17 September 2019

Mr Ian Miller

C/O-

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Ecological Values and Constraints Assessment for Lot 2 DP1233492, Laggan, NSW.

Capital Ecology project no. 2889

Dear Mr Miller,

This letter provides an Ecological Values and Constraints Assessment (EVCA) for Lot 2 DP1233492, Laggan, NSW (the 'study area', Figure 1). The study area encompasses approximately 35.60 ha and is located in the south-western part of 297 Peelwood Road, immediately north of the village of Laggan. It is understood that the study area is being investigated for a proposed subdivision as part of Upper Lachlan Shire Council's plan to rezone the land to increase available residential land in Laggan and thereby revitalise the village and broader locality.

This EVCA provides preliminary identification and assessment of the values of recognised biodiversity conservation significance occurring within the study area, specifically those currently listed pursuant to the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) and/or the NSW *Biodiversity Conservation Act 2016* (BC Act).

This EVCA has been prepared based on:

- the results of database searches for the study area, including the Commonwealth EPBC Act Protected Matters Search Tool (PMST), and NSW Wildlife Atlas (BioNet);
- a review of relevant studies and other background information, including the surveys and sources referenced herein;
- a field survey on 24 June 2019, completed to assess and record the ecological values of the study area; and
- the knowledge of the authors regarding the biota of the locality, specifically the threatened ecological communities, flora, and fauna (and associated habitat) with the potential to occur in

the lowland grassland, woodland and forest ecosystems of the South Eastern Highlands bioregion of NSW.

This EVCA is divided into the following sections.

1. Methods.
2. Results.
3. Assessment of Potential for Impacts.
4. Conclusions and Recommendations.

1. Methods

1.1 Database and Literature Review

To inform the field surveys, Capital Ecology completed a desktop review, involving the following.

- A list of threatened species (flora and fauna), threatened populations and threatened ecological communities (TECs) listed pursuant to the EPBC Act with the potential to occur in the study area was obtained using the Commonwealth Government Department of the Environment and Energy's (DoEE) online EPBC Act Protected Matters Search Tool (PMST) on 7 June 2019.
- A review of the NSW Wildlife Atlas (BioNet) point data for the significant ecological values of the locality (i.e. within a 10 km radius of the study area). These values include species listed as threatened pursuant to the EPBC Act and/or the BC Act, together with flora species considered 'rare or uncommon in NSW' and fauna species which are otherwise of a conservation focus.
- A review of previous and current studies undertaken by Capital Ecology and others in the region.

1.2 Vegetation Survey and Mapping

1.3.1 Plant Community Type (PCT) mapping

On 24 June 2019, Capital Ecology undertook a field survey to identify, assess, and map the current vegetation and habitat values in the study area. The first step of the vegetation survey involved identifying the Plant Community Types (PCTs) occurring in the study area (as defined in NSW Vegetation Information System[1]). The PCTs were identified by driving and walking across and around the study area, reading the landscape and considering numerous landscape elements, such as the:

- presence, species, growth form, and density of remnant canopy trees and/or stags or stumps of these;
- presence and species of midstorey shrubs and trees;
- floristic composition of the groundstorey; and
- the landscape position and other geographical features (elevation, aspect, soils, apparent hydrology etc.).

[1] https://www.environment.nsw.gov.au/research/Vegetationinformationsystem.htm.

1.3.2 Vegetation Zone definition and mapping

Each of the mapped PCTs were assessed and divided into Vegetation Zones based on the structure, floristic composition, and overall condition ('intactness') of the vegetation. Mapping of the Vegetation Zones was undertaken by driving and walking the boundaries and recording them using a combination of hand-held GPS and marking directly on to high resolution orthorectified aerial photograph field maps.

1.3 Likelihood of Occurrence Assessment

The Likelihood of Occurrence Assessment for threatened flora and fauna species is a categorisation used to determine the likelihood that the subject species occurs within a study area. The results are based on the findings of completed desktop studies and a field survey, expert opinion, and consideration of the species' currently recognised distribution and preferred habitat.

Threatened species and populations identified in the Likelihood of Occurrence Assessment include all of those identified during the database and literature review as potentially occurring in the locality. More specifically, threatened species included are those identified on the EPBC Act PMST, those identified on BioNet as previously recorded in the locality, and those not previously identified but considered by Capital Ecology to have some potential to occur in the study area.

The likelihood of a species occurring in the study area is categorised as either negligible, low, moderate, or high. A species that has been identified in the study area during the survey for this EVCA or by other confirmed records is expressed as confirmed.

The completed Likelihood of Occurrence Assessment is provided as Appendix C. Species assigned a moderate or higher likelihood of occurrence in the study area, other than if this is limited to transient visitation, are considered in more detail in Section 2.5 (threatened flora) and Section 2.6 (threatened fauna) of this EVCA.

2. Results

2.1 Study Area Description

The study area is 35.60 ha in size, zoned 'RU2: Rural Landscape' under the Upper Lachlan Local Environmental Plan 2010, and is identified on the Natural Resources Sensitivity Map. The study area is bordered by:

- the village of Laggan to the south;
- the remainder of the 297 Peelwood Road property to the north and other rural land to the west; and
- Peelwood Road to the east, beyond which is rural land.

Much of the study area was historically cleared. These areas have since been sown to crops and pasture under rotation. At the time of survey, the cultivated portions of the study area were sown to Cultivated Oats *Avena sativa* which was grazed by cattle.

Two tributaries of Reedy Creek flow through the study area in a west to east direction, later joining the main channel of Reedy Creek beyond Peelwood Road to the east. The northern of these tributaries is a

substantial watercourse (identified as a third order stream, Strahler 1952[2]) which is characterised by scattered small pools along a broad and waterlogged riparian zone. The extent of this waterlogged area roughly defines the lower boundary of the cultivated land. The other tributary is a minor drainage line (identified as a first order stream, Strahler 1952) which is currently cropped and is likely to convey water only following substantial rainfall.

Patches of remnant native vegetation have been retained in the riparian zone along the larger tributary of Reedy Creek, and other patches have been retained on the higher elevated land in the north and southwest of the study area. The trees in the riparian zone are predominantly remnant Black Gum *Eucalyptus aggregata* and those on the higher land are a monoculture of Broad-leaved Peppermint *Eucalyptus dives.* The groundstorey in the uncultivated portions of the study area is native dominant and of low diversity, with the most abundant species being the grazing tolerant Wallaby Grasses *Rytidosperma spp*. and Weeping Grass *Microlaena stipoides*

2.2 Vegetation

Before European settlement the study area is likely to have been characterised by a band of grassy riparian woodland (PCT 677) across the damp zone associated with the larger tributary of Reedy Creek, possibly with additional smaller patches of this woodland along the smaller tributary. This riparian woodland would have merged along a relatively narrow ecotone into dry sclerophyll forest (PCT 730) on the study area's higher elevated hill slopes and crests (Table 1).

Table 1. PCTs recorded in the study area.

PCT	PCT name	PCT description	Occurrence in the study area	TEC status Commonwealth / NSW	PCT % cleared
677	Black Gum grassy woodland of damp flats and drainage lines of the eastern Southern Tablelands, South Eastern Highlands Bioregion	This community occurs on shallow, yellow to red podzolic clay to loam soils derived from sedimentary, metamorphic and igneous substrates on foot-slopes and hill slopes. In its climax form this community would have been characterised by a canopy dominated by Brittle Gum, often with Red Stringybark, Broad-leaved Peppermint, Long-leaved Box, and occasionally Argyle Apple, with a sparse shrubstorey and sparse to moderately dense groundstorey supporting a moderate diversity of native forbs.	This PCT was mapped across the damp zone associated with the larger tributary of Reedy Creek.	Endangered (refer Section 2.3)	60%

[2] Strahler, AN (1952). *Hypsometric (area-altitude) analysis of erosional topology*. Geological Society of America Bulletin 63 (11): 1117–1142.

PCT	PCT name	PCT description	Occurrence in the study area	TEC status Commonwealth / NSW	PCT % cleared
730	Broad-leaved Peppermint - Mountain Gum dry open forest of the Central Tablelands area of the South Eastern Highlands Bioregion	This open grassy woodland occurs in broad valleys from Delegate to the Upper Shoalhaven River catchment, on clay loam soils derived from Ordovician, Silurian, and Devonian sediments and acid volcanics.	This PCT was mapped throughout the remainder of the study area, notably across the study area's higher elevated hill slopes and crests.	Not listed	60%

As noted above, the study area has been utilised for agriculture for an extended period and the majority of the vegetation which occurs today is highly modified. As shown in Figure 2, the below described vegetation zones for each PCT were identified, assessed, and mapped during the field survey. Appendix A provides the list of flora species recorded in the study area during the field survey.

PCT 677 – Black Gum grassy woodland of damp flats and drainage lines of the eastern Southern Tablelands, South Eastern Highlands Bioregion

As shown in the representative photographs provided below as Plates 1 to 3, PCT 677 occurs as the following three discernible vegetation zones.

- PCT 677 Zone 1 – Remnant Canopy – Native Dom – Low Diversity. This zone comprises approximately 2.05 ha of predominately native vegetation, characterised by a patchy remnant canopy and regeneration dominated by Black Gum with associate Snow Gum *Eucalyptus pauciflora,* an absent shrubstorey, and a groundstorey dominated by the common native grasses Wallaby Grasses, Weeping Grass*,* and River Tussock-grass *Poa labillardieri*. Exotic species such as Blackberry *Rubus fruticosus*, Couch Grass *Cynodon dactylon*, and Flatweed *Hypochaeris radicata* are also present, however generally at low density.
- PCT 677 Zone 2 – Native Dom – Low Diversity. Analogous to Zone 1, but lacking the remnant canopy and regeneration, Zone 2 comprises approximately 1.61 ha of predominately native vegetation.
- PCT 677 Zone 3 – Exotic Dom – Low Diversity. This zone comprises approximately 2.80 ha of exotic vegetation. Both the canopy and shrubstorey are absent, and the groundstorey is sown to Cultivated Oats and Clover *Trifolium* sp..

