Flora and fauna survey and assessment of Lot 101, DP 1183622, Yallakool Road, Cooma, New South Wales

by

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1.0. Introduction

During early March 2015, I undertook a detailed flora and fauna survey of Lot 10, DP 1183622, Yallakool Avenue, Cooma, New South Wales (see Fig. 1). The survey was undertaken during the afternoon of 5 March 2015 (1700-1100 hrs, Eastern Australian Summer Time, EAST), and during the day of 6 March 2015 (1000-1530 hrs, EAST). One night survey was undertaken during the evening of 6 March 2015 (1800-2030 hrs, EAST). Weather conditions were fine and warm during the day (30-35 degrees Celsius) and cooler at night with little or no cloud. The results of the survey are reported below.

The site is proposed to be subdivided into a number of residential Lots (see Fig. 1).

2.0. Materials and Methods

Methods for assessing and documenting the flora and fauna follow those listed in my previous environmental reports (viz. Hawkeswood, 2003-2005) and as outlined below. This report follows where applicable the *DECC Threatened Species Assessment Guidelines* (2008). Various horizontal and longitudinal transects were undertaken within the surveyed areas. Plants were listed in note books as the transects were walked and any unidentified or taxonomically difficult species were collected for further study and identification. Important floristic references used to verify/identify plants collected from the study site include the following: Anderson (1936), Auld & Medd (1992), Baker et al. (1985), Beadle et al. (1981), Benson & Howell (1990a), Bishop (1995), Blombery (1955, 1986), Brooker & Kleinig (1990), Burbidge (1966a,b), Burbidge & Gray (1970), Carolin & Tindale (1993), Child (1968), Costermans (1981), Cunningham et al. (1981), Fairley & Moore (1989), Harden (1990,1991,1992,1993), Jones (1988), Jones & Gray (1988), Lamp & Collett (1989), Lamp et al. (1990), Macoboy (1981), Macoboy & Blombery (1975), Nicholls (1969), Parsons (1971), Parsons & Cuthbertson (1992), Robinson (1991) & Rotherham et al. (1975).

Hand searches for reptiles were undertaken in prospective hiding sites, such as under bark, under rocks, fallen branches or refuse such as cardboard or plastic sheets, inside and under logs and up trees. Generally field research and methods followed those reported in my other reports concerning reptile surveys (viz. Hawkeswood, 2003- 2005). Reptiles which were caught for identification/verification were identified using the key of Cogger (1996) as well as photographs and other data in the following references: Bustard (1970), Cogger (1996), Frauca (1973), Greer (1990), Griffith (1997), Hoser (1989), Jenkins & Bartell (1980), Schmida (1985), Swan (1990), Wilson & Knowles (1988 and Worrell (1963).

Hand searches of potential frog refuge areas were undertaken during daylight hours. This involved searching through the vegetation alongside any area of water retention, upending large rocks or pieces of building rubble and other refuse (if present), rolling over logs, fallen branches or mats of vegetation and checking under any piece of ground cover which could serve as a frog refuge area. References used to identify/verify frogs included the following references: Anstis (1975), Barker & Grigg (1977), Brooks (1983), Clyne (1969), Cogger (1960, 1962, 1972, 1996), Griffith (1997), Hoser (1989), Kinghorn (1944), Kreft (1865), Moore (1957, 1961), Robinson (1998), Tyler (1982, 1992, 1994).

Birds were observed mostly through binoculars as well as by unaided eye during the day during the observation period. Birds were also spotlighted at night. Birds were identified/ verified using the following references: Cayley (1986), Forshaw (1992), Frith (1982), Macdonald (1980), Rowley (1975), Simpson & Day (1993), Slater (1983a,b).

Mammals were detected by checking for claw marks on smooth-barked trees and by searching for droppings on the ground. Bats were detected using ultrasound bat detectors set for 15-70 hertz and the new Anabat Express. References used to check field determinations are as follows: Cronin (1991), Hall & Richards (1979), Ride (1970), Strahan (1983, 1992, 1996) and Triggs (1997).

3.0. Comments on the habitat type, general condition and plant species of the surveyed site

The surveyed area is highly disturbed around the existing shed as well as the rest of the property as a result of past agricultural practices (see Figs.1-7, 11). At present there is a small, herd of cattle present (Fig. 7). Most of the plant species present are introduced weeds. There is an area of rocky ground (highest point on the property)(Fig. 9) where the endangered plant species *Leucochrysum albicans* (Asteraceae)(Fig. 10) occurs in clusters and individuals amongst an endangered ecological community known as Temperate *Themeda australis* Grassland. This area will be conserved and management of weeds to protect these two vegetation entities. There has been considerable weed management in this area before the present study was undertaken and this has removed *Eragrostis curvula* (South African Love Grass) and promoted the population of *Leucochrysum* and extended the area of *Themeda* grassland as well. There is a small dam near the cattle shed (see Fig. 3).

Most of the site is covered in poor agricultural quality introduced *Eragrostis* grassland dominated by *Eragrostis curvula* (Figs. 1-7, 11). Common exotic species includes numerous species of grasses, herbs and introduced shrubs such as *Rosa rubiginosa* (Rosaceae), *Lycium ferocissimum* (Solanaceae), *Verbascum thaspus* (Scrophulariaceae) and prickly Asteraceae such as *Onopordum*, *Carthamnus* and Centaurium species. No threatened flora pr fauna species were detected in these exotic grasslands. In the western area of the property there is a small waterourse/marshy areas associated with willow trees (*Salix babylonica)* which is utilized by the cattle (Fig. 7). These wet areas are also highly weed infested.

The small area of *Themeda* grassland (Natural Temperate Grassland) is sparse and rocky and dominated by two daisy species including the endangered *Leucochrysum albicans* and the common native grass, *Themeda australis* (Figs. 9, 10). There are also native herbs and grasses such as *Austrostipa scabra*. This area is shown in Fig. 1. No threatened fauna species were detected within this area of *Themeda* grassland.

