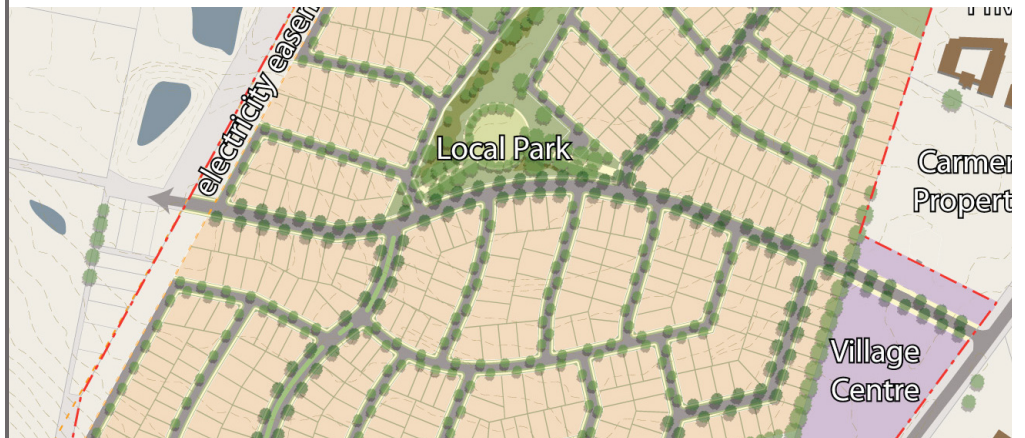




Appendix 7

Review of Flora and Fauna Issues

Florasearch



STATE SIGNIFICANT SITE STUDY REVIEW OF FLORA & FAUNA ISSUES ORANGE AGRICULTURAL INSTITUTE FOREST ROAD, ORANGE

**Prepared for
Department of Primary Industries NSW.
by Colin C. Bower PhD**

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SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

1. FloraSearch was commissioned by the NSW Department of Primary Industries to conduct a desktop review of flora and fauna issues that may potentially affect a proposal to rezone and subsequently subdivide part of the Orange Agricultural Institute (the study area).
2. The lands on the study area are used for agricultural research, particularly for livestock and agronomy. As such the area has been subdivided into fenced paddocks, most of which have been pasture improved.
3. The original natural vegetation has been almost completely cleared from most of the site, the exceptions being two areas of semi-cleared forest and woodland in the northern half of the area. These woodland patches have lost almost all of the original shrub layers and although the ground cover vegetation is highly modified with high proportions of introduced pasture species and weeds, although there are large patches dominated by native grasses.
4. Observations on a site visit indicated the original plant community on the study area comprised mainly an association of Ribbon Gum, *Eucalyptus viminalis* and Apple Box, *Eucalyptus bridgesiana*.
5. Many of the forest and woodland trees are very large old growth specimens with hollow limbs suitable for wildlife dens and nests. These appear to be heavily utilised by five species of native parrots, including the Vulnerable Superb Parrot.
6. The large dam in the north west corner of the site is highly attractive to waterbirds, with considerable shallow areas supporting wetland vegetation potentially suitable for foraging and nesting by a large suite of marsh inhabiting species.
7. Some nine threatened flora species and 20 threatened fauna species known to occur in the Orange district and surrounds were assessed for their potential to occur on the study area. All except two flora species and seven fauna species were considered highly unlikely to occur on the study area. Flora and fauna surveys in an appropriate season would be required to determine whether these species are present.
8. However, past records indicate three threatened bird species are known to utilise the study area; the Blue-billed Duck (*Oxyura australis*), the Freckled Duck (*Stictonecta naevosa*) and the Superb Parrot (*Polytelis swainsonii*).
9. No threatened flora species, populations or communities have been recorded on the study area.
10. No matters requiring action under State Environmental Planning Policy 44 of the NSW *Environmental Planning and Assessment Act 1979* were identified.
11. No matters requiring referral to the Commonwealth under the *Environment Protection and Biodiversity Conservation Act 1999* were identified.
12. It is concluded that the wetland and woodland areas shown on Figure 1 of this review have conservation significance for the protection of threatened bird species.
13. It is recommended the identified wetland and woodland areas be excluded from development and reserved for nature conservation and passive recreation with the following exceptions;
 - The Department of Primary Industries continues to use water from the dam.
 - If no alternative can be identified, that a proposed secondary access road through the woodland to the residential development area from Forest Road be assessed for its impact on threatened biodiversity.