Plate 1. Representative photograph of PCT 677 Zone 1

Plate 2. Representative photograph of PCT 677 Zone 2

Plate 3. Representative photograph of PCT 677 Zone 3

PCT 730 – Broad-leaved Peppermint - Mountain Gum dry open forest of the Central Tablelands area of the South Eastern Highlands Bioregion

As shown in the representative photographs provided below as Plates 4 to 6, PCT 730 occurs as the following three discernible vegetation zones.

- PCT 730 Zone 1 – Remnant Canopy – Native Dom – Low Diversity. This zone comprises approximately 2.99 ha of predominately native vegetation, characterised by a patchy to largely intact canopy of mature remnant Broad-leaved Peppermint, an absent midstorey and shrubstorey, and a groundstorey dominated by the common native grasses Wallaby Grasses and Weeping Grass with patches of Kangaroo Grass *Themeda triandra* and Bracken Fern *Pteridium esculentum*. Exotic species such as Sheep's Sorrel *Acetosella vulgaris*, Spear thistle *Cirsium vulgare*, and Flatweed are also present.

- PCT 730 Zone 2 – Remnant Canopy – Exotic Dom – Low Diversity. This zone comprises approximately 8.88 ha of mature remnant Broad-leaved Peppermint over an exotic groundstorey sown to Cultivated Oats and Clover. This combination of species in the groundstorey is the result of recent pasture improvement.

- PCT 730 Zone 3 – Exotic Dom – Low Diversity. This zone comprises approximately 17.30 ha of exotic vegetation. Both the canopy and shrubstorey are absent, and the groundstorey is sown to Cultivated Oats and Clover.

Plate 4. Representative photograph of PCT 730 Zone 1

Plate 5. Representative photograph of PCT 730 Zone 2

Plate 6. Representative photograph of PCT 730 Zone 3

2.3 Threatened Ecological Communities

2.3.1 Environment Protection and Biodiversity Conservation Act 1999 (Commonwealth)

Two EPBC Act listed threatened ecological communities (TECs) have the potential to occur in the locality, both listed as critically endangered under the EPBC Act:

- 'Natural Temperate Grassland of the South Eastern Highlands' (NTG-SEH), and
- 'White Box – Yellow Box – Blakely's Red Gum Grassy Woodland and Derived Native Grassland' (EPBC Act Box-Gum Woodland).

Natural Temperate Grassland of the South Eastern Highlands – listed as critically endangered pursuant to the EPBC Act

Description – As detailed in Commonwealth of Australia (2016[3]), the NTG-SEH TEC is characterised by grassy vegetation dominated by moderately tall (25–50cm) to tall (50–100cm), dense to open tussock grasses in the genera *Rytidosperma*, *Austrostipa*, *Bothriochloa*, *Poa* and *Themeda*. Up to 70% of all plant species may be forbs. The community may be treeless or contain up to 10% cover of trees, shrubs or sedges. Natural Temperate Grassland occurs within the biogeographical region of the South Eastern Highlands in valleys influenced by cold air drainage and in broad plains.

Presence in the study area – Absent – No part of the study area supports, or would have historically supported, grassland ecological communities. As such, the study area does not support this TEC.

[3] Commonwealth of Australia (2016). *Approved conservation advice for the Natural Temperate Grassland of the South Eastern Highlands (NTG–SEH) ecological community*.

White Box – Yellow Box – Blakely's Red Gum Grassy Woodland and Derived Native Grassland – listed as critically endangered pursuant to the EPBC Act

Description – The White Box – Yellow Box – Blakely's Red Gum Grassy Woodland and Derived Native Grassland TEC is characterised by a species-rich understorey of native tussock grasses, herbs and scattered shrubs (where shrub cover comprises less than 30% cover), and a dominance or prior dominance of White Box and/or Yellow Box and/or Blakely's Red Gum trees. This TEC occurs along the western slopes and tablelands of the Great Dividing Range from southern Queensland through New South Wales and the Australian Capital Territory to Victoria.

Presence in the study area – Absent – No part of the study area supports, or would have historically supported, woodland with White Box, Yellow Box or Blakely's Red Gum as one of the most common species. As such, the study area does not support this TEC.

2.3.2 Biodiversity Conservation Act 2016 (NSW)

Two BC Act listed ecological communities have the potential to occur in the study area:

- 'White Box – Yellow Box – Blakely's Red Gum Woodland' (BC Act Box-Gum Woodland)'; and
- 'Tablelands Snow Gum, Black Sallee, Candlebark and Ribbon Gum Grassy Woodland in the South Eastern Highlands, Sydney Basin, South East Corner and NSW South Western Slopes Bioregions'.

BC Act Box-Gum Woodland

This community, listed as endangered in NSW, is described below, together with an assessment of likelihood of occurrence in the study area.

Description – The below description is extracted from the NSW *Final Determination for the TSC Act endangered listed ecological community White Box – Yellow Box – Blakely's Red Gum Woodland*) (NSW Scientific Committee 2002, gazetted 15 March 2002[4]).

> *White Box Yellow Box Blakely's Red Gum Woodland is found on relatively fertile soils on the tablelands and western slopes of NSW and generally occurs between the 400 and 800 mm isohyets extending from the western slopes, at an altitude of c. 170 m to c. 1200 m, on the northern tablelands (Beadle 1981). The community occurs within the NSW North Coast, New England Tableland, Nandewar, Brigalow Belt South, Sydney Basin, South Eastern Highlands and NSW South Western Slopes Bioregions.*
>
> *White Box Yellow Box Blakely's Red Gum Woodland includes those woodlands where the characteristic tree species include one or more of the following species in varying proportions and combinations – Eucalyptus albens (White Box), Eucalyptus melliodora (Yellow Box) or Eucalyptus blakelyi (Blakely's Red Gum). Grass and herbaceous species generally characterise the ground layer. In some locations, the tree overstorey may be absent as a result of past clearing or thinning and at these locations only an understorey may be present. Shrubs are generally sparse or absent, though they may be locally common.*

[4] NSW Scientific Committee (2002). *Final Determination for the TSC Act endangered listed ecological community White Box – Yellow Box – Blakely's Red Gum Woodland*. Gazetted 15 March 2002.

Although the final determination does not provide specific listing criteria against which to assess a patch of vegetation, a useful key is provided in *Identification Guidelines for Endangered Ecological Communities – White Box Yellow Box Blakely's Red Gum Woodland (Box-Gum Woodland)* (NPWS 2002[5]), which draws its information from the final determination. As described in the final determination and the associated key, the definition for the BC Act Box-Gum Woodland TEC is extremely broad. In effect, any land for which the climax community is Box-Gum Woodland that has not been cultivated, become a stock camp, or otherwise been entirely modified, is likely to meet the minimum definition of the BC Act listed TEC.

Presence in the study area – Absent – The dominant tree species in the study area are not characteristic of the BC Act definition for the Box-Gum Woodland TEC. As such, the study area does not support vegetation which meets the criteria for this community under the BC Act.

BC Act Tablelands Snow Gum, Black Sallee, Candlebark and Ribbon Gum Grassy Woodland

This community, listed as endangered in NSW, is described below, together with an assessment of likelihood of occurrence in the study area.

Description – The below description is extracted from the NSW *Final Determination for the TSC Act endangered listed ecological community Tablelands Snow Gum, Black Sallee, Candlebark and Ribbon Gum Grassy Woodland in the South Eastern Highlands, Sydney Basin, South East Corner and NSW South Western Slopes Bioregions* (NSW Scientific Committee 2011, gazetted 10 June 2011[6]).

> *Tablelands Snow Gum, Black Sallee, Candlebark and Ribbon Gum Grassy Woodland typically forms an open-forest, woodland or open woodland that transitions into grassland at low tree cover. The canopy is dominated by Eucalyptus pauciflora (Snow Gum), E. rubida (Candlebark), E. stellulata (Back Sallee) and E. viminalis (Ribbon Gum), either as single species or in combinations. A shrub layer may be present and sub-shrubs are often a component of the ground stratum; characteristic species include Hymenanthera dentata and Melichrus urceolatus. The ground layer is dominated by grasses and other herbaceous species including Themeda australis, Poa spp., Austrostipa spp., Austrodanthonia spp., Leptorhynchos squamatus, Chrysocephalum apiculatum, and Asperula conferta. This community may also occur as secondary grassland where the dominant trees have been removed but the ground stratum remains.*
>
> *The ecological community mainly occurs on valley floors, margins of frost hollows, footslopes and undulating hills between approximately 600 and 1400 m in altitude. It occurs on a variety of substrates including granite, basalt, metasediments and Quaternary alluvium. The ecological community occurs as a part of a mosaic of native vegetation communities including swamps, bogs, wetlands, grasslands and sclerophyll forests.*

The final determination does not provide specific listing criteria against which to assess a patch of vegetation, however the presence of the key canopy eucalypts and a native dominated ground stratum are described as the key characteristics of the community. The final determination also states that the community may also occur as secondary grassland. In this regard, based on the final determination, a

[5] NSW NPWS (2002). *Identification Guidelines for Endangered Ecological Communities - White Box Yellow Box Blakely's Red Gum Woodland (Box-Gum Woodland)*. NSW National Parks and Wildlife Service.
[6] NSW Scientific Committee (2011). *Final Determination for the TSC Act endangered listed ecological community Tablelands Snow Gum, Black Sallee, Candlebark and Ribbon Gum Grassy Woodland in the South Eastern Highlands, Sydney Basin, South East Corner and NSW South Western Slopes Bioregions*. Gazetted 10 June 2011.

logical interpretation of the minimum criteria for a patch to constitute the listed community is that the patch must:

1. support a canopy which is dominated by the key eucalypt species and occurs in at least moderately intact condition; or

2. where the canopy has been cleared, the ground stratum remains in at least moderately intact condition (i.e. native dominated with moderate to high diversity).

Presence in the study area – Present – Both Zone 1 and Zone 2 of PCT 677 support a canopy dominated by a key eucalypt species of this TEC and/or have a groundstorey in moderately intact condition. Accordingly, as shown in Figure 4, PCT 677 Zones 1 and 2 are consistent with the definition for this TEC.