Table 1. List of the plant species observed within the surveyed site: [* = introduced plant species, @= endangered species]

Family and species

Magnoliopsida

Dicotyledonae

Amaranthaceae

**Alternanthera* sp.

**Amaranthus sp.*

Asteraceae
- **Carthamnus lanatus*
- **Centaurium calcitrapa*
- **Centaurium solstitioides*
- **Chondrilla juncea*
- *Chrysocephalum apiculatum*
- **Cirsium vulgaris*
- **Conyza bonariensis*
- **Hypochoeris radicata*
- **Hypochoeris sp.*
- **Lactuca serriola*
- *@Leucochrysum albicans*
- **Onopordum acanthium*
- **Sonchus oleraceus*
- **Tragopogon dubius*
- *Vittadenia cuneata*
- *Vittadenia gracilis*

Boraginaceae
- **Echium plantagineum*

Brassicaceae
- **Brassica rapa*
- **Capsella bursa-pastoris*
- **Hirshfieldia incana*
- **Rorippa pseudo-nasturtium*

Campanulaceae
- *Wahlenbergia gracilis*

Caryophyllaceae
- **Petrorhagia nanteuillii*

Convolvulaceae
- **Convolvulus erubescens*

Fabaceae
- **Medicago polymorpha*
- **Trifolium arvense*
- **Trifolium fragiferum*
- **Trifolium repens*

Hypericaceae
- **Hypericum perforatum*

Lamiaceae
- **Marrubium vulgare*
- **Stachys arvensis*

Oleaceae
- **Olea sp. (?)*

Onagraceae
Epilobium billardieranum

Oxalidaceae
**Oxalis corniculata*

Plantaginaceae
**Plantago lanceolata*

Polygonaceae
**Rumex crispus*

Ranunculaceae
Ranunculus inundatus
**Ranunculus muricatus*

Rosaceae
Acaena ovina
**Pyracantha coccinea*
**Rosa rubiginosum*

Rubiaceae
**Asperula conferta*

Salicaceae
**Salix babylonica*

Scrophulariaceae
**Verbascum thaspus*

Solanaceae
**Lycium ferocissimum*

Verbenaceae
**Verbena officinale*

Monocotyledonae

Cyperaceae
Carex sp.
Cyperus brevifolius
**Cyperus eragrostis*
Cyperus gracilis
Fimbristylis dichotoma

Juncaceae
**Juncus acutus*
Juncus sp.

Poaceae
**Aira caryophyllea*

Austrostipa scabra
Austrostipa verticillata
**Avena sativa*
**Bromus cartharticus*
**Bromus sp.*
**Cynodon dactylon*
Danthonia caespitosa
Danthonia carphoides
**Digitaria sp.*
**Echinochloa sp.*
**Eragrostis curvula*
**Eragrostis spp.*
**Festuca pratensis*
**Hordeum vulgare*
**Nasella neesiana*
**Panicum sp.*
**Paspalum dilatatum*
Paspalum distichum
**Phalaris aquatica*
**Setaria gracilis*
**Setaria sp.*
**Sporobolus sp.*
**Stipa sp.*
Themeda australis

Comments: See Appendix 2 for EPBC assessment of *Leucochrysum albicans*.

4.0. Fauna of the surveyed area

4.1. Reptiles and Amphibians

Common Eastern Toadlet (*Crinia signifera*, Myobatrachidae) - one heard calling during the evening from drainage line (marshy area) in the west of the property on 6 March 2015.
No reptiles were detected during the surveys.

4.2. Birds

During the ssurveys, bird life was found to be reasonably scarce in terms of numbers and species. A total of 9 common species of bird (including two introduced species) were observed within the study area during the observation times, these being the following:

Common Magpie (*Gymnorhina tibicen*, Corvidae)
Australian Raven (*Corvus coronoides*, Corvidae)
White faced Heron (*Egretta novaehollandiae*, Ardeidae)
Grey Fantail (*Rhipidura fuliginosa*, Rhipiduridae)
Wood Duck (C*henonetta jubata*, Anatidae)
Sacred Kingfisher (*Todiramphus sanctus*, Halcyonidae)
Double-bar Finch (*Taeniopyga bichenovii*, Fringillidae)
*European Goldfinch (*Carduelis carduelis*, Fringillidae)
*Blackbird (*Turdis merula*, Turdidae)

4.3. Mammals

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White-tailed Freetail Bat (*Tadarida australis*, Molossidae) - detected by Anabat Express bat detector.
Eastern Grey Kangaroo (*Macropus giganteus*, Macropodidae) - commonly foraging in western part of the property.
Domestic Cow (*Bos taurus*, Bovidae) - small herd present on site.
Feral Fox (*Vulpes vulpes*, Canidae) - detected by droppings.
Feral animals are common in the area and have had an enormous detrimental effect on the environment.

Comments: None of the fauna species detected within the study area are presently listed on any Schedule of the NSW Threatened Species Conservation Act (1995) and the Commonwealth Environmental Protection and Biodiversity Conservation Act (2000).

5.0. Consideration of potential occurrence of Scheduled Plant and Animal Species on the subject site

There are a number of species of plants of particular conservation concern known from the Cooma-Monaro area and which are known to occur in the general region of the subject site and I have considered such species in my assessment below.

5.1. Flora

There are at least 4 plant species which were considered to have potential habitat within 1-5 kilometres of the subject property.

All of these species of threatened plants have been listed either under the TSC Act (1995) or regarded as of conservation significance by being listed in ROTAP (see Briggs & Leigh, 1996). Recently some of them have also been listed on the schedules of the new Commonwealth Environment Protection and Biodiversity Conservation Act (2000).

Specific targeted searches were undertaken within the surveyed area in an endeavour to detect these species, but only one was located within the surveyed area, possibly due to its degraded and rural nature.

Nevertheless, these species are discussed below:

Dodonaea procumbens (Sapindaceae) is listed in Schedule 2 of the TSC Act (1995) as Vulnerable and is also classified as Vulnerable under the EPBC Act (1999). The Creeping Hop-bush is a low spreading shrub that forms a ground-hugging mat up to 1 m across and 10 cm tall. Its leaves are wedge-shaped, glossy, dark green, to 2 cm long and 8 mm wide, with up to four teeth at the tips. The flowers are small and have yellow, orange, red or pink petals. Flowers appear in spring. The fruits are reddish, papery 'hops', forming in late spring and summer.Creeping Hop-bush is found in the dry areas of the Monaro, between Michelago and Dalgety. Here it occurs mostly in Natural Temperate Grassland or Snow Gum *Eucalyptus pauciflora* Woodland. There is one population at Lake Bathurst (the northern-most occurrence of the species). Here it occurs in adjacent to the lake bed in grassland dominated by Corkscrew Grass *Austrostipa scabra* and Curly Sedge *Carex bichenoviana*. Creeping Hop-bush also occurs in South Australia and Victoria. It was not detected during the survey, nor was any potential habitat for this species present on the subject site.

