SEVEN PART TEST

ON THREATENED FLORA AND FAUNA

for a
Proposed Subdivision
at

Lot 122 DP750924
Almond Street
DENMAN
NSW

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CONTENTS

1.0 INTRODUCTION

Flora, fauna and habitat studies have been undertaken for a proposed subdivision at Lot 122 DP 750924 Almond Street Denman, NSW. Investigations in accordance with the requirements of the Environmental Planning and Assessment Act 1979 (EPA Act) and the Threatened Species Conservation Act 1995 (TSC Act) have been undertaken. The results are presented here in the form of a Seven Part Test report, incorporating an assessment of the site under the provisions of State Environmental Planning Policy No. 44 (SEPP 44) - 'Koala Habitat Protection' and the Commonwealth Environment Protection And Biodiversity Conservation Act 1999 (EPBC Act).

1.1 GENERAL DESCRIPTION OF THE SITE

The site (Lot 122) was located on the north-western fringe of the town of Denman (Figure 1). It has an area of approximately 17 ha site was situated on the fringe of the lower eastern slopes of a Triassic Narrabeen escarpment, the underlying geology on the site itself was predominately of Permian origins. A gently sloped aspect occurred throughout the site, higher ground occurred in the west of the site and sloped down towards the eastern boundary. A small constructed dam was present in the north-eastern section of the site. No drainage lines were present.

The site has had a long history of disturbance from past vegetation clearance and continued grazing. The majority of the site had also been subject to a past ploughing approximately five years ago. The high amount of past disturbance on site has resulted in the presence of large areas of grassland/pasture with scattered remnant canopy trees such as *Eucalyptus dawsonii* (Slaty Gum) and *Eucalyptus moluccana* (Grey Box). Smaller trees such as *Notelaea microcarpa* (Native Olive) and *Acacia salicina* (Cooba) were also present. A residence with associated farm sheds was present in the north-west of the site. An unsealed driveway connected the residence to Almond Road. An aerial photograph of the site is shown in Figure 2.

1.2 DESCRIPTION OF THE PROPOSAL

It is proposed that a 154 lot residential subdivision will take place within Lot 122 DP750924 (Figure 3). The proposed subdivision will involve bulk earthworks, the construction of new roads, stormwater infrastructure and the provision of utility services. This development and future construction of residential dwellings within Lot 122 will likely involve removal of the remnant trees on site.

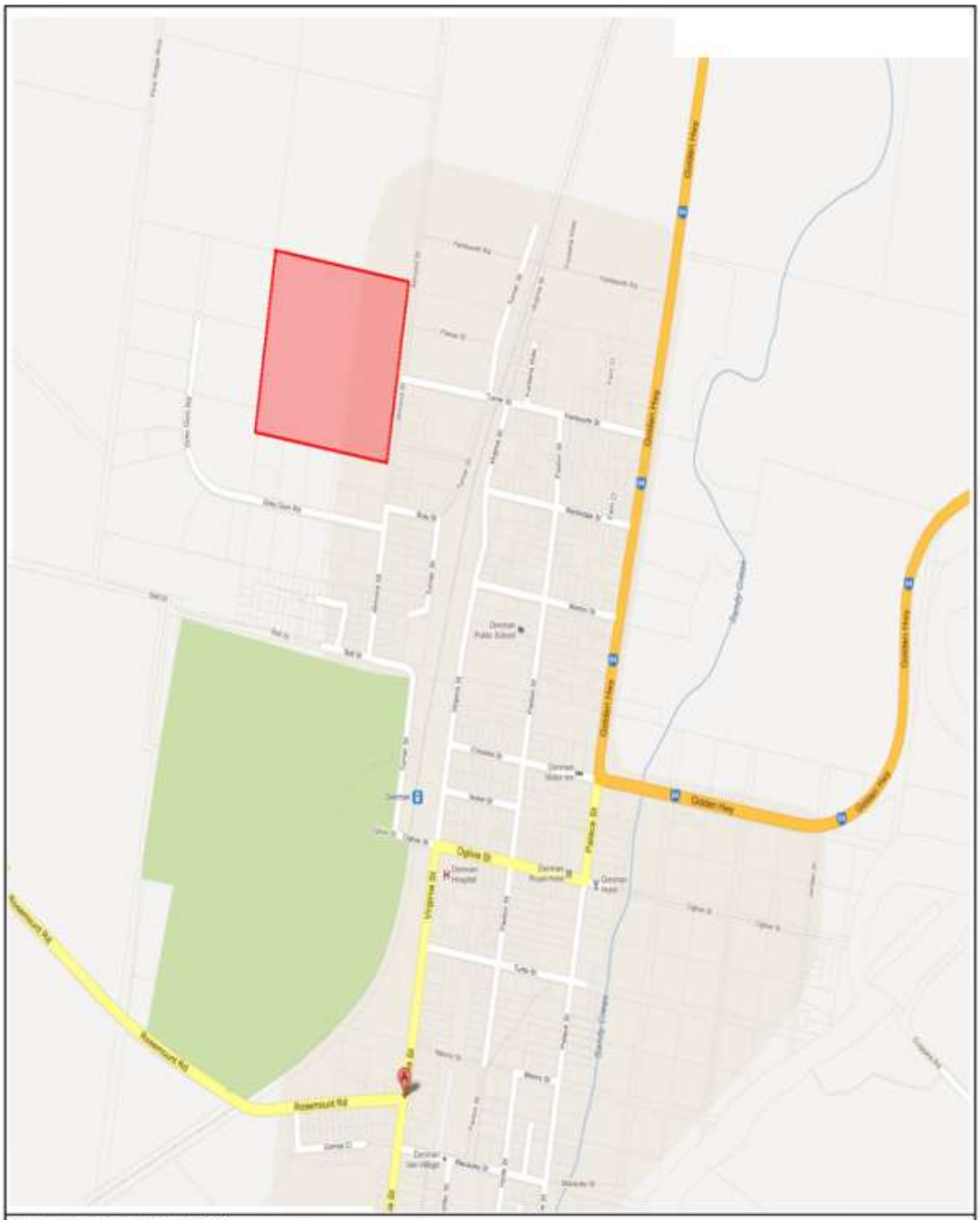

Figure 1: Lot 122 Location Map

Figure 2: Aerial Photo

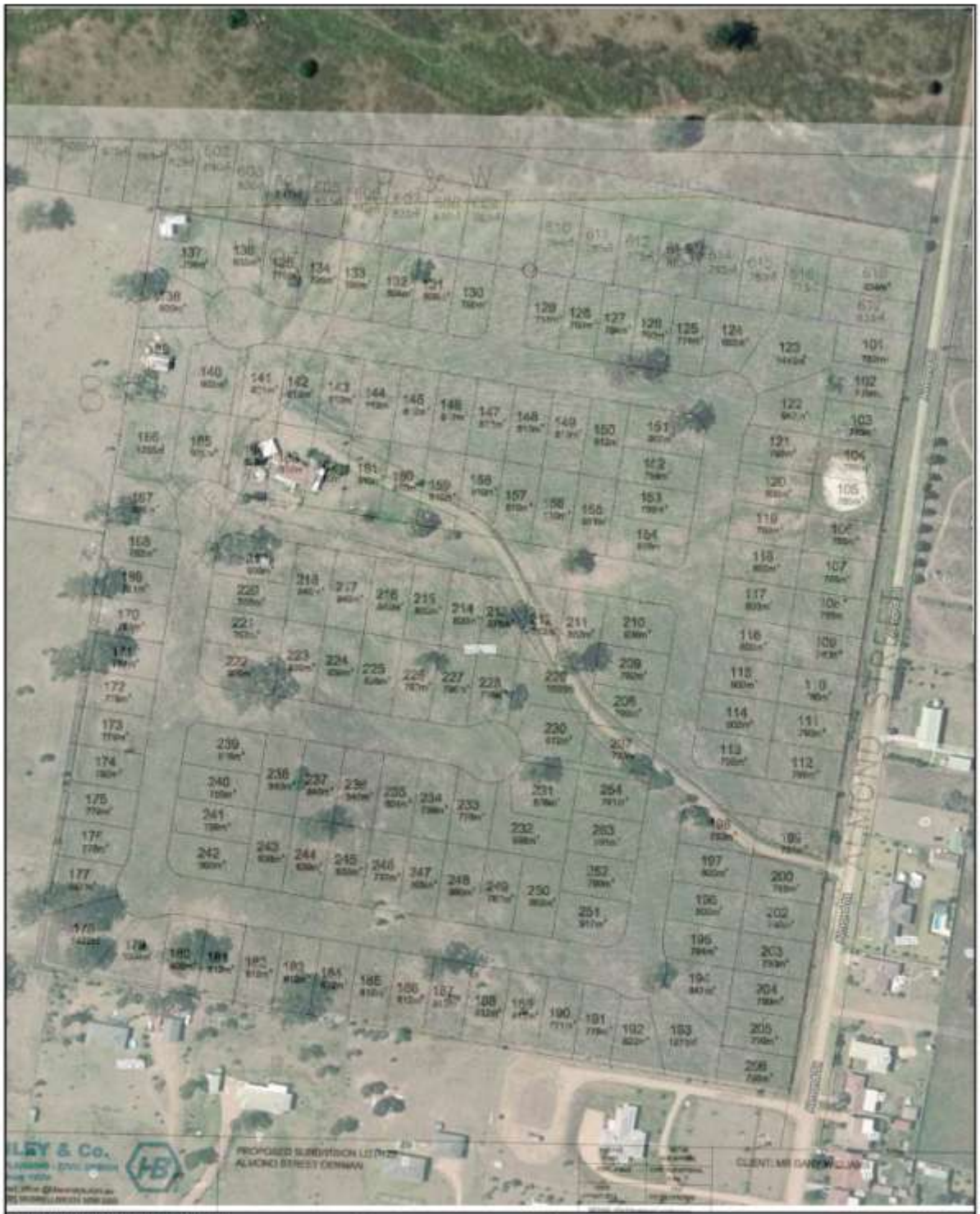

Figure 3: Plan of Proposal

2.0 SCOPE OF THE STUDY

This study was designed to address any likely flora and fauna issues of significance occurring upon the site. This was achieved by appraisal of the vegetation assemblage and structural formation, and identification of representative plant species of the various structural layers. Potential habitat offered by the vegetation present was also assessed. The possibility of this site being significant for any Schedule 1 and 2 (endangered and vulnerable) flora, fauna and ecological communities was paramount in the assessment process. Appraisal has been confined to the site and its immediate surroundings in the Section 5A assessment.

2.1 LEGISLATIVE REQUIREMENTS

This Seven Part Test on Threatened Flora and Fauna has been structured upon the guidelines laid down in Section 5A of the Environmental Planning and Assessment Act (1979), and the Threatened Species Conservation Act (1995), which requires consideration of the impact of the proposed action upon any Schedule 1 and 2 (endangered or vulnerable) species and ecological communities expected or found on the site. Endangered and vulnerable species are collectively referred to as 'threatened' species in this report.

Also considered in this report was the Commonwealth Environment Protection and Biodiversity Conservation Act (1999) and SEPP 44 – 'Koala Habitat Protection'.

Fieldwork undertaken by Wildthing Environmental Consultants was carried out under NPWS Scientific Investigation Licence S10475 and under Animal Care and Ethics Approval: Animal Research Authority Issue by the Director General of NSW Agriculture (File No. 08 – 361) for Fauna Survey for Biodiversity and Impact Assessment.

3.0 METHODOLOGY

3.1 VEGETATION APPRAISAL METHODOLOGY

The initial determination of the basic vegetation community boundaries was undertaken through the review of an orthophoto covering the site. Following this, a detailed ground survey was conducted in accordance with the Lower Hunter and Central Coast Region – Flora and Fauna Guidelines (Murray, et al 2002). Due to the disturbance to the site vegetation transects and plots were not used. Flora searches for threatened species were undertaken across the site in the manner described by Cropper (1993) as the 'Random Meander Technique'. This involved walking in a random manner throughout the entire study site and visiting the full range of potential habitats and checking every plant species seen. A list of all flora species identified on site has been provided in Appendix A.

3.2 HABITAT APPRAISAL METHODOLOGY

Habitat may be defined as the physical and biological environment required for the survival of a specific population of a species. In modern usage habitat has also come to be regarded as an association of landform and plant life, which provides sustenance and shelter for a particular fauna assemblage.

The methodology of the habitat appraisal used the vegetation community data combined, where relevant, with geomorphological features and the occurrence of particular plant species or forms (i.e. tree hollows) to provide a basis for a subjective habitat assessment aimed at placing the ecological status of the site within a local perspective.

3.2.1 GENERAL HABITAT FOR NATIVE SPECIES

From the vegetation appraisal and a general inspection of the site and surrounding areas, a subjective assessment of the general habitat value of this site was made. Considered in this assessment were:

- occurrence of that habitat type in the general vicinity;
- degree of disturbance and degradation;
- area occupied by that habitat on site;
- continuity with similar habitat adjacent to the site, or connection with similar habitat off site by way of corridors; and
- structural and floral diversity.

3.2.2 HABITAT FOR SIGNIFICANT SPECIES

This site was evaluated as potential habitat for each of the threatened species reported on the Office of Environment and Heritage (OEH) and Department of Sustainability, Environment, Water, Population and Communities (SEWPaC) database from within 10km of the site. This evaluation was based on home range, feeding, roosting, breeding, movement patterns and corridor requirements for fauna and hydrology, soil types, aspect and structural formation for flora species.

3.3 FAUNA APPRAISAL METHODOLOGY

The methodology adopted consisted of an assessment of the potential use of the site by any Schedule 1 and 2 fauna identified on the OEH and SEWPaC Databases. This was undertaken by both appraising the extent of likely habitat upon the site, searches for secondary indications of threatened species utilising the site, and incidental observations of native fauna in general. Trapping was not conducted due to the lack of understorey vegetation.

3.3.1 DIURNAL SURVEYS

Opportunistic sightings of species and secondary indications (scats, scratches, diggings, tracks etc.) of resident fauna were noted and included:

- dedicated searches for herpetofauna;
- dedicated searches for avifauna;
- searches for whitewash, prey remains and regurgitation pellets from Owls;
- investigation of any possible den sites for Tiger Quoll;
- searches for chewed cones from the Glossy Black-Cockatoo;
- checking trees (particularly smooth-barked species) for scratches consistent with arboreal mammals; and
- searches for characteristic scats, such as from Koalas.

