity and their habitats and where relevant, EPBC Act listing)	**Extent within subject land** (ha or zone reference)	**Frequency**	**Duration** (long-term/ short-term/ medium-term)	**Project phase/ timing of impact** (e.g. construction, operation, rehabilitation)	**Likelihood and consequences**
Wood collection	• *Illawarra and south coast lowland forest and woodland ecological community* (CEEC, EPBC Act). • *Lowland Grassy Woodland in the South East Corner Bioregion* (EEC, BC Act). • *Swamp Sclerophyll Forest on Coastal Floodplains of the New South Wales North Coast, Sydney Basin and South East Corner bioregions* (EEC, BC Act). • *Swamp Sclerophyll Forest on Coastal Floodplains of the New South Wales North Coast, Sydney Basin and South East Corner bioregions* (EEC, BC Act). • Southern Myotis.	Up to 6.55 ha of indirect impacts to native vegetation including: • Up to 1.78 ha of moderate condition PCT 4052. • Up to 0.64 ha of low condition PCT 4052. • Up to 1.35 ha of DNG condition PCT 4052. • Up to 1.91 ha of NOG PCT 4052 • Up to 0.88 ha of low condition PCT 4009. Indirect impacts to the two creeks.	Infrequent	Medium-term	Construction/Operation	Although the future development will increase access to the retained vegetation, based on the nature of the proposed development for senior housing, future residents are not expected to undertake wood collection within the retained vegetation to a level that it will have a detrimental effect. Unauthorised access and collection of wood is expected to be minimal.
Removal and disturbance of	Not applicable	Not applicable	Not applicable	Not applicable	Not applicable	Based on the field investigations undertaken for the proposed

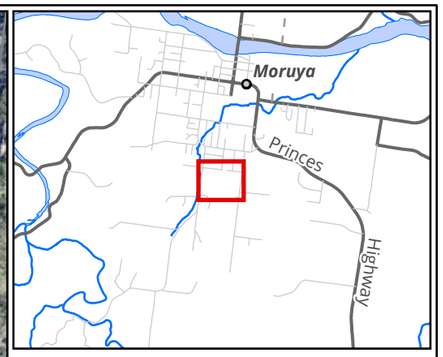
Indirect impact (Describe impact, e.g. transport of weeds and pathogens form the site to adjacent vegetation)	**Impacted entities** (PCT/threatened entity and their habitats and where relevant, EPBC Act listing)	**Extent within subject land** (ha or zone reference)	**Frequency**	**Duration** (long-term/ short-term/ medium-term)	**Project phase/ timing of impact** (e.g. construction, operation, rehabilitation)	**Likelihood and consequences**
rocks, including bush rock						modification, the subject land does not support natural bush rock.
Increase in predators	Not applicable	Not applicable	Not applicable	Not applicable	Not applicable	• The subject land already occurs within a semi-urbanised setting with pets, such as dogs, cats and horses. • The subject land is already largely cleared and wild pest predator species, such as European Fox *Vulpes vulpes*, were recorded within the subject land. • The vegetation clearance proposed by the development, and proposed land use, is unlikely to increase predatory species populations.
Increase in pest animal populations	Not applicable	Not applicable	Not applicable	Not applicable	Not applicable	• The proposal occurs in a rural area with introduced domestic pets such as cats *Felis catus* currently occurring within the locality. • Pest animals such as Rats *Rattus rattus,* European Fox and European Rabbit *Oryctolagus cuniculus* are also widely spread within the Eurobodalla region and are likely to occur across the locality. The proposal will not result in an increase in available habitat for these species and is unlikely to lead to an increase in pest animal populations.

Indirect impact (Describe impact, e.g. transport of weeds and pathogens form the site to adjacent vegetation)	**Impacted entities** (PCT/threatened entity and their habitats and where relevant, EPBC Act listing)	**Extent within subject land** (ha or zone reference)	**Frequency**	**Duration** (long-term/ short-term/ medium-term)	**Project phase/ timing of impact** (e.g. construction, operation, rehabilitation)	**Likelihood and consequences**
						• Pest animals currently exist within the subject land including Eastern Mosquitofish and European Fox. • Suitable waste disposal implemented during and post construction will further reduce the resources available for pest species.
Changed fire regimes	Not applicable	Not applicable	Not applicable	Not applicable	Not applicable	The proposal occurs in a rural area that has undergone extensive historical clearing for agriculture. Appropriate APZs and fire mitigation systems (such as hardstands and access roads) will be implemented for the future development, as outlined within the Bushfire Hazard Report (Black Ash Bushfire Consulting 2025), and the proposal will not result in an increased risk of fire.
Disturbance to specialist breeding and foraging habitat, e.g. Beach nesting for shorebirds	• *Illawarra and south coast lowland forest and woodland ecological community* (CEEC, EPBC Act). • *Lowland Grassy Woodland in the South East Corner Bioregion* (EEC, BC Act). • *Swamp Sclerophyll Forest on Coastal*	• 1.31 ha of habitat for Southern Myotis.	Ongoing	Long-term	Construction/operation	Southern Myotis is assumed present within the subject land. The project will result in indirect impacts to retained adjacent habitat for these species. However, mitigation measures such as exclusion fencing, hygiene protocols, weed management, inductions, lighting and noise control and design will be implemented in accordance with a CEMP to reduce the intensity of these indirect impacts. Direct impacts to breeding and

Indirect impact (Describe impact, e.g. transport of weeds and pathogens form the site to adjacent vegetation)	**Impacted entities** (PCT/threatened entity and their habitats and where relevant, EPBC Act listing)	**Extent within subject land** (ha or zone reference)	**Frequency**	**Duration** (long-term/ short-term/ medium-term)	**Project phase/ timing of impact** (e.g. construction, operation, rehabilitation)	**Likelihood and consequences**
	Floodplains of the New South Wales North Coast, Sydney Basin and South East Corner bioregions (EEC, BC Act). • Southern Myotis.					foraging habitat for threatened species assumed present within the subject land has been assessed in section 6.1.
Fragmentation of movement corridors	• *Illawarra and south coast lowland forest and woodland ecological community* (CEEC, EPBC Act). • *Lowland Grassy Woodland in the South East Corner Bioregion* (EEC, BC Act). • *Swamp Sclerophyll Forest on Coastal Floodplains of the New South Wales North Coast, Sydney Basin and South East Corner bioregions* (EEC, BC Act). • Southern Myotis.	Up to 6.55 ha of indirect impacts to native vegetation including: • Up to 1.78 ha of moderate condition PCT 4052. • Up to 0.64 ha of low condition PCT 4052. • Up to 1.35 ha of DNG condition PCT 4052. • Up to 1.91 ha of NOG PCT 4052 • Up to 0.88 ha of low condition PCT 4009. Indirect impacts to the two creeks.	Ongoing	Long-term	Construction/Operation	Movement corridors are somewhat limited in availability across the locality due to substantial clearing for grazing land, which has the potential to disrupt the flow of genetic material. The major movement corridors within the subject land occurs along the northern and eastern boundaries. Most of this vegetation will be retained, however a small patch of PCT 4052 moderate will be removed to construct a driveway connection for the development to Francis Street. The permanent removal of this vegetation does disrupt the habitat connectivity of this eastern movement corridor to a small extent. However, since the vegetation already exists as a narrow linear edge effected strip, the removal of this small amount of vegetation is unlikely to significantly fragment this movement

Indirect impact (Describe impact, e.g. transport of weeds and pathogens form the site to adjacent vegetation)	**Impacted entities** (PCT/threatened entity and their habitats and where relevant, EPBC Act listing)	**Extent within subject land** (ha or zone reference)	**Frequency**	**Duration** (long-term/ short-term/ medium-term)	**Project phase/ timing of impact** (e.g. construction, operation, rehabilitation)	**Likelihood and consequences**
						corridor, more than it already is subjected to.





Legend

- Subject land
- Development footprint
- Development site
- Indirect impact
- Hollow-bearing tree - To be retained
- Stag - To be retained

Figure 15 Estimated zones of indirect impact

0 100

Metres

N

Scale: 1:2,200 @ A3

Coordinate System: GDA2020 MGA Zone 56

biosis

APEM Group

Matter: 42335, Date: 17 March 2026
Prepared for: RG, Prepared by: JB, Last edited by: jbeckius
Location: P:\42300s\42335\Mapping\42335_SpencerStMoruya_BDAR_Part2.aprx
Layout: 42335_F14_IndirectImpact

Acknowledgements: Basemap © Land and Property Information 2016, Imagery © NearMap 2025

6.3 Prescribed impacts

Identification and assessment of prescribed biodiversity impacts are outlined and addressed in Table 36, and the section below, and shown in Figure 14.

Table 36 Identification of prescribed impacts

Prescribed impact	Description of relevant habitat features associated with prescribed impacts	Threatened species likely to utilise habitat features associated with prescribed impact	Importance of habitat feature to impacted species
Karst, caves, crevices, cliffs, rocks and other geological features of significance	No karst, caves, crevices, or cliffs exist within the subject land. The development will not impact on threatened species or ecological communities associated with karst, caves, crevices or cliffs.	Threatened microbat species (Southern Myotis) may utilise karst, caves, cliffs and rocks within the broader landscape. The closest potential karst, caves, cliffs or rocks are likely located approximately 2.5 km west of the subject land within large intact patches of native vegetation with steep contours.	These features provide habitat for threatened microbats who utilise caves/karsts/crevices as roosting and breeding habitat. No such habitat was detected within the subject land during this assessment.
Occurrences of human-made structures and non-native vegetation	One residential dwelling is found in the development footprint. This house will be demolished to allow for the construction of senior housing buildings, roads and landscaping. The house did not have suitable cracks, crevices or openings that may provide roosting habitat for threatened microbats. Additionally, the chimney opening was covered preventing threatened microbats, as well as other fauna, from entering the house. There are also three culverts within the subject land. The culvert that allows the 3rd order creek to flow under Dwyer's Creek Road was recorded to be filled with water and therefore not suitable for providing microbat habitat at the time of survey. The culvert that allows the 1st order creek to flow under Francis Street was newly constructed and did not have any cracks, crevices or openings that might provide roosting habitat for threatened microbats. Therefore, it is unlikely that threatened microbats are occupying the house or the culverts within the subject land. The house will be demolished as part of the proposed works, whereas the culverts will not be directly impacted.	Threatened microbat species, such as Southern Myotis, may utilise human-made structures. Non-native vegetation within the subject land is not considered to support any threatened species, other than low quality dispersal or foraging habitat.	Southern Myotis is unlikely to utilise the residential dwelling or the culverts for roosting habitat as they had limited crevices, cracks and openings that may be used by this species. Therefore, the human-made structures within the subject land have low importance for this species. Non-native vegetation may provide marginal foraging and dispersal habitat for Southern Myotis.

Prescribed impact	Description of relevant habitat features associated with prescribed impacts	Threatened species likely to utilise habitat features associated with prescribed impact	Importance of habitat feature to impacted species
	Non-native vegetation, comprising mostly NOG and exotic vegetation, is the dominant vegetation type within the subject land.		
Corridors or other areas of connectivity linking habitat for threatened entities	The removal of 13.64 ha of native vegetation (predominantly NOG) is expected to have little impact on the connectivity of threatened species habitat. The subject land is highly fragmented and subject to previous disturbance associated with past and current land uses. Most of the vegetation to be removed, such as DNG and NOG provides limited habitat corridors and connectivity for threatened species. The highest quality vegetation within the subject land along the northern and eastern boundaries will predominantly be retained within the project design. The proposed driveway that will result in some minor clearing through the eastern vegetation will result in a slight increase in fragmentation, however the connectivity of this patch of vegetation has already been impacted by a driveway to the south. The two creeks and associated riparian corridors within the subject land provide connectivity for threatened fauna. The proposed footbridge and culvert along the 3rd order creek will be designed to retain fish passage and aquatic habitat connectivity.	Southern Myotis may utilise semi-connected corridors along riparian areas and native vegetation within the subject land as foraging and dispersal habitat.	The habitat corridors and connectivity within the subject land is important for threatened species assumed present within the subject land. The project may result in a slight increase in habitat corridor fragmentation, however the vegetation and riparian corridors already exist in a fragmented and semi-connected state due to historical land clearing and the construction of roads and paths. Therefore, the proposed works are unlikely to significantly increase this fragmentation for any threatened or non-threatened fauna species.
Water bodies or any hydrological processes that sustain threatened entities	Two creeks are present within the subject land and will be overall retained. A minor footbridge and associated path and a culvert are proposed to cross the 3rd order creek. These structures will not block fish passage and the riparian corridor will be regenerated in accordance with a VMP and will be restored to a better condition than prior to the project.	Southern Myotis may utilise the creeks and dam as foraging and dispersal habitat. Therefore, it is assumed that this species may utilise both the creeks and the dam.	Southern Myotis was assumed present within the subject land, and is likely to utilise the dam for marginal foraging habitat. The creeks provide optimal foraging habitat for the Southern Myotis. The planned works within the channels and riparian corridors of the two creeks may result in changes to the hydrological processes of these creeks, which

Prescribed impact	Description of relevant habitat features associated with prescribed impacts	Threatened species likely to utilise habitat features associated with prescribed impact	Importance of habitat feature to impacted species
	One farm dam, with minimal habitat value, will be decommissioned. The dam is small and has minimal native vegetation present.		may affect the suitability of this habitat for the Southern Myotis.
Protected animals may use the proposed wind farm subject land as a flyway or migration route	There are no wind turbines involved in this project.	Not applicable.	Not applicable.
Where the proposed development may result in vehicle strike on threatened fauna or on animals that are part of a threatened ecological community	Given the subject land is already largely cleared of vegetation, it is unlikely that many species are utilising the subject land for dispersal. However, it is possible that species such as microbats, arboreal mammals, birds or frogs are entering the subject land, most likely from the poorly connected patches of vegetation along the northern and eastern boundaries of the subject land or through the two riparian corridors. The subject land is already subjected to traffic risk as it is bounded by three roads on the west, north and east boundaries, as well as driveways into the development site, adjacent to the moderate condition native vegetation. An increase in roads throughout the development footprint will increase this risk, however the risk will still be considered low due to the traffic control measures that are recommended to be outlined within a Construction Traffic Management Plan (CTMP) (speed limits, traffic calming devices and signage) by the Traffic Impact Assessment (TIA) (WSP 2026). Further detail regarding the traffic mitigation measures is provided in Section 7. Birds are generally alert when in open spaces and highly mobile, capable of moving out of the way of vehicles, particularly when traffic is moving at low speeds. Threatened microbats, amphibians, and	Threatened microbats, arboreal mammals, amphibians and birds may traverse through the subject land on occasion. Southern Myotis may be impacted through vehicle strike.	Threatened entities that are likely to use the vegetation within the subject land are moderately to highly mobile species (bats and mammals). Vehicle strikes are not considered to represent a high risk to highly mobile threatened entities (Southern Myotis) above that which currently exists. Mitigation measures are included in Section 7.

Prescribed impact	Description of relevant habitat features associated with prescribed impacts	Threatened species likely to utilise habitat features associated with prescribed impact	Importance of habitat feature to impacted species
	arboreal mammals are at very low risk of vehicle strike at speeds less than 40 km/hr. One threatened fauna species was assumed present within the subject land following targeted surveys in 2026 and is susceptible to vehicle strike.		

6.3.1 Human-made structures and non-native vegetation

Nature

Removal of the residential dwelling as part of the proposed development will cause the loss of potential, but likely currently unoccupied, roosting habitat for microbats. Southern Myotis was assumed present within the subject land, however the roosting habitat is of poor quality as the building lacks cracks, crevices, or similar sheltered interior spaces which are accessible from the outside. Additionally, the chimney chute is covered preventing microbats from roosting within the chimney.

Non-native vegetation, largely in the form of exotic vegetation, would be cleared from the subject land. This vegetation is unlikely to provide suitable habitat for native flora and fauna, except for occasional dispersal or foraging habitat for birds, amphibians and mammals.

Extent

One house (residential dwelling) would be removed from the subject land and replaced with several building types, such as multi storey apartment blocks, villas and houses for the seniors housing development.

Up to 0.31 hectares of non-native vegetation will be removed from the subject land.

Duration

Permanent.

Consequences

The removal of the house is unlikely to significantly affect Southern Myotis due to the lack of suitable habitat features such as cracks or crevices. Although the residential house was determined to be unsuitable habitat for the Southern Myotis, a pre-clearance inspection should be carried out to ensure no microbats are roosting within this structure prior to its removal. Further mitigation measures and detail is provided in Section 7.

Southern Myotis is unlikely to utilise non-native vegetation within the subject land, other than limited dispersal. Mitigation measures include retaining the best quality vegetation within the subject land (along the northern and eastern boundaries) and enhancing vegetation through a VMP and landscaping will minimise the potential impacts of removing this non-native vegetation, further detail is provided in Section 7.

6.3.2 Habitat connectivity

Nature

The remnant vegetation within the subject land provides connectivity along the northern and eastern borders of the development site to adjacent patches of vegetation within surrounding farmland and residential land. It is expected that these areas would be the primary means of movement for local fauna within the subject land. However, this vegetation is highly fragmented and edge effected, existing as thin linear strips of vegetation, providing minimal connectivity within this landscape. Connectivity for threatened fauna species that rely on aquatic and riparian habitat (Southern Myotis) is facilitated by the two creeks within the subject land. However, these creeks generally lack high quality riparian vegetation and exist in disturbed condition states.

The patches of remnant vegetation along the northern and eastern boundaries and the two creeks are proposed to remain largely untouched by the proposed development.

Extent

Up to 13.64 hectares of native vegetation will be removed or impacted within the subject land, this includes a minor section of moderate condition PCT 4052 (0.04 hectares) along the eastern boundary, partial loss of moderate condition PCT 4052 along the eastern boundary (0.24 hectares), trees comprising low condition PCT 4052 (0.93 hectares) scattered throughout the development site, large areas of DNG and NOG condition 4052 (3.59 and 8.75 hectares, respectively) and sections of PCT 4009 along the 3rd order creek (0.10 hectares). These areas provide habitat of varying significance for Southern Myotis, which was assumed present within the subject land.

Duration

Permanent.

Consequences

The impacts to the mid-storey and groundcover (assessed as partial loss) of vegetation along the eastern boundary, as well as a minor section of this vegetation that is planned for total removal, is likely to reduce connectivity for Southern Myotis and other non-threatened mammals and birds within the subject land. Additionally, the removal of scattered trees and grassland vegetation may also reduce connectivity for these species. However, DNG are likely not a significant form of habitat connection for these species, due to the absence of canopy cover. The removal of this vegetation will likely restrict fauna movement to the borders of the development site and the waterways, however it is likely most fauna species already utilise these areas for connectivity.

The waterflow and riparian corridors of the two creeks are proposed to be retained within the design, although with the addition of multiple proposed structures: a culvert, a footbridge, and footpaths. These structures are proposed within the channels and riparian corridors of these waterways. These structures are unlikely to block fish passage or water flow, thus retaining connectivity, however the hydrological processes of these creeks may be altered as a result (see section 6.3.3).

Overall, the proposed design may result in a slight increase in habitat corridor fragmentation, however the vegetation and riparian corridors already exist in a fragmented and semi-isolated state due to past vegetation clearing and the prior construction of roads and paths. Therefore, the proposed works are unlikely to significantly increase this fragmentation for any threatened or non-threatened fauna species within the subject land.

6.3.3 Water bodies, water quality and hydrological processes

Nature

There are two creeks (1st order and 3rd order), associated riparian vegetation and one farm dam within the subject land. The farm dam has minimal native vegetation and is not associated with a natural waterway, and therefore provides limited habitat for any threatened or non-threatened species. The two creeks, although impacted by past clearing, modification and weed ingress, provide aquatic and riparian foraging and dispersal habitat for Southern Myotis and habitat for many non-threatened species.

Extent

The farm dam is proposed to be decommissioned for the proposed development.

Riparian corridor buffers (measured from the top of bank on both sides of the waterways) have been adopted for the two creeks: 5 metres for the 1st order creek and 15 metres for the 3rd order creek. The 3rd order creek is also mapped as Key Fish Habitat under the FM Act. A footbridge, associated paths\ and a culvert are proposed within the channel and riparian corridor of the 3rd order creek. Approximately 0.10 hectares of low condition PCT 4009, associated with the 3rd order creek, would be cleared as a result of the proposal. These structures will likely affect the water quality and hydrological processes of the creeks. There is currently no detailed design for the footbridge or culvert, therefore the extent of their impacts are unable to be assessed at this stage. Further detail is provided below.

Duration

Permanent.

Consequences

The removal of the farm dam may reduce the extent of foraging habitat for the Southern Myotis and any other microbats dispersing through the subject land, however it is unlikely this dam provides significant foraging habitat for the Southern Myotis.

Several structures are proposed along the 3rd order creek and are expected to have varying levels of impact. The footbridge is proposed to span 5 metres on either side of the top of bank of the 3rd order creek, with any piers or pylons located outside of this area. This will protect the banks of the creek and the inner most sections of the riparian corridors, reducing potential erosion and water quality impacts, as per the NSW DDCEEW guidelines for watercourse crossings (NSW DCCEEW 2025g). The design of this bridge is unlikely to significantly alter the hydrology of this creek due to the set back of the piers from the creek channel and top of banks. The paths connecting this bridge will have minor impacts and erosion and sedimentation impacts will be minimised through mitigation measures outlined in a CEMP. A detailed design for the footbridge and paths will be provided, until this time hydrology impacts arising from this structure cannot be accurately identified.

There is currently no detailed design for the culvert or footbridge that is proposed within the 3rd order creek. It is unknown how this culvert and associated road will impact the hydrology of this creek, mapped Key Fish Habitat and Southern Myotis foraging habitat. The potential impacts of the footbridge and culvert cannot be assessed at this stage as no detailed designs have been prepared for the project. The designs of these structures will be prepared during the detailed design phase of the SSD, and the BDAR will be updated with the potential impacts of these structures. Impacts to these waterways will be mitigated through measures detailed within the project's CEMP and VMP, and further detail is provided in section 7 .

6.3.4 Vehicle strikes

Nature

The greatest vehicle risks are expected to be associated with residents, visitors and staff driving around the development site. There will be an increase in daily movements and traffic associated with construction personnel attending site, and personnel during operation of the seniors housing development. Although traffic levels are currently low within the development site, traffic levels are relatively high in adjacent land,

including along the adjacent roads that bound the development site on three sides, and within the residential developments to the north and south. Furthermore, most of the roads will be restricted to the non-native grassland vegetation which represents low importance for threatened species dispersal, the moderate condition vegetation along the northern and eastern borders of the development site will largely be retained. This is in exception to the removal of a minor section of vegetation to facilitate a driveway and removal of mid-storey vegetation along the eastern boundary vegetation for an APZ. However, this vegetation is already exposed to the risk of vehicle collision due to the existing driveway to the south and Francis Street on the east.

Extent

There will be a significant increase in daily movements associated with the construction and operation of the proposed seniors housing development within the subject land.

Duration

Permanent.

Consequences

Southern Myotis was assumed present within the subject land, as well as many non-threatened native species that inhabit the development site, that will be at an increased risk of traffic collision as a result of the proposed development. Southern Myotis is a highly mobile nocturnal species and therefore would be at a low risk of traffic collision. The TIA recommends implementing mitigation measures within a CTMP, such as speed calming devices and restricted slow speed limits, that will reduce the risk of collision to these species. Furthermore, Southern Myotis are most active at night, when traffic is expected to be lowered within the development site. Overall, there will be an increase in traffic collision risk to these species and any other non-threatened species dispersing throughout the development site, however the risks will be minimised through the mitigation measures implemented by the CTMP and the nature of the project as a seniors housing development as a whole.

6.4 Impacts considered uncertain

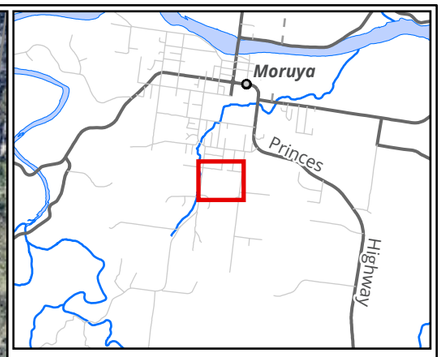
Future VI score for management zone 4052_pl located within the APZ along the eastern boundary was calculated to predict the future impacts and 'partial loss' to this vegetation due to future APZ management (i.e. mowing, slashing or thinning of mid-storey). To predict the future VI score the composition condition score, structure condition score and function condition score for this vegetation zone were altered within the BAM-C to predict for impacts to native ground cover and mid-storey, regeneration, leaf litter, stem size class 5-9cm DBH and woody debris. The canopy is proposed to be retained and therefore hollows will also be retained. To ensure impacts are appropriately calculated, the 'worst case' scenario was assumed and total impact/removal of all groundcover and mid-storey, the absence of regeneration (stem classes <5 DBH and 5-9 DBH) and removal of woody debris was applied to calculate future VI score for this management zone.

There are currently no detailed designs for the culvert and footbridge proposed along the 3rd order creek and impacts are considered uncertain and cannot be reliably predicted at this stage. The designs of these structures will be prepared during the detailed design phase of the SSD, and the BDAR will be updated with the potential impacts of these structures. Therefore, an assessment of the impacts to the creek have not been addressed within this BDAR. The BDAR will be required to be updated with an assessment of these designs during the detailed design phase.

6.5 Impacts to Groundwater Dependent Ecosystems (GDE)

Assessment of the potential for the subject land to support groundwater dependant ecosystems (GDEs) was undertaken using the Australian Government's Bureau of Meteorology Groundwater Dependant Ecosystems Atlas (BOM 2019). The subject land is not mapped as supporting GDEs associated with an aquifer in Appendix 8 of the Risk Assessment Guidelines for Groundwater Dependent Ecosystems (DPI 2012). There is a low potential Terrestrial GDE mapped directly to the south of the development site that is likely associated with the 3rd order creek and PCT 4009 within the subject land. The 3rd order creek and PCT 4009 will be directly impacted by the proposed development through the construction of a footbridge, foot pathways and a culvert. A hydrological assessment is recommended to determine the level of impact to this GDE. Any indirect impacts (e.g. stormwater runoff or an increase in weed spread) will be mitigated through a CEMP and VMP for the 3rd order creek.

There are no aquatic or subterranean GDEs mapped within the development site.



Legend

- Subject land
- Development footprint
- Development site
- Prescribed impact

Figure 15 Prescribed impacts

0 100

Metres

N

Scale: 1:2,200 @ A3

Coordinate System: GDA2020 MGA Zone 56

biosis

APEM Group

Matter: 42335, Date: 17 March 2026
Prepared for: RG, Prepared by: JB, Last edited by: jbeckius
Location: P:\42300s\42335\Mapping\42335_SpencerStMoruya_BDAR_Part2.aprx
Layout: 42335_F15_PrescImpact

Acknowledgements: Basemap © Land and Property Information 2016, Imagery © NearMap 2025

7 Mitigation and management of impacts

Identification of measures to mitigate or manage impacts has been undertaken in accordance with the BAM (DPIE 2020a), including considerations such as:

- Techniques, timing, frequency and responsibility.
- Identification of measures for which there is risk of failure.
- Evaluation of the risk and consequence of any residual impacts.
- Documentation of any adaptive management strategy proposed.

Identification of measures for mitigating impacts related to:

- Displacement of resident fauna.
- Indirect impacts on native vegetation and habitat.
- Mitigating prescribed biodiversity impacts.
- Details of the adaptive management strategy proposed to monitor and respond to impacts on biodiversity values that are uncertain.

Table 37 provides a summary of the mitigation measures that should be employed for managing project impacts to biodiversity.

Table 37 Measures to mitigate and manage impacts

Measures to mitigate and manage impacts	Action	Outcome	Timing	Responsibility
Displacement of resident fauna	Any hollow-bearing trees marked for removal should be removed according to a two-stage vegetation clearance protocol to ensure no injury or loss of fauna, where hollow-bearing trees to be inspected immediately prior to removal, by a qualified ecologist.	No direct impact to resident fauna during vegetation removal.	Immediately prior to vegetation removal.	Qualified ecologist and construction contractor.
	Any hollow-bearing trees to be removed should be placed in areas of retained vegetation to provide additional fauna habitat.	Mitigate impacts to resident fauna.	Immediately following vegetation clearance.	Qualified ecologist and construction contractor.
	A BMP and hollow replacement plan may be required to provide replacement hollow habitat in retained vegetation to compensate for this habitat removal	Mitigate impacts to resident fauna.	Immediately prior and during vegetation clearance.	Qualified ecologist, arborist and construction contractor.

Measures to mitigate and manage impacts	Action	Outcome	Timing	Responsibility
	and to provide habitat for any fauna displaced and captured during tree felling.			
	Any human-made structures, such as the single dwelling within the subject land, to be removed should be inspected prior to removal, by a qualified ecologist, to confirm absence of resident fauna (e.g., roosting microbats). If bats are detected, demolition of structures must be postponed until bats are relocated (preferably through use of passive roost exclusions).	No direct impact to resident fauna during removal of human-made structures.	Prior to removal of human-made structures.	Qualified ecologist and construction contractor.
	The dam is to be inspected immediately prior to and during decommissioning, by a qualified ecologist. There was multiple non-threatened species recorded inhabiting the dam including frogs, turtles and eels. Therefore, a dam dewatering plan is to be prepared prior to dam removal.	Mitigate impacts to resident fauna.	Immediately prior to and during dam decommissioning.	Qualified ecologist and construction contractor.
Protection of biodiversity during construction	A CEMP should be implemented that would include the following sub-plans or protocols: • VMP that includes retention and improvement of native vegetation within landscaping. • Hollow-bearing tree removal specification. • Vegetation clearance protocol. • Biodiversity Management Plan. • Fauna injury protocol. • Weed Management Plan. • Dam Dewatering Plan.	Mitigate risk of impact to environmental controls during project construction.	Ongoing/throughout earthworks.	Construction contractor.

Measures to mitigate and manage impacts	Action	Outcome	Timing	Responsibility
Indirect impacts on native vegetation and habitat	Appropriate stormwater and erosion controls will be implemented on site to avoid impacts to nearby waterways.	No further degradation to retained vegetation and habitats.	Ongoing/throughout earthworks	Construction contractor
	Where appropriate, native vegetation cleared from the subject land should be mulched for re-use on the site, to stabilise bare ground.	No further degradation to retained vegetation and habitats.	Ongoing/ throughout construction	Construction contractor
	Works areas should be wet down to reduce dust generation during construction.	No further degradation to retained vegetation and habitats.	Ongoing/throughout construction	Construction contractor
	Installation of appropriate exclusion fencing around trees and vegetation to be retained, as well as riparian corridors of the two creeks, to clearly delineate the clearing limits in the subject land: • The radius of the tree protection zone (TPZ) is calculated for each tree by multiplying its diameter at breast height by 12, in accordance with the Standards Australia Committee (2009). • A TPZ should not be less than 2 m, or greater than 15 m, except where crown protection is required (Council of Australian Standards 2009) • This would include appropriate signage such as 'No Go Zone' or 'Environmental Protection Area'. • Identify the location of any 'No Go Zones' in site inductions and a CEMP. • Where the use of exclusion fencing is	No further degradation to retained vegetation and habitats.	Before and throughout construction.	Construction contractor.

Measures to mitigate and manage impacts	Action	Outcome	Timing	Responsibility
	not appropriate, other methods of tree protection must be employed in accordance with *AS4970-2009 Protection of Trees on Development Sites* (Council of Australian Standards 2009) and the project's Arboricultural Impact Assessment Report (Allied Tree Consultancy 2025).			
	All material stockpiles, vehicle parking and machinery storage will be located within cleared areas or areas proposed for clearing, and not in areas of native vegetation that are to be retained.	No further degradation to retained vegetation and habitats.	Ongoing/Throughout construction.	Construction contractor.
	Implement hygiene measures to prevent the spread of weeds and pathogens into the development site, or from the development site into the surrounding locality.	No further spread of weeds or pathogens as a result of construction works.	Ongoing/Throughout construction.	Construction contractor.
	Reduction of impacts resulting from external lighting is recommended, and can be adapted from Part 4 (good lighting design principles) of the *Dark Sky Planning Guideline* (DPE 2016), including: • Installing light fitting shields with an opaque cover, mounted horizontally across the top of the lighting module. These shielding attachments allow only the downward projection of light. • Direct lights downwards and avoid shining directly onto the public amenities,	No indirect impact to fauna in retained vegetation and habitats.	Ongoing.	Construction contractor.

Measures to mitigate and manage impacts	Action	Outcome	Timing	Responsibility
	which have the potential to reflect light skywards. • Utilise low beam angles that are close to vertical where possible to minimise light glare.			
	Waste Management Plan to ensure rubbish is not dumped in adjacent retained vegetation or waterways.	No indirect impact to retained vegetation and waterways	Ongoing.	Construction contractor.
	VMP for the two creeks and associated riparian corridors to protect creeks from indirect impacts.	Reduce indirect impacts to waterways	Ongoing/throughout construction	Qualified ecologist and construction contractor.
Mitigating prescribed biodiversity impacts	Construction works should be restricted to daylight hours.	Reduce impacts to nocturnal species.	Ongoing/throughout construction	Construction contractor
	Implementation and signage of reduced speed limits on access roads associated with the project.	Mitigate risk to common disturbance-tolerant mobile fauna species.	Ongoing/throughout construction	Construction contractor
	Implementation of temporary stormwater controls during construction to ensure that discharges to the drainage channels are consistent with existing conditions.	Mitigate risk of impact to waterways during project construction.	Prior to construction works commencing	Construction contractor
	Sediment and erosion control measures should be implemented (e.g., silt fences, sediment traps). These should conform to relevant guidelines, should be maintained throughout the construction period and should be carefully removed following the completion of works.	Mitigate risk of impact to waterways during project construction.	Prior to construction works commencing	Construction contractor
	'Frog-friendly' and 'wetland friendly' herbicides such as Roundup Bioactive or Weedmaster DUO would be used for the control of noxious weeds.	Mitigate risk of impact to waterways and resident fauna during project construction.	Ongoing/throughout earthworks	Construction contractor

Measures to mitigate and manage impacts	Action	Outcome	Timing	Responsibility
Adaptive management strategies proposed to monitor and respond to impacts on biodiversity values that are uncertain	Implementation of an appropriate CEMP during works.	Mitigate risk of impact to environmental controls during project construction.	Ongoing/throughout earthworks	Construction contractor

7.1 Adaptive management strategy

Construction and operational management plans will all contain an adaptive management component. Adaptive management strategies will be receptive to any new and relevant data that may arise through ongoing assessment and monitoring and are key to the successful implementation of crucial objectives yet also allow flexibility to changing dynamics and ongoing feedback and results. This includes measures to monitor predicted and uncertain impacts which will trigger adaptive management actions and allow for effective and quick responses.

8 Serious and irreversible impacts

In accordance with Clause 6.7 of the BC Regulation 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 becoming extinct because:

(a) Principle 1: It will cause a further decline of the species or ecological community that is currently observed, estimated, inferred or reasonably suspected to be in a rapid rate of decline.
(b) Principle 2: It will further reduce the population size of the species or ecological community that is currently observed, estimated, inferred or reasonably suspected to have a very small population size.
(c) Principle 3: It is an impact on the habitat of the species or ecological community that is currently observed, estimated, inferred or reasonably suspected to have a very limited geographic distribution.
(d) Principle 4: The impacted species or ecological community is unlikely to respond to measures to improve its habitat and vegetation integrity and therefore its members are not replaceable.