Lepidium hyssopifolium (Brassicaceae) is listed in Schedule 2 of the TSC Act (1995) as Endangered and is also classified as Endangered under the EPBC Act (1999). Aromatic Peppercress is an erect perennial herb growing 30 to 50 cm tall. The leaves are variable, to 40 mm long by 2.5 mm wide. Leaves are fern-like in the rosette stage, and ultimately narrow and grass-like, with or without teeth, on the mature stems. The flower clusters are similar in form to that of many weedy members of this group, such as African Peppercress. Individual flowers are very small and greenish in colour. The fruits are flattened, oval-shaped 'pods' (siliculas) to 5 mm long and 2.5 mm wide. The flower and fruit stalks (pedicels) are hairy. In NSW, there is a small population near Bathurst, one populations at Bungendore, and one near Crookwell. The species was also recorded near Armidale in 1945 and 1958; however it is not known whether it remains in this area. A specimen collected in the Cooma area about 100 years ago may also be Aromatic Peppercress. It was not detected during the survey, nor was any potential habitat for this species present on the subject site.

Swainsona sericea (Fabaceae) is listed in Schedule 2 of the TSC Act (1995) as Vulnerable but not listed in the EPBC Act (1999). Swainson -pea is a prostrate or erect perennial, growing to 10 cm tall. The stems and leaves are densely hairy. The leaves are up to 7 cm long, composed of 5 - 13 narrow, pointed leaflets, each up to 15 mm long. The purple pea-shaped flowers are to 11 mm long, and are held in groups of up to 8 flowers, on a stem to 10 cm tall. The spring flowers are followed by hairy pods, up to 17 mm long. Silky Swainson-pea has been recorded from the Northern Tablelands to the Southern Tablelands and further inland on the slopes and plains. There is one isolated record from the far north-west of NSW. Its stronghold is on the Monaro. Also found in South Australia, Victoria and Queensland.Found in Natural Temperate Grassland and Snow Gum *Eucalyptus pauciflora* Woodland on the Monaro. Found in Box-Gum Woodland in the Southern Tablelands and South West Slopes. Sometimes found in association with cypress-pines *Callitris* spp. It was not detected during the survey, nor was any potential habitat for this species present on the subject site.

Leucochrysum albicans (Asteraceae) is not listed in any Schedule of the TSC Act (1995) as but is listed in the EPBC Act (1999) as Vulnerable. A perennial everlasting daisy. Stems are 10–15 cm tall, with narrow leaves 2–10 cm long, covered in white cottony hairs. Yellowish flowerheads are 2–5 cm in diameter, surrounded by numerous papery, white, overlapping ovate-oblong bracts, with the outer layers tinged red, pink, purple or brown. Fruits are brown, ovoid, 2–3 mm long, with 14–20 pappus bristles. *Leucochrysum albicans* var. *tricolor* is distinguished from the other varieties within *L. albicans* by its white involucral bracts and narrow, linear-oblanceolate leaves. In rare instances, populations typical of var. *tricolor* apparently intergrade with the yellow-flowered *L. albicans* var. *albicans.* Endemic to south-eastern Australia, where it is currently known from three geographically separate areas in Tasmania, Victoria and south-eastern NSW and ACT. In NSW it currently occurs on the Southern Tablelands adjacent areas in an area roughly bounded by Albury, Bega and Goulburn, with a few scattered localities know from beyond this region. Occurs in a wide variety of grassland, woodland and forest habitats, generally on relatively heavy soils. Can occur in modified habitats such as semi-urban areas and roadsides. Highly dependent on the presence of bare ground for germination. In some areas, disturbance is required for successful establishment.

I have provided 7-part Tests of Significance for the first three plant species in Appendix 2 of this report. *Leucochrysum albicans* is dealt with under the EPBC Act (2000).

5.2. Fauna

There are at least 20 species of fauna of particular conservation concern that are known to occur or to have occurred in the general region of the subject site (NPWS Wildlife Database) and these are listed below. All have been listed under the TSC Act (1995) as either Vulnerable or Endangered.

Despite the known occurrence of a number of species of threatened fauna from the Cooma - Monaro area, very few were considered to have any potential habitat on the subject property because of its totally degraded/rural nature dominated by weeds and introduced plants and cleared areas. Although none of these species have been recorded on the subject property, some have been detected within 5-10 km.

Reptiles

Two species of reptile of conservation significance, being listed on the Schedules of the NSW Threatened Species Conservation Act (1995), are known from the Cooma - Monaro area, these being the Grassland Bearded Dragon (*Tympanocryptus pinguicolla*, Agamidae) and the Striped Legless Lizard (*Delma impar*, Pygopodidae). The Little Whip Snake may also occur in the Region.

The Striped Legless Lizard differs most obviously from a snake in having external ear openings, small scaly flaps for hind limbs, a long tail and a broad, undivided tongue. It is pale grey-brown above, with a darker head, and almost white below. The most distinguishing characteristic is a pattern of light and dark parallel lines running along the length of the body, although these may be very pale or even absent in some individuals. This parallel stripe pattern breaks up into a diagonal pattern on the tail. They grow to about 30 cm in length, with up to three-quarters of this being the tail.The Striped Legless Lizard occurs in the Southern Tablelands, the South West Slopes and possibly on the Riverina. Populations are known in the Goulburn, Yass, Queanbeyan, Cooma and Tumut areas. Also occurs in the ACT, Victoria and south-eastern South Australia. Found mainly in Natural Temperate Grassland but has also been captured in grasslands that have a high exotic component. Also found in secondary grassland near Natural Temperate Grassland and occasionally in open Box-Gum Woodland.Habitat is where grassland is dominated by perennial, tussock-forming grasses such as Kangaroo Grass *Themeda australis*, spear-grasses *Austrostipa* spp. and poa tussocks *Poa* spp., and occasionally wallaby grasses *Austrodanthonia* spp. Sometimes present in modified grasslands with a significant content of exotic grasses. Sometimes found in grasslands with significant amounts of surface rocks, which are used for shelter.Actively hunts for spiders, crickets, moth larvae and cockroaches.Two papery eggs are laid in early summer. Moves below ground or under rocks or logs over winter. It was not detected during the survey.