3.3.2 NOCTURNAL SURVEYS

The nocturnal surveys undertaken included:

- spotlighting;
- recording of microchiropteran bat calls;
- an owl and mammal call playback census; and
- searches for frog species within suitable habitats.

Spotlighting was undertaken on foot using 100watt hand-held spotlights. The spotlighting involved walking at a slow pace around the entire site particularly areas of woodland and stopping every 2 minutes, allowing the observer to hear movements of animals.

Mobile and stationary microchiropteran bat detection was undertaken for a total of 2 hours within the study area. The transformed calls were analysed using an Anabat V Zero Crossing Analysis Interface feeding into a computer and were identified by comparison with sample bat calls. The recorded bat calls were analysed in-house by Mungo Worth.

The nocturnal avifauna and mammal survey also involved the broadcasting of recorded owl calls through an amplification system designed to project the calls at least 1 km under still night conditions in an attempt to elicit a response. The calls which were broadcast included the threatened *Ninox*

connivens (Barking Owl), *Ninox strenua* (Powerful Owl), *Tyto novaehollandiae* (Masked Owl), *Tyto tenebricosa* (Sooty Owl), *Phascolarctos cinereus* (Koala), and *Petaurus norfolcensis* (Squirrel Glider) which were listed on the OEH database as having been recorded within 10km of the site.

Searches for frogs in likely habitats were undertaken during the evening survey. The surveys were undertaken in suitable habitat and involved listening for the characteristic call of male frogs. Playback of frog calls was undertaken an attempt to elicit a response from threatened amphibian species in particular *Litoria aurea* (Green and Golden Bell Frog).

3.4 DATE, TIMES, ACTIVITIES & WEATHER CONDITIONS

A summary of the time spent on site during fieldwork and the prevailing weather conditions at the time is contained below in Table 1.

Table 1: Survey Dates, Times and Weather Conditions

DATE	TIME	ACTIVITY	WEATHER
Thursday 04/10/12	1100 - 1300	Vegetation and habitat surveys.	Calm, 0/8 Cloud, 26°C, NW Wind direction
	1330 – 1400	Vegetation and habitat surveys	
	1500 - 1600	Avifauna surveys	
	1630 – 1715	Reptile survey	
	1830 – 1945	Spotlighting Bat Call Survey	Calm, 2/8 Cloud, 17°C Waxing gibbous moon
Tuesday 16/10/12	2030-2130	Spotlighting Bat Call Survey Owl/Mammal Call Broadcast Amphibian Survey	Calm, 0/8 Cloud, 25°C New Moon

3.5 SIGNIFICANT SPECIES

The following significant species have been recorded on the OEH Database within 10km of the site (Table 2). Species marked with an asterisk (*) are considered to have potential habitat available within 10km according to the SEWPaC on-line database.

Table 2: Significant Species Considered.

Scientific Name	Common Name	TSC Act 1995	EPBC Act 1999
Flora			
Wollemia nobilis	Wollemi Pine	E4A	E
Diuris tricolor	Pine Donkey Orchid	V	
**Prasophyllum sp.* Wybong	Leek Orchid		CE
Pterostylis gibbosa	Illawarra Greenhood	E1	E
Thesium australe	Austral Toadflax	V	V
Digitaria porrecta	Finger Panic Grass	E1	E
**Bothriochloa biloba*	Lobed Blue Grass		V
Commersonia rosea	Sandy Hollow Commersonia	E1	E
Lasiopetalum longistamineum		V	
Rulingia procumbens		V	V
Prostanthera cryptandroides ssp. *cryptandroides*	Wollemi Mint-bush	V	
**Philotheca ericifolia*			V
Pomaderris queenslandica	Scant Pomaderris	E1	
Pomaderris reperta	Denman Pomaderris	E4A	CE
**Cynanchum elegans*	White-flowered Wax Plant	E1	E
Amphibians			
Litoria aurea	Green and Golden Bell Frog	E1	V
Litoria booroolongensis	Booroolong Frog	E1	E
Reptiles			
Hoplocephalus bungaroides	Broad-headed Snake	V	V
Aprasia parapulchella	Pink-tailed Legless Lizard		V
Birds			
**Gallinago hardwickii*	Latham's Snipe		M
**Rostratula benghalensis australis*	Australian Painted Snipe	E1	V&M
**Botaurus poiciloptilus*	Australasian Bittern		E
**Ardea alba*	Great Egret		M
**Ardea ibis*	Cattle Egret		M
**Lathamus discolor*	Swift Parrot	E1	E & M
Neophema pulchella	Turquoise Parrot	V	
Glossopsitta pusilla	Little Lorikeet	V	
Calyptorhynchus lathami	Glossy Black-Cockatoo	V	
Callocephalon fimbriatum	Gang Gang Cockatoo	V	
Climacteris picumnus victoriae	Brown Treecreeper	V	
**Myiagra cyanoleuca*	Satin Flycatcher		M
**Anthochaera phrygia*	Regent Honeyeater	E4A	E & M
Grantiella picta	Painted Honeyeater	V	
Pyrrholaemus sagittatus	Speckled Warbler	V	
Melithreptus gularis gularis	Black-chinned Honeyeater	V	
**Merops ornatus*	Rainbow Bee-eater		M
**Monarcha melanopsis*	Black-faced Monarch		M
Melanodryas cucullata cucullata	Hooded Robin	V	
Petroica boodang	Scarlet Robin	V	
Stagonopleura guttata	Diamond Firetail	V	
**Hirundapus caudacutus*	White Throated Needle-Tail		M
Daphoenositta chrysoptera	Varied Sittella	V	
Pomatostomus temporalis temporalis	Grey-crowned Babbler	V	
**Rhipidura rufifrons*	Rufous Fantail		M
Circus assimilis	Spotted Harrier	V	

Scientific Name	Common Name	TSC Act 1995	EPBC Act 1999
Hieraaetus morphnoides	Little Eagle	V	
**Haliaeetus leucogaster*	White-bellied Sea Eagle		M
Ninox connivens	Barking Owl	V	
Ninox strenua	Powerful Owl	V	
Tyto novaehollandiae	Masked Owl	V	
Mammals			
Dasyurus maculatus maculatus	Tiger Quoll	V	V
Phascolarctos cinereus	Koala	V	V
**Petrogale penicillata*	Brush-tailed Rock-wallaby	V	V
Petaurus norfolcensis	Squirrel Glider	V	
Pteropus poliocephalus	Grey-headed Flying-fox	V	V
**Psuedomys novaehollandiae*	New Holland Mouse		V
Saccolaimus flaviventris	Yellow-bellied Sheathtail-Bat	V	
Mormopterus norfolkensis	Eastern Freetail-Bat	V	
Falsistrellus tasmaniensis	Eastern False Pipistrelle	V	
Miniopterus australis	Little Bentwing-Bat	V	
Miniopterus schreibersii oceanensis	Large Bentwing-Bat	V	
Nyctophilus timoriensis	Greater Long-eared Bat	V	
Scoteanax rueppellii	Greater Broad-nosed Bat	V	
**Chalinolobus dwyeri*	Large Pied Bat	V	V
Vespadelus troughtoni	Eastern Cave Bat	V	
Endangered Populations			
Cymbidium canaliculatum (Tiger Orchid) – population in the Hunter Catchment			
Acacia pendula (Weeping Myall) – population in the Hunter Catchment			
Eucalyptus camaldulensis (River Red Gum) – population in the Hunter Catchment			
Diuris tricolor (Pine Donkey Orchid) – population in the Muswellbrook Local Government Area			
Endangered Ecological Communities			
White Box – Yellow Box – Blakely's Red Gum Woodland			
Hunter Valley Weeping Myall Woodland			
*White Box – Yellow Box – Blakely's Red Gum Grassy Woodland and Derived Native Grasslands (EPBC Act)			
Central Hunter Grey Box - Ironbark Woodland			
Vulnerable Ecological Community			
Hunter Valley Footslopes Slaty Gum Woodland in the Sydney Basin Bioregion			

E1=Endangered Species V=Vulnerable Species E4A/CE=Critically Endangered M=Migratory Species

4.0 RESULTS

4.1 FLORA ASSEMBLAGES

A general description of the flora assemblages identified on site is given below. The vegetation within the site is shown in Figure 4*. Photos of the vegetation on site are shown in Figures 5 – 8. A full list of the flora species recorded during the fieldwork is listed in Appendix A.

The site had been subject to past vegetation clearance and has a long history of cattle grazing. The ground had also been subject to disturbance in the form of ploughing. This has resulted in large open areas of grassland/pasture with a few scattered remnant trees. The ground layer was dominated primarily by common weed species including *Galenia pubescens* (Galenia), *Senecio madagascariensis* (Fireweed) and *Gomphocarpus fruticosus* (Narrow-leaf Cotton Bush). Some native grass species such as *Aristida ramosa* (Three-awn Speargrass), *Austrostipa ramosissima* (Stout Bamboo Grass) and *Austrostipa scabra* (Spear Grass)were also present. Other noted native ground cover species included *Maireana microphylla* (Small-leaved Blue Bush) and *Sclerolaena muricata* (Black Roly Poly).

Thirty-two mature canopy trees were found to be scattered across the site. *Eucalyptus moluccana* (Grey Gum) was found to be the dominant occurring species. Other canopy trees observed included *Eucalyptus dawsonii* (Slaty Gum) and *Eucalyptus crebra* (Narrow-leaved Iron Bark). A small number of scattered smaller remnant trees particularly *Notelea microcarpa* (Native Olive) and *Acacia salicina* (Cooba) were also recorded.

Taking into account the remnant tree species occurring on site native vegetation would likely have originally been consistent with Map Unit 10 – Central Hunter Box – Ironbark Woodland which is described in The Vegetation of the Central Hunter Valley, New South Wales (Peake, 2006).

No aquatic plants, native or otherwise, were found around the fringe of the dam on the north-eastern section of the site. Evidence of heavy grazing and use by cattle was found in this area and could be put forward as the reason behind the lack of aquatic plants.

