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# Biodiversity Development Assessment Report



Precinct 3, Polo Flat Road (Lot 3 // DP 1285072), Cooma, NSW

Proposed subdivision and housing development

Prepared for: Cardno (Stantec)

14 December 2022 Version: 1.1 – Final

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COVER PANNEL	<p><b>Top left:</b> Natural Temperate Grassland with marked <i>Leuochrysum albicans</i> var. <i>tricolor</i> within a patch of Natural Temperate Grassland.</p> <p><b>Top right:</b> Image of <i>L. albicans</i> var. <i>tricolor</i> in flower.</p> <p><b>Bottom left:</b> whole <i>L. albicans</i> var. <i>tricolor</i> plant.</p> <p><b>Bottom right:</b> the resident herd of cattle within the subject land.</p>			
LICENCES	Scientific Licence		SL101557	
	BioNet Sensitive Species Data Licence		1115	
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## Glossary and abbreviations

Acronym	Description
AOO	Area of occupancy
Assessment circle	The 1,500 m assessment buffer, surrounding and including the subject land
BAM	Biodiversity Assessment Methodology
BAMC	Biodiversity Assessment Methodology Calculator
BC Act	NSW <i>Biodiversity Conservation Act 2016</i>
BDAR	Biodiversity Development Assessment Report
BOS	Biodiversity Offset Scheme
BV Map	Biodiversity Values Map
CEEC	Critically Endangered Ecological Community
CEMP	Construction Environmental Management Plan
DA	Development Application
CMLEP	Cooma-Monaro Local Environmental Plan
DCCEEW	Commonwealth Department of Climate Change, Energy, the Environment and Water
Development footprint	the land which will be directly impacted by the proposed development (synonymous with the subject land for this report).
DoE	Commonwealth Department of the Environment (now DAWE)
DPE	NSW Department of Planning and Environment
DPIE	NSW Department of Planning, Industry, and Environment (now DPE)
ELA	Eco Logical Australia
EOO	Extent of occurrence
EP&A Act	NSW <i>Environmental Planning and Assessment Act 1979</i>
EPBC Act	Commonwealth <i>Environment Protection and Biodiversity Conservation Act 1999</i>
IBRA	Interim Biogeographic Regionalisation of Australia



Acronym	Description
MNES	Matter of National Environmental Significance
OEH	NSW Office of the Environment and Heritage
PCT	Plant Community Type
Subject land	The land to which the proposed development will occur (e.g., the Lot), identified as Precinct 3 in the development application
TEC	Threatened Ecological Community
VI	Vegetation Integrity
VZ#	Vegetation zone (number)
WM Act	NSW <i>Water Management Act 2000</i>





# 1 Introduction

This Biodiversity Development Assessment Report (BDAR) has been prepared to accompany the development applications on Polo Flat Road (Lot 3 // DP 1285072), Cooma, NSW (**Figure 1.1**).

This BDAR has been approved by Ed Cooper, an Accredited Person (BAAS18047) to apply the Biodiversity Assessment Method (BAM) under the NSW *Biodiversity Conservation Act 2016* (BC Act).

The BDAR has been prepared following steps outlined in the BAM and all credit calculations have been undertaken using the BAM Calculator (BAMC) version in case number 00031930/BAAS18047/22/00036139.

## 1.1 Biodiversity Offset Scheme trigger for assessment

The NSW *Biodiversity Conservation Act 2016* (BC Act) establishes the biodiversity assessment requirements for proposed developments and land use change. Part of the BC Act establishes an offsets scheme that aims to ensure there is not net loss of biodiversity values within NSW. Triggers outlined in the *Biodiversity Conservation Regulation 2017* (BC Reg) that require land clearing to enter the Biodiversity Offsets Scheme (BOS) are:

- exceeding the native vegetation clearing threshold (based on minimum lot size) (Section 7.2 of the BC Reg; **Table 1.1**)
- direct impacts occur on land included in the Biodiversity Values Map (BV Map) (DPE 2022a)
- significant impact on threatened species, ecological communities (or their habitat)
- the project is State Significant Development.

**Table 1.1: Maximum clearing threshold allowable under the BC Reg (Section 7.2) without triggering entry into the BOS.**

Minimum lot size	Maximum area of clearing
<1 ha	0.25 ha
1 to <40 ha	0.5ha
40 to <1,000 ha	1 ha
≥1,000 ha	2 ha

As the subject land has a minimum lot size of 500 m<sup>2</sup>, under the SMLEP, the maximum allowable clearing of native vegetation, without requiring entry into the BOS is 0.25 ha. As described in **Section 3.3**, approximately 0.7 ha of native vegetation will be cleared as part of the proposed development.

Development of Precinct 3 will be under Part 4 of the NSW *Environment Planning and Assessment Act 1979* (EP&A Act). The proposed development triggers the BOS by exceeding the clearing threshold for the property, which in this case is clearing 0.25 ha or more of native vegetation (based on a minimum lot size of 500 m<sup>2</sup>). Therefore, a BDAR is required.



## 1.2 Location and site identification

The NSW Biodiversity Assessment Method (BAM) (DPIE 2020) identifies the land to which the proposed development will occur on is the 'subject land', while the land which will be directly impacted is identified as the 'development footprint'. With regards to the proposed development, the subject land refers to all land within Lot 3 // DP 1285072.

The subject land is located within the Cooma-Monaro Local Government Area and is zoned as "R2 – Low Density Residential" under the Cooma-Monaro Local Environmental Plan (CMLEP).

Currently, the subject land does not contain any infrastructure and is used as a grazing pasture. It is situated between Yareen Road and the Monaro Highway. As an overview, the subject land includes approximately 14.1 ha which is predominantly covered by the exotic grass *Eragrostis curvula*\* (African Lovegrass), although a relatively small patch of native vegetation is found in the eastern half of the subject land. The general topography of the subject land includes a flat area in the western half, while the eastern half is dominated by a small hill.

## 1.3 Proposed activity

The proponent is proposing to:

- subdivide the subject land into 151 new lots, with the addition of access roads,
- one detention basin,
- drainage swale along the southern boundary,
- realignment of the first order stream to the western boundary of the site and
- one park.

A detailed survey undertaken by ACT Survey dated 26 April 2022 shows that there is an existing overland flow path / natural watercourse located within the north-western part of the Precinct 3 development area. The existing overland flow path is approximately 120 mm to 300 mm deep, 5 m wide and 200 m long. Stormwater runoff from the existing catchment upstream and within Precinct 3 flows towards this natural watercourse prior to discharging to the existing stormwater culvert under Monaro Highway north of the site.

The new drainage swale will capture runoff from the existing catchment upstream of Precinct 3. The proposed new drainage swale will discharge to the existing stormwater culvert under Monaro Highway.

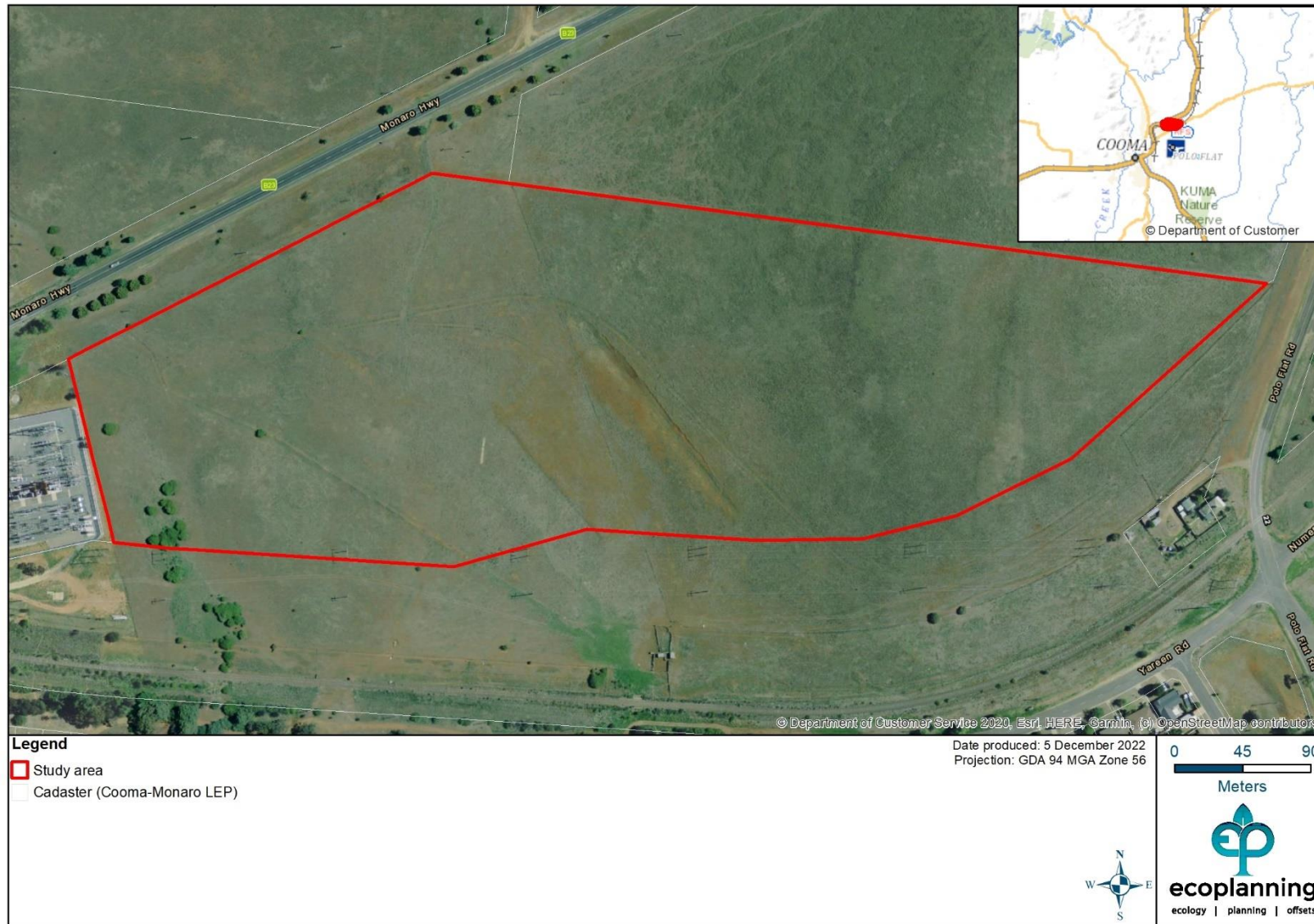


Figure 1.1: Location of the subject land.





Figure 1.2: Proposed subdivision layout for Lot 3 // DP 1285072 (received 3 November 2022).



## 2 Landscape context

### 2.1 Identifying landscape features

In accordance with section 3.1 of the BAM, several features within the subject land, and the 1,500 m assessment circle surrounding the subject land, are required to be documented. Provided below are the features required to be entered into the BAM calculator. These features will then be used to help determine the native vegetation communities which may be present in the subject land, and which threatened species may require additional assessment.

#### 2.1.1 Interim Biogeographic Regionalisation of Australia

The Interim Biogeographic Regionalisation of Australia (IBRA) is a landscape-based approach to classifying the land surface, and considers attributes of climate, geomorphology, landform, lithology, and biota (**Figure 2.1**). The subject land is located within the Monaro subregion, which forms part of the South Eastern Highlands region.

#### 2.1.2 Geomorphology features

##### *NSW Mitchell Landscapes*

Similar to IBRA regions and subregions, NSW has had its land surface classified into units based on lithology and geology. The subject land is located within the Monaro landscape (**Figure 2.1**).

##### *Areas of geological significance*

No areas of geological significance – including karsts, caves, crevices, cliffs, and rocks – were identified within the 1,500 m assessment circle. However, within the subject land, some areas were found to have a large cover of surface stones. This habitat feature was entered into the BAM calculator.

#### 2.1.3 Hydrological features

##### *Rivers, streams, drainage lines, and estuaries*

Within the subject land, one unnamed first order stream has been mapped as being present in the subject land. **Figure 2.1** shows that one first order stream arises within the subject land.

A detailed survey undertaken by ACT Survey on 26 April 2022 also shows the first order stream. They describe it as an existing overland flow path / natural watercourse located within the north-western part of the Precinct 3 development area. The existing overland flow path is approximately 120 mm to 300 mm deep, 5 m wide and 200 m long.

Beyond the subject land – and within the 1,500 m assessment circle – are numerous first, second, and third order streams, as well as several artificial dams.

##### *Local and important wetlands*

Under the BAM, a 'local wetland' is defined as an area of land that is wet by surface water or groundwater, or both, for long enough periods that the plants and animals in it are adapted to, and dependant on, moist conditions for at least some part of their life cycle. An 'important

wetland' is a wetland listed under the Directory of Important Wetlands of Australia (DIWA 2022) or an area included under the State Environmental Planning Policy (Resilience and Hazards) 2021.

No local or important wetlands are present in the subject land or the 1,500 m assessment circle.

## 2.2 Biotic features

### 2.2.1 Native vegetation cover

In accordance with Sections 3.2 and 4.3.2 of the BAM, native vegetation cover must be assessed for the 1,500 m assessment circle and subject land to assess the habitat suitability for threatened species (see **Section 4**). The extent of native vegetation on the subject land and its immediate surroundings was reviewed from vegetation mapping undertaken by the NSW Department of Planning and Environment (DPE; 2022a) – the State Vegetation Type Map – with edits made to improve linework where obvious changes to vegetation extent had occurred, using SIX Maps NSW Imagery (LPI 2022).

The total area of the 1,500 m assessment circle, including the subject land, is approximately 986 ha, with native vegetation accounting for 513 ha (both rounded to the nearest whole number; **Figure 2.1**). The value of 52% was entered into the BAM calculator.

### 2.2.2 Native vegetation patch size

To help inform the BAM calculator, the size of each contiguous patch that vegetation zones are a part of must be determined. The BAM identifies a patch as '*an area of native vegetation that:*

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

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

In assessing patch size for the subject land, it was assumed that the entire subject land was composed of non-woody ecosystems, therefore, the maximum gap between patches was set at 30 m. Additionally, hard barriers (such as artificial structures, wide or high use roads, etc.) were also considered when determining patch size. These highly modified breaks in vegetation connectivity would significantly alter ecological function of these areas of native vegetation, such that these areas warrant recognition as separate patches.

Under the BAM, patch size is required to be assessed as one of four classes per vegetation zone mapped, being <5 ha, 5-24 ha, 25-100 ha or >100 ha. Using a desktop review of the State Vegetation Type Map was used, as it is the most recent and comprehensive regional vegetation mapping completed.

The Monaro Highway to the north-west of the subject land was determined to be a hard barrier with regards to the patch size of the subject land. Additionally, the built of areas to the north, east, and south of the subject land were also considered hard barriers. However, there are no barriers to the south-east of the subject land as Polo Flat Road is only used infrequently, and unlikely to be a hard barrier to wildlife. Extending further to the south-east is an area mapped

as native grassland in the State Vegetation Type Map(DPE 2022a), which is contiguous with the subject land (**Figure 2.1**). As such, the subject land forms part of a contiguous patch which is >101 ha. This value was entered into the BAM calculator for all vegetation zones.

### 2.2.3 Other features of habitat connectivity

The subject land has the potential to act as a corridor for native species between areas to the north and south of the subject land (**Figure 2.1**). However, this connectivity would likely be limited due to the major roads being to the north (Monaro Highway) and south (Yareen Road). A more likely route of connectivity between north and south for native species is the agricultural land to the northeast of the subject land.



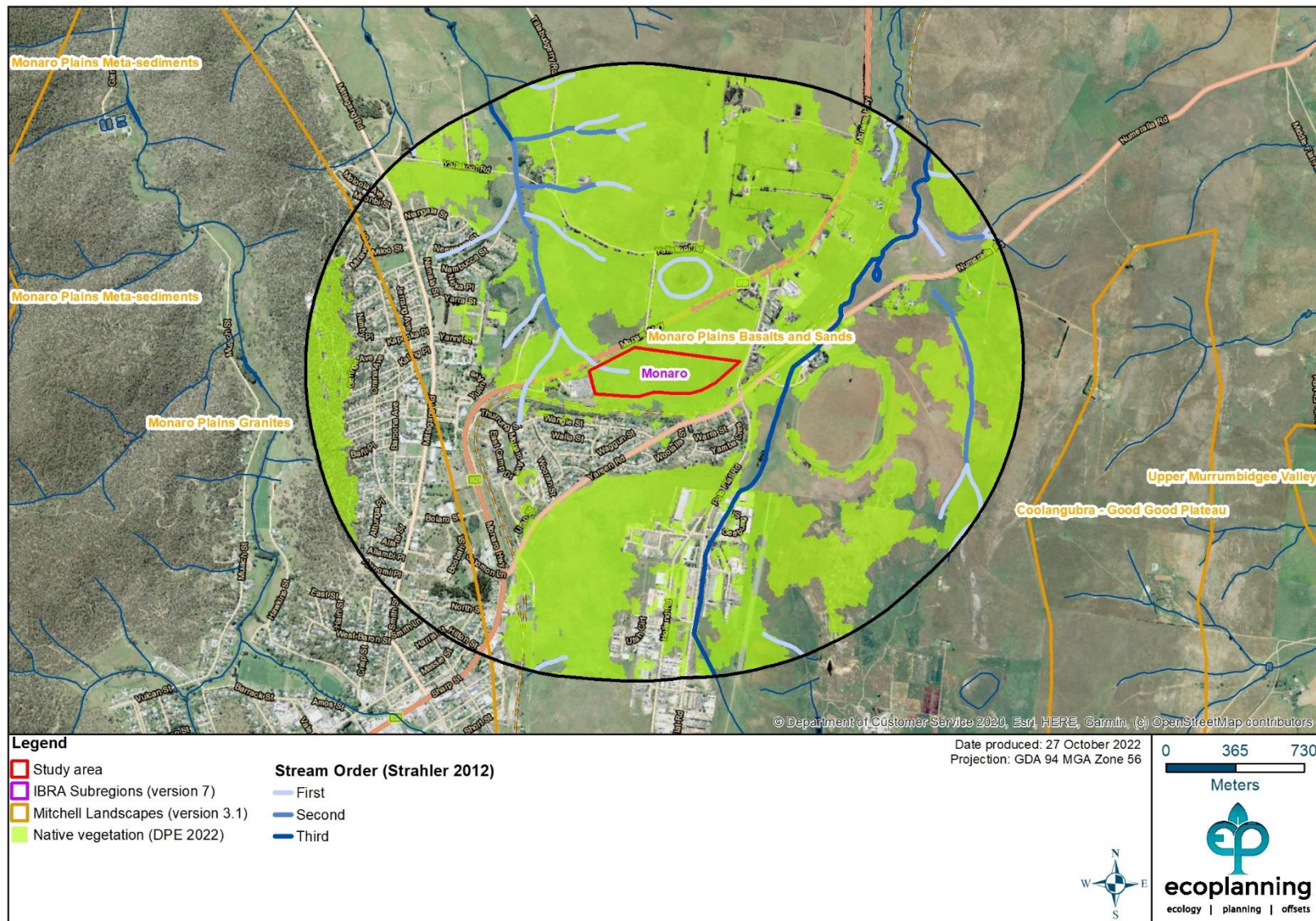


Figure 2.1: Landscape context of the subject land.