2.4 Native vegetation extent

As per the BC Act, native vegetation is defined according to Part 5A of the *Local Land Services Act 2013* (LLS Act), which states:

> *"(1) For the purposes of this Part, native vegetation means any of the following types of plants native to New South Wales:*
>
> *(a) trees (including any sapling or shrub or any scrub),*
>
> *(b) understorey plants,*
>
> *(c) groundcover (being any type of herbaceous vegetation),*
>
> *(d) plants occurring in a wetland.*
>
> *(2) A plant is native to New South Wales if it was established in New South Wales before European settlement. The regulations may authorise conclusive presumptions to be made of the species of plants native to New South Wales by adopting any relevant classification in an official database of plants that is publicly accessible."*

As per this definition, planted vegetation which comprises plant species native to NSW, regardless of whether or not the species are indigenous to the specific region and/or PCT of the study area, is classified as native vegetation.

The Commonwealth Government[7,8], ACT Government[9], and previous NSW Government[10] assessment guidelines for the temperate grassland and woodland PCTs of the NSW/ACT Southern Tablelands region each declare vegetation as native dominant if 50% or more of the perennial groundlayer is comprised of native species. However, no such threshold is defined by the Biodiversity Assessment Method (BAM), and the Office of Environment and Heritage have advised (Tobi Edmonds pers. comm., September 2018) that the criteria for use in determining native vs. exotic dominance must be more stringent than the previously applied 50/50 rule. It is understood that this is due to the potential for seasonal variation

[7] Commonwealth of Australia (2006). *Policy Statement 3.5: White Box – Yellow Box – Blakely's Red Gum grassy woodlands and derived native grasslands*. Commonwealth Department of Environment and Heritage.
[8] Commonwealth of Australia (2016). Approved conservation advice for the Natural Temperate Grassland of the South Eastern Highlands (NTG–SEH) ecological community.
[9] ACT Government (2012). *Survey guidelines for determining lowland vegetation classification and condition in the ACT,* Conservation, Planning and Research, ACT Government.
[10] NSW Government (2014). *BioBanking Assessment Methodology 2014*. NSW Government Office of Environment and Heritage.

and/or assessor disparity to substantially alter the BAM mapping result. For example, a patch of vegetation that is classified as 55% native in one season may be classified as 45% native in another.

With regard to the above, for the purposes of this EVCA:

1. 'Native vegetation' is defined as any plant, naturally occurring or planted, which is native to NSW.
2. Exotic vegetation is defined as any plant which is not native to NSW.
3. A polygon of vegetation is 'native vegetation' if:
    a. 35% (i.e. approximately one-third) or more of the perennial groundlayer comprises species native to NSW; and/or
    b. species native to NSW are present in one or more of the other strata.

In accordance with the above, Zone 1 and Zone 2 of PCT 677 and Zone 1 and Zone 2 of PCT 730 constitute BC Act native vegetation. This combined area is shown as 'Native Vegetation' in Figure 3.

2.5 Threatened Flora Occurrence

The EPBC Act and BC Act vulnerable listed species Black Gum *Eucalyptus aggregata* is present in the study area. This species is the dominate canopy species of PCT 677 Zone 1 and would once have occurred throughout PCT 677 Zone 2 and Zone 3.

The study area contains characteristically suitable habitat for the EPBC Act and BC Act vulnerable listed species River Swamp Wallaby-grass *Amphibromus fluitans.* No specimens were identified during the field survey, however this species is known to occur in the locality and the presence of its aboveground growth is known to be dependent on seasonal conditions and the occurrence of flooding events. The field survey for this EVCA was also conducted outside of the flowering season (November – March).

No other EPBC Act and/or BC Act listed threatened flora species were recorded in the study area during the field survey, nor are any identified as occurring in the study area on the NSW Wildlife Atlas (BioNet) (refer Figure 5). As detailed in the Likelihood of Occurrence Assessment (refer to Appendix C), whilst there is some potential for several threatened or rare flora species to occur in the study area, the land use history and associated disturbance of the study area is likely to preclude the persistence of these species.

2.6 Fauna Habitat and Threatened Fauna Occurrence

2.6.1 Native fauna recorded

Several native fauna species were recorded during the survey, including common birds such as Australian Magpie *Gymnorhina tibicen* and Crimson Rosella *Platycercus elegans*, and the common frogs Common Eastern Froglet *Crinia signifera* and Whistling Tree Frog *Litoria verreauxii*. Appendix B lists the fauna species recorded during the field survey. All of these are common species in NSW and the region.

Note that no targeted surveys were completed and that these species were recorded incidentally.

2.6.2 Threatened fauna habitat

As recorded during the survey, the study area supports the fauna habitat features described in Table 2.

Table 2. Fauna habitat features.

Habitat Feature	Description	Relevant Native Fauna Species/Assemblages
Remnant eucalypts	There is a substantial number of remnant trees in the study area, some of which contain functional hollows.	All remnant trees, young and mature, are likely to provide foraging resources for a variety of birds and marsupials. Any mature, hollow bearing trees in the study area are likely to provide a nesting resource for birds, bats, and marsupials, potentially including threatened species.
Native groundstorey vegetation	Several portions of study area support a low diversity native groundstorey (i.e. PCT 677 Zone 1 and Zone 2, PCT 730 Zone 1).	The grasses and forbs are likely to provide a foraging resource to a variety of native birds, reptiles, and herbivorous mammals, such as the Eastern Grey Kangaroo *Macropus giganteus* and Common Wombat *Vombatus ursinus.* Open areas with reduced canopy cover are likely to provide a hunting resource for raptors and other predatory birds.
Oat crop	Much of the study area supports a sown oat crop (i.e. PCT 677 Zone 3 and PCT 730 Zone 2 and Zone 3).	This monoculture crop would provide a limited grazing resources for common birds, reptiles, and herbivorous mammals. Open areas are likely to provide a hunting resource for raptors and other predatory birds.
Creeks/streams	A substantial third order tributary of Reedy Creek passes through the study area, and a small dam is located in the eastern extent of the study area.	The tributary in the study area is likely to provide habitat of value to some aquatic flora or fauna. Two frog species were recorded during the field survey, and the tributary is likely to provide suitable habitat for a variety of other common aquatic fauna species. The small dam is likely to provide limited habitat to waterbirds and other common aquatic fauna species.

As detailed in the Likelihood of Occurrence Assessment (Appendix C), whilst several EPBC Act and/or BC Act listed birds may visit the study area on a transient basis to forage, given the agricultural use of the land and associated high degree of vegetation modification, the habitat in the study area is unlikely to be of significance to any threatened fauna species. Nevertheless, as there is some potential (albeit low) that threatened birds (i.e. Little Eagle *Hieraaetus morphnoides*) and mammals (gliders, insectivorous bats etc.) may nest/roost in the study area's retained mature eucalypt trees, the habitat value of these trees should be more closely investigated should their clearance be proposed.

2.7 Pest Animals

The exotic pest species European Rabbit *Oryctolagus cuniculus* was recorded in the study area during the field survey. Additionally, it can be assumed that the exotic pest species European Brown Hare *Lepus europaeus* and Red Fox *Vulpes vulpes* will be present or visit the study area.

2.8 Pest Plants

Table 3 lists the two high threat weeds recorded in the study area.

Table 3. High threat weeds.

Table key.

- WoNS - (Commonwealth) Weed of National Significance.
- Regional Priority Weed in the South East Local Land Services region under the *NSW Biosecurity Act 2015.*
  - P = Prevention.
  - E = Eradication.
  - C = Containment.
  - AP = Asset Protection.
  - LM = Species subject to Local Management programs.

Species Name	Common Name	Status	Occurrence in Study Area
Shrubs			
Rubus fruticosus	Blackberry	WoNS, LM	The landowner has recently completed an extensive program of works to poison and then physically remove the Blackberry which occurred along the larger tributary of Reedy Creek. The species now only occurs in this area as a few scattered reshooting plants. Blackberry was not observed elsewhere in the study area.
Trees			
Ligustrum lucidum	Broad-leaf Privet	-	Several planted windbreaks containing this species occur in the southern portion of the study area.

2.9 Summary of Ecological Values and Potential Constraints

As shown in Figure 4, this assessment has identified the following two significant ecological values as occurring in the study area.

- The presence of the EPBC Act and BC Act vulnerable listed species Black Gum *Eucalyptus aggregata.*
- The presence of the BC Act listed TEC 'Tablelands Snow Gum, Black Sallee, Candlebark and Ribbon Gum Grassy Woodland'.

This assessment has also identified the following significant ecological value as potentially occurring in the study area.

- The presence of characteristically suitable habitat for the EPBC Act and BC Act listed species River Swamp Wallaby-grass *Amphibromus fluitans*.

3. Assessment of Potential for Impacts

3.1 Environment Protection and Biodiversity Conservation Act 1999 (Commonwealth)

The EPBC Act is the key Commonwealth Government legislation for the protection and conservation of Australia's environment and biodiversity. The EPBC Act provides the legislative framework for the assessment and approval mechanism requiring that proposed 'actions' to be assessed in terms of their

potential to impact upon 'Matters of National Environmental Significance' (MNES). MNES currently listed under the EPBC Act of relevance to the study area are:

- threatened species and ecological communities; and
- migratory species (protected under international agreements).

Where a potential impact on a MNES may occur as a result of a proposed action, the significance of that impact must be assessed. Should it be determined that a proposed action may have a significant impact on one or more listed matters, referral of the action to the Commonwealth Minister for Environment and Energy is required for consideration, and potentially assessment and approval, under the EPBC Act. If impacts to MNES cannot be avoided or substantially minimised/mitigated, the Minister is likely to declare the action a 'controlled action'. In such a case a formal offset would likely be required to offset the residual significant impact/s, the specifics of which would be determined in accordance with the EPBC Act Environmental Offsets Policy (Commonwealth of Australia 2012[11]).