No entities recorded within the subject land are considered to meet the above principles. No further assessment on SAIIs is required.

9 Impact summary

9.1 Identification of impacts requiring offset

9.1.1 Impacts to native vegetation (ecosystem credits)

As outlined in Section 9.2.1 of the BAM, the assessor must determine an offset for all impacts of proposals on PCTs that are associated with a vegetation zone that has a vegetation integrity score of:

(a) ≥15, where the PCT is representative of an EEC or a CEEC.
(b) ≥17, where the PCT is associated with threatened species habitat (as represented by ecosystem credits) or represents a vulnerable ecological community.
(c) ≥20, where the PCT does not represent a TEC and is not associated with threatened species habitat.

On this basis, offsets are required for vegetation zones 4052_moderate (including both management zones) and 4052_low as they both have vegetation integrity scores greater than 15.

The offset requirement for the proposal was calculated using the BAM Calculator. Table 38 provides a summary of the ecosystem credit offsets required for impacts from proposed development at the subject land.

Table 38 Offsets required (ecosystem credits)

Vegetation zone	Management zones	Area (ha)	Impact	VI score	Future VI score	Offset required	TEC	HBTs	Credit requirement
4052_Moderate	4052_tl	0.04	Clearance	78.5	0	Yes	Yes	Yes	11
	4052_pl	0.24	Partial	78.5	21.4	Yes	Yes	Yes	
4052_Low	-	0.93	Clearance	49.7	0	Yes	Yes	Yes	29
4052_DNG	-	3.59	Clearance	13.6	0	No	Yes	No	0
4052_NOG	-	8.75	Clearance	7.0	0	No	No	No	0
4009_Low	-	0.10	Clearance	12.9	0	No	Yes	No	0

9.1.2 Impacts to threatened species and their habitat

As outlined in Section 9.2.2 of the BAM an offset is also required for the impacts of the proposals on the habitat of threatened species assessed for ecosystem credits and associated with a PCT in a vegetation zone with a vegetation integrity score of ≥17.

The offset requirement for the proposal was calculated using the BAM Calculator. Table 39 provides a summary of the species credit offsets required for impacts from proposed development at the subject land.

Table 39 Offsets required (species credits)

Vegetation zone	Species	Habitat condition (vegetation integrity score) loss	Area (ha)	Biodiversity risk weighting	Credit requirement
4052_Moderate	Southern Myotis	78.5	0.28	2	8
4052_Low	Southern Myotis	60.2	0.93	2	23
4009_Low	Southern Myotis	12.9	0.10	2	1

Species polygons for the above species credit species impacted by the project are illustrated in Figure 16 below.

9.2 Identification of impacts not requiring offset

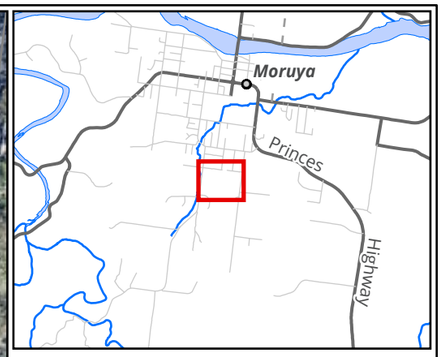
Following assessment the following impacts do not require offsetting due to VI scores being below offsetting thresholds values, or vegetation not satisfying the definition of native vegetation, as prescribed in the BAM:

- Removal of 0.10 ha of PCT 4009 Low.
- Removal of 3.59 ha of PCT 4052 DNG.
- Removal of 8.75 ha of PCT 4052 NOG.
- Removal of 0.20 ha of exotic vegetation.
- Removal of 0.21 ha of planted native vegetation, not associated with a PCT.

9.3 Identification of areas not requiring assessment

Following assessment, the following areas do not require assessment in accordance with BAM:

- Existing cleared areas, including the driveway and residential dwelling.



Legend

- Subject land
- Development footprint
- Development site
- Areas not requiring assessment
- Impacts not requiring offset
- Impacts requiring offset

Figure 16 Impacts requiring offset, not requiring offset, not requiring assessment

0 100

Metres

N

Scale: 1:2,200 @ A3

Coordinate System: GDA2020 MGA Zone 56

biosis

APEM Group

Matter: 42335, Date: 17 March 2026
Prepared for: RG, Prepared by JB, Last edited by: jbeckius
Location: P:\42300s\42335\Mapping\42335_SpencerStMoruya_BDAR_Part2.aprx
Layout: 42335_F16_Offsets

10 Assessment against biodiversity legislation

10.1 *Environment Protection and Biodiversity Conservation Act 1999*

The EPBC Act is the Australian Government's key piece of environmental legislation. The EPBC Act applies to developments and associated activities that have the potential to significantly impact on Matters of National Environmental Significance (MNES) protected under the Act. Under the EPBC Act, activities that have potential to result in significant impacts on MNES must be referred to the Commonwealth Minister for the Environment and Water for assessment.

An assessment of the impacts of the proposed development on MNES, against heads of consideration outlined in Commonwealth of Australia (2013) was prepared to determine whether referral of the proposed development to the Commonwealth Minister for the Environment is required. MNES relevant to the proposed development are summarised in Table 40.

Table 40 Assessment of the proposed development against the EPBC Act

Matter of NES	Project specifics	Potential for significant impact
Threatened species	There were no threatened flora or fauna species listed under the EPBC Act detected during surveys or assumed present. Therefore, no Significant Impact Criteria (SIC) assessments have been undertaken for any threatened flora or fauna.	A significant impact is unlikely to result from the project.
Threatened ecological communities	One TEC listed under the EPBC Act is proposed to be impacted by the current proposal, *Illawarra and south coast lowland forest and woodland* (CEEC).	A SIC assessment has been prepared for this CEEC in Appendix 5 and found no significant impact likely to occur.
Migratory species	Migratory species are considered unlikely to occur within the subject land, other than on a vagrant basis, given its location within a highly cleared and disturbed landscape. Migratory species may occasionally stopover on the development site; however, this would likely be enroute to the higher quality vegetation and wetlands within the Eurobodalla National Park to the east, the Deua National Park to the west or the important wetlands along the Moruya River to the North. It is unlikely that the vegetation and waterbodies within the subject land provide high quality breeding, roosting or foraging habitat. While there is a farm dam within the subject land, it is small and lacks good quality native vegetation and therefore is unlikely to provide	A significant impact is unlikely to result from the project.

Matter of NES	Project specifics	Potential for significant impact
	habitat for any shorebirds. Native vegetation within the subject land is degraded in nature and unlikely to support migratory species. Additionally, the creeks will be managed under a VMP, resulting in an overall improvement in the condition of these waterways. There is also no migratory species important mapping mapped within the subject land.	
National Heritage Places	There are no National Heritage Places within the subject land or surrounding locality.	The project will not result in impacts to any National Heritage Places.
Wetlands of international importance (Ramsar sites)	There are no wetlands of international importance within or in close proximity to the subject land.	The project will not result in impacts to any Ramsar sites.

10.2 *Environmental Planning and Assessment Act 1979* / Environmental Planning and Assessment Regulation 2021

The EP&A Act was enacted to encourage the proper consideration and management of impacts of proposed development or land-use changes on the environment (both natural and built) and the community. The EP&A Act is administered by NSW DCCEEW.

The EP&A Act provides the overarching structure for planning in NSW and is supported by other statutory environmental planning instruments. Sections of the EP&A Act of primary relevance to the natural environment are outlined further below.

10.3 State Environmental Planning Policies

10.3.1 State Environmental Planning Policy (Biodiversity and Conservation) 2021

Chapter 2: Vegetation in non-rural areas

This chapter aims to protect the biodiversity values of trees and other vegetation in non-rural areas of NSW and to preserve the amenity of non-rural areas through the preservation of trees and other vegetation by ensuring that the BOS will apply to all clearing of native vegetation that exceeds the offset thresholds in urban areas and environmental conservation zones that do not require development consent.

This chapter does not apply to the Eurobodalla LGA as defined in Clause 2.3 of the SEPP (i.e., Eurobodalla is not included as an LGA under land to which this chapter of the SEPP applies), therefore the provisions of this chapter under the SEPP do not apply.

Chapter 3: Koala Habitat Protection 2020

This chapter applies to land zoned RU1, RU2 or RU3. As the subject land occurs on land zoned R2 Low Density Residential and R3 Medium Density Residential under the Eurobodalla LEP, this chapter does not apply.

Chapter 4: Koala Habitat Protection 2021

Chapter 4 Koala Habitat Protection aims to encourage the conservation and management of areas of natural vegetation that provide habitat for koalas to support a permanent free-living population over their present range and reverse the current trend of koala population decline.

The subject land is located within the Eurobodalla Council (Council) LGA. Council is listed under Schedule 2, Chapter 4 of Biodiversity and Conservation SEPP, and is therefore subject to the requirements laid out by the policy. Specifically this means before a consent authority may grant consent to a DA, it must satisfy itself whether or not the land is potential Koala habitat and core Koala habitat.

The subject land does not have an approved Koala Plan of Management (KPoM).

A Council is not prevented from granting consent to a development application for consent to carry out development on land if:

- The land does not have an approved KPoM applying to the land, or
- The Council is satisfied that the land is not core Koala habitat.

The subject land supports six Koala use tree species for the South Coast Koala Management Area which includes the Eurobodalla LGA, as defined in Schedule 3 of the Biodiversity and Conservation SEPP. Koala use trees within the subject land include Woollybutt, Forest Red Gum, Rough-barked Apple, Coast grey Box, White Stringybark and Black She-oak.

Therefore the vegetation within the study area is considered potential Koala habitat as defined under Biodiversity and Conservation SEPP.

As the vegetation in the study area has been identified as potential Koala habitat, determination of whether the land constitutes core Koala habitat is required.

Core Koala habitat means:

- 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
- 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.

Three records of Koala have been recorded within 10 kilometres of the study area with the most recent being in 2019. Three modified Koala SAT surveys (Phillips & Callaghan 2011) and nocturnal spotlighting were undertaken within the subject to determine Koala activity. No signs (Scats, urine stains, scratches, fur) or individual Koala's were located during targeted surveys. Therefore, the vegetation in the subject land does not constitute core Koala habitat as defined under Biodiversity and Conservation SEPP.

No further consideration is required.

10.3.2 *Coastal Management Act 2016* and State Environmental Planning Policy (Resilience and Hazards) 2021

Chapter 2: Coastal Management

The State Environmental Planning Policy (Resilience and Hazards) 2021 aims to promote a co-ordinated approach to land use planning in the coastal zone of NSW in a manner consistent with the objects of the *Coastal Management Act 2016* (CM Act). The SEPP, including Chapter 2 Coastal Management, has replaced the now repealed:

- SEPP No. 14 Coastal Wetlands.
- SEPP No. 26 Littoral Rainforests.
- SEPP No. 71 Coastal Protection.
- SEPP Coastal Management

The CM Act and Resilience and Hazards SEPP provide maps for Coastal Wetlands, Littoral Rainforests and associated Proximity Areas, Coastal Environment Area and Coastal Use Area. Development consent cannot be granted within these areas unless the consent authority is satisfied that the proposed development will not significantly impact on areas mapped as Coastal Wetlands, Coastal Wetlands Proximity Area, Littoral Rainforests, Littoral Rainforest Proximity Area, Coastal Environment Area, or Coastal Use Area.

The subject land is not within a 'coastal zone' as defined by clause 6 of this policy, including Coastal Wetlands or Littoral Rainforests or within their relevant Proximity Areas. Therefore, the CM Act and Resilience and Hazards SEPP do not apply to this project.

10.4 Other Environmental Planning Instruments

10.4.1 Eurobodalla Local Environmental Plan 2012

Local Environmental Plans (LEP) are legal documents that guide planning decisions and controls land use within a specific local government area in Australia. The study area falls under the Eurobodalla Local Environmental Plan.

Section 6.7 Riparian lands and watercourses of the LEP states the requirements for development applications on or near riparian lands and watercourses. The objective of clause 1 of section 6.7 of the LEP is to protect and maintain the following:

> *'(a) water quality within watercourses,*
>
> *(b) the stability of the bed and banks of watercourses,*
>
> *(c) aquatic and riparian habitats,*
>
> *(d) ecological processes within, and continuity and connectivity between, waterways and riparian areas.'*

The two waterways within the subject land are identified on the *Riparian Lands and Watercourses Map* referenced by section 6.7 of the LEP as the following:

- 3rd order creek as Riparian Category 2 watercourse.

- 1st order creek as Riparian Category 3 watercourse.

Section 6.7 of the LEP states the requirements for specific riparian corridor buffer widths based upon the watercourse category as the following:

- 10 metres for Riparian Category 3 watercourses.
- 20 metres for Riparian Category 2 watercourses.

Therefore, the LEP requires a riparian corridor buffer of 20 metres for the 3rd order creek and 10 metres for the 1st order creek within the subject land.

Consultation has been undertaken with the DPHI regarding the recommended riparian corridor widths. A riparian advice letter completed by Biosis (Biosis 2025) and a letter completed by Ethos Urban (Ethos Urban 2025) were presented to DPHI expressing that adhering to the riparian corridor widths required by the LEP or the WM Act would result in the development site being unviable for development (due to extensive APZs). The letters presented new riparian corridor buffers that will allow the proposed development to remain viable whilst taking into consideration both the riparian and bushfire constraints. DPHI have agreed that riparian corridor widths (measured from the top of bank on each side) of 15 metres for the 3rd order creek and 5 metres for the 1st order creek, as presented within both letters, are suitable. These widths provide adequate riparian buffers between the waterways and the proposed development, ensuring the waterways are adequately managed and that any indirect impacts from the proposed development are minimised and the aquatic habitat is protected.

Clause 3 of section 6.7 of the LEP states that the consent authority must consider whether or not the development:

> *'(a) will cause any adverse impact on the following—*
>
> *(i) water quality and flows within a watercourse,*
>
> *(ii) aquatic and riparian species, habitats and ecosystems,*
>
> *(iii) the stability of the bed, shore and banks of a watercourse,*
>
> *(iv) the free passage of fish and other aquatic organisms within or along a watercourse,*
>
> *(v) any future rehabilitation of the watercourse and riparian areas, and*
>
> *(b) will increase water extraction from a watercourse.'*

There are two waterways present within the subject land, and the ecological function of both will be protected and improved through the implementation of riparian corridor buffers (15 metres for 3rd order creek and 5 metres for 1st order creek), erosion controls, revegetation of both aquatic and riparian vegetation, weed control and bank stability measures in accordance with the VMP. Therefore, the implementation of these controls and measures within each VMP will ensure adverse impacts on the ecological parameters stated above are mitigated. Furthermore, no water extraction from either watercourse is proposed as part of the SSD.

Clause 4 of section 6.7 of the LEP states that the consent authority must not grant development consent if the consent authority is not satisfied that:

'(a) the development is designed, sited and will be managed to avoid any significant adverse environmental impact, or

(b) if that impact cannot be reasonably avoided by adopting feasible alternatives—the development is designed, sited and will be managed to minimise that impact, or

(c) if that impact cannot be minimised—the development will be managed to mitigate that impact.'

The implementation of a VMP, riparian corridor buffers and other controls highlighted above will ensure that there will be no significant adverse environmental impact to these waterways as a result of the SSD. The VMP and associated mitigation measures will ensure the waterways are adequately managed and that any indirect impacts from the proposed development are minimised and the aquatic habitat is protected. Revegetation of the aquatic and groundcover species, management of weeds, erosion control and maintenance of bank stability will be carried out in accordance with DPE guidelines (DPE 2022b) and will overall result in improvement of the habitat conditions and ecological function of the riparian corridor compared to its current condition.

Therefore, the management of the waterways and riparian corridors within the subject land as proposed by the SSD is in accordance with the requirements of the LEP.

A foot bridge and associated path is proposed to be built across the 3rd order creek and will be located within the 15 metre riparian corridor. The bridge will span the top of banks on both sides and will not block water flow or potential fish passage upstream and downstream of the bridge. The bridge piers and the two entry points will be located greater than 5 metres from the top of bank on each side of the creek. There is also a proposed culvert located within the upstream section of the 3rd order creek. There are no detailed designs for the footbridge, culvert or paths at this stage, therefore the impacts on the creek cannot be reliably assessed. The designs of these structures will be prepared during the detailed design phase of the SSD, and the BDAR will be updated with the potential impacts of these structures.

The bridge, paths and culverts should be constructed in accordance with the NSW DCCEEW guidelines for watercourse crossings (NSW DCCEEW 2025g) and instream works (NSW DCCEEW 2025h). The following should be considered within the design:

- Bridge piers or foundations should not be located within the main channel (between the top of banks) of the creek.
- The bridges should span the entire riparian corridor, if not the inner riparian corridor (inner 7.5 metres) at least.
- Bank stabilisation measures to prevent erosion.

10.4.2 Eurobodalla Residential Zones Development Control Plan 2011

Development Control Plans (DCPs) do not apply to SSDs as stated under section 2.10 of the Planning SEPP. Therefore, further consideration of the Eurobodalla Residential Zones Development Control Plan 2011 is not required.

10.5 *Local Land Services Act 2013* and *Local Land Services Amendment Act 2016*

The proposed development is located on land zoned as 'excluded lands' on the Native Vegetation Regulatory Map and is not subject to native vegetation land management requirements prescribed under the LLS Act.

10.6 *Biodiversity Conservation Act 2016*

The BC Act is the key piece of legislation providing for the protection and conservation of biodiversity in NSW through the listing of threatened species and communities and key threatening processes (KTPs). Impacts to threatened species and communities are assessed under Section 7.3 of the BC Act.

Threatened species and communities listed under the BC Act relevant to the subject land are provided in Section 4 and Appendix 2. A summary of impacts to threatened species, populations and communities present or assumed present within the subject land is provided in Section 4.2.5.

The BOS has been triggered under the EP&A Act and BC Act as the project is a SSD. This BDAR has been prepared for the proposed development accordingly.

10.7 *Biosecurity Act 2015*

The Biosecurity Act provides for the identification, classification and control of priority weeds with the purpose of determining if a biosecurity risk is likely to occur. A biosecurity risk is defined as the risk of a biosecurity impact occurring, which for weeds includes the introduction, presence, spread or increase of a pest into or within NSW or any part of the State. A pest plant has the potential to; harm or reduce biodiversity or out-compete other organisms for resources, including food, water, nutrients, habitat and sunlight.

The General Biosecurity Duty as outlined in the Biosecurity Act states:

All plants are regulated with a general biosecurity duty to prevent, eliminate or minimise any biosecurity risk they may pose. Any person who deals with any plant, who knows (or ought to know) of any biosecurity risk, has a duty to ensure the risk is prevented, eliminated or minimised, so far as is reasonably practicable.

Three priority weeds for the South Coast LLS Region have been recorded in the subject land and are listed in Table 41, along with their associated Duty. Management activities (i.e. VMP) are outlined in Section 7 that aim to minimise the impacts from these priority weeds.

Table 41 Priority weeds within the subject land

Scientific name	Common name	Relevant biosecurity duty
Asparagus aethiopicus	Asparagus Fern	General Biosecurity Duty
***Rubus fruticosus* species aggregate**	Blackberry	General Biosecurity Duty
Senecio madagascariensis	Fireweed	General Biosecurity Duty

10.8 *Water Management Act 2000*

The WM Act provides for the sustainable and integrated management of the state's water. The WM Act is supported by a series of interpretation guidelines which provide design considerations and overarching management measures for works on waterfront land. These considerations and management measures should be considered when planning and undertaking the proposed works. To which the following guidelines are relevant:

- *Controlled activities – guidelines for riparian corridors on waterfront land* (NSW DCCEEW 2025i).
- *Controlled activities - guidelines for watercourse crossings on waterfront land* (NSW DCCEEW 2025g).

- *Controlled activities - guidelines for outlet structures on waterfront land* (NSW DCCEEW 2025j).
- *Controlled activities - guidelines for laying pipes and cables in watercourses on waterfront land* (NSW DCCEEW 2025k).
- *Controlled activities - guidelines for instream works on waterfront land* (NSW DCCEEW 2025h).
- *Controlled activities - guidelines for vegetation management plans on waterfront land* (NSW DCCEEW 2025f).

Under the WM Act an approval is required to undertake controlled activities on waterfront land, unless that activity is otherwise exempt under Section 91E of the WM Act, Section 4.41 of the EP&A Act, or Part 2 of the *Water Management Regulation 2018*. 'Waterfront land' is defined within the Act as the bed of any river, lake or estuary and any land within 40 metres of the river banks, lake shore or estuary mean high water mark.

The proposed development is deemed a SSD and is therefore exempt from the requirement to obtain a Controlled Activity Approval, for activities on or under waterfront land, in accordance with Section 4.41 of the EP&A Act. Therefore, water management considerations within the subject land are to be assessed as part of the EIS. However, it is generally recommended that the guidelines listed above are considered within the development design process, and the EIS demonstrates that the development will not negatively impact water resources.

NSW DCCEEW recommends riparian widths based on watercourse order under the Strahler method in order to protect waterways from damage such as erosion (Strahler 1964). The watercourses mapped within the subject land are classified as 1st order and 3rd order streams, which require a vegetated riparian zone (VRZ) width of 10 metres and 30 metres from the 'top of bank' on either side, respectively (NSW DCCEEW 2025i).

It is noted that waterways and corridor widths are categorised separately under the Eurobodalla LEP (as outlined in section 10.4.1. Under the LEP, the 3rd order creek is required to have an riparian corridor of 20 m either side which is slightly less than the NSW DCCEEW guidelines, while the tributary in the north-east of the subject land is required to have a riparian corridor of 10 m either side of the top of bank, which is consistent with the NSW DCCEEW guidelines.

As stated in section 10.4.1, consultation has been undertaken with the DPHI regarding the recommended riparian corridor widths and a riparian advice letter completed by Biosis (Biosis 2025) and a letter completed by Ethos Urban (Ethos Urban 2025) were reviewed by DPHI. The letters stated the riparian corridor widths required by NSW DCCEEW guidelines (NSW DCCEEW 2025i) and Eurobodalla LEP would result in the development site being unviable for development. The letters presented reduced riparian corridor buffers that will allow the proposed development to remain viable whilst taking into consideration both the riparian and bushfire constraints. DPHI have agreed that riparian corridor widths of 15 metres for the 3rd order creek and 5 metres for the 1st order creek, as presented within both letters, are suitable. These widths provide adequate riparian buffers between the waterways and the proposed development, ensuring the waterways are adequately managed and that any indirect impacts from the proposed development are minimised and the aquatic habitat is protected.

The riparian corridors of both creeks will be managed in accordance with a VMP and the NSW DCCEEW guidelines for VMPs on waterfront land (NSW DCCEEW 2025f). The 1st order creek will be rehabilitated and regenerated with species associated with the local PCT 4052 and associated CEECs *Illawarra and south coast lowland forest and woodland ecological community* (EPBC Act) and *Lowland Grassy Woodland in the South East Corner Bioregion* (BC Act), and to improve the habitat for threatened and non-threatened flora and fauna. The 3rd creek riparian corridor will also be rehabilitated in accordance with a VMP, however will consist of 'managed' vegetation in order to function as an APZ for the project. The riparian corridor will be regenerated with native groundcover species associated with the local PCT 4009. Native canopy and mid-storey species

associated with PCT 4009 will also be planted, but in a thinned density to comply with the APZ requirements. Although this riparian corridor will not be regenerated to natural pre-clearance condition, it will still be significantly improved from its current poor condition.

As mentioned in Section 10.4.1, a foot bridge and associated path is proposed to be built across the 3rd order creek and will be located within the 15 metre riparian corridor. The bridge will span the top of banks on both sides and will not block water flow or potential fish passage upstream and downstream of the bridge. The bridge piers and the two entry points will be located greater than 5 metres from the top of bank on each side of the creek. There is also a proposed culvert located within the upstream section of the 3rd order creek. There are no detailed designs for the footbridge, culvert or paths at this stage, therefore the impacts on the creek and Key Fish Habitat cannot be reliably assessed at this time. Detailed designs for these structures will be created and incorporated during the detailed design phase, the BDAR will then be amended to include assessment of these designs and potential impacts.

The bridge, paths and culverts should be constructed in accordance with the NSW DCCEEW guidelines for watercourse crossings (NSW DCCEEW 2025g) and instream works (NSW DCCEEW 2025h). The following should be considered within the design:

- Bridge piers or foundations should not be located within the main channel (between the top of banks) of the creek.
- The bridges should span the entire riparian corridor, if not the inner riparian corridor (inner 7.5 metres) at least.
- Bank stabilisation measures to prevent erosion.

10.9 *Fisheries Management Act 1994*

The FM Act provides for the protection and conservation of aquatic species and their habitat throughout NSW. Impacts to threatened species, populations and communities, and critical habitats listed under the FM Act must be assessed through an Assessment of Significance process.

There are two creeks within the subject land: a 3rd order creek (Photo 10) and a 1st order creek (Photo 11). The third order creek is classified as Key Fish Habitat in accordance with the Fisheries Management Act 1994 (FM Act) and the *Policy and guidelines for fish habitat conservation and management* (DPI 2013). DPI provide guidelines on the assessment of Key Fish Habitat through two methods 'Habitat Sensitivity' and 'Waterway Classification' (DPI 2013). The outcome of the assessment found that the key fish habitat sensitivity is classed as TYPE 2 Moderately Sensitive Key Fish Habitat and the waterway classification for fish passage fitting within CLASS 3 Minimal key fish habitat. These classifications were determined due to the creeks ephemeral nature and having a variety of native aquatic vegetation including Narrow- leaved Cumbungi, Tall Sedge, Tall Spike Rush, River Buttercup, *Cycnogeton procerum* and Swamp Millet throughout the reach (Photo 10). The creek also has well defined banks and channels in some areas, semi-permanent disconnected pools providing only sporadic refuge for aquatic fauna and is an unnamed watercourse.

Although, the native aquatic vegetation does provide habitat for aquatic fauna, other important habitat features were absent including gravel beds, boulders, undercut banks and snags. The creek was observed to have generally no flow and the water was relatively turbid during our field investigation in 2025. Furthermore, the riparian vegetation exists in a poor and highly weedy condition due to historical clearing and agricultural impacts (i.e. grazing). During normal conditions this creek provides marginal connectivity for true aquatic species such as freshwater fish, but moderate connectivity for highly mobile semi-aquatic species such as frogs, turtles, eels and crayfish, as well as aquatic flora species. In accordance with the *Policy and guidelines for*

fish habitat conservation and management (DPI 2013) a 50 metre buffer is recommended for TYPE 2/CLASS 3 Key Fish Habitat.

There are two structures proposed to cross the mapped Key Fish Habitat and 3rd order creek: a footbridge and culvert. There are no detailed designs for these structures at this stage, therefore the impacts of these structures on the Key Fish Habitat cannot be reliably predicted. The designs will be provided during the detailed design phase of the project. Once the designs are received the BDAR will be updated. All watercourses crossings across Key Fish Habitat should be designed in accordance with the DPI Key Fish Habitat guidelines (DPI 2013) and fish friendly watercourse crossings (DPI 2003).

No predicted habitat for threatened aquatic species is mapped on the Fisheries NSW spatial data portal (DPI 2025) within the subject land. No records of threatened freshwater aquatic species have been recorded within 10 kilometres of the subject land on the BioNet Atlas of NSW, however one species (Australian Grayling *Prototroctes maraena* [Endangered, FM Act]) was predicted by the Protected Matters Search Tool (PMST).

The Australian Grayling is predicted to occur within 10 kilometres of the subject land by the PMST, however the distribution map (DPI 2022) does not identify distribution of this species within or near the subject land. The Australian Grayling is a migratory species that spawns in the ocean and migrates upstream in freshwater streams and inhabits moderate to fast flowing streams (DSE 2008). The creeks within the subject land are ephemeral, with flowing water present only after rainfall, and highly degraded, therefore it is unlikely that these creeks provide habitat for this species. The creeks will also be retained within the development design and the riparian corridors protected and restored in accordance with VMP. Furthermore, the culvert located at the most downstream section of the third order creek within the subject land is listed as a 'Barrier to fish passage' in the Fisheries NSW Spatial Data Portal (DPI 2025). Due to the limited flowing water within the creeks and the culvert, it is likely fish passage would be limited within the subject land. Therefore, Australian Grayling are unlikely to occur within the subject land due to limited fish passage and habitat.

The proposed development is SSD, therefore permits under sections 201 (dredging and reclamation), 205 (harming marine vegetation) and 219 (blocking of fish passage) do not apply.

Photo 10 **Unnamed 3rd order creek and mapped Key Fish Habitat facing downstream within the subject land.**

Photo 11 **Unnamed 1st order creek facing downstream from the eastern boundary of the development site.**

11 Biodiversity credit report

Offsetting through the transfer and retirement of biodiversity credits, or paying into the BCT Offset Fund, is required for the current assessment for impacts to two vegetation zones and three species credit species within the subject land. A biodiversity credit report is provided on the following pages.

BAM Credit Summary Report

Proposal Details

Assessment Id
00055722/BAAS25013/25/00055723

Proposal Name
Spencer Street Moruya BDAR

BAM data last updated *
05/08/2025

Assessor Name
Rebecca E. Goodwin

Report Created
19/03/2026

BAM Data version *
Current classification (live - default) (82)

Assessor Number
BAAS25013

BAM Case Status
Open

Date Finalised
To be finalised

Assessment Revision
0

BOS entry trigger

Assessment Type
Major Projects

* 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

Shoalhaven Lowland Flats Wet Swamp Forest												
5	4009_Low	Swamp Sclerophyll Forest on Coastal Floodplains of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions	12.9	12.9	0.1	Biodiversity Conservation Act listing status	High Sensitivity to Gain	Endangered Ecological Community	Not Listed	2.00		0
											Subtotal	**0**
South Coast Low Hills Red Gum Grassy Forest												
1	4052_Moderate	Illawarra and south coast lowland forest and woodland ecological community	78.5	60.2	0.28	Environment Protection and Conservation Act listing status	High Sensitivity to Gain	Not Listed	Critically Endangered	2.50		11
2	4052_Low	Illawarra and south coast lowland forest and woodland ecological community	49.7	49.7	0.93	Environment Protection and Conservation Act listing status	High Sensitivity to Gain	Not Listed	Critically Endangered	2.50		29

3	4052_DNG	Illawarra and south coast lowland forest and woodland ecological community	13.6	13.6	3.6	Environment Protection and Conservation Act listing status	High Sensitivity to Gain	Not Listed	Critically Endangered	2.50		0
4	4052_NOG	Illawarra and south coast lowland forest and woodland ecological community	7	7.0	8.8	Environment Protection and Conservation Act listing status	High Sensitivity to Gain	Not Listed	Critically Endangered	2.50		0
											Subtotal	**40**
											Total	**40**

Species credits for threatened species

Vegetation zone name	Habitat condition (Vegetation Integrity)	Change in habitat condition	Area (ha)/Count (no. individuals)	Sensitivity to loss (Justification)	Sensitivity to gain (Justification)	BC Act Listing status	EPBC Act listing status	Potential SAII	Species credits
Myotis macropus / Southern Myotis (Fauna)									
4052_Low	49.7	49.7	0.93	Biodiversity Conservation Act listing status	Species dependent on habitat attributes	Vulnerable	Not Listed	False	23

4052_Moderate	60.2	60.2	0.28	Biodiversity Conservation Act listing status	Species dependent on habitat attributes	Vulnerable	Not Listed	False	8
4009_Low	12.9	12.9	0.1	Biodiversity Conservation Act listing status	Species dependent on habitat attributes	Vulnerable	Not Listed	False	1
								Subtotal	**32**

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Appendices

Appendix 1 Survey methods

Appendix 1.1 Nomenclature

The flora taxonomy (classification) used in this report follows the most recent Flora of NSW (Harden 2002, Harden 1993, Harden 2000, Harden 2002). All doubtful species names were verified with the online Australian Plant Name Index (Australian National Botanic Gardens & Australian National Herbarium 2007). Flora species, including threatened species and introduced flora species, are referred to by both their common and then scientific names when first mentioned. Subsequent references to flora species cite the common names only, unless there is no common name, for which scientific name will be used. Common names, where available, have been included in threatened species tables and the complete flora list in Appendix 3.

Names of vertebrates follow the Census of Australian Vertebrates (CAVs) maintained by the Cth DCCEEW (DSEWPaC 2009). In the body of this report vertebrates are referred to by both their common and scientific names when first mentioned. Subsequent references to these species cite the common name only.

Appendix 1.2 Permits and licences

The biodiversity assessment was conducted under the terms of Biosis' Scientific Licence issued by NSW DCCEEW under the BC Act (SL100758, expiry date 30 June 2026). Wildlife surveys were conducted under the Secretary's Animal Care & Ethics Committee Approval (TRIM 17.892, expiry date 31 January 2028). The BAM Assessment and quality review of the BDAR was carried out by Jake Schwebel (BAAS25013).

Appendix 1.3 Limitations

Field surveys were undertaken in accordance with the BAM (DPIE 2020a). Ecological surveys provide a sampling of flora and fauna at a given time and season. Factors influencing detectability of species during survey include species dormancy, seasonal conditions, ephemeral status of waterbodies, and migration and breeding behaviours of some fauna. In many cases, these factors do not present a significant limitation to assessing the overall biodiversity values of a site.

The field surveys were conducted in winter and spring during mild and generally sunny weather, which is a suitable time to determine the presence of most threatened species. Considering the small-scale size of the native vegetation within the subject land and that areas of native vegetation were easily accessible, surveys were suitable to determine the presence of most threatened species.

Surveys undertaken, combined with habitat assessments and desktop analysis are considered sufficient to reach the conclusions herein regarding this and all other species' likelihood of occurrence within the subject land.

Database searches, and associated conclusions on the likelihood of species to occur within the assessment area, are reliant upon external data sources and information managed by third parties.

Appendix 2 BAM Candidate species assessment

Table A 1 Threatened flora species assessment

Species	Status		BAM predicted SCS	Habitat Description	Potential occurrence in subject land	BAM Candidate species	Survey required/ undertaken	Potential for impact	Conclusion and rationale
	EPBC	BC							
Astrotricha crassifolia Thick-leaf Star-hair	VU	VU	No	Root-suckering shrub growing near Patonga in Gosford, the Royal National Park, the Woronora Plateau and an outlier population at Glen Davis. Grows in a variety of communities including Sydney Coastal Dry Sclerophyll Forests, Eastern Riverine Forests, Western Slopes Grasslands and Sydney Coastal Heaths. Grows on sandstone substrates.	Low	No	Surveys not required.	No	Thick-leaf Star-hair grows in a variety of communities, however, is restricted from Wollongong to Gosford and is not known to occur down the south coast. This species in not a BAM candidate species and there are no records within 10 km of the study area. Habitat features are not present within the study area. Therefore, no further assessment is required.
Caladenia tessellata Thick Lip Spider Orchid	VU	VU	No	Small orchid recorded from the Wyong, Ulladulla and Braidwood regions with the Kiama and Queanbeyan populations believed to be extinct. Found in a wide variety of communities including Central Gorge Dry Sclerophyll Forests, Cumberland Dry Sclerophyll Forests, Coastal Floodplain Woodlands and	Low	No	Surveys not required.	No	Thick Lip Spider Orchid is predicted to occur on the south coast however the habitat within the study area is highly degraded with high weed ingress. The best quality vegetation occurs in an isolated patch in the north-eastern corner of the study area. This vegetation will be retained within the masterplan design. Furthermore, this species is not a BAM candidate species and there are no records within 10km of the study area.