## 3 Native vegetation

### 3.1 Plant community types

Plant community types (PCTs) are vegetative units classified by the PCT classification system. The BioNet Vegetation Classification database includes descriptions of all PCTs, which includes the known assemblages of flora, diagnostic flora species, landscape position, and soil types. PCTs can be identified by their scientific name, common name (which is often synonymous with the scientific name) or their PCT identification number. For the purposes of this report, PCTs will be referred to by their PCT ID, unless otherwise stated.

The identification of PCTs for each vegetation community was undertaken in accordance with the NSW PCT classification as described in the BioNet Vegetation Classification (DPE 2022b). The NSW PCT classification system was revised in July 2022 and is currently in a transitional period where old PCTs have been decommissioned, however, new PCTs have not been adopted for assessment under the BOS.

Starting in 2023, the PCT system will be updated, meaning that the new PCT definitions will be adopted. Old PCTs can be identified by their PCT ID being <3000. The new PCTs definitions have ID numbers >3000. At the time of reporting, the PCTs with IDs <3000 are still in use and have been entered into the BAMC. However, for the purposes of this report, the new PCTs will also be referenced.

### 3.2 Regional and local vegetation mapping

In accordance with section 4.1 of the BAM, existing information relevant to the native vegetation of the subject land and 1,500 m assessment circle has been reviewed. The regional vegetation mapping used in this report was completed by Eco Logical Australia (ELA) (2015) and state wide vegetation mapping published by DPE (2022). Within the assessment circle, five PCTs were identified, with Kangaroo Grass – Snowgrass tussock grassland on slopes and ridges of the tablelands, South Eastern Highlands (PCT 1377) and River Tussock – - Tall Sedge – Kangaroo Grass moist grasslands of the South Eastern Highlands (PCT 1110) being mapped as within the subject land (**Table 3.1**).

**Table 3.1: Vegetation communities, mapped by ELA (2015) and DPE (2022), which were within 1,500 m of the subject land, and their most likely plant community types. Rows in blue indicate PCTs mapped within the subject land.**

PCT name (ID)	Threatened Ecological Community	
	BC Act	EPBC Act
<b>Biometric Vegetation Compilation (ELA 2015)</b>		
Kangaroo Grass - Snowgrass tussock grassland on slopes and ridges of the tablelands, South Eastern Highlands (PCT 1377)	-	Natural Temperate Grassland (CEEC)
River Tussock - Tall Sedge - Kangaroo Grass moist grasslands of the South Eastern Highlands (PCT 1110)	-	Natural Temperate Grassland (CEEC)
Speargrass grassland of the South Eastern Highlands (PCT 1202)	-	Natural Temperate Grassland (CEEC)
Wallaby Grass - Redleg Grass low grassland of the South Eastern Highlands (PCT 1376)	-	Natural Temperate Grassland (CEEC)
<b>NSW State Vegetation Type Map (DPE 2022a)</b>		
Monaro-Queanbeyan Rolling Hills Grassy Forest (PCT 3375)	-	-
Monaro Kangaroo Grass Woodland-Grassland Complex (PCT 3413)	Monaro Tableland Cool Temperate Grassy Woodland (CEEC)	Natural Temperate Grassland (CEEC)
Monaro Snowgrass-Kangaroo Grass Grassland (PCT 3414)	-	Natural Temperate Grassland (CEEC)
Monaro Hills Brittle Gum Exposed Forest (PCT 3739)	-	-
Monaro Ranges Sheltered Shrub Forest (PCT 3743)	-	-
Southern Tableland Ranges Boggy Open Woodland (PCT 3951)	Montane Peatlands and Swamps (EEC)	Temperate Highland Peat Swamps on Sandstone (EEC)

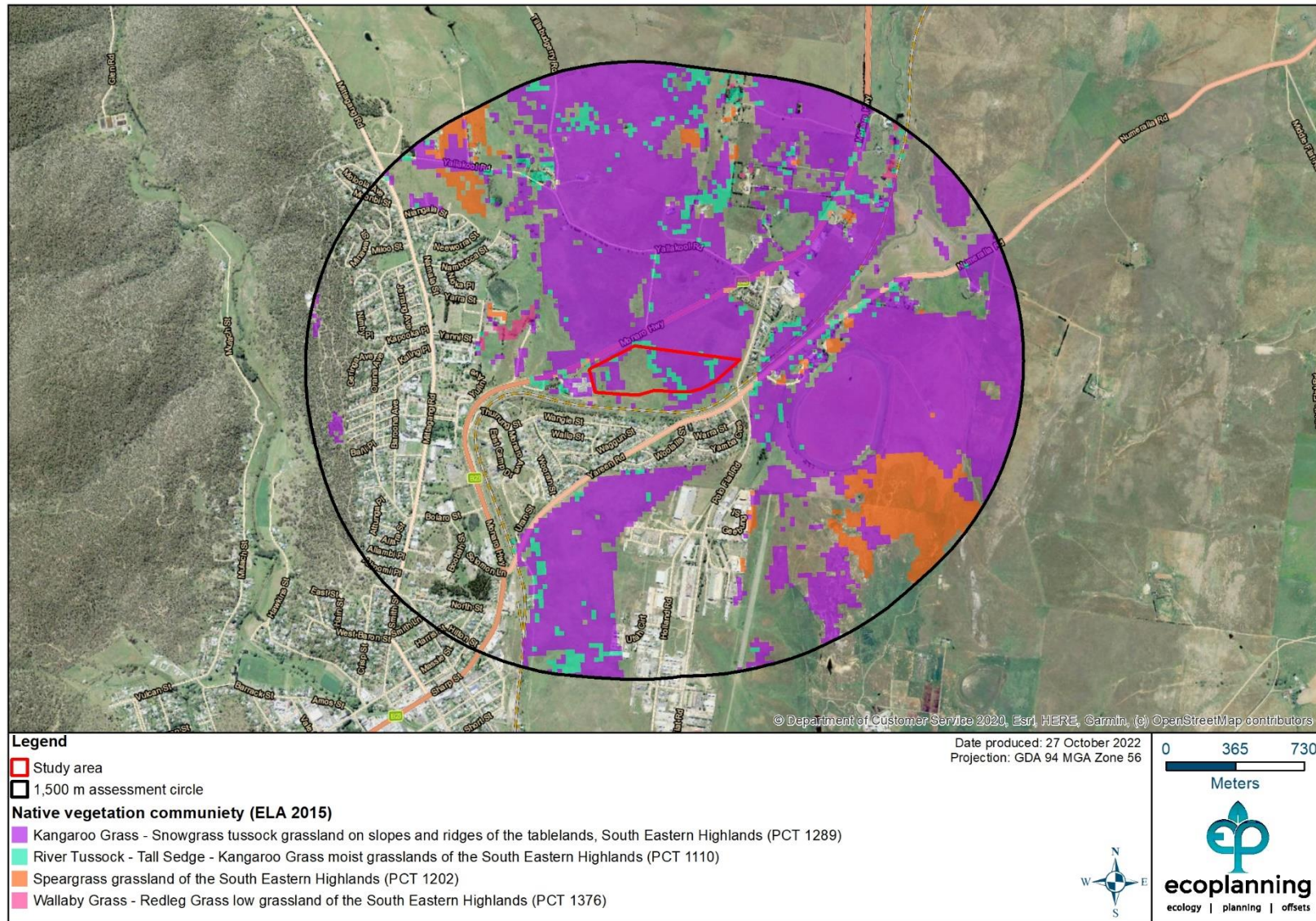


Figure 3.1: Regional vegetation mapping, within 1,500 m of the subject land, as completed by ELA (2015).



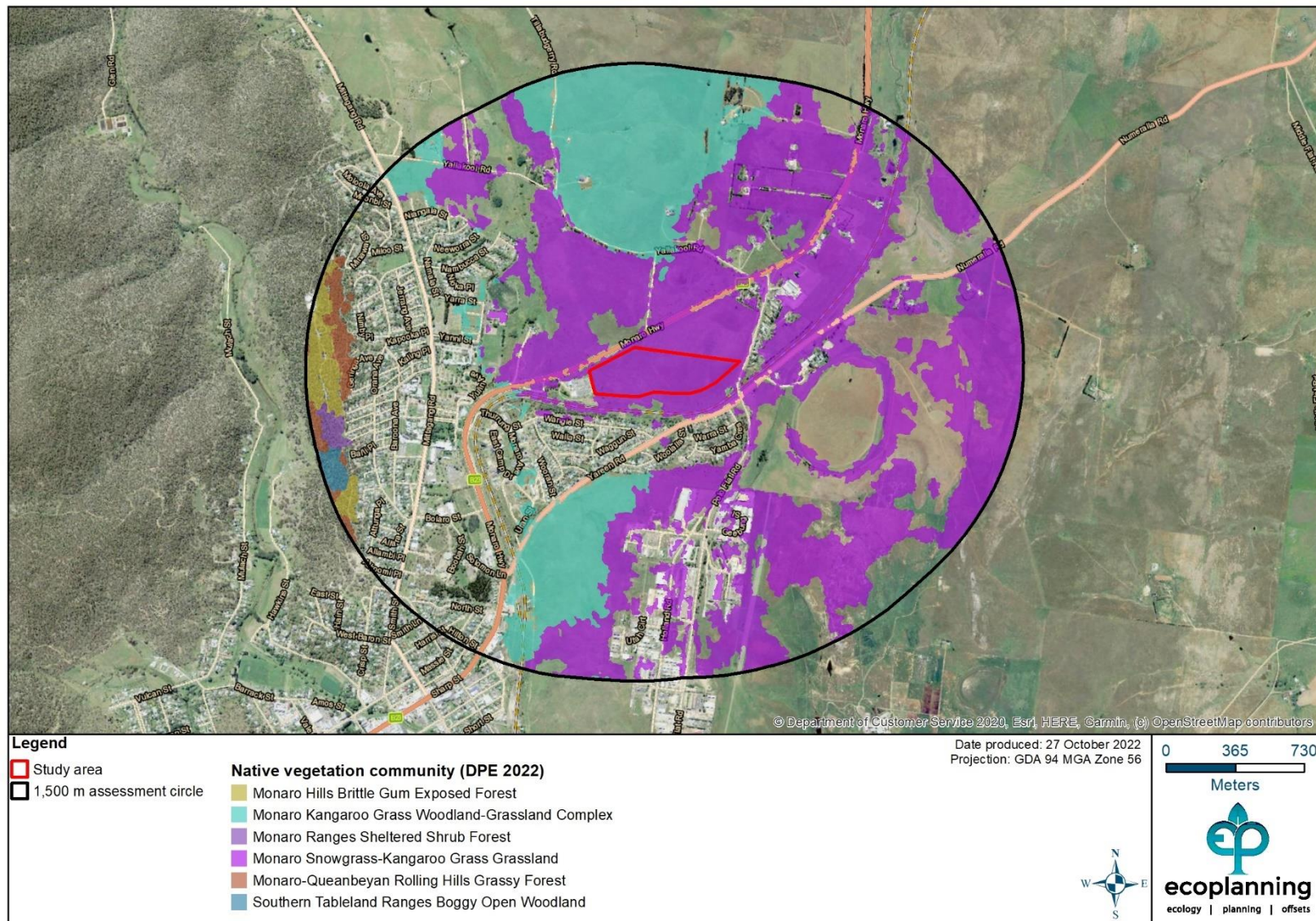


Figure 3.2 Native vegetation communities, as mapped by DPE (2022), within 1,500 m of the subject land.



### 3.3 Vegetation validation

#### 3.3.1 Method

The validation of regional vegetation mapping was completed by Elizabeth Norris (Senior Ecologist) and Jai Brien-Cooper (Field Ecologist) on the 15 and 16 August 2022. The field survey included an initial broad assessment of the vegetation communities present and the zones of each community, as well as an assessment of potential habitat to be utilised by threatened species. At the time of the survey, the conditions were sunny and cold (recorded at Polo Flat Airport; BOM 2022)(Table 3.2).

**Table 3.2: Weather observations – recorded at Cooma Airport (BOM 2022) – for each day of survey.**

Date	Temperature		Rainfall (mm)	Max wind gust	
	Max	Min		Direction	Strength (km/h)
15/08/2022	3.8	9.8	0	WNW	59
16/08/2022	-1.5	12.4	0	SW	48
24/10/2022 <sup>#</sup>	-*	-*	1.4	NE	43
25/10/2022 <sup>#</sup>	-*	-*	9.8	SW	39

<sup>#</sup> Targeted flora surveys.    \*data not available from BOM (2022).

The majority of the subject land was dominated by the exotic grass *Eragrostis curvula*\* (African Lovegrass), however, some patches were dominated by native vegetation. These areas of native vegetation were identified to form part of the PCT 'Wallaby Grass - Red-grass - Tall Speargrass - Kangaroo Grass dry tussock grassland' (PCT 1289). A summary of PCT 1289, according to the NSW Vegetation Classification (DPE 2022b) is presented in Table 3.3.

It should be noted that the subject land is grazed by a herd of approximately 10 cows and one horse at the time of survey.

**Table 3.3: Description of PCT 1289 from the NSW Vegetation Classification**

NSW Vegetation Classification overview	
<b>Plant Community Type name</b>	Wallaby Grass - Red-grass - Tall Speargrass - Kangaroo Grass dry tussock grassland of the North-western and Eastern Southern Tablelands in the South Eastern Highlands Bioregion
<b>PCT ID / BVT ID</b>	1289 / -
<b>Parent PCT</b>	3414
<b>Vegetation formation /class</b>	Grasslands/Temperate Montane Grasslands
<b>Landscape position</b>	Widespread in the Southern Tablelands (Canberra, Yass, Boorowa, Crookwell, Goulburn, Braidwood and Bungendore districts; also isolated occurrences in the Orange district; occurs mainly on well-drained footslopes and midslopes on all lithologies.
<b>Mid stratum species<sup>1</sup></b>	<i>Kunzea ericoides</i> (Burgan); <i>Acacia brownii</i> (Heath Wattle); <i>A. dealbata</i> (Silver Wattle); <i>A. genistifolia</i> (Early Wattle); <i>A. mearnsii</i> (Black Wattle); <i>A. rubida</i> (Red-stemmed Wattle); <i>Bursaria spinosa</i> (Native Blackthorn);
<b>Ground stratum species<sup>1</sup></b>	<i>Goodenia pinnatifida</i> (Scrambles Eggs); <i>Lomandra</i> spp. (Mat-rush); <b><i>Plantago varia</i></b> ; <b><i>Themeda australis</i></b> ; <i>Triptilodiscus pygmaeus</i> (Common Sunray); <i>Vittadinia muelleri</i> ; <i>Wahlenbergia</i> spp. (Bluebell); <i>Eryngium ovinum</i> (Blue Devil); <b><i>Rytidosperma</i> spp.</b> (Wallaby Grasses); <b><i>Austrostipa bigeniculata</i></b> (Yanganbil); <b><i>Bothriochloa macra</i></b> (Red Grass); <i>Calocephalus citreus</i> (Lemon Beauty-heads); <b><i>Chrysocephalum apiculatum</i></b> (Common Everlasting); <b><i>Convolvulus angustissimus</i></b> ; <b><i>Anthosachne scaber</i></b> (Wheatgrass, Common Wheatgrass);
<b>Other diagnostic features</b>	Mid-dense tall tussock grassland. Occurs in dry locations, though not in the dry rainshadow of the Monaro.
<b>Percent cleared</b>	57.0%
<b>TEC names</b>	EPBC Act (critically endangered): Natural Temperate Grassland of the South Eastern Highlands (equivalent)
<b>Source</b>	Rehwinkel (2009); Benson (1994); DWAE (2011)

<sup>1</sup> species in bold were found within the subject land.

### 3.3.2 Vegetation zones can condition classes

The distribution of vegetation zones is presented in **Figure 3.3**, with the survey effort shown in **Figure 3.3**.

#### *Vegetation Zone 1 – Moderate condition PCT 1289*

This vegetation zone had the highest diversity of native vegetation within the subject land and the lowest cover of *Eragrostis curvula*\*. This vegetation zone covered 0.7 ha, and its

distribution within the subject land is shown in **Figure 3.3**, however, generally, this vegetation zone was in two 20 m wide strips running from the top of the hill on a southeast aspect.

Grasses were the dominant vegetation from in this vegetation zone, with the most common species being *Austrostipa scabra* (Speargrass), *Austrostipa bigeniculata* (Yanganbil), *Themeda triandra* (Kangaroo Grass), *Anthosachne scabra* (Common Wheatgrass), and *Rytidosperma caespitosum* (Ringed Wallaby Grass). Other native species included *Acaena novae-zelandiae* (Bidgee-Widgee), *Asperula conferta* (Common Woodruff), *Chrysocephalum apiculatum* (Common Everlasting), *Scleranthus diander* (Tufted Knawel), and *Leucochrysum albicans* var. *tricolor* (Hoary Sunray), *Crassula sieberiana* (Australian Stonecrop), and *Vittadinia cervicalis*. Additionally, scattered in this vegetation zone was the shrub *Discaria pubescens* (Australian Anchor Plant), but accounted for <0.1% of cover. Native cover accounted for approximately 30%, with an additional 10% of cover from *Eragrostis curvula*\* and other exotic species (e.g., *Bromus catharticus*\* [Prairie Grass], *Trifolium arvense*\* [Haresfoot Clover], and *Trifolium glomeratum*\* [Clustered Clover]). The remaining ~60% of this vegetation zone was covered by a mixture of bare ground and scattered surface stones. An example of this vegetation zone is shown in **Plate 3.1**.



**Plate 3.1:** Photograph of Vegetation Zone 1 – PCT 1289 in a Moderate condition, looking north.

### *Vegetation Zone 2 – degraded PCT 1289*

This vegetation zone occupied a strip of grassland through the middle of the subject land, on an approximate southeast-northwest orientation. During the survey of 25 October, this vegetation zone was observed to have flowing water due to the high rainfall during October 2022 (total of 127.2 mm; BOM 2022).

The species present in this vegetation zone included a mix of native and exotic species, although exotic species dominated. Native species included *Austrostipa bigeniculata*, *A. scabra*, and *Rytidosperma* sp. Exotic species included *Bromus catharticus*\* (Prairie Grass), *Cerastium glomeratum*\* (Mouse-eared Chickweed), and *Trifolium glomeratum*\* (Clustered Clover).





**Plate 3.2:** A photograph of Vegetation Zone 2, looking south.

### *Vegetation Zone 3 – Exotic grassland*

This vegetation zone covered the remaining portion of the subject land not covered by vegetation zone 1 and was dominated by *Eragrostis curvula*\*. This vegetation zone occupied an area of approximately 13.3 ha (**Figure 3.3**).

*Eragrostis curvula*\* accounted for approximately 90% of the vegetative cover in this vegetation zone. The remainder of the vegetation zone included both native and exotic species, such as *Bromus catharticus*\*, *Austrostipa bigeniculata*, *Rytidosperma caespitosum*, *Trifolium arvense*\*, *Trifolium glomeratum*\*, *Medicago polymorpha*\* (Burr Medic), *Discaria pubescens*, and *Paspalum dilatatum*\*. Additionally, clustered in the eastern corner of the subject land was a small clump of *Pyracantha* sp.\* (Firethorn).

