Appendix E

Ecological Assessment
by Niche Environment and Heritage

niche
Environment and Heritage

3000 Remembrance Drive, 1, 5 & part 3 Olive Lane, Bargo

Ecological Assessment

Prepared for The Anglican Schools Corporation

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Authors:	Sian Griffiths
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Niche Environment and Heritage

A specialist environmental and heritage consultancy.

Head Office

Level 1, 460 Church Street
North Parramatta NSW 1750
All mail correspondence to:
PO Box 2443
North Parramatta NSW 1750
Email: info@niche-eh.com

Sydney
0488 224 888
Central Coast
0488 224 999
Illawarra
0488 224 777
Armidale
0488 224 094
Newcastle
0488 224 160
Mudgee
0488 224 025
Port Macquarie
0488 224 999
Brisbane
0488 224 036
Cairns
0488 284 743

Cover photograph: Red Bloodwood – Grey-Gum woodland on the edges of the Cumberland Plain in the study area (*Photo: Sian Griffiths, Niche*)

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1. Introduction

1.1 Context

Niche Environment and Heritage Pty Ltd (Niche) have been commissioned by The Anglican Schools Corporation to undertake an ecological assessment of 3000 Remembrance Drive, 1, 5 and part 3 Olive Lane, Bargo (the study area, Figure 1, Figure 2). The report is to support a rezoning application to the Department of Planning and Environment to rezone the study area from RU1 Primary Production to SP2 Infrastructure.

1.2 Site location

Figure 1 and Figure 2 show the location of the study area for this assessment, which encompasses the entirety of 3000 Remembrance Drive, 1, 5 and part 3 Olive Lane, Bargo. The study area is located within Wollondilly Local Government Area.

1.3 Existing and proposed development

Existing development on the site is shown in Figure 2 and includes:

- The eastern part of Lot 12, which is cleared and contains the existing school (being the college classrooms, administration and associated buildings and sports facilities). The Year 5/ 6 block (Stage 11 of the Masterplan) was approved by Council in January 2018 and is currently under construction. The future Year 3/ 4 block is the only building proposed under the Masterplan yet to be developed on Lot 12
- Lots 2 and 4 are currently primarily agricultural land (olive plantations). Existing development on these lots comprises several outbuildings.

Development proposed under the Masterplan for Lots 2 and 4 are shown in Figure 3 and include:

- Creation of additional alternative access (entry) into the College
- A gymnasium and performing arts block
- External sporting facilities including a playing field (and associated spectator stand, amenities and equipment store), and other courts used for various sporting activities
- College access road, car parks and a school bus shelter.

For the purpose of this assessment, the College Masterplan (Figure 3) is used as the basis for determining the suitability of the site for future development subsequent to the proposed rezoning of land.

1.4 Aim

The aim of the ecological assessment is to determine the ecological constraints of the study area and assist in determining the suitability of the proposed rezoning for the study area, from an ecological perspective.

Threatened biodiversity listed under the NSW *Biodiversity Conservation Act 2016* (BC Act) and the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) are considered in this assessment.

2. Methodology

2.1 Database and literature sources

Relevant databases were reviewed prior to field survey to identify data gaps and inform survey design. Database searches for a 10 km radius around the study area were conducted in July 2018 to identify threatened biodiversity and migratory species with known occurrences in the locality. The following databases were used for this purpose:

- Office of Environment and Heritage (OEH) BioNet, Atlas of NSW Wildlife (OEH 2018a)
- Department of the Environment and Energy (DoEE) EPBC Act Protected Matters Report (DoEE 2018a)
- Threatened Species Profiles for threatened species, endangered populations and endangered ecological communities (EECs) listed under the BC Act (OEH 2018b)
- Species Profile and Threats Database (DoEE 2018b)

Relevant previous reports undertaken in the vicinity of the study area and reviewed as part of this report include:

- Ecotone Ecological Consultants (2003) Preliminary Assessment of Flora and Fauna Impact for the Proposed Stage 1 Construction works for the Wollondilly Anglican College at Tahmoor
- Ecotone Ecological Consultants (2007) Vegetation Management Plan for the new oval and pavilion at Wollondilly Anglican College, Tahmoor
- Wollondilly Local Environment Plan 2011

Existing vegetation mapping (Cumberland Plain West, OEH 2013) was examined prior to the field survey to determine the plant community types (PCTs) likely to be present in the study area.

2.2 Field survey

A terrestrial flora and fauna survey of the study area was undertaken on 30th July 2018. Targeted surveys for the Koala were undertaken on 2 August 2018. Below is a summary of the survey methods and effort.

Field survey involved the following (see Figure 4 for survey effort):

- Six Biodiversity Assessment Method (BAM) floristic survey plots, following the methodology in the BAM (OEH 2017)
- Random meander transect, searching for threatened species and their habitats
- Four Rapid Data Points (RDP) to assist in validating vegetation mapping
- Fauna habitat assessment
- Opportunistic fauna observations
- Koala targeted surveys

These survey methods are described in more detail below.

2.2.1 Biodiversity Assessment Method (BAM) Plots

Validation of the existing vegetation mapping was carried out through collection of floristic vegetation survey data, function attributes (e.g. large trees) and average litter cover in accordance with the BAM requirements. The methodology includes establishment of 20 x 20 metre (or 400m^2 equivalent for linear areas) floristic vegetation survey plots to collect the following information:

- Species name
- Stratum (& layer) for each species
- Growth form for each species
- Cover (percent foliage cover)
- Abundance rating (for species with less than or equal to 5% cover).

In addition, the following habitat assessment data were collected at each plot:

- Function attributes: number of large trees, stem class size, tree regeneration and length of logs within a 1,000 m^2 (20 x 50 metre) plot
- Litter cover: assessment of average litter cover (and other groundcover components) within five 1 m^2 sub-plots.

2.2.2 Random meander transect

A walking transect was completed targeting threatened species habitat and other key habitat features. Locations of habitat features were mapped and recorded.

2.2.3 Rapid data point

Rapid data points were completed in the study area to determine characteristics of the vegetation cover present. Data collected at each of these points includes:

- Overstorey dominant plant species
- Midstorey dominant plant species
- Groundcover dominant plant species
- Structure
- Photo point

2.2.4 Fauna habitat assessment

Fauna habitat characteristics and parameters assessed in the study area included:

- Dominant vegetation, composition and structure
- Composition of ground layer (bare earth, litter etc.)
- Presence and relative abundance of key habitat features (e.g. tree hollows, large logs, exfoliating rock, flowering resources, aquatic features)
- Condition and disturbance factors.

Opportunistic fauna sightings during the site inspection were also recorded.

2.2.5 Koala targeted surveys

Two experienced observers spent 3.5 hours (7 person hours) searching around the most likely trees for Koala signs, being primarily scat, claw marks from Koalas on smooth-barked trees, and the scent of Koala scats and urine. The most likely habitat trees on the site were considered to be Grey Gum (*Eucalyptus punctata*) and Scribbly Gum (*Eucalyptus sclerophllya*) followed by the mahogany and stringybark species. Up to a minute was spent searching around the base of the most likely food trees and the majority of the two gum species on site were inspected for Koala signs.

A further 3.5 hours was spent spotlighting the site once it became dark, particularly looking for the bright eye-shine of Koalas and listening for Koala vocalisations.

2.3 Threatened flora and fauna likelihood of occurrence

A list of subject threatened flora and fauna within the locality (10 km radius) was determined from database searches detailed in Section 2.1. The list of potentially impacted (affected) species is determined from consideration of this list.

In order to adequately determine the relevant level of assessment to apply to potentially affected species, further analysis of the likelihood of those species occurring within the study area was completed.

Five categories for 'likelihood of occurrence' (Table 1) were attributed to species after consideration of criteria such as known records, presence or absence of important habitat features on the subject site, results of the field surveys and professional judgement. This process was completed on an individual species basis.

Species considered further in formal assessments of significance (BC Act, EPBC Act) were those in the 'Known', 'High' or 'Moderate' categories and where impacts for the species could reasonably occur from the development. Species listed as a 'Low' or 'None' likelihood of occurrence are those for which there is limited or no habitat present within the study area.

Table 1: Likelihood of occurrence criteria

Likelihood rating	Threatened flora criteria	Threatened and migratory fauna criteria
Known	The species was observed within the study area.	The species was observed within the study area.
High	It is likely that a species inhabits or utilises habitat within the study area.	It is likely that a species inhabits or utilises habitat within the study area.
Moderate	Potential habitat for a species occurs on the site. Adequate field survey would determine if there is a 'high' or 'low' likelihood of occurrence for the species within the study area.	Potential habitat for a species occurs on the site and the species may occasionally utilise that habitat. Species unlikely to be wholly dependent on the habitat present within the study area.
Low	It is unlikely that the species inhabits the study area.	It is unlikely that the species inhabits the study area. If present at the site the species would likely be a transient visitor. The site contains only very common habitat for this species which the species would not rely on for its on-going local existence.
None	The habitat within the study area is unsuitable for the species.	The habitat within the study area is unsuitable for the species.

2.4 Limitations

The current survey was primarily a habitat-based assessment – with the exception of targeted searches for some threatened flora species with the potential to occur and that could be detected at the time of the survey. Targeted surveys were also undertaken for the Koala.

Numerous threatened plant and animal species are cryptic or difficult to detect. For instance, some cryptic plant species are more easily detected at certain times of the year, such as during flowering events. Some fauna can only be detected during certain seasons (e.g. migration patterns or intra-torpor periods). These limitations were addressed by undertaking a habitat-level assessment, assuming cryptic and/or seasonal species may be present if suitable habitat is present within the study area. Habitat assessments are conservative and default to an assumed presence where there is insufficient knowledge to determine

otherwise. The assessment of potential impacts to each of the species with suitable habitat present was then undertaken accordingly.

3. Results

3.1 Literature review

A previous ecological assessment has been undertaken in the vicinity of the study area. The results of which are summarised below.

Preliminary Assessment of Flora and Fauna Impact for the Proposed Stage 1 Construction works for the Wollondilly Anglican College at Tahmoor (Ecotone Ecological Consultants 2003)

Ecotone (2003) undertook a flora and fauna impact assessment for construction of the proposed Anglican College in 2003. Field survey methods involved a habitat assessment.

Vegetation communities recorded by Ecotone (2003) in the study area included Shale Sandstone Transition Forest within 200 m of Remembrance Drive and Sydney Sandstone Ridgetop Woodland further west. Shale Sandstone Transition Forest is a critically endangered ecological community (CEEC) on both the BC and EPBC Acts.

Important habitat recorded in the study area by Ecotone (2003) included:

- Large mature trees, some containing hollows
- Large fallen limbs
- Minor areas of exposed flat sandstone rock along drainage lines
- Dams and minor drainage lines
- Bargo River.

No threatened flora were recorded or considered likely to occur. No threatened fauna were recorded in the study area. Threatened fauna that were considered to potentially use the woodland edges and open habitats of the study area include:

- Hooded Robin
- Squirrel Glider
- Koala
- Eastern False Pipistrelle
- East Coast Free-tail Bat
- Greater Broad-nosed Bat.

Vegetation Management Plan for the new oval and pavilion at Wollondilly Anglican College, Tahmoor (Ecotone Ecological Consultants 2007)

Ecotone (2003) prepared a vegetation management plan to support the proposed construction of a new sports oval and pavilion to the west of the existing school. Figure 1 of this plan shows a large parcel of native vegetation that would remain uncleared and is referred to as the 'Bushland Conservation Area' (see Figure 5). The plan states that:

> *It is agreed by SASC* (Sydney Anglican Schools Corporation) *and the College that the bushland conservation area will be retained in perpetuity in its current condition, and improved by weed control and additional planting of locally indigenous shrub and tree species, as required.*

3.2 Existing environment

3.2.1 Flora and vegetation validation

The regional vegetation mapping (OEH 2013) indicates three PCTs occur in the study area (Figure 5, Table 2). The vegetation mapping in Figure 5 was ground-truthed during the field surveys (Table 2). The dominant PCT recorded in the study area was PCT 1081, with PCT 1181 occurring along the Bargo River and associated tributaries of the study area, and PCT 1395 occurring as scattered remnants in the east of the study area near Remembrance Drive, as detailed in Table 2 and Figure 6.

A total of 78 plant species were recorded in the study area, including 70 natives and eight exotics (Appendix 1).

Table 2: PCTs occurring in the study area

PCT #	PCT best fit (OEH 2013)	TEC	Mapped location and ground-truthing
1081	Red Bloodwood – Grey Gum woodland on the edges of the Cumberland Plain, Sydney Basin Bioregion	Not listed	This was the dominant vegetation type across the study area. Areas mapped by OEH (2013) as supporting PCT 1395 in Figure 5 were found to support PCT 1081. This was evidenced by a complete absence of Ironbarks in this area. All structural layers fit with the species composition of PCT 1081 more closely than PCT 1395.
1181	Smooth-barked Apple – Red Bloodwood – Sydney Peppermint heathy open forest on slopes of dry sandstone gullies of western and southern Sydney, Sydney Basin Bioregion	Not listed	This PCT was recorded along Bargo River and its tributaries in the study area. The mapping of this PCT by OEH (2013) was largely accurate. Despite the absence of *Angophora costata* in the canopy, many of the other canopy species listed as occurring in the PCT were recorded, along with a number of the listed shrub and groundcover species.
1395	Narrow-leaved Ironbark – Broad-leaved Ironbark – Grey Gum open forest of the edges of the Cumberland Plain, Sydney Basin Bioregion	Shale Sandstone Transition Forest CEEC listed on BC and EPBC Acts	This PCT was recorded as scattered remnants along fence lines in the east of the study area, in the vicinity of Remembrance Drive. Ironbarks were recorded in this area, along with Grey Gums. These areas supported remnant trees of *Eucalyptus crebra* and *E. punctata*, with no other structural layers present.
-	Cleared	Not listed	The area supporting the existing school and associated buildings and the Olive plantations in the north-east of the study area were cleared, and did not represent any native PCTs.