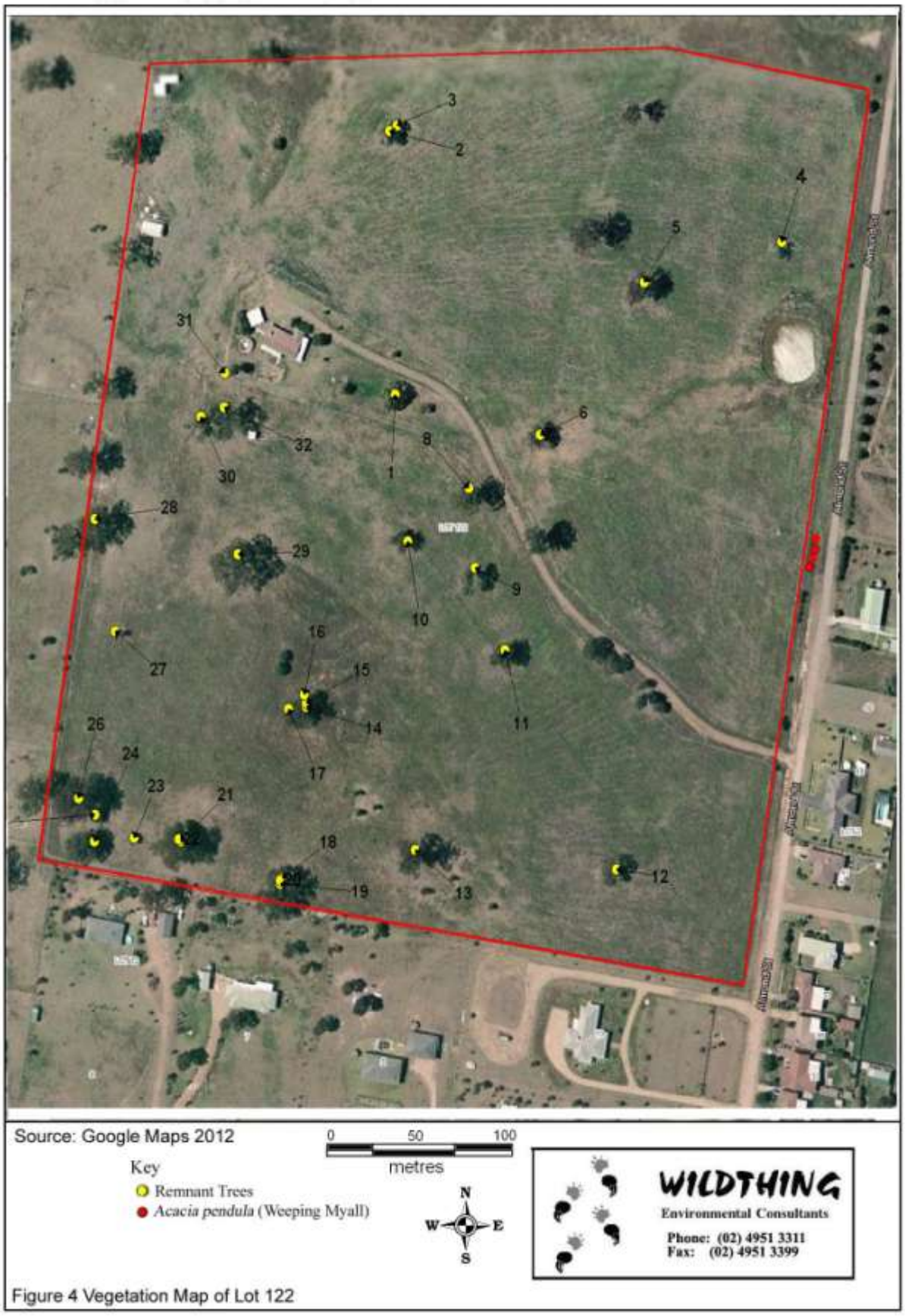

Figure 4 Vegetation Map of Lot 122

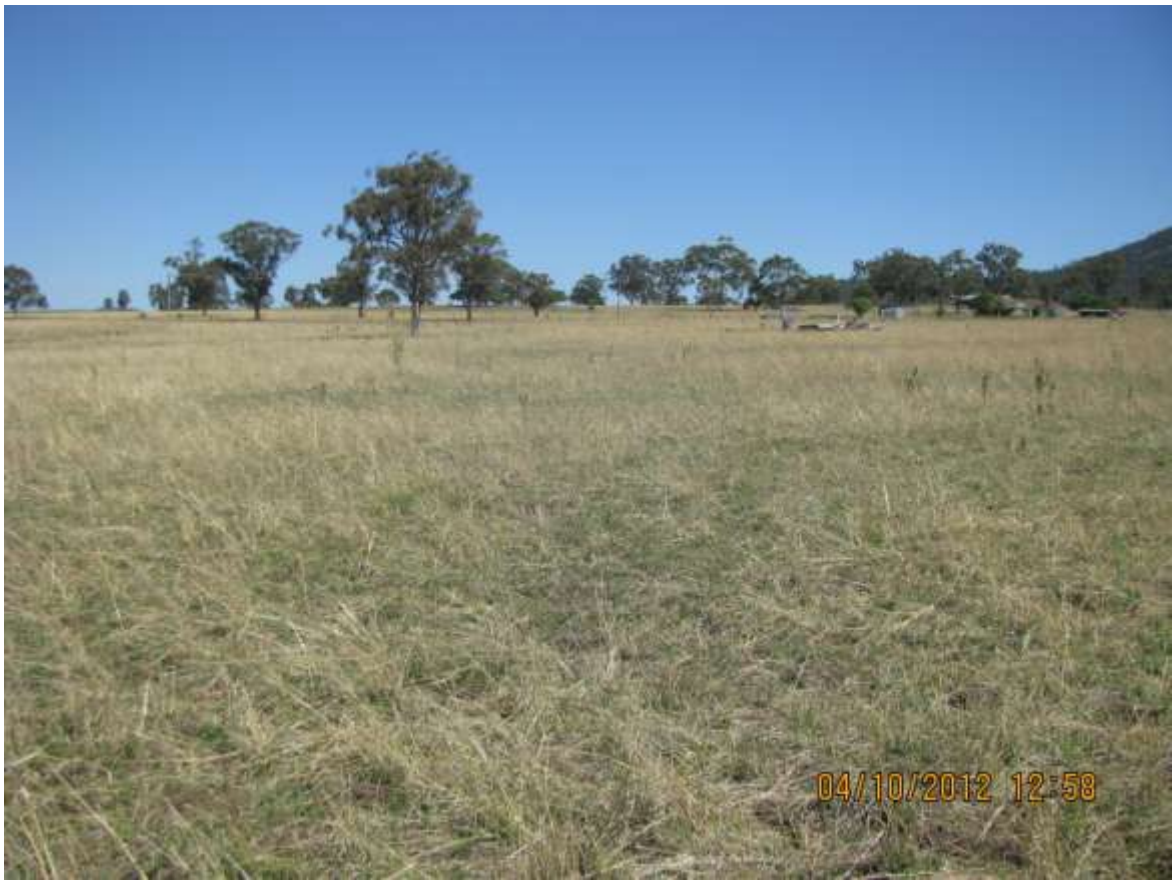

Figure 5: Vegetation within central area of site.

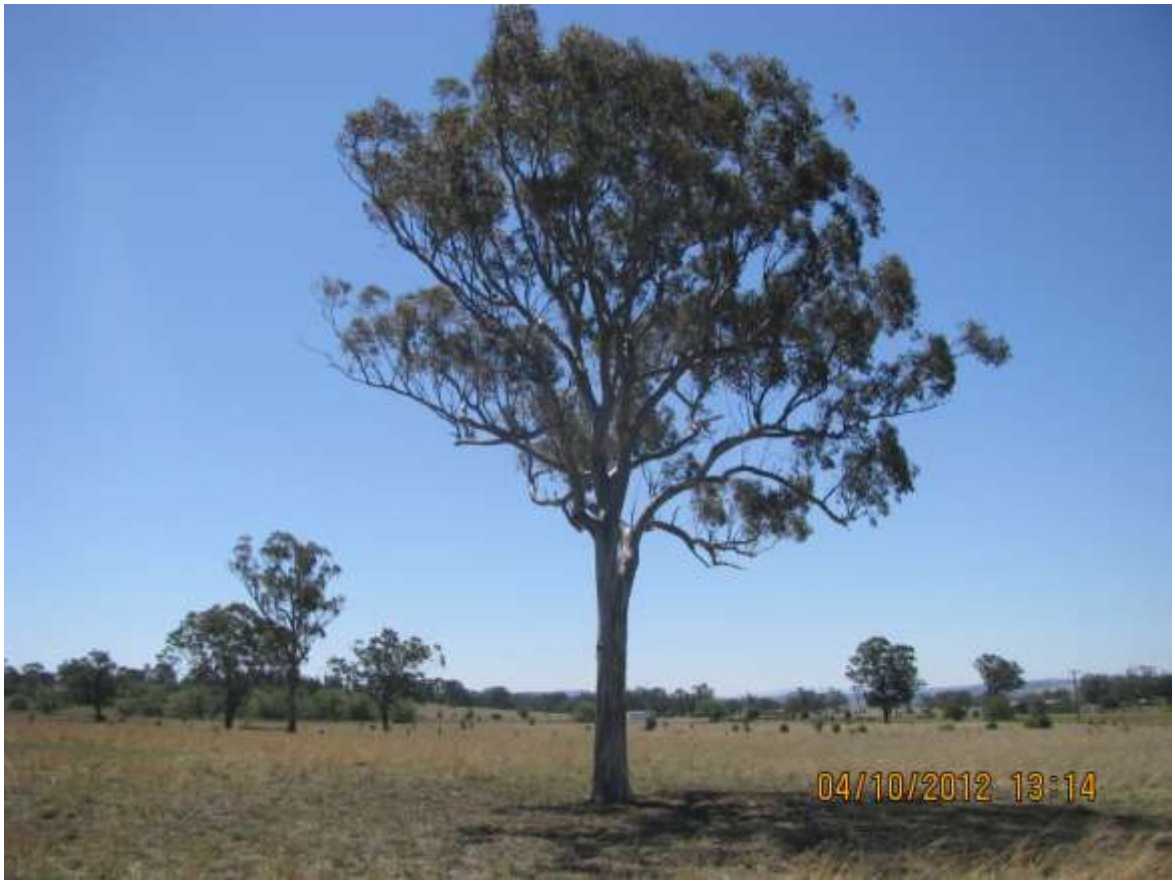

Figure 6: Vegetation within central area of site.

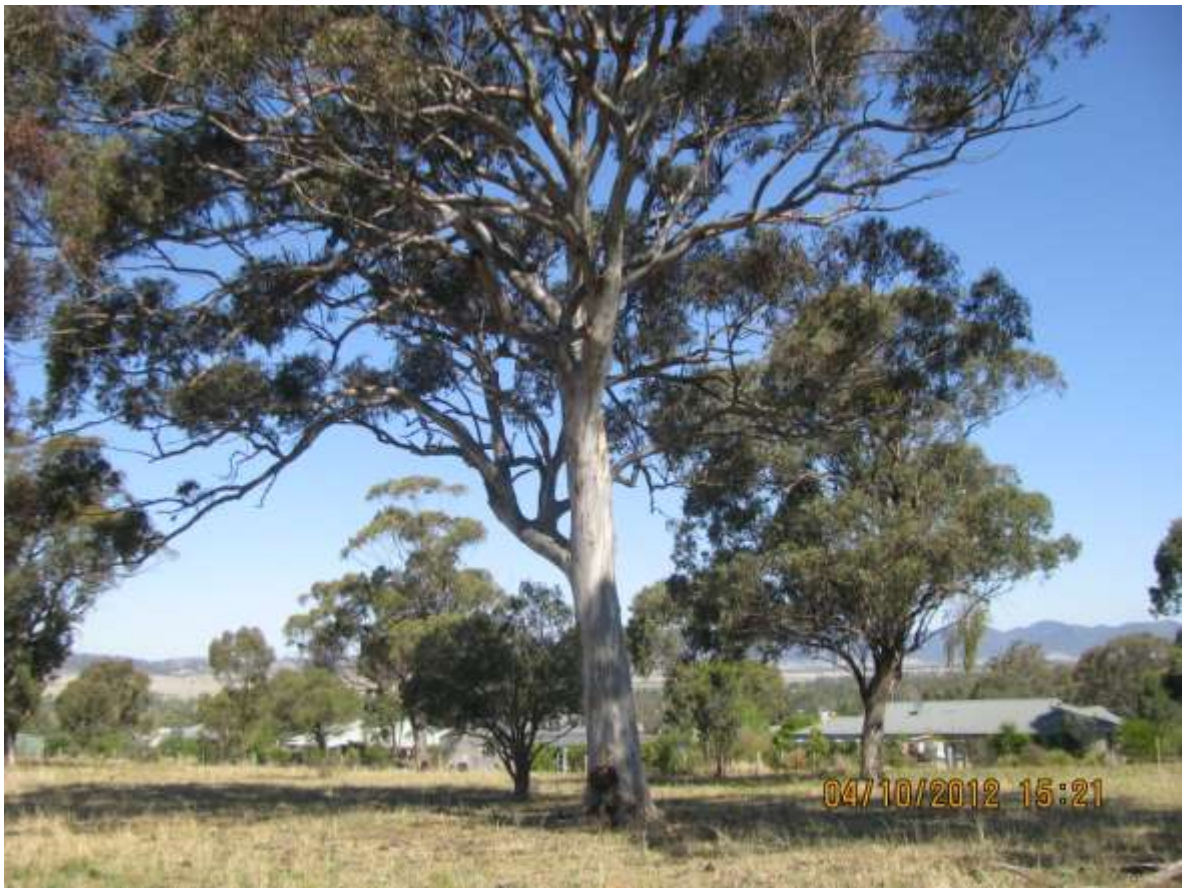

Figure 7: Remnant trees within south-west of site.

Figure 8: Constructed Dam in far east of site.

4.1.1 ENDANGERED AND VULNERABLE ECOLOGICAL COMMUNITIES

Three Endangered Ecological Communities and one Vulnerable Ecological Community have been previously recorded within 10km of the site on the OEH database. An additional community (marked with an asterisk) was also considered to have potential habitat within 10km according to the SEWPaC on-line database.

Endangered Ecological Communities:

- Hunter Valley Weeping Myall Woodland (TSC Act);
- White Box – Yellow Box – Blakely's Red Gum Woodland (TSC Act);
- *White Box – Yellow Box – Blakely's Red Gum Grassy Woodland and Derived Native Grasslands (EPBC Act);
- Central Hunter Grey Box – Ironbark Woodland (TSC Act);

Vulnerable Ecological Community:

- Hunter Valley Footslopes Slaty Gum Woodland in the Sydney Basin Bioregion - vulnerable ecological community listing.

<u>Central Hunter Grey Box – Ironbark Woodland</u>

Remnant tree species on site are components of the Endangered Ecological Community; Central Hunter Grey Box – Ironbark (NSW Scientific Committee, 2010b) which has been mapped within the local area (Peake, 2006). However considering the disturbance and current land practices, vegetation at best could only be described as a highly disturbed example of this Endangered Ecological Community.

<u>Hunter Valley Weeping Myall Woodland</u>

A stand of *Acacia pendula* (Weeping Myall) was observed immediately outside the site's eastern boundary inside the road reserve of Almond Street (Figure 4 & 9). Marginalised habitat for this species was considered to be present inside the eastern portion of the site. The proposal has the potential to detrimentally affect the current stand of *A. pendula*. It is recommended that consultation should be made with Muswellbrook Council to erect a protection zone around this stand of *A. pendula* during any future works within the site.

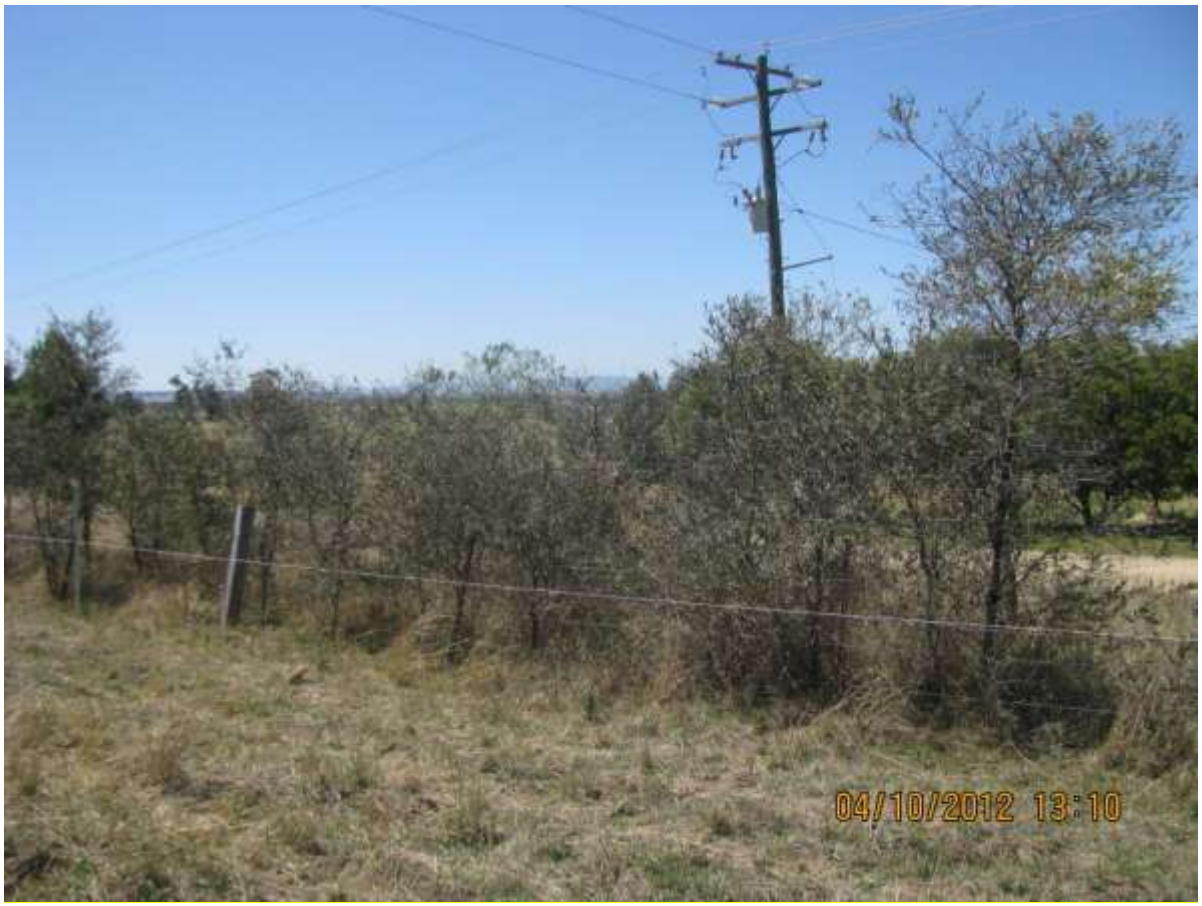

Figure 9: Stand of Weeping Myall within road reserve along Almond Street.

