

DRAFT Biodiversity Development Assessment Report

Proposed subdivision of Lot 711 DP 1128593, Greigs Flat



FEBRUARY 2022

Prepared by **Local Environmental Solutions**

Document Verification

Local Environmental Solutions
ABN 69684321400

Biodiversity Development Assessment Report

Project File Name: Lot 711 DP 1128593 Biodiversity Development Assessment Report

Revision	Date	Prepared by (name)	Reviewed by (name)	Approved by (name)
DRAFT	2/11/21	Elisabeth Larsen Accredited BAM Assessor BAAS 18161	Tony Hastings	
DRAFT	15/12/21	E Larsen, T Hastings	Jackie Miles, Garret Barry	
DRAFT	30/01/22	E Larsen, T Hastings	Garret Barry	
Stage 1 DRAFT	7/2/22	E Larsen	Garret Barry	
Stage 2 DRAFT	1/3/22	E Larsen	Garret Barry	Elisabeth Larsen

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GLOSSARY AND ABBREVIATIONS

BAM	Biodiversity Assessment Method 2020
BAM-C	Biodiversity Assessment Methodology Calculator
BC Act	<i>NSW Biodiversity Conservation Act 2016</i>
BC Regulation	<i>NSW Biodiversity Conservation Regulation 2017</i>
BDAR	Biodiversity Development Assessment Report
BOAMS	Biodiversity Offsets Agreement and Management System
BOS	NSW Biodiversity Offset Scheme
BVSC	Bega Valley Shire Council
DBH	Diameter at Breast Height
DAWE	Commonwealth Department of Agriculture, Water and the Environment
DPIE	NSW Department of Planning, Industry, and the Environment
EEC	Endangered Ecological Community
EPBC Act	<i>Commonwealth Environmental Protection and Biodiversity Conservation Act 1999</i>
EP&A Act	<i>NSW Environmental Planning and Assessment Act 1979</i>
FFA	Flora and Fauna Assessment Report
ha	Hectares
HBT	Hollow-bearing Trees
LES	Local Environmental Solutions
PCT	Plant Community Type
SAIL	Serious and Irreversible Impacts
SAT	Spot Assessment Technique
SEPP	State Environmental Planning Policy
sp/spp	Species/multiple species
TEC	Threatened Ecological Community
TBDC	DPIE Threatened Biodiversity Database Collection
VI	Vegetation Integrity
VIS	Vegetation Information System
WM Act	<i>NSW Water Management Act 2000</i>
*	Denotes introduced species

EXECUTIVE SUMMARY

This Draft Biodiversity Development Assessment Report (BDAR) has been prepared by Local Environmental Solutions on behalf of the proponent, Graeme Payten, for a proposed rezoning and subdivision of Lot 711 DP1128593, 23 Summer Hill Road, Greigs Flat 2549 NSW, in the Bega Valley Local Government Area. Garret Barry Planning Services Pty Ltd is the planning consultant for the proposal.

The subdivision proposal is classified as a local development under Part 4 of the Environmental Planning and Assessment Act 1979. Part 4 developments are subject to the thresholds of the Biodiversity Offset Scheme (BOS), as specified by the NSW Biodiversity Conservation Act 2016 (BC Act) and the Biodiversity Conservation Regulation 2017. The aim of this BDAR is to address the requirements of the BOS in accordance with the BC Act through the application of the BAM (BAM 2020).

The Biodiversity Assessment Method (BAM) is the required assessment methodology for local developments that trigger the BOS, under the BC Act. This report follows the field survey methods and the assessment format required for Stage 1 (Biodiversity Assessment) and Stage 2 (Impact Assessment) of the BAM.

Comprehensive mapping and field surveys were completed in accordance with the requirements of the BAM to identify credit obligations under the BOS. It was determined that the proposed clearing of 0.39 ha of Plant Community Type (PCT) 1149 'Silvertop Ash - Blue-leaved Stringybark shrubby open forest on hinterland hills, far southern South East Corner Bioregion' (Dry Sclerophyll Forest) and 13.07 ha of cleared grassland derived from three different vegetation types (PCT 1149, 777, and 1109) will generate sixteen Ecosystem Credits. None of the vegetation to be cleared meet the definition of any listed Threatened Ecological Communities.

The preliminary Credit Summary Report attached to this draft BDAR assumes the worst-case scenario: that all identified Candidate Species Credit Species are present within the Subject Land. However, the final Species Credit offset requirement depend on the finalisation of field assessments and targeted threatened species surveys. Should the targeted surveys determine that Candidate Species Credit Species are unlikely to occur, a BDAR modification will be submitted. The retirement of the generated biodiversity credits will be carried out in accordance with the NSW BOS.

Consideration has been given to avoiding and minimising impacts to biodiversity throughout each phase of the proposal to date. Site selection options have been assessed against key environmental criteria. Mitigation and management measures to address impacts associated with the proposal, both direct and indirect are considered in Stage 2 of the BDAR.

With the retirement of credits and effective implementation of the recommended mitigation measures, the proposal is consistent with the requirements of the BAM.

1. INTRODUCTION

Local Environmental Solutions were engaged by Garret Barry Planning Services Pty Ltd, on behalf of Graeme Payten (the Proponent), to prepare a Biodiversity Development Assessment Report (BDAR) for the proposed subdivision of Lot 711 DP1128593, 23 Summer Hill Road, Greigs Flat, NSW, within the Bega Valley Shire Local Government Area (see Figure 1-1). The regional location of the subdivision proposal is identified in Figure 1-2. The subdivision proposal is part of a combined project which also includes a Planning Proposal to rezone the land to permit the rural residential development detailed in the DA.

The subdivision proposal is classified as local development under Part 4 of the Environmental Planning and Assessment Act 1979 (EP&A Act). Part 4 developments are subject to the thresholds of the Biodiversity Offset Scheme (BOS) as specified by the NSW Biodiversity Conservation Act 2016 (BC Act) and the Biodiversity Conservation Regulation 2017 (BC Regulation).

A preliminary biodiversity assessment was carried out in August 2021 to identify, map and review constraints on the subject site with the aim to avoid and minimize impacts on ecological values in the planning and design of the subdivision (LES 2021). The subdivision proposal which is assessed in this BDAR was designed on the basis of the findings in this preliminary study.

Under the BC Act, the BOS is triggered for proposals where the clearing of native vegetation exceeds the BOS 'area clearing threshold.' Lot 711 DP1128593 has a minimum lot size of 120ha, with a clearing threshold set to 1 ha. The proposed clearing associated with the proposal (13.47 ha) exceeds this threshold, and a Biodiversity Assessment Report (BDAR) is therefore required.

The following terms will be used in this document:

- **Study Area:** the area encompassed by Lot 711 DP 1128593 (39.87 ha). The Study Area is bordered by Princes Highway to the north-east, private property to the north and west, and Nethercote Road/Yowaka River to the south-east.
- **Subject Land:** the total area associated with the proposal (15.7 ha), as defined in Clause 7.1(3) of the BC Regulation, and confirmed by the BAM Support Team (refer to email of 21 October 2021). This includes the proposed development footprint and existing dwellings, sheds, internal roads, hard surfaces (1.5 ha) and dams (0.15 ha). The Subject Land and the development footprint are equivalent for the purposes of this assessment.
- **Assessment Area:** includes the Subject Land and a 1500 m wide buffer area surrounding the outside edge of the Subject Land.

1.1 Description of proposal

The proposal includes two components:

- a. **Planning Proposal:** In the Bega Valley Local Environment Plan (2013) the Study Area is zoned as DM (Deferred matter), with adjacent private land zoned RU2 (Rural Landscape), and adjacent forested land zoned E2 (Environmental Conservation) and E3 (Environmental Management). The Study Area currently has a minimum lot size of 120ha. The Planning Proposal is to rezone the property to a mix of zones: E4 (Environmental Living), and E2 (Environmental Conservation). It is also proposed to set the minimum lot size to 2 ha for the area proposed for E4 zoning. The new

zoning and minimum lot size would allow consideration of the proposed new lots in the development application.

- b. Subdivision Proposal: The Proponent is proposing to subdivide Lot 711 DP1128593 into fifteen individual lots for residential development. This includes two lot parcels that have already been cleared and are occupied by residential dwellings. The proposed thirteen new lots will range in size from 0.5 ha to 9.61 ha.

1.2 Subject land

The Subject Land includes:

- building envelopes for thirteen new lots;
- Asset Protection Zones of variable widths around each new building envelope;
- new vehicle access roads and easements as depicted on the plan;
- areas that will be used for utilities and services, effluent management zones, landscaping, and fence lines,
- areas that will be used for temporary/ancillary construction facilities and infrastructure, and
- existing residential dwellings, sheds, internal roads, fence lines, hard surfaces, and dams.

The layout map in Figure 1-1 illustrates the indicative layout of the proposed subdivision.



- Study Area
- Subject Land
- Proposed Lots
- Proposed Roads
- Building Envelope
- Cadastre

Biodiversity Values

- Biodiversity Values
- Biodiversity Values added in the last 90 days
- Strahler stream order
- Wetlands

Summer Hill Rd, Greigs Flat NSW

IBRA region: South East Corner

IBRA subregion: South East Coastal Ranges

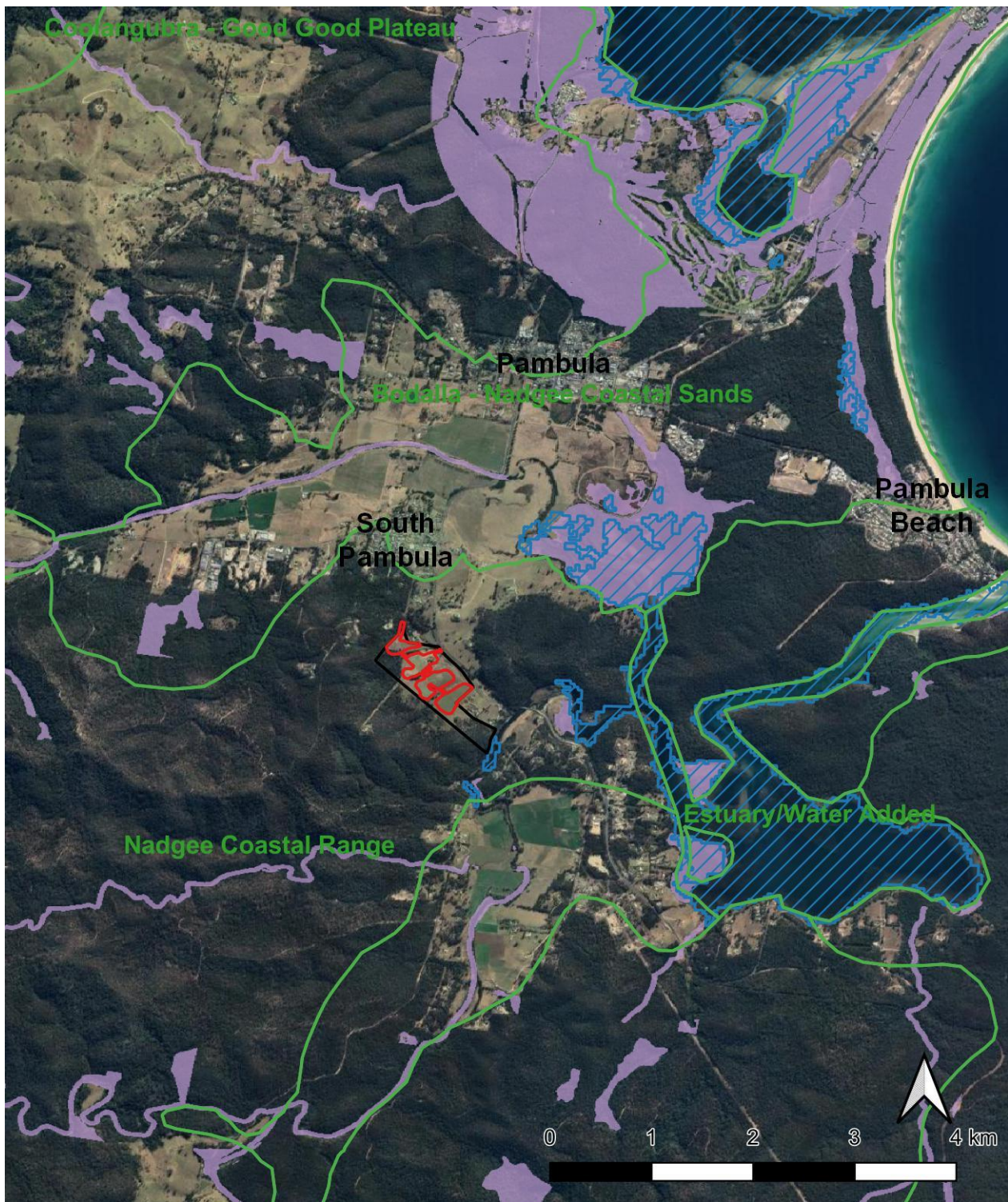
Mitchell landscape: Ndg, SEC Coastal Ranges

Cadastre, Biodiversity Values, Strahler & Wetlands sourced from NSW Gov data

Subject land boundary from surveyor, provided by client

Map drawn T. Hastings 27/01/2022

Figure 1-1 Site map: indicative layout of subdivision (as supplied by client on 21 January 2022)



- Study area
- Subject Land
- Wetlands NSW
- Mitchell Landscapes

Biodiversity Values

- Biodiversity Values
- Biodiversity Values added in the last 90 days

Summer Hill Rd, Greigs Flat NSW

IBRA region: South East Corner

IBRA subregion: South East Coastal Ranges

Mitchell landscape: Ndg, SEC Coastal Ranges

Map drawn T. Hastings 2/12/2021

Figure 1-2 Location map

1.3 Sources of information used in the assessment

The following resources were accessed to provide information for this report:

- Survey and site plans from Garret Barry Planning Services Pty. Ltd., 12/10/2021
- *Preliminary Flora and Fauna Assessment Lot 711 DP1128593* (Local Environmental Solutions, August 2021)
- Biodiversity Assessment Method (DPIE 2020) <https://www.environment.nsw.gov.au/-/media/OEH/Corporate-Site/Documents/Animals-and-plants/Biodiversity/biodiversity-assessment-method-2020-200438.pdf>
- Biodiversity Assessment Method 2020 Operational Manual – Stage 1 (DPIE 2020)
- Biodiversity Assessment Method 2020 Operational Manual – Stage 2 (DPIE 2020)
- DPI profiles of threatened species, population, and ecological communities
- *NSW Survey Guide for Threatened Plants and Their Habitat* (DPIE 2020)
- *NSW Survey Guide for Threatened Frogs and Their Habitat* (DPIE 2020)
- Mitchell Landscape descriptions from “Descriptions for NSW (Mitchell) Landscapes, Version 2 (2002)”, Department of Environment and Climate Change NSW (2011)
- Australia’s IBRA Bioregions and sub-bioregions (IBRA v.7.0) Australia's bioregions - maps - DAWE
- Commonwealth Department of Environment and Energy ‘Protected Matters Search Tool’ <http://environment.gov.au/epbc/protected-matters-search-tool>
- NSW DPIE’s Biodiversity Assessment Method calculator (BAM-C) <https://customer.lmbc.nsw.gov.au/assessment/s/userlogin>
- NSW DPIE’s BioNet Threatened Biodiversity Data Collection (TBDC) <https://www.environment.nsw.gov.au/asmslightprofileapp/account/login?ReturnUrl=%2fAtlasApp%2fDefault.aspx>
- NSW DPIE’s BioNet Vegetation Classification Database <https://www.environment.nsw.gov.au/NSWVCA20PRapp/LoginPR.aspx>
- PlantNet NSW, the Royal Botanic Gardens and Domain Trust <https://plantnet.rbgsyd.nsw.gov.au/search/simple.htm>
- Wetlands NSW (DPIE 2020). Accessed through SEED.
- NSW Government SEED Mapping https://geo.seed.nsw.gov.au/Public_Viewer/index.html?viewer=Public_Viewer&locale=en-AU
- NSW Biodiversity Values Map and Threshold Tool <https://www.lmbc.nsw.gov.au/arcgis/rest/services/BV/BiodiversityValues/MapServer>
- Biometric Vegetation Compilation. Prepared for South East Local Land Services (SELLS 2015). Access through SEED.
- NSW Planning Portal online <https://www.planningportal.nsw.gov.au/spatialviewer/#/find-a-property/address>
- SixMaps http://maps.six.nsw.gov.au/arcgis/rest/services/public/NSW_Imagery/MapServer

2. LANDSCAPE CONTEXT

2.1 Topography, geology and soils

Topography: The Study Area is an elongated, rectangular block on a gently undulating east-facing slope (1-5°), directly west of the Princes Highway and approximately 3 km south of the township of Pambula. The bulk of the Study Area has been cleared in the past and is now used for sheep and horse grazing. The land is intersected by four shallow gullies with ephemeral streams draining east to a small tributary of Yowaka River and, further downstream, to the northern branch of Pambula River, which flows into Pambula Lake, 2.3 km to the south-east, and the Pacific Ocean, 4.5 km to the east. Forest canopy within the boundaries of the Study Area consists of a 4.4 ha forest patch to the north-west, and a larger patch (6.4 ha) on the hilltop and south-facing hillside to the south. The surrounding area consists of remnant forest stands and a mosaic of small landholdings, rural residential lots, and suburban blocks (South Pambula).

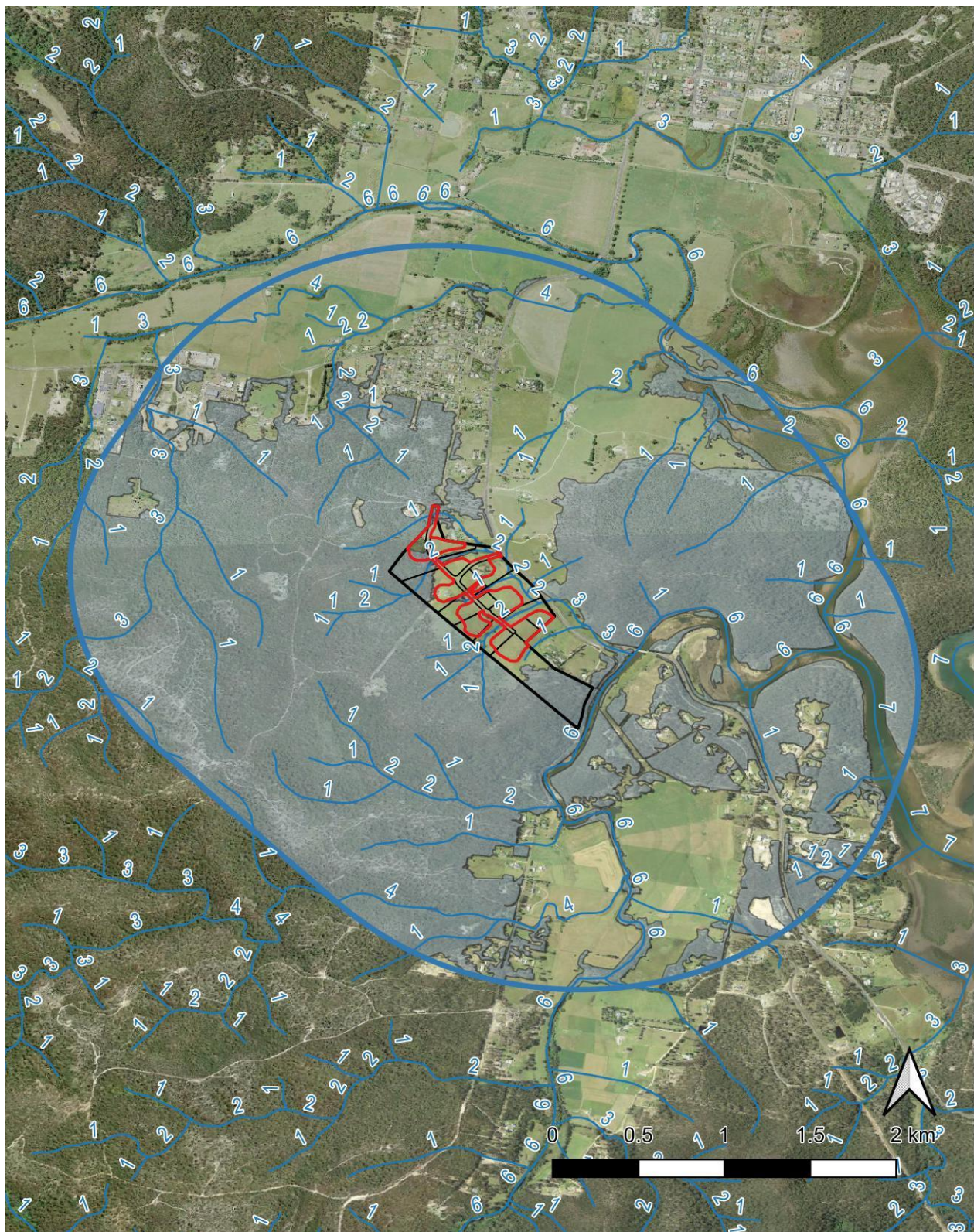
Geology and soils: The Study Area is located predominantly on rhyolite, an acid volcanic rock type which produces shallow to skeletal soils of high acidity and low fertility on slopes but less inhospitable and deeper soils on lower slopes and drainage lines. The geology is known as the 'Bournda soil landscape', as described by Tulau (1997). The great bulk of vegetation on this type of geology is uncleared due to the low value of the derived soils for farming and is in public tenure (Bournda National Park, South East Forest National Park Yowaka Section, and Nullica State Forest).