PCT 1081 Red Bloodwood– Grey Gum woodland on the edges of the Cumberland Plain, Sydney Basin Bioregion

This PCT was the dominant PCT recorded in the study area, occurring within the area to the west of the existing school (Plate 1, Figure 6). The structure was of an open forest. Dominant species in the canopy included *Corymbia gummifera* (Red Bloodwood) and *Eucalyptus sclerophylla* (Scribbly Gum), with *E. punctata* (Grey Gum) and *E. globoidea* (White Stringybark) occurring less frequently. There was an occasional midstorey supporting *Allocasuarina littoralis* (Black She-oak). The shrub layer was diverse, supporting species such as *Platysace linearifolia, Eriostemon australasius* (Pink Wax Flower), *Acacia ulicifolia* (Prickly Moses), *Pimelea linifolia* (Slender Rice Flower), *Lasiopetalum ferrugineum* (Rusty Velvet Bush), *Lambertia formosa* (Mountai Devil), *Leptospermum trinervium* (Flaky-barked Tea-tree). The groundlayer was a mix of herbs, grasses and sedges including *Cyathochaeta diandra, Lomandra multiflora* subsp. *multiflora* (Many-flowered Mat-rush), *Phyllanthus hirtellus* (Thyme Spurge), *Anisopogon avenaceus* (Oat Speargrass), *Brunoniella pumilio* (Dwarf Blue Trumpet), *Entolasia stricta* (Wiry Panic), *Lepidosperma laterale* and *Lomandra obliqua.*

This plant community was in good condition in the study area, with few weed species recorded, a high diversity of native species and a natural structure.

Plate 1. PCT 1081 Red Bloodwood– Grey Gum woodland on the edges of the Cumberland Plain, Sydney Basin Bioregion

PCT 1181 Smooth-barked Apple – Red Bloodwood – Sydney Peppermint heathy open forest on slopes of dry sandstone gullies of western and southern Sydney, Sydney Basin Bioregion

This plant community was recorded in the association with the Bargo River and its tributaries in the study area (Plate 2, Figure 6). The structure was of an open forest with a shrubby understorey. A canopy of *Corymbia gummifera, Eucalyptus globoidea, E. piperita* (Sydney Peppermint), *E. sclerophylla, E. punctata, E. sieberi* (Silvertop Ash), was present, with a midstorey of *Allocasuarina littoralis, Melaleuca linariifolia* (Flax-leaved Paperbark) and *Ceratopetalum gummiferum* (Christmas Bush). There was a diverse shrub layer supporting *Lasiopetalum ferrugineum* var. *ferrugineum*, *Lambertia formosa, Acacia terminalis* (Sunshine Wattle), *Banksia spinulosa, Pimelea linifola, Leptospermum polygalifolium* (Tantoon), *Bursaria spinosa* (Australian Boxthorn), *Eriostemon australasius* and *Isopogon anemonifolius* (Broad-leaf Drumsticks). The understorey was dominated by ferns, herbs and sedges, such as *Calochlaena dubia* (Rainbow Fern), *Pteridium esculentum* (Bracken), *Lomandra longifolia* (Spiny-headed Mat-rush), *Microlaena stipoides* (Weeping Grass), *Lomandra fluviatilis* (River Mat-rush), *Schoenus apogon* (Common Bog-rush), *Dianella caerulea* (Blue Flax-lily), *Morinda jasminoides* (Sweet Morinda), *Schoenus melanostachys* (Black Bog-rush), *Adiantum aethiopicum* (Common Maidenhair), *Xanthosia pilosa* (Woolly Xanthosia), *Entolasia stricta, Imperata cylindrica* (Blady Grass), *Billardiera scandens* (Hairy Apple Berry), *Hydrocotyle laxiflora* (Stinking Pennywort), *Entolasia stricta, Cyathochaeta diandra* and *Lepidosperma laterale.*

This plant community was in good condition in the study area, with few weed species recorded, a high diversity of native species and a natural structure. Weeds recorded included *Tradescantia fluminescens* (Wandering Jew) and *Solanum pseudocapsicum* (Madeira Winter).

Plate 2: PCT 1181 Smooth-barked Apple – Red Bloodwood – Sydney Peppermint heathy open forest on slopes of dry sandstone gullies of western and southern Sydney, Sydney Basin Bioregion

PCT1395 Narrow-leaved Ironbark – Broad-leaved Ironbark – Grey Gum open forest of the edges of the Cumberland Plain, Sydney Basin Bioregion

There were a few scattered remnants of PCT 1395 remaining in the study area, mostly occurring as trees along the existing fence lines, with no other structural layers present. *Eucalyptus globoidea, E. crebra* (Narrow-leaved Ironbark) and *E. punctata,* were recorded in this PCT, with an exotic mown understorey. This community was considered to be in low condition.

Cleared

Cleared areas did not represent any native PCT and included the existing school and associated buildings and the Olive plantations in the north-eastern section of the study area (Plate 4, Figure 6). The Olive plantations were dominated by *Olea europaea* (Common Olive), with the understorey dominated by exotic grasses such as *Pennisetum clandestinum* (Kikuyu). There were also some sheds, a chicken coop and enclosures holding sheep. This area did not support any resilience and was not considered to support a native PCT.

Throughout the cleared area there were a couple of large *Eucalyptus puncata* trees which represented remnants of the original vegetation community, occurring in an otherwise cleared landscape (Figure 6). Some of these trees supported hollows (Figure 6, Plate 4). These trees are likely remnants of the CEEC Shale Sandstone Transition Forest (PCT 1395), however these areas are no longer considered to be part of the

CEEC as they occur as isolated remnant trees, with no other structural or species diversity characteristics of the CEEC present.

Plate 3: Cleared

3.2.2 Fauna habitat

Fauna species recorded in the study area during the current survey are detailed in Appendix 2 and include two frogs, 24 birds and eight mammals.

Fauna habitats identified in the study area include:

- Open forest and open woodland, supporting canopy, shrub and groundlayer vegetation likely to be used as foraging and shelter habitat for local fauna.
- Aquatic habitats associated with an artificial dam and a cover of emergent macrophytes, which are likely to provide habitat for a variety of local frogs, reptiles, birds and mammals.
- Microhabitats including hollow-bearing trees (Plate 5, Figure 6), leaf litter and fallen timber. These microhabitats occurred throughout the native vegetation (PCTs) of the study area. Five hollow-bearing trees were recorded in the study area. It is considered likely that additional hollow-bearing trees are likely to occur in the native vegetation in the study area. Depending on the size of the hollows present, they may provide habitat for microbats, hollow dwelling birds, possums and gliders.

Plate 4: Hollow-bearing tree, *Eucalyptus punctata,* recorded within Olive plantation in the study area

3.3 Threatened ecological communities

As detailed in Table 2, one of the PCTs recorded in the study area aligns to a Threatened Ecological Community: Shale Sandstone Transition Forest (PCT 1395), which is listed as a CEEC under the BC and EPBC

Acts. This CEEC occurred as scattered remnant trees along the fence line, and did not support a natural structure, with the absence of a native shrub layer and understorey. PCT 1395 was considered to be in Low condition in the study area.

3.4 Threatened and migratory species

No threatened flora were recorded in the study area during the site inspection. No threatened species have been recorded in the study area in the current or previous surveys.

A total of 28 threatened flora species have been considered as subject species for this assessment (Appendix 1, Figure 7 shows Bionet records within a 10 kilometres radius). Eight threatened flora are considered to have a moderate or higher likelihood of occurrence in the study area after consideration of species requirements and field survey results (Appendix 1, Table 3).

A total of 69 threatened or migratory fauna species have been considered as subject species for this assessment (Appendix 1, Figure 8 shows Bionet records within a 10 kilometres radius). Twenty-four threatened or migratory fauna are considered to have a moderate or higher likelihood of occurrence in the study area after consideration of species requirements and field survey results (Appendix 1, Table 3).

Table 3: Threatened species likely to occur in the study area

Scientific Name	Common Name	BC Act	EPBC Act	Likelihood of Occurrence
Amphibians				
Pseudophryne australis	Red-crowned Toadlet	V	-	Moderate
Birds				
Artamus cyanopterus cyanopterus	Dusky Woodswallow	V	-	Moderate
Callocephalon fimbriatum	Gang-gang Cockatoo	V	-	High
Calyptorhynchus lathami	Glossy Black-Cockatoo	V	-	Moderate
Climacteris picumnus victoriae	Brown Treecreeper (eastern subspecies)	V	-	High
Daphoenositta chrysoptera	Varied Sittella	V	-	High
Glossopsitta pusilla	Little Lorikeet	V	-	Moderate
Hieraaetus morphnoides	Little Eagle	V	-	Moderate
Ninox strenua	Powerful Owl	V	-	Moderate
Petroica boodang	Scarlet Robin	V	-	High
Stagonopleura guttata	Diamond Firetail	V	-	Moderate
Tyto novaehollandiae	Masked Owl	V	-	Moderate
Tyto tenebricosa	Sooty Owl	V	-	Moderate
Mammals				
Cercartetus nanus	Eastern Pygmy-possum	V	-	Moderate
Chalinolobus dwyeri	Large-eared Pied Bat	V	V	Moderate
Dasyurus maculatus maculatus	Spotted-tailed Quoll	V	E	Moderate
Falsistrellus tasmaniensis	Eastern False Pipistrelle	V	-	Moderate
Miniopterus australis	Little Bentwing-bat	V	-	Moderate
Miniopterus schreibersii oceanensis	Eastern Bentwing-bat	V	-	Moderate

Scientific Name	Common Name	BC Act	EPBC Act	Likelihood of Occurrence
Mormopterus norfolkensis	Eastern Freetail-bat	V	-	Moderate
Myotis macropus	Southern Myotis	V	-	Moderate
Phascolarctos cinereus	Koala	V	V	Moderate
Pteropus poliocephalus	Grey-headed Flying-fox	V	V	High
Scoteanax rueppellii	Greater Broad-nosed Bat	V	-	Moderate
Plants				
Darwinia peduncularis		V	-	Moderate
Epacris purpurascens var. *purpurascens*		V	-	Moderate
Grevillea parviflora subsp. *parviflora*	Small-flowered Grevillea	V	V	High
Leucopogon exolasius	Woronora Beard-heath	V	V	Moderate
Melaleuca deanei	Deane's Melaleuca	V	V	Moderate
Persoonia bargoensis	Bargo Geebung	E	V	High
Persoonia glaucescens	Mittagong Geebung	E	V	Moderate
Persoonia hirsuta	Hairy Geebung	E	E	High

3.4.1 Koala targeted surveys

Scat search

There were no Koala scats found. One Grey Gum had some claw marks which may have been caused by a Koala, however, the marks were largely obliterated by other animal claw marks preventing certain diagnosis. Scats of many other mammals were abundant and well preserved, most likely from the extended dry weather.

Spotlighting

No Koalas were seen or heard during spotlighting. The only arboreal mammals observed were the Common Ringtail Possum (*Pseudocheirus peregrinus*) and the Sugar Glider (*Petaurus breviceps*). The only nocturnal birds observed were the Tawny Frogmouth (*Podargus strigoides*) and Australian Owlet-nightjar (*Aegotheles cristatus*).

3.5 Bushland Conservation Area

A condition of consent from the 'Senior Precinct classrooms, footbridge, car parking and accesses and extension to the effluent irrigation area' Development Consent (No. ID376-06), states the following in regarding to the native vegetation in the study area:

> *9.6 A plan shall be submitted for approval to Council ... which delineates the land to be protected from further development and shall include all land designated as either Shale Sandstone Transition Forest or Upper Georges River Forest which is outside of the asset protection zone limit for the approved Seniors Precinct, Oval and Pavilion and outside of the area approved for car parking and effluent irrigation.*
>
> *9.8 A restriction as to the Use of land shall be created on the title of the new consolidated allotment. The land affected by this restriction shall include all land detailed on the plan referred to in Condition 9.6. The protected area shall remain free of any unnatural disturbance activities including but not*

limited to removal and clearing of vegetation, access tracks, built structures, excavation or filling, grazing, application of wastewater and the like. The activities permitted within the protected area shall be in accordance with plans prepared by Ecotone Ecological Consultants Pty Ltd being:

- *The Weed Eradication and Management Plan submitted to Council on the 2 April 2007;*
- *The Vegetation Management Plan submitted to Council on the 28 March 2007;*
- *The Bushfire Management Plan submitted to Council on the 26 March 2007.*

The protected land referred to in the conditions of consent is the bushland conservation area shown on Figure 6.