INTRODUCTION

FloraSearch was commissioned by the NSW Department of Primary Industries to conduct a desktop review of flora and fauna issues that may potentially affect a proposal to rezone and subsequently subdivide part of the Orange Agricultural Institute (the study area). This review focuses on threatened flora and fauna that may potentially occur on the site and concerns the application of the NSW *Threatened Species Conservation Act 1995*, Section 5A of the NSW *Environmental Planning and Assessment Act 1979*, NSW *State Environmental Planning Policy No. 44* and the Commonwealth *Environmental Protection and Biodiversity Conservation Act 1995*.

The objectives of the review are to:

- review the existing literature on the natural history of the study area and surrounds
- inspect the site to ascertain the types and quality of natural vegetation present
- report on the findings of the review

Project Footprint

The area potentially affected by the Project (the study area) is shown on Figure 1. The figure is a Google Earth image of the site showing the existing remnant natural vegetation.

The Investigator

The review was carried out by Dr. Colin Bower (trading as FloraSearch). Dr. Bower has over 20 years experience in conducting flora and fauna surveys and impact assessments (see attached CV). In addition, he has lived in the Orange district since 1980 and is very familiar with the local flora and fauna through both his own exploration of the region and his close involvement with the Orange Field Naturalist and Conservation Society. He is coauthor of a handbook on the trees of Central Western NSW, is an associate of the Australian National Herbarium, Canberra, is a member of the Ecological Consultants of NSW (which has exacting membership criteria) and is recognised nationally as an expert on native orchids and their pollination. His expertise has been recognised by the Environmental Defenders Office and the NSW Department of Planning, both of which have used him to review and referee controversial cases.

DESCRIPTION OF STUDY AREA

The Project Area is located on gently undulating terrain at an altitude of approximately 890 to 940 m and is currently used for agricultural research. The site is roughly rectangular in shape with the main axis oriented approximately south to north and sloping to the north. The main watercourse is the source of Blackman's Swamp Creek which runs through the centre of the nearby City of Orange. This watercourse is dammed near the northern extremity of the site holding a large volume of water (174 ML) used for stock watering purposes (Figure 1). Most of the study area is cleared grazing paddocks that were holding sheep and cattle at the time of the inspection.

NSW Department of Primary Industries has undertaken a large ongoing program of native tree and shrub planting. Several large shelterbelts have been established along roadways and fencelines within the study area. Both local tree and shrub species and some from other regions have been planted successfully. These woodlots provide habitat for native birds and shelter for stock from extreme weather.

There are two main areas of remnant natural woodland on the study area. A relatively large area in the centre east of the study area is semi-cleared, and extends from the eastern edge of the major dam to the western side of the old drive-in theatre and down the northern boundary of the drive-in to

Forest Road (Figure 1). A second area of natural forest occurs on more rugged terrain on either side of the main watercourse north of the dam wall. This forest extends beyond the northern boundary into lands occupied by the Orange Rifle Range.

Project Area Surrounds

The study area is bordered on the south side by buildings associated with the Orange Agricultural Institute (OAI). The western side is bordered by privately owned grazing land and orchards. The eastern side of the study area borders Forest Road in the north, across which is a golf course. In the south the eastern boundary abuts the old Orange Drive-in Theatre site, which is destined to become a private hospital, and private land that includes the South Orange Post Office, a café and two residences.

The nearest other naturally wooded areas close to the study area are a Reserve for Public Recreation on the southern side of Bloomfield Hospital (east of Forest Road and opposite the main OAI buildings), in the Bloomfield Reserve south of Bloomfield Road and in the small Brandy Corner Reserve at the junction of Forest and Cadia Roads. Other nearby wooded areas are on the eastern side of the Bloomfield Hospital and south of this in Bloomfield Park on opposite sides of Bloomfield Road.

LITERATURE REVIEW

Previous Flora and Fauna Studies

There has been no published formal study of the flora of the Orange district or nearby regions. Relevant publications include Giles (1961) which listed the plants around Mt. Canobolas; Bower, Semple and Harcombe (2002), which discusses the native trees and their associations in Central Western NSW and Hunter (2002) on the vegetation of the Mount Canobolas State Conservation Area. The tree communities in the Orange area have been classified by Austin *et al.* (2000) as part of a larger study focused on the Central Lachlan River catchment.