Matters of National Environmental Significance

As detailed in the EPBC Act Significant Impact Guidelines (Commonwealth of Australia 2013[12]), whilst there are several criteria against which to assess the likelihood that a proposed action will significantly impact an EPBC Act listed ecological threatened species or community, it is important to note that the first states that –

> *"An action will require approval if the action has, will have, or is likely to have a significant impact on a species listed in any of the following categories:*
>
> - *extinct in the wild*
> - *critically endangered*
> - *endangered, or*
> - *vulnerable."*

With regard to the above, an action/development which would impact areas containing Black Gum (refer Figure 4) would require referral under the EPBC Act. Additionally, any action/development impacting on the riparian habitat would require targeted surveys for River Swamp Wallaby-grass in the appropriate season and conditions. Any impact to confirmed River Swamp Wallaby-grass habitat would require referral under the EPBC Act.

With regard to other MNES, whilst there is the potential for migratory species to periodically forage in the study area, the study area is unlikely to provide important habitat for any migratory species.

3.2 Biodiversity Conservation Act 2016

Under the BC Act, the Biodiversity Offsets Scheme (BOS) is triggered, and a Biodiversity Development Assessment Report (BDAR) prepared applying the NSW Biodiversity Assessment Method (BAM) by an

[11] Commonwealth of Australia (2012). *EPBC Act Environmental Offsets Policy*. Australian Government Department of Sustainability, Environment, Water, Population and Communities.
[12] Commonwealth of Australia (2013). *Matters of National Environmental Significance - Significant Impact Guidelines 1.1. Environment Protection and Biodiversity Conservation Act 1999*. Commonwealth Department of the Environment.

accredited BAM Assessor must accompany a development application, for a proposed development which:

1. *will involve clearance of native vegetation (including trees, understorey plants, groundcover plants, and wetland plants) or a prescribed impact (as set out in clause 6.1 of the Biodiversity Conservation Regulation 2017 [BC Regulation]) on land identified on the Biodiversity Values Map; and/or*

2. *will exceed the native vegetation clearance threshold for the smallest minimum lot size associated with the zoning of the subject land; and/or*

3. *may significantly impact one or more BC Act listed entities (i.e. threatened species or ecological communities).*

Biodiversity Values Map

The study area is not identified on the Biodiversity Values Map.

https://www.lmbc.nsw.gov.au/Maps/index.html?viewer=BVMap

Native vegetation clearance

The minimum lot size for the study area is 'AC = 80,000 m^2'. In this regard, as stated in Part 7, Clause 7.2 of the *Biodiversity Conservation Regulation 2017* (BC Regulation), if native vegetation clearance was to exceed 1 ha then a BDAR would be required for the proposed development.

The study area is approximately 35,600 m^2 (35.60 ha) in size. As detailed in this EVCA and illustrated in Figure 3, the vegetation zones containing a remnant canopy and/or native dominant groundstorey constitute native vegetation under the BC Act (i.e. Zones 1 and 2 of both PCT 677 and PCT 730, refer Figure 3).

In accordance with the above, based on the current minimum lot size, a development would trigger the BOS if the area of native vegetation clearance exceeds 1 ha. It is noted that the minimum lot size, and therefore the native vegetation clearance threshold, will likely change once the land is rezoned to an urban zoning.

Potential to impact one or more BC Act listed entities

As described in Section 2.9, the study area contains:

- the BC Act listed TEC – Tablelands Snow Gum, Black Sallee, Candlebark and Ribbon Gum Grassy Woodland;
- the BC Act listed flora species – Black Gum *Eucalyptus aggregata*; and
- potential habitat for the BC Act listed flora species – River Swamp Wallaby-grass *Amphibromus fluitans*.

Any proposed development that will impact one or more of these entities will require assessment to determine whether the impact is likely to be significant.

4. Conclusions and Recommendations

The following are the key conclusions or our assessment.

1. The study area's climax vegetation communities have been highly degraded by the land use history and associated vegetation and landform modification. Notwithstanding this, the patches designated 'PCT 677 Zone 1' and 'PCT 677 Zone 2' still support the canopy cover and/or the groundstorey floristic diversity sufficient to meet the listing criteria for the BC Act listed 'Tablelands Snow Gum, Black Sallee, Candlebark and Ribbon Gum Grassy Woodland' TEC.

2. The areas designated 'PCT 677 Zone 1', 'PCT 730 Zone 1', and 'PCT 730 Zone 2' have sufficient remnant canopy cover to constitute native vegetation under the BC Act. Additionally, 'PCT 677 Zone 2' has sufficient groundstorey cover of native species to constitute native vegetation under the BC Act.

3. The area designated 'PCT 677 Zone 1' contains the EPBC Act and BC Act listed species Black Gum *Eucalyptus aggregata*. Additionally, 'PCT 677 Zone 1' and 'PCT 677 Zone 2' both contain potential habitat for the EPBC Act and BC Act listed species River Swamp Wallaby-grass *Amphibromus fluitans*. Targeted surveys between November and March would be required to confirm presence/absence of this species.

Considering the above, we recommend the following for the proposed subdivision of the study area.

1. Impacts to vegetation zones 'PCT677 Zone 1' and 'PCT677 Zone 2' (refer Figure 2) should be avoided to the greatest extent practicable. Any proposed action/development impacting 'PCT677 Zone 1' would require referral to the Commonwealth DoEE under the EPBC Act due to the impact on a MNES (Black Gum). Additionally, both the above vegetation zones meet the criteria for the BC Act listed TEC 'Tablelands Snow Gum, Black Sallee, Candlebark and Ribbon Gum Grassy Woodland'. Any impact upon this TEC would trigger the BOS requirement to prepare a BDAR, likely resulting in the generation of a biodiversity offset liability.

2. Minimise the clearance of native vegetation. Any development proposal that would involve the clearance of 1 ha or more of the area classified as BC Act Native Vegetation (refer Figure 3) would trigger the BOS requirement to prepare an BDAR. If the clearance of over 1 ha of native vegetation cannot be avoided, then we note that impacts to PCT 677 are likely to be more constrained (i.e. more difficult approval process and/or generate a greater offset liability) than PCT 730, and this should be considered in the planning process accordingly (as part of a BDAR).

3. Conducting targeted surveys for the EPBC Act and BC Act listed species River Swamp Wallaby-grass is unwarranted at this time, given the potential habitat for this species is confined to vegetation zones 'PCT677 Zone 1' and 'PCT677 Zone 2' which are already highly constrained due to their being a BC Act listed TEC and habitat for an EPBC Act and BC Act listed threatened species (Black Gum). We note that targeted surveys for River Swamp Wallaby-grass would be required for the preparation of a BDAR or EPBC Act referral, both of which would be required if impacts to 'PCT677 Zone 1' or 'PCT677 Zone 2' were proposed. As discussed above, we recommend avoiding these zones in any planned action/development to avoid EPBC Act referral and avoid triggering the BOS and its requirement to prepare a BDAR.

4. If the above described avoidance of the study area's listed values is not feasible, and therefore the BOS is triggered, a BDAR would need to be prepared for submission with the development application. We note that a BDAR requires floristic and targeted surveys which are subject to seasonal requirements. As mentioned above, the area designated 'PCT 677 Zone 1 and Zone 2'

are likely to be highly constrained from a biodiversity perspective. Clearance of more than 1 ha of the native vegetation in 'PCT 730 Zone 1 and Zone 2' is likely to be approved, however it would result in the generation of a biodiversity offset liability, the value of which is determined by applying the BAM and preparation of a BDAR.

5. The conservation and rehabilitation of riparian land has many benefits both at the site scale and catchment scale (e.g. biodiversity improvement, control of erosion and sedimentation of receiving waterways etc.). Indeed, due to the very high benefit to cost ratio, rehabilitation of riparian land in the NSW South East Highlands bioregion is a top priority for the NSW Government. This means that conservation funding (e.g. through Landcare, NSW Environment Trust etc.) is prioritised for projects that involve direct conservation and rehabilitation of riparian land. As such, and given the significant conservation status and degree of constraint applicable to PCT 677 in the study area, we believe that funding could be successfully obtained to pay for rehabilitation works in PCT 677. Accordingly, we recommend that consideration be given during subdivision design and planning to establish PCT 677 Zone 1 and Zone 2 as a conservation area. This would involve fencing off the area to exclude stock, ongoing weed control, and potentially planting Black Gum and other native species to augment the existing vegetation (noting that in the absence of stock grazing the Black Gum are likely to regenerate naturally from the seed from the remaining mature trees).

Overall, with consideration of the study area's land use history and current ecological values, it is our view that the proposed rezoning and subsequent subdivision and development of the study area is a reasonable proposition. Provided that the above recommendations are appropriately incorporated, development in the study area could be designed to avoid significant impacts upon the ecological values of the study area and locality.

We trust that this EVCA provides the information and advice required. If, however, you should have any questions relating to this report, please do not hesitate to contact us.

Yours sincerely,

Robert Speirs

Director / Principal Ecologist

Alan Vincent

Field Ecologist

Attachments:

Figure 1. Locality Plan

Figure 2. Vegetation Mapping

Figure 3. Native Vegetation

Figure 4. Threatened Species Habitat and Ecological Communities

Figure 5. NSW Wildlife Atlas Data (BioNet)

Appendix A. Flora Species Recorded

Appendix B. Fauna Species Recorded

Appendix C. Likelihood of Occurrence Assessment

References

ACT Government (2012). *Survey guidelines for determining lowland vegetation classification and condition in the ACT*, Conservation, Planning and Research, ACT Government.