4.1.2 THREATENED AND RARE FLORA SPECIES

The following threatened plant species have been previously recorded within 10km of the site on the OEH database (Table 3). Species marked with an asterisk (*) are considered to have potential habitat within 10km according to the SEWPaC database.

Table 3: Threatened and rare flora species recorded within the locality.

FLORA SPECIES	TSC	EPBC	ROTAP
Wollemia nobilis Wollemi Pine	E4A	E	
Diuris tricolor Pine Donkey Orchid	V		3K
**Prasophyllum* sp. Wybong Leek Orchid		CE	2E
Pterostylis gibbosa Illawarra Greenhood	E1	E	
Thesium australe Austral Toadflax	V	V	3VCi+
Digitaria porrecta Finger Panic Grass	E1	E	3E
**Bothriochloa biloba* Lobed Blue Grass		V	
Commersonia rosea Sandy Hollow Commersonia	E1	E	
Lasiopetalum longistamineum	V		
Rulingia procumbens	V	V	

FLORA SPECIES	TSC	EPBC	ROTAP
Prostanthera cryptandroides ssp. *Cryptandroides* Wollemi Mint-bush	V		
Philotheca ericifolia		V	
Pomaderris queenslandica Scant Pomaderris	E1		
Pomaderris reperta Denman Pomaderris	E4A	CE	
**Cynanchum elegans* White-flowered Wax Plant	E1	E	

During the flora survey no specimens of the abovementioned species were found. Due to the disturbance to the site, habitat for these flora species would be greatly marginalised. It must be noted that the survey was undertaken within the known flowing periods of the orchid species *Diuris tricolor, Prasophyllum* sp. Wybong and *Pterostylis gibbosa* which is September-November, September-November and September-October respectively. Marginal habitat for *B. biloba, D. porrecta* and *T. australe* was considered to be present over the site. Of these three species *B. biloba* would be most likely to occur within the local area. No suitable habitat was considered to be present for the remaining flora species addressed.

4.1.3 ENDANGERED POPULATIONS

Four Endangered Populations are listed in the local area:

- *Cymbidium canaliculatum* (Tiger Orchid) – population in the Hunter Catchment
- *Acacia pendula* (Weeping Myall) – population in the Hunter Catchment
- *Eucalyptus camaldulensis* (River Red Gum) – population in the Hunter Catchment
- *Diuris tricolor* (Pine Donkey Orchid) – population in the Muswellbrook Local Government Area.

None of these Endangered Populations were found to be present within the site during the survey. Only marginal habitat was considered to be present for *Diuris tricolor* (Pine Donkey Orchid). Remnant trees on site particularly *Eucalyptus moluccana* (Grey Box) were considered to contain suitable habitat for *C. canaliculatum* and may result in an incremental reduction in host trees in the local area. However considering the absence of this species on site the removal of trees is unlikely to be significant.

Specimens of *E. camaldulensis* were present within low lying area within the centre of Denman. No likely habitat was considered to be present within the site.

As previously mentioned a small stand of *Acacia pendula* was found occurring outside of the eastern side of the site within the roadside reserve.

4.1.4 RARE FLORA SPECIES

No species listed under ROTAP Briggs and Leigh (1996) was found within the site.

4.1.5 NOXIOUS WEEDS AND WEEDS OF STATE AND NATIONAL SIGNIFICANCE

A number noxious weed species were found to be present within the site and are listed below in Table 4. The site lies within the scope of The Upper Hunter Noxious Plants Advisory Committee.

Table 4: Noxious Weed species found on site.

WEED SPECIES	WEED CLASS	ADDITIONAL SIGNIFICANCE
Opuntia stricta (Prickly Pear)	Class 4	
Opuntia aurantiaca (Tiger Pear)	Class 4	
Lycium ferocissimum (African Boxthorn)	Class 4	
Olea europaea ssp. *cuspidata* (African Olive).	Class 4	T
Galenia pubescens (Costal Galenia)	Class 4	
Opuntia stricta (Prickly Pear)	Class 4	
Senecio madagascariensis (Fireweed)	Class 4	

N – Weed of National Significance (Listed in the Commonwealth Government's National Weeds Strategy 1997)

T – Listed as a Threatening Process under the NSW TSC Act 1995.

***Control Classes under the Noxious Weeds Act 1993.**

Class 1 & 2 This plant must be eradicated from the land and the land must be kept free of this plant.

Class 3 This plant must be fully and continuously suppressed and destroyed.

Class 4 The growth and spread of the plant must be controlled according to the measures specified in a management plan published by the LCA. Must also, 'not be sold, propagated or knowingly distributed'.

Class 5 The requirements of the Noxious Weeds Act 1993 for a notifiable weed must be complied with.

It is recommended that all Noxious Weeds be controlled as part of any future development.

4.2 HABITAT APPRAISAL

4.2.1 HABITAT DESCRIPTION AND DISTRIBUTION IN THE VICINITY

Although generally highly modified the vegetation and landforms present on site offer potential habitat for a number of native species. The broad habitat types recorded within the site consisted of grassland/pasture, remnant woodland and aquatic.

<u>Grassland/Pasture with scattered remnant trees</u>

The grassland/pasture with scattered remnant trees was composed primarily of common weeds, native grasses and remnant native trees. Such habitat provides opportunity for a variety of avifauna, including predominantly terrestrial species preferring open spaces, seed eating birds and several birds of prey, which may hunt over this area in search of potential prey species. Macropods may also frequent such areas whilst grazing. Some species of bats may also forage over this cleared area for insects. The lack of trees and shrubs often limits the value of such areas for many species, particularly some reptiles, small mammals and birds which are vulnerable to predation in open spaces.

Tree species would provide a seasonal foraging resource for nectivorous birds and mammals such as Parrots, Honeyeaters and Flying Foxes. Tree species would also provide foraging resources for foliage dependant fauna species such as woodland bird species. A number of hollow-bearing trees would provide suitable nesting and roosting sites for a variety of avifauna and other hollow-dependant species such as tree-roosting bats.

Aquatic Habitat

Aquatic habitat was represented by a small constructed dam. This area of habitat would provide limited foraging and refuge for a number of amphibian, reptile and waterbird species. The water present would also provide a drinking resource for a number of native species such as macropods and birds.

The habitats proposed to be affected by the proposal range largely consists of ecologically less significant areas such as grassland/pasture. Scattered remnant trees that would appear capable of offering suitable resources to a number of resident and transitory species.

4.2.2 SIGNIFICANT TREE SURVEY

Thirty two significant habitat trees were identified on site during the habitat tree survey. The details of each habitat tree present on site including fauna attributes such as hollows were recorded. The results of the assessment are shown in Table 5 and the location of each tree is shown in Figure 4.

Table 5: Details of habitat trees.

TREE NO.	SPECIES	LOCATION GDA - 94	DBH (M)	HEIGHT (M)	HABITAT TREE HOLLOWS
1.	Planted Red Gum	E – 281794 N –6415191	0.45	15	
2.	*Eucalyptus moluccana* (Grey Box)	E – 281789 N –6415320	0.60	10	
3.	*Eucalyptus dawsonii* (Slaty Box)	E – 281928 N –6415320	0.60	20	
4.	*Acacia salicina* (Cooba)	E – 281928 N –6415336	0.40	5	
5.	*E. dawsonii*	E – 282008 N –6415249	0.70	20	1x Class 3
6.	*E. moluccana*	E – 281875 N –6415173	0.65	12	2x Class 1 2x Class 2 3x Class 3
7.	*E. moluccana*	E – 281879 N –6415124	0.80	17	
8.	*E. moluccana*	E –281836 N –6415146	0.75	17	2x Class 2 3x Class 3
9.	*E. moluccana*	E – 281840 N –6415107	0.60	15	2x Class 2 3x Class 3
10.	*E. moluccana*	E – 281798 N –6415121	0.60	12	1x Class 2 5x Class 3
11.	*E. moluccana*	E – 281857 N –6415067	0.70	17	1x Class 2
12.	*E. moluccana*	E – 281921 N –6414961	0.40		3x Class 3

TREE NO.	SPECIES	LOCATION GDA - 94	DBH (M)	HEIGHT (M)	HABITAT TREE HOLLOWS
13.	*E. moluccana*	E – 281809 N –6414968	0.80	18	3x Class 2
14.	*Notelaea microcarpa* (Native Olive)	E – 281747 N –6415037	0.25	6	
15.	*Eucalyptus crebra* (Narrow-leaved Iron Bark)	E – 281747 N –6415039	0.75	25	1x Class 2 2x Class 3
16.	*E. crebra*	E – 281746 N –6415043	0.60	25	1x Class 3
17.	*N. microcarpa*	E – 281737 N –6415036	0.45	8	
18.	*E. moluccana*	E – 281735 N –6414953	0.80	20	1x Class 2
19.	*E. moluccana*	E – 281734 N –6414950	0.70	20	2x Class 3
20.	*E. moluccana*	E – 281734 N –6414952	1.0	20	2x Class 1 1x Class 2 1x Class 3
21.	*E. moluccana*	E – 281678 N –6414970	1.0	20	3x Class 3
22.	*E. moluccana*	E – 281677 N –6414971	0.40	14	1x Class 2
23	*N. microcarpa*	E – 281652 N –6414971	0.25	5	
24	*E. moluccana*	E – 281630 N –6414969	0.70	17	
25	*N. microcarpa*	E – 281630 N –6414982	0.25	4	
26	*E. dawsonii*	E – 281621 N –6414990	1.0	30	
27	*E. moluccana*	E – 281640 N –6415072	0.18	7	
28	*E. moluccana*	E – 281628 N –6415127	0.75	17	4x Class 2 3x Class 3
29	*E. moluccana*	E – 281708 N –6415111	1.0	28	3x Class 2 1x Class 3
30	*E. moluccana*	E – 281686 N –6415178	0.60	16	1x Class 2 1x Class 3
31	*E. moluccana*	E – 281699 N –6415200	0.30	10	
32	*E. moluccana*	E – 281699 N –6415183	0.60	18	2x Class 2 2x Class 3

The classification system employed involved three classes:

Class 1 – large sized hollow openings (i.e. >15cm) suitable for species such as Owls
Class 2 – medium sized hollow-openings (i.e. 5-15cm) suitable for species such as Gliders and Possums
Class 3 – small sized hollow openings (i.e. <5cm) suitable for species such as microchiropteran bats.

Habitat trees should be conserved on site wherever possible, although all of these trees have the potential to be removed as result of the proposal. It is recommended that trees be avoided where possible within the scope of the proposal. If any habitat tree is required to be removed a suitably qualified ecologist will be needed to supervise the felling to reduce the chances of harming any fauna occupants.

4.2.3 HABITAT FOR SIGNIFICANT SPECIES

An assessment of habitat attributes on site has been undertaken for the significant species listed in Section 3.5. The results of the assessment are displayed in Table 6. Threatened species identified in this assessment as having potential habitat available on site have been considered further under Section 5A of the EPA Act in Section 5.0 of this report or under the EPBC Act in Section 7.0.

Table 6: Habitat Assessment for Significant Species

SPECIES	STATUS	HABITAT DESCRIPTION AND LOCALLY KNOWN POPULATIONS	LIKELIHOOD OF OCCURRENCE ON SITE
Wollemia nobilis Wollemi Pine	TSC Act – E4A EPBC Act - E	The Wollemi Pine grows 670–780 m above sea level in deeply shaded sandstone gorges. Geology of this area is Triassic sandstone from the Narrabeen group, and the gorges form massive vertical cliffs over 100 m high, on the eastern side of the main gorge. Most individuals occur on large ledges, or are inserted in crevices in the cliffs within warm temperate rainforest.	**Unlikely** No suitable habitat, in the form of typically associated geological formations, was present for this species on site.
Diuris tricolor Pine Donkey Orchid	TSC Act – V ROTAP 3K	Grows in sclerophyll forest among grass with native Cypress Pine (*Callitris* spp.). It is found in sandy soils, either on flats or small rises. Flowers from September to November.	**Low** Due to the considerable amount of past and current disturbance only marginal habitat would be present.
Prasophyllum sp. Wybong Leek orchid	TSC Act - E EPBC Act–Cri-E	Known to occur in open eucalypt woodland and grassland.	**Low** Habitat was considered to be present within areas of open grassland on site. However the lack of nearby local records, in addition to the disturbance on site, makes this orchid species less likely to be present.
Pterostylis gibbosa Illawarra Greenhood	TSC Act-E1 EPBC Act-E	All known sub-populations occur in open forest and woodland on flat or gently sloping land with poorly drained soils.	**Low** Due to the considerable amount of past and current disturbance on the site, the potential habitat for this species has been diminished.
Thesium australe Austral Toadflax	TSC Act-V EPBC Act-V ROTAP 3VCi+	Grows in grassland or woodland, often in damp sites.	**Low** Habitat was considered to be present within areas of open grassland on site. However the lack of typically associated damp areas for this species limits the likelihood of it occurring on site.
Digitaria porrecta Finger Panic Grass	TSC Act-E EPBC Act-E ROTAP 3E	Grasslands, woodlands or open forest with a grassy understorey on higher quality soils.	**Moderate** Habitat was considered to be present within areas of open grassland on site. However the diminished