2.2 Native vegetation cover in assessment area

The percent native vegetation cover within the Assessment area, which includes the Subject Land and a 1500 m wide buffer area, was calculated to be **60%**. This was entered into the BAM calculator for the proposal.

The percent native vegetation cover was calculated by assessing existing vegetation mapping and estimating the presence of any native vegetation based on aerial imagery. Unless verified by visual inspection, areas containing grasslands were assumed to be exotic grassland if associated with managed land, including rural farming land, recreational parks, and private lawns.

Native vegetation on the Subject Land connects with adjacent native vegetation to form a **750 ha** patch within the Assessment Area. This was entered into the BAM calculator for the proposal.



- Study Area
- Subject Land
- Assessment Area (1500m buffer)
- Native Vegetation
- Strahler stream orders

Summer Hill Rd, Greigs Flat NSW

IBRA region: South East Corner

IBRA subregion: South East Coastal Ranges

Mitchell landscape: Ndg, SEC Coastal Ranges

Map drawn T. Hastings 2/12/2021

Figure 2-2 Native vegetation cover within the Assessment Area

2.3 IBRA regions and subregions

The Study Area is fully within the NSW '**South East Corner Bioregion**' (SEC). This was entered into the BAM calculator for the proposal. The Bioregion is described as:

'A series of deeply dissected near coastal ranges composed of Devonian granites and Palaeozoic sediments, inland of a series of gently undulating terraces (piedmont downs) composed of Tertiary sediments and flanked by Quaternary coastal plains, dune fields and inlets. The regional climate is strongly influenced by the Tasman Sea and the close proximity of the coast to the Great Dividing Range. Vegetation consists of high elevation woodlands, wet and damp sclerophyll forests interspersed with rain-shadow woodlands in the Snowy River Valley. Lowland and coastal sclerophyll forests, woodlands, warm temperate rainforest and coastal communities occur in the lower areas' (p.10, IBRA 6.1 Region Descriptions, 2019, DAWE).

The Study Area is fully within the '**South East Coastal Ranges subregion**' (SEC02). This was entered into the BAM calculator for the proposal. The subregion is described as follows:

'The subregion consists of extensive areas of granite amongst Ordovician and Silurian metamorphosed sedimentary and volcanic rocks including slates, chert and quartzites. Gently folded red and purple Devonian sandstones and shales, and limited areas of Tertiary basalt and sand deposits occur. Quaternary coastal sediments and small areas of alluvium are also present. The subregion occurs on a very abrupt margin on the Great Escarpment. Deep gorges with rapids and waterfalls occur in the main streams including the lower Snowy River. An extensive subdued basin with rolling hills occurs on the Bega granite with steep hillslopes at the contact aureole. Streams carry large volumes of sand to valley floors and estuaries. Small beach, dune and lagoon barrier systems also occur. Coarse texture contrast soils occur on granite, with thinner profiles on metamorphics with red and yellow clay subsoils. Deep coarse sands in granite derived alluvium are often deposited in swampy valley flats. Deep fine sands occur in dunes. Peaty sands are present in lagoons and swamps' (p.65, IBRA 5.1 Sub Region Descriptions, 2019, DAWE).

2.4 NSW landscape regions (Mitchell Landscapes)

The Study Area is fully within the Mitchell Landscape '**Nadgee Coastal Range**'. This was entered into the BAM calculator. The Nadgee Coastal Range landscape is described as:

'Coastal ranges and hills on middle Devonian sandstone, quartzite, conglomerate and siltstone, and Ordovician sandstone, quartzite and phyllite with some granite. Elevation 0 to 550m. Thin stony soils on ridges, deeper red-yellow texture-contrast profiles on Ordovician rocks' (p.129, Descriptions for NSW (Mitchell) Landscapes, Version 2 (2002), DECC).

2.5 Rivers and streams

Four ephemeral streams cross the Study Area and Subject Land. These are 1st and 2nd order streams under the Strahler Stream classification system (Strahler 1952). The streams flow east in shallow drainage lines to the eastern boundary of the Study Area, where they join to form a south-flowing 3rd order stream which runs along the western side of the Princes Highway barrier. It exits through culverts under Princes Highway to join Yowaka River, approx. 400 m to the south-east.

The drainage lines in the Study Area are used in existing agricultural activities; they are grazed by sheep and horses, and the banks are periodically slashed. Water is collected on site in four farm dams.

According to BVSC online mapping, the Study Area is not subject to flooding or groundwater vulnerability. This is confirmed by the DPIE datasets “Environmental Planning Instrument – Flood”, and “Environmental Planning Instrument - Groundwater Vulnerability” (DPIE 2021 accessed through SEED).

The stream orders are mapped in Figure 2-1 and Figure 3-1.

2.6 Wetlands

There are no wetlands within the Subject Land. The closest wetland is the ‘Yowaka River estuarine wetland’ which is mapped as adjacent to and downstream of the south-east boundary of Study Area (see Figure 1-2 Location map and Figure 2-1).

2.7 Connectivity of different areas of habitat

There are no significant connectivity features within the Subject Land. The remnant and planted vegetation, which includes planted shelterbelt trees and a few paddock trees, provide some habitat connectivity, which allows more disturbance tolerant and mobile species to travel across the landscape. The ephemeral streams provide temporary aquatic connectivity when they are flowing.

The forest canopy in the northern section of the Study Area connects with contiguous forest to the west, which in turn connects to extensive forest areas along the south-east ranges and the coast. The forest canopy in the south-east corner of the Study Area forms a connection with a contiguous forest area to the east (< 100 m distance between patches across Princes Highway) which extends north to Pambula Beach and Merimbula (see Figure 2–2 and Figure 3-1).

2.8 Karst, caves, crevices, cliffs, rocks, and other geological features

No karst, caves, crevices, cliffs, rocks, and other geological features occur in the Study Area. DPIE maps of Acid Sulfate Soils do not show any features in the study area.

2.9 Areas of outstanding Biodiversity Value

There are no areas of mapped Outstanding Biodiversity Value occurring within the Study Area. The Biodiversity Values Map for the locality is provided in Figure 2-3.



Figure 2-3 Biodiversity Values Map (3 November 2021)

2.10 Landscape Features (SEARS)

There are no Secretary's Environmental Assessment Requirements (SEARs) for this subdivision proposal.

3. NATIVE VEGETATION

3.1 Native vegetation on the subject land

13.47 ha of native vegetation occurs within the Subject Land (see Figure 3-1). This is comprised of:

- 13.07 ha of pasture area/grassland vegetation. The grassland vegetation consists of a mixture of native and exotic species (20%-95% native species cover). It has been classified as 'native vegetation' for the purpose of this BDAR, due to the presence of native species. The grassland is used as grazing pasture for sheep and horses and is also periodically slashed.
- 0.39 ha of native forest in the northern section of the development site
- Four planted shelterbelt trees (two *Eucalyptus botryoides*, one *Acacia implexa*, and one *Pinus sp.*)

2.23 ha of the Subject Land does not contain native vegetation. This includes the existing building footprints (two dwellings, associated garages, sheds, water tanks and other outbuildings), driveways, other hard surfaces, fence lines, and gardens and lawns dominated by exotic species.

-  Study Area
-  Subject Land
-  Native Vegetation
- Strahler stream orders
-  Stream Buffers

IBRA region: South East Corner
IBRA subregion: South East Coastal Ranges
Mitchell landscape: Ndg, SEC Coastal Ranges

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3.2 Plant Community Types

3.2.1 Methods to assess Plant Community Types

Review of existing information

Searches were undertaken on the NSW BioNet Vegetation Classification Database to assist with the classification of Plant Community Types (PCT). The South East Land Service vegetation maps were also examined to review existing Biometric vegetation mapping within and surrounding the Study Area (SELLS 2015, accessed via SEED).

One small portion of the Subject Land was mapped as a Biometric vegetation community (see Figure 3-2):

- SR583 – Mountain Grey Gum ferny tall moist forest on coastal ranges, southern South East Corner Bioregion. Converted to the current vegetation classification (Plant Community Types), SR583 best fits with PCT 948 'Mountain Grey Gum ferny tall moist forest on coastal ranges, southern South East Corner Bioregion'.

Four additional Biometric vegetation communities were mapped within and adjacent to the Study Area:

- SR623 - Silvertop Ash - Blue-leaved Stringybark shrubby open forest on hinterland hills, far southern South East Corner Bioregion (equivalent to PCT 1149)
- SR596 - Red Bloodwood - Silvertop Ash - White Stringybark heathy open forest on coastal foothills, southern South East Corner Bioregion (equivalent to PCT 1084)
- SR608 - River Peppermint - Rough-barked Apple - River Oak herb/grass riparian forest of coastal lowlands, southern Sydney Basin Bioregion and South East Corner Bioregion (PCT 1109)
- SR672 - Yellow Stringybark - Mountain Grey Gum moist shrubby open forest on coastal ranges, southern South East Corner Bioregion (equivalent to PCT 1337)

Floristic surveys

Preliminary site inspections were undertaken by an ecologist and a botanist on 16 and 20 August 2021. The entire Study Area and adjacent vegetation was surveyed on foot and by car, and vegetation integrity survey plots (BAM plots) were established within the boundaries of the Subject Land. Random meander searches were conducted in adjacent vegetation to inform the PCT determination in areas that lacked tree cover. The objectives of these initial surveys were to determine the PCTs present within the Study Area and Subject Land, and to assess their condition and extent.

PCT identification was based on:

- the native species present within the 20 x 20 m BAM plots,
- dominant native species on adjoining land with similar aspect and landform, and
- location in the IBRA subregion using the BioNet Vegetation Classification Database.

The Study Area was stratified into areas of similar condition class to determine the vegetation zones for each PCT. Further detailed floristic surveys were undertaken on 18, 22, and 29 October 2021. BAM plots were established in each identified vegetation zone, and vegetation data (composition, structure, function) was collected following the methodology set out in BAM 2020 and in the presence of an accredited BAM Assessor.



Study Area

Subject Land

Vegetation Types: SE_LLS_Biometric_2014

- SR583 = PCT948 Mountain Grey Gum ferny tall moist forest
- SR596 = PCT1084 Red Bloodwood - Silvertop Ash - White Stringybark heathy open forest
- SR608 = PCT1108 River Peppermint - Rough-barked Apple - River Oak herb/grass riparian forest
- SR623 = PCT1149 Silvertop Ash - Blue-leaved Stringybark shrubby open forest
- SR672 = PCT1337 Yellow Stringybark - Mountain Grey Gum moist shrubby open forest

Summer Hill Rd, Greigs Flat NSW

IBRA region: South East Corner
IBRA subregion: South East Coastal Ranges
Mitchell landscape: Ndg, SEC Coastal Ranges

Map drawn T. Hastings 2/12/2021

Figure 3-2 Biometric vegetation types mapped by SELLS (2015)

3.2.2 PCTs identified on the Subject Land

There is a small patch of remnant forest canopy (0.39 ha, PCT 1149) in the north-western corner of the Subject Land. However, the bulk of the Subject Land consists of cleared pasture areas which are grazed by sheep and horses and/or periodically slashed. To identify the most likely original plant communities within these cleared areas, BAM plot data were collected in adjacent areas with similar landscape characteristics and intact native vegetation.

It is noted that the actual extent of remnant forest canopy to the north (PCT 1149) differs from that shown in the imagery used in Figure 3-3 (SixMaps aerial taken between 2011-2014). The BAM-C calculations for this BDAR are based on the actual extent of remnant forest canopy which was mapped during our field surveys in October 2021.

The following three Plant Community Types were identified within the boundaries of the Subject Land:

- PCT 1149 - Silvertop Ash - Blue-leaved Stringybark shrubby open forest on hinterland hills, far southern South East Corner Bioregion
- PCT 777 - Coast Grey Box - Mountain Grey Gum - stringybark moist shrubby open forest in coastal gullies, southern South East Corner Bioregion
- PCT 1109 - River Peppermint - Rough-barked Apple moist open forest on sheltered sites, southern South East Corner Bioregion

One further Plant Community Type was found to occur on the Study Area:

- PCT 891 - Ironbark - Woollybutt - White Stringybark open forest on coastal hills, South East Corner Bioregion

See Figure 3-3 for a map of the PCTs and vegetation zones identified on the Subject Land and Study Area.

The identified PCTs are described in the following tables (Table 3-1 to 3-4).

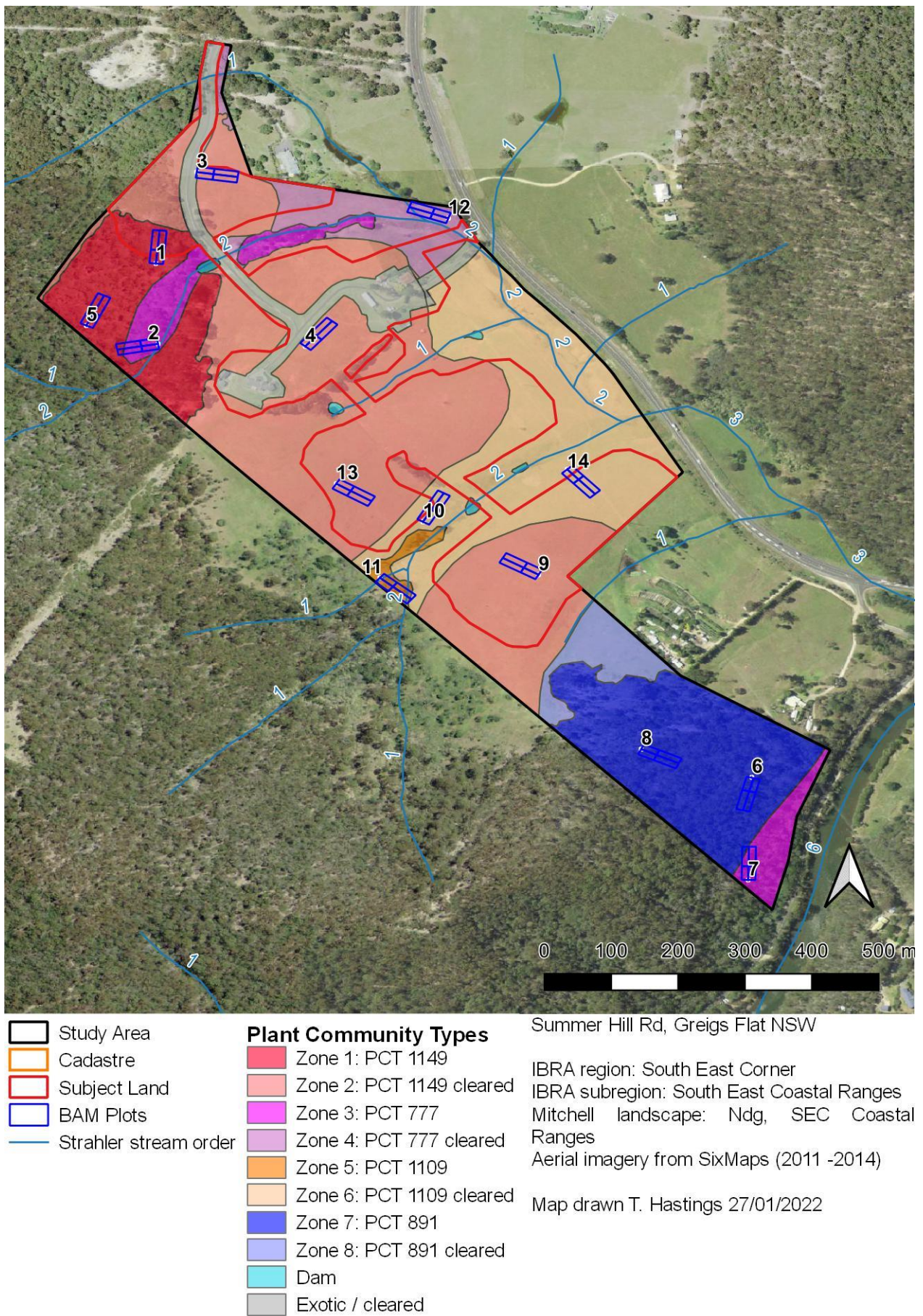


Figure 3-3 PCTs and Vegetation Zones in the Study Area; location of BAM plots

Table 3-1 PCTs identified within the Subject Land: PCT 1149

Silvertop Ash - Blue-leaved Stringybark shrubby open forest on hinterland hills, far southern South East Corner Bioregion (PCT 1149)		
Vegetation formation: Dry Sclerophyll Forests (Shrubby sub-formation)		
Vegetation class: South East Dry Sclerophyll Forests		
Conservation status: Not associated with a Threatened Ecological Community		
Estimate of percentage cleared: 5%		
Condition (vegetation zones) on the Study Area: 1) Remnant, 2) Cleared		
Approximate extent within the Subject Land: 0.39 ha (Remnant), 9.79 ha (Cleared)		
Species relied upon for PCT identification, and relative abundance of tree species (BAM plot 1):		
Upper stratum:	<i>Allocasuarina littoralis</i>	62.5%
	<i>Eucalyptus globoidea</i>	37.5%
	<i>Eucalyptus muelleriana</i>	
	<i>Eucalyptus sieberi</i>	
Mid stratum:	<i>Acacia terminalis</i>	
	<i>Cassinia trinerva</i>	
	<i>Kunzea ambigua</i>	
Ground covers:	<i>Dianella caerulea</i>	
	<i>Gonocarpus teucroides</i>	
	<i>Lomandra multiflora</i>	
<ul style="list-style-type: none"> PCT 1149 was assigned to the remnant dry forest community in the north-west corner of the Subject Land. Two BAM plots (BAM plots 1 and 5) within this forest patch supported the identification of plant community type. Three BAM plots (BAM plots 3, 4 and 13) were established in adjacent cleared areas with similar landscape position and matching ground cover species. Indicative species: The vegetation community was dominated by Black Sheoak (<i>Allocasuarina littoralis</i>), White Stringybark (<i>Eucalyptus globoidea</i>), Yellow Stringybark (<i>E. muelleriana</i>) and Silvertop Ash (<i>E. sieberi</i>), with a small tree and tall shrub layer dominated by Tickbush (<i>Kunzea ambigua</i>). The species composition was not a good fit to any of the known local PCTs, but was considered to fit best with PCT 1149, 'Silvertop Ash – Blue-leaved Stringybark shrubby open forest on hinterland hills, far southern South East Corner bioregion'. PCTs shortlisted for this dry forest community also included: <ul style="list-style-type: none"> PCT 1084 Red Bloodwood - Silvertop Ash - White Stringybark heathy open forest on coastal foothills, southern South East Corner Bioregion PCT 1157 Silvertop Ash - Rough-barked Apple shrubby open forest on the hinterland hills, far southern South East Corner Bioregion PCT1340 Yertchuk - Silvertop Ash - Blue-leaved Stringybark shrubby open forest of the Wallagaraugh catchment, far southern South East Corner Bioregion PCT 946 Mountain Grey Gum - White Stringybark open forest on sandstone mountain slopes, far south west South East Corner Bioregion 		

Silvertop Ash - Blue-leaved Stringybark shrubby open forest on hinterland hills, far southern South East Corner Bioregion (PCT 1149)



PCT 1149 Remnant (BAM plot 1)



PCT 1149 Cleared (BAM plot 13)

Table 3-2 PCTs identified 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 (PCT 777)

Vegetation formation: **Wet Sclerophyll Forests (Grassy sub-formation)**

Vegetation class: **Southern Lowland Wet Sclerophyll Forest**

Conservation status: **Not associated with a Threatened Ecological Community**

Estimate of percentage cleared: **15%**

Condition (vegetation zones) on the Study Area: **1) Remnant, 2) Cleared**

Approximate extent on the Subject Land: **0.50 ha (Cleared)**

Species relied upon for PCT identification, and relative abundance of tree species (BAM plot 2):

Upper stratum:	<i>Eucalyptus cypellocarpa</i>	11.6%
	<i>Eucalyptus muelleriana</i>	23.2%
	<i>Eucalyptus longifolia</i>	4.6%
Mid stratum:	<i>Acacia mearnsii</i>	6.9%
	<i>Pittosporum undulatum</i>	46.5%
Ground covers:	<i>Microlaena stipoides</i>	
	<i>Poa meionectes</i>	
	<i>Viola hederacea</i>	
	<i>Pandorea pandorana</i>	

- PCT 777 was assigned to the wetter forest community in the upper end of the northernmost gully, upstream from the existing dwelling to the east ('Rose Hill house'). It occurs on the lower slopes

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

along the ephemerally flowing stream in this gully (BAM plot 2). The cleared area adjacent to the lower end of this gully had matching ground cover species and was assumed to be derived from the same PCT (BAM plot 12).