The Little Whip Snake, *Suta flagellum* (Elapidae) may occur in rocky areas of the region. The Little Whip Snake is a small, slender snake, reaching 45 cm in length. Its most conspicuous feature is the black hour-glass-shaped patch from the back of the nape to between the eyes. Some specimens also have a black snout-band. The body is tan to orange above and creamy below. Each scale is emphasized by its dark edge, giving the animal a "netted" appearance. If disturbed it may hurl itself about, whip-like, and emit a foul smell. They are venomous, though their size and small venom dosage is such that they are virtually harmless, though a bite can be painful. The Little Whip Snake is found within an area bounded by Crookwell in the north, Bombala in the south, Tumbarumba to the west and Braidwood to the east. Occurs in Natural Temperate Grasslands and grassy woodlands, including those dominated by Snow Gum *Eucalyptus pauciflora* or Yellow Box *E. melliodora*. Also occurs in secondary grasslands derived from clearing of woodlands. Found on well drained hillsides, mostly associated with scattered loose rocks. Most specimens have been found under rocks or logs lying on, or partially embedded in the soil. Little is known about the habits of this small snake as it is primarily nocturnal. Feeds on lizards and frogs. It was not detected during the survey.

Amphibians

Two species of amphibian of conservation significance, being listed on the Schedules of the NSW Threatened Species Conservation Act (1995), are known from the Cooma-Monaro area and, these being the Yellow-spotted Bell Frog (*Litoria castanea*, Hylidae) and the Southern Bell Frog (*Litoria raniformis*, Hylidae).

The Yellow -spotted Bell Frogs are large mostly aquatic tree frogs, with only small finger and toe pads. They have been recorded across a range of habitat types, including rainforest, open forest, woodland, coastal heath and inland riparian forest, from the sub-alpine zone to the coastline.The Yellow-spotted Bell Frog is distinguished from other members of the group by its fully webbed toes and yellow spots on the groin and the back of the thighs. Elsewhere it is marbled green and gold, with black spots. This patterning varies greatly, but the pale green mid-back stripe is unvarying. The larger females may be up 9 cm long. The call is a series of loud, droning grunts, like a distant motorbike. The tadpoles are large, growing to about 8 cm long with a pinkish-grey body and yellowish fins.There is only a single known population of the Yellow-Spotted Bell Frog , which occurs on the Southern Tablelands. Historically, this species occurred in two separate highland ranges, on the New England Tableland and on the southern and central highlands from Bathurst/Orange to Bombala. It was not detected during the survey.

One of the largest frog species in Australia, the Southern Bell Frog may reach up to 104 mm in length, with females usually larger than males. Animals vary greatly in colour and pattern but are typically olive to bright emerald green, with irregular gold, brown, black or bronze spotting with a pale green stripe down the centre of the back. Undersides are white and coarsely granular, although during the breeding season males may become yellow or dark grey/black under the throat. The groin and posterior of the thighs are turquoise blue. They lack webbing on their fingers but the toes are almost fully webbed and toe discs are small and approximately equal in width to the digits. The male's call is a growling, engine-like "waaa waaa waaa", heard during the breeding season. In NSW the species was once distributed along the Murray and Murrumbidgee Rivers and their tributaries, the southern slopes of the Monaro district and the central southern tablelands as far north as Tarana, near Bathurst. Currently, the species is known to exist only in isolated populations in the Coleambally Irrigation Area, the Lowbidgee floodplain and around Lake Victoria. A few yet unconfirmed records have also been made in the Murray Irrigation Area in recent years. The species is also found in Victoria, Tasmania and South Australia, where it has also become endangered. Once known from the southern slopes of the Monaro region, it is known from only a few populations in the Murrumbidgee and Riverina. It was not detected during the survey.

Birds

The following 14 bird species which have been listed on the Schedules of the NSW Threatened Species Conservation Act (1995) have been purportedly recorded or are historically known from the Cooma-Monaro district:

Spotted Harrier (*Circus assimilis*, Accipitridae), Blue-billed Duck (*Oxyura australis*, Anatidae), Great Egret (*Ardea alba*, Ardeidae), Cattle Egret (*Ardea ibis*, Ardeidae), Painted Snipe (*Rostratula benhelensis*, Rostratulidae), Diamond Firetail (*Stagonopleura guttata*, Fringillidae), Australasian Bittern (*Botaurus policiloptilus*, Ardeidae), Regent Honeyeater (*Xanthomyza phrygia*, Meliphagidae), White belled Sea Eagle (*Haliaeetus leucogaster*, Accipitridae), White throated Needletail (*Hirundapus caudacutus*, Apodidae), Satin Flycatcher (*Myagra cyanoleuca*, Monarchidae), Rainbow Bee eater (*Merops ornatus*, Meropidae), Swift Parrot (*Lathamus discolor,* Psittacidae), Gang-gang Cockatoo (*Callocephalon fimbriatum*, Cacatuidae).

A few of these species are potential visitors to the subject property but none were found at the time of the investigations. It is unlikely that any would breed on the site due to the lack

of suitable habitat and possible predation by feral cats and foxes. In addition, only common species of bird were detected on this property.

Mammals

The following 6 mammal species, which have been listed on the Schedules of the NSW Threatened Species Conservation Act (1995) have been recorded or are known from the Cooma-Monaro district: Spotted-tailed Quoll (*Dasyurus maculatus*, Dasyuridae), Koala (*Phascolarctos cinereus*, Phascolarctidae), Long-nosed Potoroo (*Potorus tridactylus,* Potoroidae), Eastern False Pipistrelle (*Falsistrellus tasmaniensis*, Vespertilionidae), Grey-headed Flying Fox (*Pteropus poliocephalus*, Pteropodidae) and Southern Myotis (*Myotis macropus*, Vespertilionidae).

Specific targeted searches were undertaken for threatened fauna and none of these species were detected and it is considered somewhat unlikely that any of these species inhabits the subject property due to the highly disturbed and modified nature of the whole property.

6.0. Conclusions

6.1. Flora

Most of the surveyed area has been totally altered from its natural condition as a result of clearing and rural/residential activities (e.g. past clearing, grazing) during past and more recent times. Weeds and other exotic plants are a major environmental factor affecting many areas of the property. As such, the presence of these conditions and factors make it detrimental for native flora and fauna to survive, and hence the native biodiversity is extremely low within this property.

The surveyed property possess one endangered plant community (Natural Temperate *Themeda* Grassland) and one endangered plant species (*Leucochrysum albicans*, Asteraceae) as defined under the NSW Threatened Species Conservation Act (1996). Since these two plant entities are being preserved and managed on the subject property, no Species Impact Statements under the NSW Threatened Species Conservation Act (1996) are required. The habitat of the endangered species *Leucochrysum albicans* has been sprayed for weeds and the species is recovering within the Temperate *Themeda* Grassland. Therefore there will be little impact on these plant entities by the proposal.