SPECIES	STATUS	HABITAT DESCRIPTION AND LOCALLY KNOWN POPULATIONS	LIKELIHOOD OF OCCURRENCE ON SITE
			quality of soil on this site limits the likelihood of the occurrence of this species.
Bothriochloa biloba Lobed Blue Grass	EPBC Act-V	Commonly found on clay soils in woodlands and grasslands. This grass species has been recorded from within close proximity to the site.	**Low-Moderate** Suitable habitat was considered to be present over a large portion of the site.
Commersonia rosea Sandy Hollow Commersonia	TSC Act – E1 EPBC Act – E	Occurs on skeletal sandy soils in scrub or heath vegetation with occasional emergents of *Eucalyptus crebra*, *Callitris endlicheri* or *Eucalyptus caleyi* subsp. *caleyi*. Only known from four localities in the Sandy Hollow district of the upper Hunter Valley, New South Wales, all within an 8 km radius of Sandy Hollow.	**Unlikely** Due to the considerable amount of past and current disturbance on the site, habitat for this species was absent.
Lasiopetalum longistamineum	TSC Act - V EPBC Act – V	Grows in rich alluvial deposits. Occurs in the Mt Dangar - Gungal area within Merriwa and Muswellbrook Local Government Areas. A couple of sites are recorded within Goulburn River NP.	**Unlikely** Due to the lack of local records and the considerable amount of past and current disturbance on the site, habitat for this species was absent.
Rulingia procumbens	TSC Act-V EPBC Act-V	Grows in sandy sites, often along roadsides. Recorded in *Eucalyptus dealbata* and *Eucalyptus sideroxylon* communities, *Melaleuca uncinata* scrub, under mallee eucalypts with a *Calytrix tetragona* understorey, and in a recently burnt Ironbark and *Callitris* area. Also in *Eucalyptus fibrosa* subsp. *nubila, Eucalyptus dealbata, Eucalyptus albens* and *Callitris glaucophylla* woodlands north of Dubbo.	**Low** Suitable habitat was considered to be present amongst the remnant trees on site. The potential for this species to occur however is diminished by the amount of disturbance on site.
Prostanthera cryptandroides ssp. *cryptandroides* Wollemi Mint Bush	TSC Act-V EPBC Act-V	In the Denman-Gungal and Widden-Baerami Valley areas, occurs on rocky ridgelines on Narrabeen Group Sandstones in association with a range of communities. Associated communities include: Narrabeen Rocky Heath, Narrabeen Acacia Woodland, Narrabeen Exposed Woodland; Open Heath of *Calytrix tetragona*, *Leptospermum parviflorum*, *Isopogon dawsonii*; and Open Scrubland of *Eucalyptus dwyeri*, *Baeckea densifolia*, *Dillwynia floribunda*, *Aotus ericoides* and *Hemigenia cunefolia.*	**Unlikely** No suitable habitat, in the form of typically associated geological formations, was present for this species on site.
Philotheca ericifolia	EPBC Act-V	It grows mainly in dry sclerophyll forest and heath on damp sandy flats and in gullies, but has also been seen in dry sandy creek beds and on rocky ridges (Porteners 2008).	**Unlikely** No suitable habitat for this species was considered to be present on site.
Pomaderris queenslandica Scant Pomaderris	TSC Act – E1	Found in moist eucalypt forest or sheltered woodlands with a shrubby understorey, and occasionally along creeks.	**Unlikely** Due to the considerable amount of past and current disturbance on the site, habitat for this species was absent.

SPECIES	STATUS	HABITAT DESCRIPTION AND LOCALLY KNOWN POPULATIONS	LIKELIHOOD OF OCCURRENCE ON SITE
Pomaderris reperta Denman Pomaderris	TSC Act – E4A EPBC Act – Crit-E	Occupies woodland in association with *Eucalyptus crebra, E. blakelyi*, *Notelaea microcarpa*, and *Allocasuarina littoralis*. Associated soil is a sandy loam on sandstone or conglomerate. Recorded from a small number of sites along a single ridgeline near Denman in the upper Hunter Valley (Muswellbrook local government area).	**Unlikely** Due to the considerable amount of past and current disturbance on the site, habitat for this species was absent.
Cynanchum elegans White-flowered Wax Plant	TSC Act – E1 EPBC Act – E ROTAP 3ECi	This species occurs in scattered coastal localities from the QLD-NSW border south to Wollongong. Found in dry, littoral or subtropical rainforest, and occasionally in scrub and woodland from sea level to about 600m ASL.	**Unlikely** Due to the considerable amount of past and current disturbance on the site, habitat for this species was absent.
Litoria aurea Green and Golden Bell Frog	TSC Act – E1 EPBC Act – E	Inhabits swamps, lagoons, streams and ponds as well as dams, drains and storm water basins.	**Low** Marginal habitat was considered to be available within the dam on site.
Litoria booroolongensis Booroolong Frog	TSC Act – E1 EPBC Act – E	Found along permanent streams with some fringing vegetation cover such as ferns, sedges or grasses. The species occurs along streams in both forested areas and open pasture.	**Unlikely** Habitat was found to be absent for this frog species due to the lack of any permanent streams on site.
Hoplocephalus bungaroides Broad-headed Snake	TSC Act – V EPBC Act – V	Found only in a range of 250km from Sydney in sandstone habitats. It is often found under large slabs of rock or crevices on sandstone outcrops.	**Unlikely** No significant habitat in the form of typically associated bushrock and sandstone outcroppings were present for this species on site.
Aprasia parapulchella Pink-tailed Legless Lizard	EPBC Act – V	*Aprasia parapulchella* occurs in primary and secondary grassland, grassy woodland and woodland communities including mallee, and box-ironbark forest. Most sites where *Aprasia parapulchella* occurs are characterised by the cover of predominantly native grasses	**Low** Potential habitat was found to be present over the majority of the site. However this is marginalised by the scarcity of native grasses on site.
Gallinago hardwickii Latham's Snipe	EPBC Act – M	Utilises a variety of habitat, such as soft wet ground or shallow water with tussock and other green and dead vegetation, and scrub or open wetland from sea-level to alpine bogs.	**Unlikely** No suitable habitat for this species was considered to be present on site.
Rostratula benghalensis australis Australian Painted Snipe	TSC Act – E1 EPBC Act – V EPBC Act – M	Margins of swamps and streams, chiefly those covered with low and stunted vegetation.	**Unlikely** No suitable habitat for this species was considered to be present on site.
Botaurus poiciloptilus Australasian Bittern	EPBC Act – E	The Australasian Bittern lives alone or in loose groups and favours permanent fresh-waters dominated by sedges, rushes, reeds or cutting grasses (eg. Phragmites, Scirpus, Eleocharis, Juncus, Typha, Baumea and Gahnia) and feeds on insects, small fish, eels, frogs and other aquatic life, sometimes in ricefields.	**Unlikely** No suitable habitat in the form of a permanent freshwater body was found on site.

SPECIES	STATUS	HABITAT DESCRIPTION AND LOCALLY KNOWN POPULATIONS	LIKELIHOOD OF OCCURRENCE ON SITE
Ardea alba Great Egret	EPBC Act - M	Inhabits shallows of rivers, larger dams, freshwater wetlands and irrigation areas.	**Low** Marginal habitat was found to be present within the dam on site.
Ardea ibis Cattle Egret	EPBC Act - M	Inhabits stock paddocks, pastures, croplands, wetlands and drains.	**Moderate-High** Suitable grassland habitat was present over a large portion of the site for this species.
Lathamus discolor Swift Parrot	TSC Act – E1 EPBC Act – E	Open Forest to Woodland, also street trees and in parks and gardens, winter flowering eucalypts for feeding. This species nests in Tasmania during the summer months.	**Moderate** Seasonal foraging habitat was present for this parrot species amongst the remnant trees on site.
Neophema pulchella Turquoise Parrot	TSC Act – V	Lives on the edges of Eucalypt woodland adjoining clearings and on timbered ridges and creeks in farmland. It has also been recorded utilising roadside verges and orchards. Nests in small hollow branches of Eucalypts.	**Moderate** Suitable foraging and nesting habitat was present for this species within the site.
Glossopsitta pusilla Little Lorikeet	TSC Act – V	Tall Open Forests, woodlands, orchards, parks and street trees.	**Low-Moderate** Suitable nesting and foraging habitat was considered to be present within the site. This habitat is marginalised by the scattering of the trees on site.
Calyptorhynchus lathami Glossy Black-Cockatoo	TSC Act – V	Lowland coastal forests, dense mountain forests, semi-arid woodland and trees bordering watercourses, with (Allo)Casuarina trees for foraging. This species was recorded flying over the Denman township during the surveying period.	**Low** Suitable foraging habitat was not found on site due to the absence of any Casuarina trees. A small number of suitable larger nesting hollows were present.
Callocephalon fimbriatum Gang-gang Cockatoo	TSC Act – V	Tall montane forests and woodlands in mature wet sclerophyll forests. Requires hollows in which to breed between October and January.	**Low** Marginal nesting habitat was considered to be present on site.
Climacteris picumnus victoriae Brown Treecreeper	TSC Act – V	This species is a medium sized insectivorous bird that occupies Eucalypt woodlands, particularly open woodlands lacking a dense understorey, River Red Gums on watercourses and around lakeshores. It is sedentary and nests in tree hollows within permanent territories.	**Low** Marginal foraging and nesting habitat was found to be present within the site.
**Anthochaera phrygia* Regent Honeyeater	TSC Act – E4A EPBC Act – E	Temperate woodlands and open forest, including forest edges, preferring to forage on large-flowered Eucalypts.	**Low** Marginal foraging habitat was considered to be available within the remnant trees throughout the site.

SPECIES	STATUS	HABITAT DESCRIPTION AND LOCALLY KNOWN POPULATIONS	LIKELIHOOD OF OCCURRENCE ON SITE
Grantiella picta Painted Honeyeater	TSC Act – V	Nomadic, within a range of generally drier forested areas with mistletoes.	**Low – Moderate** Foraging habitat for this species was present on site. A number of the remnant trees were host to fruit bearing mistletoe species.
Pyrrholaemus sagittatus Speckled Warbler	TSC Act – V	Specked Warblers live in a wide range of eucalypt-dominated vegetation that has a grassy understorey, often on rocky ridges or in gullies. It builds a domed nest of grass, bark shreds and moss, lined with fur on the ground.	**Low** Marginal nesting habitat was considered to be present amongst the remnant trees on site. Previously recorded on a neighbouring site (Wildthing, 2011)
Melithreptus gularis gularis Black-chinned Honeyeater	TSC Act – V	Usually found on the western side of the Great Dividing Range in dry sclerophyll forests and woodlands containing box-ironbark associations and River Red Gum. In the Hunter Valley this species is known to utilise drier coastal woodlands. Usually found in open woodlands.	**Low** Marginal nesting habitat was considered to be present amongst the remnant trees on site.
Melanodryas cucullata ssp. *cucullata* Hooded Robin	TSC Act – V	Eucalypt woodlands, *Acacia* scrublands, *Banksia* dominated coastal scrubs and open forests.	**Low** Marginal nesting habitat was considered to be present amongst the remnant trees on site.
Petroica boodang Scarlet Robin	TSC Act – V	The Scarlet Robin breeds in drier eucalypt forests and temperate woodlands, often on ridges and slopes, within an open understorey of shrubs and grasses and sometimes in open areas. Abundant logs and coarse woody debris are important structural components of its habitat. In autumn and winter it migrates to more open habitats such as grassy open woodland or paddocks with scattered trees	**Moderate-High** Suitable habitat for this species was present within the areas of open grassland and woody debris found on site.
Stagonopleura guttata Diamond Firetail	TSC Act – V	Inhabits areas with a grassy, shrubby understorey including Eucalypt woodlands, forests, *Acacia* scrubs and mallee.	**Low - Moderate** Marginal nesting habitat for this species was considered to be present within the remnant trees on site. Previously recorded on a neighbouring site (Wildthing, 2011).
Daphoenositta chrysoptera Varied Sittella	TSC Act – V	Open eucalypt woodland/forest, mallee, inland acacia, coastal tea-tree scrubs, golf courses, orchards and parks.	**Low** Suitable habitat for this species was present within the areas of open grassy understory and remnant trees.
Pomatostomus temporalis ssp. *temporalis*	TSC Act – V	Open forest, woodland, scrubland, farmland and outer suburbs. Prefers woodlands with regenerating trees, tall shrubs, and an intact ground	**Moderate** Habitat for this species was available within the

SPECIES	STATUS	HABITAT DESCRIPTION AND LOCALLY KNOWN POPULATIONS	LIKELIHOOD OF OCCURRENCE ON SITE
Grey-crowned Babbler		cover of grass and forbs.	areas of scattered trees on site Previously recorded on a neighbouring site (Wildthing, 2011).
Rhipidura rufifrons Rufous Fantail	EPBC Act - M	Utilises a range of habitats including rainforests, wet sclerophyll forests, monsoon forests, scrubs, mangroves, watercourses, parks and gardens. During migration this species also utilises farms, street trees and buildings.	**Low** Suitable habitat was present within the areas of open grassy understory and remnant trees.
Monarcha melanopsis Black-faced Monarch	EPBC Act - M	Utilises a range of habitats including rainforests, eucalypt woodlands, coastal scrubs.	**Low** Marginal nesting habitat for this species was considered to be present amongst the remnant trees on site.
Myiagra cyanoleuca Satin Flycatcher	EPBC Act - M	Heavily vegetated gullies in forests and taller woodlands. During migration this species also utilises coastal forests, woodlands, mangroves, remnant trees in paddocks and gardens.	**Low** Suitable migrational habitat for this species was present within the remnant trees on site.
Hirundapus caudacutus White-throated Needletail	EPBC Act - M	Inhabits the airspace above forests, woodlands, farmlands, plains, lakes, coasts and towns.	**Moderate-High** Due to the non-specific habitat requirements of the White-throated Needletail habitat was considered to be present within the site.
Apus pacificus Fork-tailed Swift	EPBC Act - M	Inhabits the airspace over open country from semi deserts to coasts.	**Moderate-High** Due to the non-specific habitat requirements of the Fork-tailed Swift habitat was considered to be present within the site.
Merops ornatus Rainbow Bee-eater	EPBC Act - M	Inhabits areas such as open woodlands with sandy soils, sandridges, riverbanks, beaches, dunes, cliffs and rainforests.	**Low - Moderate** Marginal foraging habitat for this species was present within the site.
Circus assimilis Spotted Harrier	TSC Act – V	This bird of prey occurs most commonly in native grassland and is also found in agricultural areas. Other habitat areas include grassy open woodland including acacia and mallee remnants.	**Moderate** Suitable hunting and nesting habitat was available for this species across the site.
Hieraaetus morphnoides Little Eagle	TSC Act – V	The Little Eagle occupies habitats rich in prey within open eucalypt forest, woodland or open woodland. Sheoak or acacia woodlands and riparian woodlands of interior NSW are also used. For nest sites it requires a tall living tree within a remnant patch, where pairs build a large stick nest in winter and lay in early spring.	**Moderate** Suitable nesting and marginal hunting habitat was considered available across the study area.
Haliaeetus leucogaster White-bellied Sea-Eagle	EPBC Act - M	Occupies habitat characterised by the presence of large areas of open water and feeds opportunistically on a variety of fish, birds, reptiles,	**Unlikely** The site was considered to occur too far away from

