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Biodiversity Development Assessment Report



Lakewood Drive, Merimbula, NSW (Lot 602 // DP 1277714)

Proposed Seniors Housing Development

Prepared for: HDC Planning

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Glossary and abbreviations

Acronym	Description
APZ	Asset Protection Zone
AOO	Area Of Occupancy
BAM	Biodiversity Assessment Method
BC Act	NSW <i>Biodiversity Conservation Act 2016</i>
BDAR	Biodiversity Development Assessment Report
BOS	Biodiversity Offset Scheme
BVM	Biodiversity Values Map
CEMP	Construction Environmental Management Plan
DA	Development Application
DAWE	NSW Department of Agriculture, Water and the Environment (formerly DEWHA)
DPE	NSW Department of Planning and Environment
EES	NSW Environment, Energy and Science Group (formerly OEH)
EPBC	Commonwealth <i>Environment Protection and Biodiversity Conservation Act 1999</i>
EOO	Extent Of Occurrence
HBT	Hollow bearing tree
IBRA	Interim Biogeographic Regionalisation of Australia
LGA	Local Government Area
OEH	NSW Office of Environment and Heritage (now EES)
PCT	Plant Community Type
SAII	Serious and Irreversible Impacts
TEC	Threatened Ecological Community
TSSC	Commonwealth Threatened Species Scientific Committee
VI	Vegetation Integrity
VIS	Vegetation Information System
VRZ	Vegetated Riparian Zone



1 Introduction

1.1 Background

This Biodiversity Development Assessment Report (BDAR) has been prepared to accompany a Development Application (DA) relating to a proposed Seniors Living housing development and enabling infrastructure on a vacant lot (Lot 602 // DP 1277714), Lakewood Drive, Merimbula NSW. This BDAR has been prepared by Ed Cooper, an Accredited Person (BAAS18047) to apply the Biodiversity Assessment Method (BAM) under the NSW *Biodiversity Conservation Act 2016* (BC Act).

The BDAR has been prepared following the BAM 2020 and all credit calculations have been undertaken using the BAM Calculator (BAMC) in case number 00034981/BAAS18047/22/00034982.

1.2 Biodiversity Offset Scheme Triggers

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

- Exceeding the native vegetation clearing threshold (based on minimum lot size).
- Direct impacts to land included in the Biodiversity Values Map.
- Significant impact on threatened species, ecological communities (or their habitat).
- Impacts to an Area of Outstanding Biodiversity Value.

Bega Valley Local Environmental Plan (BVLEP) (2013) is the relevant Environmental Planning Instrument applying to the subject land, which provides the minimum lot size of 1000 m², for majority of the lot, and a minimum lot size of 10 ha for the northern portion of the lot. As such, the BOS entry trigger is clearing 0.25 ha of native vegetation. The proposed residential subdivision will directly impact 2.20 ha (i.e., >0.25 ha) of native vegetation, therefore entry to the NSW BOS is triggered. Additionally, part of the proposal and required Asset Protection Zone (APZ) would impact an area mapped on the Biodiversity Values Map (BVM) (DPE 2022a), therefore regardless of the area clearing threshold, this would trigger entry to the BOS.

1.3 Location and site context

The BAM defines the land to which the BDAR applies as the **subject land** which includes areas proposed to be directly and indirectly impacted. For the purposes of this BDAR, the subject land includes 2.27 ha of land as mapped in **Figure 1.1** and **Figure 1.2**. It is noted that the subject land does not include the full extent of Lot 602 // DP 1277714 (the 'study area') (3.08 ha) on which the development is proposed. A 0.21 ha area of the lot is located across Lakewood Drive, south east of the subject land, and a 0.60 ha area, on the northern boundary of the study area, will not be impacted by the proposed development.

The subject land is within the Bega Valley Local Government Area (LGA) and is zoned R3 – Medium Density Residential and C3 – Environmental Management. It is bordered by Lakewood Drive to the south, residential lots to the east and west, and C3 zoned land to the north. The subject land is predominantly dominated by native vegetation in a disturbed condition, including Open Derived Native Grasslands (ODNG), shrubs and trees species consistent with the native Plant Community Types (PCTs) present.

1.4 Proposed development

The proposed development includes the development of a Seniors Living housing development, pool, lawn bowling green, parking spaces, access roads and associated infrastructure. The development will require the removal of native vegetation, landscaping and earthworks (levelling through cut and fill). The subject land includes a bushfire Asset Protection Zone (APZ), north of the development, the APZ will require a discontinuous canopy, scrubbing/maintenance to comply with associated bushfire requirements. To the west, within the adjoining lot, cleared grassland areas will require regular maintenance as part of the APZ. **(Figure 1.3).**

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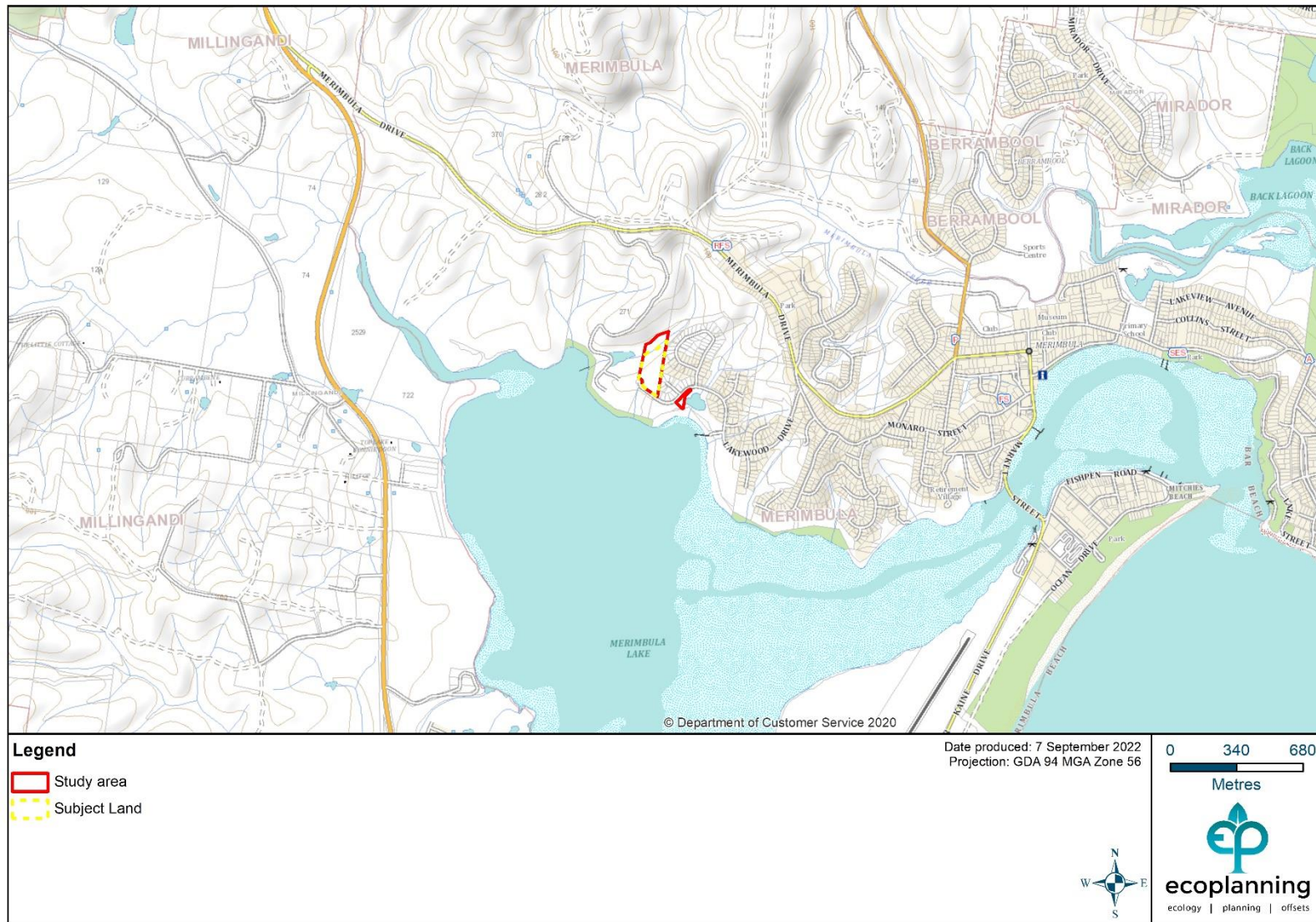


Figure 1.1: Locations of study area and subject land



Figure 1.2: Site map, including land mapped on the BVM (DPE 2022).



Figure 1.3: Proposed development footprint and impact areas

2 Landscape context

2.1 Identifying landscape features

The landscape feature assessment for the subject land has been conducted in accordance with Section 3.1 of the BAM. Landscape features provide a general description of the subject land in relation to its topographic and hydrological setting, geology and soils. The site-based method was applied for this assessment; therefore, the assessment area is the 1,500 m buffer surrounding the outside edge of the boundary of the subject land. Landscape features for the subject land and the 1,500m assessment buffer are described below and shown in **Figure 2.1**.

2.1.1 IBRA regions and subregions

IBRA regions represent a landscape-based approach to classifying the land surface, including attributes of climate, geomorphology, landform, lithology, and characteristic flora and fauna species present. The subject land is located entirely within the **South East Coastal Ranges** IBRA subregion (version 7.0) and within the **NSW South East Corner** IBRA region (version 7.0), DoEE 2012. These attributes were entered into the BAM calculator.

2.1.2 NSW landscape regions (Mitchell Landscapes)

The subject land and the majority of the 1,500m assessment buffer is located within the **Nadgee Coastal Ranges** landscape (Mitchell Landscapes v3.1; DECC 2016).

The Nadgee Coastal Ranges landscape is characterised by Coastal ranges and hills on middle Devonian sandstone, quartzite, conglomerate and siltstone, and Ordovician sandstone, quartzite and phyllite with some granite. It has a general elevation of 0 to 550 m. It consists predominantly of thin stony soils on ridges, deeper red-yellow texture-contrast profiles on Ordovician rocks. It typically contains forest of Silvertop Ash (*Eucalyptus sieberi*), Mountain Grey Gum (*Eucalyptus cypellocarpa*), Gully Gum (*Eucalyptus smithii*), White Ash (*Eucalyptus fraxinoides*), Messmate (*Eucalyptus obliqua*), Prickly Stringybark (*Eucalyptus considiniana*) and Red Bloodwood (*Corymbia gummifera*). Gullies with this landscape usually contain cool temperate and sub-tropical rainforest species such as Eastern Leatherwood (*Eucryphia moorei*), Prickly Tree-fern (*Cyathea leichardtiana*), Bolwarra (*Eupomatia laurina*), Lilly Pilly (*Acmena smithii*) and Sweet Pittosporum (*Pittosporum undulatum*). Open coastal headland heaths on shallow stony soil of Bushy Needlewood (*Hakea sericea*), Giant Honey-myrtle (*Melaleuca armillaris*), Coast Rosemary (*Westringia fruticosa*) and Dwarfed Red Bloodwood on shallow soils subject to high salt spray input and frequent fire. Wet Button Grass (*Gymnoschoenus sphaerocephalus*) swamps on high peaks (DECC 2002).

2.1.3 Other features

Rivers, streams and estuaries

The study area contains one unnamed 1st order stream located on the northern portion of the study area, outside the subject land. The 1st order stream traverses the study area and flows in a south western direction, joining Boggy Creek, a 4th order stream, approximately 400 m downstream. The 1st order stream within the study area is not greater than 2 m wide.

Local and important wetlands

No local or important wetlands are present within the subject land, however, within the 1,500 m assessment circle, there are areas mapped as 'Coastal Wetlands', 'Proximity Area for Coastal Wetlands', 'Coastal Use Area Map' and 'Coastal Environmental Area Map' under Chapter 2 – Coastal Management of the Resilience and Hazards State Environmental Planning Policy (SEPP) (2021). The subject land is entirely mapped under the 'Coastal Environmental Area Map', with a 0.93 ha area within the southern portion of the subject land mapped under the 'Coastal Use Area Map' of Chapter 2 of the Resilience and Hazards SEPP (2021) (**Figure 2.2**).

Habitat connectivity

The subject land does not form part of any recognised biodiversity corridor, flyway, or habitat connectivity feature. However, the subject land is mapped as High Environmental Value (HEV) lands in South East and Tablelands by DPE (2017), as part of the Southeast and Tablelands Regional Plan Corridors mapping. Criteria for mapping HEV lands include:

- Existing conservation areas including National Parks, Crown and State Forest reserves,
- Threatened ecological communities, key habitats and important vegetation areas,
- Sites of geological significance,
- Important wetlands, coastal lakes and estuaries

Vegetation within the study area is well connected towards the north, where native vegetation is connected to Bournda Nature Reserve and Bournda National Park. The Princess Highway interrupts this vegetation from connecting to Yurammie State Conservation Area to further to the west, these areas are part of the recognised South East and Tablelands Corridors (DPE 2017). South of the subject land vegetation connectivity is patchy but clear grass lands connect to small patches of vegetation surrounding the northern portion of Merimbula Lake, where Boggy Creek flows into.

Areas of geological significance and soil hazard features

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

Areas of outstanding biodiversity value, biodiversity values map and the BAM important areas map

The subject land does not contain any Areas of Outstanding Biodiversity Value. However, part of the northern boundary of the subject land is mapped as 'Threatened species or communities with potential for serious and irreversible impacts (SAIL)' under the BVM (DPE 2022a). The same area on the northern boundary of the subject land is mapped under the BAM – Important areas Map (DPE 2022) as Swift Parrot (*Lathamus discolor*) Important Areas. Swift Parrot is an SAIL candidate entity therefore it is inferred that the reason for inclusion of this land on the BV Map is on the basis that it contains modelled important habitat for Swift Parrot.

2.2 Determining site context

2.2.1 Assessing native vegetation cover

In accordance with Section 3.2 and Section 4.3.2 of the BAM, native vegetation cover must be assessed for a 1,500 m assessment buffer around the subject land to assess the habitat

suitability for threatened species. The extent of native vegetation on the subject land and immediate surrounds was mapped using Tozer et. al (2010) with edits made to the layer to improve linework and where obvious changes to vegetation extent had occurred (**Figure 2.1**).

The total area of the 1,500 m buffer around the subject land is 866 ha, this includes a 229 ha area of ocean (26% of the entire 1,500 m buffer), the area of native vegetation mapped within the buffer is 413 ha. This is a native vegetation cover of 48% (>30-70% class as defined in the BAM) and this value was entered into the BAM calculator.

2.2.2 Assessing patch size

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

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

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

In assessing patch size, stands of native vegetation within 100 m of other areas of native vegetation, but which are separated by hard barriers (permanent artificial structures, wide roads, etc.) have been treated as separate patches. These highly modified breaks in vegetation connectivity would significantly alter ecological function of these areas of native vegetation such that these areas warrant recognition as separate patches.

Patch size is required to be assessed as one of four classes per vegetation zone mapped, being <5 ha, 5-<25 ha, 25-100 ha, or ≥100 ha. Patch size was calculated for the vegetation within the subject land using the field validated map and native vegetation mapped within the 1,500 m buffer based on the mapping of Tozer et. al (2010).

The patch size for all vegetation zones within the subject land was assigned to the >100 ha class. Thus, a patch size of 101 ha was entered into the BAM Calculator for vegetation zones.

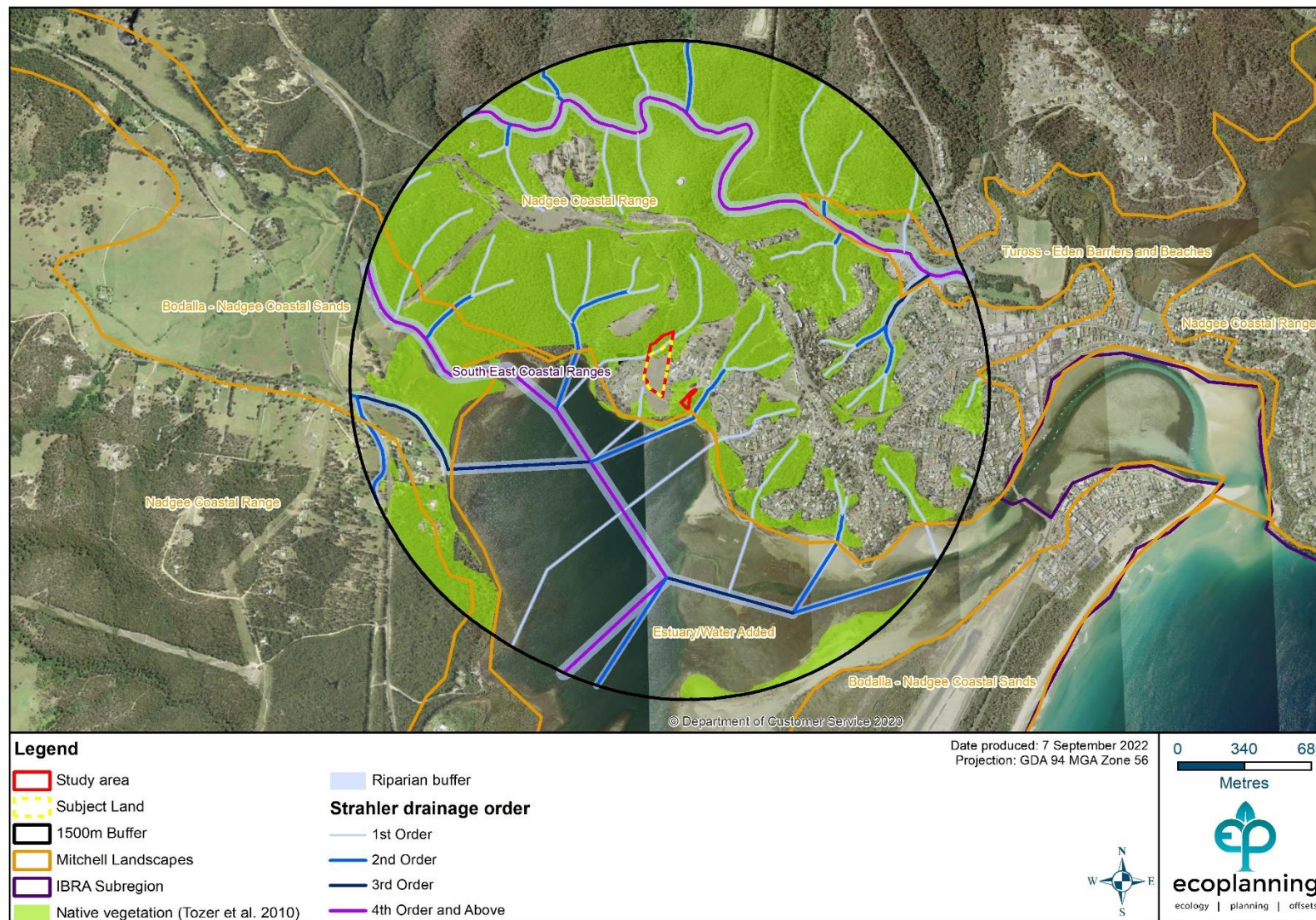


Figure 2.1: Location map.