An example of this vegetation zone is shown in **Plate 3.3**.





**Plate 3.3:** A photograph of vegetation zone 2, looking southeast.

### 3.3.3 Other PCTs considered

Some areas of the subject land had the potential to conform to the PCT ‘River Tussock - Tall Sedge - Kangaroo Grass moist grasslands of the South Eastern Highlands’ (PCT 1110), however, these areas were highly degraded, and the indicator species for PCT 1110 were not abundant. The areas that were considered to be PCT 1110 were on the low-lying areas of the subject land, within vegetation zone 3 (see **Section 3.3.2**). This was further supported by the presence of pooling water observed during surveys in October 2022, as approximately 127.2 mm of rainfall had occurred that month. However, the absence of sedges and rushes, which is typical of the vegetation community were not present, and this area was assessed as a degraded form of PCT 1289. In addition, PCT 1110 has been decommissioned in the BioNet classification (DPE 2022b).

The selection of the PCT for the native vegetation of VZ1 was more difficult, given the relatively low cover of diagnostic species. Both PCTs 1187 and 1377 were considered for VZ1 (and the remainder of the subject land) however both PCTs have been decommissioned in the BioNet classification (DPE 2022b). A review of the reference documents for both PCTs (Benson 1994; Rehwinkel 2009), found that the area within the subject land most suited PCT 1289.

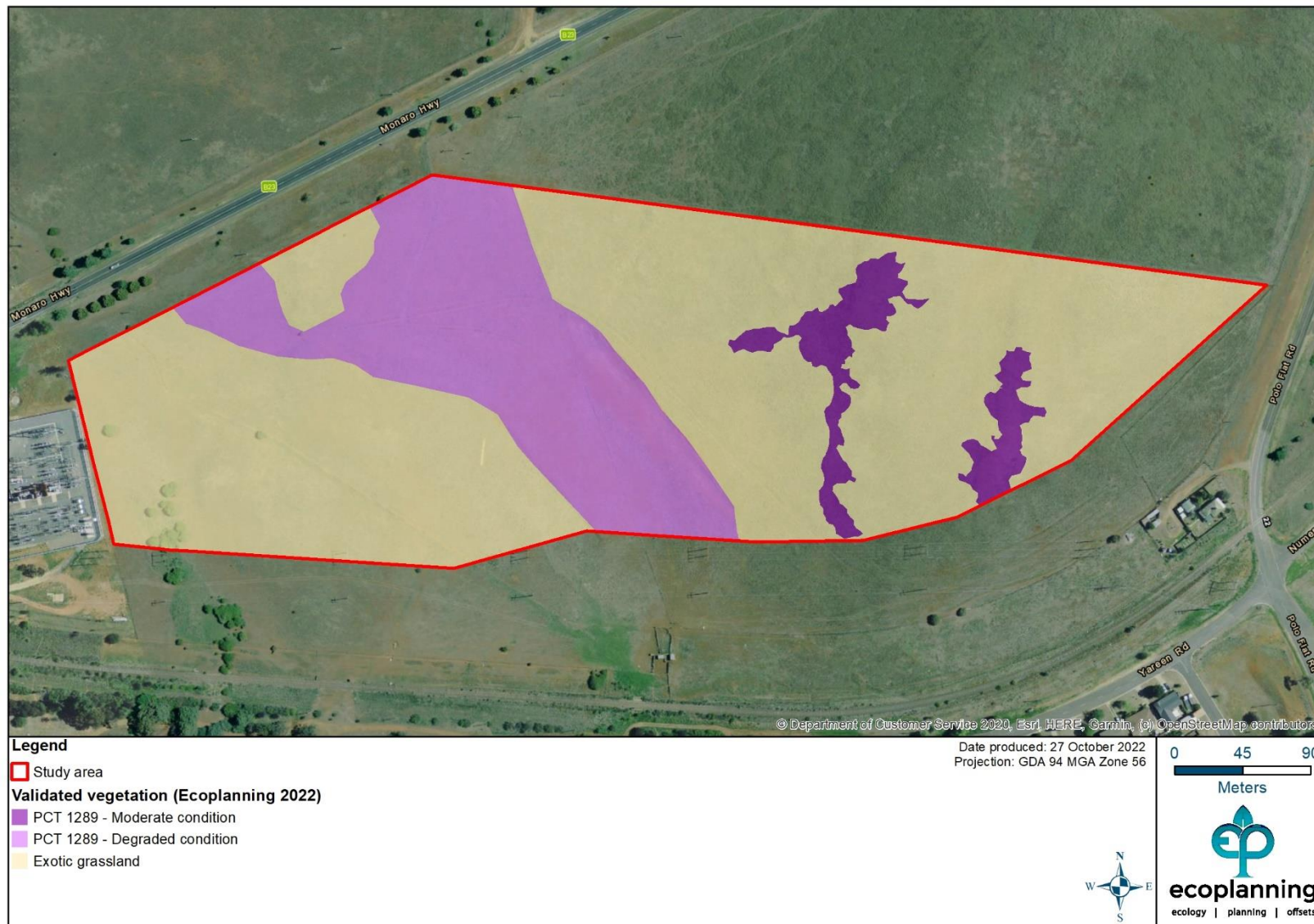


Figure 3.3: Vegetation zones within the subject land.

### 3.4 Assessment of vegetation zone integrity

In accordance with Section 4.4.3 of the BAM, vegetation zones are assessed through their vegetation integrity (VI) score. The VI score of a vegetation zone, as described by section 4.4.3 (1) of the BAM, is a metric-based assessment which combines data on a vegetation zone's vegetation composition, structure, and structural attributes. These values are then compared to the benchmark scores for each attribute, which generates the VI score. The attributes required to generate a VI score are sampled via VI plots, which are 400 m<sup>2</sup> vegetation quadrats within which the vegetation composition and relative cover is audited, as well via a 1,000 m<sup>2</sup> plot, in which the structural attributes of the vegetation are sampled. It should be noted that the vegetation quadrat is nested within the larger structural plot.

The number of plots per vegetation zone is determined by the size of each vegetation zone in accordance with table 3 of the BAM, which has been reproduced below as **Table 3.4**. Given that the area of the subject land is <2 ha, no more than one VI plot is required per vegetation zone.

**Table 3.4: Number of VI plots required to correctly sample vegetation zone, dependant on vegetation zone area. Information is reproduced from Table 3 in the BAM.**

Vegetation zone area	Minimum number of plots
<2 ha	1 plot
>2-5 ha	2 plots
>5-20 ha	3 plots
>20-50 ha	4 plots
>50-100 ha	5 plots
>100-250 ha	6 plots
>250-1,000 ha	7 plots, more may be required
>1,000 ha	8 plots, more may be required

Based on the above **Table 3.4**, a total of six VI plots were required to sufficiently assess the subject land under the BAM. A breakdown of the plots completed for each vegetation zone is presented in **Table 3.5**. The placement of all VI plots is shown in **Figure 3.4** with respect to their respective vegetation zones. Note that the 1,000 m<sup>2</sup> structural plot is not required for grassland PCTs, and they are not shown in **Figure 3.4**.



**Table 3.5: Number of plots required for each vegetation zone, and the plots completed for each.**

Vegetation zone	Area of vegetation zone	Plots required (plots completed)
1	0.7 ha	1 (BAM 1)
2	3.3	2 (BAM 2, BAM 3)
3	10.1	3 (BAM 4, BAM 5, BAM 6)

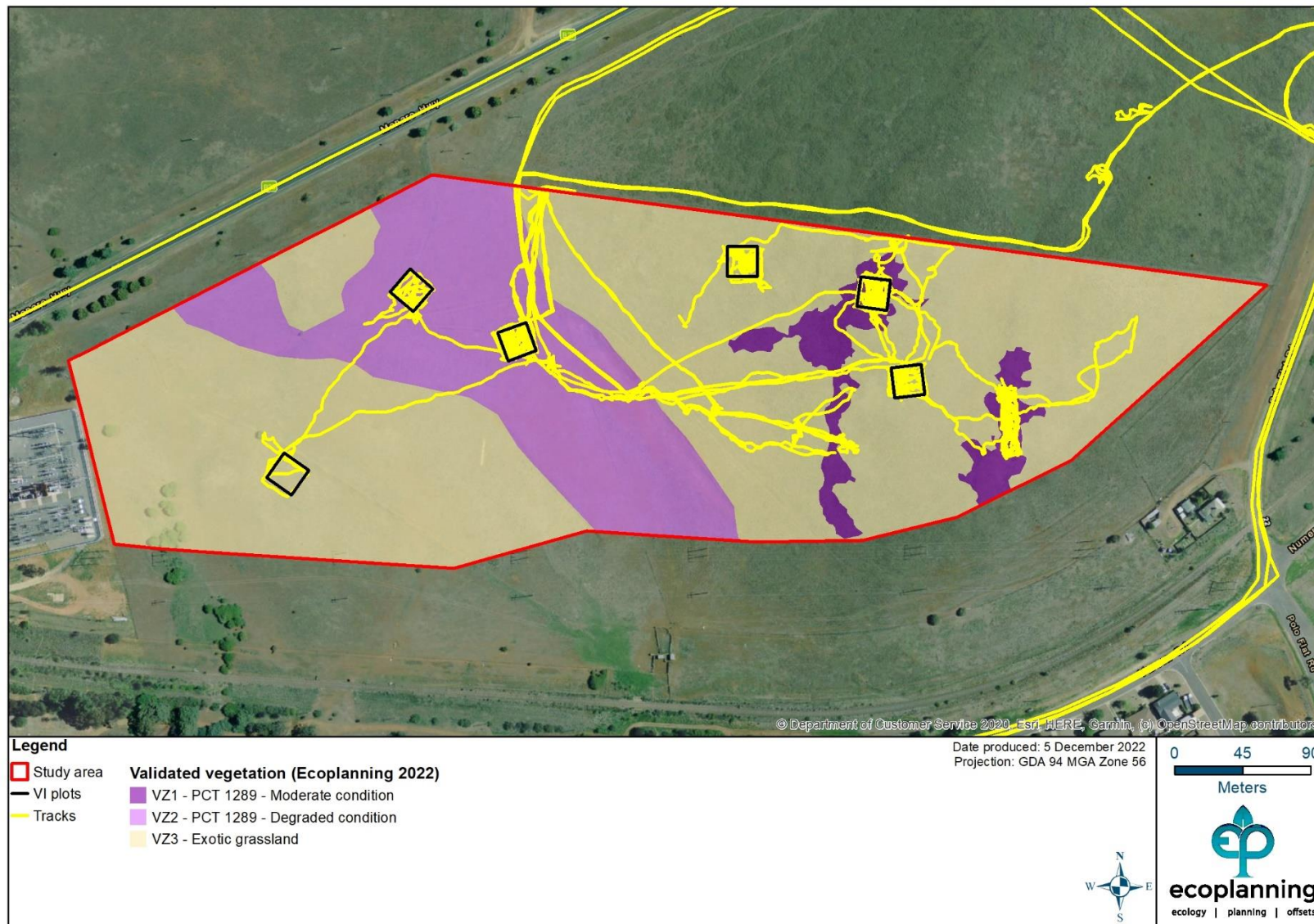


Figure 3.4: Survey effort and location of Vegetation Integrity plots in relation to the vegetation zones.

### 3.4.1 Current and future Vegetation Integrity scores

The VI scores were calculated based on the VI survey plot data collected. Data collected for the plot is provided in **Appendix A**, with the VI score shown in **Table 3.6**. As the proposed development will include complete clearance of the lot, the VI score has been set for 0 for all vegetation zones after development.

**Table 3.6: Current and future VI scores for each vegetation zone.**

Vegetation zone	Area of impact (ha)	Plot number	VI score	
			Before development	After development
1	0.7	BAM 6	56	0
2	3.3	BAM 1 BAM 2	7.6	0
3	10.1	BAM 3 BAM 4 BAM 5	1.5	0

## 3.5 Threatened ecological communities

### 3.5.1 Natural Temperate Grassland of the South Eastern Highlands

Within the subject land was the potential for one threatened ecological community (TEC) to be present; 'Natural Temperate Grasslands of the South Eastern Highlands' (Natural Temperate Grassland), which is protected under the EPBC Act.

Under the EPBC Act, TECs must satisfy both the key diagnostic characteristics (to be considered part of the TEC) and the minimum condition thresholds (to be considered of high enough quality) to be protected by Commonwealth legislation. For Natural Temperate Grassland, both the key diagnostic characteristics and condition thresholds are both listed in the document 'Approved Conservation Advice for the Natural Temperate Grassland of the South Eastern Highlands ecological community' (The Conservation Advice) (Commonwealth Threatened Species Scientific Committee 2016a). It should be noted that both the key diagnostic characteristics and condition thresholds must be met for a patch to be protected under the EPBC Act, as patches which are sufficiently modified or degraded are not protected, although still represent some value to the conservation of the TEC.

The Conservation Advice requires the assessment of Natural Temperate Grassland in an area to be done via "patches". With regards to the subject land, patches assessed will be the vegetation zones (but will be termed patches for the assessment). The Conservation Advice also requires patches to be, at a minimum, 0.1 ha, and patches can be assessed in their entirety as no assessment unit is described in the Conservation Advice. Although the VI plots will be used as a reference in each vegetation zones assessment, incidental observations within each vegetation zone will also be considered.



## Key diagnostic characteristics

Key diagnostic characteristics for all TECs require the vegetation community being assessed to conform to a number of geographic, topographic, and broad vegetation characteristics. With regards to Natural Temperate Grassland, the following diagnostic characteristics must be satisfied:

- a. Sites are generally confined to the South Eastern Highlands,
- b. Sites typically occur at elevations between 350–1200 m above sea level,
- c. Native grasses usually are dominant and include one or more of the following: *Themeda triandra*, *Poa sieberiana*, *P. labillardierei*, *Austrostipa bigeniculata*, *A. scabra*, *Bothriochloa macra*, *Rytidosperma* spp., and *Lachnagrostis* spp.
- d. Typically, a range of native forb species are present,
- e. A tree, shrub or sub-shrub layer may be present, with up to 10% projective foliage cover of each layer being present
- f. The area is not a derived or secondary grassland.

All the above characteristics must be present for a vegetation zone to be considered part of the Natural Temperate Grassland TEC. **Table 3.7** presents the results of this assessment. It was found that only VZ1 could be considered a candidate patch of Natural Temperate Grassland. VZ1 was then tested against the condition thresholds to determine if it was protected under the EPBC Act.

**Table 3.7: Assessment of each vegetation zone against the key diagnostic characteristics of nths as published by Comm. TSSC (2016). Blue rows indicate vegetation zones which satisfy all key diagnostic characteristics.**

Vegetation zone	Key diagnostic characteristic						Considered part of the TEC
	a	b	c	d	e	f	
1	✓	✓	✓	✓	✓	✓	Yes
2	✓	✓	✗	✓	✓	✓	No
3	✓	✓	✗	✓	✓	✓	No

## Condition thresholds

Vegetation zone 1 must meet the condition thresholds to be protected by the EPBC Act. The patches of Natural Temperate Grassland which are considered must meet the conditions of either a “Moderate” or “High”. There are two pathways for condition assessment outlined in the approved conservation advice, Pathway A and B. Pathway A requires the vegetation zone to be covered by ≥50% of one of the following native perennial grass species: *Themeda triandra*, *Poa labillardierei*, or *Carex bichenoviana*. No patch had a >50% cover of either characterise species, so each patch will be assessed under Pathway B. Pathway B assesses a patch based on the presence of non-grass native species, and the ratio of non-grass native species to perennial exotic species. Assessment thresholds are different depending on the timing of the assessment, with thresholds being high in “favourable” periods

(i.e. spring and early summer). The following condition thresholds are used to determine if a patch of candidate Natural Temperate Grassland can be considered part of the TEC:

- ≥8 non-grass native species,
- ≥2 indicator species (Comm. TSSC 2016b),
- ≥5 floristic value score Rehwinkel (2014).

The patch of candidate Natural Temperate Grassland within the subject land (VZ1) contained the following indicator species: *Cheilanthes* sp., *Chrysocephalum apiculatum*, *Discaria pubescens*, *Plantago hispida*, *Leucochrysum albicans*.

### *Conclusions*

Based on the above assessments, only vegetation zone 1 met both the key diagnostic characteristics and minimum condition thresholds. As this patch of Natural Temperate Grassland is considered of “Moderate” or “High” conservation value to the survival of the TEC and the patch of Natural Temperate Grassland within the subject land is >0.1 ha, it is recommended that the proposal is referred to the Minister for the Environment.

## 4 Threatened species

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

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

For some threatened species, they are identified as both ecosystem and species credit species, with different aspects of the habitat and life cycle representing different credit types. Commonly, threatened fauna species foraging habitat is represented by ecosystem credits whilst their breeding habitat is represented by species credits.

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

### 4.1 Threatened species for assessment

Threatened species that require assessment are initially identified based upon the following criteria (following section 5.2.1 2 of the BAM):

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

The process for identifying threatened species which meet the above criteria is completed through the BAM calculator. The PCT identified within the subject land, patch size, and native vegetation cover, as outlined in Section 3, were entered into the BAM calculator and a preliminary list of ecosystem and species credit species was tabulated in the following sections. The assessor may opt to include additionally species credit species which are not produced by the BAM calculator, if they find that suitable habitat is present within the subject land which is required by the additional species credit species. These additional species credit species will be highlighted, with the assumption being that all other species credit species were generated by the BAM calculator.



After the BAM calculator has generated the list of potential threatened species for the subject land using the above criteria (Section 5.2.1 2 of the BAM), and assessor has made any additions, the assessor is required to further assess the suitability of habitat within the subject land for each threatened species generated – for both ecosystem credit species and species credit species. Section 4.2 and Section 4.3 document the assessment undertaken by the assessor to determine if any of the threatened species generated by the BAM calculator are likely to be represent within the subject land, and if any further assessment is required (for species credit species).

## 4.2 Ecosystem credit species

A review of the predicted ecosystem credit species was conducted to determine the likelihood of the species occurring within the subject land. The review considered whether necessary habitat components are present as described above. The results of this assessment are presented in **Table 4.1**, all ecosystem credit species were retained.