SPECIES	STATUS	HABITAT DESCRIPTION AND LOCALLY KNOWN POPULATIONS	LIKELIHOOD OF OCCURRENCE ON SITE
		mammals and crustaceans. The nests are built in a variety of sites including tall trees, bushes, mangroves, cliffs, rocky outcrops, caves, crevices, on the ground or even in artificial structures	large waterbodies to be utilised by this bird of prey.
Ninox connivens Barking Owl	TSC Act – V	Inhabits forest and woodland, encountered most commonly in savanna and paperbark woodlands. It sometimes roosts in rainforests, but it requires more open country for hunting and hollow eucalypts for breeding.	**Moderate** Suitable hunting and marginal nesting habitat was present for this species
Ninox strenua Powerful Owl	TSC Act – V	Inhabits a wide range of vegetation types from wet eucalypt forests with a rainforest understorey to dry open forests and woodlands. The species has been recorded utilising disturbed habitats such as exotic pine plantations and large trees in parks and gardens.	**Low-Moderate** Suitable hunting habitat was considered to be present. No roosting habitat was considered present due to the lack of dense vegetation.
Tyto novaehollandiae Masked Owl	TSC Act – V	Inhabits a range of wooded habitats that contain mature trees with large hollows for roosting and nesting, and more open areas for hunting.	**Low-Moderate** Suitable hunting and marginal nesting/roosting habitat was considered to be present.
Dasyurus maculatus ssp. *maculatus* Tiger Quoll	TSC Act – V EPBC Act – V	Inhabits sclerophyll forests, rainforests and coastal woodlands. Nests are made in rock caves and hollow logs or trees, and basking sites are usually found nearby.	**Unlikely** No suitable nesting or hunting habitat was considered to be present due to the lack of dense vegetation on the site.
Phascolarctos cinereus Koala	TSC Act – V	Coastal woodland and open forest containing suitable food trees.	**Unlikely** Due to the absence of preferred koala feed trees habitat for this species was considered to be absent from the site.
Petrogale penicillata Brush-tailed Rock-wallaby	TSC Act – E1 EPBC Act – E	Found in steep rocky sites in sclerophyll forests with a grassy understorey.	**Unlikely** No suitable habitat was available due to the lack of steep rocky outcrops and cliffs.
Petaurus norfolcensis Squirrel Glider	TSC Act – V	Dry sclerophyll forests and woodlands with exudates for foraging and hollows for nesting.	**Unlikely** Due to the considerable amount of past and current disturbance on the site, habitat for this species was absent.
Pteropus poliocephalus Grey-headed Flying-Fox	TSC Act – V EPBC Act – V	Wet and Dry Sclerophyll Forests, Rainforest, Mangroves and Paperbark swamps and Banksia Woodlands.	**Moderate** Suitable seasonal foraging habitat was available in the form of flowering myrtaceous canopy species. No suitable roosting habitat was present within the site.

SPECIES	STATUS	HABITAT DESCRIPTION AND LOCALLY KNOWN POPULATIONS	LIKELIHOOD OF OCCURRENCE ON SITE
Psuedomys novaehollandiae New Holland Mouse	EPBC Act – E	Known to inhabit open heathlands, open woodlands with a heathland understorey and vegetated sand dunes.	**Unlikely** No suitable habitat was considered to be present for this species.
Saccolaimus flaviventris Yellow-bellied Sheathtail-bat	TSC Act – V	Has been reported from a wide variety of habitats. Roosts in tree hollows, animal burrows, dry clay cracks, under rock slabs and in abandoned Sugar Glider nests.	**Moderate** Suitable hunting and roosting habitat for this species was considered present on site.
Mormopterus norfolkensis East Coast Freetail-Bat	TSC Act – V	Appears to live in sclerophyll forests and woodland. Roosts in tree hollows or under loose bark.	**Moderate-High** Suitable hunting and roosting habitat present. Nearby records present on database (OEH, 2012).
Falsistrellus tasmaniensis Eastern False Pipistrelle	TSC Act – V	Inhabits sclerophyll forests and has been observed roosting in holes and hollow trunks of Eucalypts.	**Moderate** Suitable hunting and roosting habitat present.
Miniopterus australis Little Bentwing-Bat	TSC Act – V	Tropical rainforest to warm-temperate wet and dry sclerophyll forest; caves or similar structures for roosting.	**Moderate** Suitable hunting habitat present. Preferred roosting habitat absent.
Miniopterus schreibersii oceanensis Large Bentwing-Bat	TSC Act – V	Wet and dry tall open forest, rainforest, monsoon forest, open woodland, paperbark forests and open grasslands, caves or similar structures for roosting. It occasionally uses tree hollows.	**Moderate** Suitable hunting habitat present. Preferred roosting habitat absent. Previously recorded on a neighbouring site (Wildthing, 2011)
Nyctophilus timoriensis Greater Long-eared Bat	TSC Act – V	Tall eucalypt forests, mallee and woodlands. Seems to prefer semi-arid areas.	**Moderate** Suitable hunting and roosting habitat present.
Scoteanax rueppellii Greater Broad-nosed Bat	TSC Act – V	Tree-lined creeks, woodland/clearing ecotones and rainforest creeks, roosting mainly in tree hollows.	**Moderate** Suitable roosting habitat present. Preferred hunting habitat absent.
Chalinolobus dwyeri Large Pied Bat	TSC Act – V EPBC Act – V	Occupies dry sclerophyll forest and woodland. Roosts in caves, abandoned mud-nests of Fairy Martins and mine tunnels.	**Moderate** Suitable hunting habitat present. Preferred roosting habitat absent.
Vespadelus troughtoni Eastern Cave Bat	TSC Act – V	A cave-dweller, known from wet sclerophyll forest and tropical woodlands from the coast and Dividing Range to the drier forests of the semi-arid zone. It has been found roosting in small groups in sandstone overhangs, in mine tunnels and occasionally in buildings.	**Moderate** Suitable hunting habitat present. Preferred roosting habitat absent.

4.3 FAUNA APPRAISAL RESULTS

A full list of fauna species observed during the survey is contained in Appendix B.

4.3.1 DIURNAL SURVEYS

Avifauna

The site was found to contain habitat for a number of avifauna species. Common species recorded within the grassland with scattered remnant trees assemblage included *Rhipidura leucophrys* (Willie Wagtail), *Cacatua roseicapilla* (Galah), *Cracticus nigrogularis* (Pied Butcherbird), *Gymnorhina tibicen* (Magpie) and *Platycercus eximius* (Eastern Rosella). A pair of *Psephotus haematonotus* (Red Rumped Parrot) was also observed foraging on the site. The introduced *Acridotheres tristis* (Indian Myna) and *Sturnus vulgaris* (Common Starling) were found to frequent the more disturbed eastern portion of the site. Only one species of waterbird, *Chenonetta jubata* (Australian Wood Duck), was observed within the small dam on site.

No avifauna species listed as a Migratory Species under the EPBC Act 1999 or listed under the NSW TSC Act 1995 were recorded on site.

A complete list of bird species recorded during the survey is listed in Appendix B.

Amphibian Survey

Two species of amphibian, *Litoria latopalmata* (Broad-palmed Frog) and *Litoria fallax* (Dwarf Green Tree Frog) were recorded around the dam. This species is not listed as threatened under the TSC Act (1995).

Reptile Survey

Two species of reptile, *Cryptoblepharus virgatus* (Wall Lizard) and *Pseudechis gutattus* (Blue Bellied Black Snake) were recorded as a result of targeted and incidental surveys. Specimens of *C. virgatus* were found to inhabit the larger trees on site which contained refuges such as hollows and large crevices. A single specimen of *P. gutattus* was found hunting around the small dam during the nocturnal survey.

None of these species of reptile are listed as threatened under state or national legislation.

Mammal Survey

A number of *Macropus giganteus* (Eastern Grey Kangaroo) were commonly encountered over the site during the survey. Scats, footprints and resting areas consistent with those of this species were found over the whole site. A specimen of *Vombatus ursinus* (Common Wombat) suffering mange was recorded a short distance to the north of the site during the first sampling period. The introduced *Oryctolagus cuniculus* (European Rabbit) was commonly encountered over the entire site along with associated burrows

and scats. The occurrence of this introduced species is regarded as a threatening process under the TSC Act and has been further addressed in Section 5.0 of this report. A small number of *Bos taurus* (Cow) and *Gallus domesticus* (chicken) were also housed within the site.

4.3.2 NOCTURNAL SURVEYS

Spotlighting Survey

Specimens of *M. giganteus* and the introduced *O. cuniculus* were commonly observed over the entire site during spotlighting. No other mammal species were recorded.

Owl/Mammal Call Playback

There were no responses to the owl and mammal call playback surveys undertaken.

Microchiropteran Bat Call Survey

Calls ascribed to *Chalinolobus gouldii* (Gould's Wattled-Bat), *Chalinolobus morio* (Chocolate-Wattled-bat) and *Nyctinomus australis* (White-striped Freetail Bat) were positively identified on site during the bat call survey. A singular call was only identified to genus level, this being *Vespadelus* sp. Calls attributed to the genus *Vespadelus* were thought to be from either *V. vulturnus* (Little Forest Bat) or *V. regulus* (Eastern Cave Bat) which are known to occur in the local area.

Miniopterus schreibersii oceanensis, which is listed as vulnerable under the TSC Act (1995), has been recorded in the lot directly adjacent to the North of the site during a previous survey for a different assessment (Wildthing, 2011). As *Miniopterus schreibersii oceanensis* is listed as threatened under the TSC Act (1995) the precautionary principle has been applied and further consideration has been given to this species within Section 5.0 of this report.

None of these species are listed as threatened under state or national legislation.

4.3.3 SURVEY LIMITATIONS

As with all reports of this type the main survey limitation for the survey is considered to be the very short period of time in which the fieldwork was carried out. Limitations to the likelihood of detecting certain subject species were also encountered during this survey. Such limitations were generally related to the seasonal occurrence of species, be it as a result of known flowering periods for flora or migratory movements by fauna. For example the known flowering period for the threatened *Diuris tricolor* is from September to November and it would be unlikely to be detected outside this period. The cooler night temperatures would also have reduced the chances of recording frog and microchiropteran bat species.

These limitations have been overcome by applying the precautionary principle in all cases where the survey methodology may have given a false negative result. This precautionary principle was achieved by recognising that most threatened species are rare and therefore unlikely to be encountered during a survey even if they may utilise the site at other times. These species have been assessed on the basis of the presence of their habitat and the likely significance of that habitat to a viable local population.

5.0 CONSIDERATIONS UNDER SECTION 5A OF THE EPA ACT

Considerations of the effects of the proposed development under the guidelines of Section 5A of the Environmental Planning and Assessment Act (1979) for the concerned threatened species is given below. The species dealt with are those identified during the fieldwork and those identified as having potential habitat available on site in Section 4.2.2.

For the purposes of the Environmental Planning and Assessment Act 1979 and, in particular, in the administration of sections 78, 79 and 112, the following factors have been taken into account in deciding whether there is likely to be a significant effect on this threatened species, populations or ecological communities, or their habitats:

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

Threatened Flora

No threatened flora species were recorded within the survey area during fieldwork. Of the 15 flora species assessed, the site was found to contain marginal habitat for 7 of these species:

- *Diuris tricolor* (Pine Donkey Orchid)
- *Prasophyllum* sp. *Wybong* (Leek Orchid)
- *Pterostylis gibbosa* (Illawarra Greenhood)
- *Thesium australe* (Austral Toadflax)
- *Digitaria porrecta* (Finger Panic Grass)
- *Bothriochloa biloba* (Blue Lobed Grass)
- *Rulinga procumbens*

The proposal will result in a reduction of habitat for these threatened flora species, however when considering the disturbance to the site from past vegetation clearance, continued grazing and ploughing suitable habitat would be greatly diminished.

Threatened Fauna

No threatened fauna species were recorded within the survey area during fieldwork. Of the 50 fauna species assessed, the site was found to contain habitat of varying quality for 39.

Litoria aurea	Green and Golden Bell Frog
Ardea alba	Great Egret
Ardea ibis	Cattle Egret
Lathamus discolor	Swift Parrot
Neophema pulchella	Turquoise Parrot
Glossopsitta pusilla	Little Lorikeet
Calyptorhynchus lathami	Glossy Black-Cockatoo
Callocephalon fimbriatum	Gang-gang Cockatoo
Climacteris picumnus victoriae	Brown Treecreeper

**Anthochaera phrygia*	Regent Honeyeater
Grantiella picta	Painted Honeyeater
Pyrrholaemus sagittatus	Speckled Warbler
Melithreptus gularis gularis	Black-chinned Honeyeater
Melanodryas cucullata ssp. Cucullata	Hooded Robin
Petroica boodang	Scarlet Robin
Stagonopleura guttata	Diamond Firetail
Daphoenositta chrysoptera	Varied Sittella
Pomatostomus temporalis ssp. Temporalis	Grey-crowned Babbler
Rhipidura rufifrons	Rufous Fantail
Monarcha melanopsis	Black-faced Monarch
Myiagra cyanoleuca	Satin Flycatcher
Hirundapus caudacutus	White-throated Needletail
Apus pacificus	Fork-tailed Swift
Merops ornatus	Rainbow Bee-eater
Circus assimilis	Spotted Harrier
Hieraaetus morphnoides	Little Eagle
Ninox connivens	Barking Owl
Ninox strenua	Powerful Owl
Tyto novaehollandiae	Masked Owl
Pteropus poliocephalus-	Grey-headed Flying-Fox
Saccolaimus flaviventris	Yellow-bellied Sheathtail-Bat
Mormopterus norfolkensis	East Coast Freetail-Bat
Falsistrellus tasmaniensis	Eastern False Pipistrelle
Miniopterus australis	Little Bentwing-Bat
Miniopterus schreibersii oceanensis	Large Bentwing-Bat
Nyctophilus timoriensis	Greater Long-eared Bat
Scoteanax rueppellii	Greater Broad-nosed Bat
Chalinolobus dwyeri	Large Pied Bat
Vespadelus troughton	Eastern Cave Bat

The site is believed to provide some habitat for these addressed threatened species; however it is recognised that the habitat was marginalised by disturbances such as past vegetation clearance, weed invasion and continued grazing. Of the listed fauna species those more likely to utilise the site would include more mobile species such as microchiropteran bats, woodland birds, parrots and the Grey-headed Flying-fox.