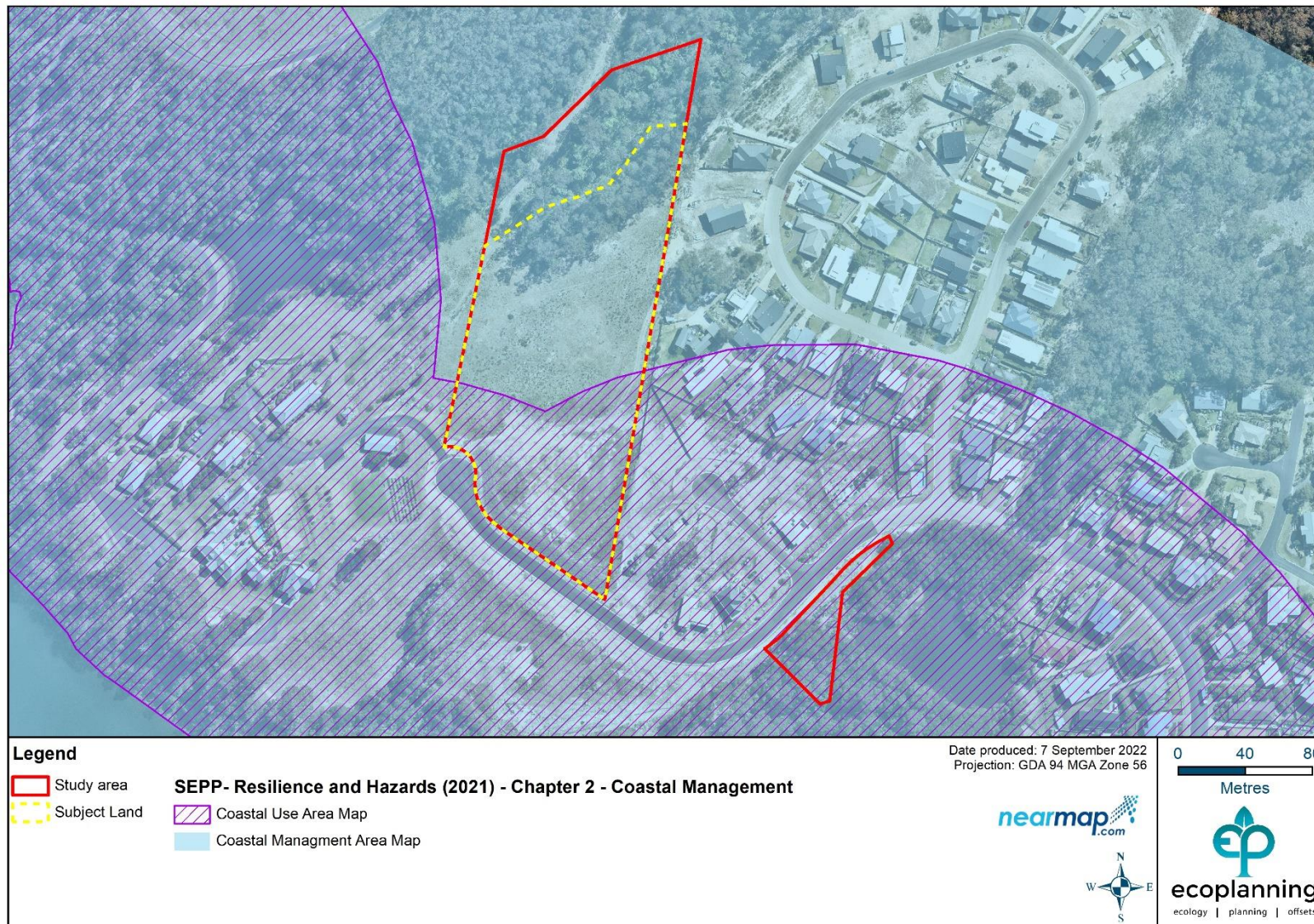


Figure 2.2: Areas identified in the SEPP Resilience and Hazards (2021) – Chapter 2 – Coastal Management in relation to the subject land

3 Native vegetation

3.1 Regional vegetation mapping

Existing information relevant to the native vegetation of the subject land and the 1,500 m assessment circle has been reviewed. Vegetation mapping by Tozer et. al (2010) *Southeast NSW Native Vegetation Classification and Mapping (SCIVI), 2010 VIS_ID 2230* identified four native vegetation communities within the subject land, namely Southeast Lowland Dry Shrub Forest, South Coast River Flat Forest, Southeast Hinterland Wet Shrub Forest, and Far South Coastal Foothills Dry Shrub Forest (**Figure 3.1**). However, within the study area, vegetation mapping by Tozer et. al (2010) identified one other native vegetation community, namely Coastal Foreddune Scrub.

Only one of the vegetation communities mapped by Tozer et. al (2010) within the subject land form part of a threatened ecological communities (TEC) listed under the BC act and EPBC Act (**Table 3.1**).

Table 3.1: Relationship between vegetation communities, PCTs and TECs.

Vegetation community	Plant Community Type (PCT)	BC Act	EPBC Act
Southeast Hinterland Wet Shrub Forest (Tozer et al. 2010)	Yellow Stringybark - Mountain Grey Gum moist shrubby open forest on coastal ranges, southern South East Corner Bioregion (PCT 1337)		
South Coast River Flat Forest (Tozer et al. 2010)	River Peppermint - Rough-barked Apple - River Oak herb/grass riparian forest of coastal lowlands, southern Sydney Basin Bioregion and South East Corner Bioregion (PCT 1108)	EEC - River-Flat Eucalypt Forest on Coastal Floodplains of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions	CEEC - River-flat eucalypt forest on coastal floodplains of southern New South Wales and eastern Victoria
Southeast Lowland Dry Shrub Forest (Tozer et al. 2010)	Red Bloodwood - Silvertop Ash - White Stringybark heathy open forest on coastal foothills, southern South East Corner Bioregion (PCT 1084)	-	-
Far South Coastal Foothills Dry Shrub Forest (Tozer et al. 2010)	Ironbark - Woollybutt - White Stringybark open forest on coastal hills, South East Corner Bioregion (PCT 891)	-	-
Coastal Foreddune Scrub (Tozer et al. 2010)	Coast Banksia – Coast Wattle dune scrub of the Sydney Basin Bioregion and South East Corner Bioregion (PCT 772)	-	-

3.2 Native vegetation extent and field assessment

Assessment and mapping of native vegetation into PCTs was based upon the validation and extent of the vegetation communities mapped by Tozer et. al (2010). Field survey was undertaken between 14 April 2022 by James Schlunke (Principal Botanist/Ecologist) and Edwin Vaca (Field Ecologist). Areas of vegetation were traversed whilst recording the vegetation structure and dominant species within each structural layer. The field surveys were conducted to identify the extent of native vegetation, validate PCT boundaries and map the

extent of vegetation zones (variation in the broad condition state of vegetation polygons) in accordance with the BAM.

A total of 2.20 ha of the 2.27 ha subject land was identified as supporting native vegetation. A 0.07 ha area within the southern portion of the subject land did not support vegetation, this area was identified as bare ground (~3% of the subject land). Areas that are not native vegetation do not require further assessment, except where they represent habitat for threatened species. The area of bare ground was found in a degraded condition with little to no vegetation remaining, therefore plot data in accordance with the BAM (2020) was not collected for this vegetation zone. This is discussed further in **Section 3.3.2**.

Three vegetation integrity plots (VI Plots) were conducted as part of the field surveys to inform the presence of one PCT, representing two vegetation zones (**Table 3.2**). Effort was made to place VI plots in locations that avoided ecotones and edges of vegetation zones; however, given the small size of some vegetation zones and linear nature of some of the vegetation present within the subject land, this was unavoidable.

The PCTs validated with the subject land PCT 777 – *Coast Grey Box - Mountain Grey Gum - stringybark moist shrubby open forest in coastal gullies, southern South East Corner Bioregion* does not correspond to a TEC. Further details are provided in **Section 3.4**.

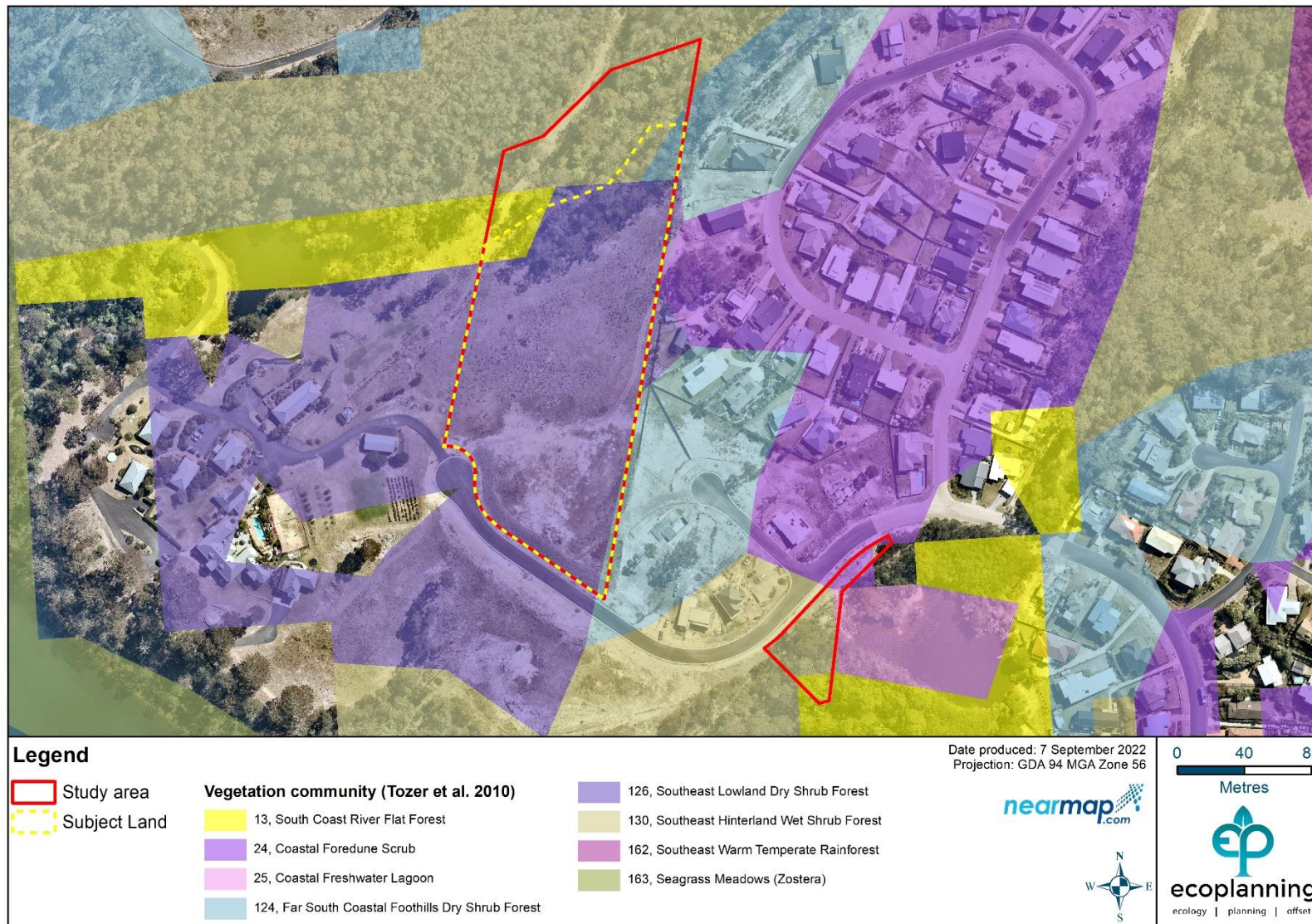


Figure 3.1: Regional vegetation community mapping (Tozer et al. 2010)

3.3 Plant Community Type selection and descriptions

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

In determining the PCT for the subject land, various attributes were considered in combination to assign vegetation to the best fit PCT. Attributes included (but not limited to) consideration of dominant species in each stratum and relative abundance, community composition, previous vegetation mapping, soils and landscape position. Reference was made to the PCT descriptions in the NSW Vegetation Information Sydney (VIS) Classification Database (DPE 2022b) and the final scientific determinations for assignment of TECs.

Based on the attributes considered above, one PCT (and two vegetation zones) was identified and mapped within the subject land:

- *PCT 777 – Coast Grey Box - Mountain Grey Gum - stringybark moist shrubby open forest in coastal gullies, southern South East Corner Bioregion, in two condition classes (Modified and Open Derived Grassland (ODNG)).*

PCT 777 does not represent a TEC listed under the BC Act and EPBC Act.

Table 3.2: Details of vegetation communities recorded within the subject land.

Veg. Zone	Plant Community Types (PCTs)	Vegetation formation and class	Condition class	BC Act	EPBC Act	Area in subject land
1	<i>PCT 777 – Coast Grey Box - Mountain Grey Gum - stringybark moist shrubby open forest in coastal gullies, southern South East Corner Bioregion</i>	Wet Sclerophyll Forest (Grassy sub-formation) and Southern Lowland Wet Sclerophyll Forest	ODNG	-	-	1.88
2	<i>PCT 777 – Coast Grey Box - Mountain Grey Gum - stringybark moist shrubby open forest in coastal gullies, southern South East Corner Bioregion</i>	Wet Sclerophyll Forest (Grassy sub-formation) and Southern Lowland Wet Sclerophyll Forest	Modified	-	-	0.32
Total (native vegetation)						2.20
-	-	-	Bare ground	-	-	0.07

3.3.1 PCT 777 – Coast Grey Box – stringybark moist shrubby open forest in coastal gullies, southern South East Corner Bioregion

Table 3.3: PCT 777 description within the subject land.