- Indicative species: Dominant species were Mountain Grey Gum (*E. cypellocarpa*), Yellow Stringybark (*E. muelleriana*) and Woollybutt (*E. longifolia*), with the same small trees and tall shrubs as PCT 1149, but with the addition of Tall Baeckea (*Sannantha pluriflora*) in the gully, and dense grass and forb groundcover on the creek flats. Dominant groundcover species were the grasses Weeping Grass (*Microlaena stipoides*) and *Poa meionectes*, and the forbs *Viola hederacea* and *Galium* spp.
- Of the BioNet Vegetation Classification's shortlisted PCTs, the type with the best fit was PCT 777, 'Coast Grey Box – Mountain Grey Gum – stringybark moist open forest in coastal gullies, southern South East Corner bioregion'.
- PCTs shortlisted for this wetter forest community also included:
 - PCT 829 Forest Red Gum - Coast Grey Box shrubby open forest on steep hills in the Bega Valley, South East Corner Bioregion
 - PCT 946 Mountain Grey Gum - Yellow Stringybark moist shrubby open forest in gullies of the coastal ranges, northern South East Corner Bioregion
 - PCT 1336 Yellow Stringybark - Coast Grey Box shrubby open forest on the coastal ranges, South East Corner Bioregion



PCT 777 Remnant (BAM plot 2)



PCT 777 Cleared (BAM plot 12)

Table 3-3 PCTs identified within the Subject Land: PCT 1109**River Peppermint - Rough-barked Apple moist open forest on sheltered sites, southern South East Corner Bioregion (PCT 1109)**Vegetation formation: **Wet Sclerophyll Forests (Shrubby sub-formation)**Vegetation class: **South Coast Wet Sclerophyll Forests**Conservation status: **Associated with Threatened Ecological Communities (see note below)**Estimate of percentage cleared: **65%**Condition (vegetation zones) on the Study Area: **1) Remnant, 2) Cleared**Approximate extent on the Subject Land: **2.78 ha (Cleared)**

Species relied upon for PCT identification, and relative abundance of tree species in BAM plot 11:

Upper stratum:	<i>Eucalyptus baueriana</i>	
	<i>Eucalyptus tereticornis</i>	9.3%
Mid stratum:	<i>Acacia mearnsii</i>	81.4%
	<i>Cassinia trinerva</i>	
Ground covers:	<i>Carex longebrachiata</i>	
	<i>Melicytus dentatus</i>	
	<i>Microlaena stipoides</i>	
	<i>Rubus parvifolius</i>	

- This PCT was assigned to a small remnant of a wetter forest community which occurred in the southernmost gully of the Subject Land.
- Indicative species: A few canopy trees were present in the vegetation community, including Blue Box (*E. baueriana*) and two large old Forest Red Gums (*Eucalyptus tereticornis*). The Forest Red Gum is an unusual occurrence in this location, but it is known to be an occasional component of PCT 1109. Other indicator species present were Black Wattle (*Acacia mearnsii*) and the shrub Tree Violet (*Melicytus dentatus*). The understorey consisted largely of mixed native and exotic pasture; the remnant vegetation here is limited to the very few scattered eucalypts.
- The presence of the Blue Boxes in this southern gully, and also in the lower end of a small gully immediately south of Rose Hill House, suggests that the cleared lower parts of the drainage lines towards the southern end of the Subject Land may have formerly contained PCT 1109. Despite the absence of Blue Box from the name of this PCT, it is a common component in this vegetation community (Jackie Miles, pers. comm.).
- Conservation status: If the remnant forest community occurred on a floodplain, it would fall within the definition of the Endangered Ecological Community (EEC) 'River-flat Eucalypt Forest on Coastal Floodplains', listed under NSW legislation and under consideration for national listing. Notably, the definition of the EEC is restricted to occurrences on *floodplains* which have been largely cleared for farming. PCT 1109 occurs, however, also in a variety of sheltered sites such as gullies and slopes with sheltered aspect, as in this locality, and is not restricted to floodplains. The remnant forest community in this locality therefore does not meet the criteria for the EEC.
- BAM plot 11 was placed in the remnant forest community. BAM plots 10 and 14 were established in the adjacent cleared area with similar landform attributes and matching ground cover species.
- PCTs shortlisted for this wetter forest community also included:
 - 829 Forest Red Gum - Coast Grey Box shrubby open forest on steep hills in the Bega Valley, South East Corner Bioregion
 - 834 Forest Red Gum - Rough-barked Apple - White Stringybark grassy woodlands on hills in dry valleys, southern South East Corner Bioregion
 - 1108 River Peppermint - Rough-barked Apple - River Oak herb/grass riparian forest of coastal lowlands, southern Sydney Basin Bioregion and South East Corner Bioregion

River Peppermint - Rough-barked Apple moist open forest on sheltered sites, southern South East Corner Bioregion (PCT 1109)



PCT 1109 Remnant (BAM plot 11)



PCT 1109 Cleared (BAM plot 10)

Table 3-4 PCT identified within the Study Area: PCT 891

Ironbark - Woollybutt - White Stringybark open forest on coastal hills, South East Corner Bioregion (PCT 891)

Vegetation formation: **Dry Sclerophyll Forests (Shrubby sub-formation)**

Vegetation class: **South East Dry Sclerophyll Forests**

Conservation status: **Not associated with a Threatened Ecological Community**

Estimate of percentage cleared: **10%**

Condition (vegetation zones) on the Study Area: **1) Remnant, 2) Cleared**

Approximate extent on the Subject Land: **0 ha**

Species relied upon for PCT identification, and relative abundance of trees in BAM plot 8:

Upper stratum:	<i>Eucalyptus bosistoana</i>	28.6%
	<i>Eucalyptus longifolia</i>	-
	<i>Eucalyptus tricarpa</i>	-
	<i>Eucalyptus muelleriana</i>	28.6%
Mid stratum:	<i>Acacia falciformis</i>	-
	<i>Acacia mearnsii</i>	5.7%
	<i>Allocasuarina littoralis</i>	11.4%
	<i>Kunzea ericioides</i>	
Ground covers:	<i>Persoonia linearis</i>	
	<i>Lomandra multiflora</i> , ssp. <i>multiflora</i>	
	<i>Themeda triandra</i> (australis)	

Ironbark - Woollybutt - White Stringybark open forest on coastal hills, South East Corner Bioregion (PCT 891)

- PCT 891 was assigned to the dryer forest community occurring on the hilltop and steep south-facing slope in the southern end of the Study Area (and outside the boundaries of the Subject Land). The forest community consists of a mixture of regrowth eucalypt forest and regrowth scrub. BAM plots 6 and 8 were established within the forest community, and BAM plot 9 was established in the adjacent cleared area to the north. The scrub and forest canopy in this area is presumably derived from past clearing and subsequent regrowth of a dry eucalypt forest community, most probably PCT 891, 'Ironbark – Woollybutt – White Stringybark open forest on coastal hills, South East Corner bioregion' which has the best fit of the shortlisted PCTs.
- Indicative species: The dominant trees in the vegetation community are Coast Grey Box (*E. bosistoana*), Yellow stringybark (*E. muelleriana*), Woollybutt, with an occasional Red Ironbark (*E. tricarpa*), and unusually, Forest Red Gum. The bulk of the subcanopy and shrub layer is dominated by Black Wattle (*Acacia mearnsii*) and Burgan (*Kunzea ericoides*).
- PCTs shortlisted for this dry forest community also included:
 - 1148 Silvertop Ash - Blue-leaved Stringybark - Woollybutt shrubby open forest on coastal foothills central South East Corner Bioregion
 - 1146 Silvertop Ash - Black She-oak shrubby open forest on hills of the Bega Valley, South East Corner Bioregion
 - 1149 Silvertop Ash - Blue-leaved Stringybark shrubby open forest on hinterland hills, far southern South East Corner Bioregion



PCT 891 Remnant (BAM plot 6)



PCT 891 Remnant (BAM plot 8)

3.2.3 Planted trees and paddock trees

The proposal will require the removal of four (4) planted trees where the 20 m wide road easement crosses the existing shelterbelt between the two existing dwellings. The four trees to be removed include two Bangalays (*Eucalyptus botryoides*) (DBH 50 cm and 75 cm), one Hickory Wattle (*Acacia implexa*) (DBH 20 cm) and one small non-native **Pinus sp.* (DBH 10 cm) (see Figure 3-4). The planted trees were not considered to be a separate vegetation zone, and are included in Zone 2, PCT 1149 Cleared.

The trees were checked for hollows, active nests, scratch marks, scats, owl pellets and other signs of habitat use by threatened fauna. No habitat features or signs of use were found.



Figure 3-4 Planted trees: four shelterbelt trees fall within the proposed 20 m wide road easement

3.3 Vegetation Integrity Assessment

3.3.1 Vegetation zones and survey effort

A total of four PCTs were identified on the Study Area (PCT 1149, PCT 777, PCT 1109 and PCT 891), of which three PCTs occurred on the Subject Land. Each of the identified PCTs were further stratified into two different condition states ('vegetation zones') to differentiate between areas with a tree canopy ('Remnant') and those without ('Cleared').

Ninety percent of the Subject Land lacked a tree canopy. To assist in determining the original PCT that may have occupied the cleared areas, additional BAM plots were placed in adjacent and intact native vegetation.

The number of BAM plots undertaken in each vegetation zone (survey effort) well exceeded the minimum number of plots required per zone area (see Table 3-5) as specified in BAM 2020.

Table 3-5 Vegetation zones and survey effort

Zone ID	PCT ID	Zone Area	Plots required	Plots completed	Patch size*
1	1149 Remnant	0.39 ha	1	2 (Plots 1, 5)	750 ha
2	1149 Cleared	9.79 ha	3	4 (Plots 3, 4, 13, 9)	750 ha
3	777 Remnant	0	0	2 (Plots 2, 7)	750 ha
4	777 Cleared	0.50 ha	1	1 (Plot 12)	750 ha
5	1109 Remnant	0	0	1 (Plot 11)	750 ha
6	1109 Cleared	2.78 ha	2	2 (Plots 10, 14)	750 ha
7	891 Remnant	0	0	2 (Plots 6, 8)	750 ha
8	891 Cleared	0	0	0	750 ha

* Patch size is the area of native vegetation within the Assessment Area (Subject Land and 1500 m buffer area). This includes patches of native trees not more than 100m apart, and patches of native groundcover not more than 30m apart.

3.3.2 Vegetation integrity assessment results

A total of seven vegetation integrity plots (BAM plots) across four vegetation zones were required to meet the level of survey effort required under the BAM. The data from these seven plots, including structure data, function data and composition data, were transferred into the BAM calculator (BAM-C) for vegetation integrity (VI) assessment. The BAM-C VI assessment results are provided in Table 3-6. The BAM plot raw data is provided in Appendix A.

Table 3-6 Vegetation integrity scores for each vegetation zone on the Subject Land

Zone ID	PCT ID	Composition score	Structure score	Function score	Presence of HBT	VI score
1	1149 Remnant	88.1	67	95.4	0	82.6
2	1149 Cleared	26.1	16.9	0	0	1.2
4	777 Cleared	19.9	26.2	15.3	0	20
6	1109 Cleared	18	33.9	0.3	0	5.9

4. THREATENED SPECIES

4.1 Ecosystem Credit Species

4.1.1 Predicted Ecosystem Credit Species

The following Ecosystem Credit Species were listed in BAM-C as known to be associated with the four vegetation zones present on the Subject Land (Table 4-1). These species are assumed to occur on the Subject Land and will generate ecosystem credits.

Table 4-1 Predicted Ecosystem Credit Species derived from the BAM-C

Predicted Ecosystem Credit Species	Associated vegetation zone	Sensitivity to gain class	Listing Status
Regent Honeyeater <i>Anthochaera phrygia</i> (Foraging habitat)	1109_Cleared 777_Cleared	High	BC Act: Critically endangered EPBC Act: Critically endangered
Dusky Woodswallow <i>Artamus cyanopterus</i> <i>cyanopterus</i>	1149_Remnant 1149_Cleared 1109_Cleared 777_Cleared	Moderate	BC Act: Vulnerable EPBC Act: Not listed
Gang-gang Cockatoo <i>Callocephalon fimbriatum</i> (foraging habitat)	1149_Remnant 1149_Cleared 1109_Cleared 777_Cleared	Moderate	BC Act: Vulnerable EPBC Act: Not listed
Glossy Black Cockatoo <i>Calyptophycus lathami</i> (foraging habitat)	1149_Remnant 1149_Cleared 1109_Cleared 777_Cleared	High	BC Act: Vulnerable EPBC Act: Not listed
Varied Sittella <i>Daphoenositta chrysoptera</i>	1149_Remnant 1149_Cleared 1109_Cleared	Moderate	BC Act: Vulnerable EPBC Act: Not listed
Spotted-tailed Quoll <i>Dasyurus maculatus</i>	1149_Remnant 1149_Cleared 1109_Cleared	High	BC Act: Vulnerable EPBC Act: Endangered
Eastern False Pipistrelle <i>Falsistrellus tasmaniensis</i>	1149_Remnant 1149_Cleared 1109_Cleared	High	BC Act: Vulnerable EPBC Act: Not listed
Purple-crowned Lorikeet <i>Glossopsitta porphyrocephala</i>	1149 Forest 1149 Cleared	High	BC Act: Vulnerable EPBC Act: Not listed
Little Lorikeet <i>Glossopsitta pusilla</i>	777_Cleared 1109_Cleared	High	BC Act: Vulnerable EPBC Act: Not listed
Little Eagle <i>Hieraaetus morphnoides</i> (foraging habitat)	1149_Remnant 1149_Cleared 777_Cleared 1109_Cleared	Moderate	BC Act: Vulnerable EPBC Act: Not listed

Predicted Ecosystem Credit Species	Associated vegetation zone	Sensitivity to gain class	Listing Status
White-throated Needletail <i>Hirundapus caudacutus</i>	1149_Remnant 1149_Cleared 777_Cleared 1109_Cleared	High	BC Act: Vulnerable EPBC Act: Not listed
Swift Parrot <i>Lathamus discolor</i>	777_Cleared	Moderate	BC Act: Endangered EPBC Act: Critically endangered
Square-tailed Kite <i>Lophoictinia isura</i> (foraging habitat)	1149_Remnant 1149_Cleared 777_Cleared 1109_Cleared	Moderate	BC Act: Vulnerable EPBC Act: Not listed
Eastern Coastal Free-tailed Bat <i>Micronomus norfolkensis</i>	1149_Remnant 1149_Cleared 777_Cleared 1109_Cleared	High	BC Act: Vulnerable EPBC Act: Not listed
Large Bent-winged Bat <i>Miniopterus orianae oceanensis</i> (foraging habitat)	1149_Remnant 1149_Cleared 777_Cleared 1109_Cleared	High	BC Act: Vulnerable EPBC Act: Not listed
Turquoise Parrot <i>Neophema pulchella</i>	1109_Cleared	High	BC Act: Vulnerable EPBC Act: Not listed
Barking Owl <i>Ninox connivens</i> (foraging habitat)	1149_Remnant 1149_Cleared 777_Cleared 1109_Cleared	High	BC Act: Vulnerable EPBC Act: Not listed
Powerful Owl <i>Ninox strenua</i> (foraging habitat)	1149_Remnant 1149_Cleared 777_Cleared 1109_Cleared	High	BC Act: Vulnerable EPBC Act: Not listed
Olive Whistler <i>Pachycephala olivacea</i>	777_Cleared	Moderate	BC Act: Vulnerable EPBC Act: Not listed
Yellow-bellied Glider <i>Petaurus australis</i>	777_Cleared 1109_Cleared	High	BC Act: Vulnerable EPBC Act: Not listed
Scarlet Robin <i>Petroica boodang</i>	1149_Remnant 1149_Cleared	High	BC Act: Vulnerable EPBC Act: Not listed
Flame Robin <i>Petroica phoenicea</i>	1149_Remnant 1149_Cleared	Moderate	BC Act: Vulnerable EPBC Act: Vulnerable
Koala <i>Phascolarctos cinereus</i> (foraging habitat)	1149_Remnant 1149_Cleared 777_Cleared 1109_Cleared	High	BC Act: Vulnerable EPBC Act: Vulnerable
Golden-tipped Bat <i>Phoniscus papuensis</i>	1149_Remnant 1149_Cleared 777_Cleared	High	BC Act: Vulnerable EPBC Act: Not listed
Grey-headed Flying-fox <i>Pteropus poliocephalus</i> (foraging habitat)	777_Cleared 1109_Cleared	High	BC Act: Vulnerable EPBC Act: Vulnerable

Predicted Ecosystem Credit Species	Associated vegetation zone	Sensitivity to gain class	Listing Status
Greater Broad-nosed Bat <i>Scoteanax rueppellii</i>	1149_Remnant 1149_Cleared 777_Cleared 1109_Cleared	High	BC Act: Vulnerable EPBC Act: Not listed
Masked Owl <i>Tyto novaehollandiae</i> (foraging habitat)	1149_Remnant 1149_Cleared 777_Cleared 1109_Cleared	High	BC Act: Vulnerable EPBC Act: Not listed

4.1.2 Ecosystem Credit Species excluded from further assessment

The following Ecosystem Credit Species were excluded from further assessment based on geographic limitations, habitat constraints or vagrancy (see BAM Subsections 5.2.1 and 5.2.2). Summaries of the justification for the exclusion of these species are provided in Table 4-2.