In the site directly adjacent to the site's northern boundary *Pomatostomus temporalis* ssp. *temporalis* (Grey-crowned Babbler), *Pyrrholaemus sagittatus* (Speckled Warbler), *Stagonopleura guttata* (Diamond Firetail) and *Miniopterus schreibersii oceanensis* (Large Bentwing-bat) were recorded during a previous survey for a different assessment (Wildthing, 2011). Suitable habitat although reduced in quality was found to be present on site.

The proposal will result in a small incremental reduction of habitat in the local area. However the trees on site are scattered remnant trees and the understory of the site is primarily grazed pasture. It is considered that the proposal is unlikely to significantly affect the life cycle of any of these species or place any viable local populations of these species at risk of extinction.

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

Four endangered populations are known to be present within the local area:

- *Cymbidium canaliculatum* (Tiger Orchid) – Population in the Hunter Catchment
- *Diuris tricolor* (Pine Donkey Orchid) – in the Muswellbrook Local Government Area
- *Acacia pendula* (Weeping Myall) – in the Hunter Catchment
- *Eucalyptus camaldulensis* (River Red Gum) – in the Hunter Catchment

Cymbidium canaliculatum (Tiger Orchid) was not recorded on site during the site assessment. Remnant trees were considered to contain suitable habitat for this orchid species. The proposal may result in the removal of a number of potential host trees; however it is not likely to have an adverse effect on the life cycle of this orchid species such that a viable local population is likely to be placed at risk of extinction.

Despite the survey being conducted within the flowering period of *D. tricolor* this orchid species was not recorded. Habitat for this species was greatly marginalised on site due to the disturbed nature of the understory. Given this it is considered that the proposal is not likely to have an adverse effect on the life cycle of this orchid species such that a viable local population is likely to be placed at risk of extinction.

No specimens of *A. pendula* were recorded within the site; however a stand of trees were found to occur immediately outside the site's eastern boundary on the road reserve. Consideration should be given concerning the impact the development could have on these stand of trees. Protective measures should be taken that will nullify any potential impacts construction and other development-related activities on site will have on these trees. Provided that recommendations mentioned in section 8.0 of this report are followed, the viable local population is unlikely to be placed at risk of extinction.

No specimens of *E. camaldulensis* were recorded within the site and as such viable local population is unlikely to be placed at risk of extinction.

c) in the case of an endangered ecological community or critically endangered ecological community, whether the action proposed:

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

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

Taking into account the remnant tree species occurring on site native vegetation would have originally been most consistent with the Endangered Ecological Community Central Hunter Grey Box – Ironbark Woodland. Past disturbances to the site have resulted in the virtual removal of the majoring of the canopy and native understory layers. Considering the disturbance, vegetation at best could be described as a highly disturbed example of Central Hunter Grey Box – Ironbark Woodland. The proposal is likely to result in the removal of the majority of trees from the site however is not likely to have a significant impact on this Endangered Ecological Community in the local area.

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

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

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

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

Within Lot 122 remnant trees will need to be removed for roads and building envelopes. A large portion of the grassland habitat will also need to be removed. This may also involve the removal of a number of large remnant trees including those containing hollows.

No areas of habitat are likely to become fragmented or isolated as a result of the proposal.

Due to the overall disturbed nature of the site and it's scattering of remnant trees, the site is considered to not contain any Endangered Ecological Communities. Thus the proposal is not likely to remove, modify, fragment or isolate an area of habitat important to the long-term survival of the addressed EECs, endangered populations or threatened flora and fauna in the locality.

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

None of the site has been designated 'critical habitat' under Part 3 of the TSC Act.

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

A Recovery Plan under the TSC Act (1995) has been completed for the Regent Honeyeater, Koala and Greenhood Orchid. Draft Recovery Plans have also been completed for the Large Forest Owls, Barking Owl, Grey-headed Flying-fox and Green and Golden Bell Frog.

The Recovery Plan for the Grey-headed Flying-fox recommends the retention of as many foraging species as possible. The proposal may result in the removal of a number of foraging trees, for this very mobile species however this would not be considered to compromise this recovery plan.

The Illawarra Greenhood Orchid Recovery Plan recommends the retention of any potential habitat for this species. This site has a low likelihood of having this species occur within it due to the lack of any well vegetated woodland being present. Therefore the proposed development is not considered to compromise this recovery plan.

Large Forest Owls include the Powerful, Masked and Sooty Owl. The recovery plan for both the Large Forest Owls and Barking Owl recommends that developments containing bushland protect nest and roost sites, patches of habitat and prey bases. The proposal is unlikely to significantly compromise either of these two Recovery Plans.

The Recovery Plan for the Regent Honeyeater recommends the retention of preferred foraging species. The proposal is unlikely to significantly compromise this Recovery Plan.

The Draft Recovery Plan for the Koala recommends the retention of preferred feed trees. The proposal will not remove any Koala Feed Tree Species listed under SEPP 44-'Koala Habitat Protection'.

The Draft Recovery Plan for the Green and Golden Bell Frog recommends the retention of Green and Golden Bell Frog habitat. As the only aquatic habitat on site is considered to be of low ecological value to the Green and Golden Bell Frog the proposal is not considered to compromise this draft recovery plan.

No Recovery Plan has been developed for the remaining addressed species. However the OEH has prepared Priority Action Statements (PAS) to promote the recovery of these species and the

abatement of key threatening processes in NSW. The Priority Action Statements identified a number of broad strategies to help these species recover in NSW. It is considered that the proposal does not significantly conflict with the PAS for any of these species.

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

The 'Key Threatening Processes' currently listed under Schedule 3 of the TSC Act that are relevant to the site have been listed below in Table 7.

Table 7: Key Threatening Processes.

Key Threatening Process	Applicability in regards to the site
Clearing of Native Vegetation.	The proposal will result in removal of native vegetation and may be viewed as being part of this Key Threatening Process. However the action is unlikely to be responsible for the loss of any EEC, endangered population or threatened species.
Loss of Hollow-bearing Trees.	A number of trees were found to contain hollows. The proposal may result in the removal of a small number of hollow-bearing trees. If a hollow-bearing tree is to be removed then it is to be felled under supervision by a suitably qualified ecologist to help protect any fauna present. It is also recommended that nestboxes be used where possible to compensate for any hollows that are removed.
Removal of dead wood and dead trees.	A small amount of dead wood was present in the site. If any dead wood is required to be removed for the proposal then it is recommended that it be moved into an area of woodland off-site that will not be affected by the sites proposed development.
Invasion of native plant communities by exotic perennial grasses.	Exotic grasses were found to be present within the site such as *Paspalum dilatatum* (Paspalum). There is the potential for further infestation within the site as a result of the proposal. Thus it is recommended that weed management strategies are created and implemented during and post development.
Competition and grazing by the feral European Rabbit *Oryctolagus cuniculus.*	The Rabbit was found to be very common within the site. The proposal is unlikely to result in an increase in the number of this introduced species.
Competition from Feral Honeybees.	One tree observed on site was found to contain Feral Honeybees. The proposal is unlikely to increase to likelihood of any further infestation.
High frequency fire resulting in the disruption of life cycle processors in plants and animals and loss of vegetation structure and composition.	It is difficult to ascertain the disruption and structural changes, if any, past fires have caused the site. The proposal is unlikely to increase the frequency of fires on site.
Predation by the Feral Cat *Felis catus.*	The Feral Cat was not recorded on site at the time of the survey however this species would be

Key Threatening Process	**Applicability in regards to the site**
	considered to have an impact on native fauna in the local area. The proposal is not likely to result in an increase in feral numbers of this introduced species.
Bushrock Removal.	Only a small amount of surface rock was observed within the site. The proposal is unlikely to result in the loss of any significant areas of bushrock. It is recommended that any rock that must be removed from the site be placed into an area of habitat that will remain in-situ.
Alteration to the natural flow regimes of rivers, streams, floodplains and wetlands.	The proposal is unlikely to result in any significant alteration to the flow of the ephemeral drainage lines on site.
Predation by the *Gambusia holbrooki* (Plague Minnow).	This species of fish was not observed within the dams on site during the survey.
Infection of native plants by *phytophthora cinnamomi.*	This infection is not known to occur on site.
Infection of Frogs by amphibian chytrid fungus causing the disease chytridiomycosis.	It is possible that this fungus has an impact on frogs in the local area. The proposal is unlikely to increase infection from this fungus.
Infection by *Psittacine circoviral* (beak and feather) disease affecting endangered psittacine species.	No endangered Psittacine species were seen on site. The proposal is unlikely to increase infection by this disease.
The invasion of native plant communities by *Olea europaea* ssp. *cuspidata* (African Olive).	A small number of individuals of African Olive were noted within the site. The proposal is unlikely to cause any further infestation of this small tree species. However it is recommended that it be controlled as part of any future development within the site.

6.0 CONSIDERATIONS UNDER SEPP 44 – 'KOALA HABITAT PROTECTION'

The principal aim of State Environment Planning Policy 44 - Koala Habitat Protection is to encourage the proper conservation and management of areas of natural vegetation that provide habitat for Koalas to ensure a permanent free-living population over their present range and to reverse the current trend of Koala population decline.

This policy applies to areas of more than one hectare or an area, which has together with any adjoining land in the same ownership an area of more than 1 hectare, whether or not the development application applies to the whole, or only part of the land. In addressing SEPP44 there are two questions to be considered, regarding the occurrence of 'Potential' and 'Core' Koala Habitat on site.

6.1 FIRST CONSIDERATION - IS THE LAND 'POTENTIAL KOALA HABITAT'?

'Potential Koala Habitat' is defined in SEPP44 as, "...an area of native vegetation where trees of the type listed in Schedule 2 (Koala feed tree species) constitute at least 15% of the total number of trees in the upper or lower strata of the tree component".

No Koala Feed Trees listed in Schedule 2 (Koala feed tree species) were identified within the site. Accordingly, no further provisions of this policy apply to the site.

No direct observations of Koalas or evidence of Koala activity such as scats and scratches on the boles of trees were recorded during fieldwork.

7.0 CONSIDERATIONS UNDER THE COMMONWEALTH ENVIRONMENT PROTECTION AND BIODIVERSITY CONSERVATION ACT 1999

Considerations have been made to the Commonwealth Environment Protection and Biodiversity Conservation (EPBC) Act 1999. Assessments have been made to determine whether or not the proposal or activity has, will have, or is likely to have a significant impact on a matter of National Environmental Significance. The matters of National Environmental Significance and the appropriate responses are listed below:

- *World Heritage properties;*

The site is within 10km of the Greater Blue Mountains World Heritage Area (Wollemi National Park). The proposal is unlikely to have any impact upon this area.

- *wetlands recognised under the Ramsar convention as having international significance;*

The site occurs upstream within the catchment area of the Hunter Estuary Wetlands. Future development on site is unlikely to have an adverse effect on these wetlands.

- *listed threatened species and communities;*

One endangered ecological community and twenty-six nationally threatened species were recorded on the SEWPaC on-line database as occurring or having potential habitat available within 10km of the site, these being:

Community: White Box – Yellow Box – Blakely's Red Gum Grassy Woodland and Derived Native Grasslands.

Threatened Species:

Wollemia nobilis	Wollemi Pine (Endangered)
Bothriochloa biloba	Lobed Blue Grass (Vulnerable)
Digitaria porrecta	Finger Panic Grass (Endangered)
Prasophyllum sp. Wybong	a leek orchid (Critically Endangered)
Pterostylis gibbosa	Illawarra Greenhood (Endangered)
Thesium australe	Austral Toadflax (Vulnerable)
Commersonia rosea	Sandy Hollow Commersonia (Endangered)
Lassiopetalum longistamineum	(Vulnerable)
Rulingia procumbens	(Vulnerable)
Philotheca ericifolia	(Vulnerable)
Prostanthera cryptandroides	(Vulnerable)
Cynanchum elegans	White-flowered (Endangered)
Pomaderris reperta	Denman Pomaderris (Critically Endangered)
Litoria aurea	Green and Golden Bell Frog (Vulnerable)
Litoria booroolongensis	Booroolong Frog (Endangered)
Aprasia parapulchella	Pink-tailed Legless Lizard
Hoplocephalus bungaroides	Broad-headed Snake (Vulnerable)
Lathamus discolor	Swift Parrot (Endangered)
Rostratula benghalensis australis	Painted Snipe (Vulnerable)
Anthochaera phrygia	Regent Honeyeater (Endangered)
Dasyurus maculatus maculatus	Tiger Quoll (Endangered)
Petrogale penicillata	Brush-tailed Rock Wallaby (Endangered)
Psuedomys novaehollandiae	New Holland Mouse (Vulnerable)

Pteropus poliocephalus	Grey-headed Flying-fox (Vulnerable)
Chalinolobus dwyeri	Large Pied Bat (Vulnerable)
Nyctophilus timoriensis	Eastern Long-eared Bat (Vulnerable)

The Endangered Ecological Community White Box – Yellow Box – Blakely's Red Gum Grassy Woodland and Derived Native Grasslands was not considered to be present within the site.

No nationally threatened species were recorded on site during the survey. Suitable habitat was considered to be available for all of the above nationally threatened species with the exception of: *W. nobilis, C. rosea, L. longistamineum, P. cryptandroides* ssp. *Cryptandroides, P. ericifolia, P. queenslandica, P. reperta, C. elegans, L. booroolongensis, H. bungaroides, G. hardwickii, R. benghalensis* and *B. poiciloptilus.* All nationally listed species with the exception of *B. biloba* and *P. ericifolia* and *A. parapulchella* that were considered to have habitat on site have been addressed under the provisions of state legislation (i.e.: Section 5A of the NSW Environmental Planning and Assessment Act 1979). As stated within Section 5.0, the proposal will lead to a marginal incremental loss of habitat within the locality for these species, however it is not considered to be significant.

The majority of the site was found to contain suitable habitat for *B. biloba*. Only marginal habitat was considered to be available for *P. ericifolia* and *A. parapulchella* . The proposal is unlikely to result in a significant impact on these species.

