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Flora and Fauna Assessment

Precinct 2, Polo Flat Road (Lot 2 & 4 // DP 1285072), Cooma, NSW

Proposed subdivision and housing development

Prepared for: Cardno (Stantec)

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PROJECT NAME	Flora and Fauna Assessment			
PROJECT ADDRESS	Precinct 2, Polo Flat Road (Lot 2 & 4 // DP 1285072), Cooma, NSW			
PREPARED FOR	Cardno (Stantec)			
AUTHOR/S	Jai Brien-Cooper			
REVIEW	**Technical**	**QA**	**Version**	**Date to client**
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ECOPLANNING PTY LTD | 74 HUTTON AVENUE BULLI NSW 2516 | P: (02) 4244 2736

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Glossary and abbreviations

Acronym	Description
DPE	NSW Department of Planning and Environment
*	An exotic species
MNES	Matter of National Environmental Significance
BDAR	Biodiversity Development Assessment Report
SVTM	State Vegetation Type Map
TSSC	Threatened Species Scientific Committee
DPE	NSW Department of Planning and Environment
BC Act	NSW *Biodiversity Conservation Act 2016*
EPBC Act	Commonwealth *Environmental Planning and Biodiversity Conservation Act 1999*
VZ	Vegetation Zone
PCT	Plant Community Type
TEC	Threatened Ecological Community
CEEC	Critically Endangered Ecological Community
km/m	Kilometre/metre
ha	Hectare (10,000 m^2), N.B. all area measurements have been rounded to 1 decimal places and are subject to rounding errors.
BOS	NSW Biodiversity Offsets Scheme

1 Introduction

This flora and fauna assessment (FFA) has been prepared to identify and assess the flora and fauna and the likely impacts of future development within Polo Flat Road (Lot 2 & 4 // DP 1285072), Cooma, NSW (**Figure 1.1**), hereafter referred to as the study area. the study area also includes a small area without a Lot and DP number, which is situated between Lots 2 and 4. In total, the study area covers approximately 12.4 ha (12.2 ha for Lot 2, 0.1 ha for Lot 4, and 0.7 ha for the area without a lot and DP number).

This FFA has been completed to support a Review of Environmental Factors (REF) for the proposed development within the study area. As the expected impacts of the proposed development will be documented via under Part 5 of the NSW Environmental Planning and Assessment Act 1979 (EP&A Act) this FFA is considered adequate, assuming that no significant impacts are anticipated. If any significant impacts are considered likely – to a threatened entity (*i.e.,* a vegetation community or species) – to come about, then entry into the biodiversity offsets scheme (BOS) will be required for approval of the proposed development.

This report aims to address the legislative context provided in **Table 1.1**. The findings of this report will inform the proposed subdivision and housing development within the study area.

Table 1.1: Legal framework addressed within this reprot.

Instrument	Considerations	Context
Commonwealth		
Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act)	Matters of National Environmental Significance	An action will require approval from the Minister if the action has, will have, or is likely to have, a significant impact on a matter of national environmental significance.
State (New South Wales)		
Environmental Planning and Assessment Act 1979 (EP&A Act)	Part 5	The proposal requires Development Consent to be granted by Snowy Monaro Regional Council under the provisions of Part 5 of the EP&A Act.

Instrument	Considerations	Context
Biodiversity Conservation Act 2016 (BC Act)	Part 4; Divisions 2 and 5 Part 7	Lists threatened species, populations, ecological communities, and key threatening processes to be considered under Part 7 of the BC Act. Establishes that a proposed development triggers the biodiversity offset scheme if it involves the clearing of native vegetation on land included on the Biodiversity Values Map.
Biosecurity Act 2015	Priority Weeds	Describes the state and regional priorities for weeds in New South Wales.

1.1 Proposal background and description

1.1.1 The study area

The study area is located within the Cooma-Monaro Local Government Area (LGA) and is zoned as "R2 – Low Density Residential" under the Cooma-Monaro Local Environmental Plan 2013 (CMLEP). The study area is composed of predominantly exotic vegetation (*viz*. exotic grasses) with only small patches of native vegetation.

No waterways, as mapped by the Natural Resources Access Regulator (NRAR), are present within the study area. However, one small (<0.1 ha) artificial dam is present in the northwest of the study area.

1.1.2 Description of the proposed development

The proposed project includes the subdivision of the study area into 140 new lots, including housing and parkland. This development will require the total clearance of the study area (**Figure 1.2**).

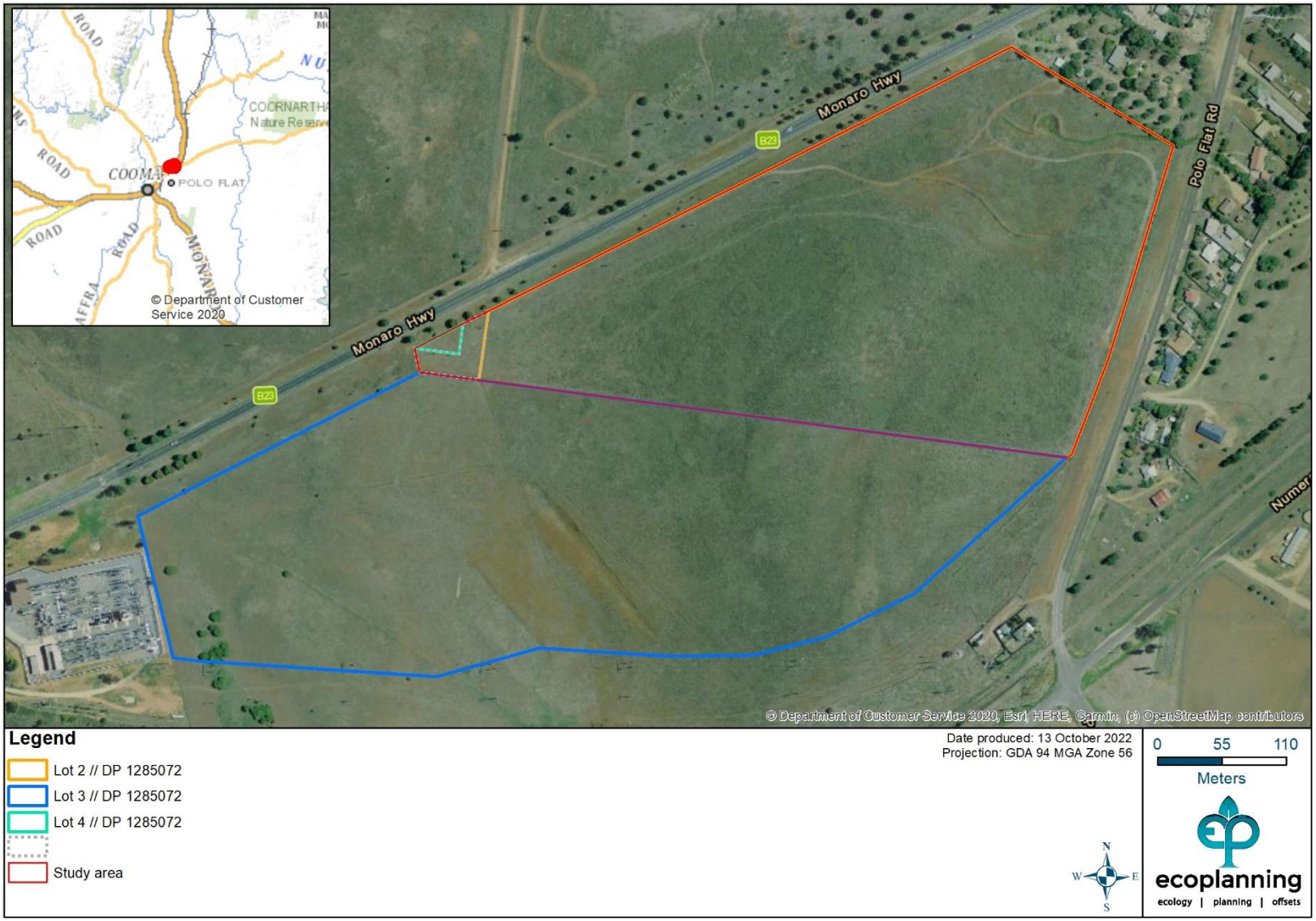

Figure 1.1: Location of the study area

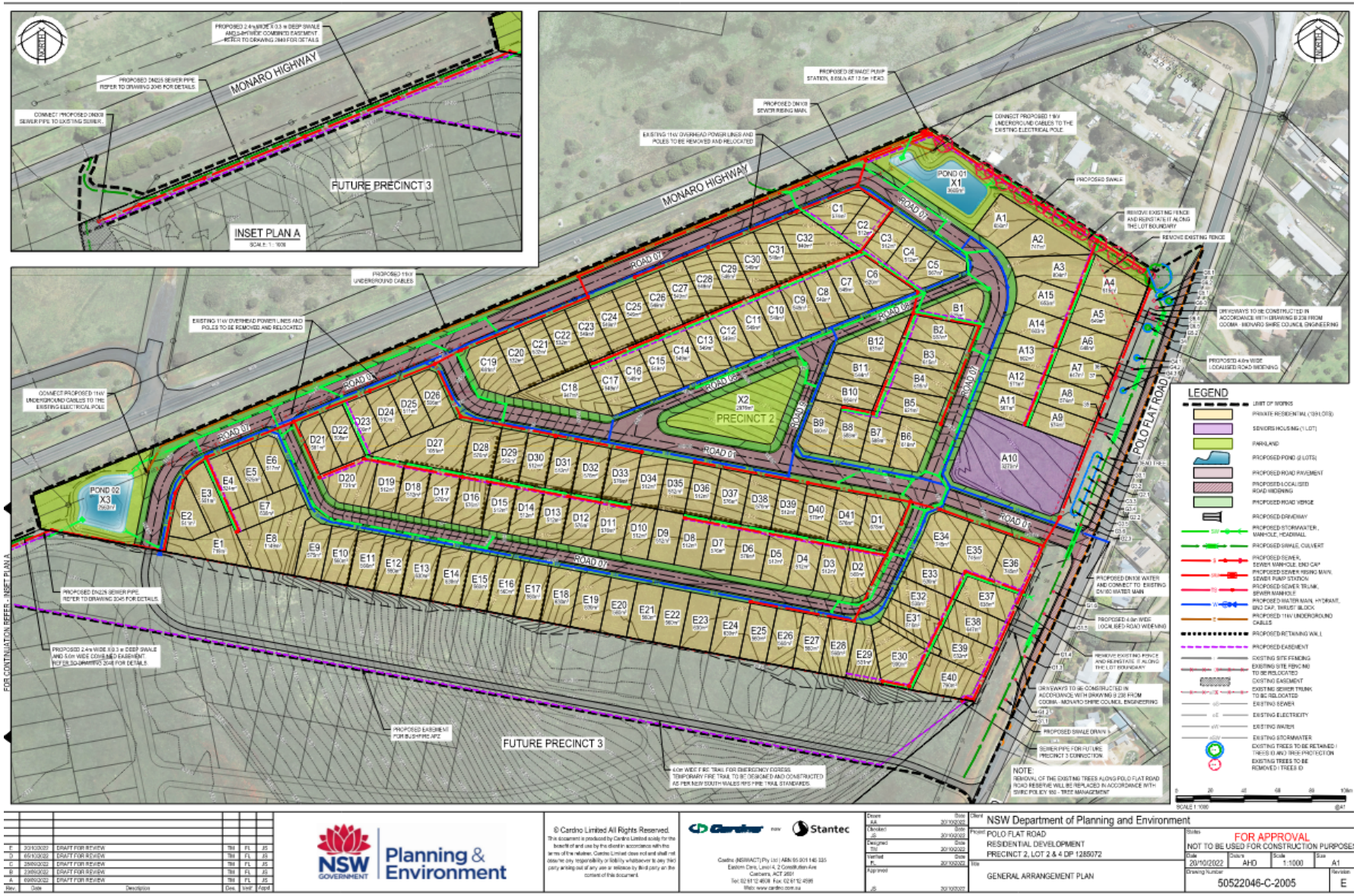

Figure 1.2: Concept plan for the proposed development (received on 7 October 2022).

2 Methods

2.1 Literature and database review

A site-specific literature and database review were undertaken for this report. This included desktop analysis of aerial photography and review of regional scale information from the following sources:

- ePlanning Spatial Viewer (DPE 2022a)
- BioNet Atlas (DPE 2022b)
- Protected Matters Search Tool (DAWE 2022)
- SIX Maps (LPI 2022)
- Biometric Vegetation Compilation (Eco Logical 2015)
- NSW State Vegetation Type Map (DPE 2022c)

2.1.1 Threatened species likelihood of occurrence assessment

Threatened species, populations and migratory species recorded within 5 km of the study area in a search of the BioNet Atlas (DPE 2022b) are typically considered relevant for this assessment, however, a review of the available information indicated there was a relatively low number of threatened species records within 10 km if the study area. In this situation, it was considered necessary to increase the assessment area from 5 km to 10 km. A species likelihood of occurrence was assessed by:

- review of location and date of recent (<5 years) and historical (5-20 years) records (1 January 2002 being the earliest record considered relevant)
- review of available habitat within the study area and surrounding areas
- review of the scientific literature pertaining to each species and population
- applying expert knowledge of each species

Following a review of available habitat within the study area, the potential for each threatened species, population and/or migratory species to occur was considered. The potential of the species, population and/or migratory species to use the study area and to be affected directly or indirectly by the proposed action was identified as either:

- “Recent record” = species has been recorded in the study area within the past 5 years
- “High” = species has previously been recorded in the study area (<5 years ago) or in proximity (for mobile species), and/or habitat is present that is likely to be used by a local population
- “Moderate” = suitable habitat for a species is present onsite but no evidence of a species detected and relatively high number of recent records (5-20 years) in the local area or species is highly mobile
- “Low” = suitable habitat for a species is present onsite but limited or highly degraded, no evidence of a species detected and relatively low number of recent records in the local area
- “Not present” = suitable habitat for the species is not present onsite or adequate survey has determined species does not occur in the study area

2.2 Field survey

A field survey was undertaken on 23 and 24 February 2022 by Jai Brien-Cooper (Field Ecologist), and Sophie Starrett (Consultant Ecologist) and Karen Spicer (Senior Ecologist) on 11 October 2022. This survey consisted of a meander through the study area to determine the distribution of vegetation patches and to identify habitat which may be utilised by native wildlife. **Table 2.1** provides the weather conditions, recorded at a nearby weather station, of each survey day.

Table 2.1: Daily weather observations recorded at Cooma Airport (BOM 2022).

Date	Temp (°C)		Rainfall (mm)	Max wind	
	Min	Max		Direction	Speed (km/h)
23/2/2022	13.2	21.1	2.0	ENE	39
24/2/2022	13.6	24.5	9.8	ENE	43
11/10/2022	1.5	16.3	0.2	NE	37

2.2.1 Vegetation communities and flora

Field survey involved traversing the study area, whilst recording visible flora species and identifying potential habitat for threatened flora species. Areas of intact, resilient vegetation were surveyed more extensively than cleared/degraded areas of the site. Nomenclature follows the Flora of NSW (Harden 1990-2002), and updates provide in PlantNet (RBGDT 2022).

Field survey was undertaken to validate regional vegetation mapping compiled by Eco Logical (2015) and State Vegetation Type Map (2022c). Validated vegetation communities were then checked against the descriptions of threatened ecological communities listed under the BC Act and/or EPBC Act.

2.2.2 Flora and fauna habitat

Opportunistic fauna survey was undertaken for birds, amphibians, reptiles, and mammals, which included recording signs of direct and indirect occupancy (i.e., scats, owl pellets, fur, bones, tracks, bark scratches, foliage chew marks).

Fauna habitat searches were conducted for potential foraging, roosting, breeding or nesting habitat of nocturnal and diurnal species. This includes inspection for the presence of tree hollows, stags, bird nests, possum dreys, decorticating bark, rock shelters, rock outcrops/crevices, mature / old growth trees, food trees (*Banksia* spp., *Allocasuarina* spp., and winter-flowering eucalypts), culverts, dens, dams, riparian areas, and refuge habitats of man-made structures.

Primary sources of literature accessed for species nomenclature and ecology were:

- Birds – Higgins (1990),
- Mammals – van Dyck *et al.* (2013),
- Reptiles and amphibians – Cogger (2018) and Anstis (2013)

2.2.3 Plant community types

In NSW, vegetation communities have been compartmentalised into vegetative units known as plant community types (PCTs). PCTs are defined by a range of characteristics, not only the assemblages of plant species, but also its position in the landscape, soils type, etc. The definitions of PCTs are compiled on the NSW Vegetation Classification (DPE 2022c), with each PCT having a "common name", "scientific name" and PCT ID or number.