Therefore, in my professional scientific opinion, I see no impediments, based on flora concerns, for the development of the property (see Fig. 1) as proposed.

6.2. Fauna

Amphibians

From my inspection, it appears that the surveyed area is generally unsuitable for most frog species with only one species being detected within the small watercourse. No endangered frog species are likely to occur within the surveyed area given the lack of suitable habitat and the highly disturbed nature of the site.

Reptiles

The surveyed area appears to be very unsuitable for reptiles with no species being detected. No endangered reptile species are likely to occur within the surveyed area given the lack of suitable habitat and the highly disturbed nature of the site.

Birds

Several common and widespread bird species were actually observed on the surveyed property and it could be expected that other common species would move across the landscape quite readily, as these and other species also occur in backyard gardens and cleared paddocks and other types of highly disturbed or converted ecosystems. No endangered reptile species are likely to occur within the surveyed area given the lack of suitable habitat and the highly disturbed nature of the site. Additionally, the surveyed site generally represents only limited nesting or resting areas for a few very common birds because of previous disturbances and presence of cattle and feral animals.

Mammals

An examination of the surveyed property and environs indicates that all species of native ground-dwelling mammals that would have occupied this area at European settlement are

now likely extinct here. The common Grey Kangaroo (*Macropus giganteus*, Macropodidae) is common in the area and would appear to be the only native terrestrial mammal present on the property.

The only other native mammals which probably still persist in the general area are a few species of small microbats. However, all of the *Salix babylonica* trees remaining on the site have not developed any suitable hollows that could be regarded as being suitable for roost sites and the paucity of decorticating bark would prevent all but the most superficial use as shelter sites. However, at least one bat species was detected using ultrasonic bat detectors during the night survey. This is the common White-tailed Freetail Bat (*Tadarida australis*, Molossidae) which was probably foraging along the watercourse/marshy areas. Only one bat call was recorded.

The subject site appears not to contain any endangered species of fauna and does not appear to act as an important corridor for endangered wildlife. The cleared/ highly altered nature of the majority of the site would preclude numerous species of native fauna except for some birds, and the occasional reptile or frog. In addition feral foxes and possibly cats are probably a concern on the property which would deter bats and other native mammals.

SEPP 44 Koala Habitat: SEPP 44 encourages the conservation and management of natural vegetation areas that provide habitat for Koalas to ensure that permanent free-living populations will be maintained. SEPP 44 aims to identify areas of potential and core Koala Habitat. These are described as follows:

Potential Koala Habitat is defined as areas of native vegetation where the trees listed in Schedule 2 of SEPP 44 constitute at least 15% of the total number of trees in the upper or lower strata of the tree component; and

Core Koala Habitat is defined as an area of land with a resident population of koalas, evidenced by attributes such as breeding females, and recent and historical records of a population.

No trees as listed in Schedule 2 of SEPP 44 are present, therefore the area is not considered potential koala habitat under SEPP 44.

No evidence for the Koala (*Phascolarctos cinereus*) occurring on the surveyed site was found. There are no host trees nor any other *Eucalyptus* species on the subject site.

Taking these factors into account, the subject property could not be considered Core Koala Habitat under SEPP 44. The proposal is not expected to impact upon Koalas or their habitat.

In my professional scientific opinion, I see no impediments, based on fauna concerns, to the development of the subject property as proposed.

7.0. References and Literature Cited

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8.0. Qualifications of the Author

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Bachelor of Applied Science (Environmental Science)(Charles Sturt University, New South Wales, 1992-1996)

Bachelor of Science (American Institute of Metaphysics, USA, 2012-2014)

Bachelor of Metaphysical Humanistic Science (Institute of Metaphysical Humanistic Science, USA, 2013)

Master of Metaphysical Humanistic Science (Institute of Metaphysical Humanistic Science, USA, 2014)

Doctor of Metaphysics (Bliss-Parsons Institute, USA, 2013)

Doctor of Philosophy (Honorary)(Cosmopolitan University, USA, 2001)

AQF 7 Arborist, AQF 8 Ecologist (Australian Qualifications Framework)

Author of over 2000 papers, books and scientific reports on the Australian flora and fauna which have been accepted by the Australian and International Scientific Community