As for flora, there have been few studies of native fauna in the Orange region. Goldney and Bowie (1987) includes a regional compilation of fauna for Central Western NSW and two assessments of fauna have been made for the Cadia Hill (Fisher and Goldney 1995) and Ridgeway Gold Mines (Resource Strategies 2000) to the south west of Orange.

More recently, two studies directly relevant to the subject site have been published. The Department of Lands (Harcombe 2007) has assessed the potential future uses of 252.5 ha of Crown Land, including the subject area, on the southern outskirts of Orange and Bower (2007) assessed potential impacts on flora and fauna of a proposed private hospital development on the old Orange Drive-in Theatre site adjacent to the study area. These studies indicate that three threatened bird species are known to utilise the study area; the Blue-billed Duck (*Oxyura australis*), the Freckled Duck (*Stictonecta naevosa*) and the Superb Parrot (*Polytelis swainsonii*). No other threatened plants or animals appear to have been identified on the study area. The potential importance of the study area for these and other threatened species is analysed in the following sections.

Bower (2007) conducted two 20 × 20 m flora quadrat samples just within the wooded part of the study area adjacent to the Drive-in Theatre site. Some 36 plant species were recorded of which two thirds were introduced pasture species or weeds, and one third were natives. The latter were mostly present in low numbers. These results are considered to be generally typical of the study area and agree with the assessment of Harcombe (2007) that the site is highly modified and dominated by introduced flora.



Figure 1. Study area on Orange Agricultural Institute (approximate boundaries) showing key wetland and natural woodland features. The location of the Superb Parrot colony nest tree is indicated by the red star.

Bower (2007) quantified the degree of disturbance for the part of the study area adjacent to the Drive-in Theatre using the NSW Department of Environment and Conservation's 'BioMetric' Terrestrial Biodiversity Assessment Tool (Gibbons *et al.* 2005). The Biometric analysis showed that on most measures the habitat value of the study area does not compare favourably with pristine habitat. This is to be expected given past disturbances to the site including semi-clearing, grazing, and pasture improvement. Native plant species richness was only half of the benchmark for natural habitat. The wooded parts of the study area immediately adjacent to the old drive-in theatre site met the Biometric benchmarks only for native overstorey cover and native ground cover (other), while fallen logs were about half the benchmark value. However, with respect to all other measures, including two measures

of native groundcover, and others for absence of exotic groundcover species, the presence of tree hollows for wildlife dens and nests, and the presence of tree regeneration, the woodland adjacent to the drive-in theatre not only failed to approach the benchmark, but mostly returned zero readings. Overall, this part of the woodland area had very limited habitat value compared to the original native vegetation of the site.

Bower (2007) recorded a total of 29 fauna species in the wider woodland area. The fauna comprised two amphibians, one reptile, 23 birds and 3 mammals. Most of the fauna observed were native species (26), and three were introduced. The latter comprised two birds, the Eurasian Blackbird, *Turdus merula* and the Common Starling, *Sturnus vulgaris*, and the Fox, *Vulpes vulpes*. Two native macropods, the Eastern Grey Kangaroo, *Macropus giganteus*, and the Swamp Wallaby, *Wallabia bicolor*, were observed by both Bower (2007) and Harcombe (2007). Despite the apparent favourability of the woodlands for nocturnal native arboreal mammals and birds, none were detected by Bower (2007).

POTENTIAL THREATENED VEGETATION COMMUNITIES, POPULATIONS AND SPECIES

Endangered Ecological Communities

One endangered ecological community listed in the schedules of the NSW *Threatened Species Conservation Act 1995*, the 'White Box Yellow Box Blakely's Red Gum (WBYBBRG) Woodland endangered ecological community', is considered a possible occurrence in the study area. The community is also listed under the Commonwealth *Environmental Protection and Biodiversity Conservation Act 1999* as the 'White Box-Yellow Box-Blakely's Red Gum grassy woodlands and derived native grasslands critically endangered ecological community'.

This community is widespread on the western slopes and tablelands of New South Wales and occurs commonly in the region around Orange. Because it occurs on relatively deep high fertility soils, it has been extensively cleared historically for cropping and grazing over its entire range.

Endangered Populations

Twenty three plant populations are listed as endangered under the NSW *Threatened Species Conservation Act 1995*. None are applicable to the study area.