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Species	Status		BAM predicted SCS	Habitat Description	Potential occurrence in subject land	BAM Candidate species	Survey required/ undertaken	Potential for impact	Conclusion and rationale
	EPBC	BC							
				Subalpine Woodlands. Grows on clay loam or sandy soils.					Therefore, no further assessment is required.
Calochilus pulchellus Pretty Beard Orchid	EN	EN	No	Terrestrial herb endemic to New South Wales, known only to occur in the Shoalhaven region. This orchid is a cryptic species, which grows on sandy-loam soils in the low wet heath understory of woodlands dominated by Scribbly Gum (Eucalyptus haemastoma).	Low	No	Surveys not required.	No	Pretty Beard Orchid is predicted to occur on the south coast however there are no habitat features for this species within the study area. There are no wet heath communities or Scribbly Gums recorded within the study area. Furthermore, this species is not a BAM candidate species and there are no records within 10km of the study area. Therefore, no further assessment is required.
Correa baeuerlenii Chef's Cap	VU	VU	No	Shrub distributed between Nelligen and Mimosa Rocks National Park. Grows in riparian areas in South Coast Sands Dry Sclerophyll Forests, South Coast Wet Sclerophyll Forests, Southern Lowland Wet Sclerophyll Forests and Southern Tableland Wet Sclerophyll Forests.	Low	No	Surveys not required.	No	The study area does occur within the predicted range for the Chef's Cap, however this species is not a BAM candidate species and there are no records within 10km of the study area. Furthermore, the vegetation formations present within the study area, Forested Wetlands and Coastal Valley Grassy Woodlands, are not a preferred habitat type for this species. The best quality vegetation occurs in an isolated patch in the north-eastern corner of the study area. This vegetation will be retained within the masterplan design. Therefore, further assessment for this species is not required.

Species	Status		BAM predicted SCS	Habitat Description	Potential occurrence in subject land	BAM Candidate species	Survey required/ undertaken	Potential for impact	Conclusion and rationale
	EPBC	BC							
Cryptostylis hunteriana Leafless Tongue Orchid	VU	VU	Yes	Orchid with a distribution spanning from Gibraltar Range National Park southwards to the coastal area near Orbost in Victoria. Grows in a variety of communities including Sydney Coastal Dry Sclerophyll Forests, Coastal Heath Swamps, New England Dry Sclerophyll Forests and Sydney Coastal Heaths. Grows in sandy soils.	Low	Yes	Surveys required – undertaken in December 2025.	No	Leafless Tongue Orchid flowering was confirmed in a population in Meroo National Park in early December, approximately 50 km north of the subject land. Populations flower later the further south they are located, therefore end of December is considered a suitable survey time within the subject land. This population is considered a suitable reference population for sites in the Batemans Bay and Moruya area. Therefore, the targeted surveys undertaken in December 2025 are considered suitable to detect the Leafless Tongue Orchid. Surveys undertaken in December 2025 and species was not detected.
Eucalyptus stenostoma Jillaga Ash	EN	EN	No	Tree to 25m tall endemic to NSW, mostly within Deua and Wadbilliga National Parks, as well as some in South East Forest National Park, Dampier State Forest and minor occurrences on private land. It is restricted to very steep slopes, rocky hill tops and ridgelines with shallow, stony soils that are somewhat infertile, on rhyolite, hornfels,	Low	No	Surveys not required.	No	Jillaga Ash is restricted to very steep slopes, rocky hill tops and ridgelines, none of which are present within the study area. This species is also not a BAM candidate species and there are no records within 10km of the study area. Therefore, further assessment for this species is not required.

Species	Status		BAM predicted SCS	Habitat Description	Potential occurrence in subject land	BAM Candidate species	Survey required/ undertaken	Potential for impact	Conclusion and rationale
	EPBC	BC							
				sandstone, mudstone, slate and granitoids.					
Genoplesium vernale East Lynne Midge Orchid	VU	VU	No	Terrestrial orchid restricted to a narrow belt ~12 km wide spanning from 17 km south of Batemans Bay to 24 km north of Ulladulla. Grows in South East Dry Sclerophyll Forests, Sydney Hinterland Dry Sclerophyll Forests and Southern Lowland Wet Sclerophyll Forests. Confined to areas with well-drained shallow soils of low fertility, often occurring near the crests of ridges and on low rises where the ground cover is more open and sedge dominated rather then being shrubby.	Low	No	Surveys not required.	No	East Lynne Midge Orchid is confined to a narrow strip of land from Batemans Bay to Ulladulla. This species is not a BAM candidate species and the closest record is approximately 6 kilometres north of the study area, north of the Moruya River. Key habitat features such as ridges are not present within the subject land. The best quality vegetation occurs in an isolated patch in the northeastern corner of the study area. This vegetation will be retained within the masterplan design. Therefore, further assessment of this species is not required.
Haloragis exalata* subsp. *exalata Square Raspwort	VU	VU	Yes	Small to medium sized shrub found growing in four widely scattered locations in eastern NSW including the central coast, south coast and north western slopes. Grows in damp, protected and shaded areas in riparian zones in a variety of communities including South East Dry Sclerophyll Forests, Coastal	Low	Yes	Surveys required – undertaken in June 2025.	No	Surveys undertaken in June 2025 and species was not detected.

Species	Status		BAM predicted SCS	Habitat Description	Potential occurrence in subject land	BAM Candidate species	Survey required/ undertaken	Potential for impact	Conclusion and rationale
	EPBC	BC							
				Floodplain Wetlands, Montane Bogs and Fens and Northern Warm Temperate Rainforests.					
Persicaria elatior Tall Knotweed	VU	VU	No	Erect herb found growing in south-eastern NSW at Mount Dromedary, Moruya State Forest near Turlinjah, Upper Avon River catchment north of Robertson, Bermagui and Picton Lakes. Also grows in northern NSW around Raymond Terrace near Newcastle and Cherry Tree and Gibberagee State Forests in the Grafton area. Grows in damp places usually on the margins of waterbodies and in swamp forests in a variety of communities including Coastal Floodplain Wetlands, Coastal Swamp Forests, Eastern Riverine Forests, Coastal Freshwater Lagoons and Coastal Heath Swamps.	Low	No	Surveys not required.	No	Key habitat features occur within the subject land and include the two creeks and associated PCT 4009. However, both creeks and PCT 4009 exist in a degraded and weedy condition and would therefore provide poor habitat for this species. This species is not a BAM candidate species and the closest record to the subject land is located approximately 6 kilometres east of the subject land. Slender Knotweed *Persicaria decipiens,* a species of the same genus, was detected onsite during surveys and was confirmed to not be Tall Knotweed. Tall Knotweed, although not specifically surveyed for, was not incidentally recorded within the subject land during flora targeted surveys. Additionally, this species is not cryptic and has a high chance of being recorded incidentally if present onsite. Therefore, further assessment for this species is not required.
Pomaderris gilmourii* var. *cana Grey Deua Pomaderris	CE	CE	No	Tall shrub restricted to Deua National Park, south-west of Moruya. Grows on rocky	Low	No	Surveys not required.	No	Habitat features specific to this species, such as rocky outcrops and rhyolite substrate, are not present

Species	Status		BAM predicted SCS	Habitat Description	Potential occurrence in subject land	BAM Candidate species	Survey required/ undertaken	Potential for impact	Conclusion and rationale
	EPBC	BC							
				outcrops in open shrubland in South East Dry Sclerophyll Forests. Grows on rhyolite substrates in skeletal soils.					within the subject land, this species is also not a BAM candidate species and there are no records within 10km of the study area. Additionally, no species of *Pomaderris* were recorded incidentally within the subject land, therefore it is highly unlikely to be recorded onsite. Therefore, further assessment for this species is not required.
Pomaderris gilmourii* var. *gilmourii	EN	EN	No	Tall shrub restricted to Deua National Park, south-west of Moruya. Grows on rocky outcrops in open shrubland in South East Dry Sclerophyll Forests. Grows on rhyolite substrates in skeletal soils.	Low	No	Surveys not required.	No	Habitat features specific to this species, such as rocky outcrops and rhyolite substrate, are not present within the subject land, this species is also not a BAM candidate species and there are no records within 10km of the subject land. Additionally, no species of *Pomaderris* were recorded incidentally within the subject land, therefore it is highly unlikely to be recorded onsite. Therefore, further assessment for this species is not required.
Pomaderris parrisiae Parris' Pomaderris	VU	VU	No	Tall shrub or small tree recorded from Egan Peaks Nature Reserve, Wadbilliga and South East Forests National Parks and a possible record from Ben Boyd National Park. Found growing in rocky	Low	No	Surveys not required.	No	Habitat features specific to this species, such as rocky shrubland or heathlands on escarpments, are not present within the subject land, this species is also not a BAM candidate species and there are no records within 10km of the subject land.

Species	Status		BAM predicted SCS	Habitat Description	Potential occurrence in subject land	BAM Candidate species	Survey required/ undertaken	Potential for impact	Conclusion and rationale
	EPBC	BC							
				shrubland or tall open forest on escarpment ranges in Southern Montane Heaths and Southern Escarpment Wet Sclerophyll Forests. Grows in skeletal soils.					Additionally, no species of *Pomaderris* were recorded incidentally within the subject land, therefore it is highly unlikely to be recorded onsite. Therefore, further assessment for this species is not required.
Rhizanthella slateri Eastern Australian Underground Orchid	EN	VU	No	Terrestrial orchid with a distribution spanning from south-east NSW to south-east Queensland. Recorded in ten populations in NSW including near Bulahdelah, the Watalgan Mountains, the Blue Mountains, Wisemans Ferry Area, Agnes Banks and near Nowra. A cryptic species which grows beneath the soil surface with flowers being the only part of the plant to occur aboveground in Sydney Sand Flats Dry Sclerophyll Forests, Eastern Riverine Forests, Northern Warm Temperate Rainforests, North Coast Wet Sclerophyll Forests, Northern Hinterland Wet Sclerophyll Forests and Southern Lowland Wet Sclerophyll Forests. Grows in deep loam soils.	Low	No	Surveys not required.	No	Habitat features specific to this species, such as deep layers of organic matter, are not present within the subject land, this species is also not a BAM candidate species and there are no records within 10km of the subject land. Therefore, further assessment for this species is not required.

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Species	Status		BAM predicted SCS	Habitat Description	Potential occurrence in subject land	BAM Candidate species	Survey required/ undertaken	Potential for impact	Conclusion and rationale
	EPBC	BC							
Rhodamnia rubescens *Scrub Turpentine*	CE	CE	Yes	Found in littoral, warm temperate and subtropical rainforest and wet sclerophyll forest usually on volcanic and sedimentary soils.	Medium	Yes	Surveys required – undertaken in June 2025.	No	Surveys undertaken in June 2025 and species was not detected.
Thesium australe *Austral Toadflax*	VU	VU	No	Small, straggling herb with a distribution comprising of small populations scattered along the coast of eastern NSW including the Northern and Southern Tablelands, Tasmania, Queensland and eastern Asia. A root parasite found growing on damp sites in grassland, grassy woodlands and coastal headlands often in association with Kangaroo Grass *Themeda triandra* in a variety of communities including New England Dry Sclerophyll Forests, Western Slopes Grasslands, Northern Tableland Wet Sclerophyll Forests, Brigalow Clay Plain Woodlands, Subalpine Woodlands and Maritime Grasslands.	Low	No	Surveys not required.	No	Habitat features specific to this species, such as grassy woodlands and Kangaroo Grass, are present within the subject land. However, Kangaroo Grass is not a dominant grass species within the subject land and only occurs sporadically. Furthermore, the grassy woodland vegetation within the subject land is for the most part highly degraded, particularly the ground layer, due to historic clearing, grazing and weed coverage. The closest record is located approximately 8.5 km south-east of the subject land within the Eurobodalla National Park. This species is not a BAM candidate species and was not detected incidentally during any surveys. Therefore, further assessment for this species is not required.
Wilsonia backhousei *Narrow-leaved Wilsonia*		VU	Yes	Small, sprawling, matted shrub confined to the coastal between Mimosa Rocks	Low	Yes	Surveys required –	No	Surveys undertaken in June 2025 and species was not detected.

Species	Status		BAM predicted SCS	Habitat Description	Potential occurrence in subject land	BAM Candidate species	Survey required/ undertaken	Potential for impact	Conclusion and rationale
	EPBC	BC							
				National Park and Wamberal north of Sydney including Nelson's Lake, Potato Point, Sussex Inlet, Wowly Gully, Parramatta River at Ermington, Clovelly, Voyager Point, Wollongong and Royal National Park. Found growing on the margins of coastal saltmarshes and lakes in Coastal Floodplain Wetlands, Temperate Montane Grasslands, Mangrove Swamps and Saltmarshes.			undertaken in June 2025.		

Table A 2 Threatened fauna species assessment

Species	Status		BAM predicted SCS	Habitat Description	Potential occurrence in subject land	BAM Candidate species	Survey required/ undertaken	Potential for impact	Conclusion and rationale
	EPBC	BC							
Birds									
Anthochaera phrygia Regent Honeyeater	CE	CE	Yes	Regent Honeyeaters are semi-nomadic, occurring in temperate eucalypt woodlands and open forests. Most records are from box-ironbark eucalypt forest associations and wet lowland coastal forests. Nectar and fruit from mistletoes are	Low	No	Surveys not required.	No	The species has been excluded as a candidate species as the subject land does not occur within areas mapped as 'Important Habitat' for the species. There are no mapped important areas for the Regent Honeyeater within or near the study area. The closest mapped area is

Species	Status		BAM predicted SCS	Habitat Description	Potential occurrence in subject land	BAM Candidate species	Survey required/ undertaken	Potential for impact	Conclusion and rationale
	EPBC	BC							
				also eaten. This species usually nest in tall mature eucalypts and sheoaks.					approximately 7.5 kilometres southeast from the study area. The best quality vegetation occurs in an isolated patch in the northeastern corner of the subject land. This vegetation will be retained within the masterplan design. Scattered mature paddock trees will also, generally, be retained within the design. Therefore, this species is unlikely to occur within the subject land and there is a low potential for impact.
Aphelocephala leucopsis Southern Whiteface	VU	VU	No	Southern whitefaces occupy open acacia or eucalypt-dominated woodlands and shrublands on ranges, foothills, lowlands, and plains. This species favours open woodlands and shrublands with low tree densities and a herbaceous litter cover or grassy understory.	Low	No	Surveys not required.	No	The Southern Whiteface is not a BAM candidate species and there are no records within 10km of the study area. The best quality vegetation occurs in an isolated patch in the northeastern corner of the study area. This vegetation will be retained within the masterplan design. Scattered mature paddock trees will also, generally, be retained within the design. Therefore, this species is unlikely to occur within the subject land and there is a low potential for impact.
Ardenna grisea Sooty Shearwater	VU		No	The Sooty Shearwater is a seabird species with a widespread distribution across the Southern Hemisphere. It inhabits pelagic waters, nesting	Low	No	Surveys not required.	No	The Sooty Shearwater inhabits pelagic waters and nests on remote islands and coastal cliffs, none of which occur within the subject land. This species is not a BAM candidate

Species	Status		BAM predicted SCS	Habitat Description	Potential occurrence in subject land	BAM Candidate species	Survey required/ undertaken	Potential for impact	Conclusion and rationale
	EPBC	BC							
				on remote islands and coastal cliffs, and undertakes long-distance migrations.					species and there are no records within 10 kilometres of the subject land. Therefore, this species is unlikely to occur within the study area and there is a low potential for impact.
Arenaria interpres Ruddy Turnstone	VU		No	Inhabits tidal reefs, sandy beaches mudflats and exposed or shallow seaweed beds.	Low	No	Surveys not required.	No	The Ruddy Turnstone inhabits coastal habitat including tidal reeds, sandy beaches, mudflats and exposed seaweed beds, none of which are present within the subject land. This species is not a BAM candidate species, and the closest record is approximately 6 kilometres to the east. Due to no habitat features required by this species present within the subject land, there is no further assessment required for this species.
Botaurus poiciloptilus Australasian Bittern	EN	EN	No	The Australasian Bittern is distributed across south-eastern Australia. Often found in terrestrial and estuarine wetlands, generally where there is permanent water with tall, dense vegetation including Typha spp. and Eleocharis spp.. Typically this bird forages at night on frogs, fish and invertebrates, and remains inconspicuous during the day.	Low	No	Surveys not required	No	The subject land does have two creeks and one dam which support scattered patches of macrophytes including Broadleaf Cumbungi. However, the two creeks are both ephemeral and do not support permanent water, and although the dam does hold permanent water, there are no significant patches of dense aquatic vegetation that might provide habitat for this species. The closest record to the subject land is

Species	Status		BAM predicted SCS	Habitat Description	Potential occurrence in subject land	BAM Candidate species	Survey required/ undertaken	Potential for impact	Conclusion and rationale
	EPBC	BC							
				The breeding season extends from October to January with nests being built amongst dense vegetation on a flattened platform of reeds.					located approximately 6.5 km east within the Eurobodalla National Park adjacent to Congo creek, an estuarine waterway. Therefore, due to the lack of permanent water and dense aquatic vegetation, this species is unlikely to be utilising the subject land. Therefore, further assessment for this species is not required.
Burhinus grallarius Bush Stone-curlew		EN	Yes	The Bush Stone-curlew is found throughout Australia except for the central southern coast and inland, the far south-east corner, and Tasmania. Only in northern Australia is it still common however and in the south-east it is either rare or extinct throughout its former range. Occurs in lightly timbered open forest and woodland, or partly cleared farmland with remnants of woodland, with a ground cover of short sparse grass and few or no shrubs where fallen branches and leaf litter are present.	Low	No	Surveys not required.	No	This species depends on vegetation with an open understorey and suitable fallen debris for cover and foraging (such as dead timber and logs). There is a minimal quantity of fallen debris present in the subject land due to prior disturbance from historical clearing and grazing. Excluded as a candidate based on habitat constraints in the BAM-C (lack of significant standing/fallen dead timber). There are also no previous records within 10 km of the subject land. Therefore, further assessment for this species is not required and there is a low likelihood of occurrence and low potential impact.
Calidris acuminata Sharp-tailed Sandpiper	VU	VU	No	This species is a migratory visitor to Australia, and spends its breeding season in Siberia. In the non-breeding season,	Low	No	Surveys not required.	No	The subject land does not provide breeding habitat for this species as this species does not breed in Australia.

Species	Status		BAM predicted SCS	Habitat Description	Potential occurrence in subject land	BAM Candidate species	Survey required/ undertaken	Potential for impact	Conclusion and rationale
	EPBC	BC							
				the Sharp-tailed Sandpiper is known to occur mostly in the south-east of Australia, but has been found on coastlines all throughout the country.					Foraging habitat such as mudflats, rocky shores, mangroves and shorelines are not present within the subject land. The Sharp-tailed Sandpiper may utilise PCT 4009 along the 3rd order creek on a vagrant basis, however due to the degraded nature of this vegetation, it is unlikely to provide good quality foraging habitat. This creek and most of PCT 4009 will not be directly impacted by the proposed works. The farm dam also does not provide foraging habitat due to the limited native aquatic vegetation. Therefore, further assessment for this species is not required and there is a low likelihood of occurrence and low potential impact.
Calidris alba Sanderling		VU	Yes	Occurs on the coast mostly on open sand beaches exposed to open sea-swells.	Low	No	Surveys not required.	No	The species has been excluded as a candidate species as the subject land does not occur within areas mapped as 'Important Habitat' for the species.
Calidris canutus Red Knot	VU		Yes	Typically located within intertidal mudflats, sandflats and sandy beaches of sheltered coasts. Occasionally found on sandy open beaches or shallow pools, or in saline wetlands close to the coast.	Low	No	Surveys not required.	No	The species has been excluded as a candidate species as the subject land does not occur within areas mapped as 'Important Habitat' for the species.

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Species	Status		BAM predicted SCS	Habitat Description	Potential occurrence in subject land	BAM Candidate species	Survey required/ undertaken	Potential for impact	Conclusion and rationale
	EPBC	BC							
Calidris ferruginea Curlew Sandpiper	CE	EN	Yes	Inhabits sheltered intertidal mudflats. Also non-tidal swamps, lagoons and lakes near the coast. Infrequently recorded inland.	Low	No	Surveys not required.	No	The species has been excluded as a candidate as the subject land does not occur within areas mapped as 'Important Habitat' for the species.
Calidris tenuirostris Great Knot	VU	VU	Yes	Mainly found on intertidal mudflats, sandflats and sandy beaches. Rarely found on inland lakes and swamps, instead preferring sheltered coastal habitats. In hot conditions, the Great Knot often roosts on damp substrates to keep cool.	Low	No	Surveys not required.	No	The species has been excluded as a candidate as the subject land does not occur within areas mapped as 'Important Habitat' for the species.
Callocephalon fimbriatum Gang-gang Cockatoo	EN	EN	Yes	In summer, occupies tall montane forests and woodlands, particularly in heavily timbered and mature wet sclerophyll forests. Also occur in subalpine Snow Gum woodland and occasionally in temperate or regenerating forest. In winter, occurs at lower altitudes in drier, more open eucalypt forests and woodlands, particularly in box-ironbark assemblages, or in dry forest in coastal areas. It requires tree hollows in which to breed.	Medium	Yes	Surveys required – undertaken in January 2026	No	Surveys undertaken in January 2026 and species was not detected.

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Species	Status		BAM predicted SCS	Habitat Description	Potential occurrence in subject land	BAM Candidate species	Survey required/ undertaken	Potential for impact	Conclusion and rationale
	EPBC	BC							
Calyptorhynchus lathami lathami South-Eastern Glossy Black-Cockatoo	VU	VU	Yes	Inhabits forest with low nutrients, characteristically with key Allocasuarina species. Tends to prefer drier forest types. Often confined to remnant patches in hills and gullies. Breed in hollows stumps or limbs, either living or dead.	Medium	Yes	Surveys required – undertaken in July 2025	No	Surveys undertaken in July 2025 and species was not detected.
Charadrius leschenaultii Greater Sand-plover	VU	VU	Yes	Entirely coastal in NSW, foraging on intertidal sand and mudflats in estuaries and roosting during high tide on sandy beaches or rocky shores. Individuals have been recorded on inshore reefs, rock platforms, small rocky islands and sand cays on coral reefs, within Australia. Occasional sightings have also occurred on near-coast saltlakes, brackish swamps, shallow freshwater wetlands and grassed paddocks.	Low	No	Surveys not required.	No	The species has been excluded as a candidate species as the subject land does not occur within areas mapped as 'Important Habitat' for the species.
Charadrius mongolus **Lesser Sand-plover**	EN	VU	Yes	In Australia, the species is known to favour coastal environs including beaches, mudflats and mangroves. Within NSW, individuals have been observed on intertidal sand and mudflats in estuaries	Low	No	Surveys not required.	No	The species has been excluded as a candidate as the subject land does not occur within areas mapped as 'Important Habitat' for the species.

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Species	Status		BAM predicted SCS	Habitat Description	Potential occurrence in subject land	BAM Candidate species	Survey required/ undertaken	Potential for impact	Conclusion and rationale
	EPBC	BC							
				or roosting on sandy beaches or rocky shores at high tide.					
Diomedea exulans Wandering Albatross	VU	EN	No	A marine, pelagic and aerial species. Versatile feeders in pelagic and shelf waters. Breed on subantarctic and Antarctic islands.	Low	No	Surveys not required.	No	The Wandering Albatross spends most of its time in flight out over the ocean, breeds in the Antarctic circle and forages in offshore and inshore waters. Habitat for this species is not present within the subject land. Therefore, no further assessment for this species is required.
Gallinago hardwickii Latham's Snipe	VU	VU	No	Typically found on wet soft ground or shallow water with good dense cover of tussocks. Often found in wet paddocks, seepage areas below dams. Foraging in mudflats and shallow wetlands.	Low	No	Surveys not required.	No	Habitat features are present within the subject land, including the dam, the two creeks and associated PCT 4009. However, the habitat is highly degraded and does not exhibit specific features likely to be utilised by this species. There are no undisturbed mudflats or shallow floodplains with a dense cover of tussocks within the subject land. The closest record is approximately 5.5 km east of the subject land, in a waterbody with permanent water adjacent to Moruya River where mud flats and mangrove forests provide high quality habitat. Therefore, this species is unlikely to utilise the poor habitat within the subject land and no further assessment is required.

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Species	Status		BAM predicted SCS	Habitat Description	Potential occurrence in subject land	BAM Candidate species	Survey required/ undertaken	Potential for impact	Conclusion and rationale
	EPBC	BC							
Haliaeetus leucogaster White-bellied Sea-Eagle		VU	Yes	A migratory species that is generally sedentary in Australia, although immature individuals and some adults are dispersive. Found in terrestrial and coastal wetlands; favouring deep freshwater swamps, lakes and reservoirs; shallow coastal lagoons and saltmarshes. It hunts over open terrestrial habitats. Feeds on birds, reptiles, fish, mammals, crustaceans and carrion. Roosts and makes nest in trees.	Medium	Yes	Surveys required – undertaken in September 2025.	No	Surveys undertaken in September 2025 and species was not detected.
Hieraaetus morphnoides Little Eagle		VU	Yes	The Little Eagle is most abundant in lightly timbered areas with open areas nearby providing an abundance of prey species. It has often been recorded foraging in grasslands, crops, treeless dune fields, and recently logged areas. The Little Eagle nests in tall living trees within farmland, woodland and forests.	Medium	Yes	Surveys required – undertaken in September 2025.	No	Surveys undertaken in September 2025 and species was not detected.
Hirundapus caudacutus White-throated Needletail	VU	VU	No	An aerial species found in feeding concentrations over cities, hilltops and timbered	Low	No	Surveys not required.	No	The scattered mature eucalypt trees within the subject land may provide marginal foraging or roosting habitat

Species	Status		BAM predicted SCS	Habitat Description	Potential occurrence in subject land	BAM Candidate species	Survey required/ undertaken	Potential for impact	Conclusion and rationale
	EPBC	BC							
				ranges. This species roosts in trees in forests and woodlands and feeds on insects. The White-throated Needletail breeds in forests and sparse hills in Asia.					for this species. The proposed development footprint will retain many of the large, scattered paddock trees, as well as the best quality vegetation along the northern and eastern boundaries of the subject land. The closest record is approximately 800 m north of the subject land. This species does not breed in Australia. Therefore, this species is unlikely to utilise the subject land on more than a vagrant basis and no further assessment is required.
Lathamus discolor Swift Parrot	CE	EN	Yes	The Swift Parrot occurs in woodlands and forests of NSW from May to August, where it feeds on eucalypt nectar, pollen and associated insects. The Swift Parrot is dependent on flowering resources across a wide range of habitats in its wintering grounds in NSW. Favoured feed trees include winter flowering species such as Swamp Mahogany *Eucalyptus robusta*, Spotted Gum *Corymbia maculata*, Red Bloodwood *C. gummifera*, Mugga Ironbark *E. sideroxylon*, and White Box *E. albens*. Commonly used lerp infested	Low	No	Surveys not required.	No	The species has been excluded as a candidate species as the subject land does not occur within areas mapped as 'Important Habitat' for the species.

Species	Status		BAM predicted SCS	Habitat Description	Potential occurrence in subject land	BAM Candidate species	Survey required/ undertaken	Potential for impact	Conclusion and rationale
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				trees include Grey Box *E. microcarpa*, Grey *Box E. moluccana* and Blackbutt *E. pilularis.* This species is migratory, breeding in Tasmania and also nomadic, moving about in response to changing food availability.					
Limosa lapponica baueri Bar-tailed Godwit	EN		Yes	The Bar-tailed Godwit (northern Siberian) occurs mainly in coastal habitats such as large intertidal sandflats, banks, mudflats, estuaries, inlets, harbours, coastal lagoons and bays. It has also been recorded in coastal sewage farms and saltworks, saltlakes and brackish wetlands near coasts, sandy ocean beaches, rock platforms, and coral reef-flats.	Low	No	Surveys not required.	No	The species has been excluded as a candidate species as the subject land does not occur within areas mapped as 'Important Habitat' for the species.
Limosa limosa Black-tailed Godwit	EN	VU	No	The Black-tailed Godwit is a migratory wading bird that breeds in Mongolia and Eastern Siberia and flies to Australia for the southern summer, arriving in August and leaving in March. In NSW, it is most frequently recorded at Kooragang Island (Hunter River estuary), with occasional	Low	No	Surveys not required.	No	Habitat features for this species, including large lakes or estuaries that provide large shallow water wading areas, are not present within the study area. The closest record for this species is approximately 7 km east of the subject land, at this mouth of the Moruya River. Therefore, no further assessment is required for this species.

Species	Status		BAM predicted SCS	Habitat Description	Potential occurrence in subject land	BAM Candidate species	Survey required/ undertaken	Potential for impact	Conclusion and rationale
	EPBC	BC							
				records elsewhere along the coast, and inland. Records in western NSW indicate that a regular inland passage is used by the species, as it may occur around any of the large lakes in the western areas during summer, when the muddy shores are exposed. The species has been recorded within the Murray-Darling Basin, on the western slopes of the Northern Tablelands and in the far north-western corner of the state.					
Lophoictinia isura Square-tailed Kite		VU	Yes	Typically inhabits coastal forested and wooded lands of tropical and temperate Australia. In NSW it is often associated with ridge and gully forests dominated by Eucalyptus longifolia, Corymbia maculata, E. elata, or E. smithii. Individuals appear to occupy large hunting ranges of more than 100 km2. They require large living trees for breeding, particularly near water with surrounding woodland /forest close by for foraging habitat. Nest sites are generally located along or near watercourses, in	Medium	Yes	Surveys required – undertaken in September 2025.	No	Surveys undertaken in September 2025 and species was not detected.

Species	Status		BAM predicted SCS	Habitat Description	Potential occurrence in subject land	BAM Candidate species	Survey required/ undertaken	Potential for impact	Conclusion and rationale
	EPBC	BC							
				a tree fork or on large horizontal limbs.					
Macronectes halli Northern Giant-Petrel	VU	VU	No	Marine, pelagic species found mainly in subantarctic waters. Breeding restricted to Macquarie Island in Australia.	Low	No	Surveys not required.	No	Habitat features for this species are not present within the study area. This species is a marine migratory bird that spends most of its time out over the open ocean. The closest record for this species is approximately 1.2 km north of the subject land, along Racecourse Creek. This species is highly unlikely to utilise the subject land. Therefore, no further assessment is required for this species.
Neophema chrysogaster Orange-bellied Parrot	CE	CE	Yes	A single breeding population of fewer than 200 individuals occurs in a narrow coastal strip of south-west Tasmania. Adult birds depart Tasmania for the mainland in February. The first adults begin leaving the mainland for Tasmania in September with the last birds having departed by November. It is a coastal species inhabiting saltmarshes, sedge plains, coastal dunes, pastures, shrublands and moorlands, generally within 10 km of the coast. Critical winter habitat for the species includes natural	Low	No	Surveys not required.	No	The Orange-bellied Parrot does not breed in NSW. Foraging habitat features specific to this species, such as sedge plains and wetlands, are present within the subject land. The subject land occurs within the northern fringe of their winter range, with most regular wintering grounds being in Victoria and South Australia. Records in NSW are extremely rare, generally from the Far South Coast and are considered irregular vagrants rather than part of the core wintering population. The subject land lacks the saltmarsh, dune, and coastal shrubland habitats used by the Orange-bellied Parrot. Vegetation is

Species	Status		BAM predicted SCS	Habitat Description	Potential occurrence in subject land	BAM Candidate species	Survey required/ undertaken	Potential for impact	Conclusion and rationale
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				saltmarshes dominated by *Sarcocornia quinqueflora* (Beaded Glasswort) and *Sclerostegia arbuscula* (Shrubby Glasswort), as well as the associated grassy or weedy pastures. Historical records indicate that the Orange-bellied Parrot was formerly more abundant and widespread in NSW than it is now, however the species' distribution continues to extend into south-eastern NSW where suitable habitat is still available.					highly modified and generally unsuitable for foraging or roosting. The vegetation within the subject land is highly degraded and have been impacted through historical clearing and grazing. Therefore, these areas are unlikely to provide habitat for this species. The moderate quality vegetation along the northern boundary and within the north-eastern corner of the subject land will be retained within the development footprint. Additionally, there are no saltmarshes, coastal dunes or estuarine habitat within the subject land that are generally preferred by this species. There are also no records within 10 km of the subject land. Therefore, due to the degraded condition of the habitat within the subject land and the absence of nearby records, no further assessment of this species is required.
Ninox connivens Barking Owl		VU	Yes	Generally found in open forests, woodlands, swamp woodlands, farmlands and dense scrub. Can also be found in the foothills and timber along watercourses in otherwise open country. Territories are typically 2000 ha	Medium	Yes	Surveys required – surveys completed in July 2025	No	Surveys undertaken in July 2025 and species was not detected.

Species	Status		BAM predicted SCS	Habitat Description	Potential occurrence in subject land	BAM Candidate species	Survey required/ undertaken	Potential for impact	Conclusion and rationale
	EPBC	BC							
				in NSW habitats. Hunts small arboreal mammals or birds and terrestrial mammals when tree hollows are absent.					
Ninox strenua Powerful Owl		VU	Yes	The Powerful Owl occupies wet and dry eucalypt forests and rainforests. It may inhabit both un-logged and lightly logged forests as well as undisturbed forests where it usually roosts on the limbs of dense trees in gully areas. Large mature trees with hollows at least 0.5 m deep are required for nesting. Tree hollows are particularly important for the Powerful Owl because a large proportion of the diet is made up of hollow-dependent arboreal marsupials. Nest trees for this species are usually emergent with a diameter at breast height of at least 100 cm. It has a large home range of between 450 and 1450 ha.	Medium	Yes	Surveys required – surveys completed in July 2025	No	Surveys undertaken in July 2025 and species was not detected.
Numenius madagascariensis Eastern Curlew	CE		Yes	Occurs in sheltered coasts, especially estuaries, embayments, harbours, inlets and coastal lagoons with large intertidal mudflats or sandflats often with beds of seagrass.	Low	No	Surveys not required.	No	The species has been excluded as a candidate species as the subject land does not occur within areas mapped as 'Important Habitat' for the species.

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Pandion cristatus Eastern Osprey		VU	Yes	Found in coastal waters, inlets, estuaries and offshore islands. Occasionally found 100 km inland along larger rivers. It is water-dependent, hunting for fish in clear, open water. The Osprey occurs in terrestrial wetlands, coastal lands and offshore islands. It is a predominantly coastal species, generally using marine cliffs as nesting and roosting sites. Nests can also be made high up in dead trees or in dead crowns of live trees, usually within one kilometre of the sea.	Medium	Yes	Surveys required – surveys completed in September 2025	No	Surveys undertaken in September 2025 and species was not detected.
Phoebetria fusca Sooty Albatross	VU	VU	No	A pelagic species that inhabits subantarctic and subtropical marine waters.	Low	No	Surveys not required.	No	This species spends the majority of its time at sea and on shorelines and steep rocky coastal cliffs. There are no habitat features within the subject land. Therefore, no further assessment of this species is required.
Pluvialis squatarola Grey Plover	VU		No	Almost entirely coastal, but occasionally recorded on inland wetlands. Mainly on marine shores, inlets, estuaries and lagoons where there are nearby large tidal mudflats or	Low	No	Surveys not required.	No	Habitat features such as marine shores, inlets, estuaries, lagoons, tidal mudflats or sandflats are not present within the subject land. Therefore, no further assessment of this species is required.