Appendix 1. Plan and photographs

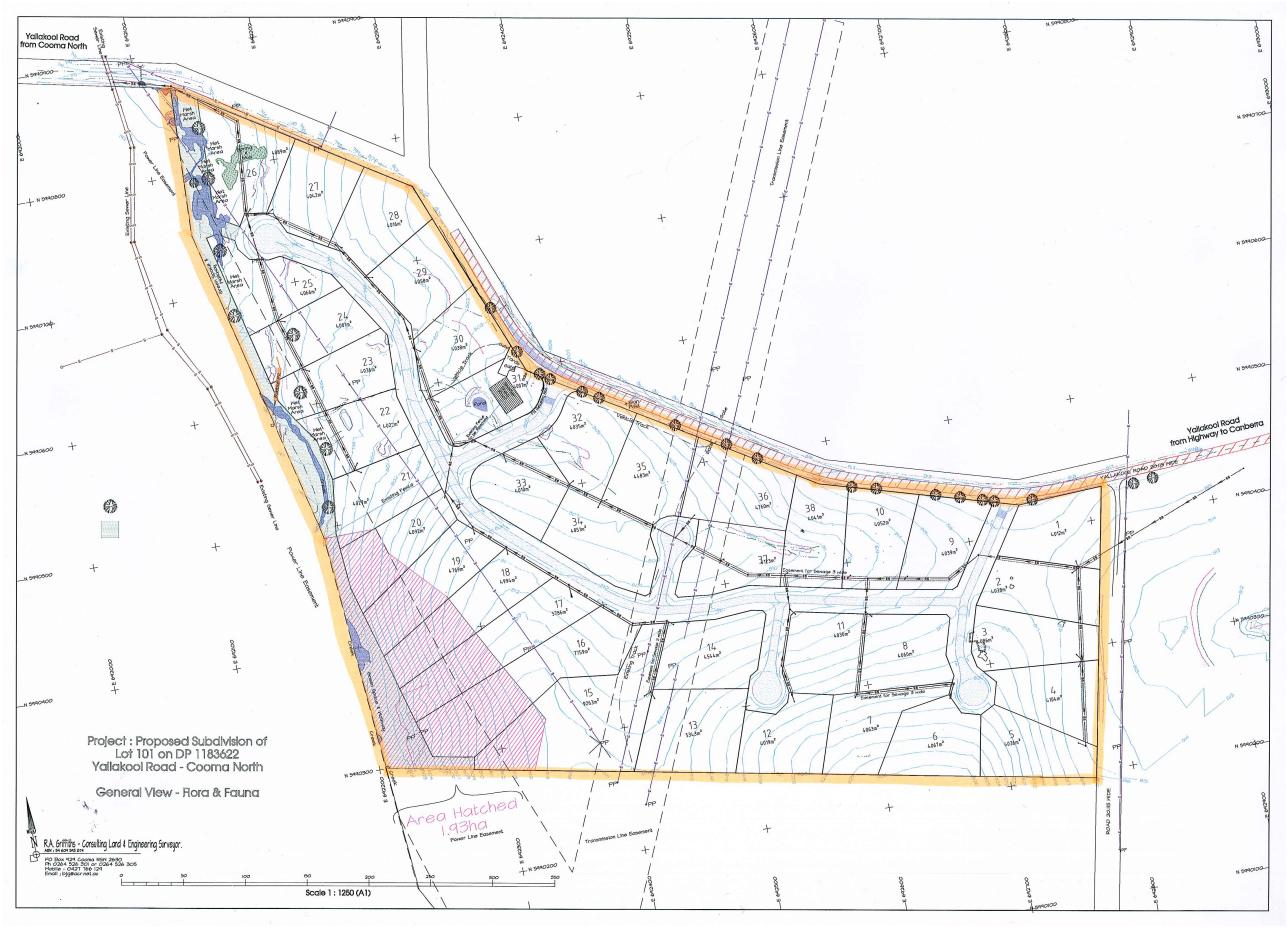

Fig. 1. Plan of the subject property of Lot 101 DP 1183622, Yallakool Road, Cooma, New South Wales. Area surveyed is bordered in orange, area in pink is the area of Natural Temperate *Themeda* Grassland containing the population of *Leucochrysum albicans (*Asteraceae).

Fig. 2. View looking towards the south-west from the shed showing the cleared nature of the property and typical exotic grasslands. (Photo: T.J. Hawkeswood).

Fig. 3. Weeds and grasses around the cattle shed. (Photo: T.J. Hawkeswood).

Fig. 4. Thistles (*Cirsium* and *Onopordum*) and other weeds are over most of the property. Note lack of trees. (Photo: T.J. Hawkeswood).

Fig. 5. View looking towards the east showing patches of *Pyracantha coccinea* (Rosacea), thistles (*Cirsium*) and other weeds in this area. Note lack of trees. (Photo: T.J. Hawkeswood).

Fig. 6. There are several willow trees (*Salix babylonica*, Salicaceae) along the western drainage line. (Photo: T.J. Hawkeswood).

Fig. 7. View looking towards the east showing several willow trees (*Salix babylonica*) and treeless areas with weeds and exotic grasses. Cattle are shown in the background. (Photo: T.J. Hawkeswood).

Fig. 8 View of the small dam behind the cattle shed. The dam possessed no frogs or other native animals. (Photo: T.J. Hawkeswood).

Fig. 9. Part of the area shown in pink in Fig. 1 containing the Temperate *Themeda* grassland and *Leucochrysum albicans (*Asteraceae). (Photo: T.J. Hawkeswood).

Fig. 10. Vigorous flowering specimen of *Leucochrysum albicans (*Asteraceae) within the Temperate *Themeda* grassland. (Photo: T.J. Hawkeswood).

Fig. 11. View looking to the east along the southern boundary. Note lack of trees of any kind within this area of the subject property. (Photo: T.J. Hawkeswood).

Appendix 2. 7-part Tests for Temperate *Themeda* Grassland and *Leucochrysum albicans* (Asteraceae) on the subject property and other endangered species recorded from the Cooma-Monaro district

7-part Tests of Significance

FLORA

A. Temperate Themeda grassland

(a) In the case of a threatened species, whether the action proposed 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.

This is an ecological community and not a species so this part is not relevant.

(b) ***In the case of an endangered population, whether the action proposed is likely to have an adverse effect on the life cycle of the species that constitutes the endangered population such that a viable local population of the species is likely to be placed at risk of extinction***

This is an ecological community and not a species so this part is not relevant.

(c) In the case of an endangered ecological community or critically endangered ecological community, whether the action proposed;

(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 the risk of extinction, or

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

(i) The Temperate *Themeda* Grassland will be conserved within a number of proposed Lots, hence its local occurrence will NOT be likely to be placed at the risk of extinction.

(i) The Temperate *Themeda* Grassland will NOT be substantially or adversely modified such that its local occurrence will be likely to be placed at the risk of extinction.

(d) In relation to the habitat of a threatened species, population or ecological community:

(i) the extent to which habitat is likely to be removed or modified and a result of the action proposed, and

(ii) whether an area of habitat is likely to become fragmented or isolated from other areas of habitat as a result of the proposed action, and

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

(i) Very little or no habitat will be removed or modified.
(ii) No area of Temperate *Themeda* grassland habitat will become fragmented as part of the proposal.
(iii) Very little or no habitat will be removed.The subdivision will not affect the long-term survival of this ecological community. It is presently being managed for weeds and will be fenced later for protection.

(e) Whether the action proposed is likely to have an adverse effect on critical habitat (either directly or indirectly)

No critical habitat is listed for this ecological community.

(f) Whether the action proposed is consistent with the objectives or actions of a recovery plan or threat abatement plan

The proposal would be consistent with the objectives or actions of a recovery plan or threat abatement plan for this ecological community in that it will be conserved in the main by the proposal.

(g) Whether the action proposed constitutes or is part of a key threatening process or is likely to result in the operation of, or increase the impact of, a key threatening process

No action on the subject property constitutes a key threatening process for this ecological community.

B. *Dodonaea procumbens* (Sapindaceae), *Lepidium hyssopifolium* (Sapindaceae), *Swainsona sericea* (Fabaceae)

(a) *In the case of a threatened species, whether the action proposed 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 proposal will not have any adverse effect on the life cycle of these species because these species are not found on this property and are therefore most unlikely to be placed at the risk of extinction by this proposal.

(b) *In the case of an endangered population, whether the action proposed is likely to have an adverse effect on the life cycle of the species that constitutes the endangered population such that a viable local population of the species is likely to be placed at risk of extinction*

The entities under review are species and not an endangered population so this part is not relevant.