**Table 4.1: Ecosystem credit species likely present within the subject land, based on results from the BAM calculator.**

Scientific name Common name (Habitat)	Habitat constraints OR Geographic limitations	Retained	Sensitivity to gain <sup>1</sup>	BC Act <sup>2</sup> EPBC Act <sup>3</sup>
<i>Artamus cyanopterus</i> <i>cyanopterus</i> Dusky Woodswallow	-	yes	Moderate	V -
<i>Chthonicola sagittata</i> Speckled Warbler	-	Yes	High	V -
<i>Circus assimilis</i> Spotted Harrier	-	Yes	Moderate	V -
<i>Daphoenositta chrysoptera</i> Varied Sittella	-	Yes	Moderate	V -
<i>Dasyurus maculatus</i> Spotted-tailed Quoll	-	Yes	High	V E
<i>Epthianura albifrons</i> White-fronted Chat	-	Yes	Moderate	V -
<i>Hieraaetus morphnoides</i> Little Eagle (foraging)	-	Yes	Moderate	V -
<i>Hirundapus caudacutus</i> White-throated Needle-tail	-	Yes	High	- V

Scientific name Common name (Habitat)	Habitat constraints OR Geographic limitations	Retained	Sensitivity to gain <sup>1</sup>	BC Act <sup>2</sup> EPBC Act <sup>3</sup>
<i>Melanodryas cucullata</i> <i>cucullata</i> Hooded Robin (South- eastern form)	-	Yes	Moderate	V -
<i>Miniopterus orianae</i> <i>oceanensis</i> Large Bent-winged Bat (foraging)	-	Yes	High	V -
<i>Petroica boodang</i> Scarlet Robin	-	Yes	Moderate	V -
<i>Petroica phoenicea</i> Flame Robin	-	Yes	Moderate	V -
<i>Stagonopleura guttata</i> Diamond Firetail	-	Yes	Moderate	V -
<i>Suta flagellum</i> Little Whip Snake	-	Yes	High	V -
<i>Varanus rosenbergi</i> Rosenberg's Goanna	-	Yes	High	V -

<sup>1</sup> Sensitivity to gain: H – high, M – Medium, L – Low. <sup>2</sup> BC Act status: V – Vulnerable, E – Endangered, CE – Critically Endangered EPBC Act status: V – Vulnerable, E – Endangered, CE – Critically Endangered.

## 4.3 Species credit species

### 4.3.1 Identify candidate species credit species

In contrast to ecosystem credit species, species credit species have a relatively high level of detectability if their required habitat is present within the survey area. As such, if optimal habitat is present, surveys are required to be undertaken. A species credit species is termed a candidate species credit species until it is found to be present within the subject land.

In accordance with section 5.2.3.2 of the BAM, a predicted species credit species can be considered unlikely to be present within the subject land – or species vegetation zones – for the following reasons:

- After field assessment:
  - The assessor has determined that the required microhabitats of a candidate species credit species are not present (Section 5.2.3 2 (a.i)). This reason must be evidence based, requiring an accompanying description of the required

- microhabitats for the respective candidate species credit species (from published literature which is referenced in text) and evidence of their survey within the subject land,
- The assessor has determined that the required habitat constraints or microhabitats are degraded to the point where the candidate species credit species is not likely to be present (Section 5.2.3 2 (a.ii)). Evidence for this degradation must also be documented,
- An expert report states that the candidate species credit species is unlikely to be present within the subject land or specific vegetation zones (Section 5.2.3 2 (b)). This expert report must be created following the requirements set out in 'Box 3' of the BAM.

The documentation undertaken by the assessor is presented in **Table 4.2**.

Following the habitat assessment of the subject land, the following references were considered when determining if the habitat within the subject land was suitable for the candidate species credit species generated by the BAM calculator:

- Identification and field guides for the following groups of threatened species (these will not be referenced in **Table 4.2**):
  - Birds – (Higgins 1990)
  - Mammals – (van Dyck et al. 2013)
  - Reptiles – (Cogger 2018)
  - Amphibians – (Anstis 2013)
  - Orchids – (Jones 2020)
  - All other flora – (Harden 1990) with additions and updates from PlantNet (RBGDT 2022a)
- Additional relevant published scientific literature and government reports,
- A review of recent threatened species records in the area (within 10 km of the subject land and within the last 20 years) using the threatened species database collection (DPE 2022c) see **Appendix C** for likelihood of occurrence analysis, and
- Application of expert knowledge.



**Table 4.2: List of threatened species which are present based on the vegetative and locality information entered into the BAM calculator. Blue rows indicated species requiring further assessment.**

Scientific name Common name (Habitat)	Habitat constraints OR Geographic limitations	StG <sup>1</sup>	SAII <sup>2</sup>	BC Act <sup>2</sup> EPBC Act <sup>3</sup>	Retention and justification
<i>Aprasia parapulchella</i> Pink-tailed Legless Lizard	Rocky areas or within 50 m of rocky areas	High	No	V V	<p>This species of legless lizard has a range extending from Bendigo, Victoria, to Gunnedah, NSW, although its occurrence is highly patchy. This species habitat is characterised by a dominance of native species (<i>viz. Themeda triandra</i>) in primary grassland, secondary grassland, and grassy woodland communities, typically on sloping sites with rocky outcrops or scattered surface rocks. Significant threats to this species are the invasion of non-native grasses and grazing.</p> <p>Although VZ1 can conform to this species preferred habitat (having a dominance of native grasses and scattered surface stones), the small area of potential habitat (0.7 ha), high cover of exotic grasses in surrounding areas, history of grazing in the subject land, and isolation from other areas of potential habitat, indicate that this species is not likely to be present in the subject land, and it is NOT considered as a candidate species.</p>
<i>Commersonia prostrata</i> Dwarf Kerrawang	-	High	No	E E	<p>This prostrate shrub forms mats with branches to 1 m long. It is found on sandy and peaty soils within forested areas.</p> <p>This species is NOT considered a candidate species as the subject land does not contain sandy or peaty soils, is not forested, and is highly disturbed.</p>
<i>Delma impar</i> Striped Legless Lizard	-	Moderate	No	V V	Yes
<i>Diuris aequalis</i> Buttercup Doubletail	North of Hoskintown	High	No	E V	<p>This orchid grows amongst grasses in sclerophyll forests in the ranges and tablelands of NSW.</p> <p>As the subject land is approximately 93 km south of this species known range, it has been rejected as a candidate species credit species.</p>

Scientific name Common name (Habitat)	Habitat constraints OR Geographic limitations	StG <sup>1</sup>	SAII <sup>2</sup>	BC Act <sup>2</sup> EPBC Act <sup>3</sup>	Retention and justification
<i>Dodonea procumbens</i> Creeping Hop-bush	Cooma-Monaro shire south of Michelago	Moderate	No	V V	Yes
<i>Eucalyptus aggregata</i> Black Gum	East of a line that runs north to south about 5 km west of Bungendore	High	No	V V	No eucalypt trees were present within the subject land, so this species is NOT considered a candidate species.
<i>Eucalyptus macarthurii</i> Paddys Box or Camden Woollybutt	-	High	No	E E	This tree, growing to 40 m having fibrous bark on the trunk and thicker branches, and smooth bark on smaller upper branches, has a patch range including two patches: one in the Blue Mountains and another in the Southern Highlands. No eucalypt trees were present within the subject land, so this species is NOT considered a candidate species.
<i>Gentiana baeuerlenii</i> Baeuerlen's Gentian	Semi-permanent or ephemeral wet areas, land containing seepage areas or seasonally wet areas with short herbfield/grassland, or within 50 m of swamps	High	Yes	E E	This annual herb is <4 cm in height and is known from a single population in Namadgi National Park (ACT). this population grow in the interface between native tussock grassland and sedgeland on the lower slopes of broad valleys. This population has not been observed since 1990 and these last records measured a population size of four individuals. This species was NOT considered as a candidate species as potential habitat for the species was highly degraded.
<i>Hieraaetus morphnoides</i> Little Eagle (breeding)	Nest trees— live (occasionally dead) large old trees within vegetation)	Moderate		V -	No suitable nesting trees were present within the subject land, so this species is NOT considered a candidate species.

Scientific name Common name (Habitat)	Habitat constraints OR Geographic limitations	StG <sup>1</sup>	SAII <sup>2</sup>	BC Act <sup>2</sup> EPBC Act <sup>3</sup>	Retention and justification
<i>Lepidium hyssopifolium</i> Aromatic Peppercress	-	High		E E	This species range does not extend to the Monaro plain. A single record for this species approximately 11 km from the subject land (100 years ago), although the identification of the specimen has been reported to be dubious. Therefore, this species is NOT considered to be a candidate species.
<i>Leucochrysum albicans</i> var. <i>tricolor</i> Hoary Sunray	-	High	No	- E	Yes. Recorded on site.
<i>Litoria raniformis</i> Southern Bell Frog	-	Moderate		E V	<p>This is one of the largest species of frog in Australia, hand has a highly variable dorsal pattern and colouration, but is always some combination of greens and light browns. Its distribution is along the waterways and tributaries of the Murray and Murrumbidgee River system, although its current known distribution is the Coleambally Irrigation Area, the Lowbidgee floodplain and around Lake Victoria. Its habitat is permanent and ephemeral swamps, billabongs, and river valleys.</p> <p>The subject land is beyond the current distribution of this species in NSW, and potential areas of habitat are highly degraded due to the history of grazing in the subject land. As such, this species is NOT considered as a candidate species.</p>



Scientific name Common name (Habitat)	Habitat constraints OR Geographic limitations	StG <sup>1</sup>	SAII <sup>2</sup>	BC Act <sup>2</sup> EPBC Act <sup>3</sup>	Retention and justification
<i>Miniopterus orianae oceanensis</i> Large Bent-winged Bat (breeding)	Cave, tunnel, mine, culvert or other structure known or suspected to be used for breeding including species records with microhabitat code "IC - in cave", observation type code "E nest-roost", or with numbers of individuals >500	Very high	Yes	V -	Habitat constraints for this species (viz. breeding habitat) was not present in the subject land, and it is NOT considered as a candidate species.
<i>Myotis macropus</i> Southern Myotis	HBTs, bridges, caves, or artificial structures within 200 m of waterbodies	High		V -	Habitat constraints for this species (viz. breeding habitat) was not present in the subject land, and it is NOT considered as a candidate species.
<i>Pelargonium</i> sp. Striatellum Omeo Storksbill	-	Very high		E E	<p>This small perennial forb often forms colonies several metres in diameter. It has small pink flowers that open in November and December, and leaves up to 2.5 cm by 2 cm. Within NSW, this species is known from four locations on basal plains of the Monaro and Lake Bathurst. Its habitat is the highwater mark of ephemeral lakes. This species can be found in association with exotic species, although the is unlikely in areas invaded by exotic plants and has a history of grazing.</p> <p>This species is NOT considered as a candidate species for the current assessment given the high intensity of exotic grasses in its potential habitat, and the history of grazing within the subject land.</p>
<i>Phascolarctos cinereus</i> Koala	Presence of Koala use trees	High		E E	No Koala use trees were present within the subject land, and this species was NOT considered as a candidate species.

Scientific name Common name (Habitat)	Habitat constraints OR Geographic limitations	StG <sup>1</sup>	SAII <sup>2</sup>	BC Act <sup>2</sup> EPBC Act <sup>3</sup>	Retention and justification
<i>Prasophyllum petilum</i> Tarengo Leek Orchid	-	High		E E	This species of Leek Orchid grows to 35 cm tall, has a solitary dull green lead with a pinkish-purple base, and 20 fragrant pale flowers along a 12 cm raceme. Populations of this species are known to grow as far south as Queanbeyan. Although this species is known of patches of Natural Temperate Grassland, it is highly susceptible to grazing.  Given that the subject land has a history of grazing, and has a high cover of exotic grasses, this species was NOT considered as a candidate species.
<i>Rutidosis leptorrhynchoides</i> Button Wrinklewort	-	High		E E	Yes
<i>Swainsona sericea</i> Silky Swainson-pea	-	High		V -	Yes
<i>Synemon plana</i> Golden Sun Moth	Wallaby grass ( <i>Rytidosperma</i> sp.), Chilean needlegrass ( <i>Nassella neesiana</i> ) or Serrated Tussock ( <i>N. trichotoma</i> ) and not east of Lake George Escarpment or Great Dividing Range	Moderate		E CE	Although the subject land is found to the west of the Great Dividing Range, there is a low abundance of the Grass species listed in the Habitat Constraints. Therefore, this species is NOT considered as a candidate species.

Scientific name Common name (Habitat)	Habitat constraints OR Geographic limitations	StG <sup>1</sup>	SAII <sup>2</sup>	BC Act <sup>2</sup> EPBC Act <sup>3</sup>	Retention and justification
<i>Thesium australe</i> Austral Toadflax	-	Moderate		V V	This semi-parasitic plant grows in damp places with high densities of native grasses ( <i>viz. Themeda triandra</i> ). As the damp area of the subject land had low covers of native tussock grasses, particularly <i>Themeda triandra</i> in the low-lying areas of the subject land ( <i>viz</i> VZ2), this species was rejected as a candidate species credit species.
<i>Tympanocryptis osbornei</i> Monaro Grassland Earless Dragon	-	High		E -	This small dragon has a key habitat requirements listed in its Conservation Assessment (Bray and Rowley 2021), which includes; open rocky areas dominated by <i>Poa sieberiana</i> and <i>Austrostipa scabra</i> , and sub-dominated by <i>Rytidosperma caespitosum</i> or <i>R. racemosum</i> . Known habitat in the Cooma area were typically north facing with inter-tussock spacing being occupied by bare ground, cryptograms, and low growing forbs. The only patch of vegetation which may conform to the habitat requirements for this species is VZ1, however, due to its small size (0.7 ha) and isolation from other areas of potential habitat, this species is NOT considered as a candidate species.
<i>Tympanocryptis pinguicolla</i> Canberra Grassland Earless Dragon	-	High		E E	This species of Grassland Dragon is known to inhabit Natural Temperate Grassland stretching from Cooma to Bathurst. Known sites of this species are dominated by <i>Rytidosperma</i> spp., <i>Austrostipa</i> spp., <i>Poa sieberiana</i> , <i>Bothriochloa macra</i> , and <i>Themeda triandra</i> , although there is some allowance for exotic grasses in the surrounding areas. Although VZ1 does conform to the requirements of the species with a dominance of native grasses, the surrounding areas are so highly dominated by exotic grasses ( <i>Eragrostis curvula</i> *) that this species is not likely to be present. as such, this species is NOT considered as a candidate species.

<sup>1</sup> Sensitivity to gain (StG), <sup>2</sup> This species is considered to be at risk of serious and irreversible impact (SAII). <sup>3</sup> BC Act status: V – Vulnerable, E – Endangered, CE – Critically Endangered. <sup>4</sup> EPBC Act status: V – Vulnerable, E – Endangered, CE – Critically Endangered.



### 4.3.2 Candidate species credit species requiring further assessment

**Table 4.3** outlines the candidate species credit species that require further assessment, the acceptable survey period for each species, and the month in which each survey was undertaken. The table also includes the survey period for *Leucochrysum albicans* var. *tricolor*, which is not listed under the BC Act, but only listed under the EPBC Act.

Targeted flora surveys were undertaken on 24 October 2022 by Jai Brien-Cooper (Field Ecologist), with the survey effort presented in **Figure 4.1**, and followed the requirements of “Surveying for Threatened Plants and their Habitats” (DPIE 2020).

The weather observations for each day of targeted survey are presented in **Table 3.2**.

**Table 4.3: Survey periods for candidate species credit species requiring further assessment. Blue cells indicate survey period, “S” indicated period when survey was undertaken, a bold “I” indicated incidental observations of the species.**

Scientific name (Common name)	Survey period											
	J	F	M	A	M	J	J	A	S	O	N	D
Striped Legless Lizard ( <i>Delmar impar</i> ) <sup>#</sup>											<b>S</b>	<b>S</b>
<i>Dodonea procumbens</i> (Creeping Hop-bush)										<b>S</b>		
<i>Leucochrysum albicans</i> var. <i>tricolor</i> (Hoary Sunray)					<b>I</b>			<b>I</b>		<b>S</b>		
<i>Swainsona sericea</i> (Silky Swainson-pea)										<b>S</b>		
<i>Rutidosis leptorrhynchoides</i> (Button Wrinklewort)										<b>S</b>		

<sup>#</sup> the EPBC Act survey guidelines allow for targeted surveys to be completed between September and early-May, this is discussed further below.

#### *Leucochrysum albicans* var. *tricolor* (Hoary Sunray)

*Leucochrysum albicans* var. *tricolor* was initially identified within the subject land during preliminary surveys of precinct 2 in May 2022 (**Plate 4.1**). The target area for this species included all of VZ1 along with open areas of VZ2 immediately adjacent to VZ1. Given that *L. albicans* var. *tricolor* was known from the subject land, a reference site was not visited prior to the targeted survey.

A GPS was used to map the distribution of this species within the subject land during surveys on 24 October 2022 by Jai Brien-Cooper (Field Ecologist) – the survey effort is presented in **Figure 4.1**. Initially, parallel traverses, separated by 5 m were completed within the area identified as optimal habitat, with additional traverses separated by 10 m outside of the optimal habitat. These traverses were used to identify the areas where this species was found, and to mark (using the GPS) any individuals not part of a cluster. Individual plants were then marked with a flag (**Plate 4.2**). After all plants were marked with a flag each plant had a GPS point created. This method reduced the chance of double counting any plants.

In total, 1,184 individual plants were recorded within the subject land (**Figure 4.2**). These 1,184 plants occurred in two clusters.





**Plate 4.1:** Image of *Leucochrysum albicans* var. *tricolor*, identified within Vegetation Zone 1, photo taken May 2022.



**Plate 4.2:** Photograph showing flagged *L. albicans* var. *tricolor* within the subject land.

### *Swainsona sericea* (Silky Swainson-pea)

*Swainsona sericea* was not known from the subject land prior to the targeted survey, therefore, a reference population was visited prior to the inspection to see if the species was flowering at the time of survey and gain familiarity with the species and its habitat. Plants at the reference population were observed to be flowering on 24 October 2022.

The survey method followed that of *L. albicans* var. *tricolor*, however, no *Swainsona sericea* were recorded within the areas surveyed. See **Figure 4.1** for the survey effort.

### *Rutidosia leptorrhynchoidea* (Button Wrinklewort)

*Rutidosia leptorrhynchoidea* was not known from the subject land prior to the targeted survey. The method for survey followed that of *L. albicans* var. *tricolor*, however, no *Rutidosia leptorrhynchoidea* were recorded within the areas surveyed. The species is quite conspicuous even when not in flower, which is why the species can be the subject of target survey throughout the year. Hence a reference site was not visited. See **Figure 4.1** for the survey effort.

### *Dodonaea procumbens* (Creeping Hop-bush)

*Dodonaea procumbens* was not known from the subject land prior to the targeted survey, therefore, a reference population was visited prior to the inspection to see if the species was flowering at the time of survey and gain familiarity with the species and its habitat. Plants at the reference population were observed to be flowering.

The method for survey followed that of *L. albicans* var. *tricolor*, however, no *Dodonaea procumbens* were recorded within the areas surveyed. See **Figure 4.1** for the survey effort.