3.6 Wollondilly Local Environment Plan (WLEP) 2011

The Bargo River is included on the Natural Resources - Water Map in WLEP 2011, as requiring a 100 m buffer and the tributary of Bargo River which crosses the study area is mapped as requiring a 10 m buffer (Figure 6). These buffers are to be measured from the top of bank of each side of the watercourse (Wollondilly Development Control Plan 2016).

The study area is not mapped as sensitive land on WLEP 2011 on the Biodiversity Map.

4. Proposed rezoning

4.1 Wollondilly Local Environment Plan (WLEP) 2011

The study area is currently zoned RU1 Primary Production in WLEP 2011, the objectives of this zone in WLEP 2011 are:

- To encourage sustainable primary industry production by maintaining and enhancing the natural resource base.
- To encourage diversity in primary industry enterprises and systems appropriate for the area.
- To minimise the fragmentation and alienation of resource lands.
- To minimise conflict between land uses within this zone and land uses within adjoining zones.
- To provide for a range of land uses (including tourism-related uses) that support the agriculture industry.
- To provide areas within which the density of development is limited in order to maintain a separation between urban areas.

The proposal is to rezone the land from RU1 Primary Production to SP2 Infrastructure. The objectives of SP2 zone in WLEP 2011 are:

- To provide for infrastructure and related uses.
- To prevent development that is not compatible with or that may detract from the provision of infrastructure.

4.2 Potential impacts

The potential impacts of the proposed rezoning is considered in relation to the proposed Masterplan in Figure 3. The proposed Masterplan has been located to avoid impacts to the intact areas of habitat in the west of the study area. Generally, impacts of the proposed Masterplan would be restricted to existing Asset Protection Zones (APZ) for the existing school buildings, low condition habitats and isolated trees growing along fence lines. The proposed Masterplan would potentially impact the following flora and fauna habitats that would require further consideration through formal impact assessment under the BC and EPBC Act at the Development Application Stage (Figure 3, Figure 6):

- Low condition areas of the CEEC Shale Sandstone Transition Forest (PCT 1395)
- Hollow-bearing trees and isolated large remnant trees, some of which occur within the otherwise cleared area
- Riparian zone and associated native vegetation (PCT 1181 Smooth-barked Apple - Red Bloodwood – Sydney Peppermint heathy open forest on slopes of dry sandstone gullies of western and southern Sydney)
- Existing APZs and associated native vegetation (PCT 1081 Red Bloodwood – Grey Gum woodland on the edges of the Cumberland Plain).

There may be scope to avoid or minimise impacts to the flora and fauna habitats listed above which would be investigated further at the Development Application Stage. Overall, the proposed Masterplan is located within existing cleared and disturbed areas and the impact is considered to be relatively minor, given the intact habitats in the western section of the study area are largely avoided.

4.3 Recommendations

Considering current and proposed future land use, the proposed rezoning to SP2 is deemed appropriate for the land encompassing the current school buildings and facilities and the area encompassing the proposed Masterplan (Figure 3), from an ecological perspective.

Any future Development Application would require a flora and fauna impact assessment, potentially including targeted surveys for threatened species that may be impacted by the proposal. Any impacts to areas mapped as supporting Shale Sandstone Transition Forest would also require assessment. Threatened biodiversity listed under the BC and EPBC Acts would need to be considered in the impact assessment. Potential assessment pathways are detailed in Section 5 below.

5. Biodiversity Offsets Scheme

Under the NSW Biodiversity Offset Scheme (BOS) it is necessary for developers who clear native vegetation or fauna habitat to provide offsets to compensate the loss of biodiversity values from their development site. The framework for the scheme was established under the BC Act. The result of this legislation is that there is a market for biodiversity "credits" under the scheme. These credits are created by establishing a Biodiversity Stewardship Site on private land, through a Biodiversity Stewardship Agreement between the land owner and the NSW Minister for the Environment, which is administered by the Biodiversity Conservation Trust (BCT).

At a development site, a Biodiversity Development Assessment Report (BDAR) is produced that states the number of biodiversity credits required to be retired by the development, while at an offset site a Biodiversity Stewardship Site Assessment Report (BSSAR) states the number of credits generated and available for retirement at the Biodiversity Stewardship Site.

It is important to determine whether any future development plan will trigger application of the BAM (OEH 2017) and BOS (with potentially substantial associated offset costs), under the BC Act. The BAM/BOS process would be required if any of the following occurs:

- Clearing of native vegetation above the stated area threshold for the site was to occur (0.5 hectares or more for a 2.34 hectare minimum lot size – this may change with rezoning).
- Tests of significance for threatened species determine that a significant impact on biodiversity is likely – the significance of the impact of any proposed development of the study area would be determined by undertaking five-part tests in accordance with Section 7.3 of the BC Act for all threatened biodiversity with potential to be impacted by the proposal.
- The proposal involves clearing of native vegetation or other impacts on land included on the Biodiversity Values Map published under the *Biodiversity Conservation Regulation 2017* – an area within the study area has been included on the Biodiversity Values Map (Figure 9). If any of this area was to be impacted by development, this would trigger the BOS under the BC Act. A biodiversity values map explanation report can be requested to understand the biodiversity values which have been mapped on the study area. If a biodiversity value has been incorrectly mapped on a property, a map review can be requested, which may result in an amendment to the map. It is likely that the study area has been included in the Biodiversity Values Map due to the mapped presence of Shale Sandstone Transition Forest in the study area. Given this vegetation community is not as widespread in the study area as suggested in Figure 5, a map review may be successful in amending the map.

If the above listed thresholds for the BOS were to be exceeded, the BAM would need to be applied to any future proposal and a BDAR would be required. If the above listed thresholds for the BOS were not exceeded, it is likely that the assessment can be undertaken using a flora and fauna assessment (five-part test), and the requirement for offsets would likely be avoided.

If it is determined that a BDAR report is required, offsetting would be required to compensate for impacts to biodiversity. Measures to offset or compensate for impacts under the BOS are described in the *Biodiversity Conversion Regulation* 2017, and can include a combination of one or more of the following:

- Retirement of the required number and class of like-for-like biodiversity credits
- the retirement of the required biodiversity credits in accordance with the variation rules

- Funding of a biodiversity conservation action that would benefit the relevant threatened species or ecological community, and that is equivalent to the cost of acquiring the required like-for-like biodiversity credits as determined by the offsets payment calculator
- Payment of an amount into the Biodiversity Conservation Fund determined in accordance with the offsets payment calculator.

6. Conclusions

The following biodiversity values were recorded in the study area:

- Three PCTs:
    - PCT 1081 Red Bloodwood – Grey Gum woodland on the edges of the Cumberland Plain, Sydney Basin Bioregion
    - PCT 1181 Smooth-barked Apple – Red Bloodwood – Sydney Peppermint heathy open forest on slopes of dry sandstone gullies of western and southern Sydney, Sydney Basin Bioregion
    - PCT 1395 Narrow-leaved Ironbark – Broad-leaved Ironbark – Grey Gum open forest of the edges of the Cumberland Plain, Sydney Basin Bioregion
- PCT 1395 is equivalent to Shale Sandstone Transition Forest, a CEEC listed under the BC and EPBC Act. This PCT was present as low condition vegetation, represented by a strip of trees along the fence line, with little or no understorey and limited resilience for regeneration
- No threatened species have been recorded in the study area in the current or previous surveys
- Eight threatened flora and twenty-two threatened or migratory fauna are considered to have a moderate or higher likelihood of occurrence in the study area after consideration of species requirements and field survey results. The habitat for these species occurs in the intact bushland adjoining Bargo River
- No evidence of Koalas utilising the site during targeted surveys
- A total of five hollow-bearing trees
- The Bargo River is included on the Natural Resources - Water Map in WLEP 2011, as requiring a 100 m buffer and the tributary of Bargo River which crosses the study area is mapped as requiring a 10 m buffer. These buffers are to be measured from the top of bank of each side of the watercourse (Wollondilly Development Control Plan 2016)
- Bushland conservation area, as defined in Development Consent No. ID376-06.

Overall, the proposed Masterplan is located within existing cleared and disturbed areas and the impact is considered to be relatively minor, given the intact habitats in the western section of the study area are largely avoided. Considering current and proposed future land use, the proposed rezoning is deemed appropriate for the current school and area encompassing the proposed Masterplan.

Any future Development Application would require a flora and fauna impact assessment, potentially including targeted surveys for threatened species that may be impacted by the proposal. Any impacts to areas mapped as supporting Shale Sandstone Transition Forest would also require assessment. Threatened biodiversity listed under the BC and EPBC Acts would need to be considered in the impact assessment.

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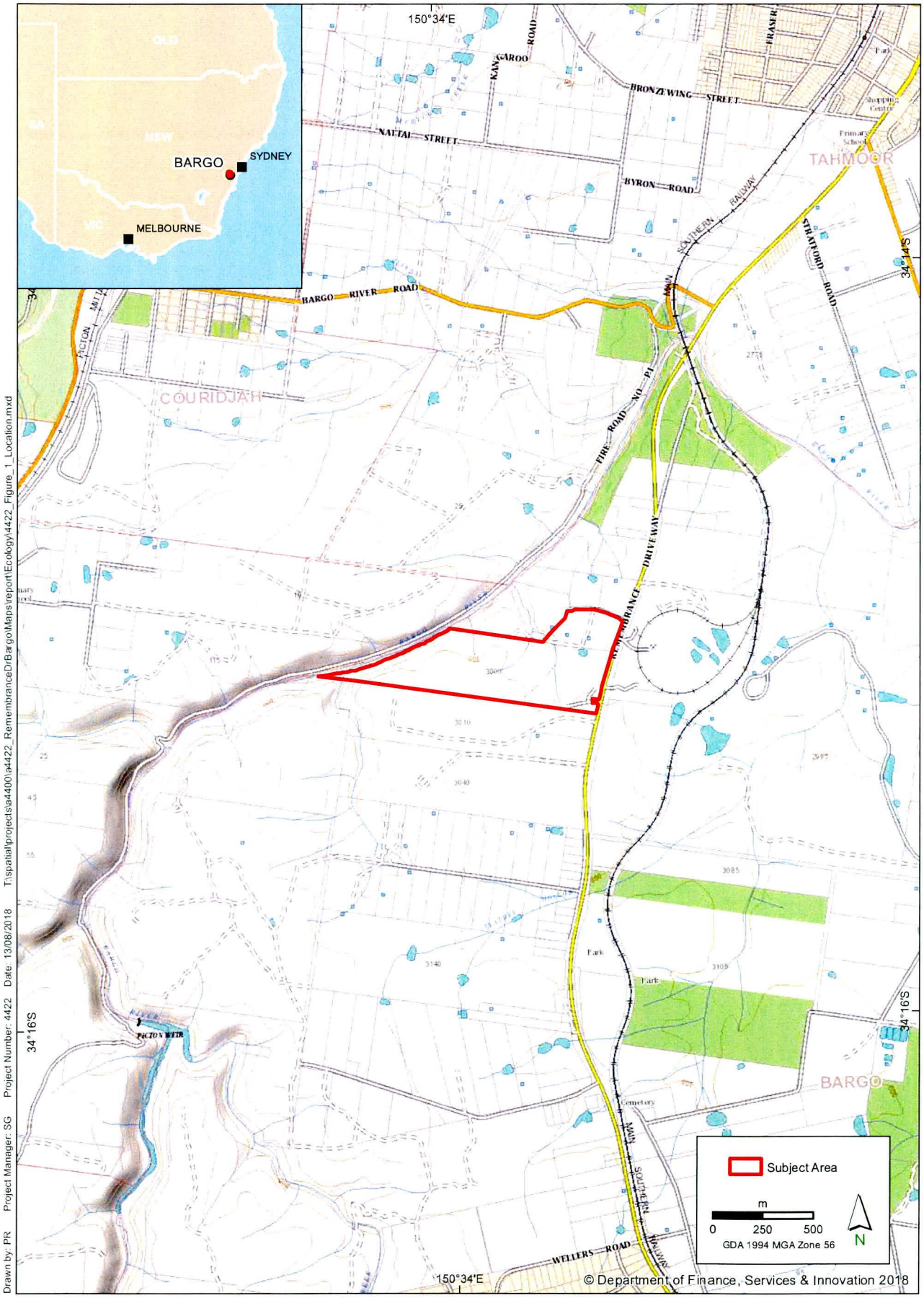
Figures