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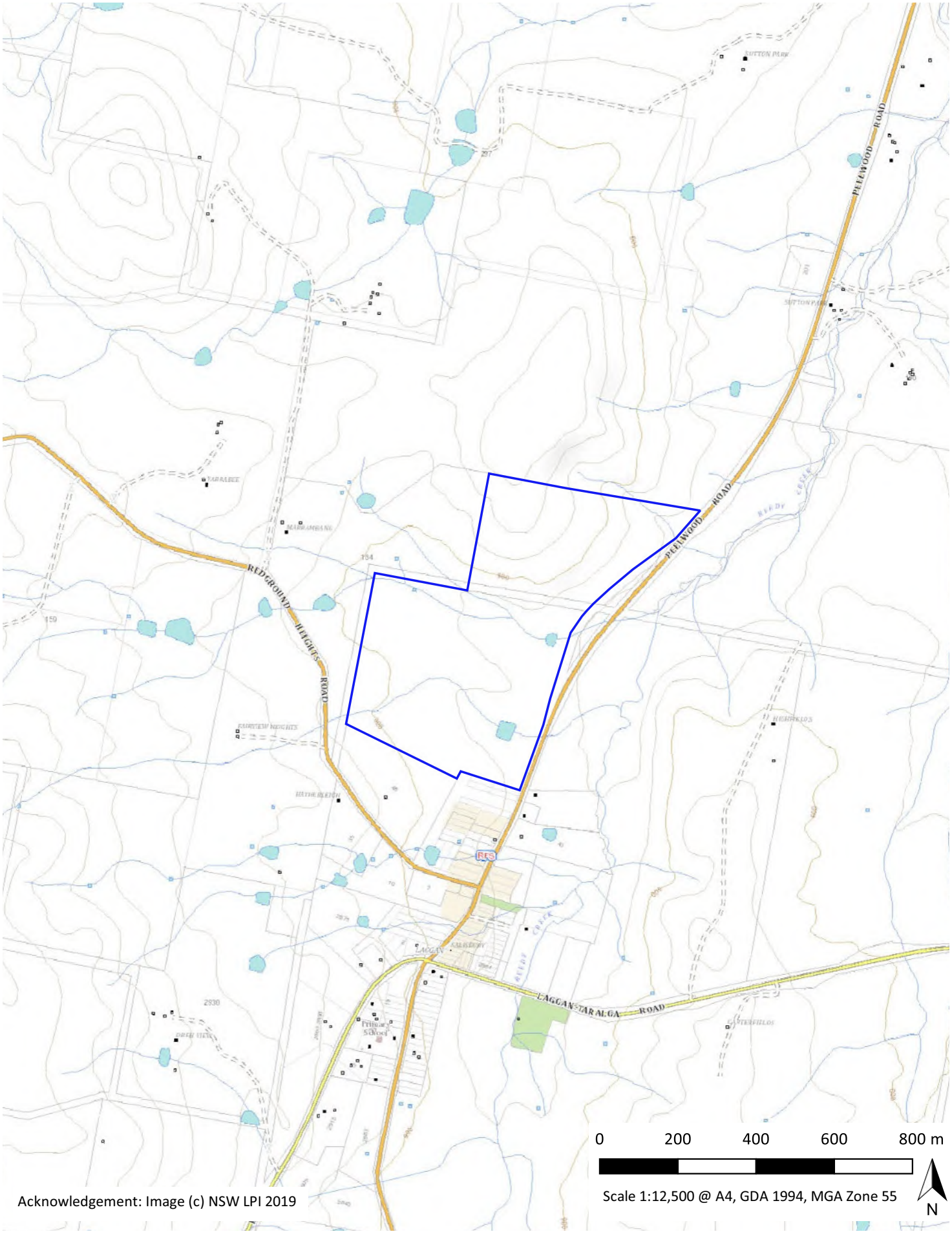

Acknowledgement: Image (c) NSW LPI 2019

Figure 1. Locality Plan

Capital Ecology Project No: 2889
Drawn by: A. Vincent
Date: 9 August 2019

Legend

Study Area

capital ecology

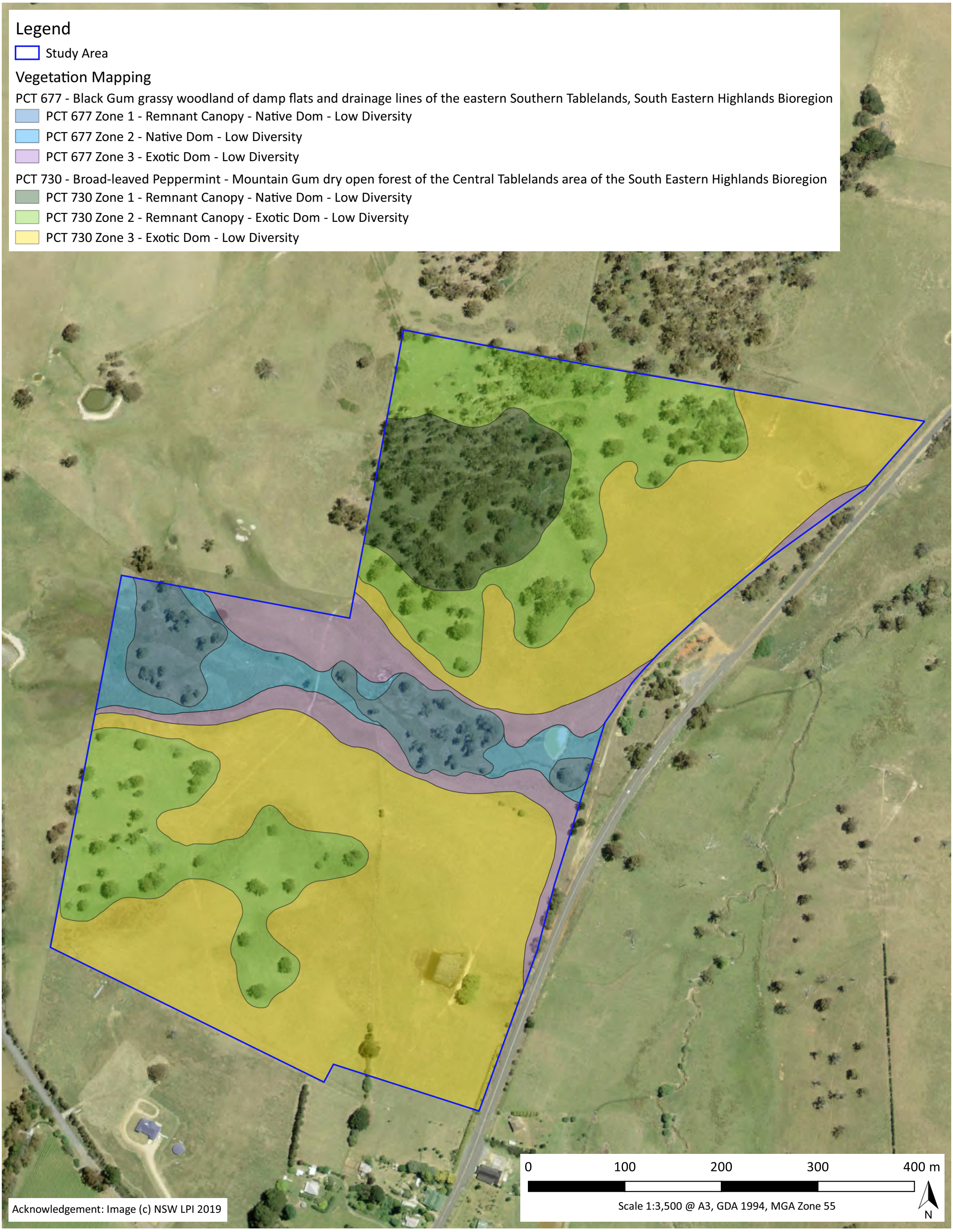

Figure 2. Vegetation Mapping

Capital Ecology Project No: 2889
Drawn by: A. Vincent
Date: 9 August 2019

capital ecology

Figure 3. Native Vegetation

Capital Ecology Project No: 2889
Drawn by: A. Vincent
Date: 9 August 2019

Legend

- Study Area
- Native Vegetation

capital ecology

Figure 4. Threatened Species Habitat and Ecological Communities

Capital Ecology Project No: 2889
Drawn by: A. Vincent
Date: 9 August 2019

Figure 5. NSW Wildlife Atlas Data (BioNet)

Capital Ecology Project No: 2889
Drawn by: A. Vincent
Date: 9 August 2019

Appendix A. Flora Species Recorded

Common name	Scientific name	BC Act status
Exotic		
Sheep's Sorrel	*Acetosella vulgaris*	-
Cape Weed	*Arctotheca calendula*	-
Cultivated Oat	*Avena sativa*	-
Brome Grass	*Bromus sp.*	-
Spear Thistle	*Cirsium vulgare*	-
Cotoneaster	*Cotoneaster glaucophyllus*	-
Couch grass	*Cynodon dactylon*	-
Cock's Foot	*Dactylis glomerata*	-
Claret Ash	*Fraxinus angustifolia*	-
Flatweed	*Hypochaeris radicata*	-
Broad-leaf Privet	*Ligustrum lucidum*	-
Apple Tree	*Malus sp.*	-
Radiata Pine	*Pinus radiata*	-
Poplar	*Populus sp.*	-
Blackberry	*Rubus fruticosus*	-
Clover	*Trifolium sp.*	-
Elm	*Ulmus sp.*	-
Native		
Australian Blackwood (Single Tree)	*Acacia melanoxylon*	Protected
Tall Sedge	*Carex appressa*	Protected
Common Spikerush	*Eleocharis acuta*	Protected
Black Gum	*Eucalyptus aggregata*	**Vulnerable**
Broad-leaved Peppermint	*Eucalyptus dives*	Protected
Snow Gum	*Eucalyptus pauciflora*	Protected
Black Sallee	*Eucalyptus stellulata*	Protected
Austral Rush	*Juncus australis*	Protected
Weeping Grass	*Microlaena stipoides*	Protected
Hairy Panic	*Panicum effusum*	Protected
River Tussock-grass	*Poa labillardieri*	Protected
Bracken Fern	*Pteridium esculentum*	Protected
Wallaby Grass	*Rytidosperma sp.*	Protected

Appendix B. Fauna Species Recorded

Class	Common name	Scientific name	BC Act status
Amphibia	Common Eastern Froglet	*Crinia signifera*	Protected
Amphibia	Whistling Tree Frog	*Litoria verreauxii*	Protected
Aves	Pacific Black Duck	*Anas superciliosa*	Protected
Aves	Grey Butcherbird	*Cracticus torquatus*	Protected
Aves	Australian Magpie	*Gymnorhina tibicen*	Protected
Aves	Noisy Miner	*Manorina melanocephala*	Protected
Aves	Crimson Rosella	*Platycercus elegans*	Protected
Aves	Eastern Rosella	*Platycercus eximius*	Protected
Mammalia	European Rabbit	*Oryctolagus cuniculus*	-

Appendix C. Likelihood of Occurrence Assessment

Key for below table

EPBC Act:

CE - critically endangered

E - endangered

V - vulnerable

CD - conservation dependent

BC Act:

CE1 - critically endangered species (Schedule 1, Part 1)

E1 - endangered species (Schedule 1, Part 2)

E2 - endangered population (Schedule 1, Part 2, Division 4)

E4 - presumed extinct (Schedule 3, Part 1)

V1 - vulnerable species (Schedule 2, Part 3)

Note: The brief species distribution and habitat descriptions provided in the below table are sourced / appropriated from the threatened species online profiles, listing determinations and/or recovery plans prepared for the species by the Commonwealth Government and NSW Government. These resources and associated references are provided on the relevant government websites.