NSW VIS overview	
Plant community type (PCT)	Coast Grey Box - Mountain Grey Gum - stringybark moist shrubby open forest in coastal gullies, southern South East Corner Bioregion
PCT ID / BVT ID	PCT 777 / BVT: SR533
Vegetation formation	Wet Sclerophyll Forest (Grassy sub-formation)
Vegetation class	Southern Lowland Wet Sclerophyll Forests
Percent cleared	15%
Conservation status	-
Subject land description	
Description and occurrence	Restricted to metasediments below 200 m elevation. It occurs in steep gullies on the coastal range mainly between Merimbula and Narooma.
Study area / Subject land	2.95 ha / 2.20 ha
Upper stratum	<i>Eucalyptus muelleriana</i> (Yellow Stringybark); <i>Eucalyptus bosistoana</i> (Coast Grey Box) ; <i>Eucalyptus cypellocarpa</i> (Monkey Gum); <i>Eucalyptus globoidea</i> (White Stringybark); <i>Eucalyptus longifolia</i> (Woolybutt)
Middle stratum	<i>Acacia falciformis</i> (Broad-leaved Hickory) ; <i>Acacia mearnsii</i> (Black Wattle); <i>Allocasuarina littoralis</i> (Black She-Oak) ; <i>Billardiera scandens</i> (Hairy Apple Berry); <i>Breynia oblongifolia</i> (Coffee Bush); <i>Clematis aristata</i> (Old Man's Beard); <i>Eustrephus latifolius</i> (Wombat Berry) ; <i>Geitonoplesium cymosum</i> (Scrambling Lily); <i>Hibbertia aspera</i> (Rough Guinea Flower) ; <i>Marsdenia rostrata</i> (Milk Vine) ; <i>Notelaea venosa</i> (Veined Mock-olive); <i>Ozothamnus diosmifolius</i> (White Dogwood) ; <i>Pandorea pandorana</i> (Wonga Wonga Vine) ; <i>Pittosporum revolutum</i> (Rough Fruit Pittosporum); <i>Pittosporum undulatum</i> (Sweet Pittosporum) ; <i>Platysace lanceolata</i> (Shrubby Platysace)
Ground stratum	<i>Desmodium varians</i> (Slender Tick-trefoil); <i>Dianella caerulea</i> (Blue Flax-lily) ; <i>Doodia aspera</i> ; <i>Entolasia stricta</i> (Wiry Panic) ; <i>Gahnia melanocarpa</i> (Black Fruit Saw-sedge); <i>Goodenia ovata</i> (Hop Goodenia); <i>Lepidosperma laterale</i> (Variable Sword-sedge); <i>Lomandra longifolia</i> (Spiny-headed Mat-rush) ; <i>Microlaena stipoides</i> var. <i>stipoides</i> (Weeping Grass) ; <i>Notodanthonia longifolia</i> (Long-leaved Wallaby Grass); <i>Oplismenus imbecillis</i> ; <i>Poa meionectes</i> ; <i>Pteridium esculentum</i> (Bracken) ; <i>Viola hederacea</i> (Ivy-leaved Violet)
Vegetation Zones	Two vegetation zones – 'Modified' and 'ODNG'
Justification for PCT selection	Remnant forest vegetation in the north of the study area and the accessory section of the lot south-east of Lakeview Drive supports wet forest with a canopy dominated by Bangalay (<i>Eucalyptus botryoides</i>) with occasional Coast Grey Box (<i>Eucalyptus bosistoana</i>) and Rough-barked Apple (<i>Angophora floribunda</i>). The mid-storey includes dense patches of Black Sheoak (<i>Allocasuarina littoralis</i>), with small trees and shrubs Sweet Pittosporum (<i>Pittosporum undulatum</i>), Hickory Wattle (<i>Acacia implexa</i>), Broad-leaved hickory (<i>Acacia falciformis</i>), River Wattle (<i>Acacia subporosa</i>), White Dogwood (<i>Ozothamnus diosmifolius</i>), Blueberry Ash (<i>Elaeocarpus reticulatus</i>), <i>Cassinia trinervia</i> and Brush Muttonwood (<i>Myrsine howittiana</i>), plus a diverse range of climbers including Snake Vine (<i>Stephania japonica</i>), Wombat Berry (<i>Eustrephus latifolius</i>), Milk

	Vine (<i>Marsdenia rostrata</i>) and Wonga Wonga Vine (<i>Pandorea pandorana</i>). The unnamed stream running along the north-western edge of the main section of the study area and above lower slopes feature a dense and tall fern ground-storey of Rainbow Fern (<i>Calochlaena dubia</i>), Bracken (<i>Pteridium esculentum</i>) and Gristle Fern (<i>Blechnum cartilagineum</i>). Further upslope, the ground storey is much less dense and includes grasses Hedgehog Grass (<i>Echinipogon caespitosus</i>), Basket Grass (<i>Oplismenus imbecillis</i>), Weeping Grass (<i>Microlaena stipoides</i> var. <i>stipoides</i>), forbs Whiteroot (<i>Lobelia purpurascens</i>), Kidney Weed (<i>Dichondra repens</i>) and <i>Hydrocotyle sibthorpioides</i>. This wet forest vegetation does not closely resemble any currently in use PCT for NSW. Broadly, this community is structurally, compositionally and distributionally most similar to PCT 777: <i>Coast Grey Box - Mountain Grey Gum - stringybark moist shrubby open forest in coastal gullies, southern South East Corner Bioregion</i>, with some affinities also to PCT 947: <i>Mountain Grey Gum - Yellow Stringybark moist shrubby open forest in gullies of the coastal ranges, northern South East Corner Bioregion</i>. However, the presence of Bangalay (<i>Eucalyptus botryoides</i>) in the canopy is not typical of either of these PCTs. Bangalay is a listed dominant canopy species in several PCTs, however none of those that occur within the IBRA subregion are broadly compositionally similar to the vegetation present on the site. This vegetation does not conform to any listed TEC under the NSW BC Act or Commonwealth EPBC Act.
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*Species in bold, denote species recorded within subject land.



Figure 3.2: PCT 777 in modified condition, southern slope



Figure 3.3: PCT 777 in modified condition, northern slope

3.3.2 PCT 777 - Open Derived Native Grasslands

The majority of the subject land features low grasslands derived from open forests compositionally similar to the remnant native vegetation present (PCT 777). The structure of the derived grasslands appears to be maintained though regular slashing, though many species present in the historical open forest vegetation remain, including regeneration of the canopy tree Bangalay (*Eucalyptus botryoides*), plus shrubs Tick Bush (*Kunzea ambigua*), Prickly Beard-heath (*Leucopogon juniperinus*), *Hibbertia aspera* and White Dogwood (*Ozothamnus diosmifolius*). The condition of the grasslands is variable across the subject land; however, it is broadly dominated by native grasses including Brown's Lovegrass (*Eragrostis brownii*), Paddock Lovegrass (*Eragrostis leptostachya*), Wiry Panic (*Entolasia stricta*) and Weeping Grass (*Microlaena stipoides* var. *stipoides*) and forbs *Gonocarpus tetragynus*, *Dianella caerulea*, *Lomandra longifolia*, and *Opercularia aspera*. Exotic grasses occur patchily throughout, particularly Parramatta Grass (*Sporobolus africanus*), Carpet Grass (*Axonopus fissifolius*), Kikuyu (*Cenchrus clandestinus*) and Paspalum (*Paspalum dilatatum*).



Figure 3.4: PCT 777 in Open Derived Native Grassland and area of bare ground within the south portion of the subject land



Figure 3.5: Field validated mapping within the study area (Ecoplanning 2022)

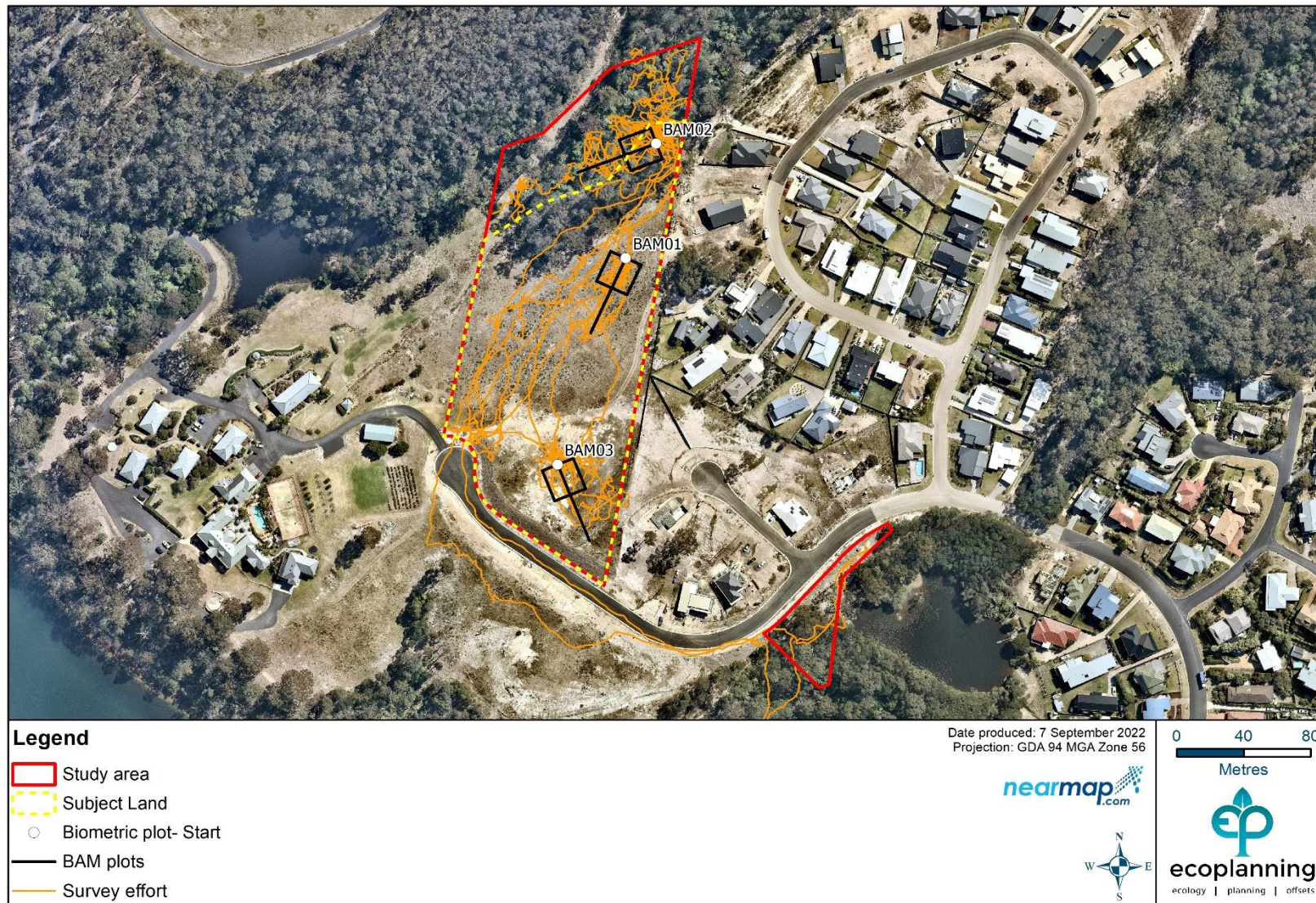


Figure 3.6: Field survey effort and vegetation integrity plot locations

3.4 Threatened Ecological Communities

PCT 777 *Coast Grey Box - Mountain Grey Gum - stringybark moist shrubby open forest in coastal gullies, southern South East Corner Bioregion* does not form part of any TEC listed under the NSW BC Act or the Commonwealth EPBC Act.

3.5 Vegetation zones and vegetation integrity

3.5.1 Vegetation integrity survey plots

Three VI survey plots were completed in the subject land to meet the requirements of the BAM. See **Appendix A** and **Appendix B** for data captured and **Figure 3.6** for the location of VI plots.

The number of plots was consistent with the requirements as outlined within Table 3 of the BAM (**Table 3.4**). Given the proximity and size of each vegetation zone, plots were orientated as best as possible to capture the most representative parts of each zone and to avoid ecotones, zone boundaries and disturbances such as tracks. However, this was not always possible.

Table 3.4: Number of VI plots required for each vegetation zone based on their respective sizes

PCT Name	Condition / Vegetation Zone	Area in Study Area	Area in Subject Land	Number plots required (completed)
<i>PCT 777 – Coast Grey Box - Mountain Grey Gum - stringybark moist shrubby open forest in coastal gullies, southern South East Corner Bioregion</i>	ODNG (VZ 1)	1.95 ha	1.88 ha	1 (2)
<i>PCT 777 – Coast Grey Box - Mountain Grey Gum - stringybark moist shrubby open forest in coastal gullies, southern South East Corner Bioregion</i>	Modified (VZ 2)	1.01 ha	0.32 ha	1 (1)

3.5.2 Current and future vegetation integrity scores

Vegetation integrity scores were calculated based on the VI survey plots collected for each vegetation zone. Data collected for each plot is included in **Appendix A**. The VI scores for each vegetation zone are shown in **Table 3.5** and are representative of a condition score / class out of 100.

Table 3.5: Vegetation Integrity Scores.

Veg zone	PCT	Condition class	Area impacted (ha)	Vegetation Integrity Score	
				Before development	After development
1	PCT 777	ODNG	1.88	28	0
2		Modified	0.32	46.8	0



Figure 3.7: Vegetation zones within subject land

4 Threatened species

Section 5 of the BAM details the process for determining the habitat suitability for threatened species.

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

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

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

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

4.1 Threatened species for assessment

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

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

The process for identifying threatened species which meet the above criteria is completed through the BAM Calculator. The PCT identified within the subject land, patch size and native vegetation cover, as outlined in **Section 2.2** and **Section 3**, were entered into the BAM Calculator and a preliminary list of ecosystem and species credit species was tabulated.

4.2 Ecosystem credit species

A review of the predicted ecosystem credit species was conducted to determine the likelihood of species occurring on the subject land. The review considers whether necessary habitat components are present as described above. For the purpose of this report, all species were included (**Table 4.1**).

Table 4.1: Ecosystem credit species predicted on site.

Scientific Name / Common Name	Habitat Constraints / Geographic Limitation	Included / Excluded	BC Act status*	EPBC Act status*
<i>Anthochaera phrygia</i> Regent Honeyeater (Foraging)		Included	CE	CE
<i>Artamus cyanopterus</i> <i>cyanopterus</i> Dusky Woodswallow		Included	V	-
<i>Callocephalon fimbriatum</i> Gang-gang Cockatoo (Foraging)		Included	V	E
<i>Calyptorhynchus lathamii</i> Glossy Black-Cockatoo (Foraging)	1. Other 2. Presence of Allocasuarina and casuarina species	Included	V	-
<i>Daphoenositta chrysoptera</i> Varied Sittella		Included	V	-
<i>Dasyurus maculatus</i> Spotted-tailed Quoll		Included	V	E
<i>Falsistrellus tasmaniensis</i> Eastern False Pipistrelle		Included	V	-
<i>Glossopsitta porphyrocephala</i> Purple-crowned Lorikeet		Included	V	-
<i>Glossopsitta pusilla</i> Little Lorikeet		Included	V	-
<i>Hieraaetus morphnoides</i> Little Eagle (Foraging)		Included	V	-
<i>Hirundapus caudacutus</i> White-throated Needle-tail		Included	-	V
<i>Lathamus discolor</i> Swift Parrot (Foraging)		Included	E	CE
<i>Lophoictinia isura</i> Square-tailed Kite (Foraging)		Included	V	-
<i>Micronomus norfolkensis</i> Eastern Coastal Free-tailed Bat		Included	V	-

Scientific Name / Common Name	Habitat Constraints / Geographic Limitation	Included / Excluded	BC Act status*	EPBC Act status*
<i>Miniopterus orianae oceanensis</i> Large Bent-winged Bat (Foraging)		Included	V	-
<i>Ninox connivens</i> Barking Owl (Foraging)		Included	V	
<i>Ninox strenua</i> Powerful Owl (Foraging)		Included	V	-
<i>Pachycephala olivacea</i> Olive Whistler		Included	V	-
<i>Petaurus australis</i> Yellow-bellied Glider	1. Hollow bearing trees 2. Hollows > 25 cm diameter	Included	V	-
<i>Phoniscus papuensis</i> Golden-tipped Bat		Included	V	-
<i>Pteropus poliocephalus</i> Grey-headed Flying-fox (Foraging)		Included	V	V
<i>Scoteanax rueppellii</i> Greater Broad-nosed Bat		Included	V	-
<i>Tyto novaehollandiae</i> Masked Owl (Foraging)		Included	V	-

* CE- Critically Endangered; E- Endangered, V- Vulnerable

4.3 Identify candidate species (species credit species)

Candidate species (species credit species) predicted to occur within the development footprint (as determined by the BAMC), their associated habitat constraints, geographic limitations and sensitivity to gain class are included in **Table 4.2**.

In accordance with Section 5.2.3 of the BAM, a predicted candidate species can be considered unlikely to occur with the subject land (or specific vegetation zones) where habitat is substantially degraded such that the species is unlikely to use the area. Justification for the exclusion of species credit species from further assessment is detail on **Table 4.2**

Table 4.2: Assessment of candidate species within the subject land

Scientific Name / Common Name	Habitat Constraints / Geographic Limitation	Sensitivity to Gain Class	BC Act status*	EPBC Act status*	Justification for species inclusion or exclusion
<i>Anthochaera phrygia</i> Regent Honeyeater (Breeding)	- Other - As per mapped area	High	CE	CE	<u>Excluded:</u> The subject land is not part of the species Important Habitat Area Map
<i>Callocephalon fimbriatum</i> Gang-gang Cockatoo (Breeding)	- Hollow bearing trees - Eucalypt tree species with hollows greater than 9 cm diameter	High	E	V	<u>Excluded:</u> Subject land does not contain any hollow bearing trees.
<i>Calyptorhynchus lathamii</i> Glossy Black-Cockatoo (Breeding)	- Hollow bearing trees - Living or dead tree with hollows greater than 15cm diameter and greater than 8m above ground	High	V	-	<u>Excluded:</u> Subject land does not contain any hollow bearing trees.
<i>Cercartetus nanus</i> Eastern Pygmy-possum		High	V		<u>Excluded:</u> Potential shelter habitat used by the species such as tree hollows, rotten stumps, holes in the ground, abandoned bird-nests, Ringtail Possum (<i>Pseudocheirus peregrinus</i>) dreys, were not identified within the study area at the time of survey, therefore limiting potential habitat suitability for the species. Additionally, the majority of the subject land is disturbed by regular clearing and does not contain canopy species.
<i>Correa baeuerlenii</i> Chef's Cap Correa	- North of the Bega River	High	V	V	<u>Excluded:</u> Subject land located south of the Bega River, outside geographical limitation of the species
<i>Heleioporus australiacus</i> Giant Burrowing Frog		Moderate	V	V	<u>Excluded:</u> The majority of the subject land is actively maintained and does not present potential habitat for the species. The edges of mapped PCT 777 vegetation, are disturbed by under scrubbing of the ground and mid-layer at the northern portion of the subject land, limiting potential habitat, additionally, the mapped stream and associated riparian buffer, within the study area, will not be impacted by the proposal.