To assess the number of potential PCTs which may be present in the study area, mapped PCTs within 1,500 m of the study area were considered.

The most recent vegetation mapping for eastern NSW is 'A revised classification of Plant Community Types for eastern New South Wales' (Connolly et al. in preparation). As part of this state-wide vegetation mapping a new suite of PCTs was created by the DPE, and these new PCTs are identified ID numbers >3000 (e.g., PCT 3415). Many decommissioned PCTs have been amalgamated or divided into the new system, while others have been directly transferred (with the addition of more detailed diagnostic information).

This new PCT nomenclature is not yet in effect for the Biodiversity Offset Scheme, and a deferred commencement period will be in effect for the latter half of 2022. Therefore, for the purposes of this report, the current PCT identification scheme (PCT IDs <3000) will be utilised, with the new scheme being mentioned where relevant.

2.2.4 Survey limitations

The field survey aimed to record as many flora species as possible. However, a definitive list of the flora within the study area cannot be gathered without systematic traverses and survey across several seasons. The techniques used in this investigation are considered adequate to gather the data necessary to validate the vegetation communities and vegetation condition within the study area and assess the likelihood of occurrence of any threatened flora species.

All species recorded were identified to species and sub-species level where possible, however, for some species, such as several grasses and forbs, identification remained conservatively at the genus level when reproductive or other diagnostic material required for full identification was lacking at the time of survey.

A full fauna survey following Threatened Species Survey and Assessment Guidelines (DPIE 2020b) was not undertaken as sufficient detail to determine the likelihood of occurrence of threatened and migratory species for the purpose of this report was achieved through a habitat assessment during the field survey.

3 Results

3.1 Literature and database review

3.1.1 Threatened species and populations, and migratory species

A search of the Bionet Atlas (DPE 2022b) – completed on 1 April 2022 – found 357 records of 31 threatened species are present within 10 km of the study area: one amphibian, 17 birds, three mammals, four reptiles, and six plants (**Figure 3.1**). No records of threatened species or populations, or migratory species have been made in the study in the past 20 years. The nearest record for a threatened species was a population of *Leucochrysum albicans* var. *tricolor* (Hoary Sunray) made by Ecoplanning in May of 2022 approximately 50 m to the south of the study area.

Appendix B presents the likelihood of occurrence for each of these species prior to the study area being assessed. The following seven species were found to have a 'moderate' or greater probability of being present in the study area:

- Animals:
  - Striped Legless Lizard (*Delma impar*) – moderate
  - Speckled Warbler (*Chthonicola sagittata*) – moderate
  - Diamond Firetail (Stagonopleura guttata) – moderate
  - Dusky Woodswallow (*Artamus cyanopterus cyanopterus*) – moderate
  - Scarlett Robin (*Petroica boodang*) – moderate
- Flora:
  - *Calotis glandulosa* (Mauve Burr-daisy) – moderate
  - *Dodonaea procumbens* (Creeping Hop-bush) – moderate
  - *Leucochrysum albicans* var. *tricolor* (Hoary Sunray) – high
  - *Swainsona sericea* (Silky Swainson-pea) – moderate

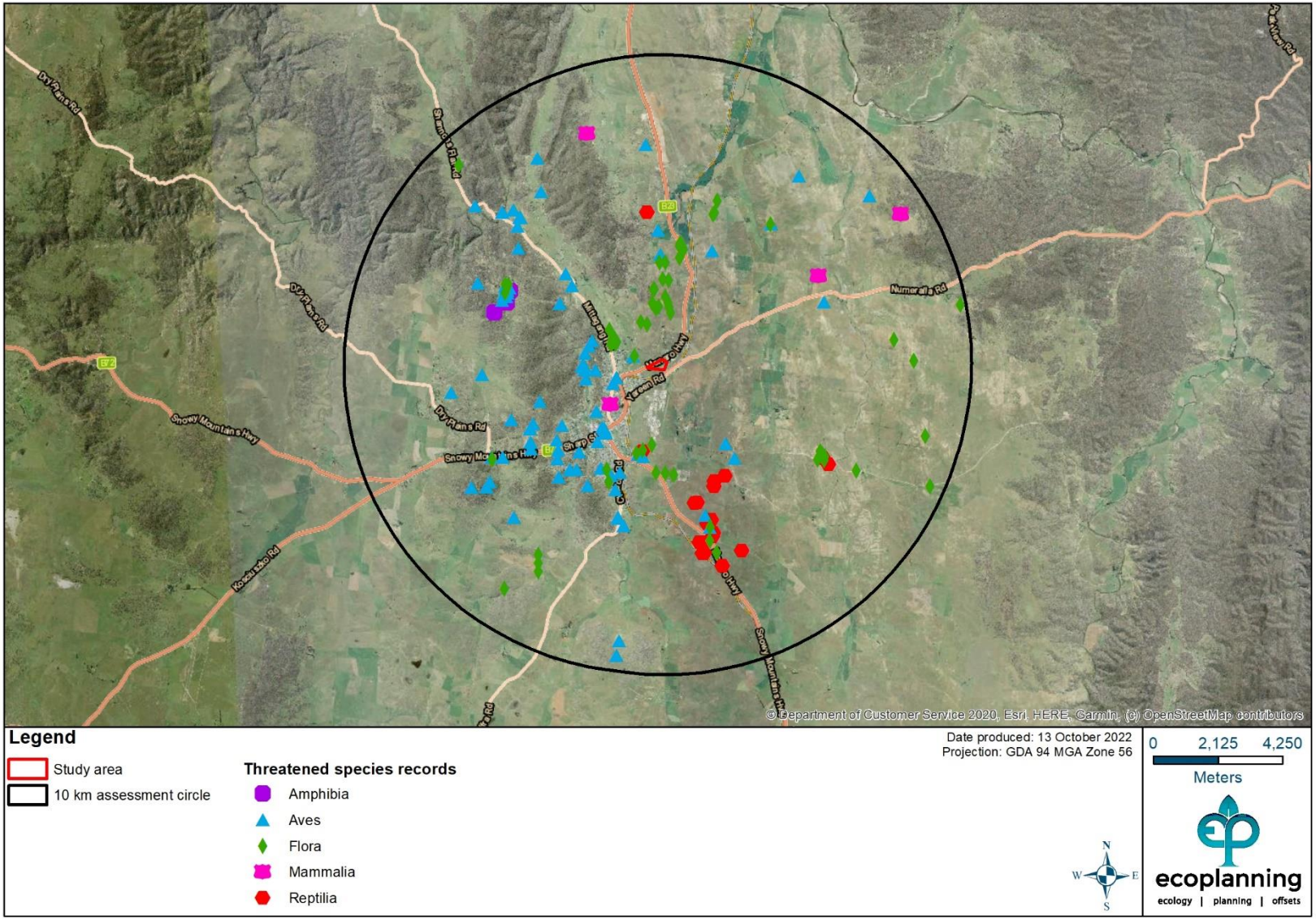

Figure 3.1: Records of threatnened species (organised by Class) within in 10 km of the study area, made in the past 20 years (DPE 2022b).

3.1.2 Plant communities

A review of regional vegetation mapping, within 1.5 km of the study area identified four PCTs, with one PCT – "Wallaby Grass – Regleg Grass – Tall Speargrass – Kangaroo Grass dry tussock grassland (PCT 1289) – being mapped as present in the study area. **Table 3.1** summarises the proximity and distribution of the four PCTs mapped by Eco Logical (2015).

Table 3.1: Summary of the Plant Communtiy Types (PCTs) found within 1,500 m of the study area, from Eco Logical (2015).

PCT name (ID)	Proximity to study area
Wallaby Grass - Red-grass - Tall Speargrass - Kangaroo Grass dry tussock grassland (PCT 1289)	In study area
River Tussock - Tall Sedge - Kangaroo Grass moist grasslands of the South Eastern Highlands (PCT 1110)	In study area
Speargrass grassland of the South Eastern Highlands (PCT 1202)	592 m
Wallaby Grass - Redleg Grass low grassland of the South Eastern Highlands (PCT 1376)	215 m

Following the more recent reclassification of PCTs in NSW, the same review found three PCTs within 1.5 km of the study area, with one PCT – Monaro Snowgrass – Kangaroo Grass grassland (PCT 3414) – being present in the study area. **Table 3.2** summarises the proximity and distribution of the three PCTs mapped by DPE (2022c).

Table 3.2: Summary of the PCTs found within 1,500 m of the study area, from the STVM.

PCT name (ID)	Proximity to study area
Monaro Kangaroo Grass Woodland-Grassland Complex (PCT 3413)	228 m
Monaro Snowgrass-Kangaroo Grass Grassland (PCT 3414)	In study area
Monaro Kangaroo Grass Woodland-Grassland Complex (PCT 3375)	1,471 m

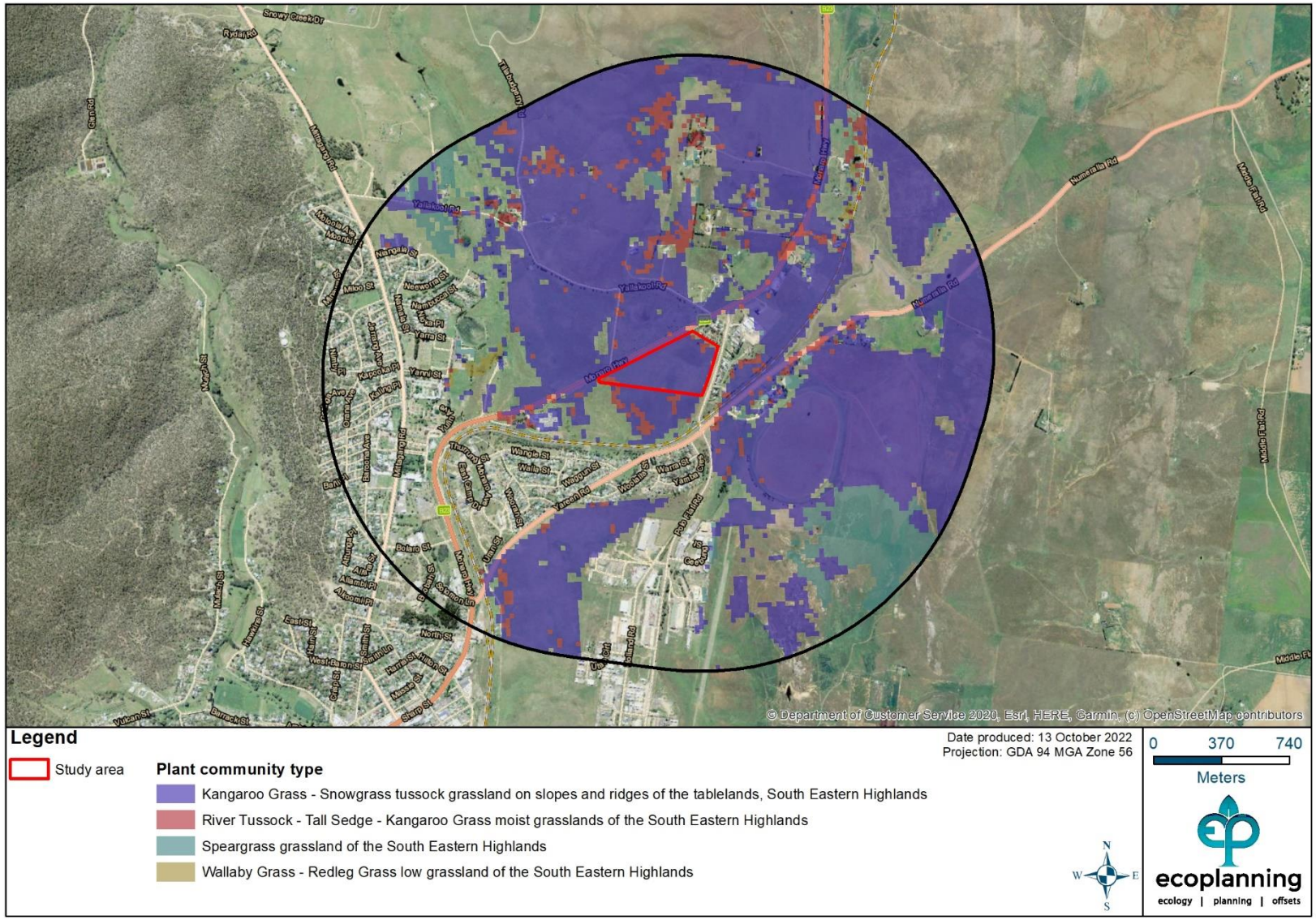

Figure 3.2: Plant Community Types – mapped within 1.5 km of the study area, following Eco Logical (2015).

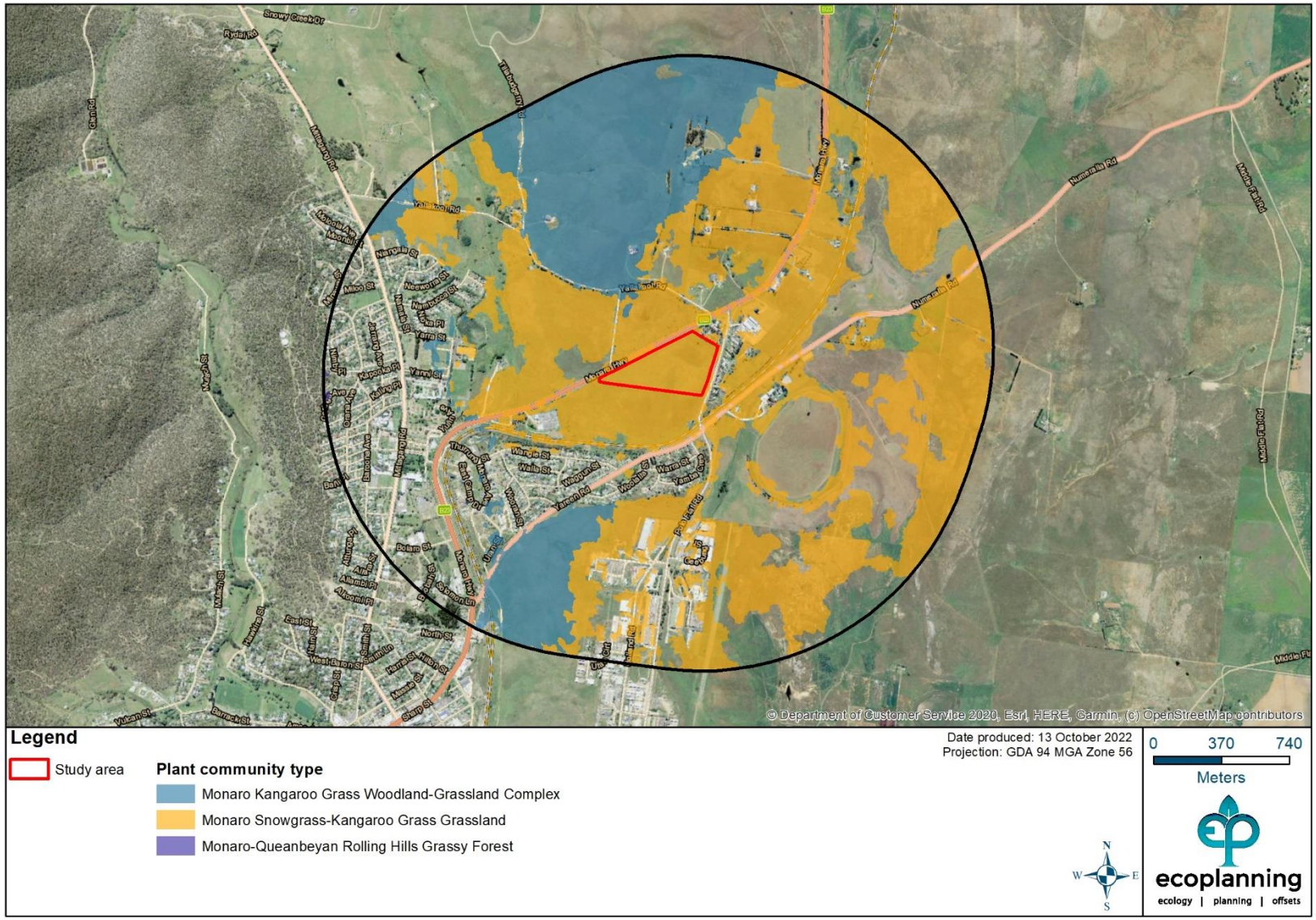

Figure 3.3: Plant Community Types – mapped within 1.5 km of the study area, following the STVM.

3.1.3 Threatened ecological communities

A review of the NSW State Vegetation Type Map and review of the NSW Vegetation Classification found that one of the PCTs (PCT 3414) within the 1,500 m assessment area had the potential to be a TEC. PCT 3414 is equivalent to the TEC "Natural Temperate Grasslands of the Southeastern Highlands", which is listed under the EPBC Act as a Critically Endangered Ecological Community (CEEC).