Species Name	EPBC Act Status	BC Act Status	Description (Distribution and Habitat)	Likelihood of Occurrence
Birds				
Anthochaera phrygia Regent Honeyeater	CE	CE1	A semi-nomadic species occurring in temperate eucalypt woodlands and open forests. Most records are from box-ironbark eucalypt forest associations and wet lowland coastal forests. Key eucalypt species include Mugga Ironbark, Yellow Box, Blakely's Red Gum, White Box and Swamp Mahogany. Also utilises a number of other eucalypt species. Nectar and fruit from the mistletoes *Amyema miquelii*, *A. pendula*, and *A. cambagei* are also eaten during the breeding season. Regent Honeyeaters usually nest in horizontal branches or forks in tall mature eucalypts and sheoaks as well as within mistletoe haustoria (section of the root which connects with the host tree). An open cup-shaped nest is constructed by the female of bark, grass, twigs and wool.	Low It is possible that the species may visit the study area to forage. The study area does not contain nesting resources or foraging resources of potential significance to the species.

Species Name	EPBC Act Status	BC Act Status	Description (Distribution and Habitat)	Likelihood of Occurrence
Artamus cyanopterus cyanopterus Dusky Woodswallow	-	**V1**	The Dusky Woodswallow has two separate populations. The eastern population is found from Atherton Tableland, Queensland south to Tasmania and west to Eyre Peninsula, South Australia. The other population is found in south-west Western Australia. The Dusky Woodswallow is found in open forests and woodlands and may be seen along roadsides and on golf courses. The south-eastern population migrates north in autumn.	Negligible The study area does not contain potential habitat for the species.
Calidris ferruginea Curlew Sandpiper	CE	E	The Curlew Sandpiper is distributed around most of the Australian coastline. Inland records are probably mainly of birds pausing for a few days during migration. The Curlew Sandpiper breeds in Siberia and migrates to Australia (as well as Africa and Asia) for the non-breeding period, arriving in Australia between August and November, and departing between March and mid-April. It generally occupies littoral and estuarine habitats, and in New South Wales is mainly found in intertidal mudflats of sheltered coasts. It also occurs in non-tidal swamps, lakes and lagoons on the coast and sometimes inland.	Negligible The study area does not contain potential habitat for the species.
Callocephalon fimbriatum Gang-gang Cockatoo	-	V1	In summer the Gang-gang Cockatoo occupies tall montane forests and woodlands, particularly in heavily timbered and mature wet sclerophyll forests. Also occur in subalpine Snow Gum woodland and occasionally in temperate or regenerating forest. In winter, the species occurs at lower altitudes in drier, more open eucalypt forests and woodlands, particularly in box-ironbark assemblages, or in dry forest in coastal areas. The Gang-gang Cockatoo usually breeds in tall forests in the Southern Tablelands region, however they have been observed on occasion to breed in Box-Gum Woodland and other similar lowland habitat around Canberra (R. Speirs pers. obs., M. Mulvaney pers. comm.).	Low This species has been recorded in the locality. It is possible that the species may visit the study area to forage. The study area does not contain nesting resources of potential significance to the species

Species Name	EPBC Act Status	BC Act Status	Description (Distribution and Habitat)	Likelihood of Occurrence
Chthonicola sagittata Speckled Warbler	-	V1	The Speckled Warbler lives in a wide range of Eucalyptus dominated communities that have a grassy understorey, often on rocky ridges or in gullies. Typical habitat includes scattered native tussock grasses, a sparse shrub layer, some eucalypt regrowth and an open canopy. Large, relatively undisturbed remnants are required for the species to persist in an area. The diet consists of seeds and insects, with most foraging taking place on the ground around tussocks and under bushes and trees. Pairs are sedentary and occupy a breeding territory of about ten hectares, with a slightly larger home-range when not breeding. The rounded, domed, roughly built nest of dry grass and strips of bark is located in a slight hollow in the ground or the base of a low dense plant.	Negligible The study area does not contain potential habitat for the species.
Climacteris picumnus victoriae Brown Treecreeper (eastern subspecies)	-	V1	In the region, Brown Treecreepers occur in dry woodlands and open forest below 1,000 metres. Brown Treecreepers also frequent paddocks and grasslands where there are sufficient logs, stumps and dead trees nearby. The species prefers relatively undisturbed woodland and dry open forest where the native understorey, especially grasses, has been preserved. The species usually prefers predominantly rough-barked trees such as Stringybarks and rough barked Boxes.	Negligible The study area does not contain potential habitat for the species.
Daphoenositta chrysoptera Varied Sittella	-	V1	The Varied Sittella occurs in a wide variety of woodland and forest habitats, particularly in lowland areas. The species prefers areas with a dominance of rough barked trees, notably Red Stringybark at relatively high density. The species is rarely recorded in sparsely treed areas.	Negligible The study area does not contain potential habitat for the species.
Grantiella picta Painted Honeyeater	-	V1	The Painted Honeyeater is found in Queensland and New South Wales west of the Great Dividing Range, through to northern Victoria. The species displays some migratory movement and is occasionally found in the Northern Territory and is a vagrant to South Australia and the ACT. The species frequents eucalypt forests and woodlands, particularly those that are infested heavily with mistletoes.	Negligible The study area does not contain potential habitat for the species.

Species Name	EPBC Act Status	BC Act Status	Description (Distribution and Habitat)	Likelihood of Occurrence
Hieraaetus morphnoides Little Eagle	-	V1	The Little Eagle is distributed throughout the Australian mainland excepting the most densely forested parts of the Dividing Range escarpment, and occupies habitats rich in prey within open eucalypt forest, woodland or open woodland. The species is sensitive to human disturbance.	**Moderate** This species has been recorded in the broader locality. The study area is likely to be part of the large hunting range of a pair of Little Eagles, however no indications of breeding activity (i.e. large stick nests, presence repeatedly observed) were observed in the study area or nearby during the field survey.
Lathamus discolor Swift Parrot	CE	E1	The Swift Parrot occurs in woodlands and forests of NSW from May to August, where it feeds on eucalypt nectar, pollen and associated insects. The Swift Parrot is dependent on flowering resources across a wide range of habitats in its wintering grounds in NSW. This species is migratory, breeding in Tasmania and also nomadic, moving about in response to changing food availability.	Low It is possible that the species may visit the study area to forage. The study area does not contain nesting resources or foraging resources of potential significance to the species.
Melanodryas cucullata cucullata Hooded Robin (southeastern form)	-	V1	The Hooded Robin occupies drier eucalypt forest, woodland and scrub, grasses and low shrubs, as well as cleared paddocks with regrowth or stumps. The species uses stumps, posts or fallen timber from which to locate prey on the ground. The species is found in woodland, often with scattered Yellow Box and/or Blakely's Red Gum, with long grass and low shrubs, or fallen logs.	Low It is possible that the species may visit the study area to forage. The study area does not contain nesting resources or foraging resources of potential significance to the species.
Ninox strenua Powerful Owl	-	V1	Widely distributed throughout the eastern forests from the coast inland to tablelands, with scattered records on the western slopes and plains suggesting occupancy prior to land clearing. The Powerful Owl inhabits a range of vegetation types, from woodland and open sclerophyll forest to tall open wet forest and rainforest. The Powerful Owl requires large tracts of forest or woodland habitat but can occur in fragmented landscapes as well. They nest in large tree hollows (at least 0.5 m deep), in large eucalypts (diameter at breast height of 80-240 cm) that are at least 150 years old.	Low It is possible that the species may visit the study area to forage. The study area does not contain nesting resources or foraging resources of potential significance to the species.

Species Name	EPBC Act Status	BC Act Status	Description (Distribution and Habitat)	Likelihood of Occurrence
Petroica boodang Scarlet Robin	-	V1	The Scarlet Robin is found in south-eastern Australia (extreme south-east Queensland to Tasmania, western Victoria and south-east South Australia) and south-west Western Australia. In NSW it occupies open forests and woodlands from the coast to the inland slopes, breeding in drier eucalypt forests and temperate woodlands.	Low It is possible that the species may visit the study area to forage. The study area does not contain nesting resources or foraging resources of potential significance to the species.
Petroica phoenica Flame Robin	-	V1	The Flame Robin is found in south-eastern Australia, from the Queensland border to Tasmania, western Victoria and south-east South Australia. In NSW it breeds in upland moist eucalypt forests and woodlands, often on ridges and slopes, in areas of open understorey. The species migrates in winter to more open lowland habitats such as grassland with scattered trees and open woodland on the inland slopes and plains.	Low It is possible that the species may visit the study area to forage. The study area does not contain nesting resources or foraging resources of potential significance to the species.
Numenius madagascariensis Eastern Curlew	CE	-	The eastern curlew is Australia's largest shorebird and a long-haul flyer. The eastern curlew takes an annual migratory flight to Russia and north-eastern China to breed, arriving back home to Australia in August to feed on crabs and molluscs in intertidal mudflats. It is extremely shy and will take flight at the first sign of danger.	Negligible The study area does not contain potential habitat for the species.
Polytelis swainsonii Superb Parrot	V	V1	Found mainly in open, tall riparian River Red Gum forest or woodland. Often found in farmland including grazing land with patches of remnant vegetation. Breeds in hollow branches of tall eucalypt trees within nine kilometres of feeding areas.	Low It is possible that the species may visit the study area to forage. The study area does not contain nesting resources or foraging resources of potential significance to the species.
Rostratula australis Australian Painted Snipe	V	E1	Usually found in shallow inland wetlands including farm dams, lakes, rice crops, swamps and waterlogged grassland. The species prefers freshwater wetlands, ephemeral or permanent, although it has been recorded in brackish waters.	Low It is possible that the species may visit the study area, however the study area does not contain nesting resources of potential significance to the species.