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Species	Status		BAM predicted SCS	Habitat Description	Potential occurrence in subject land	BAM Candidate species	Survey required/ undertaken	Potential for impact	Conclusion and rationale
	EPBC	BC							
				sandflats for feeding and sandy beaches for roosting.					
Stagonopleura guttata Diamond Firetail	VU	VU	No	The Diamond Firetail is widely distributed, found in a range of habitat types including open eucalypt forest, mallee and acacia scrubs. Often occur in vegetation along watercourses. Feeds exclusively on the ground on ripe grass and herb seeds, green leaves and insects.	Low	No	Surveys not required.	No	There is a record for this species 300 m southwest of the subject land. However, the Diamond Firetail is an ecosystem credit species and targeted surveys are not required as these species are assumed to occur, based on the occurrence of the PCTs. The vegetation within the subject land is highly degraded and have been impacted through historical clearing and grazing. Therefore, these areas are unlikely to provide good habitat for this species. The moderate quality vegetation along the northern boundary and within the north-eastern corner of the subject land will be retained within the development footprint. Therefore, no further assessment of this species is required.
Sternula albifrons Little Tern	VU	EN	No	The Little Tern favours sheltered coasts, harbours, bays, lakes, inlets, estuaries, coastal lagoons and ocean beaches especially with sand-spits and sand islets. It forages over shallow waters close inshore or over sandbars and reefs.	Low	No	Surveys not required.	No	Habitat features such as marine shores, inlets, estuaries, coastal lakes, lagoons, tidal mudflats or sandflats are not present within the subject land. Therefore, no further assessment of this species is required.

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Thalassarche cauta Shy Albatross	VU	EN	No	The Shy Albatross is a marine pelagic species inhabiting sub-antarctic and subtropical waters, spending the majority of their time at sea. Occasionally it is observed in continental shelf waters in bays and harbours.	Low	No	Surveys not required.	No	This species spends the majority of its time at sea and on shorelines and steep rocky coastal cliffs. There are no habitat features within the subject land. Therefore, no further assessment of this species is required.
Thalassarche melanophris Black-browed Albatross	VU	VU	No	Inhabits Antarctic, subantarctic and subtropical waters. Although generally pelagic the species also occurs on the continental shelf and can be seen from land.	Low	No	Surveys not required.	No	This species spends the majority of its time at sea and breeds on marine islands. There are no habitat features within the subject land. Therefore, no further assessment of this species is required.
Thinornis cucullatus cucullatus Eastern Hooded Dotterel	VU	CE	No	The Eastern Hooded Dotterel is a small to medium-sized shorebird found in southern Australia. The species prefers sandy ocean beaches and coastal habitats for feeding, nesting, and roosting. Its population in New South Wales is estimated to be around 64 adults, while the total population in Australia is approximately 5000 birds.	Low	No	Surveys not required.	No	Habitat features such as marine shores, inlets, estuaries, coastal lakes, lagoons, tidal mudflats or sandflats are not present within the subject land. Therefore, no further assessment of this species is required.
Tringa nebularia Common Greenshank	EN	EN	No	Widely distributed throughout a range of inland wetlands and sheltered coastal habitats.	Low	No	Surveys not required.	No	Habitat features such as large inland wetlands, marine shores, inlets, estuaries, coastal lakes, lagoons, tidal mudflats or sandflats are not present

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	EPBC	BC							
				Occurs in habitats with varying salinity.					within the subject land. Therefore, no further assessment of this species is required.
Tyto novaehollandiae Masked Owl		VU	Yes	The Masked Owl is found in range of wooded habitats that provide tall or dense mature trees with hollows suitable for nesting and roosting. It is mostly seen in open forests and woodlands adjacent to cleared lands. Prey includes hollow-dependent arboreal marsupials and terrestrial mammals.	Medium	Yes	Surveys required – surveys completed in July 2025	No	Surveys undertaken in July 2025 and species was not detected.
Xenus cinereus Terek Sandpiper	VU	VU	Yes	In Australia, has been recorded on coastal mudflats, lagoons, creeks and estuaries. Favours mudbanks and sandbanks located near mangroves but may also be observed on rocky pools and reefs, and occasionally up to 10 km inland around brackish pools. Generally, roosts communally amongst mangroves or dead trees, often with related wader species. Breaks up into smaller flocks or even solitary birds when feeding in open intertidal mudflats. The diet includes worms, crabs and other crustaceans, small shellfish and	Low	No	Surveys not required.	No	The species has been excluded as a candidate species as the subject land does not occur within areas mapped as 'Important Habitat' for the species.

Species	Status		BAM predicted SCS	Habitat Description	Potential occurrence in subject land	BAM Candidate species	Survey required/ undertaken	Potential for impact	Conclusion and rationale
	EPBC	BC							
				the adults and larvae of various flies, beetles and water-bugs.					
Mammals									
Cercartetus nanus Eastern Pygmy-possum		VU	Yes	Found in a broad range of habitats from rainforest through sclerophyll (including Box-Ironbark) forest and woodland to heath, but in most areas woodlands and heath appear to be preferred, except in north-eastern NSW where they are most frequently encountered in rainforest. They may occupy small patches of vegetation in fragmented landscapes and although the species prefers habitat with a rich shrub understory, they are known to occur in grassy woodlands and the presence of Eucalypts alone is sufficient to support populations in low densities.	Medium	Yes	Surveys required – surveys completed in January 2026	No	Surveys undertaken in January 2026 and species was not detected.
Chalinolobus dwyeri Large-eared Pied Bat	EN	EN	Yes	Occurs from the Queensland border to Ulladulla, with largest numbers from the sandstone escarpment country in the Sydney Basin and Hunter Valley. Primarily found in dry sclerophyll forests and woodlands, but also found in	Low	No	Surveys not required.	No	Excluded as a BAM species credit species due to the following habitat constraints; not within two kilometres of rocky areas containing caves, overhangs, escarpments, outcrops, or crevices, or within two kilometres of old mines or tunnels. The closest cave or escarpment habitat is located

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	EPBC	BC							
				rainforest fringes and subalpine woodlands. Forages on small, flying insects below the forest canopy. Roosts in colonies of between three and 80 in caves, Fairy Martin nests and mines, and beneath rock overhangs, but usually less than 10 individuals. Likely that it hibernates during the cooler months. The only known existing maternity roost is in a sandstone cave near Coonabarabran.					over 2 km west of the subject land in Deua National Park. There are also no species records within 10 km of the subject land. Therefore, due to the absence of suitable nearby habitat and the lack of close species records, no further assessment of this species is required.
Dasyurus maculatus **Spotted-tailed Quoll**	EN	VU	No	Occurs along the east coast of Australia and the Great Dividing Range. Uses a range of habitats including sclerophyll forests and woodlands, coastal heathlands and rainforests. Occasional sightings have been made in open country, grazing lands, rocky outcrops and other treeless areas. Habitat requirements include suitable den sites, including hollow logs, rock crevices and caves, an abundance of food and an area of intact vegetation in which to forage. Seventy per cent of the diet is medium-sized mammals, and also feeds on invertebrates, reptiles and	Low	No	Surveys not required.	No	The species is unlikely to exist within the subject land due to the absence of appropriate den sites and large areas of intact vegetation for foraging. The closest record is approximately 2.2km south of the subject land. The vegetation within the subject land is highly degraded and exists as scattered paddock trees and thin strips of vegetation that are subjected to edge effects and highly weedy. Therefore, further assessment for this species is not required.

Species	Status		BAM predicted SCS	Habitat Description	Potential occurrence in subject land	BAM Candidate species	Survey required/ undertaken	Potential for impact	Conclusion and rationale
	EPBC	BC							
				birds. Individuals require large areas of relatively intact vegetation through which to forage. The home range of a female is between 180 and 1000 ha, while males have larger home ranges of between 2000 and 5000 ha. Breeding occurs from May to August.					
Isoodon obesulus obesulus Southern Brown Bandicoot (eastern)	EN	EN	Yes	This species prefers sandy soils with scrubby vegetation and/or areas with low ground cover that are burn from time to time. A mosaic of post fire vegetation is important for this species.	Low	No	Surveys not required.	No	Habitat consisting of heath vegetation or open forest with a heath dominated understorey are not present within the study area. Furthermore, suitable leaf litter required for nesting is also not present within the subject land. The vegetation within the subject land is highly degraded and exists as scattered paddock trees and thin strips of vegetation that are subjected to edge effects and highly weedy, and unlikely to support a population of Southern Brown Bandicoot (eastern). There is only 1 record within 10 kilometres of the subject land, approximately 7 kilometres away. Therefore, due to the lack of suitable habitat, further assessment of this species is not required. Excluded as a BAM species credit species due to habitat degradation

Species	Status		BAM predicted SCS	Habitat Description	Potential occurrence in subject land	BAM Candidate species	Survey required/ undertaken	Potential for impact	Conclusion and rationale
	EPBC	BC							
Miniopterus orianae oceanensis Large Bent-winged Bat		VU	Yes	Occurs from Victoria to Queensland, on both sides of the Great Dividing Range. Forms large maternity roosts (up to 100,000 individuals) in caves and mines in spring and summer. Individuals may fly several hundred kilometres to their wintering sites, where they roost in caves, culverts, buildings, and bridges. They occur in a broad range of habitats including rainforest, wet and dry sclerophyll forest, paperbark forest and open grasslands. Has a fast, direct flight and forages for flying insects (particularly moths) above the tree canopy and along waterways.	Low	No	Surveys not required.	No	Excluded as a BAM species credit species due to the following habitat constraints; the subject land does not contain caves, tunnels, mines, culverts or other structure known or suspected to be used for breeding and there are no species records within or near the subject land. The closest record is approximately 2.2 kilometres away north west of the subject land in an area of high quality vegetation. No large maternity roosts were incidentally recorded within the subject land. There are three culverts that border the development site, however they are flooded with water and are unlikely to support a large roosting colony. Additionally, these culverts will not be directly impacted by the proposed works. Therefore, due to the absence of suitable breeding habitat and the lack of close species records, no further assessment of this species is required.
Myotis macropus Southern Myotis		VU	Yes	Scattered, mainly coastal distribution extending to South Australia along the Murray River. Roosts in caves, mines or tunnels, under bridges, in buildings, tree hollows, and even in dense foliage. Colonies	Medium	Yes	Surveys required – surveys completed in January 2026	Yes	Surveys were undertaken in January 2026 and Southern Myotis was recorded as part of a species group in the study area. Calls for these species are difficult to separate from the common Long-eared Bats (Nyctophilus spp.) and in the absence

Species	Status		BAM predicted SCS	Habitat Description	Potential occurrence in subject land	BAM Candidate species	Survey required/ undertaken	Potential for impact	Conclusion and rationale
	EPBC	BC							
				occur close to water bodies, ranging from rainforest streams to large lakes and reservoirs. They catch aquatic insects and small fish with their large hind claws, and also catch flying insects.					of diagnostic features, calls couldn't be confirmed to species level. However, given that there is suitable foraging and roosting habitat present at the site (hollow-bearing trees, the farm dam and the two creeks), as well as possible calls, Southern Myotis is likely to be utilising the study area and has been assumed present based off this information. Further assessment has been undertaken throughout this BDAR.
Petauroides volans Southern Greater Glider	EN	EN	Yes	The distribution of the Greater Glider includes the ranges and coastal plain of eastern Australia, where it inhabits a variety of eucalypt forests and woodlands. Presence and density of Greater Gliders is related to soil fertility, eucalypt tree species, disturbance history and density of suitable tree hollows. Feeds exclusively on eucalypt leaves, buds, flowers and mistletoe.	Medium	Yes	Surveys required – surveys completed in July 2025	No	Surveys undertaken in July 2025 and species was not detected.
Petaurus norfolcensis Squirrel Glider		Vu	Yes	Generally occurs in dry sclerophyll forests and woodlands but is absent from dense coastal ranges in the southern part of its range. Requires abundant hollow-	Medium	Yes	Surveys required – surveys completed in July 2025	No	Surveys undertaken in July 2025 and species was not detected.

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				bearing trees and a mix of eucalypts, banksias and acacias. Within a suitable vegetation community at least one species should flower heavily in winter and one species of eucalypt should be smooth barked.					
Phascogale tapoatafa Brush-tailed Phascogale		VU	Yes	The Brush-tailed Phascogale had a scattered distribution centred around the Great Dividing Range. It prefers open forests with a sparse ground cover but also inhabits mallee and rainforests. It feeds on insects and nectar, particularly in rough-barked trees. Nests and shelters in tree hollows, tree stumps and occasionally birds' nests, and can use more than 40 nests in a year.	Medium	Yes	Surveys required – surveys completed in January 2026	No	Surveys undertaken in January 2026 and species was not detected.
Phascolarctos cinereus Koala	EN	EN	Yes	In NSW the Koala mainly occurs on the central and north coasts with some populations in the western region. Koalas feed almost exclusively on eucalypt foliage, and their preferences vary regionally. Primary feed trees include *Eucalyptus robusta, E. tereticornis, E. punctata, E. haemostoma* and *E. signata.*	Medium	Yes	Surveys required – surveys completed in July 2025	No	Surveys undertaken in July 2025 and species was not detected.

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	EPBC	BC							
				They are solitary with varying home ranges.					
Potorous tridactylus trisulcatus Southern Long-nosed Potoroo	VU	VU	No	Usually found within 50 km of the coast. Inhabits coastal heath and wet and dry sclerophyll forests. Generally found in areas with rainfall greater than 760 mm. Requires relatively thick ground cover where the soil is light and sandy. Known to eat fungi, arthropods, fleshy fruit, seeds and plant tissue.	Low	No	Surveys not required	No	Habitat features preferred by this species, such as thick ground cover, light sandy soil and coastal heath vegetation, are not present within the subject land. PCT 4052, although is associated with this species, is highly degraded within the subject land and therefore unlikely to support a population of Southern long-nosed Potoroo. Although targeted surveys were not undertaken for this species, this species was not incidentally recorded during the other surveys within the subject land. There is only 1 record within 10 kilometres of the subject land, approximately 8 kilometres away. Therefore, due to the lack of suitable habitat, the degraded nature of the vegetation and the absence of nearby records, this species does not require further assessment.
Pteropus poliocephalus Grey-headed Flying-fox	VU	VU	Yes	Occurs along the NSW coast, extending further inland in the north. This species is a canopy-feeding frugivore and nectarivore of rainforests, open forests, woodlands, melaleuca swamps and banksia woodlands. Roosts in large	Low	No	Surveys not required	No	No breeding camps were identified within the subject land during development site investigations in 2023, 2025 or 2026 and no breeding camps have been previously recorded within the subject land. The closest camp is recorded

Species	Status		BAM predicted SCS	Habitat Description	Potential occurrence in subject land	BAM Candidate species	Survey required/ undertaken	Potential for impact	Conclusion and rationale
	EPBC	BC							
				colonies, commonly in dense riparian vegetation.					approximately 6 km east of the subject land at Moruya Heads in intact native vegetation. Over 100 individuals of this species were incidentally recorded flying over the subject land during dusk surveys other targeted surveys, presumably flying from their camp to forage for the night. One individual was observed foraging and dispersing through the subject land. However, no breeding camps were recorded within the subject land Therefore, as the Grey-headed Flying-fox was not determined to use to the subject land as a camp for breeding, no further investigation of this species is required.
Sminthopsis leucopus White-footed Dunnart		VU	Yes	The White-footed Dunnart is found in a range of different habitats including coastal dune vegetation, coastal forest, tussock grassland and sedgeland, heathland, woodland and forest. They shelter in bark nests in hollows under standing or fallen timber, burrows in the ground, piles of logging debris, large grass clumps, Macrozamias and rock crevices.	Low	No	Surveys not required	No	Excluded as a BAM species credit species due to habitat degradation. The closest record is approximately 8 km south east of the subject land in an area of high quality hind-dune vegetation. PCT 4009 does form habitat for this species, however due to its highly degraded condition it is unlikely this species would utilise this habitat. Additionally, only a small area of PCT 4009 will be directly impacted by the project, most of the vegetation will be retained and improved through a VMP within the

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Species	Status		BAM predicted SCS	Habitat Description	Potential occurrence in subject land	BAM Candidate species	Survey required/ undertaken	Potential for impact	Conclusion and rationale
	EPBC	BC							
									riparian corridor of the 3rd order creek. Therefore, due to the absence of suitable habitat and the lack of close species records, no further assessment of this species is required.
Amphibians									
Heleioporus australiacus Giant Burrowing Frog	VU	VU	Yes	Prefers hanging swamps on sandstone shelves adjacent to perennial non-flooding creeks. Can also occur within shale outcrops within sandstone formations. Known from wet and dry forests and montane woodland in the southern part range. Individuals can be found around sandy creek banks or foraging along ridge-tops during or directly after heavy rain. Males often call from burrows located in sandy banks next to water. Spends the majority of its time in non-breeding habitat 20-250m from breeding sites.	Low	No	Surveys not required	No	Excluded as a BAM species credit species due to habitat degradation. The subject land does not provide suitable habitat for the species in the form of ephemeral streams with permanent pools on sandstone. Furthermore, the creeks within the subject land are highly degraded due to historical clearing and grazing for agricultural purposes. No records exist within 10 km of the subject land. Therefore, no further assessment is required for this species.
Litoria aurea Green and Golden Bell Frog	VU	EN	Yes	Most existing locations for the species occur as small, coastal, or near coastal populations, with records occurring between south of Grafton and northern VIC. The species is	Medium	Yes	Surveys required – surveys completed in January 2026.	No	Surveys undertaken in January 2026 and species was not detected.

Species	Status		BAM predicted SCS	Habitat Description	Potential occurrence in subject land	BAM Candidate species	Survey required/ undertaken	Potential for impact	Conclusion and rationale
	EPBC	BC							
				found in marshes, dams and stream sides, particularly those containing bullrushes or spikerushes. Preferred habitat contains water bodies that are unshaded, are free of predatory fish, have a grassy area nearby and have diurnal sheltering sites nearby such as vegetation or rocks , although the species has also been recorded from highly disturbed areas including disused industrial sites, brick pits, landfill areas and cleared land. Breeding usually occurs in summer. Tadpoles, which take approximately 10-12 weeks to develop , feed on algae and other vegetative matter. Adults eat insects as well as other frogs, including juveniles of their own species.					
Mixophyes balbus Stuttering Frog	VU	VU	Yes	This species is usually associated with mountain streams, wet mountain forests and rainforests. It rarely moves very far from the banks of permanent forest streams, although it will forage on nearby forest floors. Eggs are deposited in leaf litter on the banks of streams and are	Low	No	Surveys not required.	No	The subject land does not provide suitable habitat for the species in the form of streams within rainforest or forest vegetation. There is also no areas with deep leaf litter required for breeding and foraging. Furthermore, the creeks within the subject land are highly degraded due to historical clearing and grazing for agricultural purposes. No records

Species	Status		BAM predicted SCS	Habitat Description	Potential occurrence in subject land	BAM Candidate species	Survey required/ undertaken	Potential for impact	Conclusion and rationale
	EPBC	BC							
				washed into the water during heavy rains.					exist within 10 km of the subject land. Due to the absence of preferred habitat features and the degraded nature of the creeks within the subject land, this species has been excluded as a BAM species credit species and no further assessment is required.

Appendix 3 Flora

Appendix 3.1 BAM plot field data

Table A 3 BAM plot floristics

Family	Scientific name	Common name	42335.B01		42335.B02		42335.B03		42335.B04		42335.B05		42335.B06		42335.B07	
			Cover%	Abundance.	Cover%	Abundance.	Cover%	Abundance.	Cover%	Abundance.	Cover%	Abundance.	Cover%	Abundance.	Cover%	Abundance.
Native species																
Apiaceae	*Centella asiatica*	Indian Pennywort	0.1	10	0.1	20										
Campanulaceae	*Lobelia purpurascens*	Whiteroot			0.1	5							0.1	20		
Clusiaceae	*Hypericum gramineum*	Small St John's Wort			0.1	10										
Convolvulaceae	*Dichondra repens*	Kidney Weed					0.1	1			0.1	10			0.3	400
Cyperaceae	*Carex inversa*	Knob Sedge													0.1	10
Cyperaceae	*Ficinia nodosa*	Knobby Club-rush							0.1	2						
Cyperaceae	*Carex longebrachiata*	-													0.5	200
Cyperaceae	*Cyperus imbecillis*	-													0.1	10
Cyperaceae	*Cyperus polystachyos*	-	0.1	20	0.5	200	0.1	30			0.1	20				
Cyperaceae	*Carex appressa*	Tall Sedge			0.1	5							0.5	20		
Fabaceae (Faboideae)	*Glycine microphylla*	Small-leaf Glycine	0.1	20	0.1	20	0.1	1							0.1	10
Fabaceae (Faboideae)	*Glycine clandestina*	Twining glycine									0.1	10				
Juncaceae	*Juncus usitatus*	-			0.1	1			0.1	1			0.5	50		
Myrtaceae	*Eucalyptus bosistoana*	Coast Grey Box													5	1

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Myrtaceae	*Angophora floribunda*	Rough-barked Apple													15	1
Oxalidaceae	*Oxalis perennans*	-					0.1	5	0.1	5	0.1	10			0.1	10
Poaceae	*Cymbopogon refractus*	Barbed Wire Grass	0.1	10	0.1	50	0.1	20			0.5	200				
Poaceae	*Cynodon dactylon*	Common Couch	20	1000	20	2000	20	5000	90	5000	30	5000	80	5000	20	1000
Poaceae	*Eragrostis leptostachya*	Paddock Lovegrass	1	300	1	300	0.1	30	0.1	10	5	500			5	800
Poaceae	*Dichelachne micrantha*	Shorthair Plumegrass	0.1	30	0.2	100	0.1	50	1	500	0.1	20	1	300	0.1	5
Poaceae	*Sporobolus creber*	Slender Rat's Tail Grass	1	200	0.1	1			0.5	200	5	1000			1	200
Poaceae	*Echinopogon caespitosus* var. *caespitosus*	Tufted Hedgehog Grass									0.1	50				
Poaceae	*Microlaena stipoides* var. *stipoides*	Weeping Grass	0.1	1					0.5	100	0.1	20	10	2000	1	500
Introduced species																
Poaceae	*Andropogon virginicus*	Whisky Grass	0.1	10	20	1000										
Poaceae	*Axonopus fissifolius*	Narrow-leafed Carpet Grass	70	5000	15	1000	30	5000	10	1000	65	5000	10	1000	15	1000
Asteraceae	*Bidens pilosa*	Cobbler's Pegs	0.1	10	0.1	5	0.1	20	0.1	1	0.1	20	0.1	1	0.1	50
Poaceae	*Bromus diandrus*	Great Brome							0.1	10						
Poaceae	*Cenchrus clandestinus*	Kikuyu Grass	1	300	1	200	50	5000							50	5000
Asteraceae	*Cirsium vulgare*	Spear Thistle							0.1	1	0.1	1				
Asteraceae	*Conyza bonariensis*	Flaxleaf Fleabane	0.1	3	0.1	10	0.1	2			0.1	50			0.1	2
Apiaceae	*Daucus carota*	Wild Carrot	0.1	1	0.5	200	2	300	0.1	40	0.1	20	0.1	10	0.1	10
Asteraceae	*Gamochaeta calviceps*	Cudweed	0.1	10	0.1	40					0.1	5			0.1	1
Asteraceae	*Hypochaeris radicata*	Catsear	0.3	100	0.1	20	0.5	500	0.1	10	0.1	50	0.1	20	0.1	20
Juncaceae	*Juncus cognatus*	-	0.1	5	0.1	50	0.1	20	0.5	100	0.1	20				
Poaceae	*Lolium perenne*	Perennial Ryegrass											0.1	50		
Primulaceae	*Lysimachia arvensis*	Scarlet Pimpernel			0.1	1	0.1	1	0.1	20	0.1	10	0.1	5		
Malvaceae	*Modiola caroliniana*	Red-flowered Mallow			0.1	10							0.1	1	0.1	1

Poaceae	*Paspalum dilatatum*	Paspalum			20	1000			0.1	40			0.5	100	1	400
Plantaginaceae	*Plantago lanceolata*	Lamb's Tongues	0.1	20	0.5	300	0.1	20	0.1	10	0.1	20			0.1	20
Polygonaceae	*Rumex crispus*	Curled Dock							0.1	1					0.1	10
Asteraceae	*Senecio madagascariensis*	Fireweed	1	300	5	1000	5	200	0.1	20	1	300	0.1	10	0.5	200
Poaceae	*Setaria pumila*	Pale Pigeon Grass	5	1000	10	1000	5	1000			0.1	20	0.5	200	1	200
Malvaceae	*Sida rhombifolia*	Paddy's Lucerne					0.5	100			0.5	200			0.5	200
Solanaceae	*Solanum nigrum*	Black-berry Nightshade													0.1	1
Fabaceae (Faboideae)	*Trifolium repens*	White Clover	0.5	200	20	5000	1	1000	0.1	50	0.1	20	0.1	50	0.1	60
Verbenaceae	*Verbena bonariensis*	Purpletop	0.1	10	0.1	5	0.1	10			0.1	10	0.5	100		

Table A 4 BAM plot floristics

Family	Scientific name	Common name	42335.B08		42335.B09		42335.B010		42335.B011		42335.B12		42335.B13		42335.B14	
			Cover%	Abundance.	Cover%	Abundance.	Cover%	Abundance.	Cover%	Abundance.	Cover%	Abundance.	Cover%	Abundance.	Cover%	Abundance.
Native species																
Apiaceae	*Centella asiatica*	Indian Pennywort									0.1	5				
Asphodelaceae	*Dianella caerulea* var. *caerulea*	-	0.1	1					0.1	1	0.1	1	0.1	1		
Asteraceae	*Lagenophora gracilis*	Slender Lagenophora	0.1	1												
Bignoniaceae	*Pandorea pandorana* subsp. *pandorana*	Wonga Wonga Vine									0.1	2				
Campanulaceae	*Lobelia purpurascens*	whiteroot	0.1	50							0.1	100	0.1	20		
Casuarinaceae	*Allocasuarina littoralis*	Black She-Oak	0.1	1					1	2						
Clusiaceae	*Hypericum gramineum*	Small St John's Wort											0.1	1		

Commelinaceae	*Commelina cyanea*	Native Wandering Jew									0.5	200				
Convolvulaceae	*Dichondra repens*	Kidney Weed	0.3	500					0.1	20	0.1	200	0.1	100		
Cyperaceae	*Ficinia nodosa*	Knobby Club-rush							0.1	1			0.1	1		
Cyperaceae	*Carex longebrachiata*	-			0.1	1					3	500	0.1	10		
Cyperaceae	*Carex spp.*	-					0.5	100								
Cyperaceae	*Cyperus imbecillis*	-	0.1	10												
Cyperaceae	*Cyperus polystachyos*	-									0.1	5	0.1	5		
Cyperaceae	*Eleocharis acuta*	-					0.1	10								
Cyperaceae	*Cyperus gracilis*	Slender Flat-sedge									0.1	10				
Cyperaceae	*Carex appressa*	Tall Sedge			0.1	20	70	1000	10	500						
Cyperaceae	*Lepidosperma laterale*	Variable Sword-sedge									0.5	50				
Ericaceae	*Leucopogon juniperinus*	Prickly Beard-heath									0.5	10				
Fabaceae (Faboideae)	*Hardenbergia violacea*	False Sarsaparilla	0.1	1												
Fabaceae (Faboideae)	*Glycine clandestina*	Twining glycine	0.1	20							0.1	20				
Fabaceae (Faboideae)	*Glycine tabacina*	Variable Glycine	0.1	1									0.1	1		
Fabaceae (Mimosoideae)	*Acacia mearnsii*	Black Wattle									1	5				
Fabaceae (Mimosoideae)	*Acacia maidenii*	Maiden's Wattle											2	20		
Fabaceae (Mimosoideae)	*Acacia cognata*	Narrow-leaf Bower Wattle							0.5	1						
Fabaceae (Mimosoideae)	*Acacia longifolia* subsp. *longifolia*	Sydney Golden Wattle	0.5	3												
Fabaceae (Mimosoideae)	*Acacia pravissima*	Wedge-leaved Wattle							0.5	1						
Geraniaceae	*Geranium solanderi*	Native Geranium							0.1	50						
Juncaceae	*Juncus pallidus*	-					1	500					0.1	10		
Juncaceae	*Juncus usitatus*	-	0.1	20	1	50			0.1	20					0.1	10
Lamiaceae	*Westringia fruticosa*	Coastal Rosemary	0.1	1												

Lamiaceae	*Plectranthus parviflorus*	-	0.5	200							0.1	20				
Lomandraceae	*Lomandra longifolia*	Spiny-headed Mat-rush									0.1	2				
Luzuriagaceae	*Eustrephus latifolius*	Wombat Berry									0.1	1				
Myrtaceae	*Eucalyptus stellulata*	Black Sally							1	6						
Myrtaceae	*Callistemon citrinus*	Crimson Bottlebrush							8	8						
Myrtaceae	*Eucalyptus tereticornis*	Forest Red Gum	5	10							15	7				
Myrtaceae	*Eucalyptus tereticornis* subsp. *tereticornis*	-											5	10		
Myrtaceae	*Eucalyptus macarthurii*	Paddys River Box							20	6						
Myrtaceae	*Angophora floribunda*	Rough-barked Apple	10	10							15	10	20	10		
Myrtaceae	*Eucalyptus eugenioides*	Thin-leaved Stringybark	1	2												
Myrtaceae	*Callistemon viminalis*	Weeping Bottlebrush							0.1	1						
Myrtaceae	*Eucalyptus globoidea*	White Stringybark									1	3				
Onagraceae	*Epilobium hirtigerum*	-					4	200								
Oxalidaceae	*Oxalis perennans*	-	0.1	50					0.1	50	0.1	30				
Pittosporaceae	*Pittosporum undulatum*	Sweet Pittosporum	0.1	2							20	100	0.1	3		
Poaceae	*Cymbopogon refractus*	Barbed Wire Grass	2	500							0.3	80	0.5	200		
Poaceae	*Entolasia marginata*	Bordered Panic									0.5	100	0.1	50		
Poaceae	*Cynodon dactylon*	Common Couch	35	5000	90	5000	2	500	30	2000			25	3000	0.5	50
Poaceae	*Themeda triandra*	-									3	500				
Poaceae	*Eragrostis leptostachya*	Paddock Lovegrass	7	1000							0.1	20	0.1	50		
Poaceae	*Bothriochloa macra*	Red Grass	0.1	1												
Poaceae	*Dichelachne micrantha*	Shorthair Plumegrass	3	1000									0.5	200		
Poaceae	*Sporobolus creber*	Slender Rat's Tail Grass	0.3	500	0.1	20							0.1	50		
Poaceae	*Isachne globosa*	Swamp Millet					0.1	10								

Poaceae	*Echinopogon caespitosus* var. *caespitosus*	Tufted Hedgehog Grass	3	1000							0.5	100	0.5	500		
Poaceae	*Poa labillardierei* var. *labillardierei*	Tussock									0.1	20				
Poaceae	*Microlaena stipoides* var. *stipoides*	Weeping Grass	10	2000	0.1	10			10	1000	10	800	20	1000	0.1	10
Poaceae	*Anthosachne scabra*	Wheatgrass, Common Wheatgrass									0.1	20				
Proteaceae	*Banksia integrifolia* subsp. *integrifolia*	Coastal Banksia							0.5	2						
Pteridaceae	*Cheilanthes sieberi* subsp. *sieberi*	Rock Fern									0.1	1				
Pteridaceae	*Pellaea falcata*	Sickle Fern									0.1	10				
Ranunculaceae	*Ranunculus inundatus*	River Buttercup					0.1	1								
Rubiaceae	*Galium leiocarpum*	-									0.1	10				
Santalaceae	*Exocarpos cupressiformis*	Cherry Ballart	0.5	1												
Introduced species																
Polygonaceae	*Acetosella vulgaris*	Sheep Sorrel	0.1	10							0.1	1	0.1	5		
Alliaceae	*Agapanthus africanus*	Lily of the Nile									0.1	1				
Poaceae	*Andropogon virginicus*	Whisky Grass	0.1	5												
Asparagaceae	*Asparagus aethiopicus*	Asparagus Fern	0.1	5							3	100				
Poaceae	*Axonopus fissifolius*	Narrow-leafed Carpet Grass	30	2000	5	1000	0.5	50	1	200	0.1	50	30	4000		
Asteraceae	*Bidens pilosa*	Cobbler's Pegs	0.1	50					0.1	1			0.1	10		
Poaceae	*Bromus diandrus*	Great Brome														
Poaceae	*Cenchrus clandestinus*	Kikuyu Grass	0.5	100	0.5	100			20	1000	0.1	50	20	1000	95	##
Asteraceae	*Cirsium vulgare*	Spear Thistle							0.1	1						
Asteraceae	*Conyza bonariensis*	Flaxleaf Fleabane	0.1	1									0.1	20		
Poaceae	*Dactylis glomerata*	Cocksfoot			0.1	1	0.5	100	0.3	100						
Apiaceae	*Daucus carota*	Wild Carrot	0.1	1	0.1	5	0.1	10	0.1	20	0.1	1	0.1	10		
Poaceae	*Ehrharta erecta*	Panic Veldtgrass	0.5	100							40	##			1	300

Asteraceae	*Gamochaeta calviceps*	Cudweed	0.1	50					0.1	50						
Poaceae	*Holcus lanatus*	Yorkshire Fog					35	300							0.5	100
Asteraceae	*Hypochaeris radicata*	Catsear	0.5	500					0.1	50	0.1	100	0.5	500		
Juncaceae	*Juncus articulatus*	-														
Juncaceae	*Juncus cognatus*	-	0.1	10	0.5	100							0.1	50		
Oleaceae	*Ligustrum sinense*	Small-leaved Privet									0.5	5				
Poaceae	*Lolium perenne*	Perennial Ryegrass			0.1	20									0.5	200
Primulaceae	*Lysimachia arvensis*	Scarlet Pimpernel			0.1	10					0.1	1	0.1	1		
Malvaceae	*Modiola caroliniana*	Red-flowered Mallow			0.1	1										
Oleaceae	*Olea europaea* subsp. *cuspidata*	African Olive									0.1	10				
Poaceae	*Paspalum dilatatum*	Paspalum			5	500	0.1	5	5	1000	0.5	100				
Pinaceae	*Pinus radiata*	Radiata Pine													70	20
Plantaginaceae	*Plantago lanceolata*	Lamb's Tongues	0.1	50	0.1	5	0.5	100	0.1	20	0.3	500	0.3	200		
Lamiaceae	*Prunella vulgaris*	Self-heal														
Malaceae	*Pyracantha angustifolia*	Orange Firethorn									0.3	1				
Rosaceae	*Rubus fruticosus* sp. agg.	Blackberry complex					0.1	10	0.5	20	0.5	10				
Polygonaceae	*Rumex crispus*	Curled Dock	0.1	10			3	200	0.1	20					0.1	1
Asteraceae	*Senecio madagascariensis*	Fireweed	0.5	300	0.5	100			0.1	5	0.1	10	0.1	10	0.1	1
Fabaceae (Caesalpinioideae)	*Senna pendula* var. *glabrata*	-									0.5	3				
Poaceae	*Setaria pumila*	Pale Pigeon Grass	0.1	10							0.1	1	0.1	50		
Malvaceae	*Sida rhombifolia*	Paddy's Lucerne	0.1	50					0.1	20	0.1	10	0.1	20	0.5	30
Poaceae	*Sporobolus africanus*	Parramatta Grass											1	500		
Fabaceae (Faboideae)	*Trifolium repens*	White Clover	0.1	20	0.1	20	1	200	0.1	100			0.1	50		
Verbenaceae	*Verbena bonariensis*	Purpletop	0.1	10	0.1	10			0.1	20						