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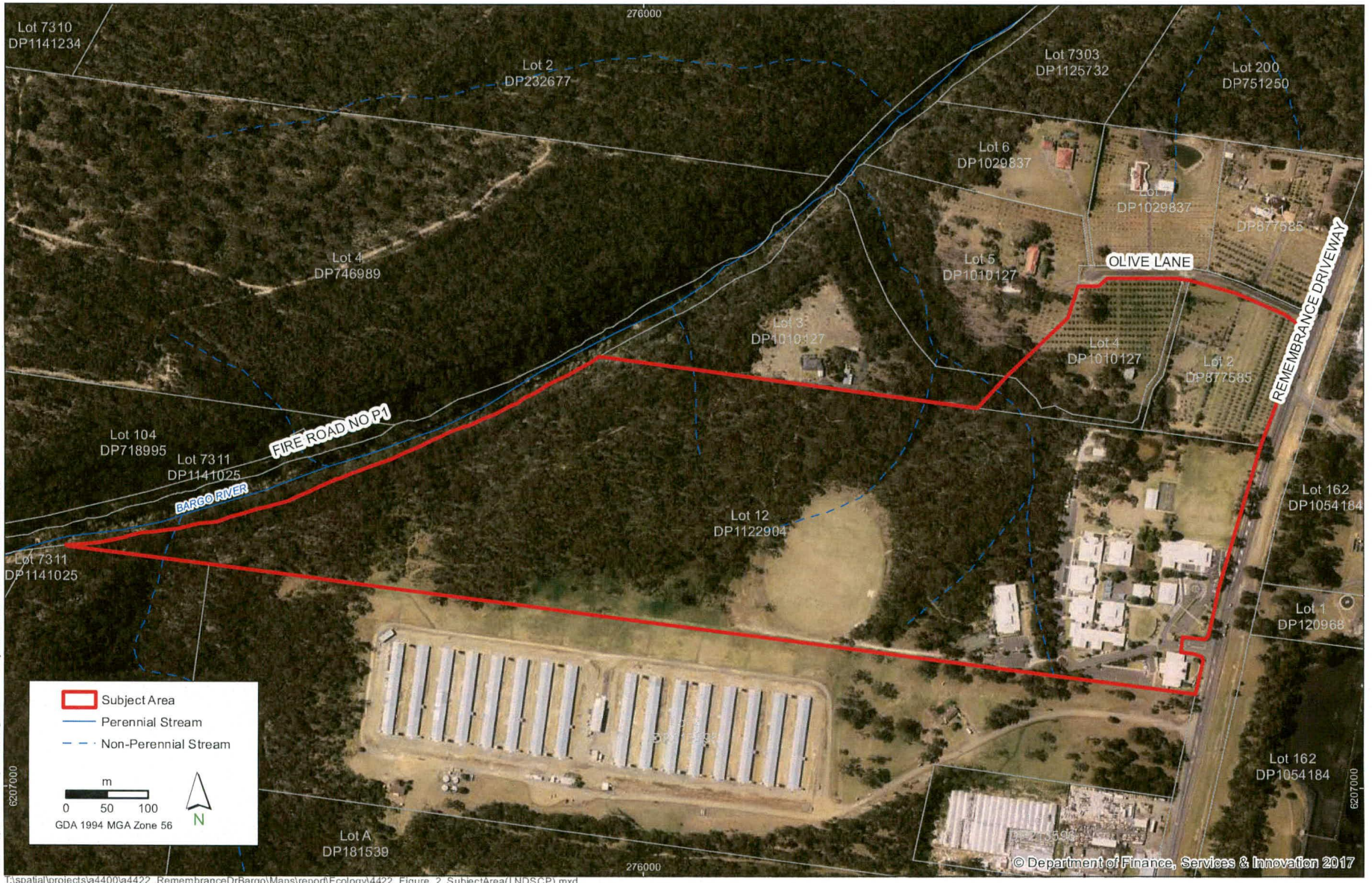
Location map

3000 Remembrance Drive, Bargo - Preliminary ecological assessment of rezoning application

FIGURE 1



Site Map

3000 Remembrance Drive, Bargo - Preliminary ecological assessment of rezoning application

FIGURE 2

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Proposed masterplan

3000 Remembrance Drive, Bargo - Preliminary ecological assessment of rezoning application

FIGURE 3

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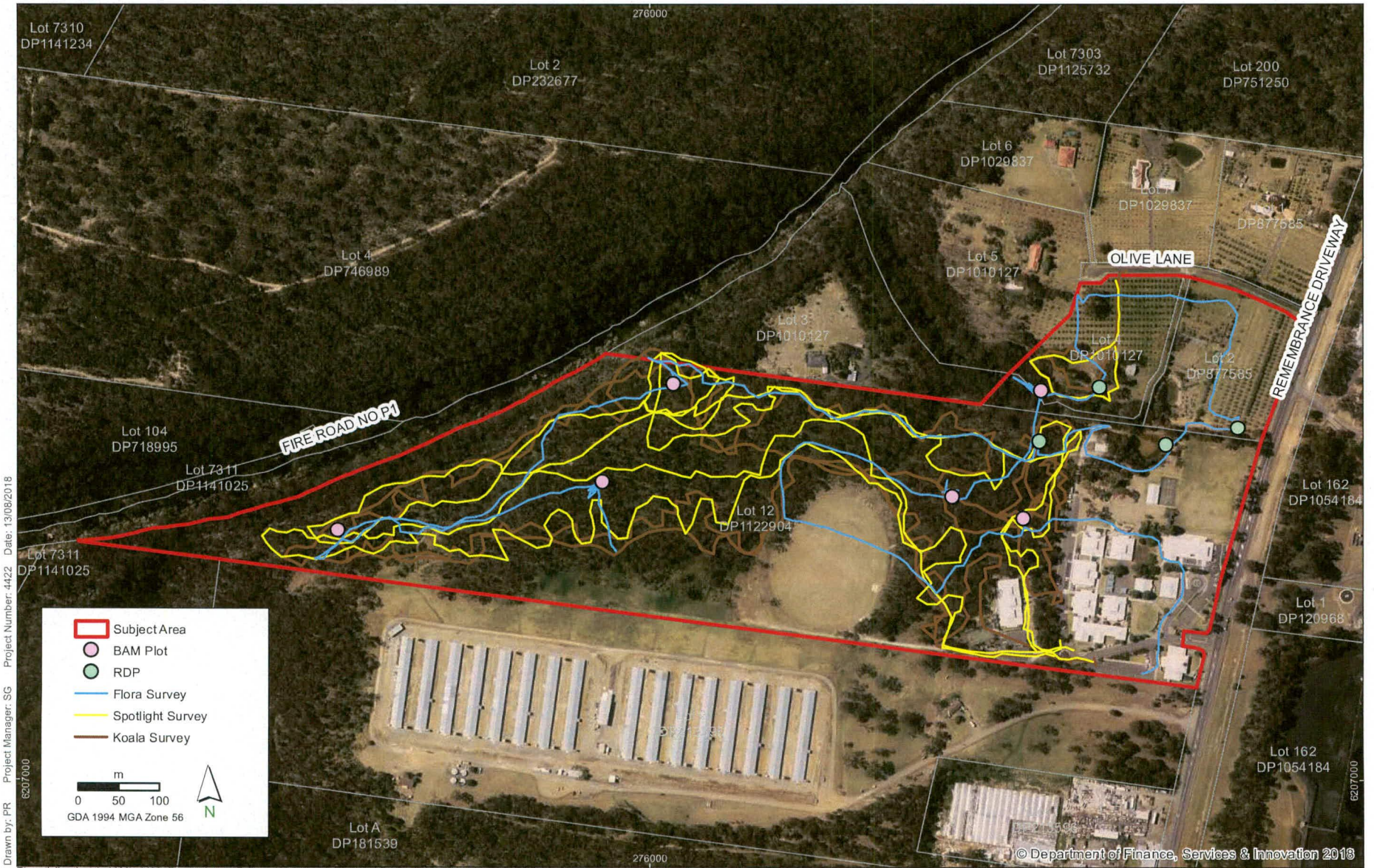

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Survey Effort

3000 Remembrance Drive, Bargo - Preliminary ecological assessment of rezoning application

FIGURE 4

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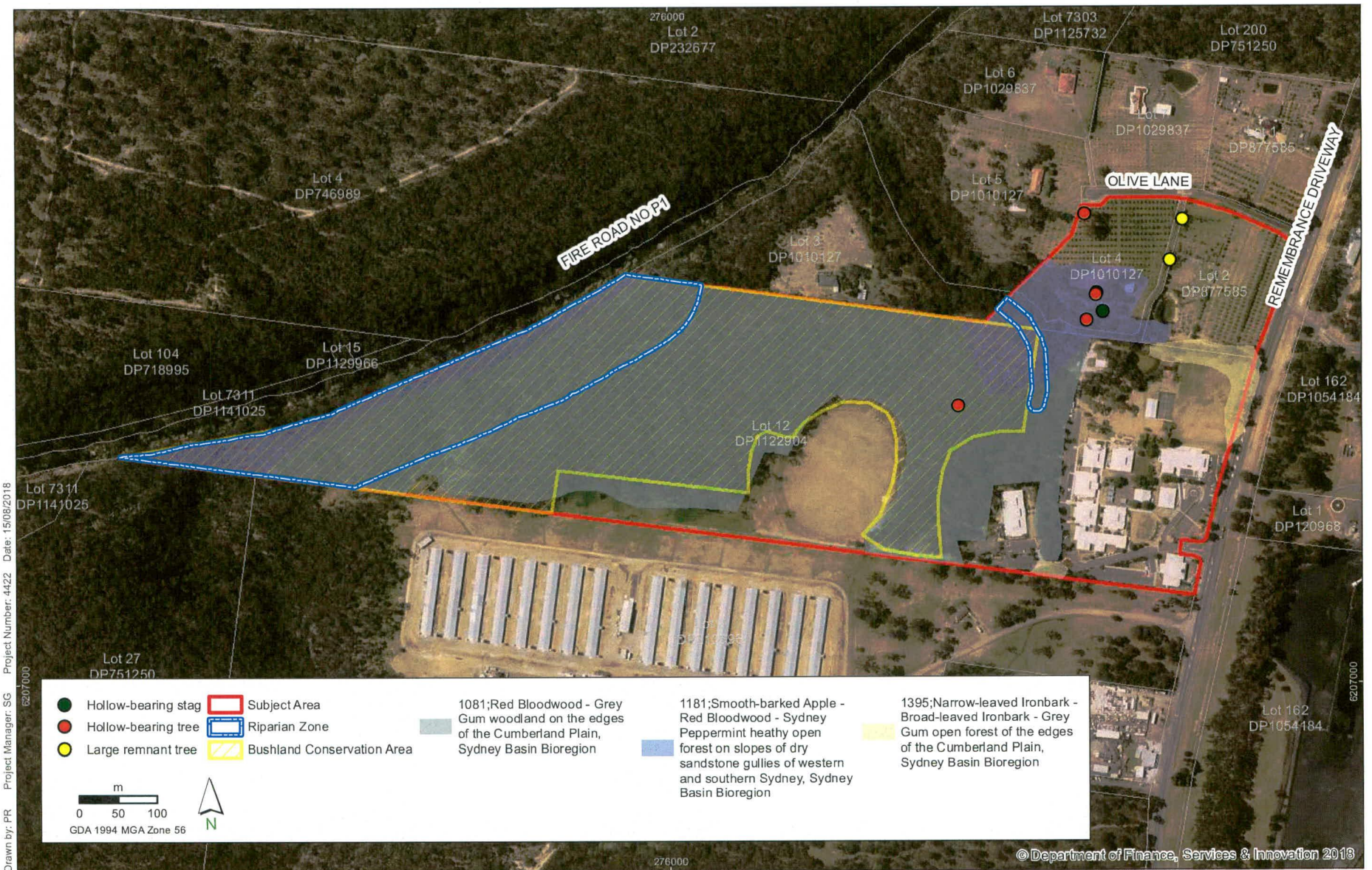
Vegetation Map