Species Name	EPBC Act Status	BC Act Status	Description (Distribution and Habitat)	Likelihood of Occurrence
Stagonopleura guttata Diamond Firetail	-	V1	The Diamond Firetail is found in eastern Australia, from Eyre Peninsula, South Australia, to south-eastern Queensland. There has been a decline in density throughout the range, and many remaining populations may now be isolated. The species inhabits a wide range of eucalypt-dominated vegetation communities that have a grassy understorey, including woodland and mallee.	Negligible The study area does not contain potential habitat for the species.
Stictonetta naevosa Freckled Duck	-	V1	The Freckled Duck occurs primarily within south-eastern and south western Australia, within the Lake Eyre and Murray Darling Basin systems. It is known vagrant across widespread areas of NSW, depending on the inland conditions. Prefers permanent bodies of freshwater such as lakes, reservoirs and farm dams.	Low It is possible that the species may visit the study area to forage. The study area does not contain nesting resources or foraging resources of potential significance to the species.
Fish and Crustacea				
Maccullochella peelii Murray Cod	V	-	The Murray Cod's natural distribution extends throughout the Murray-Darling basin ranging west of the divide from south east Queensland, through NSW into Victoria and South Australia. The species is found in the waterways of the Murray– Darling Basin in a wide range of warm water habitats that range from clear, rocky streams to slow flowing turbid rivers, billabongs and large deep holes. Murray Cod is entirely a freshwater species and will not tolerate high salinity levels.	Negligible There is no potential habitat in the study area for the species.
Macquaria australasica Macquarie Perch	E	E1	Macquarie Perch are found in the Murray-Darling Basin (particularly upstream reaches) of the Lachlan, Murrumbidgee and Murray rivers, and parts of south-eastern coastal NSW, including the Hawkesbury and Shoalhaven catchments. Macquarie perch are found in both river and lake habitats, especially the upper reaches of rivers and their substantial tributaries.	Negligible There is no potential habitat in the study area for the species.

Species Name	EPBC Act Status	BC Act Status	Description (Distribution and Habitat)	Likelihood of Occurrence
Frogs				
Litoria aurea Green and Golden Bell Frog	V	E1	The Green and Golden Bell Frog occurs mainly along coastal lowland areas of eastern NSW and Victoria. The furthest inland record of the species is at a recently discovered population near Hoskinstown in the Southern Tablelands (referred to as the Molonglo population). The species was previously known from elsewhere in the Southern Tablelands, but is now considered to have disappeared from the ACT and central slopes around Bathurst. In NSW, the species commonly occupies disturbed habitats, and breeds largely in ephemeral ponds. However, in Victoria, the Green and Golden Bell Frog occupies habitats with little human disturbance and commonly breeds in permanent ponds, as well as ephemeral ponds.	Negligible There is no potential habitat in the study area for the species.
Litoria booroolongensis Booroolong Frog	E	-	The Booroolong Frog is restricted to tablelands and slopes in NSW and north-east Victoria at 200–1300 m above sea level. The species is predominantly found along the western-flowing streams and their headwaters of the Great Dividing Range, and a small number of eastern-flowing streams in the north end of its range. The Booroolong Frog occurs along permanent streams with some fringing vegetation cover such as ferns, sedges or grasses. Adults occur on or near cobble banks and other rock structures within stream margins, or near slow-flowing connected or isolated pools that contain suitable rock habitats. Streams range from small slow-flowing creeks to large rivers in dissected mountainous country, tablelands, foothills and lowland plains. Primary habitat requirements for the Booroolong Frog are extensive rock bank structures along permanent rivers. The species can occur in cleared grazing land and pasture.	Negligible There is no potential habitat in the study area for the species.

Species Name	EPBC Act Status	BC Act Status	Description (Distribution and Habitat)	Likelihood of Occurrence
Litoria castanea Yellow-spotted Tree Frog	E	-	The Yellow-spotted Tree Frog previously had a disjunct distribution, being recorded on the New England Tablelands and on the Southern Tablelands from Lake George to Bombala. The species has only recently (2010) been rediscovered on the Southern Tablelands. Prior to this the species had not been recorded on the Southern Tablelands since the 1970s. Found in large permanent ponds, lakes and dams with an abundance of bulrushes and other emergent vegetation, it shelters during autumn and winter under fallen timber, rocks, other debris or thick vegetation.	Negligible There is no potential habitat in the study area for the species.
Litoria raniformis Growling Grass Frog	V	E1	In NSW, the species is known to exist only in isolated populations in the Coleambally Irrigation Area, the Lowbidgee floodplain and around Lake Victoria. Usually found in or around permanent or ephemeral swamps or billabongs with an abundance of bulrushes and other emergent vegetation along floodplains and river valleys. The species has also been found in irrigated rice crops. Outside the breeding season animals disperse away from water and take shelter beneath ground debris such as fallen timber and bark, rocks, grass clumps and in deep soil cracks. The species previously occurred on the Southern Tablelands at a number of sites within the Murrumbidgee River corridor, however it is now widely considered to have become extinct on the Southern Tablelands.	Negligible There is no potential habitat in the study area for the species.
Insects				
Synemon plana Golden Sun Moth	CE	E1	The Golden Sun Moth's NSW populations are found in the area between Queanbeyan, Gunning, Young and Tumut. The species occurs in Natural Temperate Grasslands and Box-Gum Grassy Woodland in which the groundcover is dominated by Wallaby Grasses (*Rytidosperma* spp.). It is believed that the females lay up to 200 eggs at the base of the Wallaby Grass tussocks. After hatching, the larvae tunnel underground where they remain feeding on the roots of Wallaby Grass tussocks. The species is also known to feed on the introduced species (and Weed of National Significance), Chilean Needle Grass *Nassella neesiana*.	Negligible There is no potential habitat in the study area for the species.

Species Name	EPBC Act Status	BC Act Status	Description (Distribution and Habitat)	Likelihood of Occurrence
Mammals				
Cercartetus nanus Eastern Pygmy-possum	-	V1	The Eastern Pygmy-possum ranges from the Gold Coast to southern NSW. Found in a broad range of habitats from rainforest to sclerophyll forest and woodland. Feeds primarily on nectar and pollen from banksias, eucalypts and bottlebrushes. Shelters in tree hollows and abandoned bird nests.	Low It is possible that the species may visit the study area to forage, however the study area does not contain potential nesting resources or foraging resources of potential significance to the species.
Chalinolobus dwyeri Large-eared Pied Bat	V	V1	The Large-eared Pied Bat appears to exist in a number of small populations throughout its range. Very few maternity sites are known. The species requires a combination of sandstone cliff/escarpment to provide roosting habitat that is adjacent to higher fertility sites, particularly box gum woodlands or river/rainforest corridors which are used for foraging.	Low It is possible that the species may visit the study area to forage, however the study area does not contain potential nesting resources or foraging resources of potential significance to the species.
Dasyurus maculatus maculatus Spot-tailed Quoll (SE mainland population)	E	V1	The Spot-tailed Quoll occurs along the east coast of Australia and the Great Dividing Range. The species uses a range of habitats including sclerophyll forests and woodlands, coastal heathlands and rainforests. Occasional sightings have been made in open country, grazing lands, rocky outcrops and other treeless areas. Habitat requirements include suitable den sites, including hollow logs, rock crevices and caves, an abundance of food and an area of intact vegetation in which to forage. Seventy per cent of the diet is medium-sized mammals, and also feeds on invertebrates, reptiles and birds. Individuals require large areas of relatively intact vegetation through which to forage. The home range of a female is between 180 and 1000ha, while males have larger home ranges of between 2000 and 5000ha. Breeding occurs from May to August.	Low It is possible that the species may pass through the study area during movements through the broader locality, however the study area does not contain habitat of potential significance to the species.
Falsistrellus tasmaniensis Eastern False Pipistrelle	-	V1	The Eastern False Pipistrelle is found on the south-east coast and ranges of Australia, from southern Queensland to Victoria and Tasmania. The species generally roosts in eucalypt hollows, but has also been found under loose bark on trees or in buildings. The species prefers moist, tall forest environments. The species is not known to forage or roost in urban or highly modified rural areas.	Low It is possible that the species may visit the study area to forage, however the study area does not contain potential nesting resources or foraging resources of potential significance to the species.

Species Name	EPBC Act Status	BC Act Status	Description (Distribution and Habitat)	Likelihood of Occurrence
Miniopterus schreibersii oceanensis Eastern Bent-wing Bat	-	V1	The Eastern Bent-wing Bat is a subspecies of the Common Bent-wing Bat, with a range thought to be from central Victoria to Cape York Peninsula, Queensland. It is a fast flyer, able to travel many kilometres in a night. Caves are the primary roosting habitat for this species however similar man-made structures are also used (culverts, eaves etc.). The species forages above the forest canopy.	Low This species has been recorded in the broader locality. It is possible that the species may visit the study area to forage, however the study area does not contain potential nesting resources or foraging resources of potential significance to the species.
Petauroides Volans Greater Glider	V	-	The greater glider is restricted to eastern Australia, occurring from the Windsor Tableland in north Queensland through to central Victoria, with an elevational range from sea level to 1200 m above sea level. The greater glider is an arboreal nocturnal marsupial, largely restricted to eucalypt forests and woodlands. It is primarily folivorous, and is typically found in highest abundance in taller, montane, moist eucalypt forests with relatively old trees and abundant hollows. The greater glider favours forests with a diversity of eucalypt species, due to seasonal variation in its preferred tree species	Low The species is not known to occur near the study area and was not recorded during the field survey.
Petrogale penicillata Brush-tailed Rock-wallaby	V	E1	In NSW they occur from the Queensland border in the north to the Shoalhaven in the south, with the population in the Warrumbungle Ranges being the western limit. They occupy rocky escarpments, outcrops and cliffs with a preference for complex structures with fissures, caves and ledges, often facing north. They browse on vegetation in and adjacent to rocky areas eating grasses and forbs as well as the foliage and fruits of shrubs and trees.	Negligible There is no potential habitat in the study area for the species.
Phascolarctos cinereus Koala (combined populations of Qld, NSW and the ACT)	V	V1	In NSW, the Koala mainly occurs on the central and north coasts with some populations in the western region. Koalas feed almost exclusively on eucalypt foliage, and their preferences vary regionally. They are solitary with varying home ranges. In high quality habitat home ranges may be 1-2 hectare and overlap, while in semi-arid country they are usually discrete and around 100 ha.	Low Old records exist of the species in the locality to the southwest. It is possible that the species may pass through the study area during movements through the broader locality, however the study area does not contain habitat of potential significance to the species.