Table A 5 BAM plot floristics

Family	Scientific name	Common name	42335.B15	
			Cover%	Abundance.
Native species				
Amaranthaceae	*Alternanthera denticulata*	Lesser Joyweed	0.1	10
Cyperaceae	*Carex gaudichaudiana*	-	50	800
Cyperaceae	*Carex longebrachiata*	-	0.5	30
Cyperaceae	*Carex* spp.	-	3	200
Cyperaceae	*Eleocharis acuta*	-	0.5	200
Cyperaceae	*Schoenoplectus validus*	-	0.5	200
Cyperaceae	*Carex appressa*	Tall Sedge	0.5	10
Geraniaceae	*Geranium solanderi*	Native Geranium	0.1	1
Juncaceae	*Juncus pallidus*	None	1	30
Lythraceae	*Lythrum hyssopifolia*	Hyssop Loosestrife	0.1	10
Onagraceae	*Ludwigia peploides* subsp. *montevidensis*	Water Primrose	0.1	200
Poaceae	*Cynodon dactylon*	Common Couch	0.5	200
Poaceae	*Anthosachne scabra*	Wheatgrass, Common Wheatgrass	0.1	10
Polygonaceae	*Persicaria decipiens*	Slender Knotweed	0.5	200
Ranunculaceae	*Ranunculus inundatus*	River Buttercup	0.5	400
Typhaceae	*Typha domingensis*	Narrow-leaved Cumbungi	40	1000
Introduced species				

Poaceae	*Anthoxanthum odoratum*	Sweet Vernal Grass	0.1	10
Poaceae	*Cenchrus clandestinus*	Kikuyu Grass	1	100
Asteraceae	*Cirsium vulgare*	Spear Thistle	0.1	10
Apiaceae	*Daucus carota*	Wild Carrot	0.5	200
Poaceae	*Holcus lanatus*	Yorkshire Fog	0.5	200
Asteraceae	*Hypochaeris radicata*	Catsear	0.1	30
Juncaceae	*Juncus articulatus*	None	0.1	30
Poaceae	*Lolium perenne*	Perennial Ryegrass	0.1	200
Malvaceae	*Modiola caroliniana*	Red-flowered Mallow	0.1	10
Plantaginaceae	*Plantago lanceolata*	Lamb's Tongues	0.1	30
Lamiaceae	*Prunella vulgaris*	Self-heal	0.1	30
Iridaceae	*Romulea rosea* var. *australis*	Onion Grass	0.1	30
Rosaceae	*Rubus fruticosus* sp. agg.	Blackberry complex	1	100
Polygonaceae	*Rumex crispus*	Curled Dock	0.5	200
Asteraceae	*Sonchus oleraceus*	Common Sowthistle	0.1	1
Fabaceae (Faboideae)	*Trifolium repens*	White Clover	0.1	30
Verbenaceae	*Verbena bonariensis*	Purpletop	0.1	10

Table A 6 BAM plot summary

Plot ID	PCT	Area (ha)	Patch size (ha)	Cond.	Zone	East.	Nrth.	Bearing	Comp. Tree	Comp. Shrub	Comp. Grass	Comp. Forbs	Comp. Ferns	Comp. Other	Struc. Tree	Struc. Shrub	Struc. Grass	Struc. Forbs	Stuc. Ferns	Stuc. Other
42335.B01	4052	8.75	>100	Other	56	236509	6020232	335	0	0	7	1	0	1	0.0	0.0	22.4	0.1	0.0	0.1
42335.B02	4052	8.75	>100	Other	56	236539	6020369	200	0	0	8	3	0	1	0.0	0.0	22.1	0.3	0.0	0.1
42335.B03	4052	8.75	>100	Other	56	236421	6020114	325	0	0	5	2	0	1	0.0	0.0	20.4	0.2	0.0	0.1
42335.B04	4052	3.59	>100	DNG	56	236312	6020354	320	0	0	7	1	0	0	0.0	0.0	92.3	0.1	0.0	0.0
42335.B05	4052	3.59	>100	DNG	56	236626	6020192	160	0	0	8	2	0	1	0.0	0.0	40.9	0.2	0.0	0.1
42335.B06	4052	3.59	>100	DNG	56	236196	6020391	255	0	0	5	1	0	0	0.0	0.0	92.0	0.1	0.0	0.0

42335.B07	4052	0.93	>100	Low	56	236385	6020115	340	2	0	8	2	0	1	20.0	0.0	27.8	0.4	0.0	0.1
42335.B08	4052	0.28	>100	Moderate	56	236654	6020240	210	4	4	10	6	0	3	16.1	1.2	60.6	1.2	0.0	0.3
42335.B09	4052	3.59	>100	DNG	56	236166	6020226	180	0	0	6	0	0	0	0.0	0.0	91.4	0.0	0.0	0.0
42335.B10	4009	0.10	>100	Low	56	236283	6020127	340	0	0	6	2	0	0	0.0	0.0	73.7	4.1	0.0	0.0
42335.B11	-	0.21	>100	Other	56	236219	6020245	160	5	3	5	4	0	0	22.6	9.0	50.2	0.4	0.0	0.0
42335.B12	4052	0.28	>100	Moderate	56	236660	6020357	290	3	3	13	8	2	3	31.0	21.5	18.4	1.2	0.2	0.3
42335.B13	4052	0.93	>100	Low	56	236542	6020318	195	3	1	12	4	0	1	27.0	0.1	47.2	0.4	0.0	0.1
42335.B14	-	0.20	>100	Other	56	236170	6020255	72	0	0	3	0	0	0	0.0	0.0	0.7	0.0	0.0	0.0
42335.B15	4009	0.10	>100	Low	56	236216	6020275	87	0	0	10	6	0	0	0.0	0.0	96.6	1.4	0.0	0.0

Plot ID	PCT	Area (ha)	Patch size (ha)	Condition	Zone	Easting	Northing	Bearing	Funn. Large Trees	Fun. Hollow Trees	Fun. Litter Cover	Fun Len. Fallen Logs	Fun. Tree Stem 5to9	Fun. Tree Stem 10to19	Fun. Tree Stem 20to29	Fun. Tree Stem 30to49	Fun. Tree50to79	Fun. Tree Regen	Fun. High Threat Exotic
42335.B01	4052	8.75	>100	Other	56	236509	6020232	335	0	0	3	0	0	0	0	0	0	0	72.2
42335.B02	4052	8.75	>100	Other	56	236539	6020369	200	0	0	6	0	0	0	0	0	0	0	61.1
42335.B03	4052	8.75	>100	Other	56	236421	6020114	325	0	0	7	0	0	0	0	0	0	0	85.1
42335.B04	4052	3.59	>100	DNG	56	236312	6020354	320	0	0	5	0	0	0	0	0	0	0	10.4
42335.B05	4052	3.59	>100	DNG	56	236626	6020192	160	1	0	0	2	1	1	0	0	0	1	66.1
42335.B06	4052	3.59	>100	DNG	56	236196	6020391	255	0	0	2	0	0	0	0	0	0	0	10.7
42335.B07	4052	0.93	>100	Low	56	236385	6020115	340	0	2	18	3	0	0	0	1	0	1	66.6
42335.B08	4052	0.28	>100	Moderate	56	236654	6020240	210	1	2	30	24	1	1	1	1	0	1	31.9
42335.B09	4052	3.59	>100	DNG	56	236166	6020226	180	0	0	2	0	0	0	0	0	0	0	11.0
42335.B10	4009	0.10	>100	Low	56	236283	6020127	340	0	0	0	0	0	0	0	0	0	0	0.7
42335.B11	-	0.21	>100	Other	56	236219	6020245	160	1	0	6	2	1	1	0	0	0	1	26.7
42335.B12	4052	0.28	>100	Moderate	56	236660	6020357	290	1	2	44	9	1	1	1	5	3	1	45.7
42335.B13	4052	0.93	>100	Other	56	236542	6020318	195	0	2	17	9	0	0	0	0	0	1	50.3
42335.B14	-	0.20	>100	Other	56	236170	6020255	72	0	0	9	8	0	0	0	0	0	0	166.1
42335.B15	4009	0.10	>100	Low	56	236216	6020275	87	0	0	3.2	0	0	0	0	0	0	0	2.2

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Appendix 3.2 BAM plot data sheets

BAM Plot Data Sheet							Site Sheet no:1 of 2
		Survey Name		Veg Zone ID	Recorders		
Date	07/07/2025	42335.B01		NOG	Jjn rg		
Zone 56	Datum GDA94	Plot ID	42335.B01	Plot dimensions	50x20	Orientation of middle	335
Easting 236509	Northing 6020232	IBRA region	South East Corner	Photo #			
Plant Community Type		4052				EEC: None	Confidence H

BAM Attribute (400m2 plot)		Sum values
Count of Native Richness	Trees	0
	Shrubs	0
	Grasses etc.	7
	Forbs	1
	Ferns	0
	Other	1
Sum of Cover of native vascular plans by growth form group	Trees	0
	Shrubs	0
	Grasses etc.	22.4
	Forbs	0.1
	Ferns	0
	Other	0.1
High Threat Weed cover		72.2

BAM Attribute (1000m2 plot)	# Tree Stems Count
DBH	
80+ cm	0
50 - 79 cm	0
30 - 49 cm	0
20 - 29cm	0
10 - 19 cm	0
5 - 9 cm	0
< 5 cm	0
Length of logs (m)	0
No. trees with hollows	0

BAM Attibute (1 x 1m plots)	Litter cover (%)				
Subplot score (% in each)	0	5	0	5	5
Average of the 5 subplots	3				

Notes	Exotic grass

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

Landform Pattern		Slope	Slope north 1 deg	Soil Surface Texture	Sandy loam
Soil Colour	Brown	Site Drainage	1st order	Distance to nearest water	150m north

Plot Disturbance	Severity code	Age code	Observational evidence
Clearing inc. logging)	0		
Cultivation (inc. pasture)	0		
Soil erosion	0		
Firewood/CWD removal	0		
Grazing (identify native/livestock	0		
Fire damage	0		
Storm damage	0		
Weediness	2	R	
Other			

400 m2 plot: Sheet 2 of 2		**Survey Name**	**Plot ID**	**Recorders**
Date	07/07/2025	42335.B01	42335.B01	Jjn rg

GF Code	Genus species	N,E or HTE	Cover	Abund	Stratum
	Andropogon virginicus	HTE	0.1	10	Ground
	Axonopus fissifolius	HTE	70	5000	Ground
	Bidens pilosa	HTE	0.1	10	Ground
	Cenchrus clandestinus	HTE	1	300	Ground
FG	Centella asiatica	N	0.1	10	Ground
	Conyza bonariensis	E	0.1	3	Ground
GG	Cymbopogon refractus	N	0.1	10	Ground
GG	Cynodon dactylon	N	20	1000	Ground
GG	Cyperus polystachyos	N	0.1	20	Ground
	Daucus carota	E	0.1	1	Ground
GG	Dichelachne micrantha	N	0.1	30	Ground
GG	Eragrostis leptostachya	N	1	300	Ground
	Gamochaeta calviceps	E	0.1	10	Ground
OG	Glycine microphylla	N	0.1	20	Ground
	Hypochaeris radicata	E	0.3	100	Ground
	Juncus cognatus	E	0.1	5	Ground
GG	Microlaena stipoides var.	N	0.1	1	Ground
	Plantago lanceolata	E	0.1	20	Ground
	Senecio madagascariensis	HTE	1	300	Ground
	Setaria pumila	E	5	1000	Ground
GG	Sporobolus creber	N	1	200	Ground
	Trifolium repens	E	0.5	200	Ground
	Verbena bonariensis	E	0.1	10	Ground

BAM Plot Data Sheet							Site Sheet no:1 of 2
		Survey Name		Veg Zone ID	Recorders		
Date	07/07/2025	42335.B02		NOG	Jjn rg		
Zone 56	Datum GDA94	Plot ID	42335.B02	Plot dimensions	50x20	Orientation of middle	200
Easting 236539	Northing 6020369	IBRA region	South East Corner	Photo #			
Plant Community Type		4052				EEC: No	Confidence H

BAM Attribute (400m2 plot)		Sum values
Count of Native Richness	Trees	0
	Shrubs	0
	Grasses etc.	8
	Forbs	3
	Ferns	0
	Other	1
Sum of Cover of native vascular plans by growth form group	Trees	0
	Shrubs	0
	Grasses etc.	22.1
	Forbs	0.3
	Ferns	0
	Other	0.1
High Threat Weed cover		61.1

BAM Attribute (1000m2 plot)	# Tree Stems Count
DBH	
80+ cm	0
50 - 79 cm	0
30 - 49 cm	0
20 - 29cm	0
10 - 19 cm	0
5 - 9 cm	0
< 5 cm	0
Length of logs (m)	0
No. trees with hollows	0

BAM Attibute (1 x 1m plots)	Litter cover (%)				
Subplot score (% in each)	5	5	5	5	10
Average of the 5 subplots	6				

Notes	

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

Landform Pattern		Slope	5 degrees nne	Soil Surface Texture	Sandy loam
Soil Colour	Brown	Site Drainage	1st ord north	Distance to nearest water	30m

Plot Disturbance	Severity code	Age code	Observational evidence
Clearing inc. logging)	0		
Cultivation (inc. pasture)	0		
Soil erosion	0		
Firewood/CWD removal	0		
Grazing (identify native/livestock	0		
Fire damage	0		
Storm damage	0		
Weediness	2	R	
Other			

400 m2 plot: Sheet 2 of 2		**Survey Name**	**Plot ID**	**Recorders**
Date	07/07/2025	42335.B02	42335.B02	Jjn rg

GF Code	Genus species	N,E or HTE	Cover	Abund	Stratum
	Andropogon virginicus	HTE	20	1000	Ground
	Axonopus fissifolius	HTE	15	1000	Ground
	Bidens pilosa	HTE	0.1	5	Ground
GG	Carex appressa	N	0.1	5	Ground
	Cenchrus clandestinus	HTE	1	200	Ground
FG	Centella asiatica	N	0.1	20	Ground
	Conyza bonariensis	E	0.1	10	Ground
GG	Cymbopogon refractus	N	0.1	50	Ground
GG	Cynodon dactylon	N	20	2000	Ground
GG	Cyperus polystachyos	N	0.5	200	Ground
	Daucus carota	E	0.5	200	Ground
GG	Dichelachne micrantha	N	0.2	100	Ground
GG	Eragrostis leptostachya	N	1	300	Ground
	Gamochaeta calviceps	E	0.1	40	Ground
OG	Glycine microphylla	N	0.1	20	Ground
FG	Hypericum gramineum	N	0.1	10	Ground
	Hypochaeris radicata	E	0.1	20	Ground
	Juncus cognatus	E	0.1	50	Ground
GG	Juncus usitatus	N	0.1	1	Ground
FG	Lobelia purpurascens	N	0.1	5	Ground
	Lysimachia arvensis	E	0.1	1	Ground
	Modiola caroliniana	E	0.1	10	Ground
	Paspalum dilatatum	HTE	20	1000	Ground
	Plantago lanceolata	E	0.5	300	Ground
	Senecio madagascariensis	HTE	5	1000	Ground
	Setaria pumila	E	10	1000	Ground
GG	Sporobolus creber	N	0.1	1	Ground
	Trifolium repens	E	20	5000	Ground
	Verbena bonariensis	E	0.1	5	Ground

BAM Plot Data Sheet								Site Sheet no:1 of 2
		Survey Name		Veg Zone ID	Recorders			
Date	07/07/2025	42335.B03		NOG	Jjn rg			
Zone 56	Datum GDA94	Plot ID	42335.B03	Plot dimensions	50x20	Orientation of middle	325	
Easting 236421	Northing 6020114	IBRA region	South East Corner	Photo #				
Plant Community Type		4052				EEC: No	Confidence H	

BAM Attribute (400m2 plot)		Sum values
Count of Native Richness	Trees	0
	Shrubs	0
	Grasses etc.	5
	Forbs	2
	Ferns	0
	Other	1
Sum of Cover of native vascular plans by growth form group	Trees	0
	Shrubs	0
	Grasses etc.	20.4
	Forbs	0.2
	Ferns	0
	Other	0.1
High Threat Weed cover		85.1

BAM Attribute (1000m2 plot)	# Tree Stems Count
DBH	
80+ cm	0
50 - 79 cm	0
30 - 49 cm	0
20 - 29cm	0
10 - 19 cm	0
5 - 9 cm	0
< 5 cm	0
Length of logs (m)	0
No. trees with hollows	0

BAM Attibute (1 x 1m plots)	Litter cover (%)				
Subplot score (% in each)	5	5	5	10	10
Average of the 5 subplots	7				

Notes	

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

Landform Pattern		Slope	Sloping west to stream 3 or 4 degress	Soil Surface Texture	Sandy loam
Soil Colour	Brown	Site Drainage	3rd order west	Distance to nearest water	120m

Plot Disturbance	Severity code	Age code	Observational evidence
Clearing inc. logging)	0		
Cultivation (inc. pasture)	0		
Soil erosion	0		
Firewood/CWD removal	0		
Grazing (identify native/livestock	0		
Fire damage	0		
Storm damage	0		

Weediness	2	R	
Other	1	R	Tyres dumped. Inside plot

BAM Plot Data Sheet					Site Sheet no:1 of 2		
		Survey Name		Veg Zone ID	Recorders		
Date	07/07/2025	42335.B04		DNG	Jjn rg		
Zone 56	Datum GDA94	Plot ID	42335.B04	Plot dimensions	50x20	Orientation of middle	320
Easting 236312	Northing 6020354	IBRA region	South East Corner	Photo #			
Plant Community Type		4052				EEC: No	Confidence H

BAM Attribute (400m2 plot)		Sum values
Count of Native Richness	Trees	0
	Shrubs	0
	Grasses etc.	7
	Forbs	1
	Ferns	0
	Other	0
Sum of Cover of native vascular plans by growth form group	Trees	0
	Shrubs	0
	Grasses etc.	92.3
	Forbs	0.1
	Ferns	0
	Other	0
High Threat Weed cover		10.4

BAM Attribute (1000m2 plot)	# Tree Stems Count
DBH	
80+ cm	0
50 - 79 cm	0
30 - 49 cm	0
20 - 29cm	0
10 - 19 cm	0
5 - 9 cm	0
< 5 cm	0
Length of logs (m)	0
No. trees with hollows	0

BAM Attibute (1 x 1m plots)	Litter cover (%)				
Subplot score (% in each)	5	5	5	5	5
Average of the 5 subplots	5				

Notes	Dng

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

Landform Pattern		Slope	1 deg north	Soil Surface Texture	Sandy loam
Soil Colour	Brown	Site Drainage	3rd creek 150m north	Distance to nearest water	150

Plot Disturbance	Severity code	Age code	Observational evidence
Clearing inc. logging)	0		
Cultivation (inc. pasture)	0		
Soil erosion	0		
Firewood/CWD removal	0		
Grazing (identify native/livestock	0		
Fire damage	0		
Storm damage	0		
Weediness	1		
Other			

400 m2 plot: Sheet 2 of 2		**Survey Name**	**Plot ID**	**Recorders**
Date	07/07/2025	42335.B04	42335.B04	Jjn rg

GF Code	Genus species	N,E or HTE	Cover	Abund	Stratum
	Axonopus fissifolius	HTE	10	1000	Ground
	Bidens pilosa	HTE	0.1	1	Ground
	Bromus diandrus	HTE	0.1	10	Ground
	Cirsium vulgare	E	0.1	1	Ground
GG	Cynodon dactylon	N	90	5000	Ground
	Daucus carota	E	0.1	40	Ground
GG	Dichelachne micrantha	N	1	500	Ground
GG	Eragrostis leptostachya	N	0.1	10	Ground
GG	Ficinia nodosa	N	0.1	2	Ground
	Hypochaeris radicata	E	0.1	10	Ground
	Juncus cognatus	E	0.5	100	Ground
GG	Juncus usitatus	N	0.1	1	Ground
	Lysimachia arvensis	E	0.1	20	Ground
GG	Microlaena stipoides var.	N	0.5	100	Ground
FG	Oxalis perennans	N	0.1	5	Ground
	Paspalum dilatatum	HTE	0.1	40	Ground
	Plantago lanceolata	E	0.1	10	Ground
	Rumex crispus	E	0.1	1	Ground
	Senecio madagascariensis	HTE	0.1	20	Ground
GG	Sporobolus creber	N	0.5	200	Ground
	Trifolium repens	E	0.1	50	Ground

BAM Plot Data Sheet					Site Sheet no:1 of 2		
		Survey Name		Veg Zone ID	Recorders		
Date	08/07/2025	42335.B05		DNG	Jjn rg		
Zone 56	Datum GDA94	Plot ID	42335.B05	Plot dimensions	50x20	Orientation of middle	160
Easting 236626	Northing 6020192	IBRA region	South East Corner	Photo #			
Plant Community Type		4052				EEC: No	Confidence M

BAM Attribute (400m2 plot)		Sum values
Count of Native Richness	Trees	0
	Shrubs	0
	Grasses etc.	8
	Forbs	2
	Ferns	0
	Other	1
Sum of Cover of native vascular plans by growth form group	Trees	0
	Shrubs	0
	Grasses etc.	40.9
	Forbs	0.2
	Ferns	0
	Other	0.1
High Threat Weed cover		66.1

BAM Attribute (1000m2 plot)	
DBH	# Tree Stems Count
80+ cm	0
50 - 79 cm	0
30 - 49 cm	0
20 - 29cm	0
10 - 19 cm	1
5 - 9 cm	1
< 5 cm	1
Length of logs (m)	2
No. trees with hollows	0

BAM Attibute (1 x 1m plots)	Litter cover (%)				
Subplot score (% in each)	0	5	0	5	0
Average of the 5 subplots	0				

Notes	Dng plot. End nears roadside veg

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

Landform Pattern		Slope	Sloping nw to dam, 2-3 deg	Soil Surface Texture	Sandy loam
Soil Colour	Dark brown	Site Drainage	1st order and dam	Distance to nearest water	Dam 2m and 1st order 200m

Plot Disturbance	Severity code	Age code	Observational evidence
Clearing inc. logging)	0		
Cultivation (inc. pasture)	0		
Soil erosion	0		
Firewood/CWD removal	0		
Grazing (identify native/livestock	0		
Fire damage	0		

Storm damage	0		
Weediness	1	R	
Other			

400 m2 plot: Sheet 2 of 2		**Survey Name**	**Plot ID**	**Recorders**
Date	08/07/2025	42335.B05	42335.B05	Jjn rg

GF Code	Genus species	N,E or HTE	Cover	Abund	Stratum
	Axonopus fissifolius	HTE	65	5000	Ground
	Bidens pilosa	HTE	0.1	20	Ground
	Cirsium vulgare	E	0.1	1	Ground
	Conyza bonariensis	E	0.1	50	Ground
GG	Cymbopogon refractus	N	0.5	200	Ground
GG	Cynodon dactylon	N	30	5000	Ground
GG	Cyperus polystachyos	N	0.1	20	Ground
	Daucus carota	E	0.1	20	Ground
GG	Dichelachne micrantha	N	0.1	20	Ground
FG	Dichondra repens	N	0.1	10	Ground
GG	Echinopogon caespitosus var.	N	0.1	50	Ground
GG	Eragrostis leptostachya	N	5	500	Ground
	Gamochaeta calviceps	E	0.1	5	Ground
OG	Glycine clandestina	N	0.1	10	Ground
	Hypochaeris radicata	E	0.1	50	Ground
	Juncus cognatus	E	0.1	20	Ground
	Lysimachia arvensis	E	0.1	10	Ground
GG	Microlaena stipoides var.	N	0.1	20	Ground
FG	Oxalis perennans	N	0.1	10	Ground
	Plantago lanceolata	E	0.1	20	Ground
	Senecio madagascariensis	HTE	1	300	Ground
	Setaria pumila	E	0.1	20	Ground
	Sida rhombifolia	E	0.5	200	Ground
GG	Sporobolus creber	N	5	1000	Ground
	Trifolium repens	E	0.1	20	Ground
	Verbena bonariensis	E	0.1	10	Ground

BAM Plot Data Sheet							Site Sheet no:1 of 2
		Survey Name		Veg Zone ID	Recorders		
Date	08/07/2025	42335.B06		DNG	Jjn rg		
Zone 56	Datum GDA94	Plot ID	42335.B06	Plot dimensions	50x20	Orientation of middle	255
Easting 236196	Northing 6020391	IBRA region	South East Corner	Photo #			
Plant Community Type		4052				EEC: No	Confidence H

BAM Attribute (400m2 plot)		Sum values
Count of Native Richness	Trees	0
	Shrubs	0
	Grasses etc.	5
	Forbs	1
	Ferns	0
	Other	0
Sum of Cover of native vascular plans by growth form group	Trees	0
	Shrubs	0
	Grasses etc.	92
	Forbs	0.1
	Ferns	0
	Other	0
High Threat Weed cover		10.7

BAM Attribute (1000m2 plot)	
DBH	# Tree Stems Count
80+ cm	0
50 - 79 cm	0
30 - 49 cm	0
20 - 29cm	0
10 - 19 cm	0
5 - 9 cm	0
< 5 cm	0
Length of logs (m)	0
No. trees with hollows	0

BAM Attibute (1 x 1m plots)	Litter cover (%)				
Subplot score (% in each)	0	5	0	0	5
Average of the 5 subplots	2				

Notes	Dng, not much litter at all

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

Landform Pattern		Slope	Sloping sw towards creek 1-3 degree	Soil Surface Texture	Sandy loam
Soil Colour	Dark brown	Site Drainage	3rd order creek	Distance to nearest water	60m

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

Weediness	1	R	Minimal weeds
Other			

400 m2 plot: Sheet 2 of 2		**Survey Name**	**Plot ID**	**Recorders**
Date	08/07/2025	42335.B06	42335.B06	Jjn rg

GF Code	Genus species	N,E or HTE	Cover	Abund	Stratum
	Axonopus fissifolius	HTE	10	1000	Ground
	Bidens pilosa	HTE	0.1	1	Ground
GG	Carex appressa	N	0.5	20	Ground
GG	Cynodon dactylon	N	80	5000	Ground
	Daucus carota	E	0.1	10	Ground
GG	Dichelachne micrantha	N	1	300	Ground
	Hypochaeris radicata	E	0.1	20	Ground
GG	Juncus usitatus	N	0.5	50	Ground
FG	Lobelia purpurascens	N	0.1	20	Ground
	Lolium perenne	E	0.1	50	Ground
	Lysimachia arvensis	E	0.1	5	Ground
GG	Microlaena stipoides var.	N	10	2000	Ground
	Modiola caroliniana	E	0.1	1	Ground
	Paspalum dilatatum	HTE	0.5	100	Ground
	Senecio madagascariensis	HTE	0.1	10	Ground
	Setaria pumila	E	0.5	200	Ground
	Trifolium repens	E	0.1	50	Ground
	Verbena bonariensis	E	0.5	100	Ground

BAM Plot Data Sheet							Site Sheet no:1 of 2
		Survey Name		Veg Zone ID	Recorders		
Date	07/07/2025	42335.B07		Low	Jjn rg		
Zone 56	Datum GDA94	Plot ID	42335.B07	Plot dimensions	50x20	Orientation of middle	340
Easting 236385	Northing 6020115	IBRA region	South East Corner	Photo #			
Plant Community Type		4052				EEC: None	Confidence H

BAM Attribute (400m2 plot)		Sum values
Count of Native Richness	Trees	2
	Shrubs	0
	Grasses etc.	8
	Forbs	2
	Ferns	0
	Other	1
Sum of Cover of native vascular plans by growth form group	Trees	20
	Shrubs	0
	Grasses etc.	27.8
	Forbs	0.4
	Ferns	0
	Other	0.1
High Threat Weed cover		66.6

BAM Attribute (1000m2 plot)	
DBH	# Tree Stems Count
80+ cm	2
50 - 79 cm	0
30 - 49 cm	1
20 - 29cm	0
10 - 19 cm	0
5 - 9 cm	0
< 5 cm	1
Length of logs (m)	3
No. trees with hollows	2

BAM Attibute (1 x 1m plots)	Litter cover (%)				
Subplot score (% in each)	10	10	40	20	10
Average of the 5 subplots	18				

Notes	Low condition, sparse big trees, heavy Couch ground cover with occasional leaf litter.

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

Landform Pattern		Slope	West sloiping 5 deg	Soil Surface Texture	Sandy loam
Soil Colour	Brown	Site Drainage	Draining west to 3rd ord creek	Distance to nearest water	100m west

Plot Disturbance	Severity code	Age code	Observational evidence
Clearing inc. logging)	0		
Cultivation (inc. pasture)	0		
Soil erosion	0		
Firewood/CWD removal	0		
Grazing (identify native/livestock	1		
Fire damage			
Storm damage	0		

Weediness	2	R	Bidens, fireweed
Other			

400 m2 plot: Sheet 2 of 2		**Survey Name**	**Plot ID**	**Recorders**
Date	07/07/2025	42335.B07	42335.B07	Jjn rg

GF Code	Genus species	N,E or HTE	Cover	Abund	Stratum
TG	Angophora floribunda	N	15	1	Canopy
	Axonopus fissifolius	HTE	15	1000	Ground
	Bidens pilosa	HTE	0.1	50	Ground
GG	Carex inversa	N	0.1	10	Ground
GG	Carex longebrachiata	N	0.5	200	Ground
	Cenchrus clandestinus	HTE	50	5000	Ground
	Conyza bonariensis	E	0.1	2	Ground
GG	Cynodon dactylon	N	20	1000	Ground
GG	Cyperus imbecillis	N	0.1	10	Ground
	Daucus carota	E	0.1	10	Ground
GG	Dichelachne micrantha	N	0.1	5	Ground
FG	Dichondra repens	N	0.3	400	Ground
GG	Eragrostis leptostachya	N	5	800	Ground
TG	Eucalyptus bosistoana	N	5	1	Canopy
	Gamochaeta calviceps	E	0.1	1	Ground
OG	Glycine microphylla	N	0.1	10	Ground
	Hypochaeris radicata	E	0.1	20	Ground
GG	Microlaena stipoides var.	N	1	500	Ground
	Modiola caroliniana	E	0.1	1	Ground
FG	Oxalis perennans	N	0.1	10	Ground
	Paspalum dilatatum	HTE	1	400	Ground
	Plantago lanceolata	E	0.1	20	Ground
	Rumex crispus	E	0.1	10	Ground
	Senecio madagascariensis	HTE	0.5	200	Ground
	Setaria pumila	E	1	200	Ground
	Sida rhombifolia	E	0.5	200	Ground
	Solanum nigrum	E	0.1	1	Ground
GG	Sporobolus creber	N	1	200	Ground
	Trifolium repens	E	0.1	60	Ground

BAM Plot Data Sheet							Site Sheet no:1 of 2
		Survey Name		Veg Zone ID	Recorders		
Date	09/07/2025	42335.B08		Moderate	Jjn rg		
Zone 56	Datum GDA94	Plot ID	42335.B08	Plot dimensions	100x10	Orientation of middle	210
Easting 236654	Northing 6020240	IBRA region	South East Corner	Photo #			
Plant Community Type		4052				EEC: None	Confidence M

BAM Attribute (400m2 plot)		Sum values
Count of Native Richness	Trees	4
	Shrubs	4
	Grasses etc.	10
	Forbs	6
	Ferns	0
	Other	3
Sum of Cover of native vascular plans by growth form group	Trees	16.1
	Shrubs	1.2
	Grasses etc.	60.6
	Forbs	1.2
	Ferns	0
	Other	0.3
High Threat Weed cover		31.9

BAM Attribute (1000m2 plot)	
DBH	# Tree Stems Count
80+ cm	2
50 - 79 cm	0
30 - 49 cm	1
20 - 29cm	1
10 - 19 cm	1
5 - 9 cm	1
< 5 cm	1
Length of logs (m)	24
No. trees with hollows	2

BAM Attibute (1 x 1m plots)	Litter cover (%)				
Subplot score (% in each)	10	40	30	40	30
Average of the 5 subplots	30				

Notes	Long transect next to road.

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

Landform Pattern		Slope	2/3 nw to dam and creek	Soil Surface Texture	Sandy loam
Soil Colour	Brown	Site Drainage	1st order	Distance to nearest water	100

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

400 m2 plot: Sheet 2 of 2		**Survey Name**	**Plot ID**	**Recorders**
Date	09/07/2025	42335.B08	42335.B08	Jjn rg

GF Code	Genus species	N,E or HTE	Cover	Abund	Stratum
SG	Acacia longifolia subsp. longifolia	N	0.5	3	Mid Storey
	Acetosella vulgaris	HTE	0.1	10	Ground
TG	Allocasuarina littoralis	N	0.1	1	Mid Storey
	Andropogon virginicus	HTE	0.1	5	Ground
TG	Angophora floribunda	N	10	10	Canopy
	Asparagus aethiopicus	HTE	0.1	5	Ground
	Axonopus fissifolius	HTE	30	2000	Ground
	Bidens pilosa	HTE	0.1	50	Ground
GG	Bothriochloa macra	N	0.1	1	Ground
	Cenchrus clandestinus	HTE	0.5	100	Ground
	Conyza bonariensis	E	0.1	1	Ground
GG	Cymbopogon refractus	N	2	500	Ground
GG	Cynodon dactylon	N	35	5000	Ground
GG	Cyperus imbecillis	N	0.1	10	Ground
	Daucus carota	E	0.1	1	Ground
FG	Dianella caerulea var. caerulea	N	0.1	1	Ground
GG	Dichelachne micrantha	N	3	1000	Ground
FG	Dichondra repens	N	0.3	500	Ground
GG	Echinopogon caespitosus var.	N	3	1000	Ground
	Ehrharta erecta	HTE	0.5	100	Ground
GG	Eragrostis leptostachya	N	7	1000	Ground
TG	Eucalyptus eugenioides	N	1	2	Canopy
TG	Eucalyptus tereticornis	N	5	10	Canopy
SG	Exocarpos cupressiformis	N	0.5	1	Ground
	Gamochaeta calviceps	E	0.1	50	Ground
OG	Glycine clandestina	N	0.1	20	Ground
OG	Glycine tabacina	N	0.1	1	Ground
OG	Hardenbergia violacea	N	0.1	1	Ground
	Hypochaeris radicata	E	0.5	500	Ground
	Juncus cognatus	E	0.1	10	Ground
GG	Juncus usitatus	N	0.1	20	Ground
FG	Lagenophora gracilis	N	0.1	1	Ground
FG	Lobelia purpurascens	N	0.1	50	Ground
GG	Microlaena stipoides var.	N	10	2000	Ground
FG	Oxalis perennans	N	0.1	50	Ground
SG	Pittosporum undulatum	N	0.1	2	Mid Storey
	Plantago lanceolata	E	0.1	50	Ground
FG	Plectranthus parviflorus	N	0.5	200	Ground
	Rumex crispus	E	0.1	10	Ground
	Senecio madagascariensis	HTE	0.5	300	Ground
	Setaria pumila	E	0.1	10	Ground
	Sida rhombifolia	E	0.1	50	Ground

GG	Sporobolus creber	N	0.3	500	Ground
	Trifolium repens	E	0.1	20	Ground
	Verbena bonariensis	E	0.1	10	Ground
SG	Westringia fruticosa	N	0.1	1	Mid Storey

BAM Plot Data Sheet					Site Sheet no:1 of 2		
		Survey Name		Veg Zone ID	Recorders		
Date	09/07/2025	42335.B09		DNG	Jjn rg		
Zone 56	Datum GDA94	Plot ID	42335.B09	Plot dimensions	50x20	Orientation of middle	180
Easting 236166	Northing 6020226	IBRA region	South East Corner	Photo #			
Plant Community Type		4052				EEC: No	Confidence H

BAM Attribute (400m2 plot)		Sum values
Count of Native Richness	Trees	0
	Shrubs	0
	Grasses etc.	6
	Forbs	0
	Ferns	0
	Other	0
Sum of Cover of native vascular plans by growth form group	Trees	0
	Shrubs	0
	Grasses etc.	91.4
	Forbs	0
	Ferns	0
	Other	0
High Threat Weed cover		11

BAM Attribute (1000m2 plot)	# Tree Stems Count
DBH	
80+ cm	0
50 - 79 cm	0
30 - 49 cm	0
20 - 29cm	0
10 - 19 cm	0
5 - 9 cm	0
< 5 cm	0
Length of logs (m)	0
No. trees with hollows	0

BAM Attibute (1 x 1m plots)	Litter cover (%)				
Subplot score (% in each)	0	5	0	0	5
Average of the 5 subplots	2				

Notes	A big collection of firewood at the end of plot has not been included in log length.