Table 4-2 Ecosystem Credit Species excluded from further assessment

Ecosystem Credit Species	PCT and vegetation zone	Justification for exclusion
Glossy Black Cockatoo <i>Calyptorhynchus lathami</i> (Foraging habitat)	1149_Cleared 777_Cleared 1109_Cleared	Absence of listed habitat constraints ('Allocasuarina and Casuarina species')
Yellow-bellied Glider <i>Petaurus australis</i>	777_Cleared 1109_Cleared	Absence of listed habitat constraints ('Hollows' and 'Hollow-bearing trees')

4.2 Species Credit Species

4.2.1 Candidate Species Credit Species

The following Candidate Species Credit Species were listed by BAM-C as species predicted to occur on the Subject Land (Table 4-3). Some of these species were excluded from further assessment based on geographic limitations, habitat constraints or vagrancy (see BAM Subsections 5.2.1 and 5.2.2). Summaries of the justification for the exclusion of Candidate Species Credit Species are provided in Table 4-4.

Table 4-3 Candidate Species Credit Species derived from the BAM-C

Candidate Species Credit Species	Sensitivity to gain class	Listing status
Narrabarba Wattle <i>Acacia constable</i>	High	BC Act: Vulnerable EPBC Act: Vulnerable
Regent Honeyeater <i>Anthochaera phrygia</i> (breeding habitat)	High	BC Act: Critically endangered EPBC Act: Critically endangered

Candidate Species Credit Species	Sensitivity to gain class	Listing status
Gang-gang Cockatoo <i>Callocephalon fimbriatum</i> (breeding habitat)	High	BC Act: Vulnerable EPBC Act: Not listed
Glossy Black-Cockatoo <i>Calyptrorhynchus lathamii</i> (breeding habitat)	High	BC Act: Vulnerable EPBC Act: Not listed
Eastern Pygmy-Possum <i>Cercartetus nanus</i>	High	BC Act: Vulnerable EPBC Act: Not listed
Chef's Cap Correa <i>Correa beauerlenii</i>	High	BC Act: Vulnerable EPBC Act: Vulnerable
Giant Burrowing Frog <i>Heleioporus australiacus</i>	Moderate	BC Act: Vulnerable EPBC Act: Vulnerable
Little Eagle <i>Hieraaetus morphnoides</i> (breeding habitat)	Moderate	BC Act: Vulnerable EPBC Act: Not listed
Southern Brown Bandicoot (eastern) <i>Isodon obesulus obesulus</i>	High	BC Act: Endangered EPBC Act: Endangered
Swift Parrot <i>Lathamus discolor</i> (breeding habitat)	Moderate	BC Act: Endangered EPBC Act: Critically endangered
Square-tailed Kite <i>Lophoictinia isura</i> (breeding habitat)	Moderate	BC Act: Vulnerable EPBC Act: Not listed
Large Bent-winged Bat <i>Miniopterus orianae oceanensis</i> (breeding habitat)	Very high	BC Act: Vulnerable EPBC Act: Not listed
Stuttering Frog <i>Mixophyes balbus</i>	Very high	BC Act: Endangered EPBC Act: Vulnerable
Large-leafed Monotaxis <i>Monotaxis macrophylla</i>	High	BC Act: Endangered EPBC Act: Not listed
Southern Myotis <i>Myotis macropus</i>	High	BC Act: Vulnerable EPBC Act: Not listed
Barking Owl <i>Ninox connivens</i> (breeding habitat)	High	BC Act: Vulnerable EPBC Act: Not listed
Powerful Owl <i>Ninox strenua</i> (breeding habitat)	High	BC Act: Vulnerable EPBC Act: Not listed
Tall knotweed <i>Persicaria elatior</i>	High	BC Act: Vulnerable EPBC Act: Vulnerable
Greater Glider <i>Petauroides volans</i>	High	BC Act: Not listed EPBC Act: Vulnerable

Candidate Species Credit Species	Sensitivity to gain class	Listing status
Squirrel Glider <i>Petauroides norfolcensis</i>	High	BC Act: Vulnerable EPBC Act: Not listed
Brush-tailed Phascogale <i>Phascogale tapoatafa</i>	High	BC Act: Vulnerable EPBC Act: Not listed
Koala <i>Phascolarctos cinereus</i> (breeding habitat)	High	BC Act: Vulnerable EPBC Act: Vulnerable
Long-nosed Potoroo <i>Potorous tridactylus</i>	High	BC Act: Vulnerable EPBC Act: Vulnerable
Oval-leaved Pseudanthus <i>Pseudanthus ovalifolius</i>	High	BC Act: Endangered EPBC Act: Not listed
Grey-headed Flying-fox <i>Pteropus poliocephalus</i> (breeding habitat)	High	BC Act: Vulnerable EPBC Act: Vulnerable
Masked Owl <i>Tyto novaehollandiae</i> (breeding habitat)	High	BC Act: Vulnerable EPBC Act: Not listed

4.2.2 Species Credit Species excluded from further assessment

The following Species Credit Species were excluded from further assessment based on geographic limitations, habitat constraints or vagrancy (see BAM Subsections 5.2.1 and 5.2.2). Summaries of the justification for the exclusion of candidate Species Credit Species are provided in Table 4-4.

Table 4-4 Species Credit Species excluded from further assessment

Species Credit Species	Habitat constraints and geographic limitations (BAM-C, TBDC)	Justification of exclusion
Narrabarba Wattle <i>Acacia constablei</i>	Habitat constraints: <ul style="list-style-type: none"> - Rocky areas - Acid volcanic outcrops or within 20 m of outcrop Geographic limitations: <ul style="list-style-type: none"> - South of Eden 	The Subject Land does not have rocky areas or acid volcanic outcrops and is not located within 20 m of outcrop The Subject Land is located north of Eden
Regent Honeyeater <i>Anthochaera phrygia</i> (Breeding habitat)	Geographic limitations: <ul style="list-style-type: none"> - Important Area Mapping exists for this species 	The Subject Land is not within an area on the Important Area Map for the Regent Honeyeater (Important Area Map accessed 15 Dec 2021)
Gang-gang Cockatoo <i>Callocephalon fimbriatum</i> (Breeding habitat)	Habitat constraints: <ul style="list-style-type: none"> - Hollow-bearing trees - Eucalypt tree species with hollows greater than 9 cm diameter 	There are no hollow bearing trees or Eucalyptus tree species with hollows greater than 9 cm on the Subject Land
Glossy Black Cockatoo <i>Callocephalon fimbriatum</i> (Breeding habitat)	Habitat constraints: <ul style="list-style-type: none"> - Hollow-bearing trees - Eucalypt tree species with hollows greater than 9 cm diameter 	There are no hollow bearing trees or Eucalyptus tree species with hollows greater than 9 cm on the Subject Land
Chef's Cap Correa <i>Correa baeuerlenii</i>	Geographic limitations: <ul style="list-style-type: none"> - North of the Bega River 	The Subject Land is south of the Bega River

Species Credit Species	Habitat constraints and geographic limitations (BAM-C, TBDC)	Justification of exclusion
Little Eagle <i>Hieraaetus morphnoides</i> (Breeding habitat)	Habitat constraints: - Nest trees: live (occasionally dead) large old trees within vegetation	The Subject Land, including paddock and shelterbelt trees, were searched for Little Eagle nest trees. No nest trees were found
Southern Brown Bandicoot (eastern) <i>Isodon obesulus obesulus</i>	Habitat constraints: - Requires dense ground cover in a variety of habitats	There are no areas with suitable dense ground cover habitat on the Subject Land
Swift Parrot <i>Lathamus discolor</i> (Breeding habitat)	Geographic limitations: - Important Area Mapping exists for this species	The Subject Land is not within an area on the Important Area Map for the Regent Honeyeater (Important Area Map accessed 15 Dec 2021)
Square-tailed Kite <i>Lophoictinia isura</i> (Breeding habitat)	Habitat constraints: - Nest trees	The Subject Land, including paddock and shelterbelt trees, were searched for Square-tailed Kite nest trees. No nest trees were found
Large Bent-winged Bat <i>Miniopterus orianae oceanensis</i> (Breeding habitat)	Habitat constraints: - Cave, tunnel, mine, culvert or other structure known or suspected to be used for breeding with numbers of individuals > 500	No suitable breeding habitat (caves, tunnels, mines, or other suitable structures) occur on the Subject Land
Stuttering Frog <i>Mixophyes balbus</i>	Habitat constraints: - Inhabits naturally vegetated streams in hilly or mountainous topography in rainforest and wet, tall open forest in the foothills and escarpment on the eastern side of the Great Dividing Range (OEH 2018)	The microhabitat required by the species (hilly topography, naturally vegetated streams, rainforest or wet, tall open forest) is absent on the Subject Land
Large-leafed Monotaxis <i>Monotaxis macrophylla</i>	Habitat constraints: - Grows on rocky ridges and hillsides (OEH 2019, J. Miles pers. comm.)	The microhabitat required by the species (rocky ridges and hillsides) is absent on the Subject Land

Species Credit Species	Habitat constraints and geographic limitations (BAM-C, TBDC)	Justification of exclusion
Barking Owl <i>Ninox connivens</i> (Breeding habitat)	Habitat constraints: <ul style="list-style-type: none"> - Hollow-bearing trees - Living or dead trees with hollows greater than 20 cm diameter and greater than 4 m above the ground 	There are no hollow bearing trees or trees with hollows greater than 20 cm on the Subject Land
Powerful Owl <i>Ninox strenua</i> (Breeding habitat)	Habitat constraints: <ul style="list-style-type: none"> - Hollow-bearing trees - Living or dead trees with hollows greater than 20 cm diameter 	There are no hollow bearing trees or trees with hollows greater than 20 cm on the Subject Land
Greater Glider <i>Petauroides volans</i>	Habitat constraints: <ul style="list-style-type: none"> - Hollow-bearing trees 	There are no hollow bearing trees on the Subject Land
Long-nosed Potoroo <i>Potorous tridactylus</i>	Habitat constraints: <ul style="list-style-type: none"> - Requires dense shrub layer or alternatively high canopy cover exceeding 70% (to capture populations inhabiting wet sclerophyll and rainforest) 	There are no areas with suitable dense shrub layer or high canopy cover habitat on the Subject Land
Grey-headed Flying-fox <i>Pteropus poliocephalus</i> (Breeding habitat)	Habitat constraints: <ul style="list-style-type: none"> - Breeding camps 	There are no known breeding camps on the Subject Land
Masked Owl <i>Tyto novaehollandiae</i> (Breeding habitat)	Habitat constraints: <ul style="list-style-type: none"> - Hollow-bearing trees - Living or dead trees with hollows greater than 20 cm diameter 	There are no hollow bearing trees or trees with hollows greater than 20 cm on the Subject Land

4.2.2 Additional Species Credit Species considered for assessment

Rhyolite endemics

The geology in the Study Area (rhyolite) gives rise to the possibility that several listed rhyolite endemics could occur on it. These are the shrubs *Zieria formosa*, *Z. parrisiae* and *Z. buxijugum*, each known from only a single site west of Pambula, and the shrubs *Leionema ralstonii* and *Westringia davidii*, and the orchid *Genoplesium rhyoliticum*, all of which occur almost exclusively around the upper edges of large rhyolite cliffs in Nullica State Forest and South East Forest National Park, Yowaka Section. Their habitat is the upper edges of large, exposed rock outcrops, where soil is shallow enough to preclude the growth of forest, and they occur in rock scrub dominated by the shrubs or small trees *Kunzea ambigua* and *Melaleuca armillaris* or, in the case of the orchid, in small pockets of soil in depressions of bedrock.

The nearest occurrence recorded of any of these species is at Nethercote Falls, about 5km to the south-west, where there are old records of *Genoplesium rhyoliticum*, but no recent records, despite searches during its flowering period in 2020. Other than this all the rhyolite endemic records are located to the west of Lochiel, more than 8 km west of the Study Area.

The outcropping of rhyolite on this site consists of small bedrock outcrops and jumbled loose rock embedded within eucalypt forest, with occasional small patches in pasture. The remnant dry forest at the northern end of the site was traversed from north to south and one BAM plot situated within it. It was not searched exhaustively for threatened species but given the lack of large bedrock outcrops with soils shallow enough to exclude eucalypts and the lack of any records nearby, the probability of any of these species occurring on the Subject Land is very low.

There is one other rhyolite endemic in the region, Narrabarba Wattle (*Acacia constablei*), a shrub wattle restricted to a few rhyolite outcrops south of Eden, and very similar in appearance to Black Wattle except for its smaller size. Young Black Wattle plants on the Subject Land were inspected to be sure that this species was not present on the site, which it is not.

The tall shrub *Pomaderris bodalla* is found in near-riparian situations from Eurobodalla LGA south to around Merimbula and west of Pambula. Suitable habitat occurs for it along the least disturbed gully west of the Rose Hill house. It is a conspicuous species and would have been detectable if present. It was not seen, although the gully was not searched right to the western boundary of the property. This area remains part of the residual lot on the site and the proposed subdivision will not result in it being cleared, so if the species were present, it should be unaffected. It has managed to persist in close proximity to housing around the edges of Merimbula.

Other threatened species considered for assessment

The presence of abundant Kangaroo Grass (*Themeda triandra*) in parts of the pasture raises the possibility of Austral Toadflax (*Thesium australe*), a partial root parasite of grasses, mostly of Kangaroo Grass, being present. The usual habitat of this species is natural grasslands or grassy woodlands, and as the pasture on the Subject Land is all derived from clearing of forest, it is extremely unlikely that this species would be present. There are two Bega Valley records of this species, both from grassy woodland habitat in the Numbugga to Bemboka area.

The Hidden Violet (*Viola cleistogamoides*) also becomes more abundant after fire and has been recorded at North Long Beach in Ben Boyd National Park after a fire in coastal heath in 2016 (J. Miles, pers. obs.). This location is about 5 km south-east of the site, but in quite different habitat, on coastal

heath on sandy soils derived from Devonian sandstone. This is the habitat favoured by this species, and as the habitat is not present here, the violet is extremely unlikely to occur on the site.

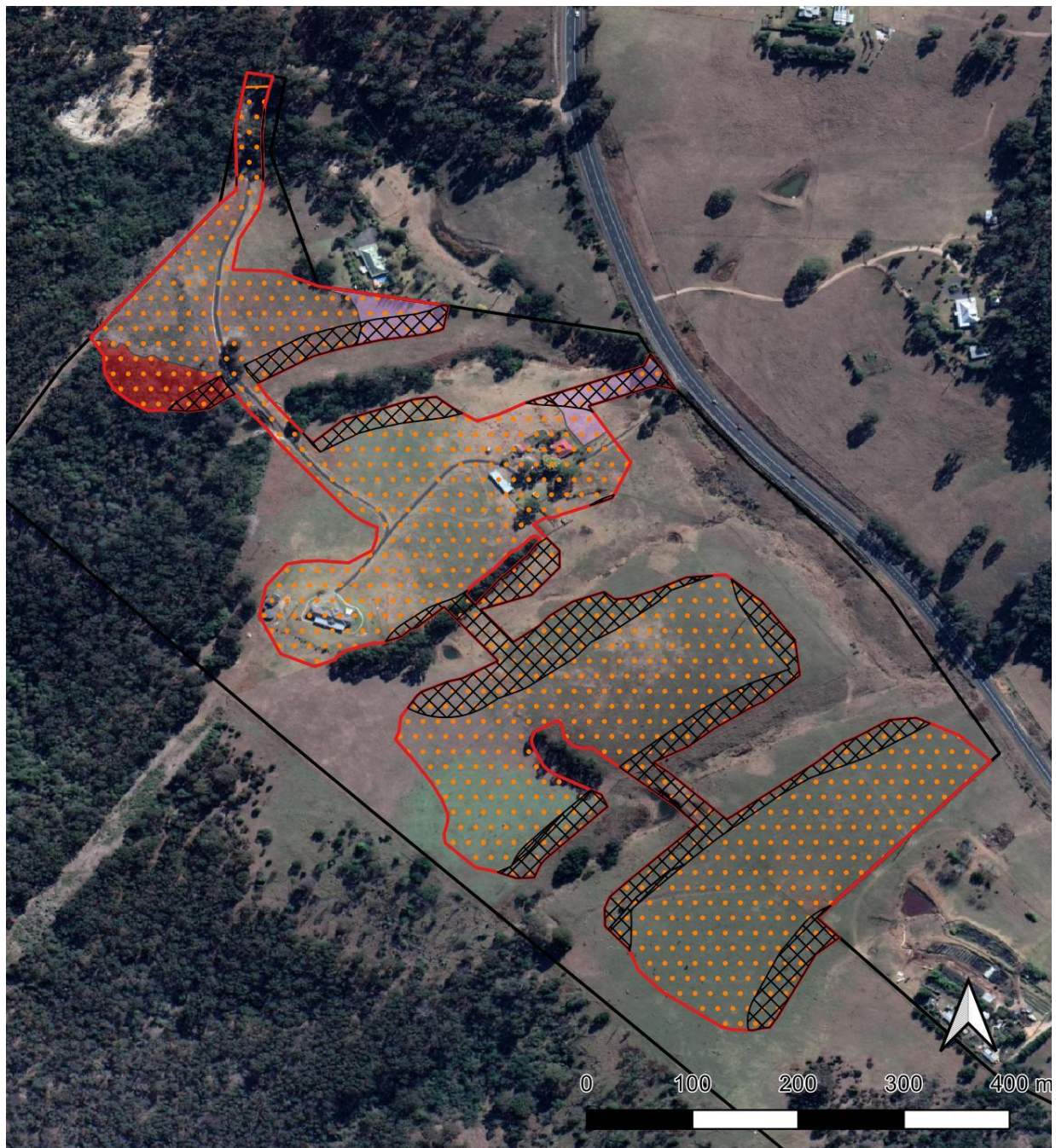
None of the additional Candidate Species Credit species considered for assessment have habitat requirements which are likely to be met on the Subject Land.

4.3 Species Credit Species that require further assessment

Based on the BAM-C results and site assessment, the following species warrant targeted surveys to determine presence or absence on the Subject Land (Table 4-5).