					Given the regular disturbance and lack of potential habitat within the majority of the subject land, the subject land is unlikely to provided suitable habitat for the species.
<i>Hieraaetus morphnoides</i> Little Eagle (Breeding)	- Other - Nest trees - live (occasionally dead) large old trees within vegetation	Moderate	V		<u>Excluded:</u> The subject land does not contain any large trees suitable as nest trees for this species.
<i>Isodon obesulus obesulus</i> Southern Brown Bandicoot (eastern)	- Other - Requires dense ground cover in a variety of habitats	High	E	E	<u>Excluded:</u> The subject land largely consists of cleared grasslands and is disturbed by regular maintenance, including the edges of PCT 777 in a modified condition, therefore not providing suitable habitat for the species. Additionally, active clearing required for the powerline easement, on the northern boundary of the study area, further disturbs any potential habitat for the species within the subject land. The continued disturbance within the subject land does not present valuable habitat for the species.
<i>Lathamus discolor</i> Swift Parrot (Breeding)	- Other - As per mapped area	Moderate	E	CE	<u>Retained:</u> Part of the subject land is part of the species Important Habitat Area Map
<i>Lophoictinia isura</i> Square-tailed Kite (Breeding)	- Other - Nest trees	Moderate	V	-	<u>Excluded:</u> The subject land does not contain any large trees suitable as nest trees for this species.
<i>Miniopterus orianae oceanensis</i> Large Bent-winged Bat (Breeding)	- Cave - Cave, tunnel, mine, culvert or other structure thought 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	Very High	V	-	<u>Excluded:</u> Habitat constraints absent – no suitable breeding or structures present within the subject land

<i>Mixophyes balbus</i> Stuttering Frog		Very high	E	V	<u>Excluded:</u> The species is associated with flowing streams, the mapped stream within the study area was not flowing at the time of survey and did not present any evidence of any major flows. Additionally, the majority of the subject land is actively maintained and does not present potential habitat for the species. The southern edges of mapped PCT 777 vegetation, are disturbed by under scrubbing of the ground and mid-layer limiting potential habitat. Given the regular disturbance , lack of potential habitat within the majority of the subject land, and unsuitable stream conditions, the subject land is unlikely to provided suitable habitat for the species.
<i>Myotis macropus</i> Southern Myotis	- Hollow bearing trees - Within 200 m of riparian zone Other - Bridges, caves or artificial structures within 200 m of riparian zone Waterbodies -This includes rivers, creeks, billabongs, lagoons, dams and other waterbodies on or within 200m of the site	High	V	-	<u>Excluded:</u> The subject land does not contain any hollow bearing trees, bridges, caves or other artificial structures, which can be used by the species for rooting or breeding habitat. The mapped stream within the subject land, did not present evidence of active water flow and is not greater than 3 m wide at any point, which is an important habitat constraint for potential foraging habitat for the species. Additionally, the majority of the subject land is actively maintained, has not canopy cover or other habitat features required for the species. As such the species have been excluded due to unsuitable habitat present within the subject land.
<i>Ninox connivens</i> Barking Owl (Breeding)	- Hollow bearing trees - Living or dead trees with hollows greater than 20 cm diameter and greater than 4m above the ground	High	V	-	<u>Excluded:</u> Habitat constraints absent – no hollow bearing trees (living or dead) present within the subject land.
<i>Ninox strenua</i> Powerful Owl	- Hollow bearing trees	High	V	-	<u>Excluded:</u> Habitat constraints absent – no hollow bearing trees (living or dead) present within the subject land.

(Breeding)	- Living or dead trees with hollow greater than 20cm diameter				
<i>Persicaria elatior</i> Tall Knotweed	- Semi-permanent/ephemeral wet areas - or within 50 m Swamps - or within 50 m Waterbodies - including Wetlands, or within 50 m	High	V	V	<u>Excluded:</u> Areas of PCT 777, in a modified and ODNG condition within the subject land are disturbed and do not contain swampy conditions, which are the preferred habitat conditions for the species. VI plots within these areas did not identify the species as present. Additionally, the mapped stream within the study area did not present the species preferred swampy conditions, and the proposed development will not impact vegetation along the mapped stream. Lastly, associated plant species such as <i>Melaleuca linearifolia</i> , <i>M. quinquenervia</i> , <i>Pseudognaphalium luteoalbum</i> , <i>Persicaria hydropiper</i> , <i>Floydia praealta</i> and <i>Cyperus semiferilis</i> , have not been recorded within the subject land. Therefore, suitable habitat is not present within the subject land.
<i>Petauroides volans</i> Greater Glider		High	-	V	<u>Excluded:</u> No suitable habitat is present within the subject land. No hollow bearing trees.
<i>Petaurus norfolcensis</i> Squirrel Glider		High	V	-	<u>Excluded:</u> No suitable habitat is present within the subject land. No hollow bearing trees and no old growth forest present.
<i>Phascogale tapoatafa</i> Brush-tailed Phascogale		High	V	-	<u>Excluded:</u> Suitable habitat not present within the subject land. No hollow bearing trees, shrubs and ground cover are disturbed by regular clearing on the majority of the subject land. Areas with canopy cover do not include rough barked canopy species, which are preferred foraging tree species by the species. .
<i>Phascolarctos cinereus</i> Koala	- Other - Presence of koala use trees - refer to Survey Comments field in TBDC	High	E	E	<u>Excluded:</u> Koala feed trees are present within the subject land, <i>Allocasuarina littoralis</i> , <i>Angophora floribunda</i> , and <i>Eucalyptus bosistoana</i> , however, only occasional occurrences of <i>Angophora floribunda</i> and <i>Eucalyptus bosistoana</i> were recorded within the patch of PCT 777 in a modified condition. Instead, <i>Eucalyptus botryoides</i> was the dominant tree species recorded within this patch of vegetation, this species is not listed as a Koala feed tree species for the region according to the SEPP Biodiversity Conservation (2021). In addition, <i>Allocasuarina littoralis</i> was recorded in patches within the mid-storey layer of PCT 777 in a modified condition but was not a dominant species.

					Furthermore, BioNet Atlas (DPE 2022) does not present any Koala records within the locality of the subject land in the past 20 years. Lastly, the majority of the subject land (1.88 ha) is made up open derived grasslands, which does not contain any canopy species and is regularly disturbed by maintenance, therefore not providing suitable habitat for the species. As such, the subject land is not Core Koala habitat and the species has been excluded .
<i>Potorous tridactylus</i> Long-nosed Potoroo	- Other - Dense shrub layer or alternatively high canopy cover exceeding 70% (i.e., to capture populations inhabiting wet sclerophyll and rainforest))	High	V	V	<u>Retained:</u> Although the majority of the site (1.88 ha) is actively disturbed and does not contain any canopy cover, a 0.32 ha of PCT 777, in a modified condition, on the northern portion of the subject land contains a high canopy cover and a dense shrub layer providing suitable habitat for the species. Therefore, the species has been retained.
<i>Pteropus poliocephalus</i> Grey-headed Flying-fox (Breeding)	- Other - Breeding camps	High	V	V	<u>Excluded:</u> No flying-fox camps within the study area. Additionally, the subject land does not contain suitable feed trees.
<i>Tyto novaehollandiae</i> Masked Owl (Breeding)	- Hollow bearing trees - Living or dead trees with hollows greater than 20cm diameter	High	V	-	<u>Excluded:</u> Habitat constraints absent – no hollow bearing trees (living or dead) present within the subject land.

4.4 Targeted fauna surveys

Review of available literature, habitat constraints and vegetation conditions within the subject land indicated that suitable habitat is present for two of the predicted candidate species credit species, *Lathamus discolor* (Swift Parrot) and *Potorous tridactylus* (Long-nosed Potoroo), and therefore require targeted fauna surveys.

Presence was assumed for both retained species credit species, meaning no further targeted surveys are required for the species. *Lathamus discolor* (Swift Parrot) is mapped under the 'Important Areas Map', with recent records of the species within the locality, therefore, presence was assumed for the species. Areas of vegetation validated as PCT 777 in a modified condition within the subject land, contained suitable habitat features for *Potorous tridactylus* (Long-nosed Potoroo), given the high canopy cover and mosaic of habitat present, including patches of dense shrubs. The species is cryptic and can be difficult to identify using survey methods, such as baited traps and camera trapping, therefore, presence has been assumed for this species.

In accordance with section 5.2.5 of the BAM (2020), species polygons have been produced for each of the species, details are provided in the following sections.

4.4.1 *Lathamus discolor* (Swift Parrot)

The 'Important Areas Map' (DPE 2022) maps the northern part of the subject land as 'Swift Parrot Important Area'. This requires a species polygon for Swift Parrot to include all areas within the subject land which are mapped on the Important Areas Map (**Figure 4.1**). Total area for the Swift Parrot species polygon within the study area is 1.02 ha, of which only 0.40 ha is within the subject land. The 0.40 ha area within the subject land, includes all areas mapped within the Important Areas Map as Swift Parrot important habitat. A breakdown by PCT within the subject land, which is included within the species polygon is presented in **Table 4.3**. These areas have been entered into the BAM calculator.

Table 4.3: Area of Swift Parrot species polygon within each vegetation zone, in the subject land.

Species	Vegetation zone area (ha)	
	PCT 777 - ODNG	PCT 777 - Modified
<i>Lathamus discolor</i> (Swift Parrot)	0.09	0.31

*Subject to rounding errors

4.4.2 *Potorous tridactylus* (Long-nosed Potoroo)

Assumed presence for the species within the subject land has been determined. Potential suitable habitat for the species is present within the northern portion of the subject land containing PCT 777 in a modified condition (0.32 ha). A further 0.60 ha of potential habitat within the northern part of the study area will not be impacted by the proposal, this area contains canopy cover, a dense shrub layer suitable for the species and will retain connectivity to larger patches of native vegetation towards the north.

There species is cryptic making it difficult to detect via baited traps or camera traps survey. Assuming presence of the species ensures that potential habitat is offset via the BOS. BAM

(2020) requires a species polygon for Long-nosed Potoroo to include PCTs that contain potential habitat for the species within the subject land (**Figure 4.2**). The majority of the subject land (1.88 ha) is dominated by open grass lands, which do not provide suitable habitat, however, areas of PCT 777, in a modified condition, within the norther portion of the subject land contain sufficient canopy cover and a shrub layer which can provide suitable habitat, and so, this 0.32 ha area has been included for the species polygon. A breakdown by PCT within the subject land, which are within the species polygon is presented in **Table 4.4**. These areas have been entered into the BAM calculator.

Table 4.4: Area of Long-nosed Potoroo species polygon within each vegetation zone, in the subject land

Species	Vegetation zone area (ha)	
	PCT 777 - ODNG	PCT 777 - Modified
<i>Potorous tridactylus</i> (Long-nosed Potoroo)	-	0.32

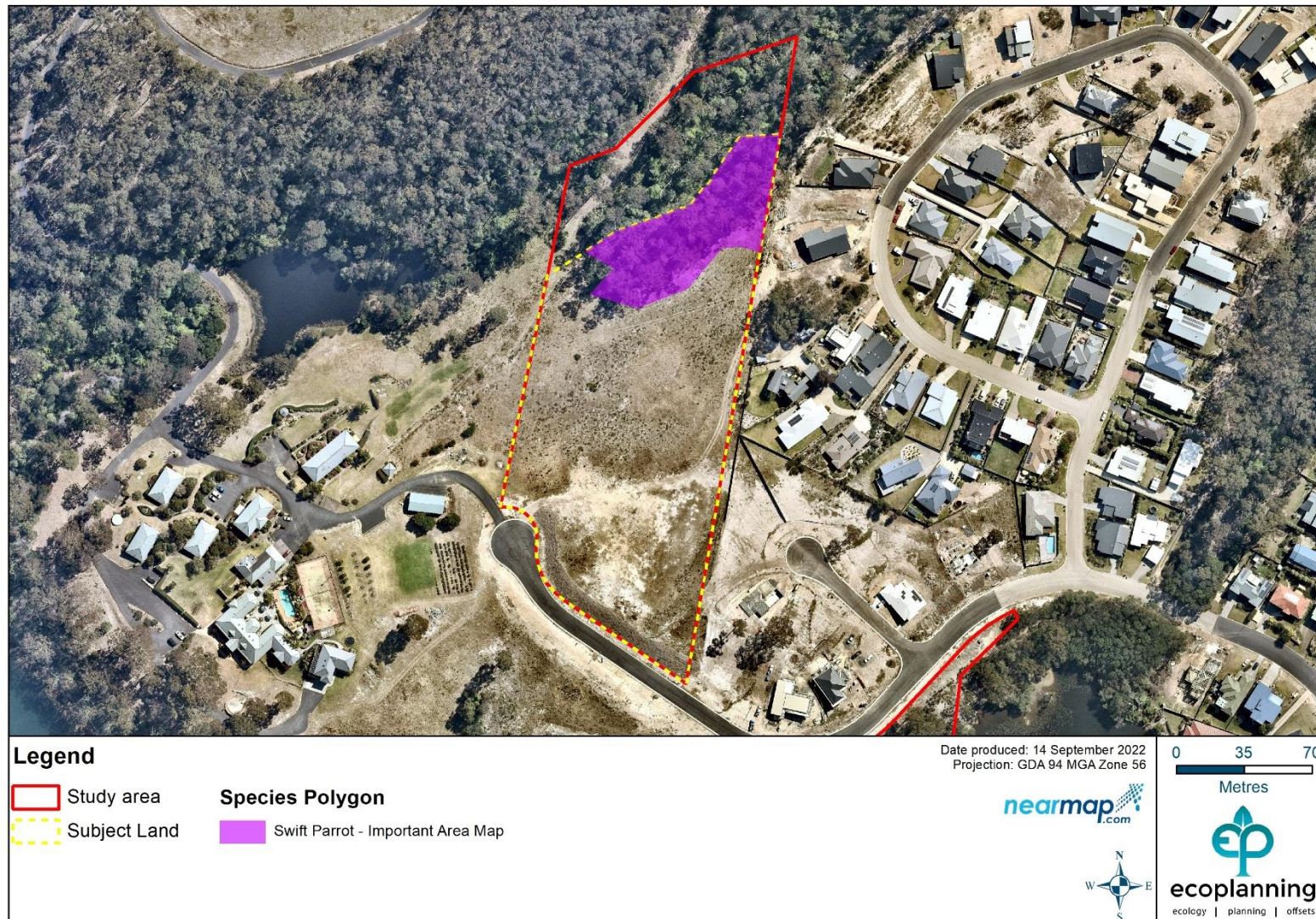


Figure 4.1: Species polygon for *Lathamus discolor* within the subject land, based on Important Areas Map (DPE 2022)

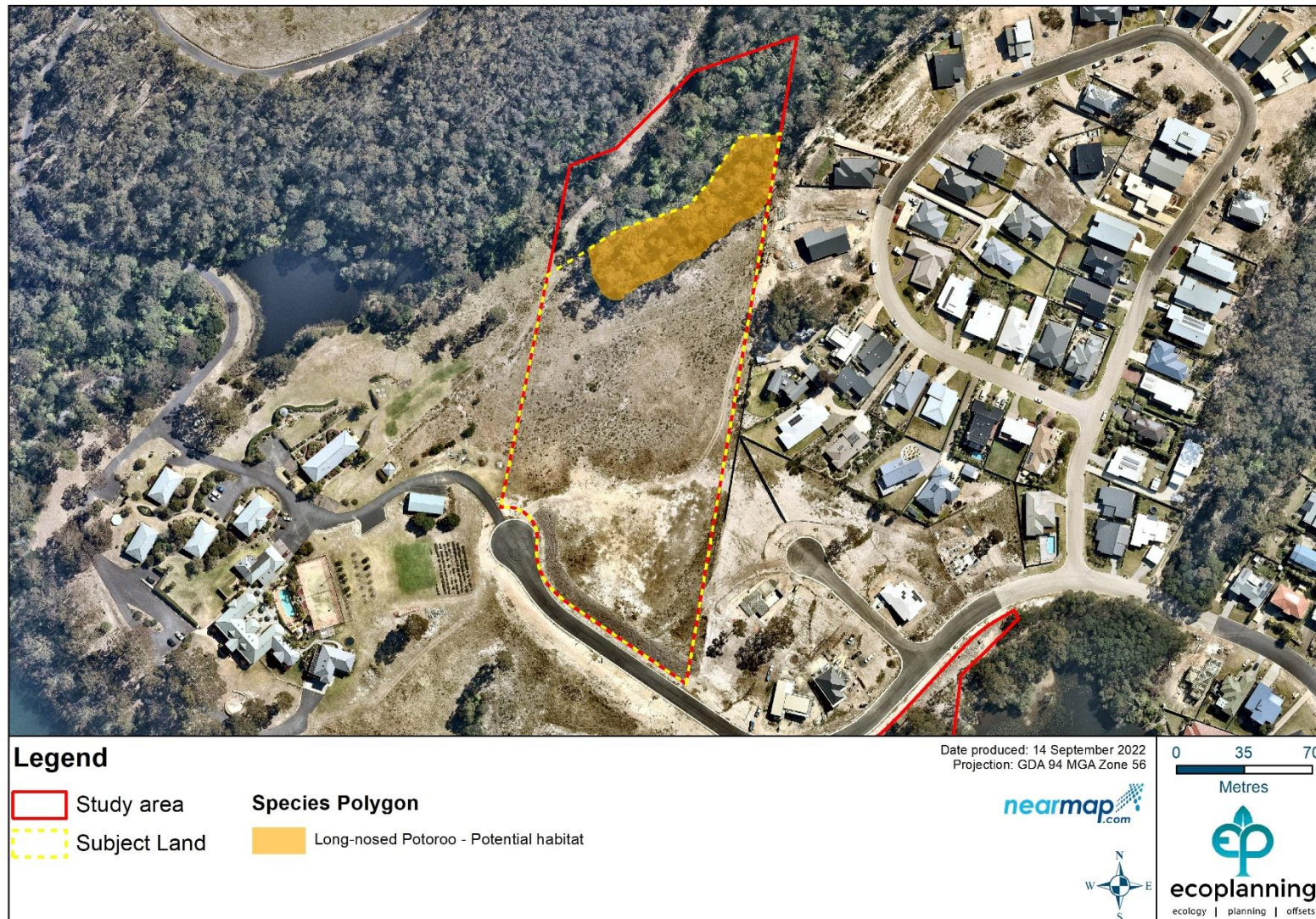


Figure 4.2: Species polygon for *Potorous tridactylus* within the subject land, based on suitable potential habitat

4.5 Identifying potential prescribed biodiversity impacts on threatened species

Prescribed biodiversity impacts are defined under Clause 6.1 of the BC Reg and Section 6 of the BAM 2020 and include impacts on biodiversity values in addition to, or instead of, impacts from clearing vegetation and/or loss of habitat. The presence of biodiversity values prescribed by the BC Reg 2017 and BAM 2020 have been considered in context of the subject land below (**Table 4.5**). It is unlikely that potential prescribed biodiversity impacts on threatened species would occur as a result of the proposal.