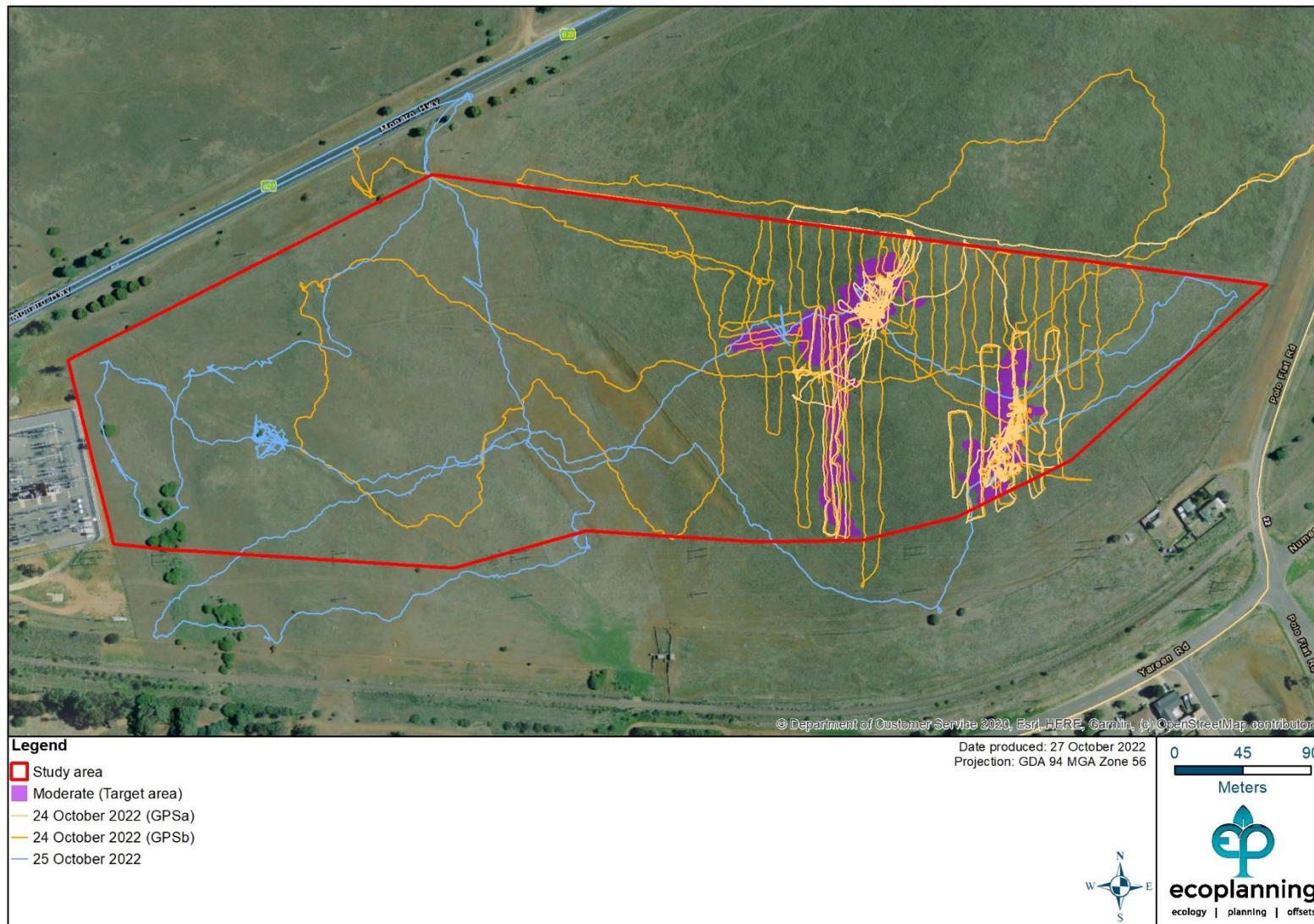
### Striped Legless Lizard (*Delma impar*)

Surveys for the Striped Legless Lizard commenced in November. The survey for the species followed those set out in Table 1 of the “Referral Guidelines for the vulnerable Striped Legless Lizard *Delma impar*” (viz those for “Artificial shelter site surveys”), published by the Commonwealth Department of Sustainability, Environment, Water, Population, and Communities (2011), and the “Threatened Reptiles – Biodiversity Assessment Method survey guidelines” as published by DPE (2022).

The “artificial shelter” (roof tile) survey method was chosen, where roof tiles are laid out in arrays of 50 tiles each, each 50-tile array is arranged in a grid of 5 by 10 tiles with 5 m spacing between each tile. The number of tile arrays is determined by the size of the survey area; for areas <2 ha, a minimum of two arrays must be placed, while an area >2 ha but <30 ha require 1 tile grid per 3 ha. The area determined to be potential habitat for the Striped Legless Lizard was adjacent to the areas of Natural Temperate Grassland, which consisted of the areas of VZ1 (the patches of Natural Temperate Grassland) as well as areas of VZ3 (exotic grassland) which were on the slopes of the subject land. This area was found to be approximately 6.6 ha (**Figure 4.3**), so a minimum of two roof tile arrays were required, an additional two arrays were also used for the current survey.

Two hundred artificial shelter features were laid out in four arrays, set out on 18 November 2022 (the arrangement is shown in **Figure 4.3**). Checks of the artificial shelters will be completed on a weekly basis, with the first check being conducted on 24 November 2022. The results of this survey will be sent as an addendum to this report.





**Figure 4.1:** Tracks recorded to show survey effort for candidate species credit flora species within the subject land. N.B. two GPS recorders were used by the one surveyor on 24 October 2022 as one malfunctioned.

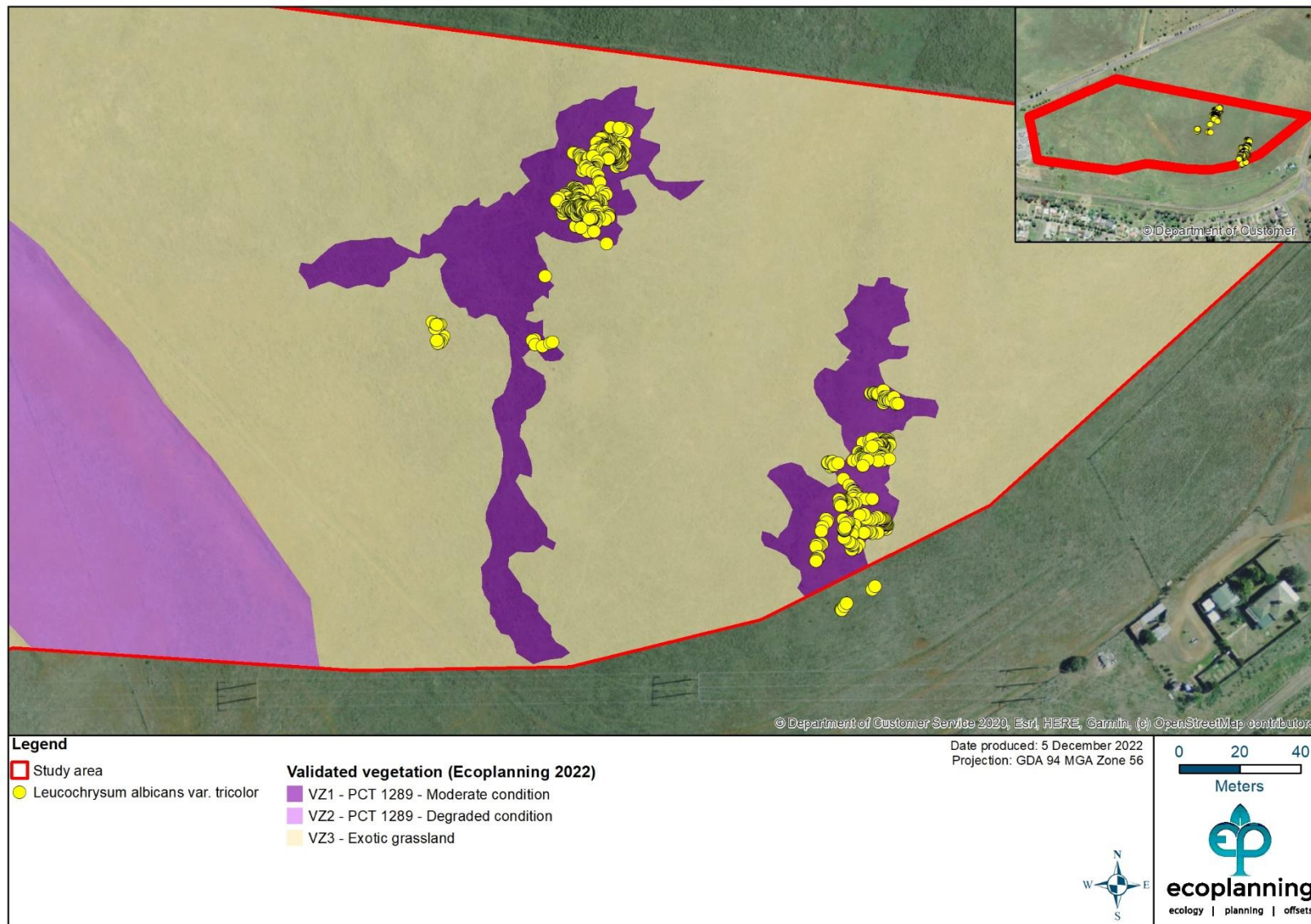


Figure 4.2: Results for the census of *Leucochrysum albicans* var. *tricolor* completed on 25 October 2022 (NB an accuracy of  $\pm 3$  m for all waypoints).



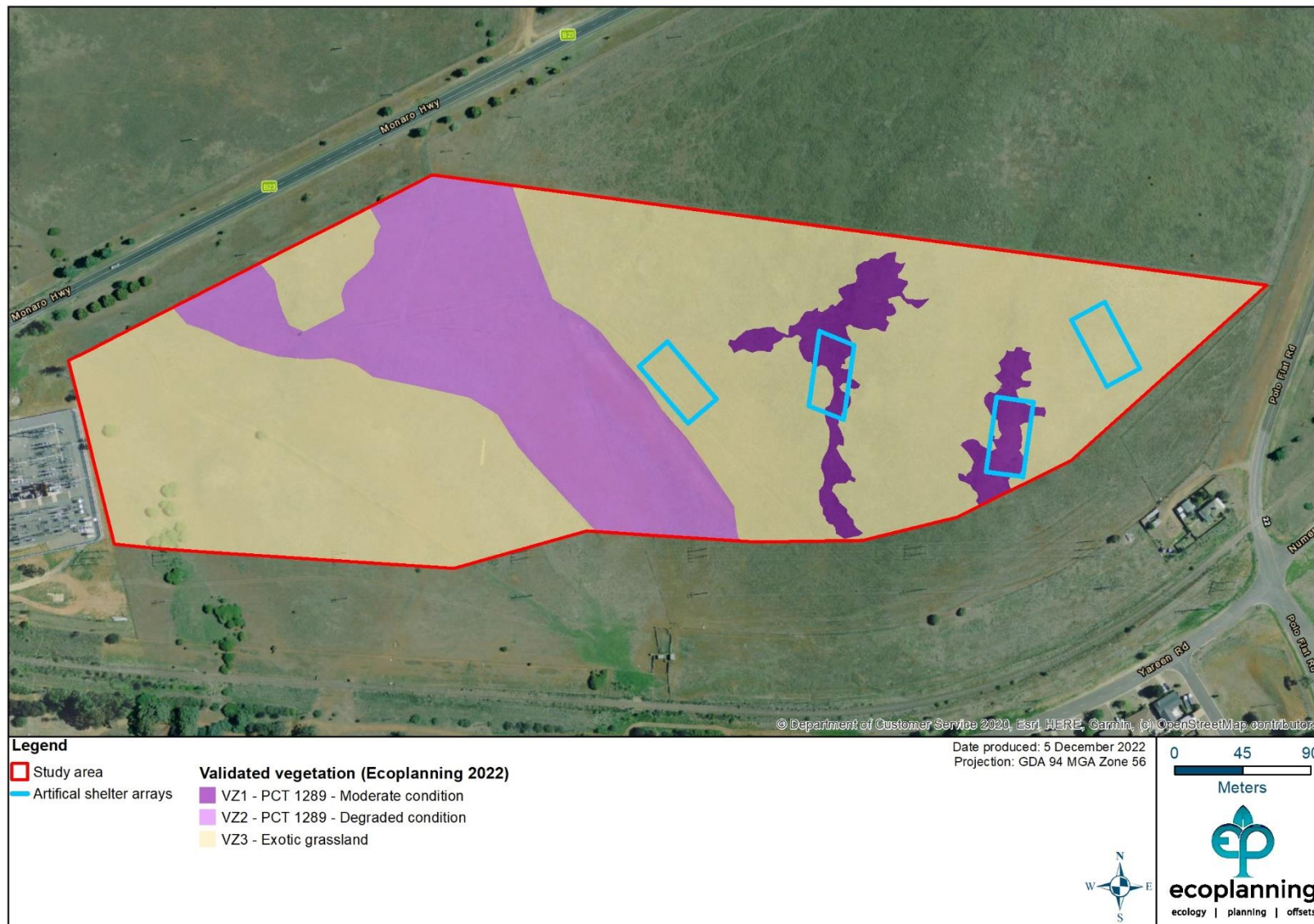


Figure 4.3: Location of the four artificial shelter (concrete roof tile) arrays used for the Striped Legless Lizard survey.

## 5 Assess impacts

### 5.1 Assessing the impacts of the BAM

#### 5.1.1 Impacts to native vegetation communities

Within the subject land, the proposed development is expecting to clear 0.7 ha that conforms to the PCT 1289. It is likely that scattered within vegetation zones 2 and 3 are native flora species, however, their abundance was not dominant enough for the zone they were apart of to be considered a PCT.

#### 5.1.2 Impacts to threatened species

The proposed development will impact the population of *L. albicans* var. *tricolor* within the subject land. The exact number of plants which will be impacted is not known exactly, given that there is an accuracy of approximately  $\pm 3$  m for all waypoints in **Figure 4.2**. All *L. albicans* var. *tricolor* identified by Ecoplanning within the subject land will be cleared as part of the proposed development. Although this species is not considered threatened under the BC Act, some consideration has been given to the impacts to the species which may come about from the proposed development.

Surveys for the Striped Legless Lizard are ongoing; therefore, it is unclear if the proposed development will impact this species, therefore, it will not be discussed in this section. An amended report will be produced, assessing the potential impacts of the proposed development of the Striped Legless Lizard if a population is identified the subject land.

#### 5.1.3 Indirect impact to native vegetation

It is difficult to quantify indirect impacts associated with the project (construction and operation phases), but these may include impacts such as noise, erosion, altered run-off regimes or inadvertent impacts to nearby habitat or vegetation (noting no adjacent habitat or vegetation). Indirect impacts will be managed through the development of a Construction Environmental Management Plan (CEMP).

Given the location of the subject land within urbanised context and adjacent to existing residential development, it is considered unlikely that the proposal would have impacts such that it would reduce the viability of any nearby native vegetation or habitat due to edge effects, noise, dust, or light spill.

The CEMP will provide measures that will reduce the likelihood of indirect impacts such as trampling of flora, rubbish dumping, introduction of pests and further weed invasion into nearby areas. In addition, runoff and construction indirect impacts would be managed through the CEMP and sediment and erosion controls will be put in place according to best practices (Landcom 2004). Detailed consideration of potential indirect impacts is provided in **Table 5.1**.



**Table 5.1: Assessment of potential indirect impacts.**

Indirect impact type	Nature	Extent	Frequency	Duration	Timing
Inadvertent impacts on adjacent habitat or vegetation	Properties adjacent to the subject land have a high cover of non-native vegetation ( <i>viz. Eragrostis curvula</i> *) and is likely low-quality habitat for native fauna.	Vegetation immediately adjacent to the subject land	Ongoing during construction phase	Ongoing during construction phase	Ongoing during construction phase
Reduced viability of adjacent habitat due to noise, dust, or light spill	Given the relatively large size of the subject land, there is the potential for dust, noise, and light pollution to impact adjacent areas of native vegetation, particularly in the construction phase. The ambient levels of these pollutants are not expected to remain at the construction phase levels, given that areas surrounding the subject land have already undergone housing development, and the Monaro Highway runs immediately to the north of the subject land. In addition, the construction phase is expected to work the CEMP, which will include controls for allowable levels of noise, light, and dust pollution to be maintained.	Areas adjacent to the subject land	Ongoing during construction phase	Ongoing during construction phase	Ongoing during construction phase

Indirect impact type	Nature	Extent	Frequency	Duration	Timing
Transport of weeds and pathogens from the site to adjacent vegetation	The subject land and areas surrounding it have already been invaded by the exotic grass <i>Eragrostis curvula</i> *, as well as other exotic species including <i>Bromus catharticus</i> *, <i>Avena</i> sp.*, <i>Hypericum perforatum</i> *, and <i>Rumex acetosella</i> *. Given that the proposed development is a subdivision and construction of housing, there is the potential for additional exotic species, as well as the introduction of pathogens, to be introduced to the areas surrounding the subject land, however, this risk is already present, given that urban development of housing has already taken place in some areas surrounding the subject land. There is also the potential for exotic species and pathogens to be introduced during the construction phase, given that workers, vehicles, machinery, and supplies will be transported into the subject land from inter- and intra-state locations.	Areas adjacent to the subject land	Ongoing during construction phase	Ongoing during construction phase	Ongoing during construction phase
Risk of starvation, exposure, and loss of shade or shelter	The proposed development is not expected to increase the risk of starvation, exposure, or loss shade or shelter for native species, given that some areas surrounding the subject land have already undergone urban housing development.	-	-	-	-
Loss of breeding habitats	Breeding habitat of non-threatened native invertebrates and small reptiles in adjacent areas is likely to be indirectly impacted by the proposed development.	Areas adjacent to the subject land	Ongoing	Ongoing	Ongoing

Indirect impact type	Nature	Extent	Frequency	Duration	Timing
Trampling of threatened flora species	As all threatened plants found in the subject land ( <i>L. albicans</i> var. <i>tricolor</i> ) will be cleared as part of the proposed development, and no threatened plants were observed in adjacent properties, there is not expected to be any indirect impacts to threatened plants	-	-	-	-
Inhibition of nitrogen fixation and increased soil salinity	The proposed development is not expected to alter the nitrogen fixation in areas of adjacent vegetation, nor is soil salinity expected to increase.	-	-	-	-
Fertiliser drift	As the proposed development will be the development of residential housing, the expected fertiliser drift will be low (in comparison to agricultural practices) and is not expected to significantly impact surrounding areas of native vegetation.	-	-	-	-
Rubbish dumping	The Cooma-Monaro Regional Council provide adequate rubbish collection services, so there is not expected to be any increase in the amount of rubbish dumping within or adjacent to the subject land.	-	-	-	-
Wood collection	No trees were present in the subject land, and only ornamental trees (not typically used for firewood) were found outside of the subject land. Therefore, wood collection is not expected to be an impact which would arise from the proposed development	-	-	-	-

Indirect impact type	Nature	Extent	Frequency	Duration	Timing
Bush rock removal and disturbance	All bushrock within the subject land will be removed or modified as part of the proposed development, so it functions within the local ecosystem will be removed.	Subject land	Development phase	Development phase	Development phase
Increase in predators and pest animals	There is the potential for cats and dogs to kept as pets by the residents of the proposed development. some of these pets (particularly cats) may become stray/feral and prey upon local birds, small mammals, and reptiles.	Adjacent areas	Ongoing	Ongoing	Post-development
Changed fire regimes	The absence of fire will be the aim of the future residents of the proposed development, this may have detrimental impacts to the native vegetation adjacent to the subject land, however, given the location of the subject land – immediately adjacent to residential area – it is expected that there has been a long time-since-fire period within the subject land and the effects of a prolonged time-since-fire would already be in effect.	Adjacent areas	Ongoing	Ongoing	Current and ongoing
Disturbance to specialist breeding and foraging habitat	The subject land is not known to contain specialist breeding habitat or foraging habitat.	-	-	-	-



### 5.1.4 Assessing prescribed biodiversity impacts on threatened species

The presence of biodiversity values by the BC Reg have been considered in the context of the subject land (**Table 5.2**). This assessment does not include the potential impacts on the Striped Legless Lizard, as surveys for this species have not yet been completed. If a population of this species is found to be present within the subject land, the following assessment of impacts will be amended to reflect the results.