Table 4-5 Candidate Species Credit Species that require further assessment, and their habitat requirements (TBDC, 30 January 2022)

Species	Habitat requirements (TBDC, 31 Jan 2022)	Vegetation zone	Area (ha)	Suitable survey timing
Giant Burrowing Frog <i>Heleioporus australiacus</i>	Forest habitat. Occurs in a variety of PCTs with 30–70% retained forest habitat	1149 Remnant	0.39	Jan, Feb, Mar, Apr, May, Sep, Oct, Nov, Dec
Southern myotis <i>Myotis macropus</i>	Breeding and roosting habitat within 200 m of waterways with pools of ≥3 m wide	1149 Remnant 1149 Cleared 777 Cleared 1109 Cleared	0.39 9.79 0.50 2.78	Jan, Feb, Mar, Oct, Nov, Dec
Eastern Pygmy-possum <i>Cercartetus nanus</i>	Forest habitat	1149 Remnant	0.39	Jan, Feb, Mar, Oct, Nov, Dec
Squirrel Glider <i>Petaurus norfolcensis</i>	Forest habitat (foraging). Require abundant tree hollows for refuge and nest sites.	1149 Remnant	0.39	Jan to Dec
Brush-tailed Phascogale <i>Phascogale tapoatafa</i>	Forest habitat (foraging). Relies on large old trees with hollows for breeding and nesting.	1149 Remnant	0.39	Jan, Feb, Mar, Apr, May, Jun, Dec
Koala <i>Phascolarctos cinereus</i>	Forest and woodland habitat (breeding)	1149 Remnant	0.39	All year
Oval-leaved Pseudanthus <i>Pseudanthus ovalifolius</i>	Forest habitat. Occurs in near-coastal dry sclerophyll forest on sandy soil	1149 Remnant	0.39	Aug, Sep, Oct, Nov
Tall knotweed <i>Persicaria elatior</i>	Occurs in semi-permanent and ephemeral wet areas, within 50m of waterbodies (see species polygon in Figure 4-1)	1149 Remnant 1149 Cleared 777 Cleared 1109 Cleared	0.08 1.79 0.31 1.18	Jan, Feb, Mar, Apr, May, Dec



- Study Area
- Subject Land

Candidate Species Credit Areas

- PCT 1149: Eastern Pygmy Possum
Giant Burrowing Frog, Squirrel Glider
Brush-tailed Phascogale, Koala
Oval-leaved Pseudanthus
- Tall knotweed habitat
- Southern Myotis foraging

Vegetation Zones (Ecosystem Credits)

- Zone 1: PCT 1149
- Zone 4: PCT 777 cleared

Summer Hill Rd, Greigs Flat NSW

Map drawn T. Hastings 17/02/2022

Figure 4-1 Candidate Species Credit areas and Ecosystem Credit areas requiring offsets

4.4 Targeted surveys

The following targeted surveys for identified Species Credit Species were/will be carried out following DPIE's taxa-specific survey guidelines with regards to timing of surveys, methods and survey effort.

Giant Burrowing Frog

Timing of survey: February and March 2022

Survey personnel and relevant experience: Sam Patmore, Ecologist

Southern Myotis

Timing of survey: February and March 2022

Survey personnel and relevant experience: Sam Patmore, Ecologist

Eastern Pygmy Possum

Timing of survey: February and March 2022

Survey personnel and relevant experience: Tony Hastings, Ecologist

Squirrel Glider

Timing of survey: February and March 2022

Survey personnel and relevant experience: Tony Hastings, Ecologist

Brush-tailed Phascogale

Timing of survey: February and March 2022

Survey personnel and relevant experience: Tony Hastings, Ecologist

Koala

Survey effort: Surveys were carried out in suitable forest habitat, which is limited on the Subject Land to the 0.39 ha forest patch to the north-west (PCT 1149 Remnant). The survey approach followed the guidelines and recommendations set out in SEPP 2021 (Koala Habitat Protection), as follows:

1. Koala use trees: The forest habitat was searched to determine the presence and abundance of known 'Koala use trees' in the South-Coast Koala Management Area, as listed in SEPP 2021.
2. Core koala habitat assessment:
 - a. Surveys: Spotlighting surveys were undertaken in the evenings of 11 February and 14 February 2022 by an Ecologist and assistant. Searches for koala scats were conducted by the same team on 11 February using the Spot Assessment Technique (SAT), as described by Phillips and Callaghan (2011). A mature White Stringybark within the PCT 1149 forest patch (GPS coordinates UTM 55 H 754609E, 590637N) was chosen as the central SAT point, around which 30 'Koala use trees' with DBH > 10 cm were sampled and searched for potential Koala scats and bark scratches to assess the presence/absence of Koala activity.
 - b. Historical records were reviewed on 15 February 2022 (BioNet, iNaturalist) to determine whether Koalas have been recorded within 2.5 km of the Study Area in the previous 18 years.

Results: Known Koala use tree species were common in the survey area. They included White Stringybark, Yellow Stringybark, Silvertop Ash and Black Sheoak (SEPP 2021). However, no indications

of Koala activity were detected during spotlighting surveys and SAT searches, and there are no recent (< 18 year old) records of Koalas within 2.5 km of the Study Area. Only three historical records are known from the South Pambula-Broadwater-Yowaka area, all recorded prior to the early 1930's. The only historical record within 2.5 km of the Subject Site is from Greigs Flat, recorded in 1931. Based on these findings, Koalas are not considered to occur within the Subject Land, and it is very unlikely that Koalas occur in the locality and Study Area.

Tall Knotweed (*Persicaria elatior*)

Survey effort: Searches for this species were undertaken on the 9 February 2022 for a period of approximately 1.5 hours by an Ecologist and assistant. Identified species polygons within the Subject Land (see Figure 4-1) were surveyed using the parallel field traverse survey technique in accordance with the NSW Guide to surveying threatened plants and their habitat (DPIE 2020).

Results: No Tall Knotweed were detected within the survey area. Due to lack of suitable wetland habitat, it is not considered to occur within the Subject Land and considered very unlikely to occur within the Study Area. This species is found around wetland edges/floors as the water recedes during drought, germinating from seed carried in the mud on the wetland floor (J. Miles, pers. obs.).

Oval-leaved Pseudanthus

Timing of survey: July-August 2022

Survey personnel and relevant experience: Elisabeth Larsen, Ecologist

4.5 Additional habitat features relevant to prescribed impacts

4.5.1 Occurrences of karst, caves, crevices, cliffs, rocks and other geological features

As verified by the field inspections, there are no occurrences of karst, caves, crevices, cliffs, rocks or other features of geological significance within the Subject Land.

4.5.2 Occurrences of human-made structures and non-native vegetation

There are three existing road crossings of 1st and 2nd order drainage with existing outfall culverts on the Subject Land (see Figure 3-1 and 4-2). Two of these existing culverts will be retained, but both will be extended as part of the subdivision proposal (Culverts A and B). The third culvert will be replaced (Culvert C).

All outfall culverts on site provide potential roosting habitat for the threatened microbat Southern Myotis (*Myotis macropus*). All construction work will be carried out outside of the breeding season of microbats known to roost and breed in man-made structures. The culverts will be inspected by a suitably trained ecologist immediately prior to start of any works, and appropriate impact mitigation measures will be carried out if any signs of microbat occupancy are detected.

There are no other occurrences of human-made structures within the impact area of the Subject Land.

There are no areas of 'non-native vegetation' within the impact area of the Subject Land.

4.5.3 Habitat connectivity for threatened species

A total of 0.39 ha of forest canopy (PCT 1149 Remnant) and four planted shelterbelt trees will be cleared as part of the development proposal. All remaining paddock trees and shelterbelt trees on the Subject Land (approx. 0.4 ha) will be retained as part of the proposal. The clearing is considered to have negligible effect on habitat connectivity or movement abilities of any threatened species with known home ranges. There are no important connectivity features in or adjacent to the Subject Land, and the forest canopy to be cleared is at the edge of a largely forested landscape. The four shelterbelt trees (2 x *Eucalypts botryoides*, 1 x *Acacia implexa*, 1 x *Pinus* sp.) do not form major 'stepping stones' across the landscape, and they are not critical in preserving connectivity between forest patches in the locality.

The clearing of 13.07 ha of derived native grassland (PCT 1109, PCT 1149 and PCT 777) is not expected to impact on any threatened fauna reliant on native groundcover. The grassland area is currently grazed by sheep and horses and subjected to regular compaction and trampling. Areas of grassland with similar floristics will be retained outside the development footprint within the Study Area (Lot 711 DP1128593). There is also open woodland on the neighbouring property directly to the west of the Study Area which is less frequented by livestock and therefore provide better groundcover resources for native fauna.

4.5.4 Water bodies, hydrological processes and water quality

Water bodies: Five streams/drainage lines will be impacted by the proposal: two new road crossings of unnamed 1st and 2nd order streams will be constructed (Culverts D and E – see Figure 4-2), and three existing road crossings will be modified. The construction and modification of these five crossings will cause temporary disturbance of the drainage line vegetation and creek beds.

None of the three dams in the Study Area will be affected by the proposal. All the dams on site are located outside the boundaries of the Subject Land.

Hydrological processes: The following is a summary of the design details for the five drainage outfall culverts which will be modified or installed as part of the proposal:

1. Culvert A: The existing culvert will be retained. An extension of the culvert will be sited downstream.
2. Culvert B: The existing dam and outfall culvert will be retained. An extension of the culvert will be sited downstream.
3. Culvert C: The existing culvert will be removed and replaced with a new culvert. The width of culvert pipe to be laid will be refined in the Construction Certificate. The length will not exceed 14 m including associated batter.
4. Culvert D: This is a new culvert to be installed. The width of culvert pipe to be laid will be refined in the Construction Certificate. The length will not exceed 12 m including pipe and associated batter.
5. Culvert E: This is a new culvert to be installed. The width of culvert pipe to be laid will be refined in the Construction Certificate. The length will not exceed 12 m including pipe and associated batter.

5. AVOID AND MINIMISE IMPACTS

5.1 Avoiding and minimising impacts on native vegetation and habitat

5.1.1 Site selection: consideration of alternative sites/routes

No alternative sites have been considered. However, the design of the development proposal has been refined in order to limit the development footprint to previously cleared/disturbed land, minimise the disturbance of forest vegetation, paddock trees and planted shelterbelt trees, and to avoid environmentally sensitive riparian zones along the 1st and 2nd order watercourses.

5.1.2 Proposal components: consideration of alternate modes or technologies

Zoning requirements: A minimum lot size of 2 ha is proposed for this development. However, the LEP allows lot averaging. This proposal therefore sees fifteen Lots ranging in size from 0.5 ha to 10 ha.

Bushfire protection: A major constraint is the requirements prescribed by Planning for Bushfire Protection (NSW Rural Fires Service 2019), requiring all habitable dwellings to have appropriate Asset Protection Zones at a BAL 29 rating. There will need to be a zone of clearing between future dwellings and existing fire threats (vegetation). The proposed APZs vary from 10 to 36 metres wide as depicted in the bushfire report by Firesense which forms part of the DA package, with a majority of APZs being less than 15 m.

5.1.3 Site layout design: consideration of alternatives

A preliminary Flora and Fauna Assessment carried out in 2021 by Local Environmental Solutions informed the proposed site layout. In the design of the subdivision, impacts to areas with the highest ecological values were avoided and minimised as far as practical by:

- confining the proposed development footprint as much as possible to already cleared and disturbed parts of the Study Area,
- avoiding environmentally sensitive areas and features, including riparian zones and dams, shelterbelt trees, paddock trees and other remnant native vegetation.

5.2 Avoiding and minimising prescribed biodiversity impacts

The BC Regulation (clause 6.1) identifies actions that are prescribed as impacts to be assessed under the Biodiversity Offsets Scheme. The following prescribed impacts are relevant to the proposal:

- Impacts of development on the habitat of threatened species or ecological communities associated with human made structures, and
- Impacts of development on water quality, water bodies and hydrological processes that sustain threatened species and threatened ecological communities.

How these prescribed impacts have been avoided and minimised by the proposal is detailed below.

5.2.1 Impacts on habitat associated with human made structures

Culverts: The three existing outfall culverts on the Subject Land could provide potential roosting habitat for Southern Myotis and other microbats that roost in human made structures of this kind. Two of these three outfall culverts will be retained and extended as part of the proposal. The third culvert will be removed and replaced.

All construction work will be carried out outside the breeding season of microbats. Before removal or other work is carried out, a qualified ecologist will examine the culverts. Appropriate mitigation measures will be carried out if any fauna is present.

5.2.2 Impacts on water quality, water bodies and hydrological processes

Disturbance to the riparian areas: Four unnamed 1st order and 2nd order streams traverse the Subject Land. Although the development footprint was designed to avoid development within the riparian zones, the final site layout could not completely avoid all impacts on these water courses.

In total, five stream crossings will be modified or constructed as part of the proposed development: The widening of the existing road to the north will impact on one 1st order and one 2nd order stream, the access road in the southern half of the Subject Land will cross one 1st order and one 2nd order drainage line, and the upgrade of the main access road from Princes Highway will impact on one 2nd order stream (see *Stormwater Management Plan* in DA package).

Overall, approximately 500 m² of understory vegetation in the drainage lines will be subject to temporary disturbance during the construction phase. The works will involve stripping the topsoil from the proposed pipe site, placing and compacting rock and or geotextile, then setting the outfall pipe and back filling for the road above. The pipe grades will emulate the current natural grades. The road design will seek to minimise the disturbance to flows. A program of rehabilitation of these disturbed areas will be carried out directly after impact to minimise soil erosion.

Farm dams: There are three existing farm dams and one proposed water quality control pond in the Study Area. All these dams are outside the Subject Land. Potential impacts will be managed as follows:

- One farm dam is located west of Culvert B. It will not be altered, and the only potential impact is run-off from the small area of clearing needed for the dwelling site APZ. Full erosion control measures will be applied to avoid impact on the dam, and the cleared section rehabilitated with native grasses.
- Two farm dams are located in riparian zones to the north of Lots 12 and 15. Both of these dams will be retained, and there are no subdivision works that will affect them. Dwelling site preparations will require normal soil conservation measures to be applied so that impacts to all water bodies are avoided.
- A water quality pond will be established in Lot 15 and the lead in to this pond will be rehabilitated to a small artificial wetland. The pond and wetland will be included in the exclusion fencing of the estate gully system to avoid grazing. Once established, this wetland area will provide a range of environmental benefits such as improved water quality. Design details for the water quality pond and wetland will be provided as part of the Construction Certificate application for the roadworks.

Pollution and/or sedimentation during construction: This risk will be managed through the application of mitigation measures specified in the project's *Erosion and Sediment Control Plan*.

Stormwater management: A *Stormwater Management Plan* will be drawn up for this subdivision in accordance with standard Conditions of Consent associated with any subdivision approval. Provided this plan is prepared and recommendations are followed the impacts of stormwater discharge are likely to be minimal.

Potential groundwater pollution: The proposed fifteen Lots will operate to on-site sewerage management systems to be approved and licenced by Council. The two existing Lots and dwellings have established systems with no history of issues. The design proposal by Martens and Associates that forms part of the development application establishes a sound management system for each new Lot with disposal areas well away from drainage lines.

It is proposed that all drainage lines will be fenced out from stock to allow regeneration of native vegetation within the constraints of the bushfire plan. This will see a significant improvement to the waterways; with stock exclusion and regeneration of vegetation, additional filtering of run-off will be provided.

6. DIRECT AND INDIRECT IMPACTS

6.1 Direct impacts

The construction and occupancy phases of the proposal have the potential to cause unavoidable impacts on biodiversity values. These direct impacts would occur as a result of habitat clearance, construction of buildings, roads and infrastructure, and the long-term occupancy of land.

Table 6-1 Direct impacts to biodiversity during the construction and operational phases

Nature of impacts	Timing/ duration	Consequence
Clearing for buildings, roads and utilities	Construction/ Long-term occupancy of land	<ul style="list-style-type: none"> Direct loss of groundcover habitat and loss of 0.39 ha of forest habitat
Displacement of resident fauna	Construction/ Long-term occupancy of land	<ul style="list-style-type: none"> Impact on common ground dwelling mammals, reptiles and common birds (i.e., Magpies) Temporary decline in local fauna populations
Injury or death of fauna	Construction/ occupancy of land	<ul style="list-style-type: none"> Impact on common ground dwelling mammals, reptiles and common birds Temporary decline in local fauna populations

It is noted that the successful rehabilitation and ongoing management of riparian zones (revegetation, weed and feral animal control), have the potential to improve the biodiversity values of the Study Area in the medium to long term, compared with the degraded status quo.

6.1.1 Changes in vegetation integrity scores

The changes to vegetation integrity (VI) scores as a result of clearing are documented for each vegetation zone in Table 7-2 below. The future VI score of zero is automatically assigned in BAM-C, based on the assumption that existing native vegetation will be fully removed in preparation for roads, underground infrastructure, building envelopes and driveways, and ornamental gardens, resulting in a future vegetation integrity score of zero. For this subdivision it is noted, however, that considerable areas within the Lots are likely to remain as managed grassland.

Table 6-2 Current and future vegetation integrity scores for each vegetation zone within the Subject Site

Plant Community Type	Vegetation zone, area	Current VI score	Future VI score
PCT 1149: Silvertop Ash - Blue-leaved Stringybark shrubby open forest on hinterland hills, far southern South East Corner Bioregion	1149 Remnant, 0.39 ha	82.6	0
	1149 Cleared, 9.79 ha	1.2	0
PCT 1109: River Peppermint - Rough-barked Apple moist open forest on sheltered sites, southern South East Corner Bioregion'	1109 Cleared, 2.78 ha	5.9	0

PCT 777: Coast Grey Box - Mountain Grey Gum - stringybark moist shrubby open forest in coastal gullies, southern South East Corner Bioregion	777 Cleared, 0.50 ha	20	0
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6.1.2 Loss of species credit species habitat or individuals

The loss of species credit species habitat or individuals as a result of clearing is documented in Table 6-3 below.

Table 6-3 Summary of Species Credit Species loss on the Subject Land

Species Credit Species	Biodiversity Risk Weighting	Area of habitat/ count of individuals
Survey results TBA		
Survey results TBA		
Survey results TBA		

6.1.3 Loss of hollow-bearing trees

There are no hollow bearing trees inside the development footprint and therefore no hollows will be removed as a result of the actions proposed.

6.1.4 Direct prescribed impacts

Direct prescribed impacts have been identified in Sections 4.5 and 5.2.

6.2 Indirect impacts

Indirect impacts of the proposal could include soil and water contamination and the effects of the generation of excessive dust, light or noise during the construction phase, and future indirect impacts resulting from the residential occupancy of the land.

Beneficial indirect impacts will include improvements to water quality and riparian habitat achieved through exclusion of stock and successful revegetation of native vegetation in the riparian zones. A planned water quality pond/wetland has the potential to improve the quality of the riparian habitat. Lot owners will be encouraged to use native vegetation in landscaping.

Table 6-4 below details the type, frequency, intensity, duration and consequence of the indirect impacts of the proposal.

Table 6-4 Potential indirect impacts to biodiversity during construction and occupation of land

Nature of indirect impact	Extent	Frequency	Duration and timing	Threatened species and habitat likely to be affected	Consequence to biodiversity
Inadvertent impacts on adjacent habitat or vegetation	Unknown	Rare	Construction phase: short term	Adjacent forest communities Riparian vegetation	Disturbance or loss of native flora and fauna habitat (mainly vegetation).
Reduced viability of adjacent habitat due to edge effects	Unknown	Ongoing	Construction phase, occupation of land	Adjacent forest communities Riparian habitat	Disturbances caused by residential development.
Inadvertent impacts on riparian corridors	Unknown	Ongoing	Construction phase, occupation of land	1 st and 2 nd order water courses	Contamination and degradation of waterways (run-off, contaminant spills). Conversely, the habitat quality of riparian corridors is expected to improve with exclusion of stock and successful revegetation.
Transport of weeds and pathogens to adjacent habitat	Unknown	Ongoing	Construction phase, occupation of land	Adjacent forest communities Riparian habitat	Habitat degradation caused by garden escapees and dumping of garden waste.
Reduced viability of adjacent habitat due to noise, dust, or light spill	Unknown	Ongoing	Construction phase, occupation of land	Adjacent forest communities Riparian habitat	Disturbances to native fauna through excessive dust, noise and light during construction. Ongoing disturbances from new residential development.
Increased risk of starvation, exposure and loss of shade or shelter	N/A	N/A	N/A	N/A	Negligible – existing habitat is already highly modified. Conversely, in the medium to long term, the habitat quality of riparian corridors is expected to improve.
Loss of breeding habitats	Unknown	Ongoing	Construction phase, occupation of land	Adjacent forest communities Riparian habitat	Loss of breeding habitat associated with clearing activities.