(c) In the case of an endangered ecological community or critically endangered ecological community, whether the action proposed;

(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 the risk of extinction, or

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

The entities under review are species and not an endangered population so this part is not relevant.

(d) In relation to the habitat of a threatened species, population or ecological community:

(i) the extent to which habitat is likely to be removed or modified and a result of the action proposed, and

(ii) whether an area of habitat is likely to become fragmented or isolated from other areas of habitat as a result of the proposed action, and

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

(i) There is no habitat for these species on the subject site; the habitat removed will be exotic grasslands which are weed infested and unnatural.
(ii) No area of habitat will become fragmented as part of this proposal.
(iii) The habitat to be removed is not important for the survival of these species as they do not occur within these artificial grasslands.

(e) Whether the action proposed is likely to have an adverse effect on critical habitat (either directly or indirectly)

No critical habitat is listed for these species.

(f) Whether the action proposed is consistent with the objectives or actions of a recovery plan or threat abatement plan

Recovery plans have been instigated by the NSW Government for these species. The proposal would be consistent with the objectives or actions of a recovery plan or threat abatement plan for this species since it will not be affected by the proposal (they do not occur anywhere on the property).

(g) Whether the action proposed constitutes or is part of a key threatening process or is likely to result in the operation of, or increase the impact of, a key threatening process

No action on the subject property constitutes a key threatening process for these species.

FAUNA

A. Grassland Bearded Dragon (*Tympanocryptus pinguicolla*, Agamidae) and the Striped Legless Lizard (*Delma impar*, Pygopodidae), Little Whip Snake (*Suta flagellum,* Elapidae)

(a) ***In the case of a threatened species, whether the action proposed 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 proposal will not have any adverse effect on the life cycle of these species because these species are not found on this property and are therefore most unlikely to be placed at the risk of extinction by this proposal.

(b) ***In the case of an endangered population, whether the action proposed is likely to have an adverse effect on the life cycle of the species that constitutes the endangered population such that a viable local population of the species is likely to be placed at risk of extinction***

The entities under review are species and not an endangered population so this part is not relevant.

(c) In the case of an endangered ecological community or critically endangered ecological community, whether the action proposed;

(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 the risk of extinction, or

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

The entities under review are species and not an endangered population so this part is not relevant.

(d) In relation to the habitat of a threatened species, population or ecological community:

(i) the extent to which habitat is likely to be removed or modified and a result of the action proposed, and

(ii) whether an area of habitat is likely to become fragmented or isolated from other areas of habitat as a result of the proposed action, and

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

(i) There is very little suitable habitat for these species on the subject site, the most suitable habitat is within the Temperate *Themeda* grassland which will be retained; the habitat removed will be exotic grasslands which are weed infested. It is most unlikely that these endangered species would be able to survive there.
(ii) No area of habitat will become fragmented as part of this proposal.

(iii) The habitat to be removed is not important for the survival of these species as they do not occur within these artificial grasslands.

(e) Whether the action proposed is likely to have an adverse effect on critical habitat (either directly or indirectly)

No critical habitat is listed for these species.

(f) Whether the action proposed is consistent with the objectives or actions of a recovery plan or threat abatement plan

Recovery plans have been instigated by the NSW Government for these species. The proposal would be consistent with the objectives or actions of a recovery plan or threat abatement plan for this species since it will not be affected by the proposal (they do not occur anywhere on the property).

(g) Whether the action proposed constitutes or is part of a key threatening process or is likely to result in the operation of, or increase the impact of, a key threatening process

No action on the subject property constitutes a key threatening process for these species.

C. Yellow-spotted Bell Frog (*Litoria castanea*, Hylidae), Southern Bell Frog (*Litoria raniformis*, Hylidae)

(a) ***In the case of a threatened species, whether the action proposed 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 proposal will not have any adverse effect on the life cycle of these species because these species are not found on this property and are therefore most unlikely to be placed at the risk of extinction by this proposal.

(b) ***In the case of an endangered population, whether the action proposed is likely to have an adverse effect on the life cycle of the species that constitutes the endangered population such that a viable local population of the species is likely to be placed at risk of extinction***

The entities under review are species and not an endangered population so this part is not relevant.

(c) In the case of an endangered ecological community or critically endangered ecological community, whether the action proposed;

(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 the risk of extinction, or

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

The entities under review are species and not an endangered population so this part is not relevant.

(d) In relation to the habitat of a threatened species, population or ecological community:

(i) the extent to which habitat is likely to be removed or modified and a result of the action proposed, and

(ii) whether an area of habitat is likely to become fragmented or isolated from other areas of habitat as a result of the proposed action, and

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

(i) There is very little suitable habitat for these species on the subject site, the most suitable habitat being within the drainage line/small watercourse which will be retained; the habitat removed will be exotic grasslands which are weed infested. It is most unlikely that these species would be able to survive there.
(ii) No area of habitat will become fragmented as part of this proposal.
(iii) The habitat to be removed is not important for the survival of these species as they do not occur within these artificial grasslands.

(e) Whether the action proposed is likely to have an adverse effect on critical habitat (either directly or indirectly)

No critical habitat is listed for these species.

(f) Whether the action proposed is consistent with the objectives or actions of a recovery plan or threat abatement plan

Recovery plans have been instigated by the NSW Government for these species. The proposal would be consistent with the objectives or actions of a recovery plan or threat abatement plan for this species since it will not be affected by the proposal (they do not occur anywhere on the property).

(g) Whether the action proposed constitutes or is part of a key threatening process or is likely to result in the operation of, or increase the impact of, a key threatening process

No action on the subject property constitutes a key threatening process for these species.

D. Spotted Harrier (*Circus assimilis*, Accipitridae), Blue-billed Duck (*Oxyura australis*, Anatidae), Great Egret (*Ardea alba*, Ardeidae), Cattle Egret (*Ardea ibis*, Ardeidae), Painted Snipe (*Rostratula benhelensis*, Rostratulidae), Diamond Firetail (*Stagonopleura guttata*, Fringillidae), Australasian Bittern (*Botaurus poiciloptilus*, Ardeidae), Regent Honeyeater (*Xanthomya phrygia*, Meliphagidae), White belled Sea Eagle (*Haliaeetus leucogaster*, Accipitridae), White throated Needletail (*Hirundapus caudacutus*, Apodidae), Satin Flycatcher (*Myagra cyanoleuca*, Monarchidae), Rainbow Bee eater (*Merops ornatus*, Meropidae), Swift Parrot (*Lathamus discolor,* Psittacidae), Gang-gang Cockatoo (*Callocephalon fimbriatum*, Cacatuidae)

(a) *In the case of a threatened species, whether the action proposed 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 proposal will not have any adverse effect on the life cycle of these species because these species are not resident on this property and are unlikely to visit the site in any frequency and are therefore most unlikely to be placed at the risk of extinction by this proposal. The site lacks suitable food resources except for seeds from grasses for such birds as the Diamond Firetail. But there really is little or no suitable breeding habitat for any of these bird species on the subject property.