Threatened Flora and Fauna Species

Tables 1 and 2 show threatened plant and animal species, respectively, as listed in the schedules of the NSW *Threatened Species Conservation Act 1995* (TSC) and the Commonwealth *Environmental Protection and Biodiversity Conservation Act 1999* (EPBC) that are considered possible former occurrences within the study area or surrounds.

Table 1.
Threatened Flora Species

Scientific Name	Common Name	Endangered	Vulnerable	Likelihood of Former Occurrence
<i>Eucalyptus canobolensis</i>	Silver-leaf Candlebark		TSC, EPBC	Low
<i>Eucalyptus pulverulenta</i>	Silver-leafed Mountain Gum		TSC, EPBC	Low
<i>Eucalyptus robertsonii</i> ssp. <i>hemisphaerica</i>	A Narrow-leaved Peppermint		TSC, EPBC	Low
<i>Eucalyptus saxicola</i>	Mt. Canobolas Apple Box	TSC		Low
<i>Goodenia macbarronii</i>	Narrow Goodenia		TSC	Low
<i>Lepidium hyssopifolium</i>	Basalt Peppergrass	TSC, EPBC		High
<i>Pultenaea campbellii</i>	New England Bush Pea		EPBC	High
<i>Swainsona sericea</i>	Silky Swainson Pea		TSC	Low
<i>Zieria obcordata</i>	A Zieria		TSC, EPBC	Low

Similarly, database searches generated a list of 20 fauna species considered to have possibly occurred in the Study area prior to European settlement (Table 2).

Table 2
Threatened Fauna Species

Scientific Name	Common Name	Endangered	Vulnerable	Likelihood of Former Occurrence
<i>Chalinobolus dwyeri</i>	Large-eared Pied Bat		TSC, EPBC	High
<i>Climacteris picumnus</i>	Brown Treecreeper		TSC	Low
<i>Grantiella picta</i>	Painted Honeyeater		TSC	High
<i>Lathamus discolor</i>	Swift Parrot	TSC, EPBC		Moderate
<i>Miniopterus schreibersii</i>	Eastern Bent-wing Bat		TSC	Moderate
<i>Ninox connivens</i>	Barking Owl		TSC	High
<i>Ninox strenua</i>	Powerful Owl		TSC	High
<i>Oxyura australis</i>	Blue-billed Duck		TSC	High
<i>Paralucia spinifera</i>	Bathurst Copper Butterfly	TSC	EPBC	Moderate
<i>Polytelis swainsonii</i>	Superb Parrot		TSC, EPBC	Moderate
<i>Petaurus australis</i>	Yellow-bellied Glider		TSC	High
<i>Petaurus norfolcensis</i>	Squirrel Glider		TSC	High
<i>Phascolarctos cinereus</i>	Koala		TSC	High
<i>Pyrrholaemus saggitatus</i>	Speckled Warbler		TSC	Low
<i>Rostratula australis</i>	Painted Snipe	TSC	EPBC	High
<i>Saccolaimus flaviventris</i>	Yellow-bellied Shearwater		TSC	Moderate
<i>Stagonopleura guttata</i>	Diamond Firetail		TSC	Low
<i>Stictonecta naevosa</i>	Freckled Duck		TSC	High
<i>Tyto novaehollandiae</i>	Masked Owl		TSC	High
<i>Xanthomyza phrygia</i>	Regent Honeyeater	TSC, EPBC		High

These lists were derived by searching the following data sources for information on the Cabonne and Blayney Shires:

- Atlas of NSW Wildlife, NSW National and Parks and Wildlife Service.
- BioNet website – Search of NSW National Parks and Wildlife Service, NSW State Forests, Australian Museum and Royal Botanic Gardens Sydney databases.

- NSW Department of Environment and Conservation website – Threatened Species Profiles
- PlantNet website – Royal Botanic Gardens Sydney search engine for information on distribution and habitats of threatened plant species.
- Commonwealth Department of the Environment and Heritage website – Protected Matters search tool.

The above sources produced a list of eleven potential threatened plant species and one endangered ecological community. The distribution and habitats of each of the species and communities was determined from the PlantNet website, DECC Threatened Species Profiles and other sources. Species that occur in specialised habitats not found in the study area were excluded from the list of nine flora species in Table 1. Similarly, the fauna list in Table 2 excludes species for which suitable habitat was unlikely to have once occurred on the study area.