					In the medium to long term, the quality of the breeding habitat in the riparian corridors is expected to improve.
Trampling of threatened flora species	N/A	N/A	N/A	N/A	None – no threatened flora species likely to be present
Inhibition of nitrogen fixation and increased soil salinity	N/A	N/A	N/A	N/A	None – Subject Site is not within salt susceptible land
Fertiliser drift to adjacent habitat	Unknown	Rare	Occupation of land (long term)	Adjacent forest communities Riparian vegetation	Alteration to species composition in adjoining habitat.
Rubbish dumping	Unknown	Occasional	Occupation of land (long term)	Adjacent forest communities Riparian vegetation	Degradation of adjoining habitat and riparian zones
Wood collection	Unknown	Occasional	Occupation of land (long term)	Adjacent forest communities	Removal of habitat features in adjoining habitat
Bush rock collection	Unknown	Occasional	Occupation of land (long term)	Adjacent forest communities	Removal of habitat features in adjoining habitat
Increase in predatory species populations	Unknown	Ongoing	Ongoing	Adjacent forest communities Riparian vegetation	Increased disturbance and predation by domestic pets (cats, dogs) in adjoining habitat
Increase in pest animal populations	N/A	N/A	N/A	N/A	Increased disturbance and predation by feral cats in adjoining habitat
Increased risk of fire	N/A	N/A	N/A	N/A	Unlikely with APZs established.
Disturbance to specialist breeding and foraging habitat	N/A	N/A	N/A	N/A	No specialist habitat present

7. MITIGATING AND MANAGING IMPACTS

7.1 Mitigation measures

A summary of the key measures required to mitigate the impacts of the proposal are provided below. Mitigation measures proposed to manage impacts, including proposed techniques, timing, frequency, responsibility for implementing each measure, risk of failure and an analysis of the consequences of any residual impacts are provided in Table 7-1 below.

7.1.1 Mitigating direct impacts from clearing vegetation and habitats

- Toolbox talk: all construction staff to be inducted on mitigation measures to prevent environmental impacts.
- Clearly mark boundaries of clearing area with temporary fencing or similar prior to construction to avoid direct impacts to adjacent areas.
- No parking, stockpiling or storage of topsoil or fill within the dripline of any trees.
- No parking, stockpiling or storage topsoil or fill or any construction materials within riparian corridors.
- Avoid night work to prevent accidental clearing outside marked boundaries.
- Ensure that the disposal of woody debris does not impact on surrounding habitats.

7.1.2 Mitigating indirect impacts from clearing vegetation and habitats

- All activities relating to the proposal would be undertaken with the objective of preventing visible dust emissions from the development site.
- A weed management procedure will be included in the *Vegetation Management Plan* and would include weed and pathogen hygiene protocols adopted to prevent introducing new weeds and pathogens onto the site from plant, machinery, and fill.
- A *Stormwater Management Plan* will be developed for the site to prevent erosion and sedimentation into adjoining riparian habitat.
- Avoid night work to minimise noise and light disturbance of fauna in surrounding habitat.

7.1.3 Mitigating prescribed impacts

- Drainage outfall construction: All creek crossings will be graded to simulate the natural incline of the drainage lines. Flow patterns will be retained.
- Culvert design: new culverts to be installed will permit access and use as roost by microbats
- Road construction: all impacts on vegetation, soils, and watercourses should be avoided and minimised.
- Water quality: Sediment barriers and spill management procedures will be set in place to control the quality of water runoff released from the site into the receiving environment
- Stock will be excluded from the riparian zones. Local indigenous plant species will be used in the revegetation of riparian zones after finalisation of road construction.
- The use of local indigenous plants for revegetation along riparian areas will be encouraged, subject to bushfire control requirements.
- A water quality pond with capacity to become a useful wetland for improvement of water quality will be established.

Table 7-1 Recommended measures to avoid and minimize impacts on native vegetation and habitat

Mitigation measure	Proposed technique	Timing	Frequency	Responsibility	Risk of failure	Consequence of impact
Indirect impacts on adjacent vegetation and riparian habitat						
Clearing protocols	<ul style="list-style-type: none"> - Approved clearing limits to be clearly delineated with temporary fencing or similar prior to construction commencing. - No stockpiling or storage within dripline of any trees. - No stockpiling or storage within riparian buffers. 	Prior to and during construction	Regularly	Landowner/ Contractor	Low	Disturbance or loss of native vegetation and habitat
Staff training and site briefings	<ul style="list-style-type: none"> - Site induction - Toolbox talks 	Construction	Regularly	Contractor	Moderate	Impacts on native vegetation and habitat if staff training is not carried out or followed
Noise: Limit construction (day/season) and operational activities to minimise impacts of noise	<ul style="list-style-type: none"> - Avoid night work 	Construction	Regularly	Contractor	Low	Disturbance of native fauna
Light spills: Limit construction and operational activities (day/season) to reduce impacts of light spill	<ul style="list-style-type: none"> - Avoid night work - Direct lights away from vegetation/ habitat 	Construction	Regularly	Contractor	Low	Disturbance of native fauna
Dust: Adaptive dust monitoring programs to control air quality	<ul style="list-style-type: none"> - All activities to be undertaken with the objective of preventing visible dust emissions from the development site. - Daily monitoring of dust generated by construction activities. Use of water cart for dust suppression. - Construction to until control measures are implemented 	Construction	Regularly	Contractor	Low	Build-up of dust on vegetation within ephemeral waterways. Sedimentation of dams and open water bodies.

Mitigation measure	Proposed technique	Timing	Frequency	Responsibility	Risk of failure	Consequence of impact
Temporary exclusion fencing to protect environmental features such as trees and riparian zones	- Prior to construction work, exclusion fencing and signage to be installed around habitat to be retained. This should include riparian zones, and shelterbelt and paddock trees	Construction	Regularly	Contractor	Low	Loss of native vegetation and habitat
Preparation of a Vegetation Management Plan (VMP)	VMP to include: - System for the removal and disposal of vegetation and topsoil containing weeds declared under the Biosecurity Act 2015 during and after construction. - System of reporting any occurrences of pathogens such as Myrtle Rust and Phytophthora. - Advice on local indigenous species for landscaping - Revegetation actions for riparian zones	Construction, operation	Regularly	Landowner	Moderate	Spread of weeds, loss of native vegetation and reduced habitat quality
Preparation of an Erosion and Sediment Control Plan	Prepare and implement an Erosion and Sediment Control Plan	Construction	Regularly	Landowner	Low risk if plan is implemented	Reduced habitat quality
Preparation of a Stormwater Management Plan	Prepare and implement a Stormwater Management Plan	Construction, operation	Regularly	Landowner	Low risk if plan is implemented	Excessive discharge of water during rainfall events into the waterways on site may alter hydrological patterns.
Prescribed biodiversity impacts						
Road and culvert design	- Design to emulate the current stream grade and flow patterns - New culverts to allow use by microbats	Construction	Regularly	Landowner/ Contractor	Moderate	Impact on threatened species habitat

Mitigation measure	Proposed technique	Timing	Frequency	Responsibility	Risk of failure	Consequence of impact
Sediment barriers and spill management procedures to control the quality of water runoff released from the site into the receiving environment	<ul style="list-style-type: none"> - Prepared and implement an <i>Erosion and Sediment Control Plan</i>. - Implement spill management procedures - Prepare and implement a Stormwater Management Plan 	Construction	Regularly	Contractor	Moderate	Impact on threatened species habitat
Appropriate landscape plantings of species native to the area to provide some fauna habitat in the riparian zones	<ul style="list-style-type: none"> - Use local indigenous species for landscaping in riparian zones - Plant trees to enhance connectivity of riparian zone with forested vegetation to the west 	Operation	Regularly	Landowner	Moderate	Impact on threatened species habitat

8. SERIOUS AND IRREVERSIBLE IMPACTS (SAII)

The principles used to determine if a development will have serious and irreversible impacts, include impacts that:

- will cause a further decline of the species or ecological community that is currently observed, estimated, inferred, or reasonably suspected to be in a rapid rate of decline, or
- will further reduce the population size of the species or ecological community that is currently observed, estimated, inferred, or reasonably suspected to have a very small population size, or Impact on the habitat of a species or ecological community that is currently observed, estimated, inferred, or reasonably suspected to have a very limited geographic distribution, or
- impact on a species or ecological community that is unlikely to respond to measures to improve habitat and vegetation integrity and is therefore irreplaceable.

The following was determined for the Subject Site:

- **Threatened Ecological Communities:** There are no mapped TECs on the Subject Site.
- **Threatened species:** There are no SAI candidate species recorded on the Subject Site.
- **Additional potential entities:** No further species were considered to be potential SAI entities.

9. BIODIVERSITY OFFSET REQUIREMENTS

9.1 Ecosystem credits

An offset is required for all impacts of development on PCTs that are associated with:

- a vegetation zone that has a vegetation integrity score ≥ 15 where the PCT represents an endangered or critically endangered ecological community, or
- a vegetation zone that has a vegetation integrity score of ≥ 17 where the PCT is associated with threatened species habitat (as represented by ecosystem credits), or a vulnerable ecological community, or
- a vegetation zone that has a vegetation integrity score ≥ 20 where the PCT **does not** represent a threatened ecological community and is not associated with threatened species habitat.

An offset is not needed for impacts on native vegetation if the vegetation integrity score is below those listed above.

Relevant to this proposal, the PCTs and vegetation zones requiring offsets, and the ecosystem credits required, are shown in Table 9-1. The vegetation zones are mapped on Figure 4-1. None of the vegetation to be cleared meet the definition of any listed Threatened Ecological Communities.

Table 9-1 Ecosystem credit offsets required for this proposal

PCT ID	PCT Name	Vegetation zone	Area ha	Vegetation integrity score	Ecosystem credits
1149	Silvertop Ash - Blue-leaved Stringybark shrubby open forest on hinterland hills, far southern South East Corner Bioregion	Remnant	0.39	82.6	12
		Cleared	9.79	1.2	0
1109	River Peppermint - Rough-barked Apple moist open forest on sheltered sites, southern South East Corner Bioregion	Cleared	2.78	5.9	0
777	Coast Grey Box - Mt Grey Gum - stringybark moist shrubby open forest in coastal gullies, southern South East Corner Bioregion	Cleared	0.50	20	4

9.2 Species credits

/TBA/ Dependent on Targeted Survey results

9.3 Offsets under the EPBC Act

/TBA/ Dependent on Targeted Survey results

9.4 Areas not requiring assessment

The two vegetation zones 'PCT 1149 Cleared' and 'PCT 1109 Cleared' do not require offsetting, as the VI scores for these two vegetation zones were below the VI thresholds listed in Section 9.1.

10. CONCLUSION

This Draft Biodiversity Development Assessment Report was prepared by Local Environmental Solutions on behalf of the proponent, Graeme Payten, for a proposed rezoning and subdivision of Lot 711 DP1128593, 23 Summer Hill Road, Greigs Flat 2549 NSW, in the Bega Valley Local Government Area.

Comprehensive mapping and field surveys were completed in accordance with the requirements of the BAM to identify credit obligations under the BOS. It was determined that the proposed clearing of 0.39 ha of Plant Community Type (PCT) 1149 'Silvertop Ash - Blue-leaved Stringybark shrubby open forest on hinterland hills, far southern South East Corner Bioregion' (Dry Sclerophyll Forest) and 13.07 ha of cleared grassland derived from three different vegetation types (PCT 1149, 777, and 1109) will generate sixteen Ecosystem Credits. None of the vegetation to be cleared meet the definition of any listed Threatened Ecological Communities.

The preliminary Credit Summary Report attached to this draft BDAR assumes the worst-case scenario: that all identified Candidate Species Credit Species are present within the Subject Land. However, the final Species Credit offset requirement depend on the finalisation of field assessments and targeted threatened species surveys. Should the targeted surveys determine that Candidate Species Credit Species are unlikely to occur, a BDAR modification will be submitted. The retirement of the generated biodiversity credits will be carried out in accordance with the NSW BOS.

11. REFERENCES

- Bowen M and Goldingay R (2000) Distribution and Status of The Eastern Pygmy Possum (*Cercartetus nanus*) in New South Wales, <https://www.publish.csiro.au/am/AM00153>, accessed 30 Jan 2022
- Local Environmental Solutions (2021) *Preliminary Flora and Fauna Assessment, Lot 711 DP1128593*. Unpublished report.
- Miles J (2021) *Acacia constablei* post-fire resurvey 2021. Unpublished report to NSW Department of Planning, Industry and Environment, Saving our Species Program.
- Miles J (2021) *Genoplesium rhyoliticum* survey, 2020-21 summer. Unpublished report to the Department of Planning, Industry and Environment, Saving our Species Program.
- Miles J (2019) *Survey of Pomaderris bodalla*, 2019. Unpublished report to NSW Department of Planning, Industry and Environment, Saving our Species Program.
- NSW Department of Planning, Industry and Environment (2020) *Surveying threatened plants and their habitats. NSW survey guide for the BAM method*, Sydney.
- NSW Department of Planning, Industry and Environment (2002) *Stuttering Frog (Mixophyes balbus) – endangered species listing*. NSW Scientific Committee – Final Determination.
- NSW Department of Sustainability, Environment, Water, Population and Communities (2011) *Survey guidelines for Australia's threatened mammals* Commonwealth of Australia, Canberra.
- NSW Rural Fire Service (2019) *Planning for Bushfire Protection*. State of NSW.
- Office of Environment and Heritage (2013) *Compilation map: Biometric vegetation types and endangered ecological communities of the Shoalhaven, Eurobodalla and Bega Valley local government areas. A living map*. Version 2.0 Technical Report, OEH Queanbeyan.
- Office of Environment and Heritage (2019) *Large leafed montotaxis – profile* <https://www.environment.nsw.gov.au/threatenedspeciesapp/profile.aspx?id=10541>, accessed 30 Jan 2022.
- Pennan T, Lemckert F and Mahony M (2004) Two hundred and ten years looking for the Giant Burrowing Frog, *Australian Zoologist* 32(4), p. 597-604.
- Phillips S, and Callaghan J (2011) The Spot Assessment Technique: A tool for determining localised levels of habitat use by Koalas *Phascolarctos cinereus* *Australian Zoologist*, Vol 35(3), p. 774-780.
- Tulau M J (1997) *Soil Landscapes of the Bega-Goalen Point 1:100 000 Sheet Report*. Department of Land and Water Conservation, Sydney.

APPENDIX A BAM CREDIT SUMMARY REPORT



BAM Credit Summary Report

Proposal Details

Assessment Id	Proposal Name	BAM data last updated *
00030111/BAAS18161/21/00030130	Graeme Payten	24/11/2021
Assessor Name	Report Created	BAM Data version *
Elisabeth Larsen	30/01/2022	50
Assessor Number	BAM Case Status	Date Finalised
BAAS18161	Open	To be finalised
Assessment Revision	Assessment Type	BOS entry trigger
1	Part 4 Developments (General)	BOS Threshold: Area clearing threshold

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

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

Zone	Vegetation zone name	TEC name	Current Vegetation integrity score	Change in Vegetation integrity (loss / gain)	Area (ha)	Sensitivity to loss (Justification)	Species sensitivity to gain class	BC Act Listing status	EPBC Act listing status	Biodiversity risk weighting	Potential SAIL	Ecosystem credits
Coast Grey Box - Mountain Grey Gum - stringybark moist shrubby open forest in coastal gullies, southern South East Corner Bioregion												
3	777_Clear ed	Not a TEC	20	20.0	0.5	PCT Cleared - 15%	High Sensitivity to Potential Gain			1.50		4
											Subtotal	4

Assessment Id	Proposal Name
00030111/BAAS18161/21/00030130	Graeme Payten



BAM Credit Summary Report

River Peppermint - Rough-barked Apple moist open forest on sheltered sites, southern South East Corner Bioregion

4	1109_Cleared	Not a TEC	5.9	5.9	2.8	PCT Cleared - 65%	High Sensitivity to Potential Gain		1.75		0
										Subtotal	0

Silvertop Ash - Blue-leaved Stringybark shrubby open forest on hinterland hills, far southern South East Corner Bioregion

1	1149_Remnant	Not a TEC	82.6	82.6	0.39	PCT Cleared - 5%	High Sensitivity to Potential Gain		1.50		12
2	1149_Cleared	Not a TEC	1.2	1.2	9.8	PCT Cleared - 5%	High Sensitivity to Potential Gain		1.50		0
										Subtotal	12
										Total	16

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>Cercartetus nanus</i> / Eastern Pygmy-possum (Fauna)									
1149_Remnant	82.6	82.6	0.39			Vulnerable	Not Listed	False	16
								Subtotal	16

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BAM Credit Summary Report

<i>Heleioporus australiacus / Giant Burrowing Frog (Fauna)</i>									
1149_Remnant	82.6	82.6	0.39			Vulnerable	Vulnerable	False	12
								Subtotal	12
<i>Myotis macropus / Southern Myotis (Fauna)</i>									
1149_Remnant	82.6	82.6	0.39			Vulnerable	Not Listed	False	16
								Subtotal	16
<i>Persicaria elatior / Tall Knotweed (Flora)</i>									
1149_Remnant	82.6	82.6	0.08			Vulnerable	Vulnerable	False	3
1149_Cleared	1.2	1.2	1.8			Vulnerable	Vulnerable	False	1
777_Cleared	20.0	20.0	0.31			Vulnerable	Vulnerable	False	3
1109_Cleared	5.9	5.9	1.2			Vulnerable	Vulnerable	False	4
								Subtotal	11
<i>Petaurus norfolcensis / Squirrel Glider (Fauna)</i>									
1149_Remnant	82.6	82.6	0.39			Vulnerable	Not Listed	False	16
								Subtotal	16
<i>Phascogale tapoatafa / Brush-tailed Phascogale (Fauna)</i>									
1149_Remnant	82.6	82.6	0.39			Vulnerable	Not Listed	False	16
								Subtotal	16
<i>Phascolarctos cinereus / Koala (Fauna)</i>									
1149_Remnant	82.6	82.6	0.39			Vulnerable	Vulnerable	False	16
								Subtotal	16



BAM Credit Summary Report

Pseudanthus ovalifolius / Oval-leaved Pseudanthus (Flora)

1149_Remnant	N/A	N/A	1			Endangered	Not Listed	True	3
								Subtotal	3

Assessment Id

00030111/BAAS18161/21/00030130

Proposal Name

Graeme Payten

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APPENDIX B VEGETATION INTEGRITY SURVEY DATA

BAM Site – Field Survey Form		1149 Dry forest		Site Sheet no: 1/2	
Survey Name		Zone ID		Recorders	
Date 16/8/21		Payten		JM + EL	
Zone 55		Datum GDA 94		BAM Plot ID Plot no. 1	
Easting 754658		Northing 5906334		Plot dimensions 20 x 50	
IBRA region		Midline bearing from 0 m		5°	
Vegetation Class Elev. 48 m		Confidence H M L			
Plant Community Type IPTCT 1149		EEC No		Confidence H M L	

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

BAM Attribute (400 m ² plot)	Sum values
Count of Native Richness	
Trees	3
Shrubs	14
Grasses etc.	10
Forbs	12
Ferns	0
Other	3
Sum of Cover, of native vascular plants by growth form group	
Trees	50
Shrubs	5
Grasses etc.	60
Forbs	3
Ferns	0
Other	0.1
High Threat Weed cover	0

BAM Attribute (1000 m ² plot)		
DBH	# Tree Stems Count	# Stems with Hollows
80 + cm	0	#(None)
50 – 79 cm	111	3
30 – 49 cm	111	3
20 – 29 cm	111	3
10 – 19 cm	1111	4
5 – 9 cm	1111	4
< 5 cm	111111	12
Length of logs (m) (W) 3m+4+1+3+2+3+2+4+6+5+3+4+7 (E) 3m+8+15+8+2+4+5+1+9+2+3+1		

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

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

BAM Attribute (1 x 1 m plots)	Litter cover (%)					Bare ground cover (%)					Cryptogam cover (%)					Rock cover (%)				
Subplot score (% in each)	30	40	70	40	10	0	10	10	30	0	0	0	0	0	0	0	20	10	10	5
Average of the 5 subplots	38					10					0					9				

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

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

Topographical	lower slope	Landform	hill slope	Landform	Patent	Microclimate	
Geology	rhylite	Soil surface	sandy loam	Soil	Colour	Soil	skeletal.
Slope	8°	Aspect	105°	Site Damage	well-dr.	Distance to nearest water and type	?