(b) ***In the case of an endangered population, whether the action proposed is likely to have an adverse effect on the life cycle of the species that constitutes the endangered population such that a viable local population of the species is likely to be placed at risk of extinction***

The entities under review are species and not an endangered population so this part is not relevant.

(c) In the case of an endangered ecological community or critically endangered ecological community, whether the action proposed;

(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 the risk of extinction, or

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

The entities under review are species and not an endangered population so this part is not relevant.

(d) In relation to the habitat of a threatened species, population or ecological community:

(i) the extent to which habitat is likely to be removed or modified and a result of the action proposed, and

(ii) whether an area of habitat is likely to become fragmented or isolated from other areas of habitat as a result of the proposed action, and

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

(i) There is very little suitable habitat for these species on the subject site, the most suitable habitat being within the drainage line/small watercourse which will be retained and perhaps the small dam for some species but nothing was recorded from the dam apart from cattle movements; the habitat removed will be exotic grasslands which are weed infested. It is most unlikely that any of these endangered species would be able to survive there.
(ii) No area of habitat will become fragmented as part of this proposal.
(iii) The habitat to be removed is not important for the survival of these species as they do not occur within these artificial grasslands.

(e) Whether the action proposed is likely to have an adverse effect on critical habitat (either directly or indirectly)

No critical habitat is listed for these species.

(f) Whether the action proposed is consistent with the objectives or actions of a recovery plan or threat abatement plan

Recovery plans have been instigated by the NSW Government for most of these species. The proposal would be consistent with the objectives or actions of a recovery plan or threat abatement plan for this species since it will not be affected by the proposal (they do not occur anywhere on the property).

(g) Whether the action proposed constitutes or is part of a key threatening process or is likely to result in the operation of, or increase the impact of, a key threatening process

No action on the subject property constitutes a key threatening process for these species.

E. Spotted-tailed Quoll (*Dasyurus maculatus*, Dasyuridae), Koala (*Phascolarctos cinereus*, Phascolarctidae), Long-nosed Potoroo (*Potorus tridactylus,* Potoroidae), Eastern False Pipistrelle (*Falsistrellus tasmaniensis*, Vespertilionidae), Grey-headed Flying Fox (*Pteropus poliocephalus*, Pteropodidae) and Southern Myotis (*Myotis macropus*, Vespertilionidae)

(a) *In the case of a threatened species, whether the action proposed 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 proposal will not have any adverse effect on the life cycle of these species because these species are not resident on this property and are unlikely to visit the site in any frequency and are therefore most unlikely to be placed at the risk of extinction by this proposal. The site lacks suitable food resources for all of these endangered species. And there really is little or no suitable breeding habitat for any of these mammal species on the subject property.

(b) *In the case of an endangered population, whether the action proposed is likely to have an adverse effect on the life cycle of the species that constitutes the endangered population such that a viable local population of the species is likely to be placed at risk of extinction*

The entities under review are species and not an endangered population so this part is not relevant.

(c) In the case of an endangered ecological community or critically endangered ecological community, whether the action proposed;

(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 the risk of extinction, or

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

The entities under review are species and not an endangered population so this part is not relevant.

(d) In relation to the habitat of a threatened species, population or ecological community:

(i) the extent to which habitat is likely to be removed or modified and a result of the action proposed, and

(ii) whether an area of habitat is likely to become fragmented or isolated from other areas of habitat as a result of the proposed action, and

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

(i) There is no suitable habitat for these species on the subject site; the habitat removed will be exotic grasslands which are weed infested and unnatural. It is most unlikely that any of these endangered species would be able to survive there.
(ii) No area of habitat will become fragmented as part of this proposal.
(iii) The habitat to be removed is not important for the survival of these species as they do not occur within these artificial grasslands.

(e) Whether the action proposed is likely to have an adverse effect on critical habitat (either directly or indirectly)

No critical habitat is listed for these species.

(f) Whether the action proposed is consistent with the objectives or actions of a recovery plan or threat abatement plan

Recovery plans have been instigated by the NSW Government for most of these species. The proposal would be consistent with the objectives or actions of a recovery plan or threat abatement plan for this species since it will not be affected by the proposal (they do not occur anywhere on the property).

(g) Whether the action proposed constitutes or is part of a key threatening process or is likely to result in the operation of, or increase the impact of, a key threatening process

No action on the subject property constitutes a key threatening process for these species.

EPBC Act assessment for *Leucochrysum albicans* (Asteraceae)

One endangered grassland plant (*Leucochrysum albicans*) was recorded.

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

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

The proposal will conserve most or all of the population of this daisy on the subject property and this population will be continually monitored for weeds in the future. Hence there should be no long-term decrease in the size of the population.

Reduce the area of occupancy of the species

No clearing of its habitat the Temperate *Themeda* grassland will be undertaken hence area of occupancy will not be affected.

Fragment an existing population into two or more populations

There is only one population on the subject property and its conservation will not allow fragmentation.

Adversely affect habitat critical to the survival of a species

The habitat will be conserved. There will be no adverse effects from the proposal.

Disrupt the breeding cycle of a population

The project will avoid clearing habitat (Temperate *Themeda* Grassland). No works will be undertaken within this area of Natural Temperate Grassland apart from the erection of protective fences. The proposal is therefore unlikely to increase habitat fragmentation for this species and therefore is unlikely to affect pollinators or seed dispersal.

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

The quality of habitat is bering improved by progressive weed removal. The area of habitat will be fenced. The species is therefore not likely to decline.

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

Mitigation measures have been included to minimise the likelihood of spread of invasive species into the habitat of this species. Measures include: (a) preventing access to areas of habitat through erection of fencing; (b) monitoring programs for noxious and problematic weeds e,g. *Eragrostis curvula* on site to ensure the requirements of *Noxious Weeds Act 1993* are met; (c) control of noxious and problematic weeds should they appear.

Introduce disease that may cause the species to decline

This species is not known to be under threat from any disease.

Conclusion

The proposal will conserve and enhance the habitat on the subject property for this daisy species in perpetuity.