Table 4.5: Prescribed Biodiversity Impacts.

Prescribed Biodiversity Impacts	Presence within the Subject Land
(a) the impacts of development on the following habitat of threatened species or ecological communities: (i) karst, caves, crevices, cliffs, rocks and other geological features of significance, (ii) human made structures, (iii) non-native vegetation,	The subject land does not contain areas of cliffs, crevices, rocks and other geological areas of significance. There are no man-made structures on site, and the non-native vegetation is comprised of sporadic exotic pasture, additionally, the majority of the subject land is regularly disturbed by clearing of the shrub and grass layer, therefore, habitat value for threatened species is limited.
(b) the impacts of development on the connectivity of different areas of habitat of threatened species that facilitates the movement of those species across their range (impacts on movement of threatened species that maintains lifecycles –BC reg)	The proposal has been largely located in areas of derived grasslands, which are constantly maintained with no canopy or shrub layers present, therefore providing limited habitat connectivity. The northern portion of the study area contains habitat connectivity to large areas of native vegetation to the north. The proposal will impact 0.32 ha of PCT 777 with connectivity to other areas of native vegetation, as a result of thinning and maintenance required by the APZ for the development. Areas of PCT 777 outside the subject land will be retained and will therefore retain the majority of the connectivity value within the surrounding landscape. It should also be noted that areas of PCT 777 in a modified condition, are already impacted due to the easement clearing required by the powerlines within the northern boundary of the study area.
(c) the impacts of development on water quality, water bodies and hydrological processes that sustain threatened species and threatened ecological communities (including from subsidence or upsidence resulting from underground mining or other development),	The site contains one unnamed 1 st order stream within the northern portion of the study area. The stream traverses the study area east to west. To mitigate potential impacts to the stream the proposed development has been placed in the southern portion of the subject land, downslope from the stream, therefore avoiding direct impacts by the proposed development and protecting land from environmental degradation as a result of the proposed development. As a result, the development is considered unlikely to significantly modify the existing hydrological processes in this area.
(d) the impacts of wind turbine strike on threatened and protected animals,	Not applicable.
(e) the impacts of vehicle strike on threatened species or fauna that are	Any vehicle movement on site will be managed and potential impacts to fauna mitigated by the CEMP. Furthermore, threatened species (or general fauna) are considered unlikely to be present within subject

Prescribed Biodiversity Impacts	Presence within the Subject Land
part of a threatened ecological community.	land, more suitable habitat remains north of the study area. Additionally, the introduction of a residential road, part of the development, will not further fragment any fauna which may be present within the area. Therefore, vehicle strikes on fauna are low.

5 Avoiding and minimising impacts on biodiversity

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

In accordance with Section 7 of the BAM, actions taken to avoid and minimise impacts through locating the project must be documented and justified in the BDAR. Impacts from clearing native vegetation and threatened species habitat can be avoided or minimised by locating the proposal in areas:

- lacking biodiversity values
- where the native vegetation or threatened species habitat is in the poorest condition (i.e., areas that have a low VI score)
- that avoid habitat for species with a high biodiversity risk weighting or land mapped on the important habitat map, or a TEC or a PCT that is highly cleared
- outside of the buffer area around breeding habitat features such as nest trees.

The proposal has been located within land zoned as *R3: Medium Density Residential*, which is fit for purpose and has avoided land within Lot 602 // DP 1277714 that is zoned *C3: Environmental Management*. Effort has been made to avoid impacts to areas of biodiversity values within the northern boundary of the study area, such as areas of native vegetation, with canopy connectivity to areas of native vegetation north of the study area, and the 1st order stream present on site. To further avoid impacts to ecological values, the proposal is largely located in areas of bare ground and grasslands, which are maintained and therefore offer little habitat value. Approximately 0.75 ha of native vegetation will remain within the study area post-development, including 0.60 ha of PCT 777 in a ODNG and modified condition, which will remain within the study area.

Furthermore, locating the development on the southern portion of the subject land away from the mapped 1st order stream, will minimise indirect impacts such as environmental degradation as a result of surface runoff caused by the development within the R3 zoned land of the subject land. Part of the APZ will impact 0.40 ha of land mapped under the BVM, this area contains vegetation in a modified condition with a thinned mid and ground layer, placement of the proposal has avoided further impacts to area of PCT 777, which contain a dense shrub layer, vegetation connectivity and a mapped stream. Additionally, a further ~0.01 ha of land mapped under the BVM, will be impacted by part of the proposed car park, vegetation within this area is cleared, with no canopy or mid-storey layers and is actively maintained, the direct and indirect impacts to this area will be minimal. Approximately 0.62 ha of land mapped under the BVM will remain within the study area, of which 0.59 ha is within the northern part of the study area.

Lastly, a Construction Environmental Management Plan (CEMP) will be implemented to minimise and mitigate any unforeseen or unexpected impacts to biodiversity, particularly areas of PCT 777, which will not be impacted at the north end of the study area.

5.2 Avoiding and minimising prescribed biodiversity impacts during project planning

The nature of prescribed impacts mean they can be difficult to offset through the provision of biodiversity credits (e.g., impacts to caves, rocky outcrops and flyways) and cannot be readily



replaced. **Section 4.5** above has considered prescribed biodiversity impacts in relation to the proposal and determined that prescribed impacts are unlikely as a result of the proposal.

Efforts to avoid and minimise impacts to native vegetation and habitat in relation to the project location and design have been described above. These efforts are applicable to any potential unforeseen prescribed biodiversity impacts.

5.3 Adaptive management for uncertain impacts

Impacts associated with the proposal are largely certain and associated with the direct impacts due to vegetation clearing. Uncertain impacts associated with the proposal would likely be limited to inadvertent impacts to adjacent vegetation (e.g., PCT 777 vegetation, on the northern portion of the study area, mapped as part of the BVM), or construction activities requiring a modified design or process. The effect of altering surface and groundwater flow paths can be uncertain and can result in unanticipated modification of native vegetation through the increase or decrease in soil moisture. The proposal has been located in the south western corner in a way to avoid environmental degradation to the 1st order stream in the northern section of the study area and has been located in an area of open grassland vegetation, which is regularly maintained.

During the construction and operation phase of the project, the works should be undertaken in accordance with any licence issued under by the NSW Environment Protection Authority or the controls under the NSW *Protection of the Environment Operations Act 1997*.

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

6 Assessing and offsetting impacts

6.1 Assessing impacts to native vegetation and habitat

The proposed development will include direct impacts to 2.20 ha of native vegetation, including PCT 777 *Coast Grey Box - Mountain Grey Gum - stringybark moist shrubby open forest* in a 'modified' (0.32 ha) and 'ODNG' (1.88 ha) conditions. The direct clearing and subsequent development of the subject land would represent a permanent impact, or loss, of this native vegetation and habitat. As outlined in **Section 3.5.2** of this BDAR, and in accordance with Section 8.1.1.5 of the BAM, the future VI score for all vegetation within the subject land has been assigned 0.

No threatened species were opportunistically recorded during the field survey. However, presence has been assumed, within areas of the subject land, for two species credit species, the Swift Parrot and Long-nosed Potoroo. Presence for the Swift Parrot has been assumed within the subject land as the Important Area Map (DPE 2022) has mapped important Swift Parrot Habitat within the northern boundary of the study area. A total of 0.40 ha area mapped as important Swift Parrot habitat will be impacted by the APZ required by proposal, with the majority (0.62 ha) of mapped habitat for the species remaining.

Within the northern boundary of the study area a 0.85 ha area of native vegetation provides potential habitat for the Long-nosed Potoroo, of which only 0.32 ha is within the subject land, and therefore impacted by the proposal. The area within the subject land is disturbed and does not present valuable habitat connectivity, such as a dense shrub layer or canopy cover, towards the south. By retaining a 0.53 ha area of potential habitat on the northern boundary of the study, which contains similar habitat with connectivity to larger stands of native vegetation, north of the study area, impacts to the species are considered to be limited.

6.2 Assessing indirect impacts on native vegetation

It is difficult to quantify indirect impacts associated with the project (construction and operation phases), but these may include impacts such as noise, erosion, altered run-off regimes or inadvertent impacts to adjacent habitat or vegetation. Indirect impacts will be managed through the development of a CEMP.

Given the subject land bordered by Lakewood Drive to the south, residential lands to the east and west, and no proposed impacts outside the northern boundary of the subject land, it is considered unlikely that the proposal would have impacts which would reduce the viability of any adjacent native vegetation or habitat due to edge effects, noise, dust or light spill. Nevertheless, given the APZ will require vegetation clearing and management to areas with habitat connectivity north of the subject land, weed spread can indirectly impact vegetation, which is proposed to be retained. The CEMP will implement weed control measures to minimise and mitigate any unforeseen or unexpected impacts to biodiversity as a result of weed spreading.

Runoff and construction indirect impacts would be managed through a CEMP, sediment and erosion controls will be put in place according to best practices (Landcom 2004), for the duration of construction works the subject land will be fenced to prevent access and contain appropriate signage to avoid any impacts to native vegetation and habitat values remaining outside the subject land. An assessment of indirect impacts is provided in **Table 6.1**.

Table 6.1: Assessment of indirect impacts

Indirect impact type	Nature	Extent	Frequency	Duration	Timing
Inadvertent impacts on adjacent habitat or vegetation	The subject land is in close proximity to areas of PCT 777 in a 'modified' and 'ODNG' conditions, that will be retained. Construction activities in proximity to areas to be retained present a risk of inadvertent impacts including accidental vegetation damaged during works etc. The current condition of land to be retained along the northern boundary of the study area is moderate. Although the consequence of inadvertent impacts is potentially high, the probability is low based on the implementation of relevant mitigation measures (Section 6.4).	Mapped native vegetation outside the subject land	Ongoing during construction and clearing phase	Ongoing during construction and clearing phase	Ongoing during construction and clearing phase
Reduced viability of adjacent habitat due to edge effects	The subject land is bound by Lakewood Drive, to the south and residential lands to the east and west, which do not present habitat connectivity. Within the northern boundary of the study area connectivity with native vegetation will not be impacted. The risk of additional edge effects to these areas is considered low with a low consequence as the proposed development will not fragment any remaining vegetation.	Mapped native vegetation outside the subject land	Ongoing during construction and operation activities	Throughout the construction and operation period	Potentially long term
Reduced viability of adjacent habitat due to noise, dust or light spill	Indirect impacts from noise, dust and light spill on nearby habitat is considered low. Any impacts will be temporary and intermittent. It is anticipated that clearing will be restricted to daytime, therefore artificial light spill is unlikely to occur. The proposal is not anticipated to significantly increase ambient noise, as the subject land is currently bound by residential properties and public road to the east, west and south boundaries.	Subject land	Ongoing during construction activities	Throughout the construction period	Short term
Transport of weeds and pathogens from the site to adjacent vegetation	There is low potential to transport weeds and pathogens to nearby vegetation, following the implementation of the CEMP. The current condition of vegetation to be retained outside the subject land is in moderate condition, with some areas of PCT 777 in modified and ODNG vegetation. Weed management measures will be implemented during construction and operational phases to reduce the risk of pathogens and weeds invading the vegetation corridor.	The vegetation along the northern boundary of the subject land	Ongoing during construction activities	Throughout the construction period	Potentially long term
Increased risk of starvation, exposure and loss of shade or shelter	The development is not expected to result in any indirect impacts resulting in an increased risk of starvation, exposure and loss of shade or shelter.	NA	NA	NA	NA

Indirect impact type	Nature	Extent	Frequency	Duration	Timing
Loss of breeding habitats	The development is not expected to result in any indirect loss of breeding habitats located adjacent to the development site.	NA	NA	NA	NA
Trampling of threatened flora species	The development is not expected to result in any indirect impacts resulting from trampling of threatened flora species given no individuals are to be retained within the development site, and none were recorded in areas adjacent to the site.	NA	NA	NA	NA
Inhibition of nitrogen fixation and increased soil salinity	The development is not expected to result in any inhibition of nitrogen fixation.	NA	NA	NA	NA
Fertiliser drift	The development is not expected to result in any fertiliser drift.	NA	NA	NA	NA
Rubbish dumping	The development could result in a minor increase in rubbish dumping as people use the future development. This would likely be minor in nature and managed by providing waste disposal facilities.	The operational footprint and surrounding area	Ongoing during construction and operation activities	Throughout the construction and operation period	Potentially long term
Wood collection	The development is not expected to result in any wood collection.	NA	NA	NA	NA
Bush rock removal and disturbance	The development is not expected to result in any bush rock removal or disturbance.	NA	NA	NA	NA
Increase in predatory species populations	The development could result in a minor increase in predatory species by attracting feral cats and foxes closer to the bush. This would likely be minor in nature.	The operational footprint and surrounding area	Ongoing during construction and operation activities	Throughout the construction and operation period	Potentially long term
Increase in pest animal populations	The development could result in a minor increase in pest and vermin animal species as people use the future development. This would likely be minor in nature and managed by providing waste disposal facilities.	The operational footprint and surrounding area	Ongoing during construction and operation activities	Throughout the construction and operation period	Potentially long term
Increased risk of fire	The development is not expected to result in any increased risk of fire.	NA	NA	NA	NA
Disturbance to specialist breeding and foraging habitat, e.g., beach nesting for shorebirds.	The development is not expected to result in any disturbance to specialist breeding and foraging habitat.	NA	NA	NA	NA

6.3 Other legislative requirements

6.3.1 State Environmental Planning Policy (SEPP) – Biodiversity and Conservation 2021 – Chapter 4 Koala habitat protection

Within NSW, the state government has developed state environmental planning policies (SEPPs) to address development which may impact certain environmental or ecological values. SEPPs give guidance on how a development may minimise its impacts on the respective environmental or ecological feature. SEPP Biodiversity and Conservation (2021) – Chapter 4 - Koala Habitat Protection is relevant to the proposed development.

The SEPP applies to the site given that subject land occurs in Bega Valley LGA, which is listed in Schedule 2 of the SEPP. A Koala Plan of Management for the LGA has not been prepared.

Known Koala use trees, as per schedule 3 of the SEPP, have been identified within the subject land, within PCT 777 (*Allocasuarina littoralis*, *Angophora floribunda* and *Eucalyptus bosistoana*). Within the study area, the canopy was dominated by *Eucalyptus botryoides* (not listed as a Koala use tree as per schedule 3 of the SEPP) with occasional occurrences of *Eucalyptus bosistoana* and *Angophora floribunda*. *Allocasuarina littoralis* was only identified within the mid-storey in dense patches on the northern portion of the study area, with few saplings recorded scattered in areas of open grasslands within the subject land, the latter do not provide sufficient habitat value for Koalas. Furthermore, the majority of the subject land (1.88 ha) is made up open derived grasslands, which does not contain any canopy species and is regularly disturbed by maintenance, therefore not providing suitable habitat for the species.

Lastly, there have not been records of Koala within 5 km of the subject land in the past 20 years. Therefore, the site is therefore not considered core Koala habitat, and further consideration of the SEPP is not required.

6.3.2 State Environmental Planning Policy (SEPP) – Resilience and Hazards 2021 – Chapter 2 Coastal Management

SEPP – Resilience and Hazards 2021 – Chapter 2 Coastal Management applies to the site given that the subject land is entirely mapped within the Coastal Environment Area Map and the southern portion of the subject land is mapped under the Coastal Use Area Map (**Figure 2.2**).

Part 2.2, Division 3 – Coastal environment area, subsection 2.10 of the SEPP – Resilience and Hazards 2021 – Chapter 2 Coastal Management requires that development consent must not be granted to development on land which this section applies unless the consent authority has considered whether the proposed development is likely to cause an adverse impact on the following:

- a) the integrity and resilience of the biophysical, hydrological (surface and groundwater) and ecological environment,
- b) coastal environmental values and natural coastal processes,
- c) the water quality of the marine estate (within the meaning of the Marine Estate Management Act 2014), in particular, the cumulative impacts of the proposed development on any of the sensitive coastal lakes identified in Schedule 1,

- d) marine vegetation, native vegetation and fauna and their habitats, undeveloped headlands and rock platforms,
- e) existing public open space and safe access to and along the foreshore, beach, headland or rock platform for members of the public, including persons with a disability,
- f) Aboriginal cultural heritage, practices and places
- g) the use of the surf zone

One unnamed 1st order stream is mapped along the northern boundary of the study area, flows in a south western direction and joins Boggy Creek downstream, south west of the study area. The proposed development has been located away from the 1st order stream and its required Vegetated Riparian Zone (VRZ), 10 m for a 1st order stream, to avoid direct impacts to the biophysical, hydrological and ecological values of the stream and areas downstream of the study area. Although, direct impacts such as vegetation clearing will not be required within the VRZ of the stream, indirect impacts by the development may occur, but these will be mitigated/avoided by the implementation of a Construction Environmental Management Plan (CEMP) prior to any construction and clearing works within the subject land. The CEMP will also include an appropriate erosion and sedimentation control plan and weed control activities, to avoid the degradation of the 1st order stream and thereby, hydrological and ecological process of areas downstream of the study area. Details of the mitigation and managing of direct and indirect impacts on the biodiversity within the subject land are detailed further in **Section 5** and **Section 6.4**.