**Table 5.2: Assessment of the proposed development on prescribed biodiversity impacts.**

Prescribed Biodiversity Impact	Presence within the subject land
<p>(a) the impacts of development on the following habitat of threatened species or ecological communities:</p> <ul style="list-style-type: none"> <li>(i) karst, caves, cervices, cliffs, and other geological structures of significance,</li> <li>(ii) rocks,</li> <li>(iii) human made structures,</li> <li>(iv) non-native vegetation</li> </ul>	<p>The subject land does not contain any karst, caves, cervices, cliffs, and other geological structures of significance, human made structures (except for fencing which is not considered habitat). However, the subject land does contain rocks (<i>i.e.</i>, the rocky areas described in <b>Section 3.3.2</b>), and non-native vegetation which dominates the subject land.</p> <p>The non-native vegetation within the subject land does not conform to any PCT (nor TEC), however, it has the potential to present itself as habitat to threatened species. <i>L. albicans</i> var. <i>tricolor</i> was found in areas dominated by exotic grasses. And, hitherto unsurveyed in the subject land, the areas of exotic grasses have the potential to support the Striped Legless Lizard. While Striped Legless Lizard occur predominantly in grassland, the rocks within VZ1 have some potential to provide refuge for Striped Legless Lizard.</p>
<p>(b) the impacts of development on the connectivity of different areas of habitat for threatened species that facilitates the movement of those species across their range,</p>	<p>The subject land has the potential to act as a route of connectivity between areas to the north and south of the subject land. However, the significance of this corridor is dubious given that immediately to the north and south of the subject land are major thoroughfares (The Monaro Highway and Yareen Road, respectively), and there is a far greater route of connection in the pastoral areas to the north of the subject land.</p>
<p>(c) the impacts of development on movement of threatened species that maintains their lifecycle,</p>	<p>A population of <i>L. albicans</i> var. <i>tricolor</i> identified within the subject land numbering 1,184. Following a review of BioNet records for this species within 5 km of the subject land (see <b>Appendix B</b>), it was identified as being the largest in the locality. Therefore, it is expected that the population of <i>L. albicans</i> var. <i>tricolor</i> within the subject land holds the bulk of genetic diversity in the locality. As inbreeding has been identified as a detrimental to the species, the loss of the population within the subject land does pose some risk to the other populations in the locality.</p>

Prescribed Biodiversity Impact	Presence within the subject land
(d) the impacts of development on water quality, water bodies and hydrological processes that sustain threatened species and threatened ecological communities (including from subsidence or upsidence resulting from underground mining or other development),	One first order stream was identified within the subject land. Being first order, this drainage line is ephemeral, however, a defined “bed and bank” is present. This drainage line is entirely within the development footprint, so impacts to it within the subject land would be direct and follow those of complete clearance. The indirect impacts to this drainage line would be downstream in the form erosion and runoff. However, given that these impacts are indirect, their magnitude to biodiversity values downstream is unknown.
(e) the impacts of wind turbine strikes on protected animals,	Not applicable.
(f) the impacts of vehicle strikes on threatened species of animals or on animals that are part of a threatened ecological community.	The proposed development will include the construction of 6 roads (see <b>Figure 1.2</b> ). If the proposed development is to proceed, then the risk of vehicle strike to threatened species will be low, given that there will be little native vegetation remaining within the subject land.

### 5.1.5 Entities at risk of Serious and Irreversible Impacts

No entities at risk of serious and irreversible impacts were identified within the subject land.

## 5.2 Other legislative considerations (non-BAM)

### 5.2.1 Matters of National Environmental Significance

The EPBC Act establishes a process for assessing the environmental impact of activities and developments where MNES may be affected. Under the Act, any action which ‘has, will have, or is likely to have a significant impact on a matter of MNES’ is defined as a ‘controlled action’, and requires approval from the Department of Climate Change, Energy, the Environment and Water (DCCEEW), which is responsible for administering the EPBC Act.

The process includes an assessment for listed threatened species and ecological communities that will be affected by the proposed action (one of the MNES). The Commonwealth has developed Significant Impact Guidelines (DotE 2013) and species-specific referral guidelines that outline a number of criteria to aid in assessing impacts on MNES and help decide whether or not a referral to the Commonwealth is required.

A search, using the EPBC Act Protected Matters Search Tool, was undertaken to identify any MNES entities within 10 km of the subject land (completed 9 November 2022). The following three MNES entities were identified as being or having the potential of being present within the subject land:

- *L. albicans* var. *tricolor* (Hoary Sunray), listed as an endangered species under the EPBC Act and observed in the subject land,
- Striped Legless Lizard (*Delma impar*), listed as a vulnerable species under the EPBC Act,

- Natural Temperate Grassland of the South Eastern Highlands, listed as a CEEC under the EPBC Act,

As discussed in **Section 3.5.1**, the area of Natural Temperate Grassland within the subject land conforms to the condition thresholds to be protected under the EPBC Act. To determine if the population of *L. albicans* var. *tricolor* or the patch of Natural Temperate Grassland within the subject land should be referred to the Commonwealth Minister, significant impact assessments, following the Commonwealth guidelines (DoE 2013) were completed for both MNES within the subject land. These assessments are presented in **Appendix B**. On the basis that the area of Natural Temperate Grassland, which is a CEEC, would be completely cleared, a referral to the Commonwealth Minister is recommended. Similarly, on the basis that a population of *L. albicans* var. *tricolor* would be completely cleared within the subject land, a referral is recommended.

An assessment of the Striped Legless Lizard has not yet been completed as the results of targeted survey are still pending.

## 5.2.2 Water Management Act

The *Water Management Act 2000* (WM Act) identifies lands within 40 m of a watercourses or other water body as waterfront land. Development on waterfront land will trigger a requirement for a controlled activity approval on waterfront land, and development is required to comply with applicable riparian buffer requirements under the Guidelines for Controlled Activities on Waterfront Land (Controlled Activity Guidelines) (NRAR 2018). The riparian buffer for a 1<sup>st</sup> order watercourse (such as that found in the subject land) is 10 m from either side of the top of bank.

## 5.2.3 Snowy-Monaro LEP

### Section 6.3 – Terrestrial Biodiversity

This section of the SNLEP aims to preserve native flora and fauna, their habitat, the processes that allow them to survive, and encourage their conservation. This section of the LEP is relevant to areas identified on the “Terrestrial Biodiversity Map”. Areas of the subject land are identified on the SMLEP Terrestrial Biodiversity Map (*viz* Map 13). These mapped areas are found on the northern boundary of the subject land, and do not incorporate any patches of native vegetation.

As the consent authority for developments subject to approval under the SMLEP, the Snowy-Monaro Regional Council must be satisfied that the proposed development is likely to have (Section 6.3.3 (a)):

- any adverse impact on the condition, ecological value and significance of the fauna and flora on the land, and*

The area identified on the Terrestrial Biodiversity Map is found within areas mapped as VZ3 (“Exotic Pasture”). As this vegetation zone was found to have a VI score of 1.5, as such, the relative ecological condition and value of the vegetation zone is low. No threatened species have been found within the areas mapped on the Terrestrial Biodiversity Map – Map 3.

- ii. *any adverse impact on the importance of the vegetation on the land to the habitat and survival of native fauna, and*

Given that the area mapped on the Terrestrial Biodiversity Map does not contain any ecological values of significance, there is not likely to be any adverse impacts on the native vegetation nor on the habitat of native fauna.

- iii. *any potential to fragment, disturb or diminish the biodiversity structure, function, and composition of the land, and*

As the ecological value of the areas identified on the Terrestrial Biodiversity Map are low (with a VI score of 1.5) the disturbance to the area is not likely to diminish the biodiversity structure, function, and composition of the land. Fragmentation is not likely to occur as the location of the mapped areas are on the edge of subject land and edge of other mapped areas to the north of the subject land.

- iv. *any adverse impact on the habitat elements providing connectivity on the land, and*

As discussed in Section 2, the subject land does not form part of any habitat corridors between patches of native vegetation.



## 6 Avoid and minimise

### 6.1 Avoiding and minimising impacts on native vegetation and habitat during project planning

In accordance with Section 7.1 of the BAM, actions taken to avoid and minimise impacts through locating the project must be documented and justified in the BDAR. In addition, Section 7.1.1 4 of the BAM states that in selecting the project location, the following should be addressed, as they apply to the project:

- Alternative modes or technologies that would avoid or minimise impacts on biodiversity values,
- Alternative routes that would avoid or minimise impacts on biodiversity values,
- Alternative locations that would avoid or minimise impacts on biodiversity values, and/or
- Alternative sites within a property which the proposal is located that would avoid or minimise impacts on biodiversity values.

The remainder of this section will discuss *L. albicans* var. *tricolor* and Natural Temperate Grassland as threatened entities, but it should be noted that they are only protected as such under the EPBC Act. Although, *L. albicans* var. *tricolor* and Natural Temperate Grassland are not protected as threatened entities under the BC Act they remain native species and native ecological communities under the BC Act, therefore, some level of avoidance and minimisation of impacts is appropriate.

As the surveys for Striped Legless Lizard are ongoing, this section will be updated if a population of this threatened species is found. Attempts to avoid or minimise impacts on native vegetation and habitat in the planning stage

During the preliminary planning stages of this proposal, the population of *L. albicans* var. *tricolor* was estimated to be approximately 40 individuals, while the distribution of Natural Temperate Grassland was estimated to be approximately 0.7 ha. The parkland to in the east of the subject land was placed to minimise the impact to the then known population of *L. albicans* var. *tricolor* and distribution of Natural Temperate Grassland. However, due to bushfire constraints, and subsequent isolation and edge effects that would arise from a small conservation park being within an urban landscape, it has been determined that conservation would not be feasible for *L. albicans* var. *tricolor* in the parkland, and total clearance of the subject land has been assessed in this BDAR.

### 6.2 Protocols to minimise impacts on biodiversity values

#### 6.2.1 Construction Environmental Management Plan

To avoid potential indirect impacts during construction, an appropriate erosion and sedimentation control plan should be in place following best practice protocols such as Landcom (2004). It is recommended that this is included in a site-specific CEMP, prior to any construction works taking place. The CEMP will be required to span the pre, during and post-construction period, and will include the above pre-clearance and fauna management protocols.

### 6.2.2 Protection of known threatened flora and native vegetation

Within the subject land is approximately 0.7 ha of PCT 1289, present in one condition state – “moderate” (**Figure 3.3**). In addition to the native vegetation communities, 1,184 *Leucochrysum albicans* var. *tricolor* plants were identified (**Figure 4.2**). However, the park that is proposed within the development no longer included conservation as an aim, and total clearance of the subject land is proposed by the proponent.

## 7 Offsetting requirements and credit calculations

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

BAM calculator reports on credit calculations are presented in **Appendix C**.

### 7.1 Vegetation community impacts that require offsetting

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

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

Vegetation zone 1, which is a CEEC under the EPBC Act, and requires offsetting if its VI score is  $> 15$ . The VI score of VZ1 was found to be 56, and it will, therefore, require offsetting under the proposed development.

No other vegetation zones within the subject land were found to meet any of the minimum offsetting requirements listed in Section 9.2.1 of the BAM.

### 7.2 Threatened species impacts

A population of 1,184 *L. albicans* var. *tricolor* were found within the subject land. This is a threatened species listed under the EPBC Act and an offset is not required under the BC Act.

#### 7.2.1 Ecosystem credits

A total of 17 ecosystem credits are required to offset the impacts of the proposed development on PCT 1289.

The following offset rules apply for the credit class for PCT 1289:

- Must be one of the following PCTs: 586, 894, 895, 896, 1110, 1185, 1186, 1187, 1202, 1288, 1289, 1298,
- Be within one of the following IBRA subregions (or within 100 km of its boundary): Monaro, Bungonia, Crookwell, Kybayan-Gourock, Monaro, Murrumbateman, Snowy Mountains and South East Coastal Ranges,
- Temperate Montane Grasslands -  $\geq 50\%$  -  $< 70\%$  cleared group (including Tier 3 or higher threat status).

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## Appendix A Vegetation Integrity plot data, as entered into the BAM calculator

**Table A-1: Composition data entered into the BAM calculator.**

Plot ID	Veg. zone	Tree	Shrub	Grass	Forb	Fern	other
BAM 1	VZ2	0	0	3	4	0	0
BAM 2	VZ2	0	0	3	4	0	0
BAM 3	VZ3	0	1	1	2	1	0
BAM 4	VZ3	0	0	2	4	0	0
BAM 5	VZ3	0	0	5	3	0	0
BAM 6	VZ1	0	1	7	8	0	0

**Table A-2: Structural data entered into the BAM calculator.**

Plot ID	Veg. zone	Tree	Shrub	Grass	Forb	Fern	other
BAM 1	VZ2	0	0	7.2	0.6	0	0
BAM 2	VZ2	0	0	17	0.4	0	0
BAM 3	VZ3	0	0.1	0.2	0.2	0.1	0
BAM 4	VZ3	0	0	6.3	0.2	0	0
BAM 5	VZ3	0	0	2.3	0.3	0	0
BAM 6	VZ1	0	0.1	32.1	2.9	0	0

IN ECOSERVER

15.8.22

Cooma Plot 1

2/ab

WP 692739 5989804 ±3m

92 L12 GPS 150° (1st corner)

7805 - 7807 (L12 camera)

Basalt rocks

*Austroblechnum* big 5 50/50 /

*Trifolium medicagalinum* 30

*Eragrostis ciliaris* 50

*Verbascum thapsus* 0.3 /

*Brassicaceae* sp (lepid) 0.3 /

*Corioperla* No I 0.1 /

*Erodium cicutarium* 0.2 /

*Carthamus lin* 0.1 /

Blue-green phorb ⑤ 0.1 /

*Leptochloa* ⑤ (rob) of 0.1 /

*Carex* sp ⑤ 0.2 /

*Hypochaeris* 0.1 /

*Eriophorum* (green) ⑤ 0.1 /

*Chrysanthemum leucanthemum* 0.1 /

*Hypochaeris macrocephala* 0.1 /

*Leptochloa* 0.2 /

*Thia soft grass* 0.2 /

*Brennus calth* 0.1 /

*Verbascum* 0.1 /

*Silene mar* 0.1 /

*Rumex vulgaris* 0.1 /

*Plantago lance* 0.1 /

*Cynodon* /

*Lepidium* (dead) /

*Malva parva* 0.1 /

*Rubidoperna* sp. 2 /

*Verbas Flap* 0.1 x

*Erodium cicutarium* 0.1 /

*Rumex* sp (brunii) 0.1 /

*Gnaphalium* 0.1 /

*Cerastium glomeratum* 0.1 /

Litter = ~20%

Poaceae sp 5%



400 m <sup>2</sup> plot: Sheet 1 of 1		Survey Name	Plot Identifier	Recorders			
Date	16/8/22	Polo Flat	Plot 2	EN			
GF Code	Full species name mandatory, or a unique means of identifying separate taxa within a survey. Data from here will be used to assign growth form counts and covers.	N, E or HTE	Cover	Abund	Strat	Vouch	
G✓	1 <i>Austroshya bigeroides</i> ++		10	50			
G✓	2 <i>Eragrostis curvula</i> ++	HTE	10				
F	3 <i>Carthamus lanatus</i>		2	5			
F✓	4 <i>Erodium cicutarium</i> I	E	1	200			
F	5 <i>Crassula sieberiana</i> I		1	10			
F	6 <i>Chryscephalum apiculatum</i> rosette		1	20			
F	7 <i>Medicago</i> sp. (abundant fruit) ++	E			11th	(fruit)	
F	8 <i>Caryophyllaceae</i> #1 pink flower ++	E	2	50			✓
F✓	9 <i>Capsella bursa-pastoris</i>		5	100			✓
F✓	10 <i>Trifolium (glomeratum)</i> ++	E	25	1000			
F	11 <i>Lepidium afghanum</i>	E	2	20			
G✓	12 <i>Bromus catharticus</i> ++	E	1	100			
G	13 <i>Poaceae</i> sp. - fine grass ++		5	100			Photo
F	14 <i>Panicum brasiliense</i> ++	E	1	20			
G✓	15 <i>Austroshya</i> #2 = <i>A. bigeroides</i> see #1 above		2	200			✓
F	16 <i>Coryza</i> sp. = <i>C. sumatrensis</i>	E	1	10			
F	17 <i>Malva parviflora</i> III	E	1	5			
F	18 <i>Hypochaeris radicata</i> III ++	E	1	10			
F	19 <i>Euchiton spurius</i> II rosettes (dead native plants)		1	5			Photo
F	20 <i>Gnaphalium</i> sp. (rosette)	E	1	10			Photo
F	21 <i>Centaurium erythraea</i>	E	1	2			
F	22 <i>Linaria pallidiflora</i>	E	1	1			
G	23 <i>Paspalum dilatatum</i> III	E	1	3			
F✓	24 <i>Cerastium glomeratum</i> ++	E	10	1000			
F	25 <i>Rumex</i> sp. (potentially known) IIII		1	7			Photo
F	26 ( <i>Polygonum</i> sp. dead)	E	DEAD				
F	27 <i>Plantago lanceolata</i> IIII	E	1	5			
F	28 <i>Cirsium vulgare</i> III	E	1	3			
F	29 Unknown rosette	E	1	2			Photo
F	30 <i>Caryophyllaceae</i> "green" = <i>Arenaria leptoclada</i>	E	1	2			X
F	31 <i>Medicago minima</i> II	E	1	2			
D	32 <i>Cynodon dactylon</i>		2	*			
V	33 <i>Carex</i> sp. (native) ++		2	50			
G✓	34 <i>Rytidosperma</i> sp. = <i>R. caespitosum</i>		5	100			X
	35						
	36						
	37 Litter = 20% - abundant dead standing litter						
	38 veg ~ 68%						
	39 earth ~ 10%						
	40 rock ~ 0.1 cow pats 0.2						

GF Code: see Growth Form definitions in BAM Appendix 1. Identify top 3 dominants in the veg zone. N: native, E: exotic, HTE: high threat exotic.