Plot Disturbance	Severity code	Age code	Observational evidence
Clearing (inc. logging)	D		occas small stump nearby
Cultivation (inc. pasture)	D		
Soil erosion	D		
Firewood / CWD removal	D		
Grazing (incl. livestock)	D		
Fire damage	D		
Storm damage	D		
Weediness	1	R	r few
Other	drought kill	2	R mid + shrub layer death + collapse

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

Age: R=recent (1-2yrs), NR=not recent (3-10yrs), Old (10yrs)

about → 1 deadw
proliferation

lots of dead standing/fallen
x presence of disturbance colonisers.

Kunzea → grass

PLOT 1

400 m ² plot: Sheet	of	Survey Name	Plot Identifier	Recorders
Date	16/8/21	Payten	Plot 1-1149	JH & EL 2/2

GF Code	Top 3 native species in each growth form group. Full species name mandatory. All other native and exotic species. Full species name where practicable	N, E or HTE	Cover	Abund	stratum	voucher
tree	<i>Eucalyptus globosa</i>	N	50	6	canopy	
↓	<i>Allocasuarina littoralis</i>		0.1	10	gr/mid	
shrub	<i>Kunzea ambigua</i>		4	50	"mid	
	<i>Pittosporum undulatum</i>		1	30	" "	
	<i>Drosera diosmifolia</i>		0.1	2	"	
	<i>Solanum vesicarium</i>		0.1	3	"	
	<i>Cassia tinctoria</i>		0.1	1	mid	
	<i>Acacia terminalis</i>		0.1	1	"	
	<i>Epacris impressa</i>		0.1	4	"	
	<i>Pollenia daphnoides</i>		0.1	1	"	
	<i>Polyscias sambucifolia</i> ssp c.		0.1	3	gr/mid	
	<i>Hibbertia empetrifolia</i>		0.1	1	gr.	
vine	<i>Glycine clandestina</i>		0.1	10	mid	
↓	<i>Pandorea pandorana</i>		0.1	2	gr.	
↓	<i>Conespermum volubile</i>		0.1	1	gr.	
grass	<i>Lepidosperma laterale</i>		1	10	gr.	
	<i>Austrostipa rudis</i>		30	100		
	<i>Microseris stipoides</i>		5	500		
	<i>Entolasia stricta</i>		0.5	20		
	<i>Lomandra longifolia</i>		0.1	2		
	<i>Oplismenus hirtellus</i>		0.1	1		
	<i>Poa ? meionectes</i>		0.1	20		
	<i>Rytidosperma longifolium</i>		20	100		
	<i>Lomandra multiflora</i>		0.1	1		
↓	<i>Echinopogon caespitosus</i>		0.1	2		
forb	<i>Solanum silvestre</i>		0.1	2		
	<i>Opercularia aspera</i>		0.5	50		
	<i>Coronidium elatum</i>		1	50		
	<i>Solanum prinophyllum</i>		0.1	20		
	<i>Gonocarpus texensis</i>		0.2	100		
	<i>Viola hederacea</i>	✓	1	100		
	<i>Leontodon saxatilis</i>	E	0.1	2		
	<i>Galium binafolium</i>	N	0.2	20		
	<i>Desmodium ganii</i>	N	0.1	5		
	<i>Hypochaeris radicata</i>	E	0.1	5		
	<i>Senecio madagascariensis</i>	E	0.1	3		
	<i>Poranthera microphylla</i>	N	0.1	2		
	<i>Xerochrysum bracteatum</i>		0.1	1		
	<i>Veronica plebeia</i>		0.1	1		
✓	<i>Brauneria pumilio</i>	✓	0.1	1	✓	

GF Code: see Growth Form definitions in Appendix 1

N: native, E: exotic, HTE: high threat exotic

GF = circle code if top 3

Cover: 0.1, 0.2, 0.3, ..., 1, 2, 3, ..., 10, 15, 20, 25, ..., 100% (foliage cover). Note: 0.1% cover represents an area of approximately 63 x 63 cm or a circle about 71 cm across. 0.5% cover represents an area of approximately 1.4 x 1.4 m, and 1% = 2.0 x 2.0 m, 5% = 4 x 5 m, 25% = 10 x 10 m

Abundance: 1, 2, 3, ..., 10, 20, 30, ..., 100, 200, ..., 1000

BAM Site – Field Survey Form		Wetter forest		Site Sheet no: 1/2	
Date: 16/8/21		Survey Name: Payten		Zone ID: Zone 7	
Zone: 55	Datum: 05A94	BAM Plot ID: Plot no. 2		Plot dimensions: 20 x 50	Photo #: Yes
Easting: 754657	Nothing: 5906241	IBRA region:		Midline bearing from 0 m: 200	
Vegetation Class: Euv 60m				Confidence: H M L	
Plant Community Type: PCT 777				EEC: No	
				Confidence: H M L	

Record easting and nothing at E in on midline. Dimensions (Shape) of 20 m by 50 m plot

BAM Attribute (400 m ² plot)	Sum values
Trees	7
Shrubs	11
Grasses etc.	11
Forbs	23
Ferns	0
Other	5
Count of Native Richness	
Trees	57%
Shrubs	5%
Grasses etc.	85%
Forbs	8%
Ferns	0
Other	0-1%
Sum of Coves of native vascular plants by growth form group	
High Threat Weed cover	0

BAM Attribute (1000 m ² plot)		
DBH	# Tree Stems Count	# Stems with Hollows
80+ cm	1	11
50 – 79 cm	111	
30 – 49 cm	11111	
20 – 29 cm	111111111	
10 – 19 cm	111111111111111	
5 – 9 cm	111	
< 5 cm	11	n/a
Length of logs (m) (W) 2m + 2 + 4 + 1 + 5 + 3 + 6 + 5 + 2 (30m)		
(E) 3m + 7 + 6 + 10 + 4 + 4 + 10 + 10 + 2 (56m)		
Counts apply when the number of tree stems within a size class is < 10. Estimates can be used when > 10 (eg. 10, 20, 30, ..., 100, 200, 300, ...). For a multi-stemmed tree, only the largest living stem is included in the count/estimate. Tree stems must be living.		
For hollows, count only the presence of a stem containing hollows. For a multi-stemmed tree, only the largest stem is included in the count/estimate. Stems may be dead and may be shrubs.		

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BAM Attribute (1 x 1 m plots)	Litter cover (%)	Bare ground cover (%)	Cryptogam cover (%)	Rock cover (%)
Subplot score (% in each)	20 30 30 30 80	5 0 0 5 5	0 0 0 0 5	0 0 0 0 0
Average of the 5 subplots	38	3	1	0

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

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

Topography: Creek	Landform: Flat	Landform: Pattern	Microclimate: Soil
Lithology: rhyolite	Soil Surface: sandy bam	Soil: clay	Soil Depth: 20m
Slope: 30°	Aspect: 100	Site Drainage: gully	Distance to nearest water and type: ephemeral

Plot Disturbance	Severity code	Age code	Observational evidence
Clearing (inc. logging)	0		
Cultivation (inc. pasture)	0		
Soil erosion	0		
Firewood / CWD removal	0		
Grazing (inc. domestic)	0		
Fire damage	1	old	v. old fire-killed snag
Storm damage	0		
Weediness	0		
Other	0		

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

Age: 0=recent (<2y), NR=not recent (>2-10y), Old (>10y)

Plot: Sheet of Survey Name Payten Plot Identifier PCT777-Plot 2 Recorders JH/E Date 16/2/21 99.5% Native veg 2/2

GF Code	Top 3 native species in each growth form group. Full species name mandatory All other native and exotic species: Full species name where practicable	N, E or HTE	Cover	Abund	stratum	voucher
Tree	<i>Euc muelleriana</i>	N	25	10		
	<i>Euc cypellocarpa</i>		25	5		
	<i>Euc longifolia</i>		5	2		
	<i>Allocasuarina littoralis</i>		2	2		
shrub	<i>Kunzea ambigua</i>		4	5		
	<i>Pittosporum undulatum</i>		1	20		
	<i>Polyscias sambucifolia</i> ssp C		0.2	20		
	<i>Solanum vesicarium</i>		0.1	3		
	<i>Ozothamnus diosmifolius</i>		0.1	2		
Tree	<i>Acacia meathii</i>		0.1	3		
	<i>Pinus laevis</i>		0.1	20		
	<i>Hibiscus aspera</i>		0.2	10		
	<i>Leucopogon juniperinus</i>		0.1	1		
tree	<i>Melaleuca armillaris</i>		0.5	1		
grass	<i>Austrostipa rodii</i>		2	20		
	<i>Oplismenus imbecilis</i>		0.1	5		
	<i>Microstachya stipoides</i>		80	1000		
	<i>Leonarda multiflora</i>		0.1	1		
	<i>Poa meioneetes</i>		1	50		
	<i>Rytidosperma longifolium</i>		1	10		
	<i>Poa ? latillordieri</i>		0.1	1		
	<i>Entolasia marginata</i>		0.1	5		
	<i>Themeda triandra</i>		0.5	20		
✓	<i>Echinopogon caespitosus</i>		0.1	5		
forb	<i>Galium leucarpum</i>		1	20		
	<i>Viola hederacea</i>		5	1000		
	<i>Galium binitolium</i>		1	100		
	<i>Operecularia hispida</i>		0.1	5		
	<i>Poranthera microphylla</i>		0.1	1		
	<i>Solanum prinophyllum</i>		0.2	20		
	<i>Operecularia aspera</i>		0.1	10		
	<i>Coronidium elatum</i>		0.5	20		
	<i>Senecio minimus</i>	↓	0.1	1		
	* <i>Cirsium vulgare</i>	E	0.1	2		
	* <i>Senecio pterophorus</i>	E	0.1	1		
	* <i>Senecio madagascariensis</i>	E	0.1	2		
	<i>Oxalis</i> sp.	N	0.1	2		
	<i>Arthropodium</i> sp.	N	0.1	5		
	* <i>Hypochaeris radicata</i>	E	0.1	5		
	<i>Geranium</i> sp.	N↓	0.1	1		

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

Solanum silvestre 0.1 1
Calomenia amaranthoides 0.1 1
Gnossocarpus tetracoides 0.1 5

Dichondra repens 0.1 5
Solanum purpureum 0.1 1
Senecio hispidulus 0.1 1
Desmodium guineense 0.1 1

BAM Site – Field Survey Form				Desired 1149		Site Sheet no: 1/2	
Date		Survey Name		Zone ID		Recorders	
16/8/21				Zone 2		JM & EL	
Zone	Datum	BAM Plot ID		Plot dimensions	Photo #		
55	GDA 94	Plot no. 3		20x50	Yes		
Easting	Northing	IBRA region		Midline bearing from 0 m			
754711	5906469			100°			
Vegetation Class						Confidence	
Elev 45m						H M L	
Plant Community Type						Confidence	
1149D Native pasture derived from non-forest						H M L	
EEC: NO							

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

BAM Attribute (400 m ² plot)	Sum values
Trees	0
Shrubs	1
Grasses etc.	6
Forbs	2
Ferns	0
Other	1
Count of Native Richness	
Trees	0
Shrubs	0.1
Grasses etc.	96
Forbs	0
Ferns	0
Other	0.1
Sum of Cover of native vascular plants by growth form group	
High Threat Weed cover	0

BAM Attribute (1000 m ² plot)		
DBH	# Tree Stems Count	# Stems with Hollows
80 + cm	(grassland)	
50 – 79 cm		
30 – 49 cm	N/A	N/A
20 – 29 cm		
10 – 19 cm		
5 – 9 cm		
< 5 cm		n/a
Length of logs (m) (≥10 cm diameter, >50 cm in length)	N/A	

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

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

BAM Attribute (1 x 1 m plots)	Litter cover (%)	Bare ground cover (%)	Cryptogam cover (%)	Rock cover (%)
Subplot score (% in each)	0 0 0 0 0	0 0 0 0 0	0 0 0 0 0	0 0 0 0 0
Average of the 5 subplots				

Litter cover is assessed as the average percentage ground cover of litter recorded from five 1 m x 1 m plots, centred at 5, 15, 25, 35, 45 m along the plot midline. Litter cover includes leaves, seeds, twigs, branches and branches (less than 12 cm in diameter). Assessors may also record the cover of rock, bare ground and cryptogams.

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

Topographical	Lower slope	Landform		Landform		Microsite	
Aspect	hypocline	Aspect	?	Aspect		Soil	shallow
Slope	5°	Aspect	100°	Site Damage		Distance to nearest water and type	100m

Plot Disturbance	Severity code	Age code	Observational evidence
Clearing (inc. logging)	3	0	
Cultivation (inc. pasture)	0		
Soil erosion	0		
Firewood/CWD removal	0		
Grazing (inc. livestock)	0		
Fire damage	0		
Storm damage	0		
Weediness	1		
Other			

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

Age: 0=recent (<3yrs), NR=not recent (3-10yrs), 0=old (>10yrs)

100 m ² plot: Sheet <u>2</u> of <u>2</u>		Survey Name	Plot Identifier	Recorders			
Date		Payten	1149D-Plot 3	Jim & EL	2/2		
GF Code	Top 3 native species in each growth form group: Full species name mandatory All other native and exotic species: Full species name where practicable	N, E or HTE	Cover	Abund	stratum	voucher	
	<i>Pteridium esculentum</i>	N	0.1	5			
	<i>Themeda triandra</i>	N	86	1500			
	<i>Microlaena stipoides</i>	N	10	1000			
	* <i>Anthoxanthum odoratum</i>	E	5	500			
	* <i>Sporobolus africanus</i>		0.5	20			
	* <i>Holcus lanatus</i>		0.3	20			
	* <i>Vulpia</i> sp.		0.2	100			
	* <i>Setaria parviflora</i>	E	0.1	5			
	<i>Eragrostis leptostachya</i>	N	5	200			
	* <i>Paspalum dilatatum</i>	E	0.1	1			
	<i>Dichelachne micrantha</i>	N	0.1	20			
	<i>Panicum effusum</i>		0.1	2			
	<i>Aristida vagans</i>	N	0.1	1			
	* <i>Briza</i> sp.	E	0.1	2			
	<i>Crassula siebertiana</i>	N	0.1	3			
	* <i>Conyza</i> sp.	E	0.1	5			
	<i>Oxalis</i> sp.	N	0.1	1			
	* <i>Gnaphalium</i> sp.	E	0.1	2			
	* <i>Lotus</i> sp.	E	0.1	10			
	* <i>Hypochaeris radicata</i>	E	0.1	2			
	<i>Glycine clandestina</i>	N	0.1	2			
	* <i>Leontodon saxatilis</i>	E	0.1	5			
	* <i>Trifolium dubium</i>	E	0.1	1			
	<i>Wahlenbergia gracilis</i>	N	0.1	5			
	* <i>Senecio madagascariensis</i>	E	0.1	2			
	* <i>Trifolium repens</i>		1	100			
	* <i>Paronychia brasiliensis</i>		0.1	2			
	* <i>Roncolea rosea</i>		0.1	5			
	* <i>Cerastium</i> sp.		0.1	1			
	* <i>Sisyrinchium ovalatum</i>	E	0.1	1			
stems	<i>Kunzea ambigua</i>	N	0.1	2			

GF Code: see Growth Form definitions in Appendix 1

N: native, E: exotic, HTE: high threat exotic

GF – circle code if top 3

Cover: 0.1, 0.2, 0.3, ..., 1, 2, 3, ..., 10, 15, 20, 25, ..., 100% (foliage cover). Note: 0.1% cover represents an area of approximately 63 x 63 cm or a circle about 71 cm across, 0.5% cover represents an area of approximately 1.4 x 1.4 m, and 1% = 2.0 x 2.0 m, 5% = 4 x 5 m, 25% = 10 x 10 m

Abundance: 1, 2, 3, ..., 10, 20, 30, ..., 100, 200, ..., 1000

BAM Site – Field Survey Form 1149-D Site Sheet no: 1/2

Date 16/8/21		Survey Name Paylen	Zone ID Zone 2	Recorders JM + EL	
Zone 55	Datum GDA	BAM Plot ID Plot no. 4	Plot dimensions 20 x 50	Photo #	Yes
Easting 754833	Northing 5906205	IBRA region	Midline bearing from 0 m 40°		
Vegetation Class Elev. 45m		PCT 1149 D			Confidence H M L
Plant Community Type ± native pasture with exotic forbs (non-Thymeda)		EEC: No			Confidence H M L

Record easting and northing at 0 to an outline. Dimensions (Shape) of 20m x 50m plot

BAM Attribute (400 m ² plot)	Sum values
Trees	0
Shrubs	0
Count of Native Richness	
Grasses etc.	4
Forbs	4
Ferns	0
Other	1
Sum of Cover of native vascular plants by growth form group	
Trees	0
Shrubs	0
Grasses etc.	65
Forbs	0
Ferns	0
Other	0
High Threat Weed cover	0.2

BAM Attribute (1000 m ² plot)		
DBH	# Tree Stems Count	# Stems with Hollows
80+ cm	(quarantined)	
50 – 79 cm		
30 – 49 cm	N/A	N/A
20 – 29 cm		
10 – 19 cm		
5 – 9 cm		
< 5 cm		n/a
Length of logs (m) (>10 cm diameter, >50 cm in length)	N/A	

Counts apply when the number of tree stems within a size class is 5-10. Estimates can be used when > 10 (e.g. 10, 20, 30, 100, 200, 300, ...). For a multi-stemmed tree, only the largest living stem is included in the count/estimate. Tree stems must be living.

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

BAM Attribute (1 x 1 m plots)	Litter cover (%)	Bare ground cover (%)	Cryptogam cover (%)	Rock cover (%)
Subplot score (%) in each	0 0 0 0 0	0 0 0 0 0	0 0 0 0 0	0 25 0 0 20
Average of the 5 subplots				

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

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

Topography	lower slope	Landform		Landform		Microclimate	
Soil		Soil Depth		Soil		Soil	
Soil texture		Soil texture		Soil		Soil	
Slope	3°	Aspect	70°	Site drainage		Distance to nearest water and type	

Plot Disturbance	Severity code	Age code	Observational evidence
Clearing (inc. logging)	3	D	
Cultivation (inc. pasture)	0		
Soil erosion	0		
Firewood/CWD removal	0		
Grazing	1	R	
Fire damage	0		
Storm damage	0		
Weediness	2		
Other	0		

Severity: 0=No evidence, 1=Light, 2=moderate, 3=severe

Age: R=recent (1-5yrs), NR=not recent (>5-10yrs), Old (>10yrs)

GF Code: see Growth Form definitions in Appendix 1 N: native, E: exotic, HTE: high threat exotic GF – circle code if top 3¹
Cover: 0.1, 0.2, 0.3, ..., 1, 2, 3, ..., 10, 15, 20, 25, ..., 100% (foliage cover). **Note:** 0.1% cover represents an area of approximately 63 x 63 cm or a circle about 71 cm across, 0.5% cover represents an area of approximately 1.4 x 1.4 m, and 1% = 2.0 x 2.0 m, 5% = 4 x 5 m, 25% = 10 x 10 m
Abundance: 1, 2, 3, ..., 10, 20, 30, ..., 100, 200, ..., 1000

BAM Site – Field Survey Form				Site Sheet no: 1/2			
Date		Survey Name		Zone ID		Recorders	
22 10 21		Payten		Zone 6		JM + EL	
Zone	Datum	BAM Plot ID	No. 10	Plot dimensions	20 x 5	Photo #	2
55	GDA						
Easting	Nothing	IBRA region		Midline bearing from 0 m	30°		
754966	5905939						
Vegetation Class				1109 Derived		Confidence: H M L	
Plant Community Type				1109D cleared gully		Confidence: H M L	
				EEC: N			

Record easting and nothing at 0 m on midline. Dimensions (2 shape) of 0.04 ha base plot.