Part 2.2, Division 4 – Coastal use area, subsection 2.11 of the SEPP – Resilience and Hazards (2021) requires that development consent must not be granted to development on land which this section applies to unless the consent authority is satisfied of the following:

- (i) the development is designed, sited and will be managed to avoid an adverse impact referred to in paragraph (a), or
- (ii) if that impact cannot be reasonably avoided—the development is designed, sited and will be managed to minimise that impact, or
- (iii) if that impact cannot be minimised—the development will be managed to mitigate that impact, and

The subject land and proposed development area is not located in an area which will cause adverse impacts to existing safe access to Merimbula Lake. Existing residential lots and Lakewood Drive, south of the subject land, separate the subject land from the lake edge. Additionally, the southern portion of the study area, which is bound by the lake will not be impacted as part of the proposal, therefore, public access to Merimbula Lake will not be adversely impacted. The proposed development is in line with the R3 land zoning of Medium density residential, which will not adversely impact the visual amenity and scenic qualities of the coast.

6.3.3 Matters of National Environmental Significance

Threatened entities listed in the EPBC Act, such as threatened species or threatened ecological communities, require separate assessment to determine if a development will have a significant impact on relevant threatened entities. The Significant Impact Criteria, published by the Commonwealth Department of the Environment (2013), was applied to the Swift Parrot, as areas within the subject land are mapped within the Important Areas Map as Swift Parrot important habitat.

The significant impact assessment for the Swift Parrot is detailed in **Appendix C**. The assessments concluded that the proposal will not have a significant impact on the Swift Parrot, given that the proposed impact is small, will not fragment remaining areas of mapped as important Swift Parrot habitat within the study area, and mitigation methods will avoid indirect impacts to remaining mapped areas within the study area. Therefore, referral in accordance with the EPBC Act is not required.

6.3.4 Serious and Irreversible Impacts (SII)

This section documents the additional impact assessment provisions for communities and species at risk of SII (Section 9.1.1 and Section 9.1.2 of the BAM) relevant to the proposal:

- Swift Parrot (*Lathamus discolor*)

Detailed consideration of whether impacts on the Swift Parrot are serious and irreversible are included in **Table 6.2**. Consideration was given to the principles and criteria set out in the *Guidance to assist a decision-maker to determine a serious and irreversible impact* (OEH 2017b)

Table 6.2: SII assessment for Swift Parrot (*Lathamus discolor*)

SII (BAM [2020], Section 9.1.1)	Response
1) The action and measures taken to avoid the direct and indirect impact on the potential entity for an SII	The actions and measures taken to avoid direct and indirect impacts on areas mapped as Swift Parrot Important Habitat within the subject land are outlined in Section 5 of this report. The proposal has been located within land zoned as R3 – Medium Density Residential, which is fit for purpose. Effort has been made to avoid native vegetation, resulting in the retention of vegetation along the northern boundary of the study area which is mapped on the BV Map (land zoned C3) and forms part of a large patch native vegetation mapped under the important Areas Map. The proposal has been located and designed to impact areas of open grassland vegetation (~96% of the subject land), which currently supports cleared areas without a canopy layer and areas of bare ground. Avoidance of all areas mapped as Swift Parrot Important Habitat within the subject land is not possible as the need to establish a APZ along the northern boundary of the subject land must extend to areas mapped as Swift Parrot Important Habitat within the Lot. However, establishing the APZ will not require complete clearance, therefore retaining some important foraging habitat for the species within the APZ. A CEMP will be implemented for the duration of the project to reduce the potential of indirect or inadvertent impacts outside of the development footprint.
2) The assessor must consult the TBDC and/or sources to report on the current population of the species including: a) evidence of rapid decline presented by an estimate of the i) decline in population of the species in NSW in the past 10 years or three generations (whichever is longer), or	The TSSC (2016) Conservation advice for the Swift Parrot details that there are no recent estimates of the number of swift parrots in the wild. Garnett et al., (2011) derived an estimate of approximately 2,000 mature individuals as part of the Bird Action Plan 2010 assessment process and considered the population to be declining. As the most recent estimate was made in 2010, and the population was thought to be declining then, the population is now likely considerably less than 2,000 birds. Additionally, the preferred population viability analysis (PVA) model by Heinsohn et al. (2015), projects an extreme population decline of 94.7%

SAII (BAM [2020], Section 9.1.1)	Response
ii) decline in population of the species in NSW in the past 10 years or three generations (whichever is longer) as indicated by: an index of abundance appropriate to the species; decline in geographic distribution and/or habitat quality; exploitation; effect of introduced species, hybridisation, pathogens, pollutants, competitors or parasites	within a three-generation period largely due to impacts from sugar gliders on Swift Parrot Breeding habitat. The Committee considers that swift parrots are likely to undergo a future very severe reduction in population size over three generation lengths (16.2 years for this assessment) of approximately 87% and that the primary threat – predation of eggs and sitting females on the nest by introduced sugar gliders. The proposed development will impact 0.40 ha of potential foraging habitat for the species (retaining 0.62 ha of foraging habitat within the study area), and therefore, will not significantly contribute to the decline of the species population. The species only breed in Tasmania, consequently, there will be no adverse impact to the species breeding habitat by the proposal.
2) b) evidence of small population size presented by: i) an estimate of the species' current population size in NSW, and ii) an estimate of the decline in the species' population size in NSW in three years or one generation (whichever is longer), and iii) where such data is available, an estimate of the number of mature individuals in each subpopulation, or the percentage of mature individuals in each subpopulation, or whether the species is likely to undergo extreme fluctuations.	The proposed development will 0.40 ha of potential foraging habitat for the species. Impact to this area is unlikely to have an adverse impact on the species population, given that further 0.62 ha area of potential foraging habitat will not be impacted within the study area and larger patches of potential foraging habitat are present within the locality. It's evident that the species population is low, given that, there are no recent estimates of the number of swift parrots in the wild. The most recent population estimate for the species is approximately 2,000 mature individuals (Garnett et al., 2011) and was considered to be in decline at the time. Over three generation lengths, future Swift Parrot populations area predicted to undergo a very severe reduction in population size, with the primary threat being predation of eggs and sitting females on the nest by introduced sugar gliders (TSSC 2016). No breeding habitat occurs on mainland NSW; therefore, the development will not contribute to the primary species population threat.

SAII (BAM [2020], Section 9.1.1)	Response
2) c) evidence of restricted geographic range for the threatened species: i) extent of occurrence ii) area of occupancy iii) number of threat-defined locations (geographically or ecologically distinct areas in which a single threatening event may rapidly affect all species occurrences), and iv) whether the species' population is likely to undergo extreme fluctuations	The swift parrot breeds in Tasmania during the summer, during the winter month the entire population migrates north to mainland Australia. The breeding range of the swift parrot is largely restricted to the east and south-east coast of Tasmania and closely mirrors the distribution of <i>Eucalyptus globulus</i>. During winter months, the swift parrot range includes much of the east coast of mainland Australia, primarily including forested areas of Victoria and eastern New South Wales but ranging up to south-east Queensland. The full extent of occurrence (EOO) for this species was estimated at 57,000km² in the Action Plan for Australian Birds 2010 (Garnett et al., 2011), which is not considered limited. Calculating the area of occupancy (AOO) for the species is challenging given the temporally and spatially variable long-distance movements of swift parrots, and their specialised breeding and foraging requirements. Each year swift parrots move long distances to occupy new locations in response to changing food availability at the landscape scale To meaningfully estimate the AOO of this species both foraging and breeding habitat have to be considered, Webb et. al (2014) developed several models to estimate the AOO for the swift parrot combining potential breeding and foraging habitats over a six-year period, the models concluded that the AOO for swift parrots ranged from 18.5 km² to 355 km² between 2009 and 2014. The results demonstrate that the species has a restricted AOO as well as undergoing extreme fluctuations in the area used between years. Loss of breeding habitat is perhaps the single most threatening event which may rapidly affect the species occurrence. Historically, there has been a loss of swift parrot breeding habitat due to land clearing for agricultural expansion (Garnett et al., 2011; Saunders & Tzaros 2011). In addition to the impact of production forestry, wildfires in Tasmania also degrade the quality of breeding habitat, with one recent fire at the Craigow site (Webb et al., 2012) causing the collapse of over 60% of known nest trees. Given the extent and severity of forest loss across the breeding range of swift parrots, and the further deleterious impacts over large areas Tasmania by sugar gliders, there is strong evidence to support a continued decline in the area of occupancy of swift parrots due to breeding habitat loss.
2) d) evidence that the species is unlikely to respond to management because: i) known reproductive characteristics severely limit the ability to increase the existing population on, or occupy new habitat (e.g., species is clonal) on, a biodiversity stewardship site ii) the species is reliant on abiotic habitats which cannot be restored or	Not applicable, the proposed development is not a stewardship site

SAII (BAM [2020], Section 9.1.1)	Response
replaced (e.g., karst systems) on a biodiversity stewardship site, or iii) life history traits and/or ecology is known but the ability to control key threatening processes at a biodiversity stewardship site is currently negligible (e.g., frogs severely impacted by chytrid fungus).	
3) Where the TBDC indicates data is “unknown” or “data deficient” for a species for a criterion listed in Sub-section 9.1.2(2), the assessor must record this in the BDAR or BCAR	PVAs presented by Heinsohn et al., (2015) are valuable for demonstrating the deterministic trend of the population but do not provide useful estimates of the probability of extinction. Standard deviation around fledging success by Lacy et al., (2014), is more likely to reflect true population variability due to the large sample size of nests under observation and calculations of variation in mortality rates between years and sites. Given that these are the only supported population analysis, the TSSC (2016) considers there is insufficient information on relevant population size and decline rates for this species.
4) a) In relation to the impacts from the proposal on the species at risk of an SAI, the assessor must include data and information on: a) the impact on the species population presented by: i) an estimate of the number of individuals (mature and immature) present in the subpopulation on the subject land (the site may intersect or encompass the subpopulation) and as a percentage of the total NSW population, and ii) an estimate of the number of individuals (mature and immature) to be impacted by the proposal and as a percentage of the total NSW population, or iii) if the species' unit of measure is area, provide data on the number of individuals on the site, and the estimated number that will be impacted, along with the area of habitat to be impacted by the proposal	Given that the species is a very highly mobile migrant to mainland NSW, estimating the number of individuals within the subject land based on point records or solely on potential foraging habitat present, will be difficult and of low confidence. The species has not been recorded in the study area within the past 20 years and breeding habitat is only present in Tasmania. Within the study area a total of 1.02 ha of potential foraging habitat for the species as mapped per the Important Area Map is present. The proposal will impact 0.40 ha of this mapped area, which constitutes to 39% of the total Swift Parrot Important Habitat mapped area within the study area. Impacts the 0.40 ha area are related to the establishment of the APZ required for the development. The APZ will not require complete clearance, allowing for some canopy species to remain. Additionally, larger patches of vegetation, within the locality, remain providing suitable foraging habitat for the species. Given that the species only breeds in Tasmania and the area of impact by the proposal is low, a significant impact on the species population is not predicted.

SAII (BAM [2020], Section 9.1.1)	Response
4) b) impact on the geographic range presented by: i) the area of the species' geographic range to be impacted by the proposal in hectares, and a percentage of the total AOO, or EOO within NSW ii) the impact on the subpopulation as either: all individuals will be impacted (subpopulation eliminated); OR impact will affect some individuals and habitat; OR impact will affect some habitat, but no individuals of the species will be directly impacted . iii) to determine if the persisting subpopulation that is fragmented will remain viable, estimate (based on published and unpublished sources such as scientific publications, technical reports, databases or documented field observations) the habitat area required to support the remaining population, and habitat available within dispersal distance, and distance over which genetic exchange can occur (e.g., seed dispersal) and pollination distance for the species iv) to determine changes in threats affecting remaining subpopulations and habitat if the proposed impact proceeds, estimate changes in environmental factors including changes to fire regimes (frequency, severity); hydrology, pollutants; species interactions (increased competition and effects on pollinators or dispersal); fragmentation, increased edge effects, likelihood of disturbance; and disease, pathogens and parasites. Where these factors have been considered elsewhere in relation to the target species, the assessor may refer to the relevant sections of the BDAR or BCAR.	The proposal will impact an 0.40 ha of potential foraging habitat for the swift parrot, as mapped by the Important Area Map. This constitutes to 32% of the total area of potential foraging habitat with the study area. The proposed development will partly impact the canopy present within the 0.40 ha to establish an APZ, therefore reducing potential foraging habitat for the species. However, given the amount of retained potential foraging habitat (0.62 ha) within the study area, and larger stands of native vegetation within the locality (also mapped under the Important Areas Map), impacts by the proposal are deemed to not be significant on the species foraging habitat. No individuals will be directly impacted by the proposal, as pre-clearance protocols and a CEMP will be in place prior to any works commencing. Garnett et al., (2011) estimates the full EOO for this species at 57,000km² in the Action Plan for Australian Birds 2010. This includes primarily areas in NSW, but also includes occurrences within Victoria, ACT and south eastern Queensland. Given that the species is a winter migrant to mainland Australia from Tasmania, the proposed impact by the development to 0.40 ha of potential foraging habitat fragment the population or of adversely impact the genetic exchange. Sections 4.4, 5 and 6 of the BDAR detail efforts by the proposal to avoid and mitigate direct and indirect impact as well as assessing impacts on potential species habitat relating to the swift parrot.

SAII (BAM [2020], Section 9.1.1)	Response
5.) The assessor may also provide new information to demonstrate that the principle identifying the TEC at risk of an SAI, is not accurate.	No new information is provided.



Figure 6.1: Development footprint and PCT present within subject land

6.4 Mitigation and management of impacts on biodiversity values

As all impacts to biodiversity cannot be avoided by the proposal, the mitigation measures proposed below (**Table 6.3**) and in will assist with ensuring that direct and indirect impacts are mitigated to the fullest extent practical.

6.4.1 Construction Environmental Management Plan (CEMP)

A site-specific CEMP will be developed prior to construction taking place and implemented over the life of the project. The CEMP will incorporate adaptive management principles. The CEMP will outline management actions to avoid inadvertently causing additional impacts to those described in this BDAR. Management actions will avoid and/or limit the potential for indirect offsite impacts and include an appropriate erosion and sedimentation control plan and weed control activities. Any management actions should follow best practice protocols such as Landcom (2004) or the RMS Biodiversity Guidelines (2011).

A number of non-threatened fauna species such as birds and reptiles are likely to be present at the subject land. Therefore, an appropriate pre-clearance and fauna management protocol, and unexpected finds procedure will be put in place at the time of construction to avoid and mitigate any potential harm or injury to these individuals.

6.4.2 Pre-clearance protocols

It is possible that fauna, such as common birds and reptiles are present within the site at the time of construction. Appropriate pre-clearance protocols are to be put in place at the time of vegetation clearing to mitigate and avoid potential harm or injury to these individuals. These protocols should be included in the CEMP. They should include, as a minimum, pre-clearance surveys, clearing supervision and soft-felling techniques where habitat trees are required to be removed. Habitat trees are those that provide sheltering or breeding habitat for fauna and include, but not limited to hollow branches or stick nests. These protocols should be adaptive depending on site specific conditions. As habitat trees (where nests or other habitat features are identified) have not been identified within the subject land (at the time of survey), a pre-clearance survey should aim to identify any active nests

Soft-felling techniques as part of vegetation clearing encourages fauna to relocate outside of the disturbance footprint prior to habitat clearing or alternatively provide an opportunity to move fauna during vegetation clearing works. Soft felling techniques should be adaptive depending on site species conditions and reduces the chance of injury to fauna.

Should habitat trees be present in the subject land at the time of construction and soft-felling techniques required, then the project ecologist is to develop the clearing procedure in co-ordination with the project manager and any clearing contractors. This will include notifying WIREs or a local vet clinic prior to clearing, marking habitat trees, staged vegetation removal, presence of a qualified wildlife handler, and a plan for the relocation of any fauna and salvageable habitat features.

Additionally, prior to clearing of vegetation:

- The subject land boundaries should be fenced to avoid impacts to vegetation proposed to retention.
- Signs should be clearly located along the fence to ensure no access to areas outside the subject land by works personnel or machinery.

- Fencing and signage should remain in place until all works are completed within the subject land.
- WIRES and the nearest veterinary clinic should be notified of the works and the potential for injured wildlife.