3.2 Field survey

3.2.1 Vegetation validation

Within the study area, the vegetation was separated into three broad vegetation zones (VZ); degraded PCT 1289 (VZ1), Exotic grassland (VZ2), and artificial dam (VZ3), and exotic trees (VZ4; **Table 3.3**, **Figure 3.4**).

Table 3.3: Vegetation zones found within the study area.

PCT	Vegetation zone	Condition	Area (ha)
Wallaby Grass - Red-grass - Tall Speargrass - Kangaroo Grass dry tussock grassland (PCT 1289)	1	Degraded	0.68
-	2	Exotic grassland	11.71
-	3	Artificial dam	0.02
-	4	Exotic trees	0.02

Figure 3.4: Vegetation zones within the study area.

Table 3.4: A summary of the description of PCT 1289 as found in the NSW Vegetation Classification.

NSW Vegetation Classification summary	
PCT name	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
PCT ID / BVT ID	1289 /
Vegetation formation/class	Grasslands / Temperate Montane Grasslands
Landscape position	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.
Upper Stratum species	Nil.
Mid stratum species	*Kunzea ericoides* (Burgan); *Acacia brownii* (Heath Wattle); *A. dealbata* (Silver Wattle); *A. genistifolia* (Early Wattle); *A. mearnsii* (Black Wattle); *A. rubida* (Red-stemmed Wattle); *Bursaria spinosa* (Native Blackthorn);
Ground stratum species	*Goodenia pinnatifida* (Scrambles Eggs); *Lomandra* spp. (Mat-rush); *Plantago varia*; ***Themeda australis***; *Triptilodiscus pygmaeus* (Common Sunray); ***Vittadinia muelleri***; ***Wahlenbergia* spp.** (Bluebell); *Eryngium ovinum* (Blue Devil); *Austrodanthonia* spp.; *Austrostipa bigeniculata* (Yanganbil); ***Bothriochloa macra*** (Red Grass); *Calocephalus citreus* (Lemon Beauty-heads); ***Chrysocephalum apiculatum*** (Common Everlasting); ***Convolvulus angustissimus***; ***Elymus scaber*** (Wheatgrass, Common Wheatgrass);
Other diagnostic features	Mid-dense tall tussock grassland. Occurs in dry locations, though not in the dry rainshadow of the Monaro.
Percent cleared	57%
TEC names	Listed EPBC Act, CE: Natural Temperate Grassland of the South Eastern Highlands (Equivalent)
Source	

Vegetation zone 1 – PCT 1289 – Degraded

Vegetation zone 1 (VZ1) occupied a small 0.68 ha strip of land on the eastern boundary of the study area (**Figure 3.4**; **Plate 3.1**). Over half of VZ1 was dominated by exotic species, *viz. Eragrostis curvula** (African Lovegrass) and *Hypericum perforatum** (St. john's Wort). The commonest native species in VZ1 was *Bothriochloa macra*, having a total cover of <30% within

this zone. Other native grasses included *Austrostipa bigeniculata* and *Rytidosperma* spp. (Wallaby Grasses). Although not dominant in this vegetation zone, some non-grass ground cover species were recorded, including: *Vittadinia muelleri, Galium angustifolium* (Narrowleaf Bedstraw), *Euchiton sphaericus* (Star Cudweed), and *Wahlenbergia* spp. (Bluebells).

Generally, the native diversity was higher in areas which lacked *Eragrostis curvula**. These patches were small, being less than 20 m × 20 m, and approximately three in number. *Eragrostis curvula** remained dominant within these patches.

No trees or shrubs were recorded in this vegetation zone.

For a point of comparison, the description of PCT 1289 (from BioNet) is summarised in **Table** 3.4.

Plate 3.1: Photograph of vegetation zone 1.

Vegetation zone 2 – Exotic grassland

Vegetation zone 2 (VZ2) covered the majority of the study area (11.71 ha; **Figure 3.4**; **Plate 3.2**). It was present in a highly degraded state, being dominated by *Eragrostis curvula** – covering approximately 80% of VZ2. Although VZ2 was highly degraded, it is expected that, given that surrounding areas have been found to conform to PCT 1289, VZ2 in the study area was likely PCT 1289 before disturbance. Scattered throughout VZ2 were small patches which were characterised by a scattering of surface stones and a dominance of *Hypericum perforatum**. As these areas were relatively small, and in a degraded condition, they were included in VZ2.

The assemblage of native species across VZ2 was relatively homogenous. Native grasses included *Bothriochloa macra*, *Austrostipa aristiglumis* (Plains Grass), *A. ramosissima* (Stout Bamboo Grass), *Digitaria brownii* (Cotton Panic Grass), and *Panicum effusum* (Hairy Panic Grass). Native non-grass species included *Euchiton sphaericus, Daucus glochidiatus* (Native Carrot), and *Convolvulus angustissimus*.

Plate 3.2: Photograph of vegetation zone 2.

Vegetation zone 3 – Farm dam

One small, artificial farm dam (0.02 ha) was located in the north of the study area (**Figure 3.4**; **Plate 3.3**). Some aquatic and emergent vegetation was located around the edges of the dam.

Plate 3.3: Farm dam.

Vegetation zone 4 – exotic trees

This vegetation zone runs the length of the northern border of the study area, is formed of a canopy of exotic hedge trees, likely *Cupressus* sp.* (**Plate 3.4**).

Plate 3.4 Image of the *Cupressus sempervirens forming VZ4.**

3.2.2 Threatened ecological communities

One PCT within the study area (PCT 1289) has the potential to conform to the description of the TEC Natural Temperate Grasslands, which is listed under the EPBC Act as a critically endangered ecological community (CEEC).

To be considered part of Natural Temperate Grassland under the EPBC Act, the vegetation patch must conform to the requirements set out in the conservation advice for Natural Temperate Grassland approved by the Commonwealth Threatened Species Scientific Committee (Comm. TSSC; 2011). Firstly, the vegetation must conform to the key diagnostic characteristics. Secondly, patches that meet the key diagnostic characterises must also meet a minimum condition threshold.

With regards to the study area, each vegetation zone of PCT 1289 will be assessed as an individual patch, as each vegetation zone has sufficient differences to be separated for assessment and each is larger than the minimum size required to be considered a patch of Natural Temperate Grassland (0.01 ha).

According to EPBC Act any patches which conform to the TEC Natural Temperate Grassland require a significant impact assessment according to *Significant Impact Guidelines 1.1 – Matters of National Environmental Significance*, as published by Commonwealth Threatened Species Scientific Committee (Comm. TSSC; 2016a), to determine if the proposed impact is likely to be significant. If the impact to patches of Natural Temperate Grassland within the study area is considered significant, then a referral is recommended.

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 all be satisfied (following Section 1.5.1 of the Conservation Advice):

a. The patch is found within the NSW Western Slopes, South East Corner, or Sydney Basin Bioregions,
b. The site is found between 250 m and 1,200 m above sea level,
c. Be dominated by native grasses and include one or more of the following species: *Themeda triandra, Poa sieberiana, P. labillardierei, P. meionectes* (Short Snowgrass), *Austrostipa bigeniculata, A. scabra, A. densiflora, Bothriochloa macra, Rytidosperma spp., Eragrostis* spp*., Dichelachne* spp. (Plume Grasses), *Anthosachne scaber, Panicum effusum* (Hairy Panic), *Chloris truncata* (Windmill Grass), *Enneapogon nigricans* (Nine-awn Grass), *Carex appressa* (Tussock Sedge), *C. bichenoviana* (Plains Sedge), and *Lachnagrostis* spp. (Blowngrasses).
d. Typically, there is a range of native forb species present that are sufficient to re-establish the character of native groundcover.
e. A tree or shrub layer may be present with a cover of <10%,
f. The area is not a derived grassland or secondary grassland.

Neither VZ1 nor VZ2 conform to all the key diagnostic characteristics of Natural Temperate Grassland as both fail to conform to characteristic “c”. VZ1 has a higher proportion of native grasses than VZ2, however it is still not “dominated” (*i.e.,* native grasses have a higher combined cover than exotic speices) by one or more of the native grasses listed in

characteristic "c". The definition for dominance used in this assessment follows the condition class assessment of Natural Temperate Grassland; *the percentage cover of native vascular plants (including annual and perennial species) in the patch is greater than the percentage cover of perennial exotic species*. Although some areas of VZ1 did have a greater proportion of native vascular plants to perennial exotic plants, this could not be said for the entirety of VZ1. Overall, VZ1 was still dominated by *Eragrostis curvula**.

Conclusion

Based on the above assessment, no vegetation zones within the study area conformed to the key diagnostic characteristics and therefore no vegetation zones area considered to be Natural Temperate Grassland.

3.2.3 Threatened species observed

During the surveys of the study area, one threatened species – the Gang-gang Cockatoo (*Callocephalon fimbriatum*) – was observed flying outside the study areas boundary. In addition, a population of approximately 40-100 *Leucochrysum albicans* var. *tricolor* was observed within the lot immediately to the south of the study area. No *Leucochrysum albicans* var. *tricolor* were observed in the study area, however, potential habitat for the species is likely to be present.

Likelihood of occurrence

Following the surveys of the study area, a likelihood of occurrence analysis was completed for the species identified in **Section 3.1.1**. This assessment incorporated data collected during the survey which included potential habitat. The species which scored a likelihood of occurrence of "Moderate" or greater are presented in **Table 3.5**, which also includes the rationale for their post survey likelihood of occurrence.

Table 3.5: Threatened species with a post survey likelihood of occurrence of "Moderate" or greater, including the rationale for the likelihood of occurrence.

Species	Likelihood of occurrence post survey	Rationale
Striped Legless Lizard (*Delma impar*)	Moderate	Potential habitat across much of the study area.
Gang-gang Cockatoo (*Callocephalon fimbriatum*)	Moderate	Potential foraging habitat in VZ4.
Diamond Firetail (*Stagonopleura guttata*)	Moderate	Mobile nature of the species and the proximity of recent records
Dusky Woodswallow (*Artamus cyanopterus cyanopterus*)	Moderate	Mobile nature of the species and the proximity of recent records

Species	Likelihood of occurrence post survey	Rationale
Leucochrysum albicans var. tricolor (Hoary Sunray)	High	The proximity of the study area to a known population and the high possibility of there being a viable seedbank for the species
Calotis glandulosa (Mauve Burr-daisy)	Moderate	Potential habitat found within VZ1.
Swainsona sericea (Silky Swainson-pea)	Moderate	Potential habitat found within VZ1.

Dodonaea procumbens previously had a likelihood of occurrence of "moderate" however, the field survey completed on 23 and 24 February 2022, determined that this species was not present in the study area.

In addition, previous surveys by Ecoplanning identified a population of *Leucochrysum albicans* var. *tricolor* approximately 40 m to the south of the subject land. At the time of reporting, this population had not been fully assessed, however, initial estimates indicated that it was approximately 40-100 in number. This assessment will be documented via a Biodiversity Development Assessment Report Ecoplanning (in. prep). Although no *Leucochrysum albicans* var. *tricolor* were found within the study area, the likelihood of occurrence will remain "High" given the proximity of the known population to the study area, and the possibility that there is a viable seedbank for the species within the study area.

Decreased likelihood of occurrence

Following the survey of the study area, it was found that the following species had their likelihood of occurrence reduced, from a "moderate" or greater to "Low". Table 3.6details the species where this result occurred, and the rational for the decreased likelihood.

Table 3.6: Threatened species which had their likelihood of occurrence decrease to "Low" based on the findings of the field survey.

Species	Likelihood of occurrence pre survey	Rationale
Dodonaea procumbens (Creeping Hop-bush)	Moderate	This species exclusively inhabits rocky outcrops, which are not present in the study area.
Speckled Warbler (*Chthonicola guttata*)	Moderate	Although this species can inhabit grasslands and farmland, it requires the grassy habitat to be adjoining to wooded areas, which is not present in the vicinity of the study area.

Species	Likelihood of occurrence pre survey	Rationale
Scarlet Robin (*Petroica boodang*)	Moderate	An important component of this species habitat is a complex understory which includes fallen logs and shrubs, neither of which are present in the study area.

4 Impact assessments

This section outlines the potential direct and indirect impacts of the proposed development on ecological values within the study area.

4.1 Direct impacts

Direct impacts associated with the proposed subdivision and development of the study area includes the clearing of native and non-native vegetation. In total, 12.4 ha will be cleared.

4.1.1 Vegetation clearing

For the proposed development to proceed, 12.4 ha of vegetation will be required to be cleared. The majority of this (11.5 ha) is dominated by *Eragrostis curvula** (VZ2). Approximately 0.6 ha of VZ2 is present in a matrix of native and non-native grassland. However, overall, *Eragrostis curvula** is the dominate species. Only VZ1 could be identified as a PCT (PCT 1289), although this vegetation zone was also in a highly degraded state. A number of *Cupressus* sp.* trees, forming VZ4, will need to be felled as part of the proposed development (accounting for 0.02 ha).

In addition, a small artificial farm dam will need to be cleared (<0.1 ha).

4.1.2 Loss of fauna habitat

Within the study area three broad fauna habitat types are present. Firstly, the study area is dominated by exotic grassland, which may provide habitat for some native fauna, such as native reptiles, mammals, invertebrates, and birds. Secondly, the small farm dam may be habitat for some native aquatic fauna, such as turtles, frogs, birds, and aquatic macro invertebrates. Thirdly, forming VZ4inlcudes a number of exotic trees. These trees can be potential nesting habitat for some native birds (no hollows were found in these trees), these trees may also be secondary foraging habitat for native birds (particularly members of Psittacidae).

4.2 Indirect impacts

It is difficult to quantify indirect impacts of the proposed development, but these may include impacts such as erosion and sediment wash, accidental damage to vegetation from construction plant and machinery, noise and dust and the spread of invasive weeds. Given the already highly modified nature of the study area and surrounds, indirect impacts from the proposal are considered to be relatively minor and, with appropriate controls in place through the development and implementation of a site-specific Construction Environmental Management Plan (CEMP), have a very low likelihood to occur outside of the study area.

4.3 Avoidance and mitigation

4.3.1 Impacts to native vegetation

The potential impacts of the proposal can be minimised and mitigated by adhering to the following recommendations:

- Erosion and sediment control measures will be established before work begins and maintained in effective working order throughout the duration of the works, and until the study area has been stabilised, to prevent off - site transport of eroded sediments. Any exotic vegetation removed from the study area will be disposed of at an approved facility.
- Treatment and disposal of any exotic flora present within the study area.

4.3.2 Clearing protocols

Felling exotic trees

As the exotic trees may be habitat for some native birds, a protocol should be put in place to mitigate any impacts which may come about. these mitigation measures should follow:

Prior to felling, all trees should be inspected by an ecologist to determine if any native birds are nesting within them. If no birds are found to be nesting, then felling can procced without supervision of an experienced ecologist. If birds are found to be nesting, then the felling should cease until the chicks have fled the nest. Once the nest is unoccupied, felling can continue.

Farm dam

As the artificial dam may be habitat for native fauna – particularly fishes and reptiles – a protocol should be put in place to mitigate any impacts that draining of the dam may have:

1. The dam should be drained to approximately ¼ of its capacity (the ecologist need not be present for this step),
2. Under a suitably qualified ecologists' supervision, the remaining ¼ of the dam is to be drained,
3. Any native fauna recovered is to be housed in suitably sized storage contains and relocated to a nearby, permanent, waterbody, once the dam is drained.
4. Any exotic fauna should be humanely euthanized.

The "suitably qualified ecologist" noted above should have a tertiary degree in biology (or equivalent) and should have experience in handling native fauna.

4.3.3 Weed management

All non-native flora should be disposed of at an appropriate waste management facility.

4.4 Legislative context

4.4.1 Commonwealth *Environmental Protection and Biodiversity Conservation Act 1999*

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 national environmental significance" is defined as a "controlled action", and requires approval from the Commonwealth Department of Agriculture, Water, and the Environment (DAWE) who are responsible for administering the EPBC Act.

Threatened species

No threatened species, listed under the EPBC Act were identified in the study area. However, immediately to the south of the study area there is a population of *Leucochrysum albicans* var. tricolor which is an Endangered species under the EPBC Act. In addition, there is potential habitat for the Striped Legless Lizard within the study area. Given that both species have a moderate or greater likelihood of occurring in the study area, the EPBC Act Significant Impact Criteria (SIC) were applied to these species (**Appendix D**). The results of these assessments were that the proposed development is unlikely to have any significant impact on any species.

Threatened ecological communities

No threatened ecological communities were identified within the study area.