3000 Remembrance Drive, Bargo - Preliminary ecological assessment of rezoning application

FIGURE 5

Imagery: (c) DigitalGlobe 2016-03-31



Ground truthed vegetation and biodiversity values

3000 Remembrance Drive, Bargo - Preliminary ecological assessment of rezoning application

FIGURE 6

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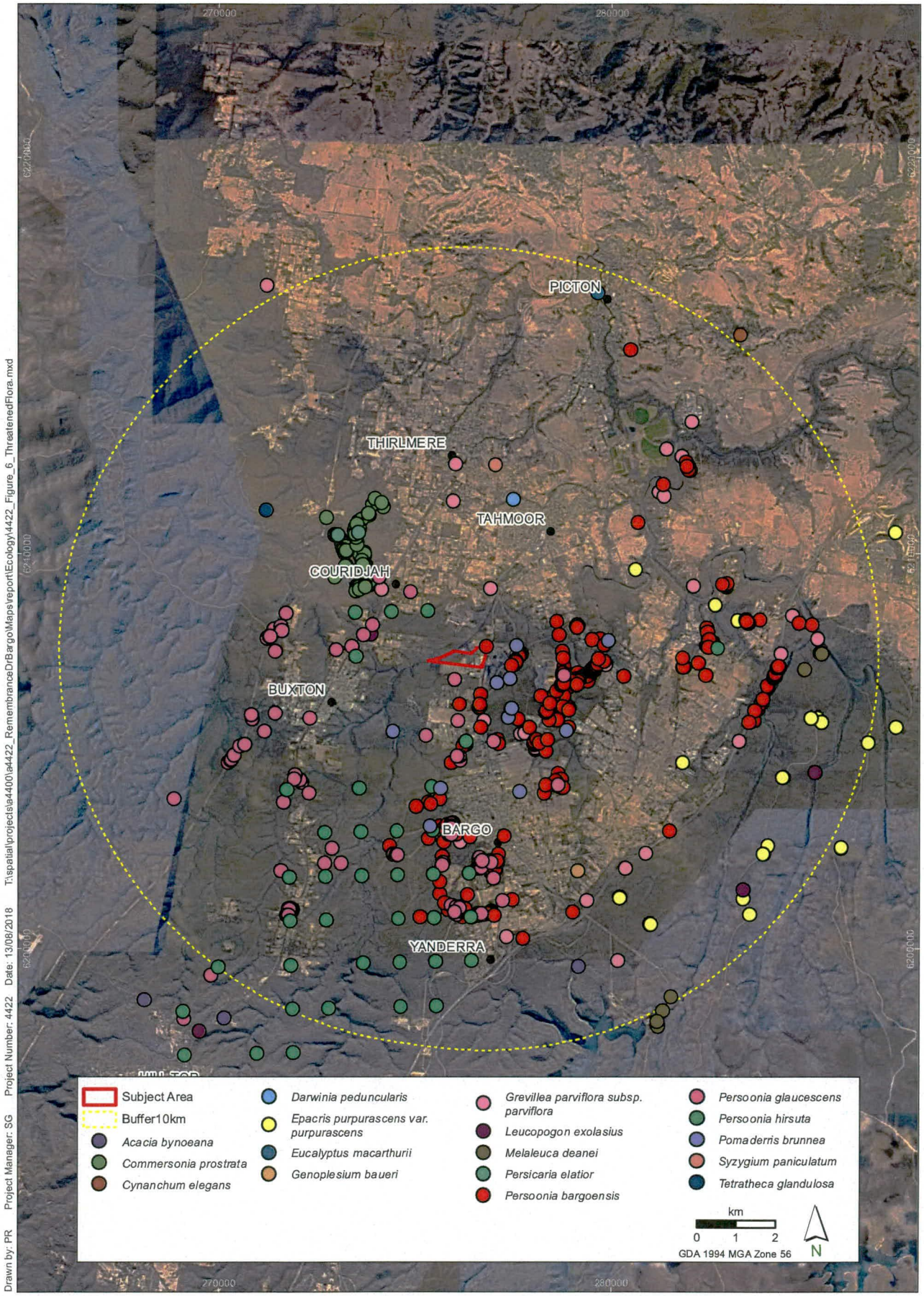
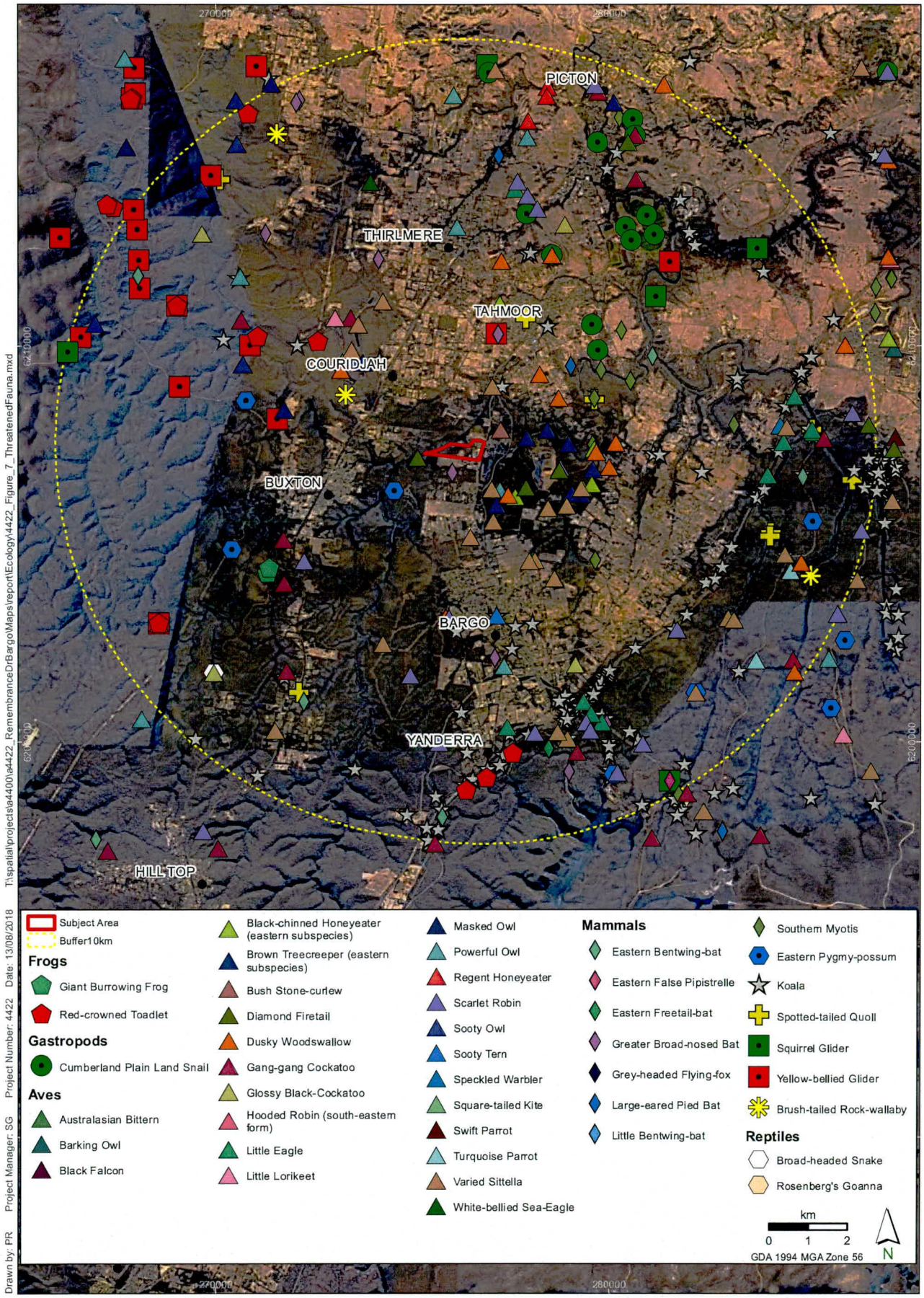


Threatened flora recorded within a 10 km radius (Bionet)

3000 Remembrance Drive, Bargo - Preliminary ecological assessment of rezoning application

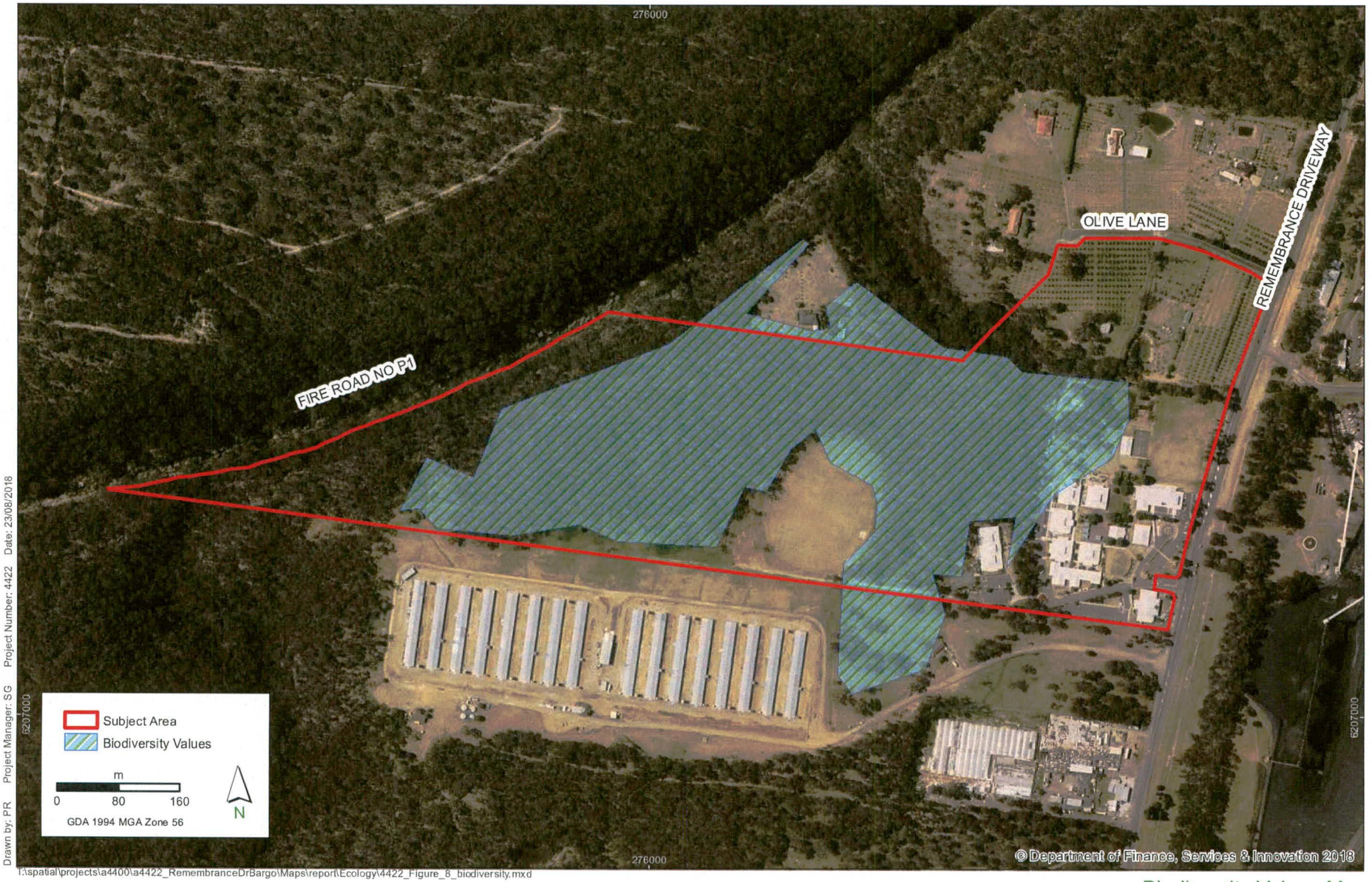
FIGURE 7



Threatened fauna recorded within a 10 km radius (Bionet)

3000 Remembrance Drive, Bargo - Preliminary ecological assessment of rezoning application

FIGURE 8



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Biodiversity Values Map

3000 Remembrance Drive, Bargo - Preliminary ecological assessment of rezoning application

FIGURE 9

Appendices

Appendix 1 – Flora species recorded in the study area

Family	Species	Common Name
Acanthaceae	*Brunoniella pumilio*	Dwarf Blue Trumpet
Adiantaceae	*Adiantum aethiopicum*	Common Maidenhair
Apiaceae	*Hydrocotyle laxiflora*	Stinking Pennywort
Apiaceae	*Platysace linearifolia*	
Apiaceae	*Xanthosia pilosa*	Woolly Xanthosia
Asteraceae	*Cirsium vulgare**	Spear Thistle
Asteraceae	*Hypochaeris radicata**	Catsear
Asteraceae	*Taraxacum officinale**	Dandelion
Asteraceae	*Xerochrysum viscosum*	Sticky Everlasting
Blechnaceae	*Blechnum spp.*	
Casuarinaceae	*Allocasuarina littoralis*	Black She-Oak
Commelinaceae	*Tradescantia fluminensis**	Wandering Jew
Cunoniaceae	*Ceratopetalum gummiferum*	Christmas Bush
Cyperaceae	*Cyathochaeta diandra*	
Cyperaceae	*Lepidosperma laterale*	Variable Sword-sedge
Cyperaceae	*Schoenus apogon*	Fluke Bogrush
Cyperaceae	*Schoenus melanostachys*	
Dennstaedtiaceae	*Pteridium esculentum*	Bracken
Dicksoniaceae	*Calochlaena dubia*	Rainbow Fern
Dilleniaceae	*Hibbertia spp.*	
Ericaceae	*Lissanthe strigosa*	Peach Heath
Fabaceae (Faboideae)	*Bossiaea spp.*	
Fabaceae (Faboideae)	*Dillwynia parvifolia*	
Fabaceae (Faboideae)	*Glycine tabacina*	Variable Glycine
Fabaceae (Faboideae)	*Hardenbergia violacea*	False Sarsaparilla
Fabaceae (Faboideae)	*Hovea spp.*	
Fabaceae (Faboideae)	*Mirbelia spp.*	
Fabaceae (Mimosoideae)	*Acacia linifolia*	White-wattle
Fabaceae (Mimosoideae)	*Acacia terminalis*	Sunshine Wattle
Fabaceae (Mimosoideae)	*Acacia ulicifolia*	Prickly Moses
Goodeniaceae	*Dampiera purpurea*	
Lobeliaceae	*Pratia purpurascens*	Whiteroot
Lomandraceae	*Lomandra filiformis*	Wattle Matt-rush
Lomandraceae	*Lomandra fluviatilis*	
Lomandraceae	*Lomandra glauca*	Pale Mat-rush
Lomandraceae	*Lomandra longifolia*	Spiny-headed Mat-rush
Lomandraceae	*Lomandra multiflora subsp. multiflora*	Many-flowered Mat-rush
Lomandraceae	*Lomandra obliqua*	
Myrtaceae	*Corymbia gummifera*	Red Bloodwood
Myrtaceae	*Eucalyptus crebra*	Narrow-leaved Ironbark
Myrtaceae	*Eucalyptus globoidea*	White Stringybark
Myrtaceae	*Eucalyptus piperita*	Sydney Peppermint
Myrtaceae	*Eucalyptus punctata*	Grey Gum