Table 6.3: Proposed mitigation measures

Identifier	Mitigation action	Development phase	Outcome	Timing	Responsibility
E01	A Construction Environmental Management Plan (CEMP) would be prepared and approved by Blacktown City Council prior to clearing of native vegetation and threatened species habitat within the development site. The CEMP would include the following: Identification of necessary hold points to ensure all biodiversity management actions are met. i.e., pre-clearing surveys followed by stage clearing of vegetation. Preparation of maps to clearly identify construction limits and environmentally sensitive areas. Erosion and sediment control actions in accordance with the Blue Book (Landcom 2004) to be implemented during construction phases. Updates to avoid and minimise indirect impacts to threatened species habitat and ecological communities located adjacent to the development site. Any required updates to the site induction procedure.	Pre-construction	Flora and fauna would be managed in accordance with the requirements of the CFFMP; prevention of over clearing of vegetation; prevention of weed establishment and invasion.	Pre-construction and construction	Project ecologist Construction contractor
E02	Prior to commencement of construction a Vegetation Management Plan (VMP) would be prepared by a qualified ecologist for the conservation and enhancement of biodiversity values within retained vegetation Bell Bird Creek. The VMP at a minimum will identify biodiversity values and provide targeted management actions to improve vegetation and ecological condition.	Pre-construction	Improve condition of remnant vegetation and threatened species habitat along Bell Bird Creek	Pre-construction and during operations	Project ecologist Appointed bush regeneration contractor
E03	Site inductions during construction to include a briefing regarding the local fauna of the site and protocols to be undertaken if fauna are encountered.	Construction	Prevents fauna injury/mortality	Construction	Construction contractor
E04	Prior to the commencement of clearing, the project ecologist will conduct a pre-clearing survey to confirm the absence of any nesting fauna within the trees to be removed.	Construction	Prevents fauna injury/mortality	Pre-construction	Project ecologist
E05	Vegetation occurring within the first 30 metres of the eastern boundary of the subject land would be monitored to ensure it is not being indirectly impacted by construction for the development (e.g., establishment of weeds, erosion and sedimentation or from earthworks). Where impacts are detected, the project ecologist would prepare an adaptive management plan to avoid further impacts.	Construction	Prevention of indirect impacts to adjacent vegetation	Monthly during construction	Construction contractor

E06	Frequent maintenance of construction machinery and plant will be undertaken to minimise unnecessary noise or air pollution.	Construction	Minimises disruption to fauna foraging, nesting or roosting behaviours	Construction	Construction contractor
E07	If any animal is injured during the clearing process, contact the relevant local wildlife rescue agency (e.g., WIRES) and/or veterinary surgery as soon as practical. Until the animal can be cared for by a suitably qualified animal handler, if possible, minimise stress to the animal and reduce the risk of further injury by: Handling fauna with care and as little as possible. Covering larger animals with a towel or blanket and placing in a large cardboard box. Placing small animals in a cotton bag, tied at the top. Keeping the animal in a quiet, warm, ventilated and dark location.	Construction / Operation	Prevents fauna injury/ mortality	Pre-construction, construction	Construction contractor
E08	During operation, where possible, lighting fixtures adjacent to the Bell Bird Creek, along the eastern boundary will be deactivated when not required during night-time hours. If this is not possible, directional lighting or light shades will be adopted to reduce light spill into adjacent habitat.	Construction / Operation	Minimises disruption to fauna foraging, nesting or roosting behaviours	Construction	Construction contractor

7 Offset requirements and credit calculations

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

7.1 Impacts which require an offset

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

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

All vegetation zones within the subject land are representative of an CECC and/or had a vegetation integrity score of greater than 15 (**Table 7.1**) and, therefore, require offsetting.

Table 7.1: Vegetation zones assessed that require an offset.

Vegetation zone	Plant community type	Condition Class	Vegetation Integrity Score	Total impact (ha)
1	PCT 777 – Coast Grey Box - Mountain Grey Gum - stringybark moist shrubby open forest in coastal gullies, southern South East Corner Bioregion	ODNG	28	1.88
2		Modified	46.8	0.32
Total native vegetation			-	2.20

7.2 Impacts that do not require offsetting or further assessment

There are no impacts to native vegetation that do not require offsetting. Therefore, there are no areas of native vegetation of threatened species habitat that scored a vegetation integrity score below the offset condition threshold outlined above.

Impacts to areas identified as 'bare ground' within the subject land were not further assessed in this report because they could not be characterised as a native vegetation community due to lack of vegetation present.

7.3 Credit calculations and classes

7.3.1 Ecosystem credits

The ecosystem credits required to offset the proposal are provided in **Table 7.2** and **Appendix D**. A total of **26** ecosystem credits are required to offset the proposed development.

Table 7.2: Ecosystem credits summary and credit profiles.

Veg zone number	Plant community type	Condition Class	Credits required
1	PCT 777 – Coast Grey Box - Mountain Grey Gum - stringybark moist shrubby open forest in coastal gullies, southern South East Corner Bioregion	ODNG	20
2		Modified	6
Total			26

The total cost of ecosystem credits, should the Biodiversity Conservation Trust (BCT) be used to offset the impacts, are currently (8 September 2022) estimated to be **\$264,894.07** (excl GST). Details are provided in **Table 7.3** and **Appendix D**. The proponent may also wish to purchase credits available on the market or may wish to pursue other offset sites as required. A final decision on how the credits will be secured will be made as the project progresses.

Table 7.3: Ecosystem credits summary and credit profiles.

Plant community type	Price per credit	No. of credits	Final credit price (ex GST)
PCT 777 – Coast Grey Box - Mountain Grey Gum - stringybark moist shrubby open forest in coastal gullies, southern South East Corner Bioregion	\$9,262.03	26	\$264,894.07

7.3.2 Species credits

The species credits required to offset the proposal are provided in **Table 7.4** and **Appendix D**. A total of **20** species credits are required to offset the proposed development.

Table 7.4: Species credits required

Species	Credits required
Fauna	
Swift Parrot (<i>Lathamus discolor</i>)	13
Long-nosed Potoroo (<i>Potorous tridactylus</i>)	7
Total	20

The total cost of species credits, should the Biodiversity Conservation Trust (BCT) be used to offset the impacts, are currently (8 September 2022) estimated to be **\$10,380.56** (excl GST). Details are provided in **Table 7.5** and **Appendix D**.

Table 7.5: Cost of species credits

Species	Price per credit	No. of credits	Final credit price (ex GST)
Swift Parrot (<i>Lathamus discolor</i>)	\$309.97	13	\$5,903.34
Long-nosed Potoroo (<i>Potorous tridactylus</i>)	\$463.67	7	\$4,477.22
Total		20	\$10,380.56

8 References

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Appendix A Plot data collected

Plot No.	PCT	Area (ha)	Condition class	Zone	Easting	Northing	Bearing
1	777	1.88	ODNG	56	222777	5913083	191
2	777	0.32	Modified	56	222795	5913153	224
3	777	1.88	ODNG	56	222736	5912958	146

Plot No.	Composition					
	Tree	Shrub	Grass	Forb	Fern	Other
1	1	4	7	7	2	5
2	3	10	10	4	2	13
3	1	5	11	8	2	3

Plot No.	Structure					
	Tree	Shrub	Grass	Forb	Fern	Other
1	0.2	4.7	78.3	0.9	0.3	0.5
2	28	5.5	1.7	0.8	39	38
3	0.1	1.1	37.8	1	0.2	0.6

Plot No.	Function										
	Large trees	Hollow trees	Litter cover (%)	Fallen logs (m)	Tree steam 5-10 cm	Tree stem 10-20 cm	Tree stem 20-30 cm	Tree steam 30-50 cm	Tree stem 50-80 cm	Tree regen	High threat exotic
1	0	0	0	0	A	A	A	A	A	P	5.3
2	0	0	87	22	P	P	P	P	P	A	0.1
3	0	0	9	0	A	A	A	A	A	P	2.2

A – Absent, P – Present, NA – No benchmark data

Appendix B Flora and fauna species inventories

Flora

Family	Scientific Name	Common Name	Native/ Exotic	PCT 777 Modified	PCT 777 ODNG
Apiaceae	<i>Centella asiatica</i>	Indian Pennywort	Native		X
	<i>Hydrocotyle hirta</i>	Hairy Pennywort	Native	X	
	<i>Hydrocotyle sibthorpioides</i>		Native	X	X
	<i>Platysace lanceolata</i>	Shrubby Platysace	Native	X	X
Apocynaceae	<i>Marsdenia rostrata</i>	Milk Vine	Native	X	
	<i>Tylophora barbata</i>	Bearded Tylophora	Native	X	
Arecaceae	<i>Phoenix canariensis</i>	Canary Island Date Palm	Exotic	X	
	<i>Bidens pilosa</i>	Cobbler's Pegs	Exotic		X
	<i>Cassinia trinerva</i>		Native	X	
	<i>Cirsium vulgare</i>	Spear Thistle	Exotic	X	X
	<i>Conyza sumatrensis</i>	Tall fleabane	Exotic		X
	<i>Coronidium elatum</i>		Native	X	
	<i>Facelis retusa</i>		Exotic		X
	<i>Gamochaeta americana</i>		Exotic		X
	<i>Gamochaeta calviceps</i>	Cudweed	Exotic		X
	<i>Hypochaeris glabra</i>	Smooth Catsear	Exotic	X	X
	<i>Leontodon saxatilis</i>	Lesser Hawkbit	Exotic		X
	<i>Ozothamnus diosmifolius</i>	White Dogwood	Native	X	X
	<i>Senecio madagascariensis</i>	Fireweed	Exotic	X	X
Bignoniaceae	<i>Pandorea pandorana</i>	Wonga Wonga Vine	Native	X	
Blechnaceae	<i>Blechnum cartilagineum</i>	Gristle Fern	Native	X	
Campanulaceae	<i>Lobelia purpurascens</i>	whiteroot	Native	X	X
	<i>Wahlenbergia gracilis</i>	Sprawling Bluebell	Native		X
Casuarinaceae	<i>Allocasuarina littoralis</i>	Black She-Oak	Native	X	X
Clusiaceae	<i>Hypericum gramineum</i>	Small St John's Wort	Native		X
Convolvulaceae	<i>Dichondra repens</i>	Kidney Weed	Native	X	X
Cyatheaceae	<i>Cyathea australis</i>	Rough Treefern	Native	X	
Cyperaceae	<i>Cyperus eragrostis</i>	Umbrella Sedge	Exotic		X
	<i>Gahnia melanocarpa</i>	Black Fruit Saw-sedge	Native	X	X
	<i>Lepidosperma laterale</i>	Variable Sword-sedge	Native	X	X
Dennstaedtiaceae	<i>Pteridium esculentum</i>	Bracken	Native	X	X
Dicksoniaceae	<i>Calochlaena dubia</i>	Rainbow Fern	Native	X	
Dilleniaceae	<i>Hibbertia aspera</i>	Rough Guinea Flower	Native	X	X

Family	Scientific Name	Common Name	Native/ Exotic	PCT 777 Modified	PCT 777 ODNG
	<i>Hibbertia dentata</i>	Twining Guinea Flower	Native	X	
<i>Elaeocarpaceae</i>	<i>Elaeocarpus reticulatus</i>	Blueberry Ash	Native	X	
<i>Ericaceae</i>	<i>Leucopogon juniperinus</i>	Prickly Beard-heath	Native	X	X
	<i>Leucopogon lanceolatus</i>		Native	X	
<i>Euphorbiaceae</i>	<i>Homalanthus populifolius</i>		Native	X	
<i>Fabaceae</i> (<i>Faboideae</i>)	<i>Glycine clandestina</i>	Twining glycine	Native	X	X
	<i>Hardenbergia violacea</i>	False Sarsaparilla	Native	X	X
	<i>Indigofera australis</i>	Australian Indigo	Native	X	
	<i>Kennedia rubicunda</i>	Dusky Coral Pea	Native	X	X
	<i>Lotus subbiflorus</i>	Hairy Birds-foot Trefoil	Exotic		X
<i>Fabaceae</i> (<i>Mimosoideae</i>)	<i>Acacia falciformis</i>	Broad-leaved Hickory	Native	X	
	<i>Acacia implexa</i>	Hickory Wattle	Native	X	
	<i>Acacia mearnsii</i>	Black Wattle	Native	X	X
	<i>Acacia mucronata</i> subsp. <i>longifolia</i>		Native		X
	<i>Acacia subporosa</i>	River Wattle	Native	X	
	<i>Acacia ulicifolia</i>	Prickly Moses	Native	X	X
<i>Gentianaceae</i>	<i>Centaurium tenuiflorum</i>	Branched Centaury, Slender centaury	Exotic		X
<i>Goodeniaceae</i>	<i>Goodenia ovata</i>	Hop Goodenia	Native	X	
<i>Haloragaceae</i>	<i>Gonocarpus tetragynus</i>	Poverty Raspwort	Native		X
	<i>Gonocarpus teucrioides</i>	Germander Raspwort	Native	X	X
<i>Lauraceae</i>	<i>Cassytha glabella</i>		Native		X
<i>Lomandraceae</i>	<i>Lomandra longifolia</i>	Spiny-headed Mat-rush	Native	X	X
	<i>Lomandra multiflora</i> subsp. <i>multiflora</i>	Many-flowered Mat-rush	Native	X	X
<i>Luzuriagaceae</i>	<i>Eustrephus latifolius</i>	Wombat Berry	Native	X	
	<i>Geitonoplesium cymosum</i>	Scrambling Lily	Native	X	
<i>Lythraceae</i>	<i>Lythrum hyssopifolia</i>	Hyssop Loosestrife	Native		X
<i>Malvaceae</i>	<i>Modiola caroliniana</i>	Red-flowered Mallow	Exotic		X
<i>Menispermaceae</i>	<i>Stephania japonica</i>	Snake vine	Native	X	
<i>Myrtaceae</i>	<i>Angophora floribunda</i>	Rough-barked Apple	Native	X	
	<i>Eucalyptus bosistoana</i>	Coast Grey Box	Native	X	
	<i>Eucalyptus botryoides</i>	Bangalay	Native	X	X
	<i>Kunzea ambigua</i>	Tick Bush	Native	X	X
<i>Oleaceae</i>	<i>Notelaea venosa</i>	Veined Mock-olive	Native	X	
<i>Oxalidaceae</i>	<i>Oxalis perennans</i>		Native	X	X



Family	Scientific Name	Common Name	Native/ Exotic	PCT 777 Modified	PCT 777 ODNG
Passifloraceae	<i>Passiflora caerulea</i>	Blue Passionflower	Exotic	X	
	<i>Passiflora cinnabarina</i>	Red Passionfruit	Native	X	
Phormiaceae	<i>Dianella caerulea</i>	Blue Flax-lily	Native	X	X
Pittosporaceae	<i>Billardiera mutabilis</i>	Climbing Apple Berry	Native	X	X
	<i>Pittosporum revolutum</i>	Rough Fruit Pittosporum	Native	X	X
	<i>Pittosporum undulatum</i>	Sweet Pittosporum	Native	X	X
Plantaginaceae	<i>Plantago lanceolata</i>	Lamb's Tongues	Exotic		X
	<i>Veronica plebeia</i>	Trailing Speedwell	Native	X	X
Poaceae	<i>Axonopus fissifolius</i>	Narrow-leaved Carpet Grass	Exotic		X
	<i>Bothriochloa macra</i>	Red Grass	Native		X
	<i>Cenchrus clandestinus</i>	Kikuyu Grass	Exotic		X
	<i>Cynodon dactylon</i>	Common Couch	Native		X
	<i>Digitaria sanguinalis</i>	Crab Grass	Exotic		X
	<i>Echinopogon caespitosus</i>	Bushy Hedgehog-grass	Native	X	X
	<i>Entolasia marginata</i>	Bordered Panic	Native	X	X
	<i>Entolasia stricta</i>	Wiry Panic	Native	X	X
	<i>Eragrostis brownii</i>	Brown's Lovegrass	Native		X
	<i>Eragrostis curvula</i>	African Lovegrass	Exotic		X
	<i>Eragrostis leptostachya</i>	Paddock Lovegrass	Native		X
	<i>Imperata cylindrica</i>	Blady Grass	Native		X
	<i>Lachnagrostis filiformis</i>		Native		X
	<i>Microlaena stipoides</i> var. <i>stipoides</i>	Weeping Grass	Native	X	X
	<i>Oplismenus imbecillis</i>		Native	X	X
	<i>Panicum simile</i>	Two-colour Panic	Native		X
	<i>Paspalidium distans</i>		Native		X
	<i>Paspalum dilatatum</i>	Paspalum	Exotic		X
	<i>Poa labillardierei</i> var. <i>labillardierei</i>	Tussock	Native		X
	<i>Poa meionectes</i>		Native	X	
	<i>Setaria parviflora</i>		Exotic		X
	<i>Sporobolus africanus</i>	Parramatta Grass	Exotic		X
Primulaceae	<i>Lysimachia arvensis</i>	Scarlet Pimpernel	Exotic		X
	<i>Myrsine howittiana</i>	Brush Muttonwood	Native	X	
Proteaceae	<i>Persoonia linearis</i>	Narrow-leaved Geebung	Native	X	X
Pteridaceae	<i>Cheilanthes austrotenuifolia</i>	Rock Fern	Native	X	
	<i>Cheilanthes sieberi</i> subsp. <i>sieberi</i>	Rock Fern	Native	X	X

Family	Scientific Name	Common Name	Native/ Exotic	PCT 777 Modified	PCT 777 ODNG
Rubiaceae	<i>Gynochthodes jasminoides</i>	Sweet Morinda	Native	X	
	<i>Opercularia aspera</i>	Coarse Stinkweed	Native	X	X
	<i>Opercularia diphylla</i>	Stinkweed	Native		X
	<i>Pomax umbellata</i>	Pomax	Native		X
Rutaceae	<i>Zieria smithii</i>	Sandfly Zieria	Native	X	
Thymelaeaceae	<i>Pimelea axiflora</i>		Native	X	
Ulmaceae	<i>Trema tomentosa</i> var. <i>aspera</i>	Native Peach	Native	X	
Verbenaceae	<i>Verbena bonariensis</i>	Purpletop	Exotic		X
Vitaceae	<i>Cissus hypoglauca</i>	Giant Water Vine	Native	X	

Fauna

Family	Scientific name	Common name	Native / Exotic
Acanthizidae	<i>Acanthiza chrysorrhoa</i>	Yellow-rumped Thornbill	Native
	<i>Acanthiza nana</i>	Yellow Thornbill	Native
	<i>Smicrornis brevirostris</i>	Weebill	Native
Alcedinidae	<i>Dacelo novaeguineae</i>	Laughing Kookaburra	Native
Artamidae	<i>Cracticus tibicen</i>	Australian Magpie	Native
Cacatuidae	<i>Cacatua galerita</i>	Sulphur-crested Cockatoo	Native
	<i>Eolophus roseicapillus</i>	Galah	Native
Charadriidae	<i>Vanellus miles</i>	Masked Lapwing	Native
Monarchidae	<i>Grallina cyanoleuca</i>	Magpie-lark	Native
Psittacidae	<i>Trichoglossus haematodus</i>	Rainbow Lorikeet	Native
Psophodidae	<i>Psophodes olivaceus</i>	Eastern Whipbird	Native
Rhipiduridae	<i>Rhipidura leucophrys</i>	Willie Wagtail	Native
Tachyglossidae	<i>Tachyglossus aculeatus</i>	Short-beaked Echidna	Native



Appendix C Assessments of Significance

Commonwealth listings under the EPBC Act

The EPBC Act Matters of National Environmental Significance (MNES) (EPBC Act Significant Impact Guidelines) (DotE 2013) provides 'Significant Impact Criteria' that are to be used to assist in determining whether a proposed action is likely to have a significant impact on a MNES and subsequently the need for referral. MNES identified within the subject land, including the Swift Parrot, have been addressed below.