Significant impact assessments

The following species, protected by the EPBC Act, were considered to have a "moderate" or greater likelihood of occurring within the study area (**Appendix B**):

- *Leucochrysum albicans* var. *tricolor* (Hoary Sunray) – Endangered,
- *Calotis glandulosa* (Mauve Burr-daisy) – Vulnerable, and
- Striped Legless Lizard (*Delmar impar*) – Vulnerable.
- Gang-gang Cockatoo (*Callocephalon fimbriatum*) – Vulnerable

Each species was assessed against their respective test (separate tests being used for Vulnerable, Endangered, and Critically Endangered species) and are presented in **Appendix D**. the proposed development is not expected to have a significant impact (worthy of an MNES referral) on any of the above threatnened species.

4.4.2 NSW *Biodiversity Conservation Act 2016*

Threatened species

No threatened species, listed under the BC Act, were identified within the study area. However, following the likelihood of occurrence analysis undertaken (**Appendix B**), it was identified that five threatened species have a "moderate" or greater likelihood of occurring in the study area:

- Striped Legless Lizard (*Delma impar*) – Vulnerable
- Diamond Firetail (*Stagonopleura guttata*) – Vulnerable
- Dusky Woodswallow (*Artamus cyanopterus cyanopterus*) – Vulnerable
- Gang-gang Cockatoo (*Callocephalon fimbriatum*) – Vulnerable
- *Calotis glandulosa* (Mauve Burr-daisy) – Vulnerable
- *Swainsona sericea* (Silky Swainson-pea) – Vulnerable

Threatened ecological communities

No threatened ecological communities were present within the study area.

Significant impact assessments

The following species listed under the BC Act have had significant impact assessments (5 Part Tests) completed:

- Striped Legless Lizard (*Delma impar*) – moderate
- Diamond Firetail (*Stagonopleura guttata*) – moderate
- Dusky Woodswallow (*Artamus cyanopterus cyanopterus*) – moderate
- Gang-gang Cockatoo (*Callocephalon fimbriatum*) – moderate
- *Calotis glandulosa* (Mauve Burr-daisy) – moderate
- *Swainsona sericea* (Silky Swainson-pea) – moderate

No threatened species, protected by the BC Act and who had a likelihood of occurrence of "Moderate" or greater, was found to be significantly impacted by the proposed development (**Appendix C**). Given that no threatened species – protected under the BC Act – were found to be significantly impacted by the proposed development, entry into the NSW Biodiversity Offsets Scheme is not required (see **Section 4.4.3**).

4.4.3 NSW *Environmental Planning and Assessment Act 1979*

Part 5

Typically, a proposed development is assessed under Part 4 of the EP&A Act, which requires the following thresholds (outlined in Part 5 of the NSW Biodiversity Conservation Regulation) to be considered:

- **Clearing thresholds** – clearing greater than the ratio of minim lot size to area of clearing, as stated in section 7.2 of the BC Reg,
- **Significant Impacts** – whether the proposed development will have significant impacts on threatnened entities listed under the NSW BC Act, or
- **Biodiversity Values Map** – if any part of the proposed development will directly impact area identified on the NSW biodiversity values map (DPE 2022).

If the proposed development exceeds any one of these thresholds, then entry into the NSW Biodiversity Offsets Scheme is required, and assessment of the potential impacts must be completed via a report which follows the NSW Biodiversity Assessment Method (DPE 2020).

In contrast, if a proposed development is to be assessed under Part 5 of the EP&A Act, then only the significant impacts threshold is necessary for entry into the BOS. If significant impacts to any threatened entities are not expected to arise, then assessment of the proposed development may be completed via an FFA.

No TECs were present within the study area, and no 5 Part Tests were completed for any TECs. However, 5 Part Tests have been completed for all the threatened species considered to have a "Moderate" or greater likelihood of occurring within the study area. Based on the 5 Part Tests – completed in **Appendix C** – it was found that the proposed development would not have any significant impacts on any of the threatened species assessed. Following these conclusions, this FFA is considered to be an adequate review of the proposed impacts to biodiversity within the study area.

4.4.4 State Environmental Planning Policy (Biodiversity and Conservation) 2021

Chapter 4 – Koala Habitat Protection 2021

This chapter of the State Environmental Planning Policy (Biodiversity and Conservation) 2021 aims to conserve habitat which is, or may be, utilised by Koala. Although the study area cannot be identified as "Exempt land" (see 4.6 of the SEPP) the study area is not potential Koala habitat, as no native trees are present in the study area, and it cannot be considered as potential Koala habitat.

4.4.5 NSW Biosecurity Act 2015

Several exotic species were identified within the study area. Following the NSW *Biosecurity Act 2015,* specific control measures may need to be put in place. **Table 4.1** summarises the level of threat for each exotic species found within the study area and the required control measures which may be required for each species.

Table 4.1: Dominant weeds identified within the study area, and their relation to the NSW *Biosecurity Act 2015.*

Species	WoNS[1]	Biosecurity duty
*Eragrostis curvula** African Lovegrass	No	• **General Biosecurity Duty** • **South East specific** Regional Recommended Measure (for Regional Priority - Asset Protection). Land managers reduce impacts from the plant on priority assets.
*Lycium ferocissimum** African Boxthorn	Yes	• **General Biosecurity Duty**
Hypericum perforatum St. Johns Wort	No	• **General Biosecurity Duty**
Conyza spp. Fleabane	No	• **General Biosecurity Duty**

[1] WoNS – Weed of National Significance

5 Conclusions and recommendations

The proposed development for the study area includes a subdivision of the study area into 140 new housing lots, park land, and access roads. To complete the proposed development, total clearance of the study area will be required.

Very little native vegetation occurs in the study area. Approximately 80% of the study area was dominated by *Eragrostis curvula**. Some native species were present, being mostly restricted to small patches within an area in the northeast of the study area (VZ1). This small area was approximately 0.68 ha; however, it was still dominated by *Eragrostis curvula**. The native species within VZ1, although not dominant, could be identified as conforming to the PCT "Wallaby Grass - Red-grass - Tall Speargrass - Kangaroo Grass dry tussock grassland" (PCT 1289). PCT 1289 has the potential to conform to a threatened ecological community (TEC) – Natural Temperate Grassland – however, this TEC was not present within the study area due of the dominance of the exotic grass *Eragrostis curvula**.

No threatened species were found within the study area. A likelihood of occurrence completed indicated that *Leucochrysum albicans* var. *tricolor* was the most likely to occur within the study area, as a population of approximately 40-100 plants occurs immediately to the south of the study area. Six additional threatened species – two plants, three birds, and one reptile – were also found to have a moderate or greater likelihood of occurring within the study area. Both BC Act and EPBC Act significant impact assessments were completed for each threatened species (where required), and it was found that the proposed development would not have a significant impact on any species.

Proposed developments assessed under Part 5 of the EP&A Act (such as the proposed development), need only considered the significant impacts threshold for entry into the BOS. As no significant impacts to threatened entities – listened under the BC Act – are anticipated to come about from the proposed development, the NSW Biodiversity Assessment Method has not been applied, and the assessment of impacts to biodiversity documented in this FFA are considered adequate.

A number of mitigation measures have been provided, each should be implemented, where relevant, to minimise the impacts to native biodiversity.

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Appendix A Flora recorded within the study area

Family	Scientific Name	Common name	Native/Exotic
Amaranthaceae	*Alternanthera* spp.	Joyweed	Native
Apiaceae	*Daucus glochidiatus*	Native Carrot	Native
Asteraceae	*Centaurea calcitrapa*	Star Thistle	Exotic
	Chrysocephalum apiculatum	Common Everlasting	Native
	Conyza spp.	A Fleabane	Exotic
	Euchiton sphaericus	Star Cudweed	Native
	Gamochaeta spp.		Exotic
	Lactuca serriola	Prickly Lettuce	Exotic
	Vittadinia muelleri	A Fuzzweed	Native
Campanulaceae	*Wahlenbergia spp.*	Bluebell	Native
Clusiaceae	*Hypericum perforatum*	St. Johns Wort	Exotic
Convolvulaceae	*Convolvulus angustissimus*		Native
Cupressaceae	*Cupressus* sp.	A Cypress	Exotic
Cyperaceae	*Cyperus eragrostis*	Umbrella Sedge	Exotic
Fabaceae (Faboideae)	*Trifolium angustifolium*	Narrow-leaved Clover	Exotic
Plantaginaceae	*Plantago* spp.	Plantain	Native
Poaceae	*Austrostipa aristiglumis*	Plains Grass	Native
	Austrostipa bigeniculata	Yanganbil	Native
	Austrostipa verticillata	Slender Bamboo Grass	Native
	Avena fatua	Wild Oats	Exotic
	Bothriochloa macra	Red Grass	Native
	Digitaria brownii	Cotton Panic Grass	Native
	Eragrostis curvula	African Lovegrass	Exotic
	Panicum effusum	Hairy Panic	Native
	Rytidosperma spp.		Native
Polygonaceae	*Rumex* spp.	Dock	Native
Rosaceae	*Acaena novae-zelandiae*	Bidgee-widgee	Native
Rubiaceae	*Galium* spp.		Native
Solanaceae	*Lycium ferocissimum*	African Boxthorn	Exotic

Appendix B Threatened species likelihood of occurrence analysis

Common Name *Scientific Name*	Listing*	№ Records	Nearest record	Most recent record	Likelihood of occurrence#	
					Pre survey	Post Survey
Kingdom – ANIMALIA; Class – AMPHIBIA						
Litoria verreauxii alpina (Alpine Tree Frog)	BC Act = E EPBC Act = V	3	5.1 km (23/10/2020)	5.1 km (23/10/2020)	Low	Low
Kingdom – ANIMALIA; Class – AVES						
Apus pacificus (Fork-tailed Swift)	EPBC Act = C,J,K	5	2.5 km (30/01/2019)	2.5 km (30/01/2019)	Low	Low
Artamus cyanopterus cyanopterus (Dusky Woodswallow)		34	5.2 km (23/10/2020)	0.6 km (28/09/2015)	Moderate	Moderate
Callocephalon fimbriatum (Gang-gang Cockatoo)	BC Act = V EPBC Act = E	77	5.4 km (23/10/2020)	1.1 km (26/12/2005)	Low	Moderate
Chthonicola sagittata (Speckled Warbler)		40	5.2 km (23/10/2020)	1.1 km (26/12/2005)	Moderate	Low
Circus assimilis (Spotted Harrier)		1	5.4 km (21/10/2013)	5.4 km (21/10/2013)	Low	Low
Climacteris picumnus victoriae (Brown Treecreeper (eastern subspecies))		4	3.4 km (21/04/2020)	3.2 km (14/10/2003)	Low	Low
Daphoenositta chrysoptera (Varied Sittella)		3	4.2 km (30/03/2009)	4.2 km (30/03/2009)	Low	Low
Glossopsitta pusilla (Little Lorikeet)		2	1.1 km (05/01/2002)	1.1 km (05/01/2002)	Low	Low

Common Name *Scientific Name*	Listing*	№ Records	Nearest record	Most recent record	Likelihood of occurrence#	
					Pre survey	Post Survey
Haliaeetus leucogaster (White-bellied Sea-Eagle)		1	5 km (21/10/2013)	5 km (21/10/2013)	Low	Low
Hieraaetus morphnoides (Little Eagle)		6	2.2 km (01/09/2018)	2.2 km (01/09/2018)	Low	Low
Hirundapus caudacutus (White-throated Needletail)	EPBC Act = V,C,J,K	8	2.1 km (01/01/2017)	1.1 km (04/01/2002)	Low	Low
Melanodryas cucullata cucullata (Hooded Robin (south-eastern form))		10	5.3 km (23/10/2020)	4.2 km (11/05/2018)	Low	Low
Ninox connivens (Barking Owl)		1	6.6 km (28/12/2005)	6.6 km (28/12/2005)	Low	Low
Pachycephala olivacea (Olive Whistler)		2	1.1 km (03/10/2002)	1.1 km (03/10/2002)	Low	Low
Petroica boodang (Scarlet Robin)		32	2.1 km (03/07/2019)	1.1 km (31/12/2005)	Moderate	Moderate
Petroica phoenicea (Flame Robin)		10	2.1 km (03/07/2019)	2.1 km (03/07/2019)	Low	Low
Stagonopleura guttata (Diamond Firetail)		15	5.2 km (23/10/2020)	0.6 km (28/09/2015)	Moderate	Moderate
Kingdom – ANIMALIA; Class – MAMMALIA						
Petaurus norfolcensis (Squirrel Glider)		1	7.8 km (28/04/2014)	7.8 km (28/04/2014)	Low	Low
Phascolarctos cinereus (Koala)	BC Act = V EPBC Act = E	2	9.1 km (08/10/2021)	5.7 km (30/06/2006)	Low	Low

Common Name *Scientific Name*	Listing*	№ Records	Nearest record	Most recent record	Likelihood of occurrence#	
					Pre survey	Post Survey
Pteropus poliocephalus (Grey-headed Flying-fox)	BC Act = V EPBC Act = V	1	1.7 km (06/04/2019)	1.7 km (06/04/2019)	Low	Low
Kingdom – ANIMALIA; Class – REPTILIA						
Delma impar (Striped Legless Lizard)	BC Act = V EPBC Act = V	7	4 km (20/03/2020)	4 km (20/03/2020)	Low	Moderate
Suta flagellum (Little Whip Snake)		5	5.8 km (16/06/2019)	2.7 km (31/03/2016)	Low	Low
Tympanocryptis osbornei (Monaro Grassland Earless Dragon)		6	6.2 km (13/07/2021)	5.8 km (26/02/2010)	Low	Low
Kingdom – PLANTAE						
Varanus rosenbergi (Rosenberg's Goanna)		1	4.9 km (05/02/2013)	4.9 km (05/02/2013)	Low	Low
Calotis glandulosa (Mauve Burr-daisy)	BC Act = V EPBC Act = V	17	1.2 km (18/11/2020)	0.6 km (28/09/2015)	Moderate	Moderate
Dodonaea procumbens (Creeping Hop-bush)	BC Act = V EPBC Act = V	19	3.7 km (18/11/2020)	3.2 km (06/02/2020)	Low	Not present
Eucalyptus aggregata (Black Gum)	BC Act = V EPBC Act = V	1	3.6 km (10/05/2018)	3.6 km (10/05/2018)	Low	Not present
Leucochrysum albicans var. *tricolor* (Hoary Sunray)		13	1.7 km (18/11/2020)	1.4 km (30/05/2003)	Moderate	High
Rutidosis leiolepis (Monaro Golden Daisy)	BC Act = V EPBC Act = V	2	3.4 km (26/03/2012)	3.4 km (26/03/2012)	Low	Low

Common Name *Scientific Name*	Listing*	№ Records	Nearest record	Most recent record	Likelihood of occurrence#	
					Pre survey	Post Survey
Swainsona sericea (Silky Swainson-pea)		22	1.2 km (18/11/2020)	1.2 km (18/11/2020)	Moderate	Moderate

* "**V**" = vulnerable; "**E**" = endangered; "**CE**" = critically endangered; "C" = China-Australian Migratory Bird Agreement; "J" = Japanese-Australian Migratory Bird Agreement; "R" = Republic of Korea-Australian Migratory Bird Agreement

"**Recent record**" = species has been recorded in the study area with the past 5 years; "**High**" = species has previously been recorded in the study area (>5 years ago) or in proximity to (for mobile species), and/or habitat is present that is likely to be used by a local population; "**Moderate**" = suitable habitat for a species is present onsite but no evidence of a species detected and relatively *high* number of recorded (5-20 years) within 10 km of the study area or species is highly mobile; "**Low**" = suitable habitat for a species is present onsite but limited or highly degraded, no evidence of a species detected and relatively low number of recent records within 10 km of the study area; "**Not present**" – suitable habitat for the species is not present on site or adequate survey has determined species does not occur in the study area.