Species Name	EPBC Act Status	BC Act Status	Description (Distribution and Habitat)	Likelihood of Occurrence
Pteropus poliocephalus Grey-headed Flying Fox	V	-	The Grey-headed Flying Fox occurs in the coastal belt from Rockhampton in central Queensland to Melbourne in Victoria. Whilst Brisbane, Newcastle, Sydney and Melbourne are occupied continuously, the species is widespread throughout their range during summer. In autumn the species occupies coastal lowlands and is uncommon inland. In winter the species congregates in coastal lowlands north of the Hunter Valley and is occasionally found on the south coast of NSW and on the northwest slopes (associated with flowering eucalypts of these areas). The Grey-headed Flying-fox requires foraging resources and roosting sites. It is a canopy-feeding frugivore and nectarivore, which utilises vegetation communities including rainforests, open forests, closed and open woodlands, Melaleuca swamps and Banksia woodlands. The Grey-headed Flying-fox roosts in aggregations of various sizes on exposed branches. Roost sites are typically located near water, such as lakes, rivers or the coast.	Low It is possible that the species may visit the study area to forage, however the study area does not contain potential roosting resources or foraging resources of potential significance to the species.
Reptiles				
Delma impar Striped Legless Lizard	V	V1	The Striped Legless Lizard is patchily distributed in grasslands of south-eastern NSW, the ACT, north-eastern, central and south-western Victoria, and south-eastern South Australia. Most areas where the species persists are thought to have had low to moderate levels of agricultural disturbance in the past and it has been suggested that ploughing in particular may be incompatible with the survival of the species. Until recently, the species was thought to inhabit only native grasslands dominated by species such as Tall Speargrass and Kangaroo Grass. In recent years, surveys have revealed the Striped Legless Lizard in many sites dominated by exotic grasses such as Phalaris, Serrated Tussock and Flatweed. They have also been found in several secondary grassland sites, generally within two kilometres of primary grassland.	Negligible There is no potential habitat in the study area for the species.

Species Name	EPBC Act Status	BC Act Status	Description (Distribution and Habitat)	Likelihood of Occurrence
Plants				
Amphibromus fluitans River Swamp Wallaby-grass	V	-	River Swamp Wallaby-grass has been recorded along the Lachlan River at sites at Laggan near Crookwell and the headwaters of the Wollondilly River. The species grows mostly in permanent swamps, as well as lagoons, billabongs, dams and roadside ditches. The species requires moderately fertile soils with some bare ground, such conditions being caused by seasonally-fluctuating water levels.	**Moderate** This species is known to occur in the locality. The riparian habitat in the study area is potential habitat for this species. However, the species was not detected during the field survey.
Eucalyptus aggregata Black Gum	V	V1	Black Gum occurs on the central and southern tablelands of NSW, and in a small disjunct population in Victoria. In NSW, it occurs predominantly in the South Eastern Highlands Bioregion. The species is a small to medium-sized woodland tree which grows in grassy woodlands on alluvial soils in moist sites along creeks on broad, cold and poorly-drained flats and hollows. It commonly occurs with Candlebark *Eucalyptus rubida*, Ribbon Gum *E. viminalis*, and Snow Gum *E. pauciflora*, with a grassy understorey of River Tussock *Poa labillardieri*. Most populations are located on private land or road verges and travelling stock routes.	**Confirmed** This species is present in the study area.
Eucalyptus macarthurii Camden Woollybutt / Paddys River Box	E	E1	The species is currently recorded from the Moss Vale District to Kanangra Boyd National Park. In the Southern Highlands it occurs mainly on private land, often as isolated individuals in, or on the edges, of paddocks. Isolated stands occur in the north west part of the range on the Boyd Plateau. The only known record in the conservation estate is within Kanangra Boyd National Park. The species occurs on grassy woodland on relatively fertile soils on broad cold flats.	Negligible This species is not present in the study area.

Species Name	EPBC Act Status	BC Act Status	Description (Distribution and Habitat)	Likelihood of Occurrence
Lepidium hyssopifolium Basalt Peppercress	E	E	This species is known from a few populations in NSW, Victoria and Tasmania. The Basalt Pepper-cress is known to establish on open, bare ground with limited competition from other plants. It was previously recorded from Eucalypt woodland with a grassy ground cover, low open Casuarina woodland with a grassy ground cover and tussock grassland. Recently recorded localities have predominantly been in weed-infested areas of heavy modification, high degradation and high soil disturbance such as road and rail verges, on the fringes of developed agricultural land or within small reserves in agricultural land. Many populations are now generally found amongst exotic pasture grasses and beneath exotic trees.	Low The species is not known to occur in the locality and was not recorded during the field survey.
Leucochrysum albicans var. *tricolor* Hoary Sunray	E	-	The Hoary Sunray occurs from Queensland to Victoria and in Tasmania. In the ACT the species can be seen in spring in abundance on the roadside along Fairbairn Avenue and into Mt Ainslie Nature Reserve, on the western slopes of Mt Majura and adjacent to the Federal Highway road easement. In NSW it is distributed on the inland slopes and plains including grasslands and woodlands on the Monaro and is quite a common species along in less modified areas. The species is usually found in ungrazed and lightly grazed areas, along roadsides in particular. It appears to be very sensitive to grazing, but responds to disturbance as a coloniser and appears to tolerate mowing. Flowers spring to summer.	Negligible There is no potential habitat in the study area for the species
Pelargonium sp. Striatellum Omeo Stork's-bill	E	E1	An undescribed species of Pelargonium, Omeo Stork's Bill is a tufted perennial herb threatened by grazing, recreational activities, and exotic species. It is known to occur just above the high-water level of ephemeral lakes in NSW and Victoria.	Negligible There is no potential habitat in the study area for the species

Species Name	EPBC Act Status	BC Act Status	Description (Distribution and Habitat)	Likelihood of Occurrence
Pomaderris pallida Pale Pomaderris	V	V1	Pale Pomaderris has been recorded from near Kydra Trig, north-west of Nimmitabel, Tinderry Nature Reserve, and the Queanbeyan River. A record from Byadbo in Kosciuszko National Park has not been relocated. The main distribution is along the Murrumbidgee in the ACT. It was recorded recently in eastern Victoria. This species usually grows in shrub communities surrounded by Brittle Gum *Eucalyptus mannifera* and Red Stringybark *E. macrorhynca* or Black Cypress *Callitris endlicheri* woodland.	Negligible The species is quite conspicuous when present and was not recorded during the field survey.
Prasophyllum petilum Tarengo Leek Orchid	E	E1	When first described in 1991, the Tarengo Leek Orchid was known only from the Hall Cemetery in the ACT. It has since been found at four sites in New South Wales: Captains Flat Cemetery, Ilford Cemetery, Steves Travelling Stock Route (TSR) at Delegate and the Tarengo TSR near Boorowa. The Tarengo Leek Orchid occurs on relatively fertile soils in grassy woodland or natural grassland. The three cemetery sites originally contained grassy woodland, dominated by Snow Gum *Eucalyptus pauciflora* and Black Gum *E. aggregata* at Captains Flat, and Blakely's Red Gum *E. blakelyi* and Yellow Box *E. melliodora* at Hall and Ilford. Both Tarengo TSR and Steves TSR are natural grasslands. The species is intolerant of grazing and this is considered to be the key reason it has been found only within cemeteries and TSRs, land from which grazing has been restricted.	Negligible There is no potential habitat in the study area for the species.
Rutidosis Leptorrhynchoides Button Wrinklewort	E	E1	In the ACT and NSW, Button Wrinklewort occurs in box-gum woodland, secondary grassland derived from box-gum woodland or in natural temperate grassland. It prefers open spaces where it does not have to compete for light. It is known from several sites in the ACT, NSW and Victoria, where it is threatened by habitat loss, grazing and weed encroachment.	Negligible There is no potential habitat in the study area for the species.

Species Name	EPBC Act Status	BC Act Status	Description (Distribution and Habitat)	Likelihood of Occurrence
Swainsona recta Small Purple-pea	E	E1	The Small Purple-pea occurs in the grassy understorey of woodlands and open forests dominated by Blakely's Red Gum, Yellow Box, Candlebark and Bundy. The species grows in association with understorey dominants that include Kangaroo Grass, Poa tussocks and spear-grasses. Plants die back in summer, surviving as rootstocks until they shoot again in autumn. The species is intolerant of grazing but generally tolerant of fire, which also enhances germination by breaking the seed coat and reducing competition from other species.	Negligible The study area is unlikely to provide potential habitat to the species due to land use history and the degraded nature of the groundstorey vegetation within the study area. The species is also not known to occur in the locality.
Swainsona sericea Silky Swainson-pea	-	V1	Silky Swainson-pea is a low growing perennial, found from the Northern Tablelands to the Southern Tablelands and Monaro region as well as further inland on the slopes and plains. The species is found in Natural Temperate Grassland and Snow Gum Woodland on the Monaro, and in Box-Gum Woodland in the Southern Tablelands and South West Slopes.	Negligible The study area is unlikely to provide potential habitat to the species due to land use history and the degraded nature of the groundstorey vegetation within the study area. The species is also not known to occur in the locality.
Thesium australe Austral Toadflax	V	V1	Found in very small to large populations scattered across eastern NSW, along the coast, and from the Northern to Southern Tablelands. Austral Toadflax is a root parasite that takes water and some nutrients from other plants, especially Kangaroo Grass. It is often found in damp sites in association with Kangaroo Grass but it is also found on other grass species at inland sites. Occurs on clay soils in grassy woodlands or coastal headlands.	Negligible There is no potential habitat in the study area for the species.