*Swift Parrot (*Lathamus discolor*) – Critically Endangered*

The Swift Parrot breeds in Tasmania during spring and summer, migrating in autumn and winter across Bass Strait to south-eastern Australia where it forages widely on flowering Eucalypts in a wide variety of forest types. It mostly feeds in box-ironbark forest, but also in parks, gardens and flowering Eucalypts in paddocks (Menkhorst et al. 2017). *Eucalyptus botryoides*, *Eucalyptus bosistoana* and *Angophora floribunda* at the site provide potential foraging habitat for this species. There are 13 records of this species within the locality with the nearest being in 2007, 0.1 km from the site and the most recent record 1.3 km from the site in 2021.

Within the subject land, an area of 0.40 ha is mapped within the Important Area Map as Important Swift Parrot Habitat. An additional 0.62 ha area mapped as Important Swift Parrot Habitat will not be impacted within the study area. Areas of mapped Important Swift Parrot Habitat area represented by PCT 777 – Coast grey Box – stringybark moist shrubby open forest in coastal gullies, southern South East Corner Bioregion (see **Section 4**).

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

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

The study area constitutes approximately 3.08 ha of land, of which 0.40 ha of foraging habitat for this species will be directly impacted (approximately 13%) largely for the establishment of an APZ. Although the majority of the APZ falls within the PCT 777 'modified' condition class, total clearance of all vegetation is not required to establish an APZ and the impacts in this area will be associated with partial clearance, retaining as many canopy trees as possible while also meeting APZ requirements. Additionally, 0.62 ha of land mapped as Swift Parrot Important Habitat will not be impacted within the study area.

Given the Swift Parrot does not breed in NSW, forages widely, the small amount of potential foraging habitat to be impacted and that extensive areas of potential habitat occur to the north of the site, it is unlikely that the proposal would lead to a long-term decrease in the size of a population.

- *reduce the area of occupancy of the species*

The proposal will marginally reduce the area of occupancy of this species through the direct impact of 0.40 ha of potential foraging habitat. However, 0.62 ha of potential foraging habitat

will remain for this species in the study area and extensive habitat is present around the site. Therefore, the proposal is unlikely to significantly reduce the area of occupancy of this species.

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

The habitat to be removed is on the fringe of an extensive area of potential habitat for this species which is extremely mobile and forages over large distances. Therefore, no habitat will become fragmented and no populations will become fragmented, as a consequence of the proposal. Furthermore, impact to the 0.40 ha area impacted will not be of total clearance as the establishing the APZ only requires thinning of the canopy layer.

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

Habitat at the site does not provide breeding resources for this species and represents only very small portion of potential foraging habitat for this species. Therefore, the proposal would not adversely affect habitat critical to the survival of this species.

- *disrupt the breeding cycle of a population*

This species breeds in Tasmania and, therefore, there are no impacts from the proposal on the breeding cycle of this species.

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

The study area constitutes approximately 3.08 ha of land, of which 0.40 ha of foraging habitat for this species will be directly impacted (approximately 13%) largely for the establishment of an APZ. Although the majority of the APZ falls within the PCT 777 'modified' condition class, total clearance of all vegetation is not required to establish an APZ and the impacts in this area will be associated with partial clearance, retaining as many canopy trees as possible while also meeting APZ requirements. Additionally, 0.62 ha of land mapped as Swift Parrot Important Habitat will not be impacted within the study area.

Given the Swift Parrot forages widely, the small amount of potential foraging habitat to be impacted and that extensive areas of potential habitat occur to the around of the site, it is unlikely that the proposal would decrease the availability of habitat for this species to the extent that it is likely to decline.

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

This component is not applicable.

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

This component is not applicable.

- *interfere with the recovery of the species*

The proposal is unlikely to substantially interfere with the recovery of the species as the amount of potential habitat to be impacted is very small (0.40 ha) and a substantial amount of potential

foraging habitat for the species remains within the study area (0.62 ha) and adjacent to the site.

Conclusion of EPBC Act Significant Impact Guidelines (DotE 2013) for Swift Parrot.

A referral is not recommended for the Swift Parrot, as:

- no breeding habitat would be removed
- the proposal is will not impact on the breeding cycle of this species
- the proposal would not affect critical habitat (e.g., further fragment the surrounding bushland or remove essential habitat)
- suitable foraging habitat is found in the locality, particularly to the north of the site and 0.62 ha of potential foraging habitat will remain in the study area.

Appendix D Biodiversity payment summary report and credit summary



Biodiversity payment summary report

Assessment Id	Payment data version	Assessment Revision	Report created
00034981/BAAS18047/22/00034982		0	08/09/2022
Assessor Name	Assessor Number	Proposal Name	BAM Case Status
Ed Cooper	BAAS18047	Lakewood Drive Merimbula	Open
Assessment Type	Date Finalised	BOS entry trigger	
Part 4 Developments (General)	To be finalised	BOS Threshold: Biodiversity Values Map and area clearing threshold	

PCT list

Price calculated	PCT common name	Credits
Yes	777 - Coast Grey Box - Mountain Grey Gum - stringybark moist shrubby open forest in coastal gullies, southern South East Corner Bioregion	26

Species list

Price calculated	Species	Credits
Yes	<i>Lathamus discolor</i> (Swift Parrot)	13
Yes	<i>Potorous tridactylus</i> (Long-nosed Potoroo)	7

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

Assessment Id	Proposal Name	Page 1 of 3
00034981/BAAS18047/22/00034982	Lakewood Drive Merimbula	



Biodiversity payment summary report

IBRA sub region	PCT common name	Threat status	Offset trading group	Risk premium	Administrative cost	Methodology adjustment factor	Price per credit	No. of ecosystem credits	Final credits price
South East Coastal Ranges	777 - Coast Grey Box - Mountain Grey Gum - stringybark moist shrubby open forest in coastal gullies, southern South East Corner Bioregion	No	Southern Lowland Wet Sclerophyll forests <50%	20.69%	\$297.12	2.3178	\$9,262.03	26	\$240,812.79
Subtotal (excl. GST)									\$240,812.79
GST									\$24,081.28
Total ecosystem credits (incl. GST)									\$264,894.07

Species credits for threatened species

Species profile ID	Species	Threat status	Price per credit	Risk premium	Administrative cost	No. of species credits	Final credits price
10455	Lathamus discolor (Swift Parrot)	Endangered	\$309.97	20.6900%	\$80.00	13	\$5,903.34
10662	Potorous tridactylus (Long-nosed Potoroo)	Vulnerable	\$463.67	20.6900%	\$80.00	7	\$4,477.22
Subtotal (excl. GST)							\$10,380.56
GST							\$1,038.06

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Biodiversity payment summary report

Total species credits (incl. GST)

\$11,418.62

Grand total

\$276,312.69

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BAM Credit Summary Report

Proposal Details

Assessment Id	Proposal Name	BAM data last updated *
00034981/BAAS18047/22/00034982	Lakewood Drive Merimbula	16/06/2022
Assessor Name	Report Created	BAM Data version *
Ed Cooper	08/09/2022	54
Assessor Number	BAM Case Status	Date Finalised
BAAS18047	Open	To be finalised
Assessment Revision	Assessment Type	BOS entry trigger
0	Part 4 Developments (General)	BOS Threshold: Biodiversity Values Map and area clearing threshold

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

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

Zone	Vegetation zone name	TEC name	Current Vegetation integrity score	Change in Vegetation integrity (loss / gain)	Area (ha)	Sensitivity to loss (Justification)	Species sensitivity to gain class	BC Act Listing status	EPBC Act listing status	Biodiversity risk weighting	Potential SAIL	Ecosystem credits
Coast Grey Box - Mountain Grey Gum - stringybark moist shrubby open forest in coastal gullies, southern South East Corner Bioregion												
1	777_ODN G	Not a TEC	28	28.0	1.9	PCT Cleared - 15%	High Sensitivity to Gain			1.50		20

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Proposal Name
Lakewood Drive Merimbula

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BAM Credit Summary Report

2 777_Modified	Not a TEC	46.8	46.8	0.32	PCT Cleared - 15%	High Sensitivity to Gain		1.50	6
								Subtotal	26
								Total	26

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 SAIL	Species credits
<i>Lathamus discolor</i> / Swift Parrot (Fauna)									
777_Modified	46.8	46.8	0.31	Environment Protection and Conservation Act listing status	Effectiveness of management in controlling threats	Endangered	Critically Endangered	True	11
777_ODNG	28.0	28.0	0.09	Environment Protection and Conservation Act listing status	Effectiveness of management in controlling threats	Endangered	Critically Endangered	True	2
								Subtotal	13

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BAM Credit Summary Report

Potorous tridactylus / Long-nosed Potoroo (Fauna)									
777_Modified	46.8	46.8	0.32	Biodiversity Conservation Act listing status	Effectiveness of management in controlling threats	Vulnerable	Vulnerable	False	7
								Subtotal	7



BAM Biodiversity Credit Report (Like for like)

Proposal Details

Assessment Id	Proposal Name	BAM data last updated *
00034981/BAAS18047/22/00034982	Lakewood Drive Merimbula	16/06/2022
Assessor Name	Assessor Number	BAM Data version *
Ed Cooper	BAAS18047	54
Proponent Names	Report Created	BAM Case Status
	08/09/2022	Open
Assessment Revision	Assessment Type	Date Finalised
0	Part 4 Developments (General)	To be finalised
BOS entry trigger	* 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.	
BOS Threshold: Biodiversity Values Map and area clearing threshold		

Potential Serious and Irreversible Impacts

Name of threatened ecological community	Listing status	Name of Plant Community Type/ID
Nil		
Species		
Lathamus discolor / Swift Parrot		

Additional Information for Approval

Assessment Id	Proposal Name	Page 1 of 4
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BAM Biodiversity Credit Report (Like for like)

PCT Outside Ibra Added

None added

PCTs With Customized Benchmarks

PCT

No Changes

Predicted Threatened Species Not On Site

Name

No Changes

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

Name of Plant Community Type/ID	Name of threatened ecological community	Area of impact	HBT Cr	No HBT Cr	Total credits to be retired
777-Coast Grey Box - Mountain Grey Gum - stringybark moist shrubby open forest in coastal gullies, southern South East Corner Bioregion	Not a TEC	2.2	0	26	26

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BAM Biodiversity Credit Report (Like for like)

**777-Coast Grey Box -
Mountain Grey Gum -
stringybark moist shrubby
open forest in coastal gullies,
southern South East Corner
Bioregion**

Like-for-like credit retirement options

Class	Trading group	Zone	HBT	Credits	IBRA region
Southern Lowland Wet Sclerophyll Forests This includes PCT's: 777, 1079, 1206, 1212, 1214, 1220, 1283	Southern Lowland Wet Sclerophyll Forests <50%	777_ODNG	No	20	South East Coastal Ranges, Bateman, Bungonia, East Gippsland Lowlands, Kybayan-Gourock, Monaro and Snowy Mountains. or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.
Southern Lowland Wet Sclerophyll Forests This includes PCT's: 777, 1079, 1206, 1212, 1214, 1220, 1283	Southern Lowland Wet Sclerophyll Forests <50%	777_Modified	No	6	South East Coastal Ranges, Bateman, Bungonia, East Gippsland Lowlands, Kybayan-Gourock, Monaro and Snowy Mountains. or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.

Species Credit Summary

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BAM Biodiversity Credit Report (Like for like)

Species	Vegetation Zone/s	Area / Count	Credits
Lathamus discolor / Swift Parrot	777_Modified, 777_ODNG	0.4	13.00
Potorous tridactylus / Long-nosed Potoroo	777_Modified	0.3	7.00

Credit Retirement Options			Like-for-like credit retirement options
Lathamus discolor / Swift Parrot	Spp	IBRA subregion	
	Lathamus discolor / Swift Parrot	Any in NSW	
Potorous tridactylus / Long-nosed Potoroo	Spp	IBRA subregion	
	Potorous tridactylus / Long-nosed Potoroo	Any in NSW	

Assessment Id	Proposal Name	Page 4 of 4
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BAM Biodiversity Credit Report (Variations)

Proposal Details

Assessment Id

00034981/BAAS18047/22/00034982

Assessor Name

Ed Cooper

Proponent Name(s)

Assessment Revision

0

BOS entry trigger

BOS Threshold: Biodiversity Values Map and area clearing threshold

Proposal Name

Lakewood Drive Merimbula

Assessor Number

BAAS18047

Report Created

08/09/2022

Assessment Type

Part 4 Developments (General)

BAM data last updated *

16/06/2022

BAM Data version *

54

BAM Case Status

Open

Date Finalised

To be finalised

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

Potential Serious and Irreversible Impacts

Name of threatened ecological community	Listing status	Name of Plant Community Type/ID
Nil		
Species		
Lathamus discolor / Swift Parrot		

Additional Information for Approval

PCT Outside Ibra Added

None added

Assessment Id

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BAM Biodiversity Credit Report (Variations)

PCTs With Customized Benchmarks

PCT

No Changes

Predicted Threatened Species Not On Site

Name

No Changes

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

Name of Plant Community Type/ID	Name of threatened ecological community	Area of impact	HBT Cr	No HBT Cr	Total credits to be retired
777-Coast Grey Box - Mountain Grey Gum - stringybark moist shrubby open forest in coastal gullies, southern South East Corner Bioregion	Not a TEC	2.2	0	26	26.00

777-Coast Grey Box - Mountain Grey Gum - stringybark moist shrubby open forest in coastal gullies, southern South East Corner Bioregion	Like-for-like credit retirement options					
	Class	Trading group	Zone	HBT	Credits	IBRA region
	Southern Lowland Wet Sclerophyll Forests This includes PCT's: 777, 1079, 1206, 1212, 1214, 1220, 1283	Southern Lowland Wet Sclerophyll Forests <50%	777_ODNG	No	20	South East Coastal Ranges, Bateman, Bungonia, East Gippsland Lowlands, Kybayan-Gourock, Monaro and Snowy Mountains. or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.

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BAM Biodiversity Credit Report (Variations)

	Southern Lowland Wet Sclerophyll Forests This includes PCT's: 777, 1079, 1206, 1212, 1214, 1220, 1283	Southern Lowland Wet Sclerophyll Forests <50%	777_Modified	No	6	South East Coastal Ranges, Bateman, Bungonia, East Gippsland Lowlands, Kybayan-Gourock, Monaro and Snowy Mountains. or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.
Variation options						
Formation	Trading group	Zone	HBT	Credits	IBRA region	
Wet Sclerophyll Forests (Grassy sub-formation)	Tier 4 or higher threat status	777_ODNG	No	20	IBRA Region: South East Corner, or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.	
Wet Sclerophyll Forests (Grassy sub-formation)	Tier 4 or higher threat status	777_Modified	No	6	IBRA Region: South East Corner, or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.	

Species Credit Summary

Species	Vegetation Zone/s	Area / Count	Credits
Lathamus discolor / Swift Parrot	777_Modified, 777_ODNG	0.4	13.00
Potorous tridactylus / Long-nosed Potoroo	777_Modified	0.3	7.00

Credit Retirement Options Like-for-like options

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BAM Biodiversity Credit Report (Variations)

Lathamus discolor/ Swift Parrot	Spp		IBRA region
	Lathamus discolor /Swift Parrot		Any in NSW
	Variation options		
	Kingdom	Any species with same or higher category of listing under Part 4 of the BC Act shown below	IBRA region
	Fauna	Endangered	South East Coastal Ranges, Bateman, Bungonia, East Gippsland Lowlands, Kybayan-Gourock, Monaro and Snowy Mountains. or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.
Potorous tridactylus/ Long-nosed Potoroo	Spp		IBRA region
	Potorous tridactylus /Long-nosed Potoroo		Any in NSW
	Variation options		
	Kingdom	Any species with same or higher category of listing under Part 4 of the BC Act shown below	IBRA region

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BAM Biodiversity Credit Report (Variations)

	Fauna	Vulnerable	South East Coastal Ranges, Bateman, Bungonia, East Gippsland Lowlands, Kybayan-Gourock, Monaro and Snowy Mountains. or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.
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