Family	Species	Common Name
Myrtaceae	*Eucalyptus resinifera*	Red Mahogany
Myrtaceae	*Eucalyptus sclerophylla*	Hard-leaved Scribbly Gum
Myrtaceae	*Eucalyptus sieberi*	Silvertop Ash
Myrtaceae	*Kunzea ambigua*	Tick Bush
Myrtaceae	*Leptospermum polygalifolium*	Tantoon
Myrtaceae	*Leptospermum trinervium*	Slender Tea-tree
Myrtaceae	*Melaleuca linariifolia*	Flax-leaved Paperbark
Phormiaceae	*Dianella caerulea*	Blue Flax-lily
Phyllanthaceae	*Phyllanthus hirtellus*	Thyme Spurge
Pittosporaceae	*Billardiera scandens*	Hairy Apple Berry
Pittosporaceae	*Bursaria spinosa*	Native Blackthorn
Poaceae	*Anisopogon avenaceus*	Oat Speargrass
Poaceae	*Entolasia stricta*	Wiry Panic
Poaceae	*Imperata cylindrica*	Blady Grass
Poaceae	*Microlaena stipoides*	Weeping Grass
Poaceae	*Oplismenus aemulus*	
Poaceae	*Rytidosperma spp.*	
Poaceae	*Setaria gracilis**	Slender Pigeon Grass
Polygonaceae	*Rumex crispus**	Curled Dock
Proteaceae	*Banksia spinulosa*	Hairpin Banksia
Proteaceae	*Isopogon anemonifolius*	Broad-leaf Drumsticks
Proteaceae	*Lambertia formosa*	Mountain Devil
Proteaceae	*Persoonia linearis*	Narrow-leaved Geebung
Proteaceae	*Xylomelum pyriforme*	Woody Pear
Rubiaceae	*Morinda jasminoides*	Sweet Morinda
Rubiaceae	*Opercularia diphylla*	
Rubiaceae	*Pomax umbellata*	Pomax
Rutaceae	*Eriostemon australasius*	
Solanaceae	*Solanum prinophyllum*	Forest Nightshade
Solanaceae	*Solanum pseudocapsicum**	Madeira Winter Cherry
Sterculiaceae	*Lasiopetalum ferrugineum*	
Sterculiaceae	*Lasiopetalum ferrugineum var. ferrugineum*	
Thymelaeaceae	*Pimelea linifolia*	Slender Rice Flower
Verbenaceae	*Verbena bonariensis**	Purpletop
Xanthorrhoeaceae	*Xanthorrhoea resinosa*	

Appendix 2 – Fauna species recorded in the study area

Common Name	Species	Notes
Australian Magpie	*Gymnorhina tibicen*	
Australian Owlet-nightjar	*Aegotheles cristatus*	
Australian White Ibis	*Threskiornis molucca*	School Grounds
Australian Wood Duck	*Chenonetta jubata*	
Brown Treecreeper	*Climacteris picumnus*	On Lot 3 Olive lane. Scheduled Population.
Clicking Froglet	*Crinia signifera*	
Common Brushtail Possum	*Trichosurus vulpecula*	Scats only
Common Ringtail Possum	*Pseudocheirus peregrinus*	2
Common Wallaroo	*Macropus robustus*	Common
Common Wombat	*Vombatus ursinus*	Common
Eastern Grey Kangaroo	*Macropus giganteus*	Few
Eastern Rosella	*Platycercus eximius*	
Eastern Yellow Robin	*Eopsaltria australis*	
Golden Whistler	*Pachycephala pectoralis*	
Grey Butcherbird	*Cracticus torquatus*	
Grey Shrike-thrush	*Colluricincla harmonica*	
Jacky Winter	*Microeca fascinans*	
Laughing Kookaburra	*Dacelo novaeguineae*	
Little Wattlebird	*Anthochaera chrysoptera*	
Magpie-lark	*Grallina cyanoleuca*	
Masked Lapwing	*Vanellus miles*	
Mistletoe bird	*Dicaeum hirundinaceum*	
New Holland Honeyeater	*Phylidonyris novaehollandiae*	
Peron's Tree Frog	*Litoria peronii*	
Pied Currawong	*Strepera graculina*	
Rabbit	*Oryctolagus cuniculus*	
Red Wattlebird	*Anthochaera carunculata*	
Red-browed Treecreeper	*Climacteris erythrops*	Near River
Sugar Glider	*Petaurus breviceps*	4
Swamp Wallaby	*Wallabia bicolor*	Common
Tawny Frogmouth	*Podargus strigoides*	
White-browed Scrubwren	*Sericornis frontalis*	

Common Name	Species	Notes
White-throated Treecreeper	*Cormobates leucophaeus*	
Yellow-faced Honeyeater	*Lichenostomus chrysops*	

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Appendix 1 – Likelihood of occurrence of threatened biodiversity in the study area

Scientific Name	Common Name	BC Act	EPBC Act	Habitat	Likelihood of Occurrence
Amphibians					
Heleioporus australiacus	Giant Burrowing Frog	V	V	The Giant Burrowing Frog has been recorded breeding in a range of water bodies associated with sandy environments of the coast and adjacent ranges from the Sydney Basin south to eastern Victoria. It breeds in hanging swamps, perennial non-flooding creeks and occasionally permanent pools, but permanent water must be present to allow its large tadpoles time to reach metamorphosis.	Low
Litoria aurea	Green and Golden Bell Frog	E	V	Inhabits a very wide range of water bodies including marshes, dams and streams, particularly those containing emergent vegetation such as bullrushes or spikerushes. It also inhabits numerous types of man-made water bodies including quarries and sand extraction sites. Optimum habitat includes water-bodies that are un-shaded, free of predatory fish such as Plague Minnow, have a grassy area nearby and diurnal sheltering sites available.	Low
Litoria littlejohni	Littlejohn's Tree Frog	V	V	Occurs in wet and dry sclerophyll forests and heathland associated with sandstone outcrops between 280 and 1000 m on the eastern slopes of the Great Dividing Range from the Central Coast down into Victoria. Individuals have been collected from a wide range of water bodies that includes semi-permanent dams, permanent ponds, temporary pools and permanent streams, with calling occurring from fringing vegetation or on the banks. Individuals have been observed sheltering under rocks on high exposed ridges during summer and within deep leaf litter adjacent to the breeding site. Calling occurs in all months of the year, often in association with heavy rains. The tadpoles are distinctive, being large and very dark in colouration.	Low
Mixophyes balbus	Stuttering Frog	E	V	Associated with streams in dry sclerophyll and wet sclerophyll forests and rainforests of more upland areas of the Great Dividing Range of NSW and down into Victoria. Breeding occurs along forest streams with permanent water where eggs are deposited within nests excavated in riffle zones by the females and the tadpoles swim free into the stream when large enough to do so. Outside of breeding, individuals range widely across the forest floor and can be found hundreds of metres from water.	Low
Pseudophryne australis	Red-crowned Toadlet	V	-	Occurs on wetter ridge tops and upper slopes of sandstone formations on which the predominant vegetation is dry open forests and heaths. This species typically breeds within small ephemeral creeks that feed into larger semi-perennial streams. After rain these creeks are characterised by a series of shallow pools lined by dense grasses, ferns and low shrubs and usually contain leaf litter for shelter. Eggs are terrestrial and laid under litter, vegetation or rocks where the tadpoles inside will reach a relatively late stage of development before waiting for flooding waters before hatching will occur.	Moderate
Birds					

Scientific Name	Common Name	BC Act	EPBC Act	Habitat	Likelihood of Occurrence
Actitis hypoleucos	Common Sandpiper	-	M, MA	Utilises a wide range of coastal wetlands and some inland wetlands, mostly found around muddy margins or rocky shores. Forages in shallow water and on soft mud, roosts on rocks or vegetation such as mangroves. Northern hemisphere breeding.	None
Anthochaera phrygia	Regent Honeyeater	CE	CE	The Regent Honeyeater mainly inhabits temperate woodlands and open forests of the inland slopes of south-east Australia. Birds are also found in drier coastal woodlands and forests in some years. There are only three known key breeding regions remaining: north-east Victoria (Chiltern-Albury), and in NSW at Capertee Valley and the Bundarra-Barraba region. In NSW the distribution is very patchy and mainly confined to the two main breeding areas and surrounding fragmented woodlands. In some years flocks converge on flowering coastal woodlands and forests.	Low
Artamus cyanopterus cyanopterus	Dusky Woodswallow	V	-	Often reported in woodlands and dry open sclerophyll forests, usually dominated by eucalypts, including mallee associations. It has also been recorded in shrublands and heathlands and various modified habitats, including regenerating forests; very occasionally in moist forests or rainforests.	Moderate
Botaurus poiciloptilus	Australasian Bittern	E	E	The Australasian Bittern is widespread but uncommon over south-eastern Australia. In NSW they may be found over most of the state except for the far north-west. Favours permanent freshwater wetlands with tall, dense vegetation, particularly bullrushes and spikerushes.	None
Burhinus grallarius	Bush Stone-curlew	E	-	The Bush Stone-curlew is found throughout Australia except for the central southern coast and inland, the far south-east corner, and Tasmania. Only in northern Australia is it still common however and in the south-east it is either rare or extinct throughout its former range. Inhabits open forests and woodlands with a sparse grassy ground layer and fallen timber. Largely nocturnal, being especially active on moonlit nights.	Low
Calidris acuminata	Sharp-tailed Sandpiper	-	M	Prefers muddy edges of shallow or brackish wetlands, with inundated or emergent sedges, saltmarsh or other low vegetation. Also found foraging in sewage ponds and flooded paddocks. Northern hemisphere breeding.	None
Calidris ferruginea	Curlew Sandpiper	E	CE, M	It occurs along the entire coast of NSW, particularly in the Hunter Estuary, and sometimes in freshwater wetlands in the Murray-Darling Basin. 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 the inland. Northern hemisphere breeding.	None
Calidris melanotos	Pectoral Sandpiper	-	M	Prefers shallow fresh to saline wetlands, found at coastal lagoons, estuaries, bays, swamps, inundated grasslands, saltmarshes and artificial wetlands. Northern hemisphere breeding.	None
Callocephalon fimbriatum	Gang-gang Cockatoo	V	-	In summer, 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, occurs at lower altitudes in drier, more open	High

Scientific Name	Common Name	BC Act	EPBC Act	Habitat	Likelihood of Occurrence
				eucalypt forests and woodlands, particularly in box-ironbark assemblages, or in dry forest in coastal areas. It requires tree hollows in which to breed.	
Calyptorhynchus lathami	Glossy Black-Cockatoo	V	-	Inhabits forest with low nutrients, characteristically with key *Allocasuarina spp*. Tends to prefer drier forest types with a middle stratum of Allocasuarina below Eucalyptus or Angophora. Often confined to remnant patches in hills and gullies. Breed in hollows stumps or limbs, either living or dead. Endangered population in the Riverina.	Moderate
Chthonicola sagittata	Speckled Warbler	V	-	The Speckled Warbler lives in a wide range of eucalypt dominated communities that have a grassy understorey, often on rocky ridges or in gullies. Typical habitat would include scattered native tussock grasses, a sparse shrub layer, some eucalypt regrowth and an open canopy.	Low
Climacteris picumnus victoriae	Brown Treecreeper (eastern subspecies)	V	-	Found in eucalypt woodlands (including box-gum woodland) and dry open forest of the inland slopes and plains inland of the Great Dividing Range; mainly inhabits woodlands dominated by stringybarks or other rough-barked eucalypts, usually with an open grassy understorey, sometimes with one or more shrub species; also found in mallee and river red gum forest bordering wetlands with an open understorey of acacias, saltbush, lignum, cumbungi and grasses; usually not found in woodlands with a dense shrub layer; fallen timber is an important habitat component for foraging; also recorded, though less commonly, in similar woodland habitats on the coastal ranges and plains.	High
Cuculus optatus, Cuculus saturatus	Oriental Cuckoo	-	M, MA	Mainly inhabits coniferous, deciduous and mixed forests. Breeds in northern hemisphere. Brood parasite, laying eggs in nests of other birds.	Low
Daphoenositta chrysoptera	Varied Sittella	V	-	Inhabits wide variety of dry eucalypt forests and woodlands, usually with either shrubby under storey or grassy ground cover or both, in all climatic zones of Australia. Usually in areas with rough-barked trees, such as stringybarks or ironbarks, but also in paperbarks or mature eucalypts with hollows.	High
Dasyornis brachypterus	Eastern Bristlebird	E	E	Found in coastal woodlands, dense scrub and heathlands, particularly where it borders taller woodlands.	Low
Falco subniger	Black Falcon	V	-	Widely, but sparsely, distributed in NSW, mostly occurring in inland regions. In NSW there is assumed to be a single population that is continuous with a broader continental population, given that falcons are highly mobile, commonly travelling hundreds of kilometres. The Black Falcon inhabits woodland, shrubland and grassland in the arid and semi-arid zones, especially wooded watercourses and agricultural land with scattered remnant trees.	Low
Gallinago hardwickii	Latham's Snipe	-	M	Latham's Snipe is a non-breeding migrant to the south east of Australia including Tasmania, passing through the north and New Guinea on passage. Latham's Snipe breed in Japan and on the east Asian mainland. Seen in small groups or singly in freshwater wetlands on or near the coast,	None