BAM Attribute (400 m ² plot)	Sum values
Trees	0
Shrubs	0
Grasses etc.	7
Forbs	5
Ferns	1
Other	0
Sum of Cover of native vascular plants by growth form group	
Trees	0
Shrubs	0
Grasses etc.	33
Forbs	10
Ferns	40
Other	0
High Threat Weed cover	0.5

(b1/berry)

BAM Attribute (1000 m ² plot)		
DBH	# Tree Stems Count	# Stems with Hollows
80 + cm		
50 – 79 cm		
30 – 49 cm	N/A - none	
20 – 29 cm		
10 – 19 cm		
5 – 9 cm		
< 5 cm		n/a
Length of logs (m) ≥ 10 cm diameter, > 50 cm in length	N/A - none	

Counts apply when the number of tree stems within a size class is ≥ 10. Estimates can be used when < 10 (eg. 10, 20, 50, 100, 200, 300...). For a multi-stemmed tree, only the largest living stem is included in the count/estimate. Tree stems must be living.

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

BAM Attribute (1 x 1 m plots)	Litter cover (%)	Bare ground cover (%)	Cryptogam cover (%)	Rock cover (%)
Subplot score (% in each)	0 10 5 0 0	0 0 0 0	0 0 0 0	0 0 20 0 0
Average of the 5 subplots	3	0	0	4

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

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

Morphological Type	lower slope	Landform	Cement	Landform Pattern		Microclimate	1
Lithology	basal +	Soil Surface Texture		Soil Colour		Soil Depth	Shallow
Slope	10	Aspect	115°	Site Drainage		Distance to nearest water and type	Bar, gully + dam

Plot Disturbance	Severity code	Age code	Observational evidence:
Clearing (inc. logging)	3	0	
Cultivation (inc. pasture)	0		too steep - also not slashed,
Soil erosion	0		unlike ridge top pasture, so
Firewood/CWD removal	0		
Grazing (excl. stock)	2	R	lots more Rubus, Carex long + bracken
Fire damage	0		
Storm damage	0		
Weediness	2		
Other	0		

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

Age: R=recent (<5yrs), NR=not recent (6-10yrs), O=old (>10yrs)

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400 m ² plot: Sheet 2 of 2		Survey Name	Plot Identifier	Recorders		
Date	22.10.21	Payten	1109 derived grassland, Plot 10	JM & EL		
GF Code	Top 3 native species in each growth form group: Full species name mandatory All other native and exotic species: Full species name where practicable	N, E or HTE	Cover	Abund	stratum	voucher
E	1 <i>Pteridium esculentum</i>		40	1000		
S	2 <i>Rubus parvifolius</i>		5	100		
Gr	3 <i>Carex longebrachiata</i>		25	100		
	4 * <i>Holcus lanatus</i>	E	10	200		
	5 * <i>Bromus ? hordeaceus</i>	E	0.5	100		
	6 * <i>Sporobolus africanus</i>	E	0.1	5		
	7 <i>Eragrostis leptostachya</i>		0.1	5		
	8 * <i>Lolium perenne</i>	E	0.2	50		
	9 * <i>Vulpia</i> sp	E	0.5	500		
	10 <i>Microlaena stipoides</i>		2	100		
	11 * <i>Poa pratensis</i>	E	0.2	50		
	12 * <i>Anthoxanthum odoratum</i>	E	0.5	20		
	13 <i>Carex ? invelsa</i>		0.1	5		
	14 <i>Juncus</i> sp		0.1	5		
	15 <i>Memeda triandra</i>		0.2	20		
	16 <i>Austrostipa rudis</i>		5	100		
	17 * <i>Briza minor</i>	E	0.1	1		
	18 * <i>Paspalum dilatatum</i>	E	0.1	5		
Forb	19 * <i>Sisyrinchium rosulatum</i>	E	0.1	20		
Forb	20 <i>Epilobium biederianum</i>		0.1	20		
	21 <i>Geranium gaudieri</i>		10	100		
	22 * <i>Ceniza sumatrensis</i>	E	0.1	10		
	23 * <i>Vicia</i> sp	E	0.1	5		
	24 * <i>Tribolium dubium</i>	E	0.5	100		
	25 * <i>Gnomocharis</i> sp	E	0.1	10		
	26 * <i>Hypochaeris radicata</i>	E	0.2	20		
	27 <i>Rumex brownii</i>		0.1	5		
	28 * <i>Plantago lanceolata</i>	E	0.2	20		
	29 <i>Daucus glaberrimus</i>		0.1	10		
	30 * <i>Senecio madagascariensis</i>	E	0.2	40		
	31 * <i>Cirsium vulgare</i>	E	0.1	1		
	32 * <i>Cerastium</i>	E	0.1	5		
	33 * <i>Lotos</i> sp hairy	E	0.1	5		
	34 * <i>Verbena benariensis</i>	E	0.1	10		
	35 * <i>Mediola caroliniana</i>	E	0.1	5		
	36 * <i>Tribolium repens</i>	E	0.1	1		
	37 * <i>Euphorbia pappus</i>	E	0.1	1		
	38 * <i>Hypochaeris glabra</i>	E	0.1	1		
	39 * <i>Senecio asper</i>	E	0.1	2		
S	40 * <i>Rubus fruticosus</i>	HTE	0.5	20		

GF Code: see Growth Form definitions in Appendix 1

N: native, E: exotic, HTE: high threat exotic

GF = circle code if 'top 3'

Cover: 0.1, 0.2, 0.3, ..., 1, 2, 3, ..., 10, 15, 20, 25, ..., 100% (foliage cover); Note: 0.1% cover represents an area of approximately 63 x 63 cm or a circle about 71 cm across, 0.5% cover represents an area of approximately 1.4 x 1.4 m, and 1% = 2.0 x 2.0 m, 5% = 4 x 5 m, 25% = 10 x 10 m

Abundance: 1, 2, 3, ..., 10, 20, 30, ..., 100, 200, ..., 1000, ...

Oxalis sp N 0.1/1

BAM Site – Field Survey Form				Site Sheet no: 1/2	
Date		Survey Name	Zone ID	Recorders	
22 10 21		Payton	Zone 8	JN & EL	
Zone 55	Datum 66A	BAM Plot ID	Plot no. 12	Plot dimensions	20x50
Easting 765020	Northing 5906391	IBRA region		Midline bearing from 0 m	290°
Vegetation Class Euc. 20 m				Confidence: H M L	
Plant Community Type PCT 797 derived, cleared gully				EEC: No	
				Confidence: H M L	

Record easting and northing at 0 m on midline. Dimensions (2 shape) of 0.04 ha test plot.

BAM Attribute (400 m ² plot)	Sum values
Trees	1
Shrubs	1
Grasses etc.	6
Forbs	1
Ferns	1
Other	0
Count of Native Richness	
Trees	0.1
Shrubs	0.5
Grasses etc.	37
Forbs	0.1
Ferns	25
Other	0
Sum of Cover of native vascular plants by growth form group	
High Threat Weed cover	0.1

(b) berry

BAM Attribute (1000 m ² plot)		
DBH	# Tree Stems Count	# Stems with Hollows
80 + cm		
50 – 79 cm		
30 – 49 cm		
20 – 29 cm		
10 – 19 cm		
5 – 9 cm		
< 5 cm	11 (12)	n/a
Length of logs (m) (>10 cm diameter, >50 cm in length)	None	

Counts apply when the number of tree stems within a size class is < 10. Estimates can be used when > 10 (eg. 10, 20, 50, ..., 100, 200, 300, ...). For a multi-stemmed tree, only the largest living stem is included in the count/estimate. Tree stems must be living.

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

BAM Attribute (1 x 1 m plots)	Litter cover (%)	Bare ground cover (%)	Cryptogam cover (%)	Rock cover (%)
Subplot score (% in each)	10 5 5 10 10	0 0 0 0 0	0 0 0 0 10	0 0 0 0 0
Average of the 5 subplots	6	0	2	0

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

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

Morphological Type	Lower slope	Landform Element		Landform Pattern		Microsite	
Urology	basalt	Soil Surface Texture		Soil Colour		Soil Depth	shallow
Slope	5	Aspect	200	Site Drainage	good	Distance to nearest water and type	2 m, gully

Plot Disturbance	Severity code	Age code	Observational evidence
Clearing (inc. logging)	3	0	
Cultivation (inc. pasture)	0		?
Soil erosion	0		
Firewood/CWD removal	0		
Grazing (stock, domestic)	2	A	current, sheep
Fire damage	0		
Storm damage	0		
Weediness	2		
Other	0		

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

Age: A=recent (<5yrs), NR=not recent (5-10yrs), O=old (>10yrs)

777 D - Plot 12

2/2

400 m ² plot: Sheet _ of _	Survey Name	Plot Identifier	Recorders
Date 22.10.21	Payten	ex-777 grassland	JM & EL

GF Code	Top 3 native species in each growth form group: Full species name mandatory All other native and exotic species: Full species name where practicable	N, E or HTE	Cover	Abund	stratum	voucher
E	<i>Pteridium esculentum</i>		25	200		
T	<i>Acacia meatnsii</i> (browsed)		0.1	4		
S	<i>Rubus parvifolius</i>		0.5	50		
S	* <i>Rubus fruticosus</i>	HTE	0.1	1		
Gr.	<i>Themeda triandra</i>		15	100		
	* <i>Andropogon virginicus</i>	E	0.2	10		
	* <i>Anthriscanthus odoratum</i>	E	40	1500		
✓	<i>Eragrostis leptostachya</i>		0.5	50		
	* <i>Cenchrus clandestinus</i>	E	0.5	5		
	* <i>Phalaris aquatica</i>	E	0.5	20		
	<i>Entolasia stricta</i>		0.1	2		
	* <i>Holcus lanatus</i>	E	0.2	10		
	<i>Juncus</i> sp.		0.1	5		
	* <i>Paspalum dilatatum</i>	E	0.2	10		
	<i>Microlaena stipoides</i>		20	500		
✓	<i>Carex longibrachata</i>		0.2	10		
forb	20 * <i>Vicia</i> sp	E	0.1	1		
	21 * <i>Hypochaeris radicata</i>	E	0.5	100		
✓	22 * <i>Plantago lanceolata</i>	E	0.1	20		
	23 <i>Geranium gaudieri</i>		0.1	20		
	24 * <i>Senecio madagascariensis</i>	E	0.1	2		
	25 * <i>Cirsium vulgare</i>	E	0.1	1		
	26 * <i>Conyza sumatrensis</i>	E	0.1	1		
	27 * <i>Cerastium</i> sp	E	0.1	1		
✓	28 * <i>Sonchus oleraceus</i>	E	0.1	1		
	29					
	30					
	31					
•	32					
	33					
	34					
	35					
	36					
	37					
T	38 <i>Eucalyptus</i> sp (seedling, browsed)		0.1	1		
	39 from adjacent planted row of					
	40 mostly non-local sap					

GF Code: see Growth Form definitions in Appendix 1 N: native, E: exotic, HTE: high threat exotic GF – circle code if 'top 3'.

Cover: 0.1, 0.2, 0.3, ..., 1, 2, 3, ..., 10, 15, 20, 25, ..., 100% (foliage cover); Note: 0.1% cover represents an area of approximately 63 x 63 cm or a circle about 71 cm across, 0.5% cover represents an area of approximately 1.4 x 1.4 m, and 1% = 2.0 x 2.0 m, 5% = 4 x 5 m, 25% = 10 x 10 m

Abundance: 1, 2, 3, ..., 10, 20, 30, ..., 100, 200, ..., 1000, ...

BAM Site – Field Survey Form				Site Sheet no: 1/2	
Date	29/10/21	Survey Name	Payten	Zone ID	Zone 2
Zone	55	Datum	GDA	Recorders	E.L. and A.P.
Easting	754864	Plot ID	Plot no. 13	Plot dimensions	20x50
Nothing	5905999	IBRA region		Photo #	yes
Vegetation Class	Cleared sheep paddock				Midline bearing from 0 m
Plant Community Type	1149 D cleared shrubland				122°
					Confidence: (H) M L
					Confidence: (H) M L
					EEC: No

Record easting and nothing at 0 m on midline. Dimensions (Shape) of 0.04 ha base plot.

BAM Attribute (400 m ² plot)	Sum values
Trees	0
Shrubs	0
Grasses etc.	4
Forbs	4
Ferns	0
Other	2
Count of Native Richness	
Trees	0
Shrubs	0
Grasses etc.	15%
Forbs	3%
Ferns	0
Other	2%
Sum of Cover of native vascular plants by growth form group	
High Threat Weed cover	

BAM Attribute (1000 m ² plot)		
DBH	# Tree Stems Count	# Stems with Hollows
80 + cm		
50 – 79 cm		
30 – 49 cm	N/A	
20 – 29 cm		
10 – 19 cm		
5 – 9 cm		
< 5 cm		n/a
Length of logs (m) 0-10 cm diameter, >50 cm in length	N/A	

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

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

BAM Attribute (1 x 1 m plots)	Litter cover (%)	Bare ground cover (%)	Cryptogam cover (%)	Rock cover (%)
Subplot score (% in each)	500050	000000	000000	000000
Average of the 6 subplots	2	0	0	0

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

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

Morphology Type	Open slope	Landform	hillslope	Landform Pattern		Microclimate	
Lithology	rhysolite/basalt	Soil Surface Texture	Sandy loam	Soil Colour		Soil Depth	Shallow
Slope	3-5°	Aspect	122°	Site Drainage	Good	Distance to nearest water and type	200m - dam

Plot Disturbance	Severity code	Age code	Observational evidence:
Clearing (inc. logging)	3		Slashed & grazed
Cultivation (inc. pasture)	0		
Soil erosion	0		
Firewood / CWD removal	N/A		
Grazing (pasture/scrubland)	2		
Fire damage	0		
Storm damage	0		
Weediness	2		
Other	0		

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

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

400 m ² plot: Sheet 2 of 2		Survey Name	Plot Identifier	Recorders					
Date	29/10/21	1149 D	Plot no. 13	EL & AP					
GF Code	Top 3 native species in each growth form group: Full species name mandatory All other native and exotic species: Full species name where practicable		N, E or HTE	Cover	Abund.	stratum	voucher		
F	* Trifolium repens		E	15	200	Gr.			
	* Hypochaeris radicata		E	5	100				
	* Lotus subbiflorus	(?)	E	15	200				
	* Sisyrinchium rosulatum		E	0.2	50				
	* Senecio madagascarensis		E	0.1	50				
F	o Epilobium billardierianum		N	0.1	5				
Gr	* Microlaena stipoides		N	0.2	50				
Gr	o Juncus sp.		N	0.1	20				
Gr	* Sporobolus africanus		E	15	100				
F	* Rumex acetosella		E	0.1	50				
F	* Cirsium vulgare		E	0.1	10				
Gr	* Setaria parviflora		E	0.1	20				
F	* Anagallis arvensis		E	2.0	100				
Gr	14 Carex inversa		N	2.0	100				
F	15 Wahlenbergia gracilis		N	2.0	100				
Gr	* Cenchrus clandestinus		E	0.1	10				
F	17 Oxalis sp.		N	1	100				
Gr	* Poa pratensis		E	15	1000				
F	* Modiola caroliniana		E	0.1	10				
Gr	20 Poa metonektes	MSS	N	0.5	100				
F	* Vicia sp.		E	0.1	10				
F	22 Pteridium aquilinum								
F	* Plantago lanceolata		E	12	100				
Gr	24 Eragrostis leptostachya		N	5	100				
	* Gamochaeta sp.		E	0.1	10				
F	* Conyza sp.		E	0.1	10				
Gr	28 Themeda triandra		N	10	200				
F	28 Lythrum hyssopifolia		N	0.1	100				
F	* Trifolium dubium		E	5	1000				
Gr	* Briza minor		E	0.1	100				
F	31								
F	* Leontodon saxatilis		E	5	100				
Gr	* Anthoxanthum odoratum		E	10	100	Gr			
	34								
	35								
	36								
	37								
	38								
	39								
	40								

GF Code: see Growth Form definitions in Appendix 1

N: native, E: exotic, HTE: high threat exotic

GF - circle code if 'top 3'

Cover: 0.1, 0.2, 0.3, ..., 1, 2, 3, ..., 10, 15, 20, 25, ..., 100% (foliage cover); Note: 0.1% cover represents an area of approximately 63 x 63 cm or a circle about 71 cm across, 0.5% cover represents an area of approximately 1.4 x 1.4 m, and 1% = 2.0 x 2.0 m, 5% = 4 x 5 m, 25% = 10 x 10 m

ph = photo

BAM Site – Field Survey Form				Site Sheet no: 1/2	
Date	29/10/21	Survey Name	Payton	Zone ID	Zone 6
Zone	58	Datum	58A	Recorders	EL & AP
Plot ID	Plot no. 14	Plot dimensions	20x50	Photo #	Yes 2
IBRA region		Midline bearing from 0 m	138° SE		
Vegetation Class	Cleared - sheep grazing				Confidence: (H) M L
Plant Community Type	1109 D				Confidence: (H) M L
EEC: N					

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

BAM Attribute (400 m ² plot)	Sum values
Trees	0
Shrubs	0
Grasses etc.	2
Forbs	1
Ferns	0
Other	2
Count of Native Richness	
Trees	0
Shrubs	0
Grasses etc.	25
Forbs	0.5
Ferns	0
Other	3.5
Sum of Cover of native vascular plants by growth form group	
High Threat Weed cover	0

DBH	# Tree Stems Count	# Stems with Hollows
80 + cm		
50 - 79 cm		
30 - 49 cm	N/A	
20 - 29 cm		
10 - 19 cm		
5 - 9 cm		
< 5 cm		n/a
Length of logs (m) ≤ 10 cm diameter, > 50 cm in length	N/A	

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

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

BAM Attribute (1 x 1 m plots)	Litter cover (%)	Bare ground cover (%)	Cryptogam cover (%)	Rock cover (%)
Subplot score (% in each)	5 5 20 5 0	0 0 0 0 0	0 0 0 0 0	0 0 0 0 0
Average of the 5 subplots	7	0	0	0

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

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

Morphological Type	Lower slope	Landform Element	Hill slope	Landform Pattern		Microclimate	
Lithology	basalt	Soil Surface Texture	Sandy loam	Soil Colour		Soil Depth	Shallow
Slope	3-5°	Aspect	SE 138°	Site Drainage	Good	Distance to nearest water and type	50m, creek

Plot Disturbance	Severity code	Age code	Observational evidence
Clearing (inc. logging)	3		slashed & grazed
Cultivation (inc. pasture)	0		
Soil erosion	0		
Firewood / CWD removal	0		
Grazing (stock / herbivory)	2		
Fire damage	0		
Storm damage	0		
Weediness	1		
Other	0		

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

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

[illegible]