- *migratory species protected under international agreements;*

Twelve nationally listed migratory species were recorded on the SEWPaC on-line database as occurring or having potential habitat available within 10km of the study area, these being:

Migratory Terrestrial Species:

- *Haliaeetus leucogaster* (White-bellied Sea-Eagle)
- *Hirundapus caudacutus* (White-throated Needletail)
- *Merops ornatus* (Rainbow Bee-eater)
- *Monarcha melanopsis* (Black-faced Monarch)
- *Myiagra cyanoleuca* (Satin Flycatcher)
- *Rhipidura rufifrons* (Rufous Fantail)
- *Anthochaera phrygia* Regent Honeyeater

Migratory Wetland Species:

- *Ardea alba* (Great Egret)
- *Ardea ibis* (Cattle Egret)
- *Gallinago hardwickii* (Latham's Snipe)
- *Rostratula benghalensis* (Painted Snipe)

Migratory Marine Birds

- *Apus pacificus* (Fork-tailed Swift)
- *Ardea alba* (Great Egret)
- *Ardea ibis* (Cattle Egret)

Haliaeetus leucogaster (White-bellied Sea-Eagle) was observed flying high over the site during the previous survey (Wildthing Environmental Consultants, 2005). As the site does not occur within proximity to larger waterbodies no suitable habitat was likely to be present for this species. Of the remaining species habitat of varying quality was considered to be present for *A. alba, A. ibis, H. caudacutus, M. ornatus, M. melanopsis, M. cyanoleuca, R. rufifrons* and *A. phrygia* on site. Considering the relatively small impact on habitat in the locality it is unlikely that these species or any of the listed migratory species would be significantly affected by the proposal.

- *nuclear activities;*

The proposal does not involve any type of nuclear activity.

- *the Commonwealth marine environment;*

The proposal does not involve the modification of the Commonwealth marine environment.

8.0 RECOMMENDATIONS

The recommendations given in the report have been listed here along with a brief discussion of their implementation:

Protection of *Acacia pendula* populations

It is recommended that, in collaboration with Muswellbrook Council, the stand of *Acacia pendula* immediately adjacent to the sites eastern boundary be protected by such means as a fenced-off exclusion zone. This protection zone should extend inside Lot 122 as well as on the road reserve to protect the plant from both incidental damage from traffic and future residential development close to the stand. This protection will help prevent any further degradation. In addition to this the stand of *A. pendula* and all areas of habitat included inside the confines of the fenced off zone should undergo periodic control of weeds and erosion control.

Protection of individual trees

It is recommended that as many remnant trees as possible should be retained within the scope of the proposal. However if any habitat (hollow-bearing) trees cannot be avoided then their removal will need to be supervised by a suitably qualified ecologist to reduce the chances of harming any fauna occupants.

Prevent the spread of Weeds

It is recommended that comprehensive weed management strategies be created and implemented during development and that this weed management is continued post development to ensure that further infestation of weeds to the local as a result of the proposal is limited.

9.0 CONCLUSION

Flora, fauna and habitat studies have been undertaken for a proposed subdivision within Lot 122 DP750924 Almond Road, Denman NSW.

The site has had a long history of disturbance from past vegetation clearance, ploughing and continued grazing which has resulted in the presence of large areas of grassland/pasture and scattered remnant trees. Remnant trees on site included species such as *Eucalyptus moluccana* (Grey Box) were likely to have once been representative of the Endangered Ecological Community, Central Hunter Grey Box – Ironbark Woodland. However the past disturbance of this site has resulted in the virtual removal of the native understory layers. The proposal will result in the removal of the majority of the trees from the site. Considering the disturbance and the recommendations to retain any remnant trees possible within the scope of the development it is unlikely that the proposal will have a significant impact on this community in the local area.

A stand of the Endangered Population *Acacia pendula* was present outside the site between the road reserve of Almond Street and the eastern boundary of the site. Recommendations have been made to ensure that the proposed development does not impact this stand of trees. These recommendations include the protection of the stand by a fenced off exclusion zone.

No threatened flora species were recorded during the survey. Limited habitat was found to be present within the site for 7 of the 15 threatened flora species assessed. The proposal will result in a marginal reduction in habitat for these threatened flora species in the local area, however would be unlikely to be significant.

No threatened fauna species were recorded during the survey. Habitat of varying quality was found to be present within the site for 40 of the 51 species: The proposal will result in an incremental reduction of habitat in the local area for these threatened species. However as a result of the disturbance to the site the proposal is unlikely to have a significant effect on these threatened fauna species such that a local extinction would occur.

Investigations in accordance with State Environmental Planning Policy No. 44 - 'Koala Habitat Protection' revealed the site contained no listed Koala Feed Tree species. Therefore the site does not constitute 'Potential Koala Habitat' and accordingly no further provisions of this policy apply to this site.

Considerations have been made to the Commonwealth Environment Protection and Biodiversity Conservation (EPBC) Act (1999). It was determined that the proposal is unlikely to have a significant impact on a matter of National Environmental Significance.

In conclusion the subdivision and subsequent development will result in a small incremental reduction of habitat for a number of threatened species in the local area. However considering the current disturbance to the site and given the recommendations the proposal would be unlikely to cause the local extinction of any threatened species, endangered ecological communities and populations addressed in this report.

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APPENDIX A

FLORA LIST

KEY

Introduced species are indicated by an asterisk ("*").

The following standard abbreviations are used to indicate subspecific taxa:

ssp. - subspecies
var.- variety
× **-** hybrid between the two indicated species

Threatened Species Conservation Act 1995 (TSC Act)

Schedule 1: Endangered – E
Schedule 2: Vulnerable - V

Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act)

Endangered – E
Vulnerable - V

ROTAP (Rare or Threatened Australian Plants)

Distribution

1. – Known from only one collection
2. – Geographic range in Australia less than 100km
3. – Geographic range in Australia greater than 100km.
+ - Also occurs overseas.

Conservation Status

E. – Endangered. Species at risk of disappearing from the wild within 20 years. Includes populations of 100 or less individual plants.
V. – Vulnerable. Species not presently endangered, but at risk over 20-50 years.
R. – Rare in Australia, but not currently under threat. Includes species within a very restricted area or small populations over a wide range.
K. – Poorly known. Accurate knowledge is inadequate.
C. – Reserved. The species has at least one population within a national park or other reserve.

Size of Reserved Populations

a. – 1000 plants or more known within a conservation reserve.
i. – Less than 1000 plants known within a conservation reserve.
- - Reserved population size not accurately known.
t - Total known population reserved.

Regionally Significant Plant Species (Hunter Valley and Central Coast). Hunter Rare Plants Committee (Bell. et. al, 2003).

L – endemic to Hunter Region
DA – disjunct in the Hunter Region, rare or localized (aggregated)
DB – disjunct in the Hunter Region, widespread and uncommon (broad)
R – rare but extends beyond the Hunter Region
U – everywhere uncommon
N – at northern distributional limit in the Hunter Region
E – at eastern distributional limit in Hunter Region
S – at southern distributional limit in Hunter Region
W – at western distributional limit in Hunter Region
T – maybe threatened in Hunter Region
s – probably secure in the Hunter Region

FLORA LIST FOR THE SITE

SCIENTIFIC NAME	COMMON NAME	TSC ACT	EPBC ACT	ROTAP	REGIONALLY SIGNIFICANT
CLASS FILICOPSIDA (Ferns)					
Pteridaceae					
Cheilanthes sieberi	Mulga Fern				
LILOPSIDA: (Monocotyledons)					
Juncaceae					
Juncus usitatus	Common Rush				
Poaceae					
Austrostipa verticillata	Slender Bamboo Grass				
Cymbopogon refractus	Barbed Wire Grass				
Elymus scaber					
**Lolium perenne*	Perennial Ryegrass				
**Paspalum dilatatum*	Paspalum				
Xanthorrhoeaceae					
Lomandra multiflora ssp. *multiflora*					
MAGNOLIIDAE (Dicotyledons)					
Acanthaceae					
Brunoniella pumilio	Dwarf Brunoniella				
Aizoaceae					
**Galenia pubescens*	Galenia				
Asclepiadaceae					
**Gomphocarpus fruticosus*	Narrow-leaved Cottonbush				
Asteraceae					
Calotis lappulacea	Yellow Burr-daisy				

SCIENTIFIC NAME	COMMON NAME	TSC ACT	EPBC ACT	ROTAP	REGIONALLY SIGNIFICANT
**Carthamus lanatus*	Saffron Thistle				
Chrysocephalum apiculatum	Yellow Buttons				
**Cirsium vulgare*	Spear Thistle				
Cymbonotus lawsonianus	Bear's Ears				
**Hypochaeris radicata*	Catsear				
**Lactuca serriola*	Prickly Lettuce				
**Senecio madagascariensis*	Fireweed				
Vittadinia cuneata	Fuzzweed				
**Xanthium occidentale*	Noogoora Burr				
Brassicaceae					
**Sisymbrium officinale*	Mustard Weed				
Cactaceae					
**Opuntia aurantiaca*	Tiger Pear				
Campanulaceae					
Wahlenbergia minus					
Wahlenbergia stricta	Tall Bluebell				
Caryophyllaceae					
**Silene gallica*	French Catchfly				
Chenopodiaceae					
Enchylaena tomentosa	Ruby Saltbush				
Sclerolaena muricata	Black Roly Poly				
Euphorbiaceae					
Breynia oblongifolia	Coffee Bush				
Fabaceae (Faboideae)					
**Medicargo polymorpha*	Burr Medic				
**Trifolium arvense*	Haresfoot Clover				
**Trifolium campestre*	Hop Clover				

SCIENTIFIC NAME	COMMON NAME	TSC ACT	EPBC ACT	ROTAP	REGIONALLY SIGNIFICANT
Geraniaceae					
Geranium homeanum	Cranesbill				
Geranium solanderi	Native Geranium				
Goodeniaceae					
Goodenia ovata	Hop Goodenia				
Lamiaceae					
**Stachys arvensis*	Stagger Weed				
Malvaceae					
Sida corrugata	Variable Sida				
**Sida rhombifolia*	Paddy's Lucerne				
Oleaceae					
Notelaea microcarpa	Native Olive				
Polygonaceae					
Rumex brownii	Swamp Dock				
**Rumex crispis*	Curled Dock				
Plantaginaceae					
**Plantago lanceolata*	Plantain				
Primulaceae					
**Anagallis arvensis* var. *arvensis*	Scarlet Pimpernel				
Rubiaceae					
Asperula conferta	Common Woodruff				
Santalaceae					
Santalum lanceolatum	Northern Sandalwood				E

SCIENTIFIC NAME	COMMON NAME	TSC ACT	EPBC ACT	ROTAP	REGIONALLY SIGNIFICANT
Solanaceae					
**Lycium ferocissimum*	African Boxthorn				
Verbenaceae					
**Verbena bonariensis*	Purple Top				

APPENDIX B
FAUNA LIST FOR SITE

FAUNA LIST

Family sequencing and taxonomy follow for each fauna class:

Birds - Pizzey and Knight (1997).

Herpetofauna - Cogger (1996), Ehmann (Ed) (1997) and Barker, Grigg and Tyler (1995).

Mammals - Strahan (Ed) (1995) and Churchill (1998).

- Species observed or indicated by scats, tracks etc. on site during this investigation.

#(?) - Indicates a species identified without certainty or to a Genus level only.

* - Indicates an introduced species.

@ - Indicates species recorded during previous assessment of site.

Threatened species addressed within this assessment appear in **bold** font.

Scientific Name	Common Name	Legal Status	Observation
AMPHIBIANS			
Family Hylidae - Tree Frogs			
Litoria latopalmata	Broad-palmed Frog		#
Litoria fallax	Dwarf Tree Frog		#
REPTILES			
Family Scinidae - Skinks			
Cryptoblepharus virgatus	Wall Lizard		#
Family Elapidae - Venomous Snakes			
Pseudechis gutattus	Blue Bellied Black Snake		#
BIRDS			
Family Anatidae - Ducks, Swans and Geese			
Chenonetta jubata	Australian Wood Duck		#
Family Cacatuidae - Cockatoos and Corellas			
Cacatua galerita	Sulphur-crested Cockatoo		#
Cacatua roseicapilla	Galah		#
Family Psittacidae - Parrots, Rosellas and Lorikeets			
Platycercus eximius	Eastern Rosella		#
Psephotus haematonotus	Red-rumped Parrot		#
Family Pardalotidae - Pardalotes, Gerygones, Scrubwrens, Heathwrens and Thornbills			
Acanthiza chrysorrhoa	Yellow-rumped Thornbill		#
Pardalotus striatus	Striated Pardalote		
Family Meliphagidae - Honeyeaters			
Philemon corniculatus	Noisy Friarbird		#
Family Sturnidae Starlings and Mynas)			
**Acridotheres tristis*	Indian Myna		#
**Sturnus vulgaris*	Common Starling		#
Family Dicruridae - Monarchs, Flycatchers, Fantails, Drongo and Magpie-Lark			
Rhipidura leucophrys	Willie Wagtail		#
Grallina cyanoleuca	Magpie-lark		#
Family Campephagidae - Cuckoo-shrikes and Trillers			
Coracina novaehollandiae	Black-faced Cuckoo-shrike		#
Family Artamidae - Wood-swallows, Butcherbirds, Magpie and Currawongs			
Cracticus nigrogularis	Pied Butcherbird		#
Gymnorhina tibicen	Australian Magpie		#

Scientific Name	Common Name	Legal Status	Observation
Family Corvidae - Crows, Raven			
Corvus coronoides	Australian Raven		#
Family Hirundinidae - Swallows and Martins			
Hirundo neoxena	Welcome Swallow		#
MAMMALS			
Family Macropodidae - Kangaroos, Wallabies			
Macropus giganteus	Eastern Grey Kangaroo		#
Family Molossidae- Mastiff Bats			
Nyctinomus australis	White-striped Freetail Bat		#
Family Vespertilionidae - Plain-nosed Bats			
Chalinolobus gouldi	Gould's Wattled bat		#
Chalinolobus morio	Chocolate Wattled Bat		#
Vespadelus regulus	Eastern Cave Bat		#?
Vespaledus vulturnus	Little Forest Bat		#?
Family Canidae			
**Vulpes vulpes*	Red Fox		#
**Canis familiaris*	Dog		#
Family Leporidae			
* *Oryctolagus cuniculus*	European Rabbit		#
Family Gallus			
* *Gallus domesticus*	Chicken		#
Family Bovidae			
**Bos taurus*	Cow		#