Scientific Name	Common Name	BC Act	EPBC Act	Habitat	Likelihood of Occurrence
				generally among dense cover. They are found in any vegetation around wetlands, in sedges, grasses, lignum, reeds and rushes and also in saltmarsh and creek edges on migration.	
Glossopsitta pusilla	Little Lorikeet	V	-	Distributed in forests and woodlands from the coast to the western slopes of the Great Dividing Range in NSW, extending westwards to the vicinity of Albury, Parkes, Dubbo and Narrabri. Mostly occur in dry, open eucalypt forests and woodlands. They feed primarily on nectar and pollen in the tree canopy. Nest hollows are located at heights of between 2 m and 15 m, mostly in living, smooth-barked eucalypts.	Moderate
Grantiella picta	Painted Honeyeater	V	V	The Painted Honeyeater is nomadic and occurs at low densities throughout its range. The greatest concentrations of the bird and almost all breeding occurs on the inland slopes of the Great Dividing Range in NSW, Victoria and southern Queensland. During the winter it is more likely to be found in the north of its distribution. Inhabits boree, brigalow and box-gum woodlands and box-ironbark forests.	Low
Haliaeetus leucogaster	White-bellied Sea-Eagle	V	MA	Inhabits coastal and near coastal areas, building large stick nests, and feeding mostly on marine and estuarine fish and aquatic fauna.	Low
Hieraaetus morphnoides	Little Eagle	V	-	Most abundant in lightly timbered areas with open areas nearby. Often recorded foraging in grasslands, crops, treeless dune fields, and recently logged areas. May nest in farmland, woodland and forest in tall trees.	Moderate
Hirundapus caudacutus	White-throated Needletail	-	M, MA	An aerial species found in feeding concentrations over cities, hilltops and timbered ranges.	Low
Lathamus discolor	Swift Parrot	E	CE	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
Lophoictinia isura	Square-tailed Kite	V	-	Typically inhabits coastal forested and wooded lands of tropical and temperate Australia. In NSW it is often associated with ridge and gully forests dominated by Woollybutt, Spotted Gum, River Peppermint or Gully Gum. Individuals appear to occupy large hunting ranges of more than 100km^2. They require large living trees for breeding, particularly near water with surrounding woodland-forest close by for foraging habitat. Nest sites are generally located along or near watercourses, in a tree fork or on large horizontal limbs.	Low
Melanodryas cucullata cucullata	Hooded Robin (south-eastern form)	V	-	Occupy a wide range of eucalypt woodlands, Acacia shrublands and open forests.	Low

Scientific Name	Common Name	BC Act	EPBC Act	Habitat	Likelihood of Occurrence
Melithreptus gularis gularis	Black-chinned Honeyeater (eastern subspecies)	V	-	Eucalypt woodlands within an approximate annual rainfall range of 400-700mm	Low
Monarcha melanopsis	Black-faced Monarch	-	M	Found along the coast of eastern Australia, becoming less common further south. Inhabits rainforests, eucalypt woodlands, coastal scrub and damp gullies. It may be found in more open woodland when migrating.	Low
Motacilla flava	Yellow Wagtail	-	M	Breeds in temperate Europe and Asia. The Yellow Wagtail is a regular wet season visitor to northern Australia. Increasing records in NSW suggest this species is an occasional but regular summer visitor to the Hunter River region. The species is considered a vagrant to Victoria, South Australia and southern Western Australia. Habitat requirements for the Yellow Wagtail are highly variable, but typically include open grassy flats near water. Habitats include open areas with low vegetation such as grasslands, airstrips, pastures, sports fields; damp open areas such as muddy or grassy edges of wetlands, rivers, irrigated farmland, dams, waterholes; sewage farms, sometimes utilise tidal mudflats and edges of mangroves.	Low
Myiagra cyanoleuca	Satin Flycatcher	-	M	The Satin Flycatcher is found along the east coast of Australia from far northern Queensland to Tasmania, including south-eastern South Australia. Found in tall forests, preferring wetter habitats such as heavily forested gullies, but not rainforests.	Low
Neophema pulchella	Turquoise Parrot	V	-	The Turquoise Parrot's range extends from southern Queensland through to northern Victoria, from the coastal plains to the western slopes of the Great Dividing Range. Lives on the edges of eucalypt woodland adjoining clearings, timbered ridges and creeks in farmland. Nests in tree hollows, logs or posts, from August to December. It lays four or five white, rounded eggs on a nest of decayed wood dust.	Low
Ninox connivens	Barking Owl	V	-	Generally found in open forests, woodlands, swamp woodlands and dense scrub. Can also be found in the foothills and timber along watercourses in otherwise open country.	Low
Ninox strenua	Powerful Owl	V	-	Occupies wet and dry eucalypt forests and rainforests. Can occupy both un-logged and lightly logged forests as well as undisturbed forests where it usually roosts on the limbs of dense trees in gully areas. It is most commonly recorded within turpentine tall open forests and black she-oak within open forests. Large mature trees with hollows at least 0.5 m deep are required for nesting. Tree hollows are particularly important for the Powerful Owl because a large proportion of the diet is made up of hollow-dependent arboreal marsupials. Nest trees for this species are usually emergent with a diameter at breast height of at least 100 cm.	Moderate
Numenius madagascariensis	Eastern Curlew	-	CE, MA, M	A primarily coastal distribution. Found in all states, particularly the north, east, and south-east regions including Tasmania. Rarely recorded inland. Mainly forages on soft sheltered intertidal sand flats or mudflats, open and without vegetation or cover. Breeds in the northern hemisphere.	None

Scientific Name	Common Name	BC Act	EPBC Act	Habitat	Likelihood of Occurrence
Pandion cristatus, Pandion haliaetus	Eastern Osprey	V	M, MA	Ospreys are found right around the Australian coast line, except for Victoria and Tasmania. They are common around the northern coast, especially on rocky shorelines, islands and reefs. The species is uncommon to rare or absent from closely settled parts of south-eastern Australia. Favour coastal areas, especially the mouths of large rivers, lagoons and lakes. Feed on fish over clear, open water.	None
Petroica boodang	Scarlet Robin	V	-	The Scarlet Robin is found from SE Queensland to SE South Australia and also in Tasmania and SW Western Australia. In NSW, it occurs from the coast to the inland slopes. The Scarlet Robin lives in dry eucalypt forests and woodlands. The understorey is usually open and grassy with few scattered shrubs.	High
Rhipidura rufifrons	Rufous Fantail	-	M	Found along the east coast of Australia from far northern Queensland to Tasmania, including south-eastern South Australia. Inhabits tall forests, preferring wetter habitats such as heavily forested gullies, but not rainforests.	Low
Rostratula australis	Australian Painted Snipe	E	E, MA	In NSW, this species has been recorded at the Paroo wetlands, Lake Cowell, Macquarie Marshes and Hexham Swamp. Most common in the Murray-Darling Basin. Prefers fringes of swamps, dams and nearby marshy areas where there is a cover of grasses, lignum, low scrub or open timber. Nests on the ground amongst tall vegetation, such as grasses, tussocks or reeds.	None
Stagonopleura guttata	Diamond Firetail	V	-	Feeds exclusively on the ground, on ripe and partly-ripe grass and herb seeds and green leaves, and on insects (especially in the breeding season). Found in grassy eucalypt woodlands, including box-gum woodlands and snow gum woodlands. Also occurs in open forest, mallee, natural temperate grassland, and in secondary grassland derived from other communities.	Moderate
Tringa nebularia	Common Greenshank	-	M	Variety of inland wetlands and sheltered coastal habitats of varying salinity. Found on mudflats, saltmarsh, mangroves in embayments, harbours, deltas and lagoons. Breeds in northern hemisphere.	None
Tyto novaehollandiae	Masked Owl	V	-	Inhabits a diverse range of wooded habitat that provide tall or dense mature trees with hollows suitable for nesting and roosting. Mostly recorded in open forest and woodlands adjacent to cleared lands. Nest in hollows, in trunks and in near vertical spouts or large trees, usually living but sometimes dead. Nest hollows are usually located within dense forests or woodlands. Masked Owls prey upon hollow-dependent arboreal marsupials, but terrestrial mammals make up the largest proportion of the diet.	Moderate
Tyto tenebricosa	Sooty Owl	V	-	Often found in tall old-growth forests, including temperate and subtropical rainforests. In NSW mostly found on escarpments with a mean altitude less than 500 mm. Nests and roosts in hollows of tall emergent trees, mainly eucalypts often located in gullies. Nests have been located in trees 125 to 161 cm in diameter.	Moderate
Invertebrates					

Scientific Name	Common Name	BC Act	EPBC Act	Habitat	Likelihood of Occurrence
Meridolum corneovirens	Cumberland Plain Land Snail	E	-	Primarily inhabits Cumberland Plain woodland (a CEEC). This community is a grassy, open woodland with occasional dense patches of shrubs. Lives under litter of bark, leaves and logs, or shelters in loose soil around grass clumps. Occasionally shelters under rubbish.	Low
Mammals					
Cercartetus nanus	Eastern Pygmy-possum	V	-	Inhabits rainforest through to sclerophyll forest and tree heath. Banksias and myrtaceous shrubs and trees are a favoured food source. Will often nest in tree hollows, but can also construct its own nest. Because of its small size it is able to utilise a range of hollow sizes including very small hollows. Individuals will use a number of different hollows and an individual has been recorded using up to 9 nest sites within a 0.5 ha area over a 5 month period.	Moderate
Chalinolobus dwyeri	Large-eared Pied Bat	V	V	Located in a variety of drier habitats, including the dry sclerophyll forests and woodlands to the east and west of the Great Dividing Range. Can also be found on the edges of rainforests and in wet sclerophyll forests. This species roosts in caves and mines in groups of between 3 and 37 individuals.	Moderate
Dasyurus maculatus maculatus	Spotted-tailed Quoll	V	E	Spotted-tailed Quoll are found on the east coast of NSW, Tasmania, eastern Victoria and north-eastern Queensland. Only in Tasmania is it still considered common. 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.	Moderate
Falsistrellus tasmaniensis	Eastern False Pipistrelle	V	-	Inhabit sclerophyll forests, preferring wet habitats where trees are more than 20 m high. Two observations have been made of roosts in stem holes of living eucalypts. There is debate about whether or not this species moves to lower altitudes during winter, or whether they remain sedentary but enter torpor. This species also appears to be highly mobile and records showing movements of up to 12 km between roosting and foraging sites.	Moderate
Isoodon obesulus obesulus	Southern Brown Bandicoot (eastern)	E	E	Prefers sandy soils with scrubby vegetation and-or areas with low ground cover that are burn from time to time. A mosaic of post fire vegetation is important for this species.	Low
Miniopterus australis	Little Bentwing-bat	V	-	Coastal north-eastern NSW and eastern Queensland. The Little Bentwing-bat is an insectivorous bat that roost in caves, in old mines, in tunnels, under bridges, or in similar structures. They breed in large aggregations in a small number of known caves and may travel hundreds of kilometres from feeding home ranges to breeding sites. They have a preference for moist eucalypt forest, rainforest or dense coastal banksia scrub where it forages below the canopy for insects.	Moderate
Miniopterus schreibersii oceanensis	Eastern Bentwing-bat	V	-	Eastern Bentwing-bats occur along the east and north-west coasts of Australia. Caves are the primary roosting habitat, but also use derelict mines, storm-water tunnels, buildings and other man-made structures. Form discrete populations centred on a maternity cave that is used annually in spring and summer for the birth and rearing of young.	Moderate

Scientific Name	Common Name	BC Act	EPBC Act	Habitat	Likelihood of Occurrence
Mormopterus norfolkensis	Eastern Freetail-bat	V	-	Most records are from dry eucalypt forests and woodlands to the east of the Great Dividing Range. Appears to roost in trees, but little is known of this species' habits.	Moderate
Myotis macropus	Southern Myotis	V	-	The Southern Myotis is found in the coastal band from the north-west of Australia, across the top-end and south to western Victoria. Generally roost in groups of 10 - 15 close to water in caves, mine shafts, hollow-bearing trees, stormwater channels, buildings, under bridges and in dense foliage.	Moderate
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. It is typically found in highest abundance in taller, montane, moist eucalypt forests with relatively old trees and abundant hollows.	Low
Petaurus australis	Yellow-bellied Glider	V	-	Occur in tall mature eucalypt forest generally in areas with high rainfall and nutrient rich soils. Forest type preferences vary with latitude and elevation; mixed coastal forests to dry escarpment forests in the north; moist coastal gullies and creek flats to tall montane forests in the south. Found along the eastern coast to the western slopes of the Great Dividing Range, from southern Queensland to Victoria.	Low
Petaurus norfolcensis	Squirrel Glider	V	-	Generally occurs in dry sclerophyll forests and woodlands but is absent from dense coastal ranges in the southern part of its range. Requires abundant hollow bearing trees and a mix of eucalypts, banksias and acacias. There is only limited information available on den tree use by Squirrel gliders, but it has been observed using both living and dead trees as well as hollow stumps. Within a suitable vegetation community at least one species should flower heavily in winter and one species of eucalypt should be smooth barked. Endangered population in the Wagga Wagga LGA.	Low
Petrogale penicillata	Brush-tailed Rock-wallaby	E	V	Found in rocky areas in a wide variety of habitats including rainforest gullies, wet and dry sclerophyll forest, open woodland and rocky outcrops in semi-arid country. Commonly sites have a northerly aspect with numerous ledges, caves and crevices.	None
Phascolarctos cinereus	Koala	V	V	Inhabits eucalypt forests and woodlands. The suitability of these forests for habitation depends on the size and species of trees present, soil nutrients, climate and rainfall.	Moderate
Potorous tridactylus tridactylus	Long-nosed Potoroo	V	V	Inhabits coastal heath and wet and dry sclerophyll forests. Generally found in areas with rainfall greater than 760 mm. Requires relatively thick ground cover where the soil is light and sandy.	Low
Pseudomys novaehollandiae	New Holland Mouse	-	V	The New Holland Mouse currently has a disjunct, fragmented distribution across Tasmania, Victoria, New South Wales and Queensland. Across the species' range the New Holland Mouse is known to inhabit open heathlands, open woodlands with a heathland understorey, and vegetated sand dunes.	Low