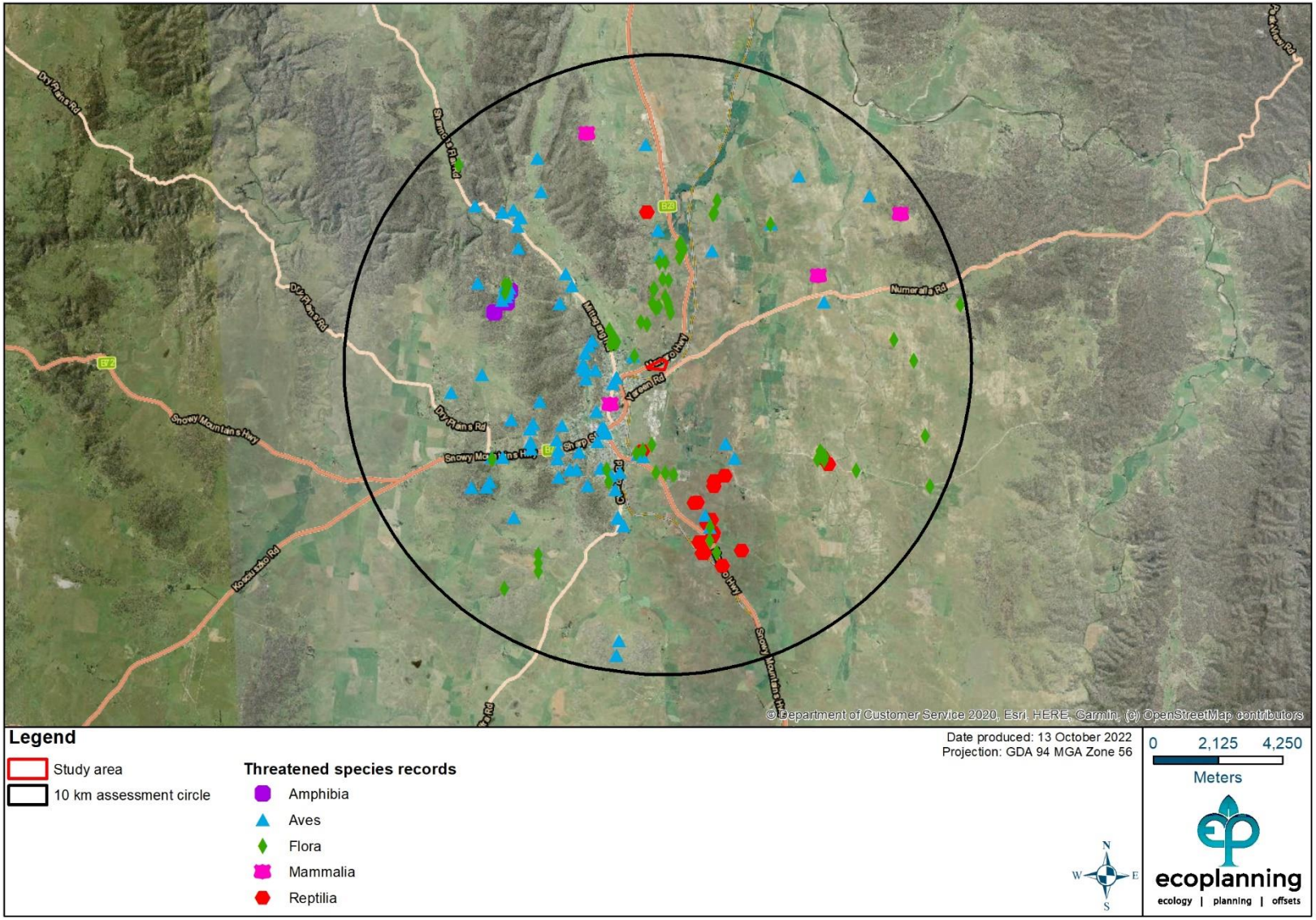

Figure B.1: Distribution of threatened species records within 10 km of the study area, species have been grouped by taxonomic Class.

Appendix C BC Act significant impact assessments

The following assessments have been completed using the guideline published by the NSW Office of Environment and Heritage, *Threatened Species Test of Significance Guideline* (OEH 2018). Each assessment will include a brief description of the species biology and ecology.

For the purposes of this FFA, five significant impact assessments are required:

- Striped Legless Lizard (*Delma impar*) – moderate
- Diamond Firetail (*Stagonopleura guttata*) – moderate
- Dusky Woodswallow *Artamus cyanopterus cyanopterus*) – moderate
- Gang-gang Cockatoo (*Callocephalon fimbriatum*) – moderate
- *Calotis glandulosa* (Mauve Burr-daisy) – moderate
- *Swainsona sericea* (Silky Swainson-pea) – moderate

The Test of Significance for the Diamond Firetail and Dusky Woodswallow have been amalgamated as these species utilise similar niches and will, therefore, be impacted by the proposed development in similarly. It should be noted that "the species" refers to the respective species of each assessment and "the locality" refers to a 10 km buffer around the study area. The description of each species includes a summary of their profile from BioNet profile (DPE 2022b), with additional sources referenced in text.

Figure C-1 shows the distribution of known records of both threatened species, within 10 km of the study area, in the past 20 years.

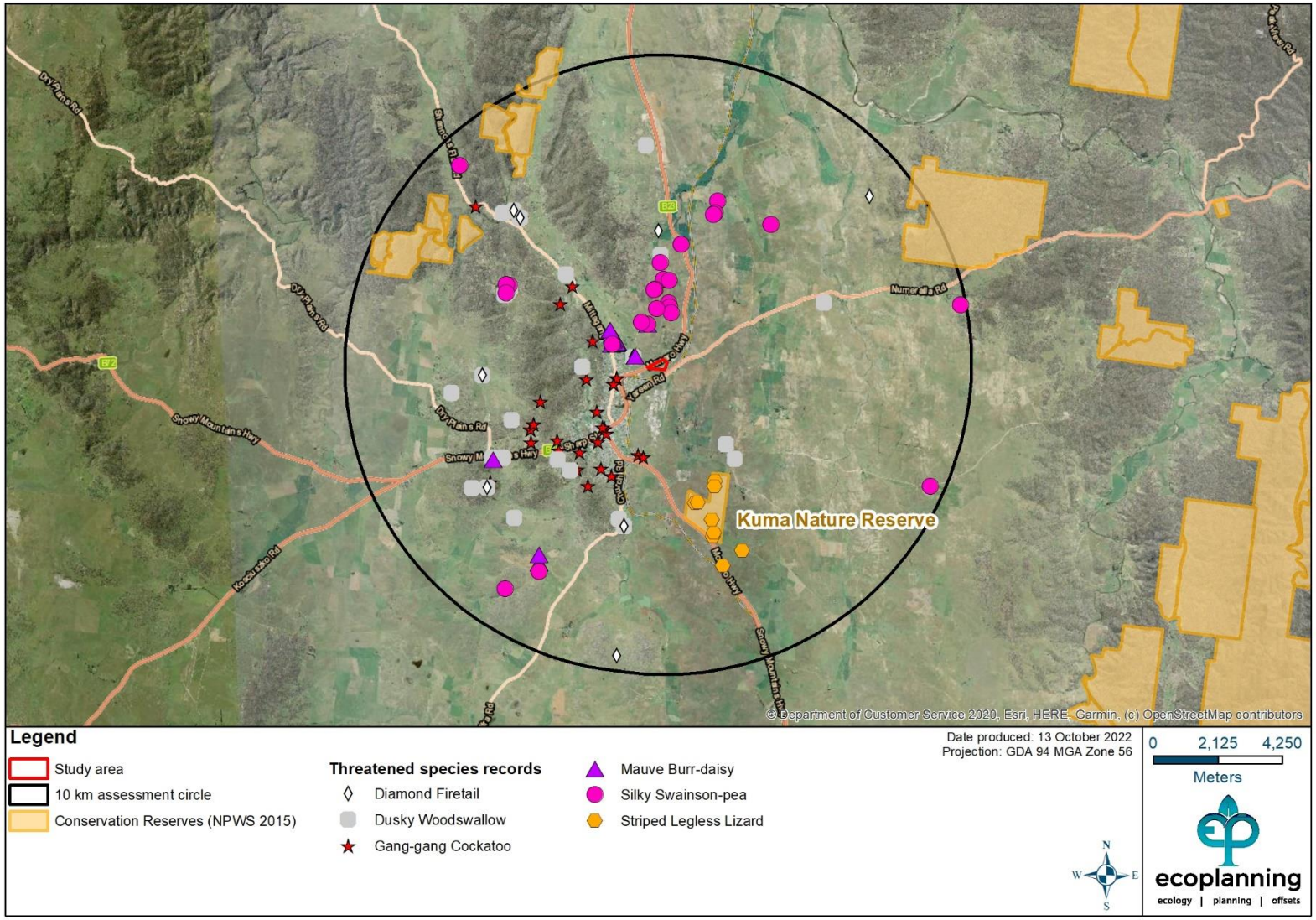

Figure C.1: Records (within 10 km in the past 20 years) of the four BC Act threatened species which have had BC Act Tests of Significance completed in this report.

Striped Legless Lizard (Delma impar) – Vulnerable

Description

The Striped Legless Lizard (*Delma impar*) grows to approximately 30 cm in length, and although can be highly variable in its colouration and pattern, this species typically has a pale grey ventral surface, a series of dark dorso-lateral and lateral longitudinal stripes along the length of its body – beginning at the neck – each stripe is exactly 1 scale wide (Cogger 2018). Although the life history of this species is not well known, the striped legless lizard can live for approximately 10 years. Females can lay a solitary clutch (two eggs) in a soil cavity or as part of a communal clutch (up 36 eggs) under a structure (*e.g.,* a rock). This species is insectivorous, feeding on spiders, grasshoppers, crickets, and cockroaches (Comm. TSSC 2016b).

This species is found throughout southeastern Australia – *viz.* southern NSW, Victoria, ACT, and South Australia – with outlying records from Gilgandra and Muswellbrook, NSW. the habitat required for this species is typically native grassland, and native woodland and exotic grassland adjacent to native grassland. This species can be found in association with four EPBC Act protected TECs, including Natural Temperate Grassland. This species is more likely to be found in native grasslands with increased structural complexity (Howland *et al.* 2016) – complex grassland structure being "areas of tussocks with high biomass, surface rocks or invertebrate burrows necessary as sites for oviposition and which provide protection for eggs from disturbance" (Comm. TSSC 2016b).

The EPBC Act Conservation Advice for this species identifies all populations as likely to be important for this species recovery, with the study area being found in a region identified as supporting an "important population".

It should be noted that a monitoring program for the threatened Monaro Grassland Earless Dragon (*Tympanocryptis osbornei*) has identified a population of the Striped Legless Lizard within the Kuma Nature Reserve (approximately 3.8 km to the southeast of the study area: **Figure B.1**).

Assessment

a. in the case of a threatened species, whether the proposed development or activity is likely to have an adverse effect on the life cycle of the species such that a viable local population of the species is likely to be placed at risk of extinction

In the previous 20 years, seven records for the Striped Legless Lizard have been made in the locality of the study area. All records for this species have been made in the Kuma Nature reserve, approximately 3.8 km to the southeast of the study area, and all have been made in the previous five years. Although the majority of the study area does not contain habitat which would be considered optimal for this species, there is potential habitat for the Striped Legless Lizard in the lot immediately to the south of the study area. This southern property (Lot 3 // DP 1285072) will be assessed separately as part of a Biodiversity Development Assessment Report. However, considering that the study area is adjoining to more favourable habitat for this species, it was considered moderately likely that it may occur within the study area. It should also be considered that if a population of the species is present within the study area, that it would likely be isolated from surrounding populations, as the study area is surrounding by sealed roads and built-up urban areas.

Given that the study area is isolated from surrounding areas of potential habitat and represents low-quality habitat for the species (viz. small patches of native vegetation surrounded by areas dominated by exotic grasses), clearing of the study area is not expected to have an adverse impact on the local population of the species which would increase the risk of this species extinction.

b. in the case of an endangered ecological community or critically endangered ecological community, whether the proposed development or activity:

i. is likely to have an adverse effect on the extent of the ecological community such that its local occurrence is likely to be placed at risk of extinction, or

ii. is likely to substantially and adversely modify the composition of the ecological community such that its local occurrence is likely to be placed at risk of extinction

Not applicable.

c. in relation to the habitat of a threatened species or ecological community:

i. the extent to which habitat is likely to be removed or modified as a result of the proposed development or activity, and

The proposed development is expected to clear approximately 12.4 ha, all of which is low to moderate-quality potential habitat for the species.

ii. whether an area of habitat is likely to become fragmented or isolated from other areas of habitat as a result of the proposed development or activity, and

The study area is already isolated from surrounding areas of potential habitat for the species as the study area is surrounded by sealed roads (viz. Polo Flat Road, the Monaro Highway, Yareena road, and Wangle Street) or built-up urban areas.

iii. the importance of the habitat to be removed, modified, fragmented or isolated to the long-term survival of the species or ecological community in the locality

Given that the study area is isolated from surrounding potential habitat for the species (viz. Kuma Nature Reserve, approximately 3.8 km to the southeast of the study area) and the study area is dominated by exotic grasses (*viz Eragrostis curvula**), the habitat proposed to be removed as part of the proposed development is not considered to be of importance to the recovery of the species.

d. whether the proposed development or activity is likely to have an adverse effect on any declared area of outstanding biodiversity value (either directly or indirectly),

No parts of the study area are identified as areas of outstanding biodiversity value, nor is it expected that any development activities within the study will indirectly impact any areas of outstanding biodiversity value.

e. whether the proposed development or activity is or is part of a key threatening process or is likely to increase the impact of a key threatening process.

The key threatening processes that are relevant to the Striped Legless Lizard and the proposed development are:

- Bushrock removal – some areas of the study area have a scattering of surface stones, which will be removed as part of the proposed development, these stones may be potential habitat.
- Clearing of native vegetation – the study area is dominated by exotic grasses, however, some small patches (each are <400 m^2) will be cleared as part of the proposed development.
- Predation by feral cats – given that the proposed development will include the construction of >100 dwellings, it is expected that one will have a pet cat (*Felis catus*). There is the potential for this cat to escape, become feral, and predate on the local population of Striped Legless Lizard. However, it is also expected that this process is already occurring, given that the township of Cooma already has occupied dwellings with pet cats that have escaped.

Conclusion

Although the study area does not contain favourable habitat for the Striped Legless Lizard, it has the potential to occur given the study areas proximity to potential habitat (immediately to the south in Lot 3 // DP 1285072). In addition, consideration must be given to the isolation of the study area to surrounding patches of grassland. Surrounding the study area (and potential habitat to the south) are sealed roads (including the Monaro Highway) which would significantly isolate the potential population. Therefore, the habitat within the study area is not considered to be critical to the recovery of the Striped Legless Lizard. In addition, any population present within the study area would not be considered critical to the survival of the species due to its isolation from surrounding populations (the nearest known being 3.8 km to the southeast.

Small Passerines

This assessment of significance amalgamates the perceived impacts of the proposed development on the Diamond Firetail (*Stagonopleura guttata*; moderate likelihood of occurrence) and the Dusky Woodswallow (*Artamus cyanopterus cyanopterus*; moderate). Unless each species is named specifically, the term "the species" will refer to both species.

Description – Diamond Firetail

The Diamond Firetail is a small (10-12 cm long and approximately 17 g). This species colouration has a bright red bill, red eyes, and red rump. The throat is white and a band on the lower breast is black with strongly contrasted white dots. The wings are ashy brown, and the back and head are grey.

This species is endemic to southeastern Australia, extending from central Queensland to the the Eyre Peninsula. There are populations in the northern, southern, and central areas of its range. Its habitat is typically eucalypt woodlands (*viz* Box-Gum Woodlands and Snow Gum Woodlands), although it can also be found in open forest, mallee, Natural Temperate Grassland, and secondary grasslands. This species tends to have an affinity for riparian areas, though this is not exclusive.

Diamond Firetails tend to flock in groups of 5 to 40 individuals, which separate in the breeding season (August to January), where mating pairs will create a globular nest in densely shrubby areas, with preference for shrubs under an active hawk nest.

Description – Dusky Woodswallow

The Dusky Woodswallow is a small to medium sized passerine (16-19.5 cm and 19 g). This species is dark overall, mostly grey brown turning darker towards the tail, it also has a back mask. The bill is bluish black with a black tip. The wings are bluish charcoal. On the underside is dark grey, with a white stripe on the tip of the tail.

These species are widespread but uncommon in NSW, with a similar abundance across southern Australia. Breeding typically occurs on the western slops of the Great Dividing Range. The primary habitat for this species is a dry open eucalypt forest and woodlands but can also be found in farmland and grassland that is adjoining wooded areas. This bird is mostly seen either on the wing, where it forages for aerial invertebrates, resting on tree branches, or – when in more urban area – powerlines. When conditions are favourable, this species will migrate to northern areas of its range to breed, where breeding pairs will construct an open cup nest made from twigs, grasses, and dry casuarina needles.