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

Landform Pattern		Slope	0 flat next to 3rd order	Soil Surface Texture	Sandy loam
Soil Colour	Brown	Site Drainage	3rd order	Distance to nearest water	30

Plot Disturbance	Severity code	Age code	Observational evidence
Clearing inc. logging)	1	R	Big pile of trees and waste
Cultivation (inc. pasture)			
Soil erosion			
Firewood/CWD removal	2	R	Big pile of wood
Grazing (identify native/livestock			
Fire damage			
Storm damage			
Weediness	1	R	Fireweed etc
Other			

400 m2 plot: Sheet 2 of 2		**Survey Name**	**Plot ID**	**Recorders**
Date	09/07/2025	42335.B09	42335.B09	Jjn rg

GF Code	Genus species	N,E or HTE	Cover	Abund	Stratum
	Axonopus fissifolius	HTE	5	1000	Ground
GG	Carex appressa	N	0.1	20	Ground
GG	Carex longebrachiata	N	0.1	1	Ground
	Cenchrus clandestinus	HTE	0.5	100	Ground
GG	Cynodon dactylon	N	90	5000	Ground
	Dactylis glomerata	E	0.1	1	Ground
	Daucus carota	E	0.1	5	Ground
	Juncus cognatus	E	0.5	100	Ground
GG	Juncus usitatus	N	1	50	Ground
	Lolium perenne	E	0.1	20	Ground
	Lysimachia arvensis	E	0.1	10	Ground
GG	Microlaena stipoides var.	N	0.1	10	Ground
	Modiola caroliniana	E	0.1	1	Ground
	Paspalum dilatatum	HTE	5	500	Ground
	Plantago lanceolata	E	0.1	5	Ground
	Senecio madagascariensis	HTE	0.5	100	Ground
GG	Sporobolus creber	N	0.1	20	Ground
	Trifolium repens	E	0.1	20	Ground
	Verbena bonariensis	E	0.1	10	Ground

BAM Plot Data Sheet							Site Sheet no:1 of 2
		Survey Name		Veg Zone ID	Recorders		
Date	07/07/2025	42335.B10		Low	Jjn rg		
Zone 56	Datum GDA94	Plot ID	42335.B10	Plot dimensions	50x20	Orientation of middle	340
Easting 236283	Northing 6020127	IBRA region	South East Corner	Photo #			
Plant Community Type		4009				EEC: None	Confidence M

BAM Attribute (400m2 plot)		Sum values
Count of Native Richness	Trees	0
	Shrubs	0
	Grasses etc.	6
	Forbs	2
	Ferns	0
	Other	0
Sum of Cover of native vascular plans by growth form group	Trees	0
	Shrubs	0
	Grasses etc.	73.7
	Forbs	4.1
	Ferns	0
	Other	0
High Threat Weed cover		0.7

BAM Attribute (1000m2 plot)	# Tree Stems Count
DBH	
80+ cm	0
50 - 79 cm	0
30 - 49 cm	0
20 - 29cm	0
10 - 19 cm	0
5 - 9 cm	0
< 5 cm	0
Length of logs (m)	0
No. trees with hollows	0

BAM Attibute (1 x 1m plots)	Litter cover (%)				
Subplot score (% in each)	0	0	0	0	0
Average of the 5 subplots	0				

Notes	Soaked area. No canopy, Ends in blackberry.

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

Landform Pattern		Slope	None, in water	Soil Surface Texture	Sandy loam
Soil Colour	Brown	Site Drainage	It is drain	Distance to nearest water	20

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

400 m2 plot: Sheet 2 of 2		**Survey Name**	**Plot ID**	**Recorders**
Date	07/07/2025	42335.B10	42335.B10	Jjn rg

GF Code	Genus species	N,E or HTE	Cover	Abund	Stratum
	Axonopus fissifolius	HTE	0.5	50	Ground
GG	Carex appressa	N	70	1000	Ground
GG	Carex spp.	N	0.5	100	Ground
GG	Cynodon dactylon	N	2	500	Ground
	Dactylis glomerata	E	0.5	100	Ground
	Daucus carota	E	0.1	10	Ground
GG	Eleocharis acuta	N	0.1	10	Ground
FG	Epilobium hirtigerum	N	4	200	Ground
	Holcus lanatus	E	35	300	Ground
GG	Isachne globosa	N	0.1	10	Ground
GG	Juncus pallidus	N	1	500	Ground
	Paspalum dilatatum	HTE	0.1	5	Ground
	Plantago lanceolata	E	0.5	100	Ground
FG	Ranunculus inundatus	N	0.1	1	Ground
	Rubus fruticosus sp. agg.	HTE	0.1	10	Ground
	Rumex crispus	E	3	200	Ground
	Trifolium repens	E	1	200	Ground

BAM Plot Data Sheet					Site Sheet no:1 of 2		
		Survey Name		Veg Zone ID	Recorders		
Date	08/07/2025	42335.B11		Other	Jjn rg		
Zone 56	Datum GDA94	Plot ID	42335.B11	Plot dimensions	100x10	Orientation of middle	160
Easting 236219	Northing 6020245	IBRA region	South East Corner	Photo #			
Plant Community Type		4052				EEC: No	Confidence M

BAM Attribute (400m2 plot)		Sum values
Count of Native Richness	Trees	5
	Shrubs	3
	Grasses etc.	5
	Forbs	4
	Ferns	0
	Other	0
Sum of Cover of native vascular plans by growth form group	Trees	22.6
	Shrubs	9
	Grasses etc.	50.2
	Forbs	0.4
	Ferns	0
	Other	0
High Threat Weed cover		26.7

BAM Attribute (1000m2 plot)	# Tree Stems Count
DBH	
80+ cm	0
50 - 79 cm	0
30 - 49 cm	0
20 - 29cm	0
10 - 19 cm	1
5 - 9 cm	1
< 5 cm	1
Length of logs (m)	2
No. trees with hollows	0

BAM Attibute (1 x 1m plots)	Litter cover (%)				
Subplot score (% in each)	5	5	10	0	10
Average of the 5 subplots	6				

Notes	Planted section, blackberry, kangaroos, a bottle of VB.

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

Landform Pattern		Slope	Minimal to creek. 1 deg ne	Soil Surface Texture	Sandy loam
Soil Colour	Dark brown	Site Drainage	Creek 3rd	Distance to nearest water	10m

Plot Disturbance	Severity code	Age code	Observational evidence
Clearing inc. logging)			
Cultivation (inc. pasture)			
Soil erosion			
Firewood/CWD removal			
Grazing (identify native/livestock			
Fire damage			
Storm damage	2	R	Veg pushed over
Weediness			
Other			

400 m2 plot: Sheet 2 of 2		**Survey Name**	**Plot ID**	**Recorders**
Date	08/07/2025	42335.B11	42335.B11	Jjn rg

GF Code	Genus species	N,E or HTE	Cover	Abund	Stratum
SG	Acacia cognata	N	0.5	1	
SG	Acacia pravissima	N	0.5	1	Mid Storey
TG	Allocasuarina littoralis	N	1	2	Ground
	Axonopus fissifolius	HTE	1	200	Ground
TG	Banksia integrifolia subsp. integrifolia	N	0.5	2	Mid Storey
	Bidens pilosa	HTE	0.1	1	Ground
SG	Callistemon citrinus	N	8	8	Mid Storey
TG	Callistemon viminalis	N	0.1	1	Mid Storey
GG	Carex appressa	N	10	500	Ground
	Cenchrus clandestinus	HTE	20	1000	Ground
	Cirsium vulgare	E	0.1	1	Ground
GG	Cynodon dactylon	N	30	2000	Ground
	Dactylis glomerata	E	0.3	100	Ground
	Daucus carota	E	0.1	20	Ground
FG	Dianella caerulea var. caerulea	N	0.1	1	Ground
FG	Dichondra repens	N	0.1	20	Ground
TG	Eucalyptus macarthurii	N	20	6	Canopy
TG	Eucalyptus stellulata	N	1	6	Canopy
GG	Ficinia nodosa	N	0.1	1	Ground
	Gamochaeta calviceps	E	0.1	50	Ground
FG	Geranium solanderi	N	0.1	50	Ground
	Hypochaeris radicata	E	0.1	50	Ground
GG	Juncus usitatus	N	0.1	20	Ground
GG	Microlaena stipoides var.	N	10	1000	Ground
FG	Oxalis perennans	N	0.1	50	Ground
	Paspalum dilatatum	HTE	5	1000	Ground
	Plantago lanceolata	E	0.1	20	Ground
	Rubus fruticosus sp. agg.	HTE	0.5	20	Ground
	Rumex crispus	E	0.1	20	Ground
	Senecio madagascariensis	HTE	0.1	5	Ground
	Sida rhombifolia	E	0.1	20	Ground
	Trifolium repens	E	0.1	100	Ground
	Verbena bonariensis	E	0.1	20	Ground

BAM Plot Data Sheet					Site Sheet no:1 of 2		
		Survey Name		Veg Zone ID	Recorders		
Date	07/07/2025	42335.B12		Moderate	Jjn rg		
Zone 56	Datum GDA94	Plot ID	42335.B12	Plot dimensions	50x20	Orientation of middle	290
Easting 236660	Northing 6020357	IBRA region	South East Corner	Photo #			
Plant Community Type		4052				EEC: Yes	Confidence M

BAM Attribute (400m2 plot)		Sum values
Count of Native Richness	Trees	3
	Shrubs	3
	Grasses etc.	13
	Forbs	8
	Ferns	2
	Other	3
Sum of Cover of native vascular plans by growth form group	Trees	31
	Shrubs	21.5
	Grasses etc.	18.4
	Forbs	1.2
	Ferns	0.2
	Other	0.3
High Threat Weed cover		45.7

BAM Attribute (1000m2 plot)	# Tree Stems Count
DBH	
80+ cm	1
50 - 79 cm	3
30 - 49 cm	5
20 - 29cm	1
10 - 19 cm	1
5 - 9 cm	1
< 5 cm	1
Length of logs (m)	9
No. trees with hollows	2

BAM Attibute (1 x 1m plots)	Litter cover (%)				
Subplot score (% in each)	20	40	50	40	70
Average of the 5 subplots	44				

Notes	Some weeds, probably some firewood collection from houses across road lowering log count, near watercourse. Blackberry.

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

Landform Pattern		Slope	Sloping west 5-7 degrees	Soil Surface Texture	Sandy clay
Soil Colour	Light brown	Site Drainage	1st order	Distance to nearest water	30m

Plot Disturbance	Severity code	Age code	Observational evidence
Clearing inc. logging)			
Cultivation (inc. pasture)			
Soil erosion			
Firewood/CWD removal	1	R	Lack of fresh logs, close to houses and fenceline loose
Grazing (identify native/livestock			
Fire damage			
Storm damage			
Weediness			
Other			

400 m2 plot: Sheet 2 of 2		**Survey Name**	**Plot ID**	**Recorders**
Date	07/07/2025	42335.B12	42335.B12	Jjn rg

GF Code	Genus species	N,E or HTE	Cover	Abund	Stratum
SG	Acacia mearnsii	N	1	5	Mid Storey
	Acetosella vulgaris	HTE	0.1	1	Ground
	Agapanthus africanus	E	0.1	1	Ground
TG	Angophora floribunda	N	15	10	Canopy
GG	Anthosachne scabra	N	0.1	20	Ground
	Asparagus aethiopicus	HTE	3	100	Ground
	Axonopus fissifolius	HTE	0.1	50	Ground
GG	Carex longebrachiata	N	3	500	Ground
	Cenchrus clandestinus	HTE	0.1	50	Ground
FG	Centella asiatica	N	0.1	5	Ground
EG	Cheilanthes sieberi subsp.	N	0.1	1	Ground
FG	Commelina cyanea	N	0.5	200	Ground
GG	Cymbopogon refractus	N	0.3	80	Ground
GG	Cyperus gracilis	N	0.1	10	Ground
GG	Cyperus polystachyos	N	0.1	5	Ground
	Daucus carota	E	0.1	1	Ground
FG	Dianella caerulea var. caerulea	N	0.1	1	Ground
FG	Dichondra repens	N	0.1	200	Ground
GG	Echinopogon caespitosus var.	N	0.5	100	Ground
	Ehrharta erecta	HTE	40	5000	Ground
GG	Entolasia marginata	N	0.5	100	Ground
GG	Eragrostis leptostachya	N	0.1	20	Ground
TG	Eucalyptus globoidea	N	1	3	Canopy
TG	Eucalyptus tereticornis	N	15	7	Canopy
OG	Eustrephus latifolius	N	0.1	1	Ground
FG	Galium leiocarpum	N	0.1	10	Ground
OG	Glycine clandestina	N	0.1	20	Ground
	Hypochaeris radicata	E	0.1	100	Ground
GG	Lepidosperma laterale	N	0.5	50	Ground
SG	Leucopogon juniperinus	N	0.5	10	Mid Storey
	Ligustrum sinense	HTE	0.5	5	Mid Storey
FG	Lobelia purpurascens	N	0.1	100	Ground
GG	Lomandra longifolia	N	0.1	2	Ground
	Lysimachia arvensis	E	0.1	1	Ground
GG	Microlaena stipoides var.	N	10	800	Ground
	Olea europaea subsp. cuspidata	E	0.1	10	Mid Storey
FG	Oxalis perennans	N	0.1	30	Ground
OG	Pandorea pandorana subsp.	N	0.1	2	Ground
	Paspalum dilatatum	HTE	0.5	100	Ground
EG	Pellaea falcata	N	0.1	10	Ground
SG	Pittosporum undulatum	N	20	100	Mid Storey

BAM Plot Data Sheet							Site Sheet no:1 of 2
		Survey Name		Veg Zone ID	Recorders		
Date	09/07/2025	42335.B13		Other	Jjn rg		
Zone 56	Datum GDA94	Plot ID	42335.B13	Plot dimensions	50x20	Orientation of middle	195
Easting 236542	Northing 6020318	IBRA region	South East Corner	Photo #			
Plant Community Type		4052				EEC: Yes	Confidence M

BAM Attribute (400m2 plot)		Sum values
Count of Native Richness	Trees	3
	Shrubs	1
	Grasses etc.	12
	Forbs	4
	Ferns	0
	Other	1
Sum of Cover of native vascular plans by growth form group	Trees	27
	Shrubs	0.1
	Grasses etc.	47.2
	Forbs	0.4
	Ferns	0
	Other	0.1
High Threat Weed cover		50.3

BAM Attribute (1000m2 plot)	
DBH	# Tree Stems Count
80+ cm	3
50 - 79 cm	0
30 - 49 cm	0
20 - 29cm	0
10 - 19 cm	0
5 - 9 cm	0
< 5 cm	1
Length of logs (m)	9
No. trees with hollows	2

BAM Attibute (1 x 1m plots)	Litter cover (%)				
Subplot score (% in each)	20	40	20	5	0
Average of the 5 subplots	17				

Notes	some regen

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

Landform Pattern		Slope	Slight north 1d	Soil Surface Texture	Sandy loam
Soil Colour	Brown	Site Drainage	1st lrder	Distance to nearest water	60m

Plot Disturbance	Severity code	Age code	Observational evidence
Clearing inc. logging)			
Cultivation (inc. pasture)			
Soil erosion			
Firewood/CWD removal	1	R	Cut logs
Grazing (identify native/livestock			
Fire damage			
Storm damage			
Weediness			
Other			

400 m2 plot: Sheet 2 of 2		**Survey Name**	**Plot ID**	**Recorders**
Date	09/07/2025	42335.B13	42335.B13	Jjn rg

GF Code	Genus species	N,E or HTE	Cover	Abund	Stratum
TG	Acacia maidenii	N	2	20	Mid Storey
	Acetosella vulgaris	HTE	0.1	5	Ground
TG	Angophora floribunda	N	20	10	Canopy
	Axonopus fissifolius	HTE	30	4000	Ground
	Bidens pilosa	HTE	0.1	10	Ground
GG	Carex longebrachiata	N	0.1	10	Ground
	Cenchrus clandestinus	HTE	20	1000	Ground
	Conyza bonariensis	E	0.1	20	Ground
GG	Cymbopogon refractus	N	0.5	200	Ground
GG	Cynodon dactylon	N	25	3000	Ground
GG	Cyperus polystachyos	E	0.1	5	Ground
	Daucus carota	E	0.1	10	Ground
FG	Dianella caerulea var. caerulea	N	0.1	1	Ground
GG	Dichelachne micrantha	N	0.5	200	Ground
FG	Dichondra repens	N	0.1	100	Ground
GG	Echinopogon caespitosus var.	N	0.5	500	Ground
GG	Entolasia marginata	N	0.1	50	Ground
GG	Eragrostis leptostachya	N	0.1	50	Ground
TG	Eucalyptus tereticornis subsp.	N	5	10	Canopy
GG	Ficinia nodosa	N	0.1	1	Ground
OG	Glycine tabacina	N	0.1	1	Ground
FG	Hypericum gramineum	N	0.1	1	Ground
	Hypochaeris radicata	E	0.5	500	Ground
	Juncus cognatus	E	0.1	50	Ground
GG	Juncus pallidus	N	0.1	10	Ground
FG	Lobelia purpurascens	N	0.1	20	Ground
	Lysimachia arvensis	E	0.1	1	Ground
GG	Microlaena stipoides var.	N	20	1000	Ground
SG	Pittosporum undulatum	N	0.1	3	Mid Storey
	Plantago lanceolata	E	0.3	200	Ground
	Senecio madagascariensis	HTE	0.1	10	Ground
	Setaria pumila	E	0.1	50	Ground
	Sida rhombifolia	E	0.1	20	Ground
	Sporobolus africanus	E	1	500	Ground
GG	Sporobolus creber	N	0.1	50	Ground
	Trifolium repens	E	0.1	50	Ground

BAM Plot Data Sheet							Site Sheet no:1 of 2
		Survey Name		Veg Zone ID	Recorders		
Date	18/12/2025	Moruya BDAR		Other	RG, TOH		
Zone 56	Datum GDA94	Plot ID	42335.B14	Plot dimensions	50x20	Orientation of middle	72
Easting 236170	Northing 6020255	IBRA region	South East Corner	Photo #			
Plant Community Type						EEC: None	Confidence H

BAM Attribute (400m2 plot)		Sum values
Count of Native Richness	Trees	0
	Shrubs	0
	Grasses etc.	3
	Forbs	0
	Ferns	0
	Other	0
Sum of Cover of native vascular plans by growth form group	Trees	0
	Shrubs	0
	Grasses etc.	0.7
	Forbs	0
	Ferns	0
	Other	0
High Threat Weed cover		166.1

BAM Attribute (1000m2 plot)	
DBH	# Tree Stems Count
80+ cm	0
50 - 79 cm	0
30 - 49 cm	0
20 - 29cm	0
10 - 19 cm	0
5 - 9 cm	0
< 5 cm	0
Length of logs (m)	8
No. trees with hollows	0

BAM Attibute (1 x 1m plots)	Litter cover (%)				
Subplot score (% in each)	5	5	10	10	15
Average of the 5 subplots	9				

Notes	

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

Landform Pattern		Slope	Flat	Soil Surface Texture	Sandy clay
Soil Colour	Light brow	Site Drainage	Free	Distance to nearest water	

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

400 m2 plot: Sheet 2 of 2		**Survey Name**	**Plot ID**	**Recorders**
Date	18/12/2025	Moruya BDAR	42335.B14	RG, TOH

GF Code	Genus species	N,E or HTE	Cover	Abund	Stratum
	Cenchrus clandestinus	HTE	95	1000	Ground
GG	Cynodon dactylon	N	0.5	50	Ground
	Ehrharta erecta	HTE	1	300	Ground
	Holcus lanatus	E	0.5	100	Ground
GG	Juncus usitatus	N	0.1	10	Ground
	Lolium perenne	E	0.5	200	Ground
GG	Microlaena stipoides var.	N	0.1	10	Ground
	Pinus radiata	HTE	70	20	Canopy
	Rumex crispus	E	0.1	1	Ground
	Senecio madagascariensis	HTE	0.1	1	Ground
	Sida rhombifolia	E	0.5	30	Ground

BAM Plot Data Sheet							Site Sheet no:1 of 2
		Survey Name		Veg Zone ID	Recorders		
Date	18/12/2025	Moruya BDAR		Low	RG, TOH		
Zone 56	Datum GDA94	Plot ID	42335.B15	Plot dimensions	100x10	Orientation of middle	87
Easting 236216	Northing 6020275	IBRA region	South East Corner	Photo #			
Plant Community Type		4009				EEC: None	Confidence H

BAM Attribute (400m2 plot)		Sum values
Count of Native Richness	Trees	0
	Shrubs	0
	Grasses etc.	10
	Forbs	6
	Ferns	0
	Other	0
Sum of Cover of native vascular plans by growth form group	Trees	0
	Shrubs	0
	Grasses etc.	96.6
	Forbs	1.4
	Ferns	0
	Other	0
High Threat Weed cover		2.2

BAM Attribute (1000m2 plot)	# Tree Stems Count
DBH	
80+ cm	0
50 - 79 cm	0
30 - 49 cm	0
20 - 29cm	0
10 - 19 cm	0
5 - 9 cm	0
< 5 cm	0
Length of logs (m)	0
No. trees with hollows	0

BAM Attibute (1 x 1m plots)	Litter cover (%)				
Subplot score (% in each)	2	5	2	2	5
Average of the 5 subplots	3.2				

Notes	

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

Landform Pattern	Creekline	Slope	Swale	Soil Surface Texture	Sandy clay
Soil Colour	Brown	Site Drainage	poor	Distance to nearest water	

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

400 m2 plot: Sheet 2 of 2		**Survey Name**	**Plot ID**	**Recorders**
Date	18/12/2025	Moruya BDAR	42335.B15	RG, TOH

GF Code	Genus species	N,E or HTE	Cover	Abund	Stratum
FG	Alternanthera denticulata	N	0.1	10	Ground
GG	Anthosachne scabra	N	0.1	10	Ground
	Anthoxanthum odoratum	E	0.1	10	Ground
GG	Carex appressa	N	0.5	10	Ground
GG	Carex gaudichaudiana	N	50	800	Ground
GG	Carex longebrachiata	N	0.5	30	Ground
GG	Carex spp.	N	3	200	Ground
	Cenchrus clandestinus	HTE	1	100	Ground
	Cirsium vulgare	E	0.1	10	Ground
GG	Cynodon dactylon	N	0.5	200	Ground
	Daucus carota	E	0.5	200	
GG	Eleocharis acuta	N	0.5	200	Ground
FG	Geranium solanderi	N	0.1	1	Ground
	Holcus lanatus	E	0.5	200	Ground
	Hypochaeris radicata	E	0.1	30	Ground
	Juncus articulatus	HTE	0.1	30	Ground
GG	Juncus pallidus	N	1	30	Ground
	Lolium perenne	E	0.1	200	Ground
FG	Ludwigia peploides subsp.	N	0.1	200	Ground
FG	Lythrum hyssopifolia	N	0.1	10	Ground
	Modiola caroliniana	E	0.1	10	Ground
FG	Persicaria decipiens	N	0.5	200	Ground
	Plantago lanceolata	E	0.1	30	Ground
	Prunella vulgaris	E	0.1	30	Ground
FG	Ranunculus inundatus	N	0.5	400	Ground
	Romulea rosea var. australis	HTE	0.1	30	Ground
	Rubus fruticosus sp. agg.	HTE	1	100	Ground
	Rumex crispus	E	0.5	200	Ground
GG	Schoenoplectus validus	N	0.5	200	Ground
	Sonchus oleraceus	E	0.1	1	Ground
	Trifolium repens	E	0.1	30	Ground
GG	Typha domingensis	N	40	1000	Ground
	Verbena bonariensis	E	0.1	10	Ground

Appendix 4 Fauna

Below is a list of fauna species recorded from the subject land during the present assessment.

Fauna species in these tables are listed in alphabetical order within their taxonomic group.

Notes to table:

Status – EPBC Act: CE – Critically Endangered EN – Endangered VU – Vulnerable	**Status – BC Act:** E1 – endangered species (Part 1, Schedule 1) E2 – endangered population (Part 2, Schedule 1) E4 – presumed extinct (Part 4, Schedule 1) E4A – critically endangered V – vulnerable (Part 1, Schedule 2)
Status – FM Act: C1 – critically endangered E1 – endangered E2 – endangered E4 – presumed extinct V1 – vulnerable	**Status – Non-indigenous species** * pest species not native to the area

Table A 7 Fauna species recorded from the subject land

Common name	Scientific name	Commonwealth status	NSW status
Birds			
Australasian Grebe	*Tachybaptus novaehollandiae*		
Australian Magpie	*Cracticus tibicen*		
Australian Raven	*Corvus coronoides*		
Australian Wood Duck	*Chenonetta jubata*		
Chestnut Teal	*Anas castanea*		
Dusky Moorhen	*Gallinula tenebrosa*		
Eastern Rosella	*Platycercus eximius*		
Eurasian Coot	*Fulica atra*		
Galah	*Eolophus roseicapilla*		
Intermediate Egret	*Ardea intermedia*		
King Parrot	*Alisterus scapularis*		
Laughing Kookaburra	*Dacelo novaeguineae*		
Little Corella	*Cacatua sanguinea*		
Magpie-lark	*Grallina cyanoleuca*		
Masked Lapwing	*Vanellus miles*		

Common name	Scientific name	Commonwealth status	NSW status
Nankeen Kestrel	*Falco cenchroides*		
Pacific Black Duck	*Anas superciliosa*		
Rainbow Lorikeet	*Trichoglossus moluccanus*		
Red Wattlebird	*Anthochaera carunculata*		
Straw-necked Ibis	*Threskiornis spinicollis*		
Striated Pardalote	*Pardalotus striatus*		
Wedge-tailed Eagle	*Aquila audax*		
White-necked Heron	*Ardea pacifica*		
Willie Wagtail	*Microeca fascinans*		
Swamp Harrier	*Circus approximans*		
Mammals			
Common Brushtail Possum	*Trichosurus vulpecula*		
Eastern Grey Kangaroo	*Macropus giganteus*		
European Fox*	*Vulpes vulpes*		
Grey-headed Flying-fox	*Pteropus poliocephalus*	VU	VU
Frogs			
Common Eastern Froglet	*Crinia signifera*		
Eastern Dwarf Tree Frog	*Litoria fallax*		
Peron's Tree Frog	*Litoria peronii*		
Spotted Marsh Frog	*Limnodynastes tasmaniensis*		
Whistling Tree Frog	*Litoria verreauxii*		
Reptiles			
Eastern Snake-necked Turtle	*Chelodina longicollis*		
Fish			
Eastern Mosquitofish*	*Gambusia holbrooki*		
Southern Short-finned Eel	*Anguilla australis*		

Appendix 5 Significant Impact Criteria assessments

Appendix 5.1 Illawarra and south coast lowland forest and woodland ecological community

Distribution

Illawarra and south coast lowland forest and woodland ecological community is listed as critically endangered under the EPBC Act. This CEEC is distributed along the coastal plains and foothills below the escarpment between Wollongong and Moruya (Threatened Species Scientific Committee 2016).

Habitat requirements

This community occurs as a forest or woodland, with foliage cover of the main canopy greater than 10%. The canopy is typically dominated by Forest-Red Gum or Woollybutt with one or more of the following commonly present; Roughbarked Apple, Coast Grey Box, Thin-leaved Stringybark and White Stringybark. The understorey is commonly comprised of a sub-canopy of smaller trees including Black Wattle and Maiden's Wattle *Acacia maidenii*, with Swamp Oak *Casuarina glauca* also common at some locations, particularly near drainage lines, for example, at Bawley Point. Shrub species often present in the understorey include Hickory Wattle *Acacia falcata*, Coffee Bush *Breynia oblongifolia*, Prickly Beard Heath, and Yellow Tea Tree *Leptospermum polygalifolium*, with groundcover characterised by a dense cover of grasses, particularly Weeping Grass, Kangaroo Grass, and Drooping Sedge (Threatened Species Scientific Committee 2016).

Threats to this community include vegetation clearing and fragmentation, introduction of invasive species, grazing by feral animals, logging and timber removal, and climate change.

Survey observation

Illawarra and south coast lowland forest and woodland aligns with moderate condition PCT 4052, which consists of the linear strips of vegetation along the northern and eastern boundaries of the development site, consisting of a total of 1.78 hectares within the subject land. These patches are considered to satisfy the condition thresholds for 'moderate condition' in line with the Approved Conservation Guidelines for this community. The proposed work will result in the total loss of 0.04 ha and partial loss of 0.24 ha of moderate condition PCT 4052 consistent with Illawarra and south coast lowland forest CEEC. Although 0.24 ha of moderate condition PCT 4052 will only be subjected to partial loss rather than total loss, this will equate to total loss of this CEEC. To determine partial loss, it was estimated (as a worst-case scenario) that the canopy trees will remain and the native groundcover and mid-storey will be fully impacted within this area. This CEEC requires >30% perennial native groundcover, therefore the area of moderate condition PCT 4052 that has been assessed as partial loss will likely no longer be consistent with the condition thresholds of this CEEC. Therefore, the area of total removal of this CEEC has been calculated as 0.28 ha of moderate condition PCT 4052.

The proposal will impact on this CEEC, therefore an assessment of whether the proposed works are likely to lead to a significant impact on the CEEC is provided below.

Table A 8 SIC assessment for Illawarra and south coast lowland forest and woodland ecological community

SIC assessment for Illawarra and south coast lowland forest and woodland ecological community
Reduce the extent of an ecological community.
The extent of the EPBC Act listed Illawarra and south coast lowland forest and woodland within the subject land is 1.78 ha. Areas classified as Illawarra and south coast lowland forest and woodland within the subject land consists of patches of vegetation with an intact canopy and low-moderate level of weed ingress throughout the understorey. The vegetation to be removed as a result of the proposed works equates to 13.6 % of the Illawarra and south coast lowland forest recorded within the subject land and <0.01% of the community within the broader local area (of which there is approximately 302.99 ha mapped in the locality [assessment area]). While the proposed works will require the removal of approximately 0.28 ha of Illawarra and south coast lowland forest and woodland within the subject land, much of the vegetation to be removed is currently subject to a moderate level of disturbance from edge effects and weed ingress from historical clearing and grazing for agricultural practices. The amount of vegetation to be removed is considered small in relation to both vegetation to be retained within the study area and the broader locality. It is therefore unlikely that the proposed works for the seniors housing development will reduce the extent of the ecological community in the locality or as a whole.
Fragment or increase fragmentation of an ecological community.
Illawarra and south coast lowland forest and woodland within the subject land is currently highly fragmented and exists as thin strips of edge affected vegetation that borders the subject land. Clearing for agricultural and residential areas within the subject land and the overarching locality has resulted in fragmentation to remnant vegetation. Removal of 0.28 ha of vegetation surrounding the proposed seniors housing development will not create any new barrier to the movement of genetic material within this community, that do not already exist due to past land management. The CEEC along the eastern boundary is proposed to be impacted, which may reduce connectivity slightly between the CEEC located along the northern boundary and the vegetation to the south. However, this patch of CEEC is already highly edge effected due to the linear nature of the patch and presence of physical barriers including the road on the eastern side, the driveway road which cuts through the patch and the cleared pasture on the western side. Therefore, these impacts are unlikely to significantly fragment the CEEC more than it already is. The connectivity within the CEEC along the northern boundary will be retained, retaining connectivity outside the subject land to vegetation to the east and west.
Adversely affect habitat critical to the survival of an ecological community.
Areas that meet the minimum condition thresholds or are within the buffer zone are considered critical to the survival of Illawarra and south coast lowland forest and woodland. Additional areas such as adjoining native vegetation and areas that meet the description of the ecological community but not the condition thresholds are also considered important to the survival of the ecological community. In the case of the current assessment, all vegetation along the northern and eastern boundaries of the development site, as well as adjoining vegetation to the east and south, are considered critical habitat for Illawarra and south coast lowland forest and woodland, comprising a total of 1.78 ha in the subject land. As the proposed works will result in the removal of 0.28 ha of this community, the proposed works will impact on critical habitat for the community. However, vegetation to be removed predominantly consists of edge-effected vegetation subject to a moderate level of weed ingress, and the amount of vegetation to be removed equates to only 15.7% of the total area of habitat within the subject land, and <0.01% within the broader locality, which is not considered to be a significant amount in the context of the current extent of habitat critical to the community within the surrounding area. Thus, although removal of Illawarra and south coast lowland forest and woodland will occur within the subject land, it is unlikely to adversely affect the ecological community as a whole.