Scientific Name	Common Name	BC Act	EPBC Act	Habitat	Likelihood of Occurrence
Pteropus poliocephalus	Grey-headed Flying-fox	V	V	This species is a canopy-feeding frugivore and nectarivore of rainforests, open forests, woodlands, melaleuca swamps and banksia woodlands. Bats commute daily to foraging areas, usually within 15 km of the day roost although some individuals may travel up to 70 km.	High
Scoteanax rueppellii	Greater Broad-nosed Bat	V	-	Prefer moist gullies in mature coastal forests and rainforests, between the Great Dividing Range and the coast. They are only found at low altitudes below 500 m. In dense environments they utilise natural and human-made opening in the forest for flight paths. Creeks and small rivers are favoured foraging habitat. This species roosts in hollow tree trunks and branches.	Moderate
Fish					
Maccullochella peelii peelii	Murray Cod	-	V	The Murray Cod is found in a wide range of warm water habitats, from clear, rocky streams to slow-flowing turbid rivers and billabongs. Generally, they are found in waters up to 5 m deep and in sheltered areas with cover from rocks, timber or overhanging banks. The species is highly dependent on wood debris for habitat, using it to shelter from fast-flowing water.	None
Macquaria australasica	Macquarie Perch	E (FM Act)	E	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. Macquarie perch are found in both river and lake habitats, especially the upper reaches of rivers and their tributaries	Low
Reptiles					
Hoplocephalus bungaroides	Broad-headed Snake	E	V	Occurs almost exclusively in association with communities occurring on Triassic sandstone within the Sydney Basin. Typically found among exposed sandstone outcrops with vegetation types ranging from woodland to heath. Within these habitats they spend most of the year sheltering in and under rock crevices and exfoliating rock. However, some individuals will migrate to tree hollows to find shelter during hotter parts of summer.	Low
Varanus rosenbergi	Rosenberg's Goanna	V	-	Rosenberg's Goanna occurs on the Sydney Sandstone in Wollemi National Park to the north-west of Sydney, in the Goulburn and ACT regions and near Cooma in the south. Found in heath, open forest and woodland, associated with termites, the mounds of which this species nests in; termite mounds are a critical habitat component. Individuals require large areas of habitat and feeds on carrion, birds, eggs, reptiles and small mammals. They shelter in hollow logs, rock crevices and in burrows, which they may dig for themselves, or they may use other species' burrows, such as rabbit warrens.	Low
Flora					
Acacia bynoeana	Bynoe's Wattle	E	V	Grows mainly in heath and dry sclerophyll forest in sandy soils. Mainly south of Dora Creek-Morisset area to Berrima and the Illawarra region, west to the Blue Mountains, also recorded from near Kurri Kurri in the Hunter Valley and from Morton National Park.	Low

Scientific Name	Common Name	BC Act	EPBC Act	Habitat	Likelihood of Occurrence
Allocasuarina glareicola		E	E	Primarily restricted to the Richmond (NW Cumberland Plain) district, but with an outlier population found at Voyager Point, Liverpool. Grows in Castlereagh woodland on lateritic soil. Found in open woodland with Parramatta Red Gum, Broad-leaved Ironbark, Narrow-leaved Apple, Scribbly Gum and Paperbarks.	Low
Asterolasia elegans		E	E	Occurs north of Sydney, in the Baulkham Hills, Hawkesbury and Hornsby local government areas. Also likely to occur in the western part of Gosford local government area. Known from only seven populations, only one of which is wholly within a conservation reserve. Occurs on Hawkesbury sandstone in sheltered forests on mid- to lower slopes and valleys, e.g. in or adjacent to gullies which support sheltered forest.	Low
Commersonia prostrate	Dwarf Kerrawang	E	E	Occurs on sandy, sometimes peaty soils in a wide variety of habitats: snow gum woodland at Rose Lagoon; Blue-leaved Stringybark open forest at Tallong; and in Brittle Gum low open woodland at Penrose; Scribbly Gum - Swamp Mahogany ecotonal forest at Tomago.	Low
Cryptostylis hunteriana	Leafless Tongue-orchid	V	V	Does not appear to have well defined habitat preferences and is known from a range of communities, including swamp-heath and woodland. The larger populations typically occur in woodland dominated by Scribbly Gum, Silvertop Ash, Red Bloodwood and Black She-oak and appears to prefer open areas in the understorey of this community.	Low
Cynanchum elegans	White-flowered Wax Plant	E	E	Recorded from rainforest gullies scrub and scree slopes from the Gloucester district to the Wollongong area and inland to Mt Dangar.	Low
Darwinia peduncularis		V	-	Occurs as local disjunct populations in coastal NSW with a couple of isolated populations in the Blue Mountains. It has been recorded from Brooklyn, Berowra, Galston Gorge, Hornsby, Bargo River, Glen Davis, Mount Boonbourwa and Kings Tableland. Usually grows on or near rocky outcrops on sandy, well drained, low nutrient soil over sandstone.	Moderate
Epacris purpurascens var. *purpurascens*		V	-	Recorded from Gosford in the north, to Narrabeen in the east, Silverdale in the west and Avon Dam vicinity in the South. Found in a range of habitat types, most of which have a strong shale soil influence.	Moderate
Eucalyptus macarthurii		V	-	A moderately restricted distribution, 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. Occurs on grassy woodland on relatively fertile soils on broad cold flats.	Low
Genoplesium baueri	Bauer's Midge Orchid	E	E	Grows in dry sclerophyll forest and moss gardens over sandstone. Flowers February to March. Has been recorded between Ulladulla and Port Stephens. Currently the species is known from just over 200 plants across 13 sites. The species has been recorded in Berowra Valley Regional Park,	Low

Scientific Name	Common Name	BC Act	EPBC Act	Habitat	Likelihood of Occurrence
				Royal National Park and Lane Cove National Park and may also occur in the Woronora, O'Hares, Metropolitan and Warragamba Catchments.	
Grevillea parviflora subsp. *parviflora*	Small-flowered Grevillea	V	V	Grows in sandy or light clay soils usually over thin shales. Occurs in a range of vegetation types from heath and shrubby woodland to open forest. Found over a range of altitudes from flat, low-lying areas to upper slopes and ridge crests. Often occurs in open, slightly disturbed sites such as along tracks.	High
Haloragis exalata subsp. exalata	Square Raspwort	V	V	Occurs in 4 widely scattered localities in eastern NSW. It is disjunctly distributed in the central coast, south coast and north-western slopes botanical subdivisions of NSW. The species appears to require protected and shaded damp situations in riparian habitats.	Low
Leucopogon exolasius	Woronora Beard-heath	V	V	Grows in woodland on sandstone. Restricted to the Woronora and Grose Rivers and Stokes Creek, Royal National Park.	Moderate
Melaleuca deanei	Deane's Melaleuca	V	V	Grows in wet heath on sandstone in coastal districts from Berowra to Nowra.	Moderate
Pelargonium sp. Striatellum	Omeo's Stork's-bill	E	E	Flowering occurs from October to March. Occurs in habitat usually located just above the high water level of irregularly inundated or ephemeral lakes. During dry periods, the species is known to colonise exposed lake beds. The species is known to form clonal colonies by rhizomatous propagation.	Low
Persicaria elatior	Tall Knotweed	V	V	This species normally grows in damp places, especially beside streams and lakes. Occasionally in swamp forest or associated with disturbance.	Low
Persoonia acerosa	Needle Geebung	V	V	Occurs in dry sclerophyll forest, scrubby low-woodland and heath on low fertility soils. Recorded only on the central coast and in the Blue Mountains, from Mt Tomah in the north to as far south as Hill Top where it is now believed to be extinct. Mainly in the Katoomba, Wentworth Falls, Springwood area.	Low
Persoonia bargoensis	Bargo Geebung	E	V	The Bargo Geebung occurs in woodland or dry sclerophyll forest on sandstone and on heavier, well drained, loamy, gravely soils.	High
Persoonia glaucescens	Mittagong Geebung	E	V	The Mittagong Geebung grows in woodland to dry sclerophyll forest on clayey and gravely laterite. The preferred topography is ridge-tops, plateaux and upper slopes. Aspect does not appear to be a significant factor.	Moderate
Persoonia hirsuta	Hairy Geebung	E	E	Distributed from Singleton in the north, along the east coast to Bargo in the south and the Blue Mountains to the west. A large area of occurrence, but occurs in small populations, increasing the species' fragmentation in the landscape. Found in sandy soils in dry sclerophyll open forest, woodland and heath on sandstone. Usually present as isolated individuals or very small populations. Probably killed by fire (as other *Persoonia spp*. are) but will regenerate from seed.	High

Scientific Name	Common Name	BC Act	EPBC Act	Habitat	Likelihood of Occurrence
Pimelea spicata	Spiked Rice-flower	E	E	Once widespread on the Cumberland Plain, the Spiked Rice-flower occurs in two disjunct areas; the Cumberland Plain (Narellan, Marayong, Prospect Reservoir areas) and the Illawarra (Landsdowne to Shellharbour to northern Kiama). In both the Cumberland Plain and Illawarra environments this species is found on well-structured clay soils. On the inland Cumberland Plain sites it is associated with grey box and Ironbark. In the coastal Illawarra it occurs commonly in Coast Banksia open woodland with a better developed shrub and grass understorey.	Low
Pomaderris brunnea	Brown Pomaderris	V	V	The species is expected to live for 10 - 20 years, while the minimum time to produce seed is estimated to be 4 - 6 years. Found in a very limited area around the Colo, Nepean and Hawkesbury Rivers, including the Bargo area. It also occurs at Walcha on the New England Tableland and in far eastern Gippsland in Victoria.	Low
Pterostylis saxicola	Sydney Plains Greenhood	E	E	Restricted to western Sydney between Freemans Reach in the north and Picton in the south. Most commonly found growing in small pockets of shallow soil in depressions on sandstone rock shelves above cliff lines. The vegetation communities above the shelves where Sydney Plains Greenhood occurs are sclerophyll forest or woodland on shale-sandstone transition soils or shale soils.	Low
Pultenaea glabra	Smooth Bush-Pea	V	V	Grows in swamp margins, hillslopes, gullies and creekbanks and occurs within dry sclerophyll forest and tall damp heath on sandstone. Restricted to the higher Blue Mountains.	Low
Syzygium paniculatum	Magenta Lilly Pilly	E	V	Found only in NSW, in a narrow, linear coastal strip from Bulahdelah to Conjola State forest. On the south coast the species occurs on grey soils over sandstone, restricted mainly to remnant stands of littoral rainforest. On the central coast it occurs on gravels, sands, silts and clays in riverside gallery rainforests and remnant littoral rainforest communities.	Low
Tetratheca glandulosa		V	-	Associated with shale-sandstone transition habitat where shale-cappings occur over sandstone, with associated soil landscapes such as Lucas Heights, Gymea, Lambert and Faulconbridge. Topographically, the plant occupies ridgetops, upper-slopes and to a lesser extent mid-slope sandstone benches. Soils are generally shallow, consisting of a yellow, clayey-sandy loam. Stony lateritic fragments are also common in the soil profile on many of these ridgetops. Vegetation structure varies from heaths and scrub to woodlands-open woodlands, and open forest.	Low
Thelymitra kangaloonica	Kangaloon Sun Orchid	CE	CE	*Thelymitra sp*. Kangaloon is only known to occur on the southern tablelands of NSW in the Moss Vale - Kangaloon - Fitzroy Falls area at 550-700 m above sea level. It is known to occur at three swamps that are above the Kangaloon Aquifer. It is found in swamps in sedgelands over grey silty grey loam soils	Low
Thesium australe	Austral Toadflax	V	V	Grows in very small populations scattered across eastern NSW, along the coast, and from the Northern to Southern Tablelands. It is also found in Tasmania and Queensland and in eastern Asia. Occurs in grassland or grassy woodland. Grows on Kangaroo Grass tussocks but has also been recorded within the exotic Coolatai Grass.	Low

Key: CE = Critically Endangered; E, E1 = Endangered; EP = Endangered Population; V = Vulnerable; M = Migratory.

Note: Species that exclusively rely on marine environments, including seabirds, have been excluded from the Likelihood of Occurrence table, due to lack of suitable habitat in the study area.

Habitat descriptions taken from the relevant profiles on the OEH Threatened Species website or DoEE SPRAT database unless otherwise stated.

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A specialist environmental and heritage consultancy.

Head Office

Niche Environment and Heritage
PO Box 2443 North Parramatta NSW 1750
Email: info@niche-eh.com

All mail correspondence should be through our Head Office