Assessment

a. *in the case of a threatened species, whether the proposed development or activity is likely to have an adverse effect on the life cycle of the species such that a viable local population of the species is likely to be placed at risk of extinction*

The nearest known record for any of the small passerines which are likely to inhabit the study area is 600 m to the north of the study area, made in 2015 (the Dusky Woodswallow and Diamond Firetail). Given that these species are highly mobile, it is likely that each of the small passerines have utilised the study area at some point, potentially for foraging habitat. There is minimal breeding habitat for these species within the study, only the *Lycium ferocissimum** present have the potential to form breeding habitat. None of the small passerines were identified during the field assessment. Given the small amount of breeding habitat, and the likely low quality of foraging habitat within the study area, clearing of the 12.4 ha study area is not expected to increase the risk of extinction for any of the three identified small passerines.

b. in the case of an endangered ecological community or critically endangered ecological community, whether the proposed development or activity:

i. is likely to have an adverse effect on the extent of the ecological community such that its local occurrence is likely to be placed at risk of extinction, or

ii. is likely to substantially and adversely modify the composition of the ecological community such that its local occurrence is likely to be placed at risk of extinction

Not applicable.

c. in relation to the habitat of a threatened species or ecological community:

i. the extent to which habitat is likely to be removed or modified as a result of the proposed development or activity, and

The proposed development is expected to clear approximately 12.4 ha, all of which is low-quality potential habitat for the species.

ii. whether an area of habitat is likely to become fragmented or isolated from other areas of habitat as a result of the proposed development or activity, and

although these species primary mode of locomotion is flight, the sealed roads surrounding the study area do pose some form of barrier, from vehicle strike and potentially noise pollution. However, as the proposed development is a total clearance of the study area, fragmentation and/or isolation is not expected to come about.

iii. the importance of the habitat to be removed, modified, fragmented, or isolated to the long-term survival of the species or ecological community in the locality

Collectively, the study area has potential foraging habitat which could be utilised by the small passerine species, as the study area is dominated by exotic grasses, which forms habitat for the main food source for these species – invertebrates. The scattered *Lycium ferocissimum** within the study area may be utilised as breeding habitat by the small passerines, however, given the low abundance of breeding habitat, this would not be the primary use of the study area of these species. Therefore, the study area is most likely of low priority for the species being assessed.

d. whether the proposed development or activity is likely to have an adverse effect on any declared area of outstanding biodiversity value (either directly or indirectly),

No parts of the study area are identified as areas of outstanding biodiversity value, nor is it expected that any development activities within the study will indirectly impact any areas of outstanding biodiversity value.

e. whether the proposed development or activity is or is part of a key threatening process or is likely to increase the impact of a key threatening process.

The key threatening processes which are relevant to the proposed development and the small passerines are;

- Clearing of native vegetation – the study area is dominated by exotic grasses, however, some small patches (each are <400 m^2) will be cleared as part of the proposed development.
- Predation by feral cats – given that the proposed development will include the construction of >100 dwellings, it is expected that one will have a pet cat (*Felis catus*). There is the potential for this cat to escape, become feral, and predate on the local population of Striped Legless Lizard. However, it is also expected that this process is already occurring, given that the township of Cooma already has occupied dwellings with pet cats that have escaped.

Conclusion

The study area does not present itself as high quality habitat to either small passerine assessed. The *Lycium ferocissimum** may present itself as breeding habitat for the Diamond Firetail, however, the remainder of the study area, being dominated by exotic grasses, has potential to be foraging habitat for the species. As such, if the proposed development is to proceed, the impact to these species is expected to be negligible to their recovery

*Gang-gang Cockatoo (*Callocephalon fimbriatum) – endangered

Description

The EPBC Act conservation advice for this species has summarised all current knowledge for the species (Comm. TSSC 2022). It is a medium size cockatoo; 32-36 cm long and 230-334 g in wight, wing span is 20-26 cm. the sexes are dimorphic. Females and juveniles are scaly grey, with males having an additional bright red crest atop their heads. Their call has been described as sounding like a squeaky gate.

The species is known from southeastern Australia, ranging from as far north to Coffs Harbor NSW. it is commonest in alpine areas but is well known in coastal areas. Historic dogma suggested that the species was migratory, flying to higher altitudes in cooler months to breed, though this is now considered dubious. Gang-gangs are monogamous and require a hollow with an opening diameter of at least 12 cm and at least 5 m from the forest floor. The primary food for this species is native trees, such as Eucalypt and *Callitris* spp. pines, as well as some exotic species, (*e.g., Cotoneaster* spp. and *Lycium* spp.*).

With regards to the study area, the potential habitat would be the *Cupressus** pines within VZ4 and the *Lycium** shrubs in VZ1. Gang-gangs were observed flying outside of the study area during surveys on 23 February 2022. Prior to this, the nearest record of Gang-gangs was 1.1 km (made in 2005), while the most recent record was made in 2020 (5.4 km from the study area). A total of 77 records of this species have been made in the previous 20 years within 10 km of the study area.

Assessment

a. in the case of a threatened species, whether the proposed development or activity is likely to have an adverse effect on the life cycle of the species such that a viable local population of the species is likely to be placed at risk of extinction

Within the local area of Cooma, there is an extant population of Gang-Gangs, determined by 77 records within 10 km of the study area, within the past 20 years the nearest record of Gang-gangs was 1.1 km (made in 2005), while the most recent record was made in 2020 (5.4 km from the study area). The species was also observed flying outside of the study area during surveys in February 2022.

No breeding habitat was identified within the study area (*i.e.,* hollow bearing trees) nor was primary foraging habitat (*i.e.,* native eucalypt tree and *Callitris* shrubs). However, within VZ1 and VZ4, potential secondary foraging habitat was identified in the form of *Lycium** shrubs and *Cupressus** trees (respectively). In total, this accounts for approximately 0.02 ha of low-quality foraging habitat.

If the proposed development was to proceed, the clearing of the low-quality foraging habitat is not expected to impact the local population of Gang-gangs, nor is the risk of extinction of the species expected to increase.

b. in the case of an endangered ecological community or critically endangered ecological community, whether the proposed development or activity:

iii. is likely to have an adverse effect on the extent of the ecological community such that its local occurrence is likely to be placed at risk of extinction, or

iv. is likely to substantially and adversely modify the composition of the ecological community such that its local occurrence is likely to be placed at risk of extinction

Not applicable.

c. in relation to the habitat of a threatened species or ecological community:

i. the extent to which habitat is likely to be removed or modified as a result of the proposed development or activity, and

The proposed development is expected to clear approximately 0.02 ha, all of which is low-quality foraging habitat for the species.

ii. whether an area of habitat is likely to become fragmented or isolated from other areas of habitat as a result of the proposed development or activity, and

This species is highly mobile, and the clearing of 0.02 ha of foraging habitat is not expected to fragment the species in any way.

iii. the importance of the habitat to be removed, modified, fragmented or isolated to the long-term survival of the species or ecological community in the locality

The study area represents 0.02 ha of low-quality foraging habitat, clearing of these trees and shrubs is not expected to reduce the long-term survival of the species in the local area.

d. whether the proposed development or activity is likely to have an adverse effect on any declared area of outstanding biodiversity value (either directly or indirectly),

No parts of the study area are identified as areas of outstanding biodiversity value, nor is it expected that any development activities within the study will indirectly impact any areas of outstanding biodiversity value.

e. whether the proposed development or activity is or is part of a key threatening process or is likely to increase the impact of a key threatening process.

The key threatening processes that are relevant to the Striped Legless Lizard and the proposed development are:

- Predation by feral cats – given that the proposed development will include the construction of >100 dwellings, it is expected that one will have a pet cat (*Felis catus*). There is the potential for this cat to escape, become feral, and predate on the local population of Striped Legless Lizard. However, it is also expected that this process is already occurring, given that the township of Cooma already has occupied dwellings with pet cats that have escaped.

Conclusion

Although the study area does not contain favourable habitat for the gang-gang Cockatoo, it has the potential to occur given the species is highly mobile. As the study area does not contain any breeding habitat, and only a small area (0.02 ha) of secondary foraging habitat is present, the proposed development is not expected to have a significant impact on the species.

Calotis glandulosa (Mauve Burr-Daisy) - Vulnerable

Description

Calotis glandulosa is a small (to 35 cm tall) erect to ascending herbaceous plant with a woody base. The species is hirsute, with short glandular hairs and scattered longer septate hairs (the glandular hairs being the titular feature of the species). The basal leaves are absent, with the cauline leaves being 1.5-3 cm long and 5-9 mm wide; cuneate but not pinnatifid at the apex, and sessile. The flower heads are approximately 20 cm in diameter. The involucral bracts are ovate to lanceolate, acute, entire, and without scales; the ray florets are blue to white and are 5-8 mm long (PlantNet 2022). Due to adaptations of the achnes, propagules of this species are known to be dispersed by animals.

This species is endemic to NSW, occurring in the Kosciuszko National Park, Monaro Plain, and Upper Shoalhaven Catchment. This species grows in grassland and grassy woodland plant communities, being associated with three TECs including the EPBC Act Natural Temperate Grassland. Its habitat is often in areas that are grazing-restricted, although it is known from areas of recent disturbance (Comm. TSSC 2008). The NSW BioNet database identifies five habitat features which are associated with this species presence (DPE 2022b):

- montane and subalpine grasslands in the Australian Alps,
- subalpine grassland (dominated by *Poa* spp.), and montane or natural temperate grassland dominated by Kangaroo Grass (*Themeda australis*) and Snow Gum (*Eucalyptus pauciflora*) Woodlands on the Monaro and Shoalhaven area,
- Appears to be a coloniser of bare patches, which explains why it often occurs on roadsides,
- Apparently common on roadsides in parts of the Monaro, though it does not persist for long in such sites, and
- Does not persist in heavily grazed pastures of the Monaro or the Shoalhaven area.

Although the study area does not conform to all the habitat features listed above, areas of the study area do include patches of bare ground, which are known to be conducive to the presence of this species.

Assessment

a. in the case of a threatened species, whether the proposed development or activity is likely to have an adverse effect on the life cycle of the species such that a viable local population of the species is likely to be placed at risk of extinction

The nearest record of this species in relation to the study area, is 0.6 km to the northwest of the study are, this record was made in 2015 (**Figure B.1**). The most recent record was made in 2020, approximately 1.5 km. this indicates that the local population is still present in the vicinity of the study area, however, it is not known if it is present in the study area as no targeted surveys have been completed. However, for the purposes of this assessment, it will be assumed that a population is present in the study area. the most likely location that this species will be found in the study area is in VZ1, as it is relatively high quality within the study area, although compared to areas where it is known, it is of low quality.

What also needs to be considered is the isolation of the study area to known records of the species. all side of the contiguous patch of vegetation that the study area is apart of is boarded by sealed roads and built up urban areas. These pose hard barriers to the movement of the species, both genetic material (i.e. pollen via pollinators) or propagules (i.e. seeds). This indicates that the population which may be

present in the study area would be isolated. If the population is cleared as part of the proposed development, then it is unlikely to adversely impact the recovery of the species.

b. in the case of an endangered ecological community or critically endangered ecological community, whether the proposed development or activity:

i. is likely to have an adverse effect on the extent of the ecological community such that its local occurrence is likely to be placed at risk of extinction, or

ii. is likely to substantially and adversely modify the composition of the ecological community such that its local occurrence is likely to be placed at risk of extinction

Not applicable.

c. in relation to the habitat of a threatened species or ecological community:

i. the extent to which habitat is likely to be removed or modified as a result of the proposed development or activity, and

The study area represents a maximum of 12.4 ha of potential habitat for this species, however, more than likely, 0.6 ha of the study area is potential habitat.

ii. whether an area of habitat is likely to become fragmented or isolated from other areas of habitat as a result of the proposed development or activity, and

The study area is already isolated from surrounding areas of potential habitat for the species as it is completely surrounded by sealed roads (viz. Polo Flat Road, the Monaro Highway, Yareena road, and Wangle Street) or built-up urban areas.

iii. the importance of the habitat to be removed, modified, fragmented or isolated to the long-term survival of the species or ecological community in the locality

The study area represents low quality habitat for this species as it has been continuously grazed, and only small patches (<1 ha in total) represents potential habitat.

d. whether the proposed development or activity is likely to have an adverse effect on any declared area of outstanding biodiversity value (either directly or indirectly),

No parts of the study area are identified as areas of outstanding biodiversity value, nor is it expected that any development activities within the study will indirectly impact any areas of outstanding biodiversity value.

e. whether the proposed development or activity is or is part of a key threatening process or is likely to increase the impact of a key threatening process.

The key threatening processes which are relevant to the proposed development and the small passerines are;

- Clearing of native vegetation – the study area is dominated by exotic grasses, however, some small patches (each are <400 m^2) will be cleared as part of the proposed development.

Conclusions

Given that the study area is isolated from surrounding populations of *Calotis glandulosa*, and the study area represents low quality habitat for the species, the proposed development is not expected to be a significant impact to this species.

Swainsona sericea (Silky Swainson-pea) – Vulnerable

Description

This perennial is a prostrate to erect herb, growing to 10 cm tall. This species can be readily identified by it being densely pubescent, with hairs being appressed or raised. The leaves are 2-7 cm long, with 5-13 narrow-elliptic leaflets that are 5-15 cm long; terminal leaflets are longer than the lateral leaflets. Racemes have 2-8 flowers which are 7-11 mm long. Calyxes are pubescent and the corolla is purple. Pods are 10-17 mm long.

This species can be found in the NSW northern Tablelands to Southern Tablelands, to the NSW Plains, with a stronghold in the Monaro. This species is also found in South Australia, Victoria, and Queensland. In the Monaro region, this species can be found in Natural Temperate Grassland and grassy woodlands, having associations with *Callitris* spp. in wooded areas. Little is known on the ecology of this species, however, its BioNet profile indicates that it regenerates after fire (DPE 2022b), however, this species has a tendency to inhabit areas of bare soil (pers. obs.)

The nearest record of this species is 1.2 km to the north of the study area, which was made in November 2020. This record was not made in a conservation reserve.

Assessment

a. in the case of a threatened species, whether the proposed development or activity is likely to have an adverse effect on the life cycle of the species such that a viable local population of the species is likely to be placed at risk of extinction

The nearest – and moist recent – records of this species was made 1.5 km to the northwest of the study area, in 2020 (**Figure B.1**). There have been 22 records of this species made within 10 km of the study area in the past 20 years, indicating that the local population is persistent, however, it is not known if it is present in the study area as no targeted surveys have been completed. However, for the purposes of this assessment, it will be assumed that a population is present in the study area. the most likely location that this species will be found in the study area is in VZ1, as it is relatively high quality within the study area, although compared to areas where it is known, it is of low quality.

What also needs to be considered is the isolation of the study area to known records of the species. all side of the contiguous patch of vegetation that the study area is apart of is boarded by sealed roads and built up urban areas. These pose hard barriers to the movement of the species, both genetic material (i.e. pollen via pollinators) or propagules (i.e. seeds). This indicates that the population which may be present in the study area would be isolated. If the population is cleared as part of the proposed development, then it is unlikely to adversely impact the recovery of the species.

b. in the case of an endangered ecological community or critically endangered ecological community, whether the proposed development or activity:

i. is likely to have an adverse effect on the extent of the ecological community such that its local occurrence is likely to be placed at risk of extinction, or

ii. is likely to substantially and adversely modify the composition of the ecological community such that its local occurrence is likely to be placed at risk of extinction

Not applicable.

c. in relation to the habitat of a threatened species or ecological community:

i. the extent to which habitat is likely to be removed or modified as a result of the proposed development or activity, and

The study area represents a maximum of 12.4 ha of potential habitat for this species, however, more than likely, 0.6 ha of the study area is potential habitat.

ii. whether an area of habitat is likely to become fragmented or isolated from other areas of habitat as a result of the proposed development or activity, and

The study area is already isolated from surrounding areas of potential habitat for the species as it is completely surrounded by sealed roads (viz. Polo Flat Road, the Monaro Highway, Yareena road, and Wangle Street) or built-up urban areas.

iii. the importance of the habitat to be removed, modified, fragmented or isolated to the long-term survival of the species or ecological community in the locality

The study area represents low quality habitat for this species as it has been continuously grazed, and only small patches (<1 ha in total) represents potential habitat.

d. whether the proposed development or activity is likely to have an adverse effect on any declared area of outstanding biodiversity value (either directly or indirectly),

No parts of the study area are identified as areas of outstanding biodiversity value, nor is it expected that any development activities within the study will indirectly impact any areas of outstanding biodiversity value.

e. whether the proposed development or activity is or is part of a key threatening process or is likely to increase the impact of a key threatening process.

The key threatening processes which are relevant to the proposed development and the small passerines are;

- Clearing of native vegetation – the study area is dominated by exotic grasses, however, some small patches (each are <400 m^2) will be cleared as part of the proposed development.

Conclusions

Given that the study area is isolated from surrounding populations of *Calotis glandulosa*, and the study area represents low quality habitat for the species, the proposed development is not expected to be a significant impact to this species.

Appendix D 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.