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, ...

t - tree, m - mallee, s - shrub, g - tussock, h - hummock, d - other, v - sedge (Cyperaceae), r - rush (non-Cyperaceae), f - forb, e - fern,

q - tree fern, p - palm, a - cycad, l - vine, k - epiphyte, x - xanthorrhoea,

bare earth ~ 10% cow pats ~ 0.2  
rock ~ 0.1



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400 m <sup>2</sup> plot: Sheet of		Survey Name	Plot Identifier	Recorders
Date	16 8 22	Polo Flat 6th	B3	JBC

GF Code	Full species name mandatory, or a unique means of identifying separate taxa within a survey. Data from here will be used to assign growth form counts and covers.	N, E or HTE	Cover	Abund	Strat	Vouch
	1 <i>Eragrostis caerulea</i>		9.57	>1000		
	2 <i>Verbascum fery</i>		0.2	20		
	3 <i>Bromus catharticus</i>		0.2	>200		
(5)	4 <del>Stellaria</del> Unknown A		0.1	>100		
	5 <i>Medicago</i> sp. d		0.2	>100		
	6 <i>Cheilanthes</i> sp.		0.1	1		
	7 <i>Coryza</i> sp (rosette) sum		0.2	>100		
	8 <i>Hypericum perforatum</i>		0.1	>50		
(5)	9 <i>Gemochacta</i> sp.		0.1	>50		
	10 <del>Cross fast (weed)</del> <i>Eradium</i>		0.2	>100		
	11 <i>Echium</i> (H. Sage leaf)		0.2	>100		
(5)	12 <i>Vittidina</i> sp.		0.1	20	/	
	13 <i>Chryscephalum</i> sp. trifolium		0.1	>50	/	
(5)	14 <i>Medicago</i> <del>intooly</del> glomeratum		0.1	>100		
GF	(5) 15 Rosette A. Unknown C		0.1	50	/	
	16 <i>Trifolium aurence</i>		0.2	>100	/	
	17 <del>Spiky shrub (Lip)</del> <i>Dicaria pubescens.</i>		0.1	1	/	
(5)	18 <i>Ranulea rosa.</i>		0.1	>100	/	
	19 <i>xytidasperma</i> sp (chewed)		0.2	>100	/	
(5)	20 <del>Palmate strawberry</del> Unknown B		0.1	1	/	
	21					
	22					
	23					
	24					
	25					
	26					
	27					
	28					
	29					
	30					
	31					
	32					
	33					
	34					
	35					
	36					
	37					
	38					
	39					
	40					

GF Code: see Growth Form definitions in BAM Appendix 1. Identify top 3 dominants in the veg zone. N: native, E: exotic, HTE: high threat exotic.

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, ...

t - tree, m - mallee, s - shrub, g - tussock, h - hummock, d - other, v - sedge (Cyperaceae), r - rush (non-Cyperaceae), f - forb, e - fern, q - tree fern, p - palm, a - cycad, l - vine, k - epiphyte, x - xanthorrhoea.

Singford/Booka/Gallah/Kurrawong/



400 m <sup>2</sup> plot: Sheet of		Survey Name	Plot Identifier	Recorders			
Date	16.3.22	Polo Flat	Plot 4	EN			
GF Code	Full species name mandatory, or a unique means of identifying separate taxa within a survey. Data from here will be used to assign growth form counts and covers.		N, E or HTE	Cover	Abund	Strat	Vouch
G✓1	Eragrostis curvula		HTE	40	200		
G✓2	Austrostipa bigeniculata			5	100		
F✓3	Trifolium arvense		E	1.5	200		
F	Salvia verbenaca		E	1.1	20		
F	Conyza sp. (rosette) - C. sumatrensis		E	1.1	10		
F	Caryophyllaceae pink flower @ Plot 1+2		E	1.2	50		✓
F✓7	Trifolium glomeratum		E	1.5	300		
F	Medicago fruts +- Medicago sp.		E	—	—		
F	Gamochaeta sp (?purple) IIII IIII +-		E	1.1	50		
F	Hirschfeldia incana +-		E	1.1	10		
F	Euchilon sphaerovus			DEAD			
G	Poaceae sp. fine soft - as @ Plot 1+2			1.5	200	inadequate to ID	
L	Convolvulus (erubescens)			DEAD			
F	cerastium glomeratum		E	1.1	20		
G	Bromus catharticus I		E	1.2	20		
F	Tragopogon sp. II		E	DEAD			
F	Crassula suberecta II			1.1	3		
F	Asteraceae sp I = Vittadinia rivellii			DEAD			X
F	Plantago lanceolata III		E	1.1	3		
F	Erodium cicutarium IIII		E	1.1	6		
G	Rythidosperma sp II +- R. caespitosum			1	100		X
F✓22	Petrophragma rantevii - (narrow lvs)		E	2	200		
F	Rosette unknown I ?Asteraceae sp.		E	1.1	1		Prob
F	Verbascum thapsus II		E	1.1	2		
F	Lepidium afraicum (at Plot 1+2)		E	DEAD			
F	Malva parviflora II		E	1.1	2		
G	Austrostipa sp. (grazed ? scrub) IIII II			1.2	30	inadequate to ID to species	
F	Medicago minima IIII		E	1.1	5		
F	Rumex sp (at Plot 2) = R. brownii			1.1	1		
F	Acetosella vulgaris = Rumex acetosella		E	1.1	2		
G	Bethanochloa maritima			1.1	2		
F	Onopordium acanthum		E	1.1	2		
	33						
	34						
	35						
	36						
	37 veg ~65%						
	38 litter ~30% abundant dead standing litter - mainly			Eragrostis			
	39 abundant lichen 5%						
	40 cow pats 0.2 rock 0.2 path 1						

GF Code: see Growth Form definitions in BAM Appendix 1. Identify top 3 dominants in the veg zone. N: native, E: exotic, HTE: high threat exotic.

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, ...

t - tree, m - mallee, s - shrub, g - tussock, h - hummock, d - other, v - sedge (Cyperaceae), r - rush (non-Cyperaceae), f - forb, e - fern, q - tree fern, p - palm, a - cycad, l - vine, k - epiphyte, x - xanthorrhoea.



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400 m <sup>2</sup> plot: Sheet of	Survey Name	Plot Identifier	Recorders
Date 15/1/22	Cooma Polo Flat Stk	B5	JSC

GF Code	Full species name mandatory, or a unique means of identifying separate taxa within a survey. Data from here will be used to assign growth form counts and covers.	N, E or HTE	Cover	Abund	Strat	Vouch
1	<i>Eragrostis curvula</i>		50	>1000		
2	<i>Bromus catharticus</i>		1	>100		
3	<del>Medicago</del> sp (B3) <i>Trifolium gomeratum</i>		0.1	>100		
4	Not stellaria (B3) Unknown B.		0.1	>100		
5	<i>Chryscephalum</i> sp		0.1	20		
6	<i>Rytidosperma</i> sp.		0.4	>100		
7	<del>Poa/Eragrostis 'shoberi'</del> <i>Poa indurata</i>		10	>100		(added to E. curvula)
8	<i>Luzula stipa</i> big		1	>100		
(S) 9	<del>Saint Paul's</del> Unknown C		0.1	>100		
(S) 10	<del>Saint Paul's</del> 'Fleshy' <i>Crassula sieber</i>		0.1	>100		
11	<i>Erechtium cicutarium</i>		0.2	>100		
12	<i>Conyza</i> sp.		0.1	100		
(S) 13	<i>Medicago</i> woolly		0.1	>100		
14	<i>Luzula stipa</i> sp (scabra)		1	>100		
(S) 15	<i>Asperula conferta</i>		0.1	50		
16	<i>Echium</i> (Sage leaf) sp.		0.2	100		
17	<i>Themedia triandra</i>		0.1	30		
18	<del>Poa</del> sp					
19	<i>Trifolium averense</i> sp.		0.2	>100		
20	<i>Bromus</i> sp (chunky seed) <del>verrucosus</del>		0.1	10		
(S) 21	Dry moss creeper (Unknown A)		0.1	20		
22	<i>Hypericum perforatum</i>		0.1	20		
23						
24						
25						
26						
27						
28						
29						
30						
31						
32						
33						
34						
35						
36						
37						
38						
39						
40	<i>Euclyptus</i> ?					

GF Code: see Growth Form definitions in BAM Appendix 1. Identify top 3 dominants in the veg zone. N: native, E: exotic, HTE: high threat exotic.

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, ...

t - tree, m - mallee, s - shrub, g - tussock, h - hummock, d - other, v - sedge (Cyperaceae), r - rush (non-Cyperaceae), f - forb, e - fern, q - tree fern, p - palm, a - cycad, l - vine, k - epiphyte, x - xanthorrhoea.





400 m <sup>2</sup> plot: Sheet 1 of		Survey Name	Plot Identifier	Recorders			
Date	16 / 3 / 22	Polo Flat	Plot 6	EN			
GF Code	Full species name mandatory, or a unique means of identifying separate taxa within a survey. Data from here will be used to assign growth form counts and covers.		N, E or HTE	Cover	Abund	Strat	Vouch
G ✓	1	Eragrostis curvula		10	50		
G ✓	2	Themeda triandra grazed		20	100		
F	3	Trifolium daniellii	E	3	200		
F	4	Aspenia (conferta) 1+		1	20		X
F	5	Eragrostis curvula 1+	E	1	5		
F	6	Pecthragis nortoni (seedlings) 1+		1	50		
F ✓	7	Scleranthus 'diander' 1+ 1+		1	100		X
F	8	Salvia verbenaca	E	1	50		
G	9	Austrospiza bigerivata		5	100		
F	10	Gomphocarpus sp. (1 purple)	E	1	2		
F	11	Chrysanthemum apiculatum 1+ 1+		1	100		
F ✓	12	Geranium sp. (vegetative only) narrow leaf		1	30		NC
F ✓	13	Trifolium sp. (1 glomeratum)	E	5	200		
F	14	Corydalis 'green' = Arenaria leptoclada	E	1	5		X
F	15	Medicago falcata 1+ m. minima	E	DEMO			
F	16	Villadonia sp. 1+ 1+ = V. cuneata var. cuneata		1	10		
F	17	Verbascum thapsus 1+ 1+	E	1	30		
G ✓	18	Rhynchospora sp. (1+ 1+) R. corymbosa		1	100		X
G	19	Bromus catharticus 1	E	1	10		
G	20	Bothriochloa nuda 1+ 1+ 1+		1	50		
F	21	Ranunculus brasiliensis	E	1	10		
F	22	Hypochaeris glabra 1	HTE	DEMO			
F	23	Acaena nova-zelandica 1+		1	5		
G	24	Poa sp. 1+ 1+ 1+ Plots 12 + 4		1	100	inadequate to 10	
F	25	Leurochrysum albidum 1+ 1+ 1+ 1+ 1+ 1+		1	~50		X
F/S	26	Pimelea sp. 1 (veg only)		0.1	1		X
F	27	Plantago lanceolata 1	E	0.1	1		
F	28	Narrow hairy - Plantago hispida		1	20		X
G	29	Austrospiza filix 1+ Austrospiza (sabra) likely		5	100		X
G	30	Anthosacme sabra 1+		0.1	3		X
F	31	Coryza sp. 1	E	0.1	2		
F	32	Tragopogon sp.	E	DEMO			
	33						
	34						
	35						
	36	veg 45%					
	37	includes dead standing grass					
	38	little 30% 5% 10%					
	39	abundant lichen + surface rock					
	40	earth 5%					

GF Code: see Growth Form definitions in BAM Appendix 1. Identify top 3 dominants in the veg zone. N: native, E: exotic, HTE: high threat exotic.

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, ...

t - tree, m - mallee, s - shrub, g - tussock, h - hummock, d - other, v - sedge (Cyperaceae), r - rush (non-Cyperaceae), f - forb, e - fern, q - tree fern, p - palm, a - cycad, l - vine, k - epiphyte, x - xanthorrhoea.



## Appendix B EPBC Act significant impact assessments

The following assessments have been completed using the guideline published by the Commonwealth Department of the Environment, *Matters of National Environmental Significance Significant impact guidelines 1.1*. Each assessment will include a summary of the known area of occurrence, extent of occupancy, and ecology, with additional information included which will be pertinent to the assessment. In-text references will be made in the summary, with information used to answer assessment questions being extracted from the summary.

The following TECs and threatened species will be assessed: *Velleia perfoliata* – observed

- Natural Temperate Grasslands of the South Eastern Highlands – Critically Endangered Ecological Community
- *Leucochrysum albicans* var. *tricolor* (Hoary Sunray) – Endangered Species

As targeted assessments for the above species have been completed, no additional impact assessments were considered necessary. Any threatened species or TECs found to be present after this report has been submitted will require additional impact assessments.

**Figure D.1** shows the mapped distribution of potential Natural Temperate Grassland within 20 km of the subject land (the locality), as well as the known records for *L. albicans* var. *tricolor* within the locality.

It should be noted that “the species” or “the patch” refers to the respective species or TEC of each assessment. It should be also noted that when “the Conservation Advice” is referred to within each assessment, it is referencing the EPBC Act Conservation Advice for the respective species or TEC. The acronym AOO refers to the area of occupancy of a species or TEC, and EOO refers to the extent of occurrence of a species or TEC.

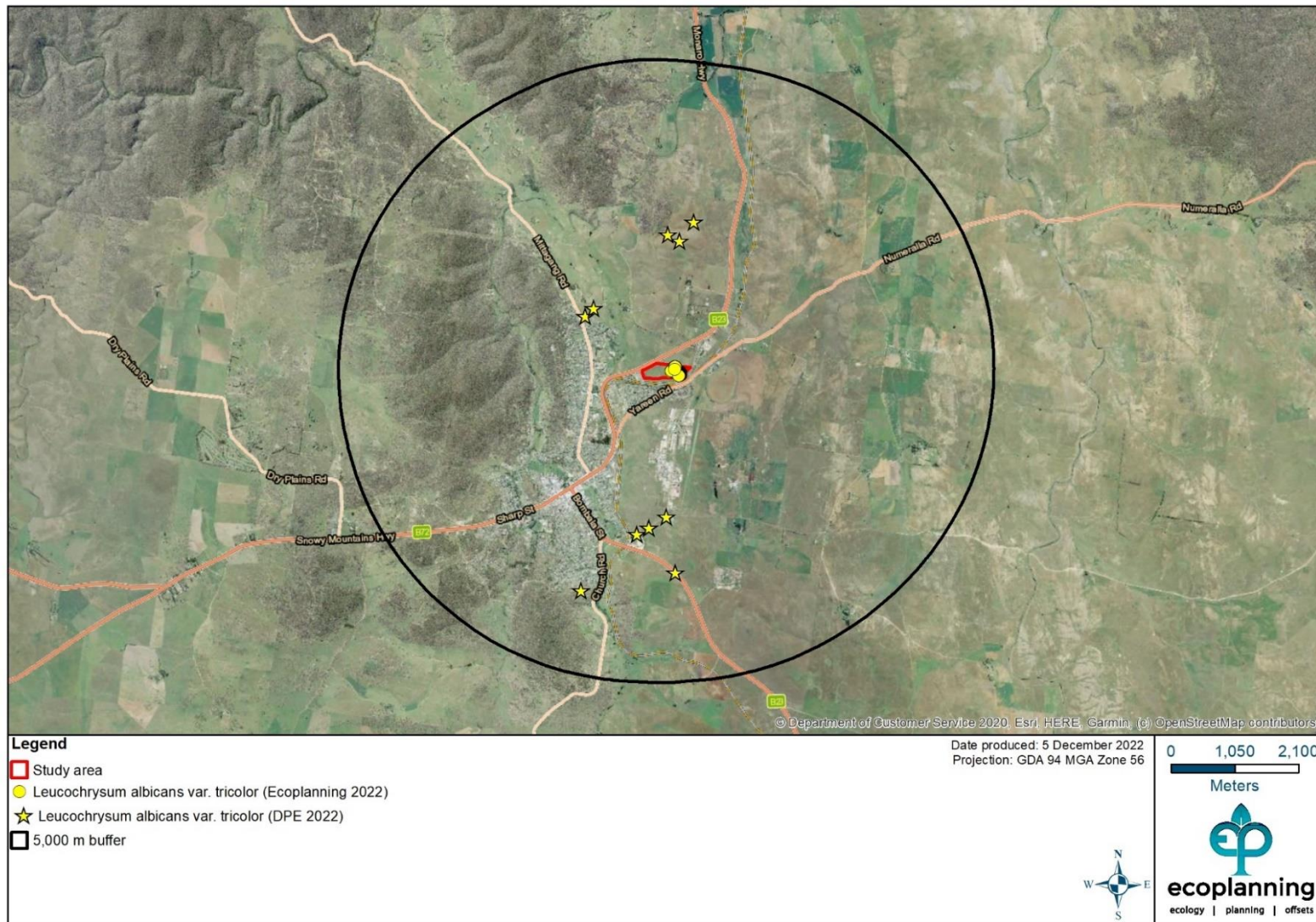
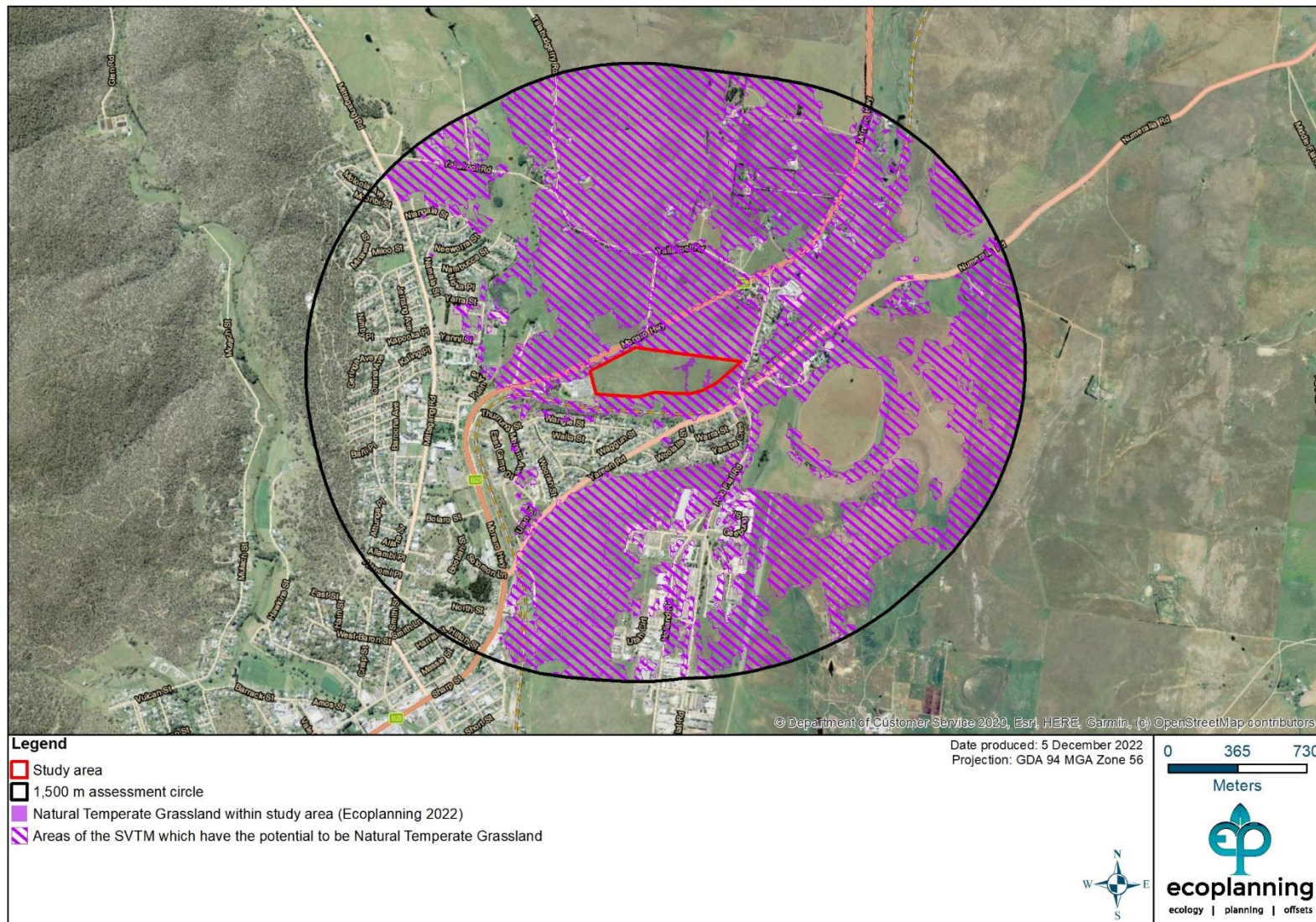


Figure B.1: BioNet records (DPE 2022c) of *Leucochrysum albicans* var. *tricolor* made within 5 km of the subject land in the previous 20 years (from 1 January 2022).