SIC assessment for Illawarra and south coast lowland forest and woodland ecological community
Modify or destroy abiotic factors necessary for an ecological community's survival, including reduction of groundwater levels, or substantial alteration of surface water drainage patterns.
Construction will result in localised disturbance to soil, hydrology and topography, through vegetation clearing and development of a proposed seniors housing development. However, the project is not expected to result in substantial alteration to surface water patterns or alterations of hydrological patterns to the two creeks that intersect the subject land, that would impact on Illawarra and south coast lowland forest and woodland, as mitigation measures would ensure that indirect impacts (such as sediment and nutrient transportation) would be controlled and would not impact remaining areas of Illawarra and south coast lowland forest and woodland. As such, the project is not expected to result in impacts that will modify or destroy abiotic factors necessary for the survival of the CEEC.
Cause a substantial change in the species composition of an occurrence of an ecological community, including a decline or loss of functionally important species, for example through regular burning or flora and fauna harvesting.
The occurrence of Illawarra and south coast lowland forest and woodland is defined as the narrow linear patches of the community that occur along the northern and eastern boundaries of the development site, with some minor breaks in connectivity due to roads. These patches are currently subject to edge effects along the entirety of the linear patch due to the cleared pastural land on the eastern and southern sides and the roads and easements to the north and east. The cleared areas adjacent to the community contain a high cover of introduced vegetation including priority weeds, which have encroached into the community. Land use impacts from past clearing and trampling have therefore reduced the community integrity, species richness and genetic exchange through fragmentation. Clearing required for the proposed works will include areas of moderate weed ingress and edge effected vegetation and is unlikely to further reduce species diversity and simplify community structure. The areas of the community within the broader area will remain in a similar condition and are unlikely to suffer substantial changes in species composition. In addition, mitigation measures outlined in the recommendations section of this report will be implemented during works to minimise the spread of weeds, along with a VMP for the two creeks within the development site.
Cause a substantial reduction in the quality or integrity of an occurrence of an ecological community, including but not limited to: - ***Assisting invasive species establishment*** ***- 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.***
All Illawarra and south coast lowland forest and woodland within the subject land is currently subject to a high level of weed ingress, erosion and chemical inputs as a result of surrounding land uses, including adjacent agricultural paddocks to the east and west and residential areas to the north and south. Therefore, the proposed works are not considered to increase weed or pest invasion, or cause mobilisation of fertilisers, herbicides or other chemicals within the CEEC. Construction activities can be managed through standard practices to avoid further sedimentation and pollution through application of the mitigation measures outlined within a CEMP. Additionally, a VMP for the two creeks will include weed management activities that will aid in preventing invasive species establishment. Therefore, the proposed works are unlikely to cause a substantial reduction in the quality or integrity of an occurrence of the CEEC.
Interfere with the recovery of an ecological community.
Illawarra and south coast lowland forest and woodland does not currently have an adopted or made recovery plan. However, the Commonwealth Conservation Advice for the community (Threatened Species Scientific Committee 2016) lists priority protection and restoration actions under section 5.2 to support the recovery of Illawarra and south coast lowland forest and woodland. Some of the priority protection and conservation actions significant to the proposed works are:

SIC assessment for Illawarra and south coast lowland forest and woodland ecological community

- Prevent further clearance, fragmentation or detrimental modification of remnants of the ecological community and of surrounding native vegetation, for example, during residential development. High conservation value, unmodified and older growth areas are particularly important for retention and management.
- Protect the native soil seed bank by minimising soil disturbance and removal.
- Prevent impacts to native vegetation, native fauna, hydrology or soil structure from any developments and activities adjacent to or near patches of the ecological community by planning for and appropriately mitigating off-site effects. For instance, apply buffer zones and avoid activities that could cause significant hydrological change or eutrophication.
- Detect and control weeds early to prevent major infestations. Small infestations should be a priority for removal.
- Prevent weed invasion by minimising soil disturbance.

Interference with the objectives of the Commonwealth conservation advice will be minimised by implementing management strategies and measures outlined in the recommendations section of this report, and ensuring any potential impacts are avoided if possible. The proposed works will result in minimal clearing of the community (0.28 ha) within the immediate locality, however vegetation to be removed is currently subject to a high level of disturbance. It is therefore unlikely that the proposed works will interfere with recovery actions for the community as a whole.

Conclusion.

Considering the above factors, it is unlikely that the proposed work will generate a significant impact on Illawarra and south coast lowland forest and woodland or their habitats as:

- The proposed works are unlikely to reduce the extent of the ecological community, given the areas to be cleared are minimal and most of this CEEC will be retained (74%) within the development site or not directly impacted (86%) within the subject land.
- The community within the subject land is currently exposed to weed invasion, disturbance and modification from past land clearing and surrounding land use, and physical barriers such as roads, and the proposed works are unlikely to further the extent of either fragmentation or modification of the community.
- The proposed works are unlikely to have an adverse effect on habitat critical to the survival of the community.
- The proposed works will not modify or destroy abiotic factors necessary for the survival of the community.

Based on the factors above, it is concluded that the proposed works are unlikely to lead to a significant impact on the Illawarra and south coast lowland forest and woodland. As such, referral to the Federal Minister for Environment and Water is not recommended.

Appendix 6 Koala SAT Survey Data

Table A 9 Koala SAT survey results

Tree Number	Scientific Name	Common Name	Scat Present? Y/N
SAT Site 1			
1	*Eucalyptus globoidea*	White Stringybark	N
2	*Eucalyptus tereticornis*	Forest Red Gum	N
3	*Angophora floribunda*	Rough-barked Apple	N
4	*Angophora floribunda*	Rough-barked Apple	N
5	*Eucalyptus tereticornis*	Forest Red Gum	N
6	*Eucalyptus tereticornis*	Forest Red Gum	N
7	*Angophora floribunda*	Rough-barked Apple	N
8	*Eucalyptus globoidea*	White Stringybark	N
9	*Eucalyptus tereticornis*	Forest Red Gum	N
10	*Angophora floribunda*	Rough-barked Apple	N
11	*Eucalyptus tereticornis*	Forest Red Gum	N
12	*Eucalyptus globoidea*	White Stringybark	N
13	*Angophora floribunda*	Rough-barked Apple	N
14	*Angophora floribunda*	Rough-barked Apple	N
15	*Angophora floribunda*	Rough-barked Apple	N
16	*Angophora floribunda*	Rough-barked Apple	N
17	*Eucalyptus tereticornis*	Forest Red Gum	N
18	*Angophora floribunda*	Rough-barked Apple	N
19	*Eucalyptus tereticornis*	Forest Red Gum	N
20	*Eucalyptus tereticornis*	Forest Red Gum	N
21	*Angophora floribunda*	Rough-barked Apple	N
22	*Angophora floribunda*	Rough-barked Apple	N
23	*Angophora floribunda*	Rough-barked Apple	N
24	*Eucalyptus globoidea*	White Stringybark	N
25	*Eucalyptus tereticornis*	Forest Red Gum	N
26	*Eucalyptus tereticornis*	Forest Red Gum	N
27	*Angophora floribunda*	Rough-barked Apple	N
28	*Angophora floribunda*	Rough-barked Apple	N
29	*Eucalyptus globoidea*	White Stringybark	N
30	*Angophora floribunda*	Rough-barked Apple	N

Tree Number	Scientific Name	Common Name	Scat Present? Y/N
31	*Eucalyptus tereticornis*	Forest Red Gum	N
SAT Site 2			
1	*Eucalyptus bosistoana*	Coast Grey Box	N
2	*Eucalyptus bosistoana*	Coast Grey Box	N
3	*Eucalyptus tereticornis*	Forest Red Gum	N
4	*Angophora floribunda*	Rough-barked Apple	N
5	*Angophora floribunda*	Rough-barked Apple	N
6	*Eucalyptus bosistoana*	Coast Grey Box	N
7	*Angophora floribunda*	Rough-barked Apple	N
8	*Angophora floribunda*	Rough-barked Apple	N
9	*Eucalyptus bosistoana*	Coast Grey Box	N
10	*Eucalyptus bosistoana*	Coast Grey Box	N
11	*Eucalyptus bosistoana*	Coast Grey Box	N
12	*Eucalyptus bosistoana*	Coast Grey Box	N
13	*Angophora floribunda*	Rough-barked Apple	N
14	*Eucalyptus bosistoana*	Coast Grey Box	N
15	*Eucalyptus tereticornis*	Forest Red Gum	N
16	*Angophora floribunda*	Rough-barked Apple	N
17	*Angophora floribunda*	Rough-barked Apple	N
18	*Angophora floribunda*	Rough-barked Apple	N
19	*Angophora floribunda*	Rough-barked Apple	N
20	*Angophora floribunda*	Rough-barked Apple	N
21	*Angophora floribunda*	Rough-barked Apple	N
22	*Angophora floribunda*	Rough-barked Apple	N
23	*Angophora floribunda*	Rough-barked Apple	N
24	*Eucalyptus tereticornis*	Forest Red Gum	N
25	*Angophora floribunda*	Rough-barked Apple	N
26	*Angophora floribunda*	Rough-barked Apple	N
27	*Angophora floribunda*	Rough-barked Apple	N
28	*Angophora floribunda*	Rough-barked Apple	N
29	*Eucalyptus tereticornis*	Forest Red Gum	N
30	*Angophora floribunda*	Rough-barked Apple	N
SAT Site 3			
1	*Eucalyptus longifolia*	Woollybutt	N
2	*Eucalyptus longifolia*	Woollybutt	N

Tree Number	Scientific Name	Common Name	Scat Present? Y/N
3	*Eucalyptus longifolia*	Woollybutt	N
4	*Eucalyptus tereticornis*	Forest Red Gum	N
5	*Eucalyptus tereticornis*	Forest Red Gum	N
6	*Eucalyptus tereticornis*	Forest Red Gum	N
7	*Eucalyptus tereticornis*	Forest Red Gum	N
8	*Eucalyptus longifolia*	Woollybutt	N
9	*Eucalyptus tereticornis*	Forest Red Gum	N
10	*Eucalyptus tereticornis*	Forest Red Gum	N
11	*Eucalyptus tereticornis*	Forest Red Gum	N
12	*Eucalyptus tereticornis*	Forest Red Gum	N
13	*Eucalyptus tereticornis*	Forest Red Gum	N
14	*Eucalyptus tereticornis*	Forest Red Gum	N
15	*Eucalyptus tereticornis*	Forest Red Gum	N
16	*Eucalyptus longifolia*	Woollybutt	N
17	*Eucalyptus longifolia*	Woollybutt	N
18	*Eucalyptus tereticornis*	Forest Red Gum	N
19	*Eucalyptus tereticornis*	Forest Red Gum	N
20	*Eucalyptus longifolia*	Woollybutt	N
21	*Eucalyptus tereticornis*	Forest Red Gum	N
22	*Eucalyptus tereticornis*	Forest Red Gum	N
23	*Eucalyptus tereticornis*	Forest Red Gum	N
24	*Eucalyptus tereticornis*	Forest Red Gum	N
25	*Eucalyptus tereticornis*	Forest Red Gum	N
26	*Eucalyptus tereticornis*	Forest Red Gum	N
27	*Eucalyptus tereticornis*	Forest Red Gum	N
28	*Eucalyptus tereticornis*	Forest Red Gum	N
29	*Eucalyptus tereticornis*	Forest Red Gum	N
30	*Eucalyptus tereticornis*	Forest Red Gum	N

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Photo 12 Koala SAT survey 1 – Focal tree

Photo 13 Koala SAT survey 2 – Focal tree

Photo 14 Koala SAT survey 3 – Focal tree

Appendix 7 Microbat assessment report

11 Spencer Street Moruya

Microbat assessment report

20 March 2026

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Introduction

1.1 Scope of assessment

The objective of this microbat assessment report is to establish with a high level of confidence, the likely presence of a species-credit bat species (or breeding habitat) at the study site: 11 Spencer Street, Moruya. Specifically, the aims are to:

- Describe the microbat fauna within the study area.
- Document in detail the methods used for survey, data collection and analysis.
- Identify potential roosting habitat for threatened microbats within the subject land and likely occupation by threatened microbats.
- Identify potential constraints and mitigation measures for the project in relation to threatened microbat species.

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2 Methods

2.1 Alignment with the Biodiversity Assessment Method

2.1.1 Threatened microbat species list

A list of predicted threatened microbat species expected to occur within the subject land was generated as per Section 5 of the New South Wales Biodiversity Assessment Method (BAM) (DPIE 2020).

Table 1 provides a list of candidate credit species considered in this assessment, each species' required survey period, and the relevant method of assessment.

Table 1 Candidate fauna species credit species

Species name	Common name	Type	Survey period	Method of assessment
Myotis macropus	Southern Myotis	Breeding or foraging habitat	October-March	Acoustic detection Roost searches

Bat species allocated to the ecosystem credit class, that do not require targeted survey include:

- Eastern False Pipistrelle *Falsistrellus tasmaniensis*
- Eastern Coastal Free-tailed Bat *Micronomus norfolkensis*
- Eastern Bent-winged Bat *Miniopterus orianae oceanensis* (Foraging habitat only)
- Golden-tipped Bat *Phoniscus papuensis*
- Yellow-bellied Sheathtail-bat *Saccolaimus flaviventris*
- Greater Broad-nosed Bat *Scoteanax rueppellii*

2.1.2 Survey method and effort summary

Four Wildlife Acoustics SM4BAT full spectrum (FS) ultrasonic bat detectors were deployed at four sites within the study area on 12 January 2026 (Table 3). Detectors were fitted with omnidirectional microphones and set to record from dusk until dawn using default settings for trigger, sensitivity, sampling rate and minimum/maximum frequency. Each time a bat flying past a detector calls it is recorded as a digital file (defined here as a 'pass') that is saved directly onto a memory card in the detector unit. Units were set on trigger mode to record at night. Files were recorded in full spectrum format (.wav) and viewed using Anabat Insight analysis software.

Files not containing bat calls ('noise') were filtered out using a standard "allbats" filter in Anabat Insight. These were labelled as 'trash' and not included in further analysis. A call (pass) was defined as a sequence of five or more consecutive pulses of similar frequency and shape. Passes containing less than five pulses were also removed from the analysis ('not enough pulses') and not included as valid bat calls for activity analysis. A custom decision tree was used to group calls into frequency bands based on characteristic frequency (Fc) for species identification and activity analysis. "Noise" files and "not enough pulses" files were only reviewed where there was minimal data recorded from a site and unit functioning was being checked or additional checks were in place to find any expected species not recorded.

Calls were identified by visually comparing the spectrogram and call characteristics (e.g., characteristic frequency and call shape) with reference calls and descriptions from available reference materials (Reinhold et al. 2001, Pennay et al. 2004).

The purpose of call analysis was to generate a list of species present, with a focus on threatened species. Once a species was positively identified, it was recorded as present. Species identification was not attempted for all files recorded. Where a threatened species was not recorded through the decision tree, additional checks were used to improve confidence that a false negative was not recorded including target frequency filters and manual review.

2.1.3 Justification of survey method and effort

The survey was undertaken with reference to the following guidelines:

- *'Species credit' threatened bats and their habitats: NSW survey guide for the Biodiversity Assessment Method* (DPIE 2021).
- *Survey guidelines for Australia's threatened bats* (DEWHA 2010).

Habitat assessment and call analysis was undertaken by experienced staff.

The content of this report aligns with the minimum standards for the interpretation and reporting of bat call data described by the Australasian Bat Society (2025). Examples of acoustic recordings for each species identified from the survey are provided in Appendix 1.

2.1.4 Timing of survey

Bat detectors were deployed in January, in line with the requirements of the BAM guidelines (DPIE 2020).

2.1.5 Weather details during survey

Weather observations for each ultrasonic survey date are shown in Table 2. The survey was conducted during summer, when bat activity is likely to be high, to maximise the chance of detection of threatened species and in accordance with survey periods described in the BAM.

Table 2 Weather during the targeted microbat survey (Moruya, NSW)

Survey undertaken	Survey night	Temperature (°C)		Rain (mm)
		Min.	Max.	
Ultrasonic survey	12/1/2026	12.7	22.9	45.0
Ultrasonic survey	13/1/2026	16.9	25.3	0
Ultrasonic survey	14/1/2026	19.3	24.5	0
Ultrasonic survey	15/1/2026	17.0	24.0	63.0
Ultrasonic survey	16/1/2026	16.9	21.8	0

Information from the Australia Government Bureau of Meteorology website.

Details of surveys undertaken as part of the current assessment are provided below.

2.1.6 Limitations and assumptions

Ultrasonic sampling is associated with a number of limitations. Detectability of bats relates to the intensity of their calls, their flight characteristics and the structure of the surrounding vegetation, all of which influence the distance over which a bat can be detected. Differences in the probability of detection may result in reduced likelihood of recording and therefore positively identifying some species as present within a site.

Variability in detected bat calls tends to be very high, with night-to-night differences due to minor changes in weather conditions and bat behaviour (Law et al. 2015). A recorded call constitutes a measure of bat presence, but does not reflect species abundance. The number of calls provides a comparable index of bat activity of individual species between sampling nights and sampling sites.

Manual call analysis has limitations, including the arbitrary selection of useable calls and subjectivity of the observer. Definitions as to which calls are assigned to each species have been provided to improve the consistency at which calls were attributed to a species.

2.2 Habitat assessment

2.2.1 Roost searches

For the purposes of the BAM (DPIE 2020), breeding habitat is specific habitat features that are used, or presumed likely to be used, by threatened bat species as maternity sites. Maternity sites are locations where female bats give birth and form nursery colonies. Breeding habitat is considered present if there is:

- Potential breeding habitat, and;
- Breeding individuals of the target species on the subject land (at least one female bat of the target species that is pregnant, carrying pups or lactating, or a juvenile bat of the target species that is present or has been previously recorded on the subject land).

A habitat assessment was undertaken to determine whether suitable microbat roosting habitat was likely to be present at the site including both natural features (hollows, caves, karst, etc.) or man-made features (buildings, culverts, etc.). This assessment specifically considered Southern Myotis (Table 1).

Table 3 Detector deployment details

Unit number	Unit type	Date deployed	Number of detector nights	Deployment location	Image
09121	SM4BAT (FS)	12/01/2026	2	Mounted to a tree trunk, northwest of site.	
09099	SM4BAT (FS)	12/01/2026	4	Mounted to a tree trunk, northeast of site.	
09098	SM4BAT (FS)	12/01/2026	4	Mounted to a tree trunk, east of site near large waterbody.	
09096	SM4BAT (FS)	12/01/2026	4	South of site near waterway.	No image

Unit number	Unit type	Date deployed	Number of detector nights	Deployment location	Image
Total			**14**		

2.3 Call identification

Data was viewed using Anabat Insight (version 2.1.6 licensed), Titley Scientific. Species identification was first refined by using known species geographic distributions (AusBats 2025) to generate a list of species with potential to occur at the site. Species identification was guided by the probability of occurrence at the site based on distribution, database records obtained from NSW BioNet and known habitat values at each detector point and across the site more broadly. Call identification is further detailed in Section **Error! R eference source not found.**.

Due to variability in the quality of calls and difficulty in distinguishing some species a conservative approach was taken when analysing calls and assigning an identification. The identification of each call was assigned a confidence rating (Duffy et al. 2000) as summarized in Table 4.

Table 4 Call identification confidence ratings

Identification	Description
C – Almost certain	Diagnostic call characteristics present, consistent with descriptions in reference material and/or reference calls.
PR – Probable	Highly likely the call represents nominated species, but call lacks enough detail (e.g. call quality) to be definite or similarities with other species of similar call type or frequency limits identification certainty and/or there is a limited number of sequences to be confident in species presence.
SG – Species Group	Call characteristics (e.g., frequency, shape) are indicative of a number of species and call lacks sufficient detail (e.g. call quality, diagnostic features) that would allow identification to species level.
X – Not Detected	Of the data analysed, no calls were attributable to this species.

2.4 Reference library

No reference calls were collected during the survey. Call identification was assisted by the following resources:

- *Bat calls of NSW* (Pennay et al. 2004) including sample call files downloaded from https://www.environment.nsw.gov.au/topics/animals-and-plants/surveys-monitoring-and-records/bat-calls-of-nsw.
- *Key to the bat calls of south-east Queensland and north-east New South Wales* (Reinhold et al. 2001).
- *The ecology of the east-coast free-tailed bat (*Mormopterus norfolkensis*) in the Hunter region* (McConville 2013).
- Unpublished course materials from the Advanced Bat Call Analysis Workshop (May 2023, October 2025) – Titley Scientific and Balance! Environmental (Greg Ford and Julie Broken-Brow). Attended by Felicity Williams.
- Unpublished course materials from the Advanced Bat Call Analysis Workshop (March 2025) – Titley Scientific and Balance! Environmental (Greg Ford and Julie Broken-Brow). Attended by Emma Heath.

Species nomenclature used in this report follows BioNet (NSW DCCEEW) unless otherwise stated.

2.5 Qualifications

Call analysis was undertaken by Felicity Williams. Felicity has over eight years' experience using ultrasonic call detection and analysis for impact assessments on microbats in both Victoria and NSW, representing more than 60 projects and hundreds of thousands of calls reviewed and identified.

Felicity has completed the following ultrasonic call recording and analysis training courses:

- Advanced Bat Call Analysis Workshop (October 2025) – Titley Scientific and Balance! Environmental (Greg Ford and Julie Broken-Brow).
- Advanced Bat Call Analysis Workshop (May 2023) – Titley Scientific and Balance! Environmental (Greg Ford and Julie Broken-Brow).
- Anabat Insight Advanced Skills Workshop (March 2022) – Titley Scientific (Kristen Thompson).
- Micro-workshop: Deployment Techniques for Bat Detectors (March 2022) – Titley Scientific.
- Micro-workshop: Basics of Bat Calls (February 2022) – Titley Scientific.
- Bats of Gluepot Reserve (2011) – Survey techniques and identification (Terry Reardon, Dennis Matthews).
- Anabat system training course (December 2010) – Titley Scientific (Chris Corben).

2.6 Quality assurance

Examples of positive identifications (almost certain or probable) are presented in Appendix 1.

3 Results

3.1 Habitat assessment

Roosting habitat is present in the form of hollow-bearing trees. No natural cave or cave-like features present such as rocky outcrops or sandstone crevices. There is one residential dwelling and three culverts within the subject land. The residential dwelling is in good condition, with minimal access points available for microbats to access, including cracks, crevices or other openings (the chimney is covered).

The three culverts were assessed and found to be unsuitable for roosting due to flooding, and the absence of suitable cracks or crevices.

No evidence of bat scats / guano or urine staining were observed at either the dwelling or the culverts, and no audible sounds of bat calls 'squeaking' were heard.

The structures are considered unlikely to provide suitable roosting or breeding habitat for threatened microbats.

3.2 Passive acoustic detection

3.2.1 Data collection

A total of 39,695 files were recorded by the 4 detectors over 11 detector nights. Of these, 29,049 files (73.2%) were discarded by the allbats filter and not used for further analysis. In addition, 3,007 files contained less than five pulses and were not manually reviewed. There was a significant proportion of trash files recorded, likely a result of insect activity and rain or wind creating false triggers on the units. Given the site is in a highly urbanised location, false triggers due to unidentified noise is expected.

A total of 203 non-bat files were removed, resulting in a total of 7,370 bat calls from the recording period. A total of 2,147 (29% of valid bat call files) were manually reviewed.

3.2.2 Species identification

Twelve species were positively identified (Almost Certain or Probable) of the 18 species that are known to occur within 20 kilometres of the study area (AusBats 2025). Up to three additional species may have been recorded, however reliable identification to species level was not possible due to the similarity of call characteristics between species. Three species known or predicted to occur in the locality were not detected in the survey.

Table 5 provides a list of all species known or predicted to occur in the study area, their conservation status, and confirmation of identification following call analysis.

Table 5 Bat call analysis species identification

Species name	Common name	EPBC Act status*	BC Act status*	Identification*
Austronomus australis	White-striped Free-tailed Bat	-	-	C
Chalinolobus gouldii	Gould's Wattled Bat	-	-	C

Species name	Common name	EPBC Act status*	BC Act status*	Identification*
Chalinolobus morio	Chocolate Wattled Bat	-	-	C
Falsistrellus tasmaniensis	Eastern False Pipistrelle	-	V	C
Micronomus norfolkensis	Eastern Coastal Free-tailed Bat	-	V	C
Miniopterus orianae oceanensis	Eastern Bent-winged Bat	-	V	C
Myotis macropus	Southern Myotis	-	V	SG
Nyctophilus geoffroyi	Lesser Long-eared Bat	-	-	SG
Nyctophilus gouldi	Gould's Long-eared Bat	-	-	SG
Ozimops ridei	Ride's Free-tailed Bat	-	-	C
Phoniscus papuensis	Golden-tipped Bat	-	V	X
Rhinolophus megaphyllus	Eastern Horseshoe Bat	-	-	X
Saccolaimus flaviventris	Yellow-bellied Sheathtail-bat	-	V	X
Scoteanax rueppellii	Greater Broad-nosed Bat	-	V	C
Scotorepens orion	South-eastern Broad-nosed Bat	-	-	PR
Vespadelus darlingtoni	Large Forest Bat	-	-	C
Vespadelus regulus	Southern Forest Bat	-	-	PR
Vespadelus vulturnus	Little Forest Bat	-	-	C

* V – vulnerable; C – confirmed; SG – species group ; X – not recorder ; PR - Probable.

3.2.3 Bat activity

Bat activity was relatively high at the site with mean activity of 527 passes per detector night (Table 6). Unit 09099 recorded the highest activity with 1,017 calls recorded 14 January. The lowest was 59 calls on 09096 15 January. The earliest calls were recorded from 8:40 PM, with local sunset time of 8:19 PM.

Table 6 Bat call activity

Detector ID	Maximum bat activity (bat passes per night)	Average bat activity (mean bat passes per night)
S4U09096	761	125.5
S4U09098	813	600.75
S4U09099	1017	742
S4U09121	807	752.5

Large (Eastern) Bent-winged Bat was identified from only a small number of sequences, well after dusk. Given the low activity of this species over the 14 detector nights, it is unlikely to be roosting within the site, and is most likely to be foraging or commuting through the area.

Southern Myotis calls are difficult to separate from Long-eared Bats (*Nyctophilus spp.*). There was a relatively high number of calls in this species group present. Combined with the presence of potential habitat for Southern Myotis, it is assumed that some of these calls may represent calls for that species.

3.2.4 Threatened species

Threatened species identified to species level (probable or almost certain) included:

- Eastern Coastal Free-tailed Bat *Micronomus norfolkensis* (Vulnerable, BC Act).
- Large (Eastern) Bent-winged Bat *Miniopterus orianae oceanensis* (Vulnerable, BC Act).
- Eastern False Pipistrelle *Falsistrellus tasmaniensis* (Vulnerable, BC Act).
- Greater Broad-nosed Bat *Scoteanax rueppellii* (Vulnerable, BC Act).

Southern Myotis (Vulnerable, BC Act) was recorded as part of a species group. Calls for these species are difficult to separate from the common Long-eared Bats (*Nyctophilus spp.*) and in the absence of diagnostic features, calls cannot be confirmed to species level. Given that there is suitable foraging and roosting habitat present at the site (hollow-bearing trees, the farm dam and waterways), as well as possible calls, Southern Myotis should be assumed present unless further active survey is undertaken to rule it out (such as thermal camera survey or harp trapping).

3.3 Alignment with the BAM

3.3.1 Ecosystem credit species

The following ecosystem credit species were confirmed present (almost certain or probable identification) or assumed present (identified as part of a species group) in and/or adjacent to the subject land:

- Eastern Coastal Free-tailed Bat *Micronomus norfolkensis* (Vulnerable, BC Act).
- Large (Eastern) Bent-winged Bat *Miniopterus orianae oceanensis* (Vulnerable, BC Act) – foraging habitat.
- Eastern False Pipistrelle *Falsistrellus tasmaniensis* (Vulnerable, BC Act).
- Greater Broad-nosed Bat *Scoteanax rueppellii* (Vulnerable, BC Act).

3.3.2 Species credit species

Table 7 provides a summary of the survey and results for species-credit microbat surveys.

Table 7 Summary of species-credit threatened microbat survey method and results

Species name	Common name	Survey required	Survey method	Survey results	Species Polygon (ha) or count
Myotis macropus	Southern Myotis	Yes	Acoustic detection	Recorded (assumed present)	Refer to Biodiversity Development Assessment Report (BDAR)

3.3.3 Matters of National Environmental Significance

There are no microbats considered Matters of National Environmental Significance (MNES) relevant to the proposed development.

4 Conclusion and recommendations

The following threatened species were confirmed present (almost certain or probable identification) or assumed present (identified as part of a species group) in and/or adjacent to the subject land:

- Eastern False Pipistrelle *Falsistrellus tasmaniensis*
- Eastern Coastal Free-tailed Bat *Micronomus norfolkensis*
- Large (Eastern) Bent-winged Bat *Miniopterus orianae oceanensis*
- Greater Broad-nosed Bat *Scoteanax rueppellii*
- Southern Myotis *Myotis macropus*

Of these, Southern Myotis is the only species-credit species under the BAM. Details regarding impacts to threatened species are detailed in the BDAR.

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Appendices

Appendix 1 Example time versus frequency graphs for species identification

All time versus frequency graphs are shown in F7 (10 milliseconds), compressed mode, unless otherwise stated. Sequences are shown in both full spectrum and zero crossing formats, on a scale of 10–90 kilohertz. The oscillogram is also shown above each sequence to indicate amplitude.