For the purposes of this FFA, two significant impact assessments are required:

- *Leucochrysum albicans* var. *tricolor* (Hoary Sunray) – Endangered,
- Gang-gang Cockatoo (*Callocephalon fimbriatum*) – Endangered
- *Calotis glandulosa* (Mauve Burr-daisy) – Vulnerable, and
- Striped Legless Lizard (*Delmar impar*) – Vulnerable.

Figure D.1 shows the distribution of known records of both threatened species, within 10 km of the study area, in the past 20 years.

It should be noted that "the species" refers to the respective species of each assessment. Also, assessment points "g" and "h" will be assessed as one as they include similar areas to be assessed.

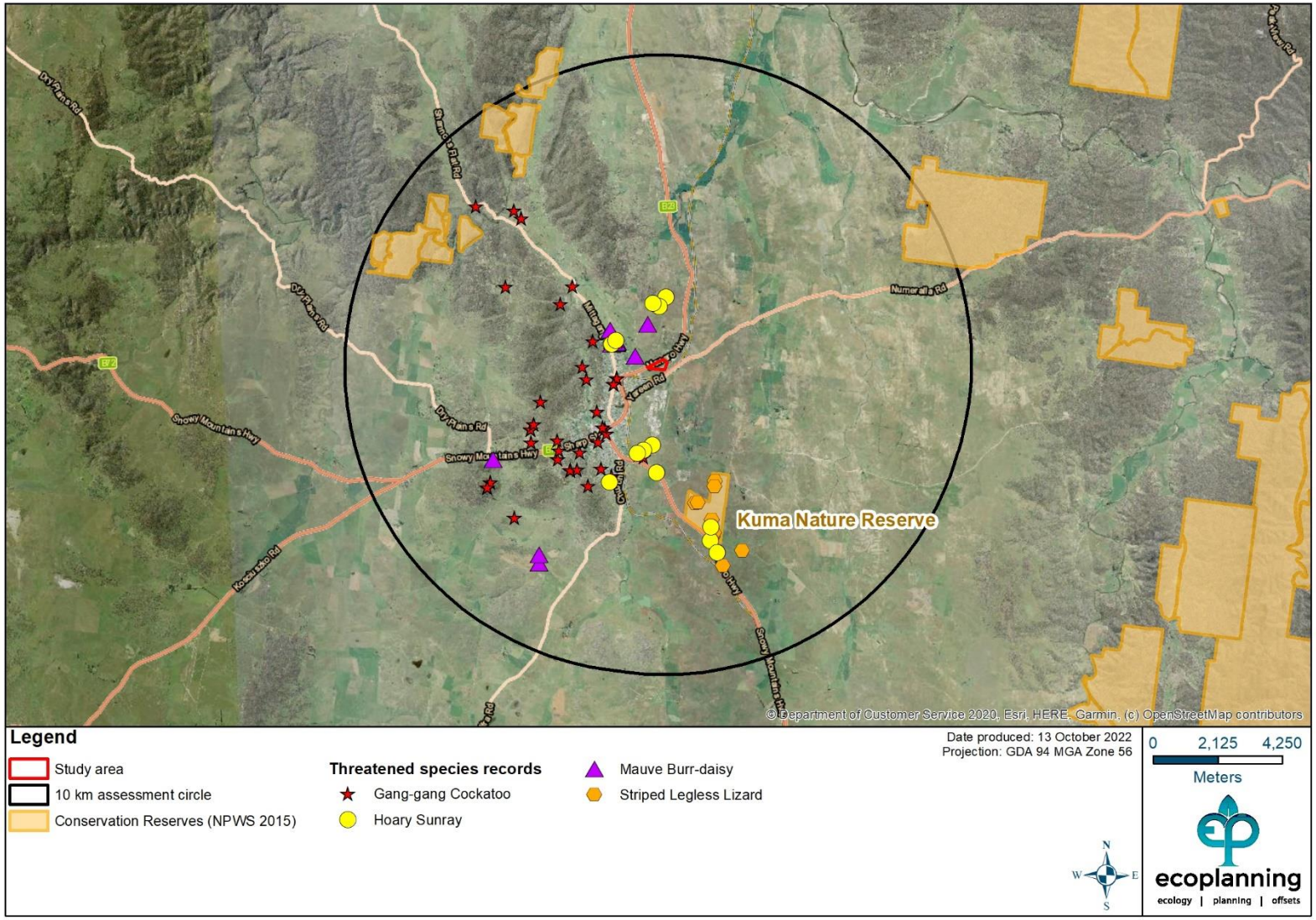

Figure D.1: Records (within 10 km in the past 20 years) of the three EPBC Act threatened species which have had EPBC Act Tests of Significance completed in this report.

Leucochrysum albicans var. tricolor (Hoary Sunray) – Endangered

Conventionally, this species is named *Leucochrysum albicans* var. *tricolor*, however, it is synonymous with *Leucochrysum albicans* subsp. *albicans* var. *tricolor* and *Helipterum albicans* var. *incanum.*

Description

Leucochrysum albicans var. *tricolor* is a small perennial herb is found in southeastern Australia, with populations in higher elevations across Tasmania, Victoria, and NSW/ACT. In NSW it is found in the southeastern 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 involucral 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 involucral 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). 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, 1994c).

No targeted surveys for this species have been completed in the study area, however, investigation of potential habitat (bare ground) did not yield any individuals. The nearest known population of this species is 1.5 km from the study area. a population of this species is also known of the Kuma Nature Reserve, approximately 3.8 km to the southeast of the study area.

Using the BioNet records for *Calotis glandulosa*, removing records which are potentially dubious (those from Dubbo and Mt. Imlay, see the EPBC Act conservation advice), and importing this data into GeoCAT (Bachman *et al.* (2011), using a 2 km^2 cell width), the estimated extent of occurrence is estimated to be 137,9030.6 ha, and the area of occupancy is estimated to be 43,200 ha. The resulting distribution map is presented in **Figure D-2**. Note, this mapping only uses records from NSW, and the area of occupancy and extent of occurrence are likely to be greater given that this species can be found in NSW, ACT, Vic, and Tas.

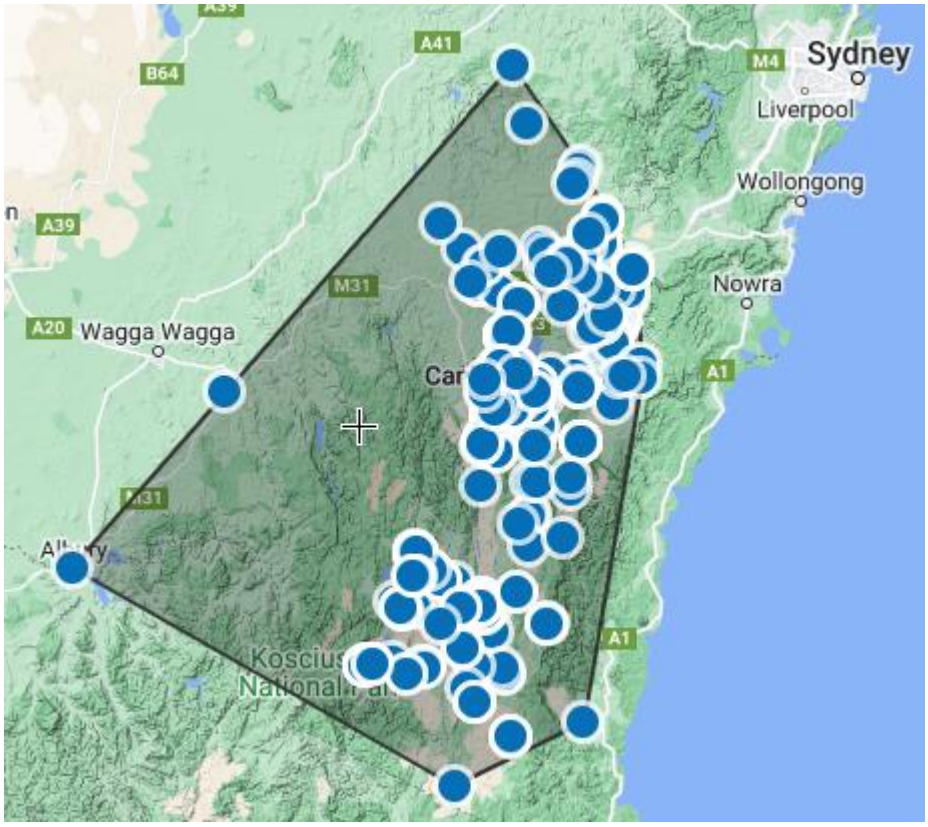

Figure D.1: The estimated extent of occurrence for *Leucochrysum albicans* var. *tricolor* generated by GeoCAT (Bachman *et al.* 2011), using filtered records from BioNet (DPE 2022b).

Assessment

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:

a. Lead to a long-term decrease in the size of the population,

Although the study area does not contain favourable habitat for this species, its proximity to a known population indicates that some individuals are present. There is unlikely to be a persistent seed bank in the soil. Therefore, clearing of the study area may lead to a long-term decrease in the total population of *L. albicans* var. *tricolor* across its entire range, although this reduction would likely be negligible. What should also be considered it the potential population within the study area connectivity to surrounding areas. The nearest recorded population is approximately 1.7 km to the north and west of the study area, and with cross pollination being likely between the two populations. In addition, as the propagules of *L. albicans* var. *albicans* can move many kilometres, movement of propagule exchange between the study area and surrounding favourable habitat is potential.

It is expected that the loss of the potential population in the study area will reduce the overall population of *L. albicans* var. *tricolor*, but this population is of low value to the recovery of species given its size and connectivity to the species in general.

b. Reduce the area of occupancy of the species,

The proposed development of the study area is expected to clear 12.4 ha, which will reduce the potential area of occupancy of this species, however, this reduction in area of occupancy will be <0.01%, as the extent of occurrence includes much of NSW's alpine areas (see Figure 1 from the *L. albicans* var. *albicans* recovery plan).

c. *Fragment an existing population into two or more populations,*

As *L. albicans* var. *albicans* has propagules that can move many kilometres – via the wind - the total clearance if the study area is not expected to cause fragmentation of any surrounding populations, nor stop the movement of propagules of genetic material between populations.

d. *Adversely affect habitat critical to the survival of the species,*

No Critical Habitat as defined under section 207A of the EPBC Act has been identified or included in the Register of Critical Habitat. Identification of Habitat critical to the survival is noted in the Recovery Plan as a key goal to the conservation of this species. What is noted in the Recovery Plan, is that habitat key to the germination of this species is patches of bare ground which have minimal competition from other species. areas of the study area – particularly in VZ1 – do conform to this. However, this area is approximately 0.6 ha, and clearance of this area is not expected to impact the survival of the species, given that it is a minute proportion of the species area of occupancy.

e. *Disrupt the breeding cycle of a population,*

The main impact that the proposed development will have on the breeding cycle of the species is a reduction in the genetic pool. Movement of propagules from study is not considered likely. It is unclear how valuable any *L. albicans* var. *tricolor* would be to the genetic quality of the species. The Recovery Plan for this species notes that the erosion of the genetic pool for *L. albicans* var. *tricolor* is a moderate risk for this species, given its "boom-and-bust" population fluctuations, and fragmentation of populations. Removal of any *L. albicans* var. *tricolor* from the study area would represent a reduction in the genetic variation of the species, however, the magnitude of this impact is not known, given no individuals have been found in the study area and the available habitat (bare ground) is not common, occupying <0.6 ha of the study area.

f. *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 is expecting to clear <0.6 ha of potential habitat which can be utilised by this species, this area is mainly within VZ1, however, small areas within VZ2 may be potential habitat. Potential habitat for this species would be bare patches of ground, free from competition by other species. However, given that the area of potential habitat which will be cleared under the proposed development is a minute proportion of the species extent of occurrence, the proposed development is not expected to clear habitat to a level that will cause the species to undergo a long-term decline.

g. *Result in invasive species that are harmful to a critically endangered or endangered species becoming established in the critically endangered or endangered species' habitat,*
h. *Introduce disease that may cause the species to decline, or*

The proposed development is not expected to result in the establishment of any invasive species or disease which will cause the decline in *L. albicans* var. *tricolor.*

i. *Interfere with the recovery of the species.*

As the potential habitat set to be cleared as part of the proposed development is of small area (<0.6 ha), the proposed development is not expected to interfere with the recovery of the species.

Conclusions

Given that the quality of the habit within the study area is relatively small, clearing of the study area is not expected to cause a significant impact on this species.

*Gang-gang Cockatoo (*Callocephalon fimbriatum*) – Endangered*

Description

The EPBC Act conservation advice for this species has summarised all current knowledge for the species (Comm. TSSC 2022). It is a medium size cockatoo; 32-36 cm long and 230-334 g in wight, wing span is 20-26 cm. the sexes are dimorphic. Females and juveniles are scaly grey, with males having an additional bright red crest atop their heads. Their call has been described as sounding like a squeaky gate.

The species is known from southeastern Australia, ranging from as far north to Coffs Harbor NSW. it is commonest in alpine areas but is well known in coastal areas. Historic dogma suggested that the species was migratory, flying to higher altitudes in cooler months to breed, though this is now considered dubious. Gang-gangs are monogamous and require a hollow with an opening diameter of at least 12 cm and at least 5 m from the forest floor. The primary food for this species is native trees, such as Eucalypt and *Callitris* spp. pines, as well as some exotic species, (*e.g., Cotoneaster* spp. and *Lycium* spp.*).

With regards to the study area, the potential habitat would be the *Cupressus** pines within VZ4 and the *Lycium** shrubs in VZ1. Gang-gangs were observed flying outside of the study area during surveys on 23 February 2022. Prior to this, the nearest record of Gang-gangs was 1.1 km (made in 2005), while the most recent record was made in 2020 (5.4 km from the study area). A total of 77 records of this species have been made in the previous 20 years within 10 km of the study area.

The conservation advice for the species estimates the extent of occurrence to be between 38,000,000-41,000,000 ha and the area of occupancy to be between 2,270,000-4,000,000 ha.

Assessment

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:

a. Lead to a long-term decrease in the size of the population,

Within the local area of Cooma, there is an extant population of Gang-Gangs, determined by 77 records within 10 km of the study area, within the past 20 years the nearest record of Gang-gangs was 1.1 km (made in 2005), while the most recent record was made in 2020 (5.4 km from the study area). The species was also observed flying outside of the study area during surveys in February 2022. The study area represents approximately 0.02 ha of secondary foraging habitat for the species.

The proposed development is not expected to lead to a long-term decrease in the size of the Gang-gang Cockatoo population, both locally and nationally.

b. Reduce the area of occupancy of the species,

The proposed development of the study area is expected to clear 0.02 ha, which will reduce the potential area of occupancy of this species, however, this reduction in area of occupancy will be <0.01%, as the extent of occurrence includes much of NSW's alpine areas (see Figure 1 from the *Gang-gang Cockatoo* Conservation Advice).

c. Fragment an existing population into two or more populations,

The conservation advice for this species suggests there is one population of Gang-gangs, with there being the potential for four over its entire range. However, as the impact area of the proposed development is small in comparison to the maximum extent of occurrence for the species (12.4 ha

compared to 4,000,000 ha), and the species is highly mobile, the proposed development is not expected to fragment the species in any way.

d. Adversely affect habitat critical to the survival of the species,

The Conservation Advice for the speices identifies habitat critical to the survival of the species as being:

> *"Habitat critical to the survival of the Gang-gang Cockatoo includes all foraging habitat during both the breeding and non-breeding season. For the purpose of this document, this does not include exotic feeding grounds such as ornamental trees, shrubs, and hedges within urban and suburban areas."*

As the study area only includes ornamental or exotic trees and shrubs, no habitat critical to the survival of the species is found within the study area.,

e. Disrupt the breeding cycle of a population,

No breeding habitat is found within the study area.

f. Modify, destroy, remove, isolate, or decrease the availability or quality of habitat to the extent that the species is likely to decline,

The study area represents approximately 0.02 ha of potential foraging habitat for the species. clearing of this non-native vegetation is not expected to cause a decline in the species.

g. Result in invasive species that are harmful to a critically endangered or endangered species becoming established in the critically endangered or endangered species' habitat,

h. Introduce disease that may cause the species to decline, or

The proposed development is not expected to result in the establishment of any invasive species or disease which will cause the decline in the Gang-gang Cockatoo.

i. Interfere with the recovery of the species.

As the potential habitat set to be cleared as part of the proposed development is of small area (0.02 ha of secondary foraging habitat), the proposed development is not expected to interfere with the recovery of the species.

Conclusions

Given that the quality of the habit within the study area is relatively small, clearing of the study area is not expected to cause a significant impact on this species.