**Figure B.2:** Areas of Natural Temperate Grassland within the subject land, and PCTs mapped by DPE (2022) as being PCTs with the potential of conforming to Natural Temperate Grassland.



## NATURAL TEMPERATE GRASSLANDS OF THE SOUTH EAST HIGHLANDS – CRITICALLY ENDANGERED ECOLOGICAL COMMUNITY

### DESCRIPTION

The Natural Temperate Grassland community can be found in a range of locations, but all are located in the South East Highlands IBRA subregion of Australia. In the Monaro region, the TEC is known from the Monaro plains, which are dominated by soils derived from the local basalt bedrock. This TEC can also be found as far north as Bathurst NSW, and as far south as East Gippsland. In more northern regions of the TECs range, frost hollows and valley floors are important topographic features for its presence.

Although the name of the community implies a tree-less ecosystem, there is an allowance for a small cover of trees (<10% cover). Instead, the dominance of perennial tussock grasses is an important feature of the community. A secondary layer consisting of shorter tussock grasses and annual and perennial forbs is generally present. In seasonally wet areas, the moist influence can cause the establishment of sedges and rushes. Dominant perennial grasses of Natural Temperate Grassland typically include *Themeda triandra*, *Poa sieberiana*, *P. labillardierei*, *Austrostipa bigeniculata*, *A. scabra*, *Bothriochloa macra*, numerous *Rytidosperma* sp. Large tussock grasses typically dominate when grazing pressure is low, with shorter tussock grasses tend to have a greater grazing tolerance. When grazing pressure and soil fertility are high, exotic grasses will tend to dominate.

An example of the TEC from in the subject land is shown in **Plate B.3**.

For the purposes of this assessment, a 1.5 km buffer around the subject land has been used to estimate the potential cover of Natural Temperate Grassland in the local area. Regional vegetation mapping completed by DPE (2022; the State Vegetation Type Map) was used to estimate the distribution of the TEC, with those PCTs which have the potential to conform to the TEC. Additionally, the term “the patch” will refer to 0.7 ha patch of Natural Temperate Grassland identified within the subject land.

Although *L. albicans* var. *tricolor* will be assessed in a separate assessment of significance, it will also be discussed within the assessment of significance for Natural Temperate Grassland, given it was found within the patch of Natural Temperate Grassland, and the conservation discusses that patches of Natural Temperate Grassland which contain rare and/or threatened species be of greater significance than patches without protected or rare species.



**Figure B.3: Top – image of Natural Temperate Grassland of the South Eastern Highlands from within the subject land (Vegetation Zone 1).**

#### **ASSESSMENT**

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

- ***reduce the extent of an ecological community***

Mapping completed by DPE (2022) identifies 474.9 ha of potential Natural Temperate Grassland within the surrounding 1.5 km of the subject land. With the patch of Natural Temperate Grassland in the subject land being 0.7 ha, this represents a clearing of <0.01% of its local extent.

- ***fragment or increase fragmentation of an ecological community, for example by clearing vegetation for roads or transmission lines,***

The patch of Natural Temperate Grassland within the subject land is small (0.7 ha) and isolated (being found within a highly degraded patch of exotic pasture). Given the current isolation and size of the patch within the subject land, and that total clearance of the subject land is proposed, no direct fragmentation of Natural Temperate Grassland will come about from the proposed development.

There is the potential for indirect fragmentation – in the form of a reduction in the movement of propagules or native animals – due to the proposed development. However, given that the landscape is already bisected by several roads (including the Monaro Highway) and that to the north of the subject land the landscape remains unfragmented, this indirect fragmentation is unlikely to impact the local distribution of Natural Temperate Grassland.

- ***adversely affect habitat critical to the survival of an ecological community***

The conservation advice for Natural Temperate Grassland identifies all patches of Natural Temperate Grassland which meet the listing criteria as area critical to the survival of the TEC. Given that the area of VZ1 does conform to the listing criteria of Natural Temperate Grassland, it is considered a patch of vegetation which is critical to the survival of the community.

- **modify or destroy abiotic (non-living) factors (such as water, nutrients, or soil) necessary for an ecological community's survival, including reduction of groundwater levels, or substantial alteration of surface water drainage patterns**

The proposed development will likely cause some minor changes to the local abiotic environment; however, these impacts are likely to be indirect and minor in magnitude and is discussed further in **Table 5.1**.

- **cause a substantial change in the species composition of an occurrence of an ecological community, including causing a decline or loss of functionally important species, for example through regular burning or flora or fauna harvesting**

The patch of Natural Temperate Grassland within the subject land had a native species richness of 16 species, this included seven native grass species, one shrub, and eight native forb species – one of which being an endangered species (*L. albicans* var. *tricolor*). In addition to the population of *L. albicans* var. *tricolor*, a small population of approximately ten *Discaria pubescens* which, although is not a threatened species under either the BC Act or EPBC Act, is considered a rare species which is likely threatened (PlantNet 2022b).

- **cause a substantial reduction in the quality or integrity of an occurrence of an ecological community, including, but not limited to:**

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

Given that the area surrounding the patch within the subject land has been invaded by *Eragrostis curvula*\* (>80% cover in some areas), *Vulpia* spp.\*, and *Avena* spp.\*, the patch is already considered at high risk of invasion of exotic species.

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

As the proposed development will create 151 new dwellings, there is expected to be an increase to the mobilisation of chemical and/or pollutants to the local area. However, this increase is not expected to be detrimental to surrounding patches of Natural Temperate Grassland, given that the proposed development will create residential housing, and not industrial, commercial, or agricultural facilities, which can substantially increase the mobilisation of chemicals and pollutants.

- **interfere with the recovery of an ecological community.**

Given the small size of the patch of Natural Temperate Grassland within the subject land, its low surface area to volume ratio (making it susceptible to edge effects), and its isolation of other patches of Natural Temperate Grassland, the removal of 0.7 ha is not expected to interfere with the recovery of Natural Temperate Grassland in the local area nor nationally.

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

As the proposed development will create 151 subdivisions, there is likely to be the introduction of invasive species. However, this risk of introduction is not likely to be significance in comparison of to the base rate of pest species introduction which is present in the local area as Cooma is a popular destination during holiday periods, and the subject land currently supports a high density of exotic grasses.

## CONCLUSION

Although the removal of the 0.7 ha patch of Natural Temperate Grassland from within the subject land is unlikely to significantly impact the recovery of the TEC nationally, given the level of edge effects which the patch is subject to, the moderate level of species richness and the presence of rare and threatened species (*Discaria pubescens* and *L. albicans* var. *tricolor*) indicate that the patch is of some importance to the conservation of the TEC. As such, it is recommended that the impact of the proposed development on the patch of Natural Temperate Grassland be referred to the Commonwealth Government.



## **LEUCOCHRYSUM ALBICANS VAR. TRICOLOR – ENDANGERED SPECIES**

### **DESCRIPTION**

*Leucochrysum albicans* var. *tricolor* is a small perennial herb is found in south-eastern Australia, with populations in higher elevations across Tasmania, Victoria, and NSW/ACT (**Plate D.8.1**). In NSW it is found in the south-eastern highlands bioregion and is roughly bounded by the towns of Albury, Bega, and Goulburn. It found in a range of grassland and grassy woodland vegetation communities, residing on clay soils or stony soils. The presence of bare ground is important for this species for its germination and development, meaning that areas which have a high coverage of ground cover species, both native and exotic, are unlikely to support *L. albicans* var. *tricolor*. Given that this species has a reliance on bare ground, it can be found in areas of high disturbance such as roadsides and grazed paddocks.

*L. albicans* var. *tricolor* grows to 45 cm in height, has linear to oblong leaves 2-10 cm long and 1-9 mm wide, and is covered in woolly hairs. Flower heads are solitary on slender peduncles 7-15 cm long. The florets of this species are yellow. The inner involucre bracts are white with the outer bracts are white with a purple or brown stripe. *L. albicans* var. *tricolor* differs from *L. albicans* var. *albicans* in that the involucre bracts on *L. albicans* var. *albicans* are yellow, these species have been known to intergrade. *L. albicans* var. *albicans* is an obligate out-breeder, meaning that cross-pollination is required for fertilisation, with the movement of pollen being facilitated by bees (Apidae) and flies (Teprotide) (Berechree 2003, cited in DAWE 2021). The propagules of this species can move over many kilometres and are able to persist in the soil for only a few months (Gilfedder and Kirkpatrick 1994a, 1994b).

It should be noted that most of the research completed on *L. albicans* var. *tricolor* has occurred in Tasmania.

To help assist in determining how large the local population for this species is, BioNet records made within 5 km of the subject land in the past 20 years (i.e., since 1 January 2002) were reviewed. A map of these records is presented in **Figure D.1**. Excluding those records for the species made by Ecoplaning within the subject land, there is a total of ten records for the species, with the nearest being 1.4 km from the subject land (made in May 2003), and the most recent being made in November 2020 (1.7 km from the subject land). Each record identifies 1-100 plants, with the local population totalling 223 plants (excluding the population found in the subject land). It would seem likely that given the area of Natural Temperate Grassland mapped in the surrounding area, that the numbers of *L. albicans* var. *tricolor* is much higher than the records indicate, given the numbers of plants identified in the subject land.



Plate D.8.1: Left – image of *Leucochrysum albicans* var. *tricolor* in flower (image taken May 2022).  
Right – image of whole *L. albicans* var. *tricolor* plant (image taken October 2022).

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

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

The local population for the species includes all ten records for the species within 5 km of the subject land. A reference population at Kuma NR was visited on 23 October 2022 (survey effort not recorded) and was estimated to be several hundred. Although a census of the local population was not undertaken as part of this BDAR, it is assumed that the population within the subject land is one of the more significant in the region. Additionally, the relative dearth of records for the species within 5 km of the subject land (769 in total) suggests that more plants are present but unrecorded. For the purposes of this assessment, the local population for *L. albicans* var. *tricolor* is estimated to be 2,000 individuals.

If the proposed development is to proceed, the local population of the species will be halved, this will likely cause a long-term decrease the population of the species within the locality and will also completely remove a population of the species.

- **reduce the area of occupancy of the species**

Following the Conservation Advice for the species, the AOO was identified to be between 83,600 ha and 181,200 ha, with the Conservation Advice using 137,600 ha as the AOO for its assessment – this area will also be used for this assessment. The Conservation Advice also identifies the EOO to be between 41,718,800 ha and 46,461,800 ha, this is shown in **Figure D.2**. The Conservation Advice for the species also notes that the EOO and AOO for the species is contracting.

Within the subject land, the species polygon (as defined in DPE 2020) for *L. albicans* var. *tricolor* was found to be 0.7 ha (this area was set at the optimal habitat within the subject land, VZ1). This is expected to be the maximum AOO within the subject land. The loss of the maximum AOO for the species within the subject land represents a loss of <0.01% of the maximum possible AOO for the species across its entire range.

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

Records for *L. albicans* var. *tricolor* within 5 km of the subject land appears disjunct, although it is expected that there is some connectivity between individual plants and localised populations. Given that pollination for the species is undertaken by airborne insects (*viz.* native bees and flies) and the propagules for the species are able to disperse over many kilometres, the proposed development is not expected to fragment the local population of *L. albicans* var. *tricolor*. However, the proposed development will completely clear a population of the species, which has the potential to remove genetic diversity from the local population.

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

The conservation advice for *L. albicans* var. *tricolor*, nor does not identify any habitat that is critical to the survival of the species. However, the Conservation Advice does list several features which would likely be found in habitat that is critical to the survival of the species. In NSW and the ACT, that habitat feature is suggested to be patches of the TEC Natural Temperate Grassland.

However, as the Conservation Advice does not list any habitat critical to the survival of the species, then no habitat critical to the survival of the species will be cleared as part of the proposed development.

- **disrupt the breeding cycle of a population**

It is unclear how the removal of 1,184 *L. albicans* var. *tricolor* will impact the breeding cycle of the local population. However, the National Recovery Plan does identify that effects of small population sizes put the species at a moderate to high risk of extinction dependant on the region – although no regions are specified. However, there is the potential for some impacts to the genetic diversity of the local population

Note that the National Recovery Plan for the species references Berechree (2003, cited in DAWE 2021), which could not be accessed for the assessment.

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

The proposed development will remove 1,184 individuals and 0.7 ha of habitat utilised by the species. Although this does not represent an impact that will cause the species to decline at a national scale, nor at a state level (referring to the NSW and ACT population), it will cause a decline to the local population. This is mainly due to the highly localised nature of local populations, as they can require specific regimes of disturbance and/or specific microhabitats.

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

The National Recovery Plan for the species identifies weed invasion as an impact which puts the species at a high risk to extinction. As the population of the species within the subject land is proposed to be cleared, the impacts which may arise due to the introduction of any pest species will be to populations which will remain extant populations. However, there is already a high diversity of exotic species within the area, with species such as *Eragrostis curvula*\*. Therefore, it is unlikely that any new species will increase the risk of extinction, given the risk of extinction is already identified as high.

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

No diseases are known to impact *L. albicans* var. *tricolor*. There is the potential for an unknown species to be introduced to the local area as part of the proposed development,

however, this risk will remain with or without the proposed development as the surrounding area has already been subject to developed.

- ***interfere with the recovery of the species***

The proposed clearing of 1,184 *L. albicans* var. *tricolor* will not significantly impact the species, given the total population is estimated to be in the millions. However, the impact to the local population of *L. albicans* var. *tricolor* and will impact the local recovery of the species. The removal of the local population within the subject land has the potential to reduce the genetic diversity of populations of the species in the surrounding areas which could potentially limit its ability to recover.

### **Conclusion**

The complete removal of a local population of *L. albicans* var. *tricolor* is considered potentially significant and, therefore, a referral to the Commonwealth Minister is recommended.



Indicative distribution of Hoary Sunray  
(*Leucochrysum albicans* subsp. *tricolor*)

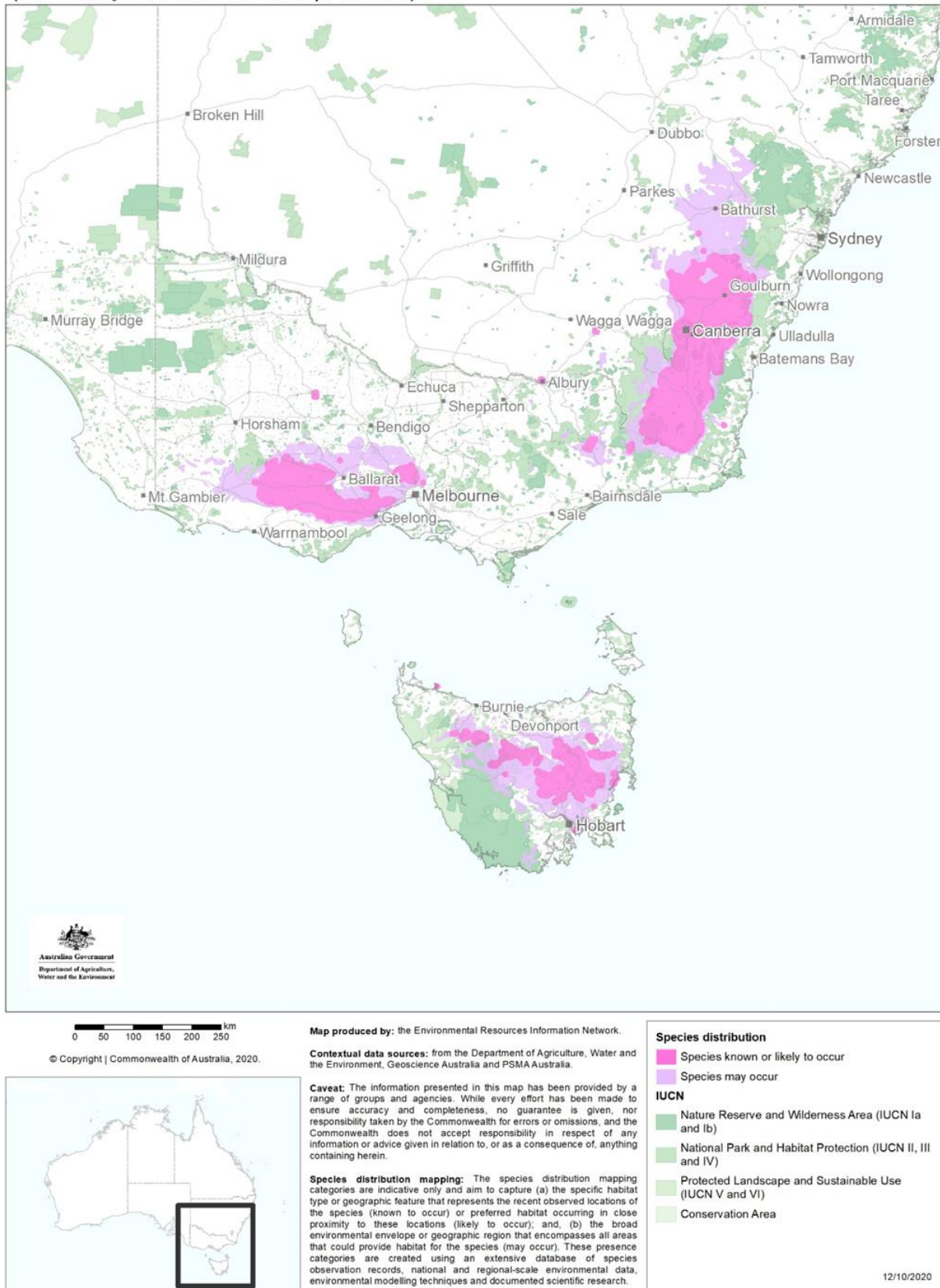


Figure B.4: Screenshot of Map 1 from the EPBC Act Conservation Advice for *Leucochrysum albicans* var. *tricolor*.

## Appendix C BAM calculator credit reports

**Will be added when the report is finalised.**