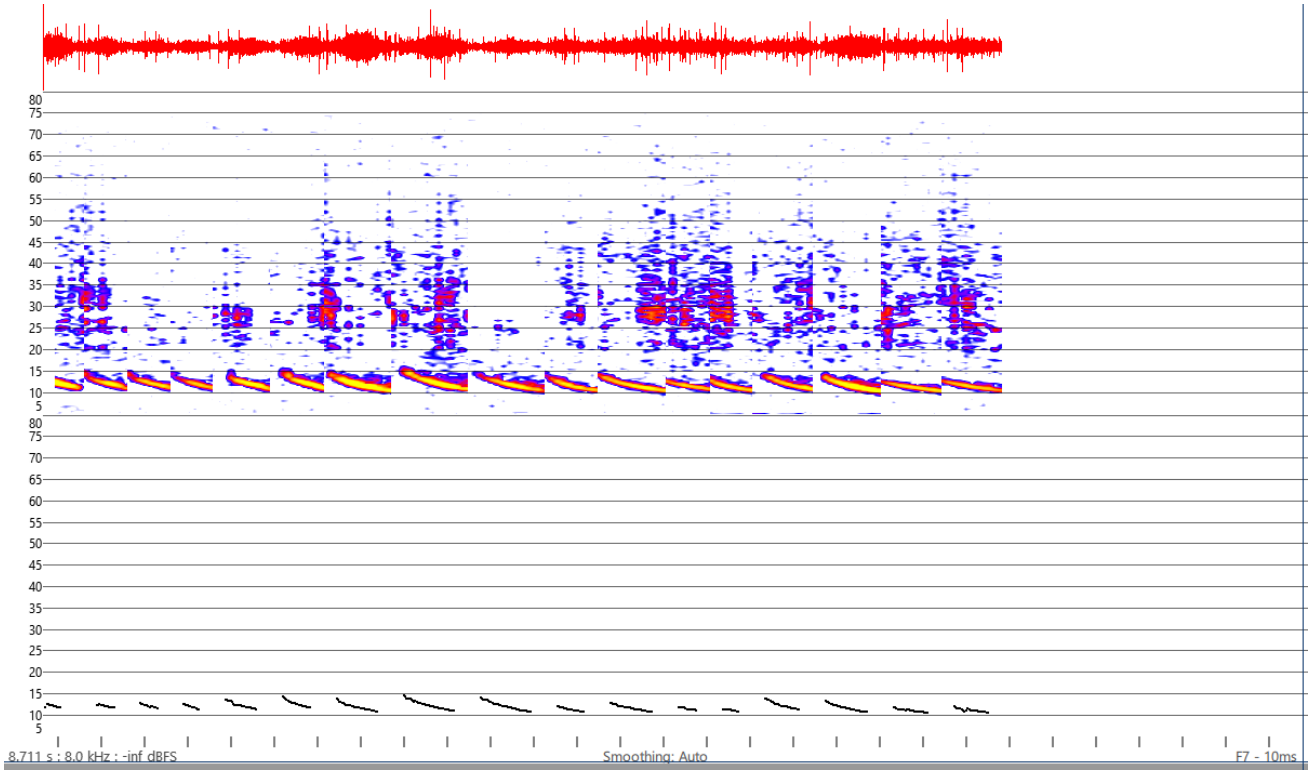

Plate 1 **White-striped Free-tailed Bat *Austronomus australis***

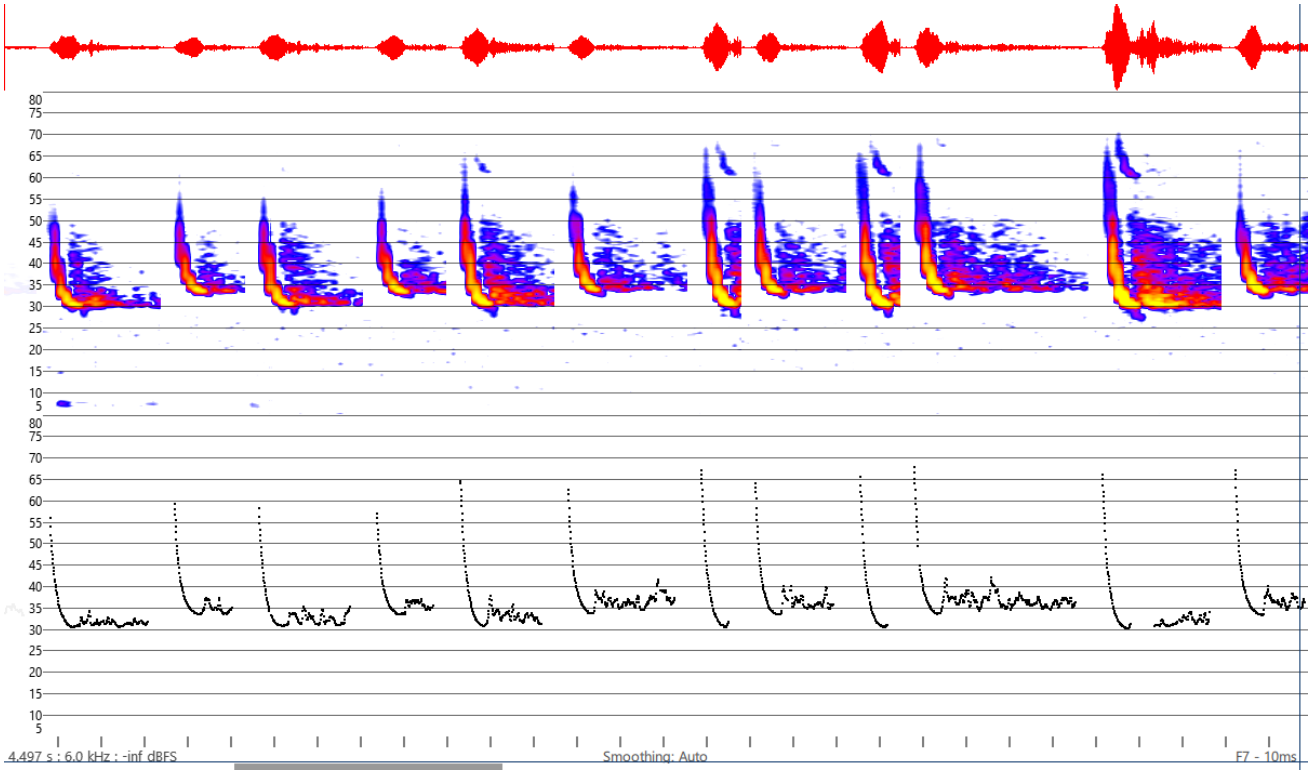

Plate 2 **Gould's Wattled Bat *Chalinolobus gouldii***

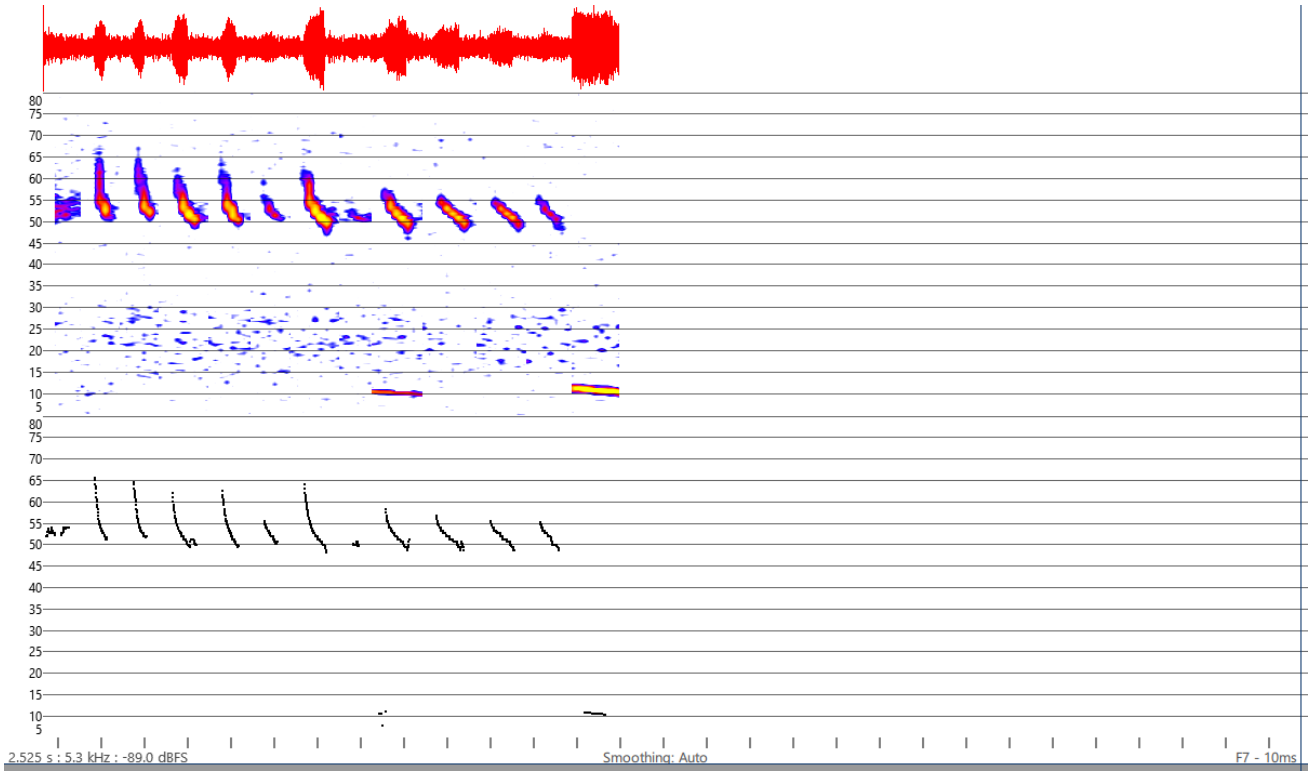

Plate 3 **Chocolate Wattled Bat *Chalinolobus morio***

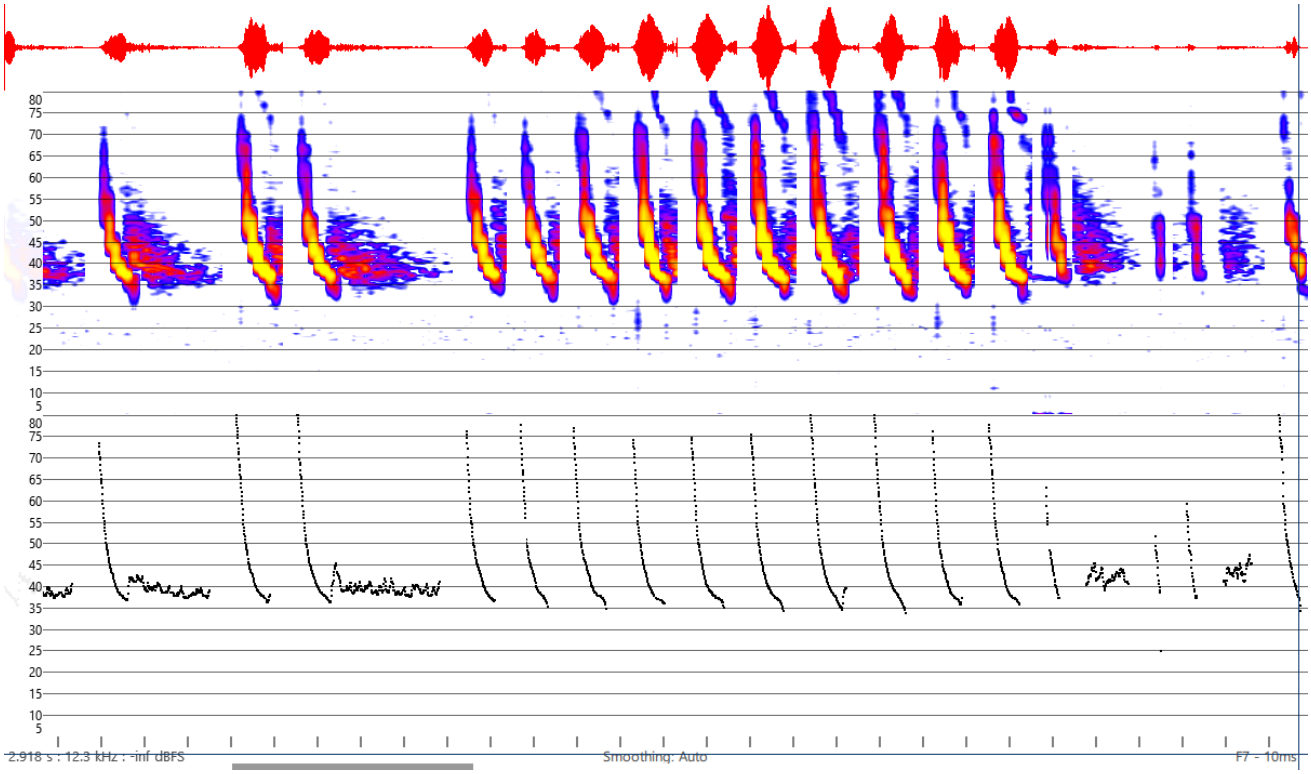

Plate 4 **Eastern False Pipistrelle *Falsistrellus tasmaniensis***

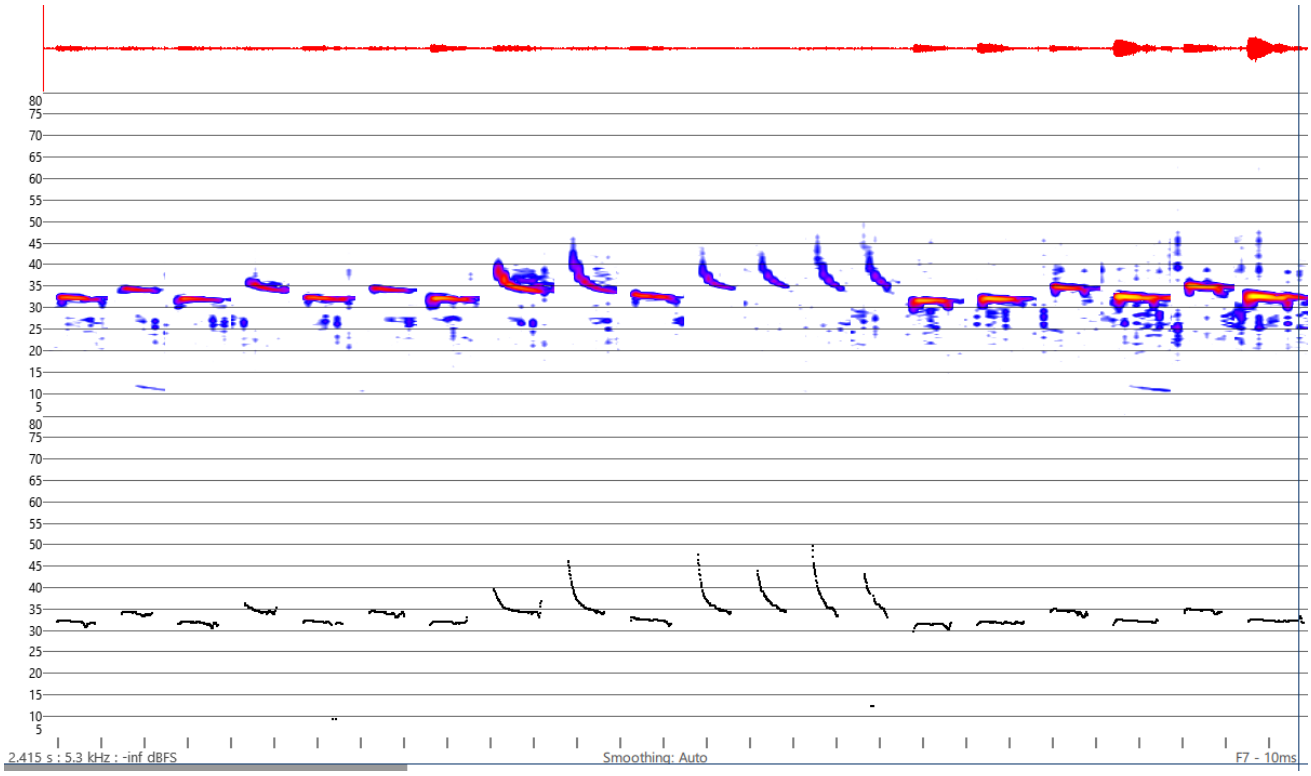

Plate 5 **Eastern Coastal Free-tailed Bat *Micronomus norfolkensis***

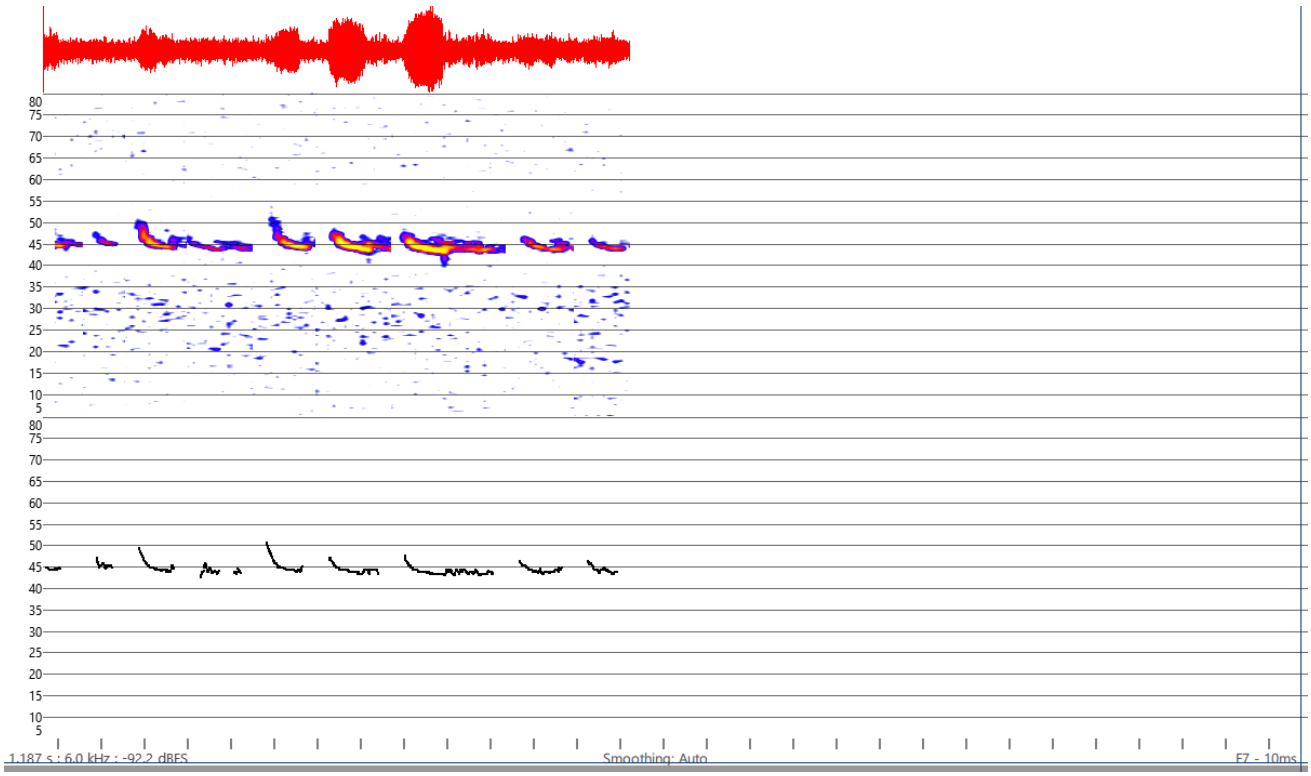

Plate 6 **Eastern Bent-winged Bat *Miniopterus orianae oceanensis***

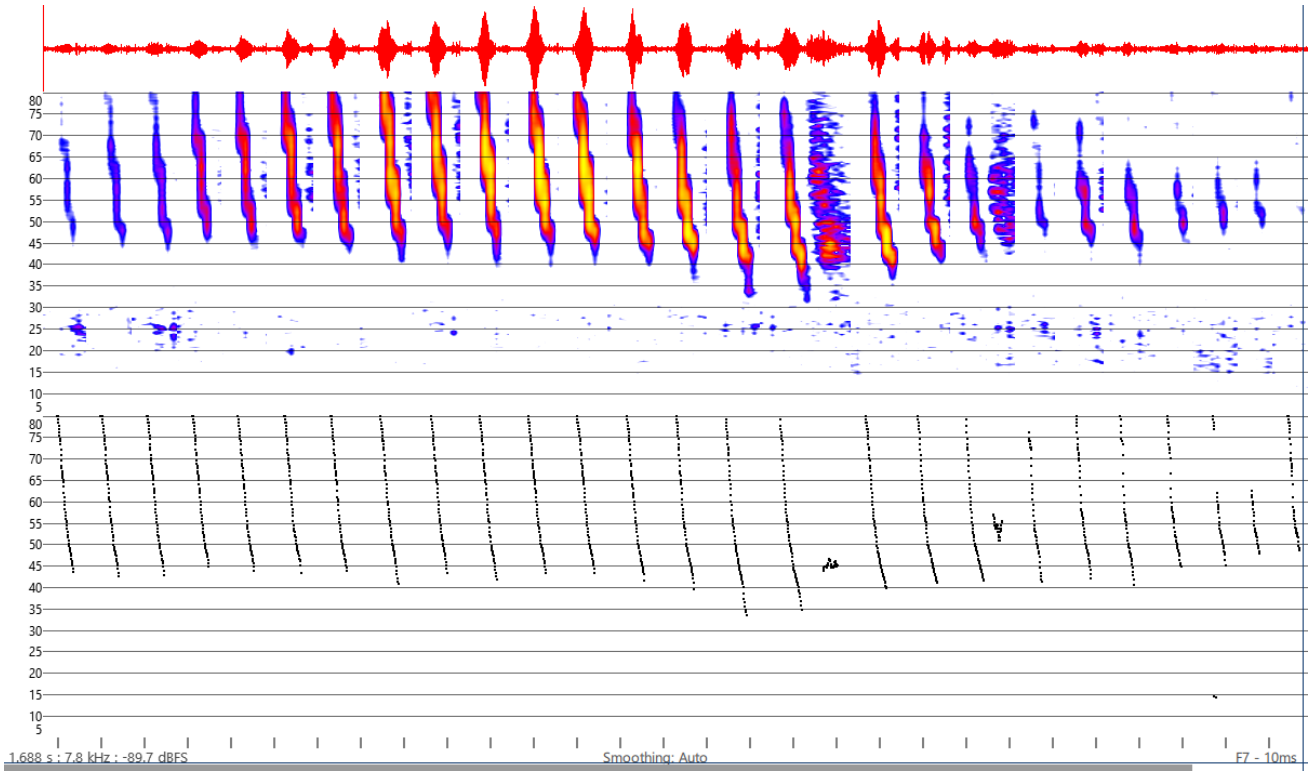

Plate 7 **Southern Myotis *Myotis macropus* and *Nyctophilus* spp. species group**

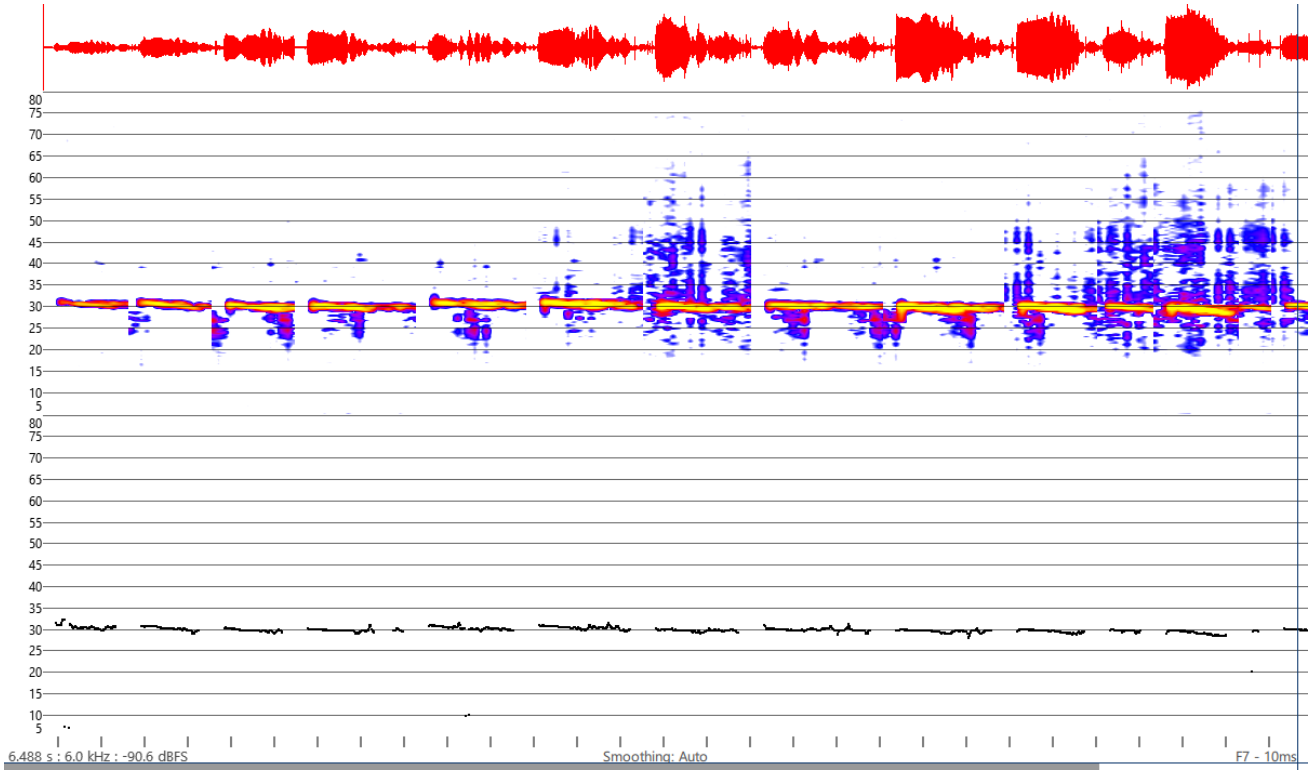

Plate 8 **Ride's Free-tailed Bat *Ozimops ridei***

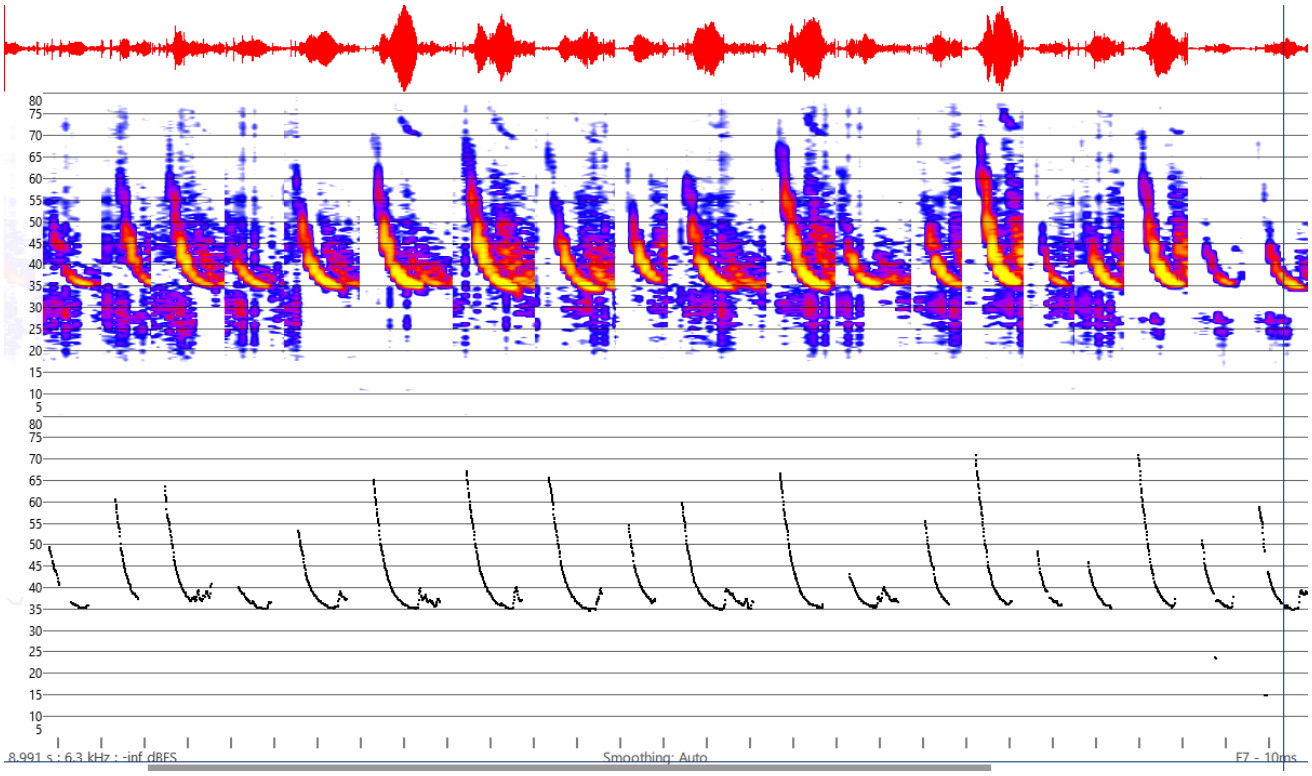

Plate 9 **Eastern Broad-nosed Bat *Scotorepens orion***

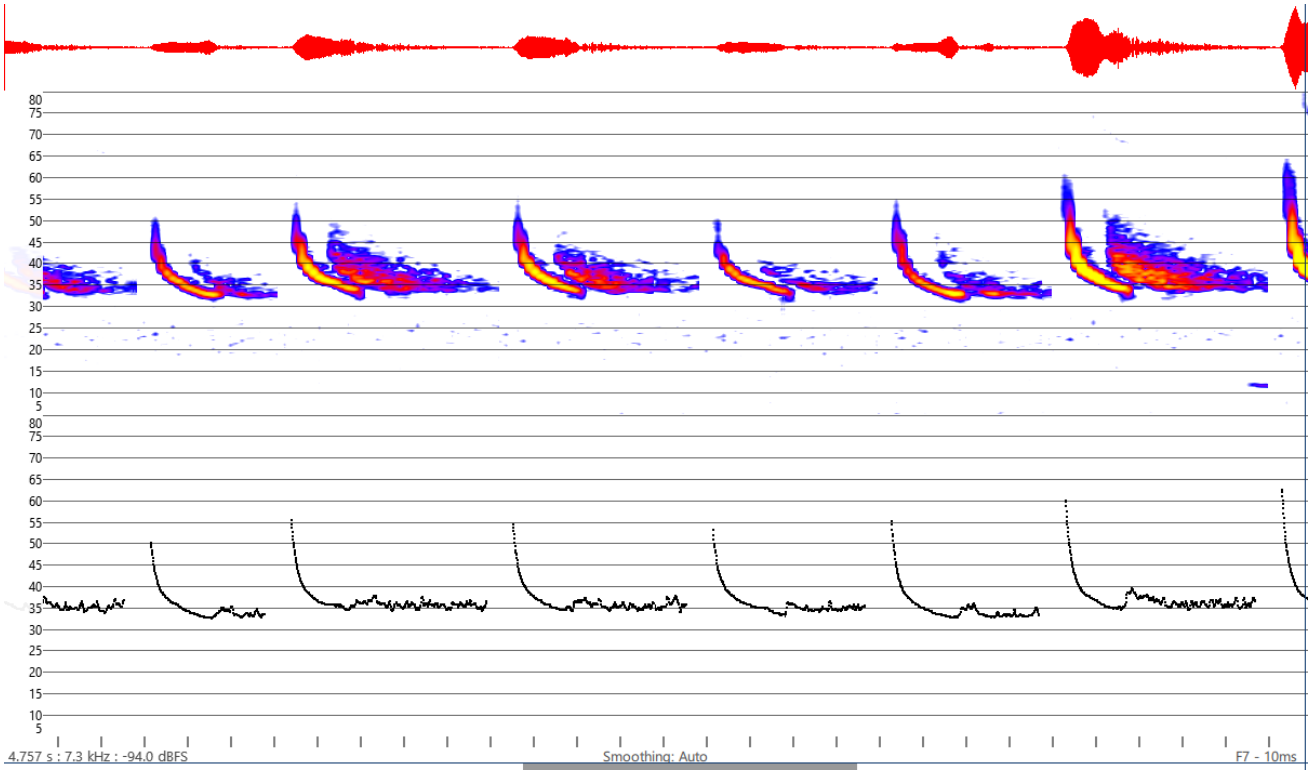

Plate 10 **Greater Broad-nosed Bat *Scoteanax rueppellii***

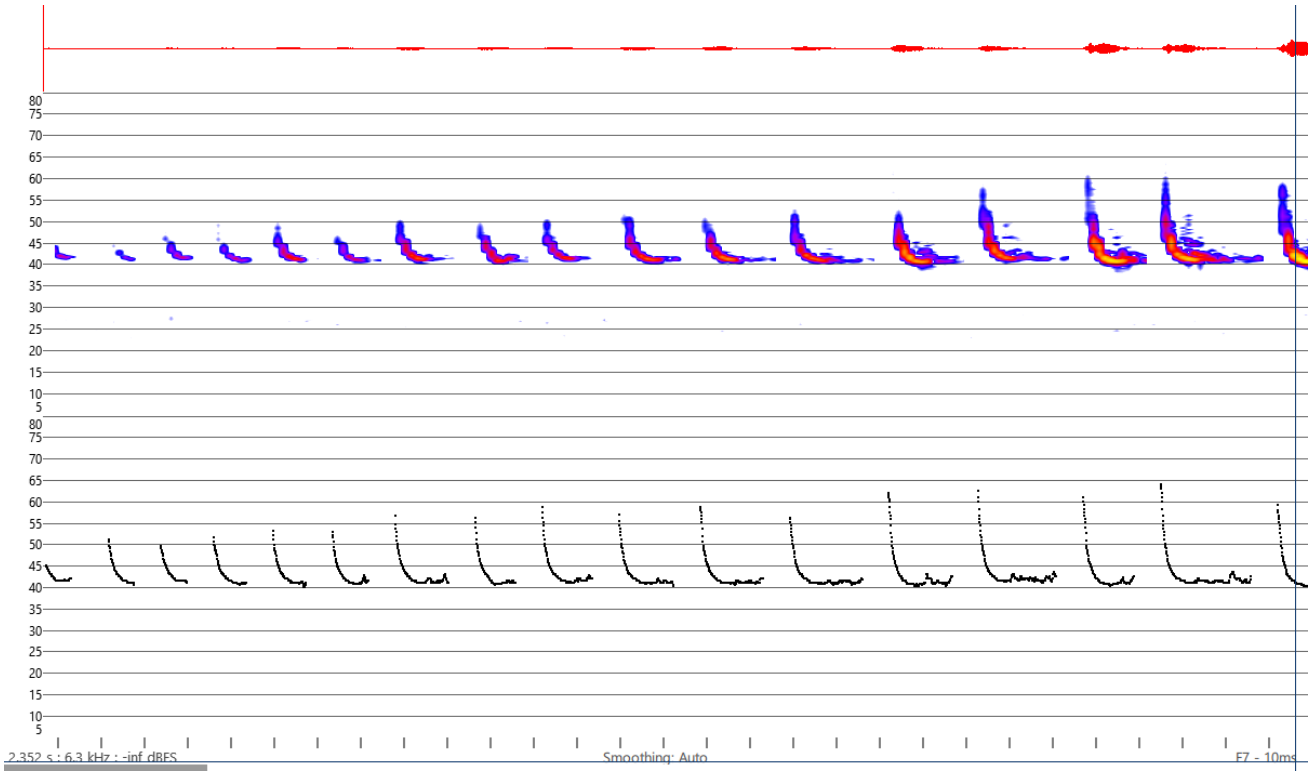

Plate 11 **Large Forest Bat *Vespadelus darlingtoni***

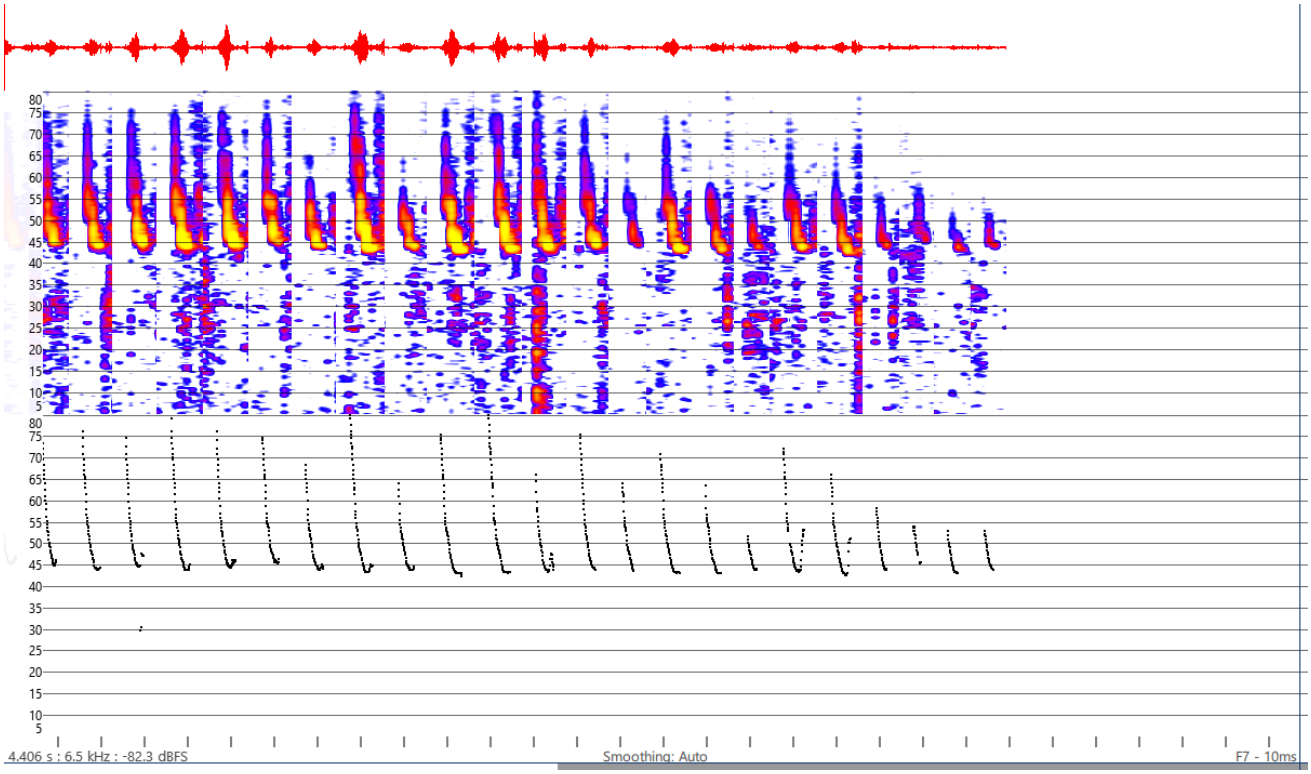

Plate 12 **Southern Forest Bat *Vespadelus regulus***

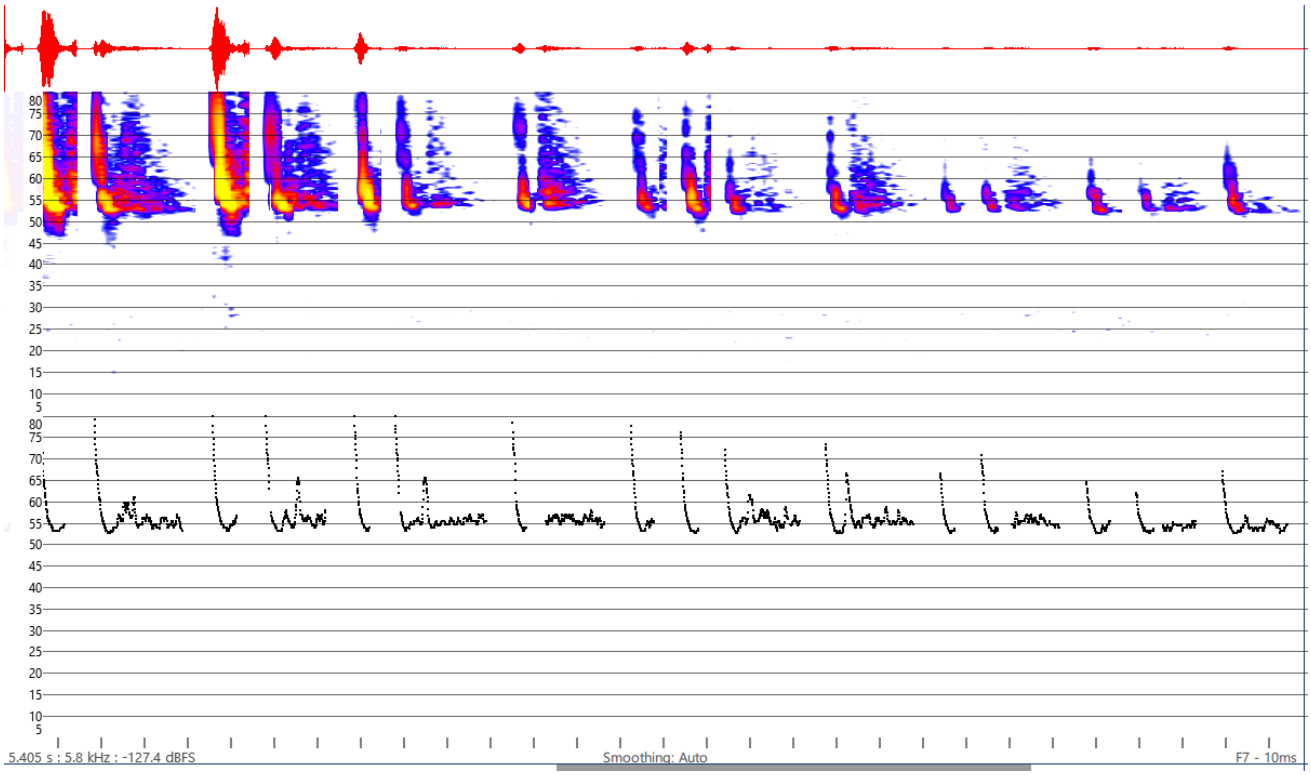

Plate 13 **Little Forest Bat *Vespadelus vulturnus***

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