Calotis glandulosa (Mauve Burr-Daisy) – Vulnerable

Description

Calotis glandulosa is a small (to 35 cm tall) erect to ascending herbaceous plant with a woody base. The species is hirsute, with short glandular hairs and scattered longer septate hairs (the glandular hairs being the titular feature of the species). The basal leaves are absent, with the cauline leaves being 1.5-3 cm long and 5-9 mm wide; cuneate but not pinnatifid at the apex, and sessile. The flower heads are approximately 20 cm in diameter. The involucral bracts are ovate to lanceolate, acute, entire, and without scales; the ray florets are blue to white and are 5-8 mm long (PlantNet 2022). Due to adaptations of the achnes, propagules of this species are known to be dispersed by animals (*viz.* mammals).

This species is endemic to NSW, occurring in the Kosciuszko National Park, Monaro Plain, and Upper Shoalhaven Catchment. This species grows in grassland and grassy woodland plant communities, being associated with three TECs including the EPBC Act Natural Temperate Grassland. Its habitat is often in areas that are grazing-restricted, although it is known from areas of recent disturbance (Comm. TSSC 2008). The NSW BioNet database identifies five habitat features which are associated with this species presence (DPE 2022b):

- montane and subalpine grasslands in the Australian Alps,
- subalpine grassland (dominated by *Poa* spp.), and montane or natural temperate grassland dominated by Kangaroo Grass (*Themeda australis*) and Snow Gum (*Eucalyptus pauciflora*) Woodlands on the Monaro and Shoalhaven area,
- Appears to be a coloniser of bare patches, which explains why it often occurs on roadsides,
- Apparently common on roadsides in parts of the Monaro, though it does not persist for long in such sites, and
- Does not persist in heavily grazed pastures of the Monaro or the Shoalhaven area.

Although the study area does not conform to some of the habitat feature listed above, areas of the study area do include patches of bare ground, which are known to be conducive to the species presence. The nearest record of this species it was made in 2015 approximately 580 m to the northwest of the study area (**Figure C.1**).

Using the BioNet records for *Calotis glandulosa*, removing records which are potentially dubious (those from Dubbo and Mt. Imlay, see the EPBC Act conservation advice), and importing this data into GeoCAT (Bachman *et al.* (2011), using a 2 km^2 cell width), the estimated extent of occurrence is estimated to be 559,4428.6ha, and the area of occupancy is estimated to be 72,400 ha. The resulting distribution map is presented in **Figure D-3**. Note, this estimation only uses NSW records.

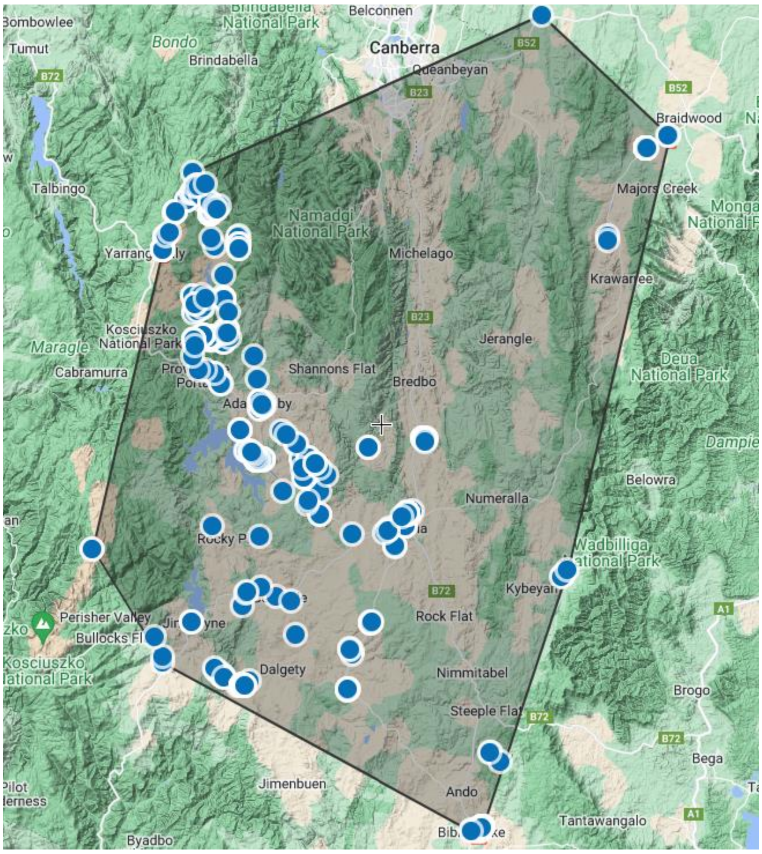

Figure D.1: The estimated extent of occurrence for *Calotis glandulosa* generated by GeoCAT (Bachman *et al.* 2011), using filtered records from BioNet (DPE 2022b).

Assessment

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:

a. *Lead to a long-term decrease in the size of the population,*

Some areas of the study area do contain patches that can be considered potential habitat for this species; however, no individuals were identified during field surveys – although no targeted surveys have been completed. Therefore, clearing of the study area may lead to decrease in the total population of *Calotis glandulosa* across its entire range, although this reduction would likely be negligible and short-lived. What should also be considered it the potential population within the study area connectivity to surrounding areas. As noted, prior, the study area is isolated from surrounding known populations by sealed roads and urban areas. This isolation does not likely impose a restriction on the movement of genetic material, as the main pollinators for this species – flighted invertebrates – can move across these barriers. However, what these barriers will impact is the movement of propagules, as the primary mode of dispersal for this species is the seeds being attached to fur and feathers. As the sealed roads and urban areas will be more restrictive to mammals and birds, seeds will unlikely move beyond the patch of land that the study area is contiguous with. The nearest most recent record of this species is 1.7 km from the study area. movement of genetic material between the study area and this population 1.7 km away is potential.

It is expected that the loss of the potential population in the study area will reduce the overall population of *Calotis glandulosa*, but this population is of low value to the recovery of species given its size and connectivity to the species in general.

b. Reduce the area of occupancy of the species,

The study area represents approximately 12.4 ha. the area most likely to be used by this species is <0.6 ha (VZ1), therefore, the proposed development will clear <0.6 ha of the species area of occupancy, to total extent of occurrence for this species is estimated to be 72,400 ha in NSW. This reduction is expected to be negligible given that the proposed removal of potential habitat represents <0.01% of its area of occupancy

c. Fragment an existing population into two or more populations,

The study area is already isolated from surrounding populations by sealed roads and built-up urban areas.

d. Adversely affect habitat critical to the survival of the species,

No habitat, critical to the survival of the species, is identified in its Conservation Advice.

e. Disrupt the breeding cycle of a population,

It is unclear how the proposed development will impact the breeding cycle of the species given that the species is not known from the study area, there is relatively low-quality habitat, and the study area is isolated from surrounding populations by sealed roads and built-up urban area, so movement of propagules and pollen will be restricted.

f. Modify, destroy, remove, isolate, or decrease the availability or quality of habitat to the extent that the species is likely to decline,

Only a small proportion of the study has been identified as potential habitat for this species, so clearing of the study area is not expected to impact the habitat for the species to the extent that the species will decline.

g. Result in invasive species that are harmful to a critically endangered or endangered species becoming established in the critically endangered or endangered species' habitat,

h. Introduce disease that may cause the species to decline, or

The proposed development is not expected to result in the establishment of any invasive species or disease which will cause the decline in the species.

i. Interfere with the recovery of the species.

Given that the study area includes mostly low-quality habitat for the species, the study area is isolated from surrounding area of native vegetation, the proposed clearing and development of the study area is not expected to interfere with the recovery of the species.

Conclusion

The proposed development of the study area is not expected to be a significant impact on *Calotis glandulosa*; this is mainly due to the study area being isolated, containing a small area (0.6 ha) of potential habitat, and is dominated by exotic grasses. As such, a MNES referral is not recommended.

Striped Legless Lizard (Delma Impar) – vulnerable

Description

The Striped Legless Lizard (*Delma impar*) grows to approximately 30 cm in length, and although can be highly variable in its colouration and pattern, this species typically has a pale grey ventral surface, a series of dark dorso-lateral and lateral longitudinal stripes along the length of its body – beginning at the neck – each stripe is exactly 1 scale wide (Cogger 2018). Although the life history of this species is not well known, the striped legless lizard can live for approximately 10 years. Females can lay a solitary clutch (two eggs) in a soil cavity or as part of a communal clutch (up 36 eggs) under a structure (*e.g.,* a rock). This species is insectivorous, feeding on spiders, grasshoppers, crickets, and cockroaches (Comm. TSSC 2016b).

This species is found throughout southeastern Australia – *viz*. southern NSW, Victoria, ACT, and South Australia – with outlying records from Gilgandra and Muswellbrook, NSW. The habitat required for this species is typically native grassland, and native woodland and exotic grassland adjacent to native grassland. This species can be found in association with four EPBC Act protected TECs, including Natural Temperate Grassland. This species is more likely to be found in native grasslands with increased structural complexity (Howland *et al.* 2016) – complex grassland structure being "areas of tussocks with high biomass, surface rocks or invertebrate burrows necessary as sites for oviposition and which provide protection for eggs from disturbance" (Comm. TSSC 2016b).

The EPBC Act Conservation Advice for this species identifies all populations as likely to be important for this species recovery, with the study area being found in a region identified as supporting an "important population".

The justification for completing this significant impact assessment for the striped legless lizard is that targeted surveys will be completed in Lot 3 // DP 1285072, however, these are not being undertaken in the study area as the potential habitat is of low quality.

Using the BioNet records for *Calotis glandulosa*, removing records which are potentially dubious (those from Dubbo and Mt. Imlay, see the EPBC Act conservation advice), and importing this data into GeoCAT (Bachman *et al.* (2011), using a 2 km^2 cell width), the estimated extent of occurrence is estimated to be 4,775,895.9 ha, and the area of occupancy is estimated to be 15,600 ha, however, these estimates are likely to be lower than the actual numbers given at this assessment has only used NSW records and the Striped Legless Lizard is found in Vic and ACT. The resulting distribution map is presented in **Figure D-3**.

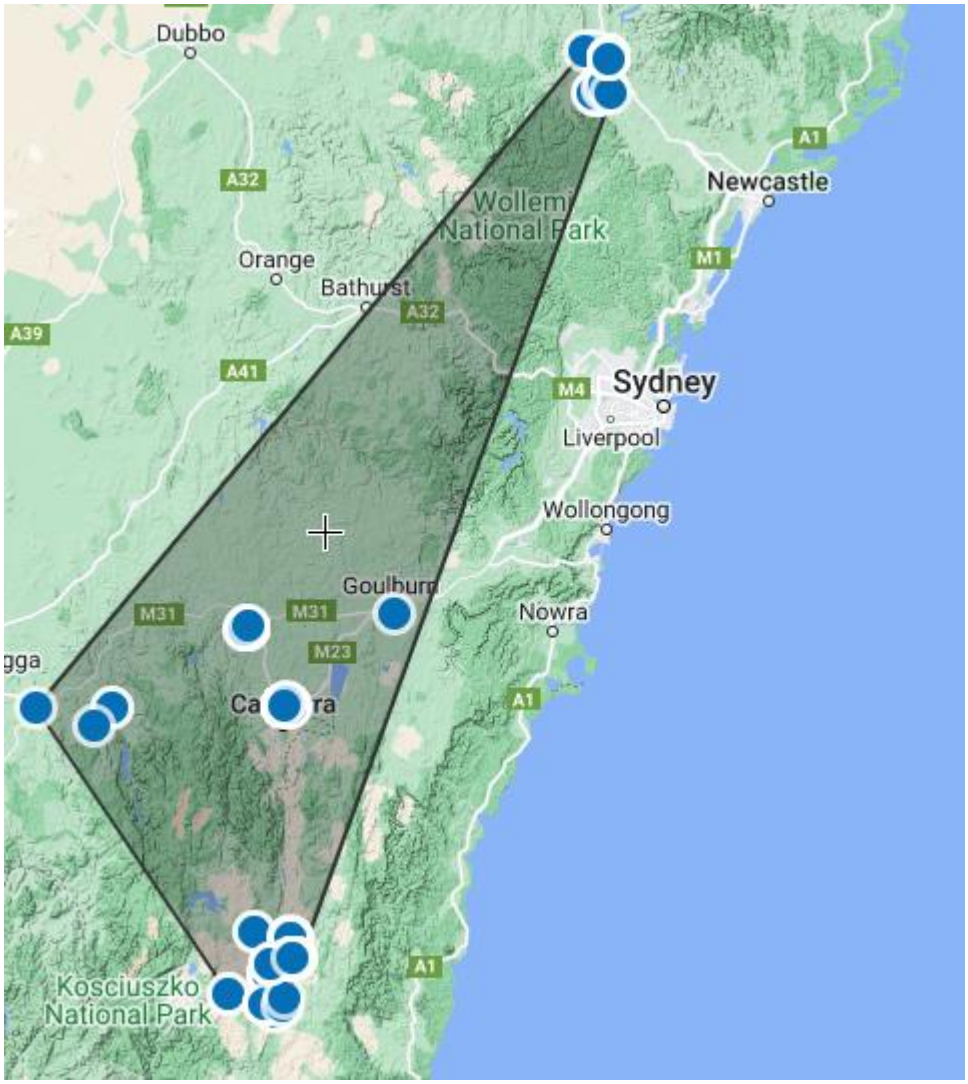

Figure D.1: The estimated extent of occurrence for the Striped Legless Lizard generated by GeoCAT (Bachman *et al.* 2011), using filtered records from BioNet (DPE 2022b).

Assessment

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:

a. Lead to a long-term decrease in the size of the population,

The nearest record of this species to the study area is 4 km from the study area, made in 2020. There is an additional six records of the Striped Legless Lizard within 10 km of the study area. The known population is in Kuma Nature Reserve. If a population is present within the study area, it is expected that it will be isolated from any surrounding populations, given that the patch that the study area is contiguous with is bordered on all sides by sealed roads and urban areas. Therefor, it is expected that dispersal of any Striped Legless Lizard within the study area is limited, given the sealed roads would present themselves as hard barriers. It is therefore assumed that any population which may be present in the study area is isolated from any surrounding populations.

b. Reduce the area of occupancy of the species,

The study area represents approximately 12.4 ha of potential habitat for the species, clearing of which will be a <0.01%, assuming the extent of occurrence is 15,600 ha.

c. Fragment an existing population into two or more populations,

If the Striped Legless Lizard is present within the study area, this population is already isolated from surrounding populations, *viz.* by sealed roads but also by built up areas.

d. Adversely affect habitat critical to the survival of the species,

The conservation advice for the Striped Legless Lizard identifies habitat critical to the survival of the species as:

- An area where two or more adults or juveniles are confirmed to inhabit which also contains grassland with complex structure, these areas may also include areas of exotic grassland,
- The site is floristically diverse with little disturbance which as a diversity and abundance of foraging resources likely to sustain a lizard population,
- Has long-term protection from development,
- Forms part of a larger area that has not been developed and is adjacent to conservation reserves and has been free from agricultural practices for the past 10 years.

Although the study area does contain grassland with a complex structure and supports a diversity of foraging resources (e.g., grasshoppers, crickets, and spider tunnels; pers. obs.) the study area cannot be considered critical habitat for the species as the majority of the site is not floristically diverse (being dominated by *Eragrostis curvula**).

e. Disrupt the breeding cycle of a population,

It is unclear how the proposed development will impact the breeding cycle of the species given that the species is not known from the study area, there is relatively low-quality habitat, and the study area is isolated from surrounding populations by sealed roads and built-up urban area.

f. Modify, destroy, remove, isolate, or decrease the availability or quality of habitat to the extent that the species is likely to decline,

The study area has been identified as low-quality habitat for the species, which is also isolated from surrounding patches of potential habitat, so clearing of the study area is not expected to impact the habitat for the species to the extent that the species will decline.

g. Result in invasive species that are harmful to a critically endangered or endangered species becoming established in the critically endangered or endangered species' habitat,

h. Introduce disease that may cause the species to decline, or

The proposed development is not expected to result in the establishment of any invasive species or disease which will cause the decline in the species.

i. Interfere with the recovery of the species.

Given that the study area includes mostly low-quality habitat for the species, the study area is isolated from surrounding area of native vegetation, the proposed clearing and development of the study area is not expected to interfere with the recovery of the species.

Conclusion

For the purposes of this assessment, it is assumed that a small population of Striped Legless Lizard is present within the study area. The proposed development is expected to clear approximately 12.4 ha of low-quality habitat. In addition, the population which is assumed present within the study area is likely to be highly fragmented form any surrounding populations, given that the patch of land that the study area is contiguous with is isolated on all sides by sealed roads and urban areas. As such, the assumed population within the study area is of low value to the conservation of the Striped Legless Lizard, when other populations in the surrounding landscape are found within conservation reserves (*viz*. Kuma Nature Reserve). Therefore, a MNES referral is not recommended.