DISCUSSION

Vegetation Communities

Observations of remnant native trees on the study area on 28 April 2008 showed that the dominant pre-European trees were Ribbon Gum (*Eucalyptus viminalis*) and Apple Box (*Eucalyptus bridgesiana*) in agreement with Bower (2007) and Harcombe (2007). Low numbers of Candlebark (*Eucalyptus rubida*) also occur sporadically. Other native trees found in remnant woodlands in the vicinity of Bloomfield Hospital and Bloomfield Park to the south east of the study area include Snow Gum, *Eucalyptus pauciflora*, Black Sally, *Eucalyptus stellulata* and rarely, Black Gum, *Eucalyptus aggregata*. This combination of trees indicates the native vegetation formerly covering the study area belonged to the Southern Tableland Wet Sclerophyll Forest class of Keith (2004). Within this vegetation class are numerous vegetation communities; the relevant community for the study area is the *Eucalyptus viminalis* / *Acacia melanoxylon* (Ribbon Gum / Black Wattle) community defined by Austin *et al.* (2000).

It is clear that the White Box Yellow Box Blakely's Red Gum Woodland endangered ecological community does not occur on the study area.

Condition of the Vegetation

The natural plant community that formerly occurred on the study area has been largely eliminated by past land uses. The current vegetation varies across the area, according to the degree of clearing and whether or not there has been pasture improvement.

Three areas of the site retain significant natural values that have also been identified by Harcombe (2007). These comprise Mapping Areas 3, 4 and 10 of Harcombe (2007) and are discussed below.

1. Forest north of major dam wall

This is a relatively small area of Ribbon Gum / Apple Box forest, but represents the least disturbed natural area on the site (Figure 1). The trees are at close to natural densities with an almost continuous canopy. There are some mid storey Silver Wattles (*Acacia dealbata*), albeit at lower than natural densities. The ground cover has a mix of native and introduced species, with some substantial areas dominated by native Wallaby Grasses (*Austrodanthonia* species) and Weeping Grass (*Microlaena stipoides*). Trees in the centre of the area are a major roosting site

for Sulphur-crested Cockatoos (*Cacatua galerita*). Other wildlife observed here were Eastern Grey Kangaroos (*Macropus giganteus*) and a Swamp Wallaby (*Wallabia bicolor*).

This area is relatively small, steep and unsuitable for development. It provides valuable wildlife habitat surprisingly close to the urban areas of Orange. Wildlife able to use this site, in addition to the above, include many species of birds, insectivorous bats, possums and gliders, though these have yet to be surveyed on the area. This site is continuous with similar habitat in the rifle range reserve, which together create a worthwhile refuge for native fauna on the edge of Orange. The high natural values of this area were also recognised by Harcombe (2007). This area is currently open to grazing by cattle, which is suppressing regeneration of native trees and shrubs. Withdrawal of stock from this area, or at least a reduction in grazing, may allow natural regeneration to occur.

2. Large dam and associated wetland

The 174 ML dam in the north west corner of the study area (Figure 1) provides a permanent source of water that is large enough to attract high numbers of waterbirds (Harcombe 2007). Many birds were using the dam on 28 April 2008, even though the water level was low due to drought. Large dams, such as this, are drought refuges for water birds when inland swamps and waterways dry out. In January 2006 this dam was hosting the threatened Blue-billed and Freckled Ducks, the former in breeding condition, suggesting they were utilising the site for nesting.

This dam has important attributes as habitat for waterbirds. The backwaters support a large shallow area of tall dense swamp plants suitable for a wide range of aquatic birds that require dense marshy vegetation for feeding and nesting. In the case of the Blue-billed Duck, dense vegetation over water is trampled down into a concealed platform on which eggs are laid. The water and the dense vegetation, respectively, protect and hide the nest from predators. Other species likely to use such areas include snipe, crakes, rails, swamphens, moorhens, grebes, swans and bitterns.

This area is largely fenced off from stock which has allowed the wetland area to develop a dense cover of vegetation providing habitat for birds. This dam is used to supply water to the Orange Agricultural Institute. It is envisaged that this use would continue.

3. Central woodland

A large area of woodland comprising mature trees of mainly Ribbon Gum and Apple Box occurs on the eastern side of the main dam extending to the back (west) of the old Drive-in Theatre and through the old Travelling Stock Reserve (TSR) north of the Drive-in Theatre to Forest Road (Figure 1). Many of these trees would have been on the site prior to white settlement of the Orange area and are one of the few surviving remnants of the woodland that once covered the Macquarie Plateau on the basalt flows from Mt. Canobolas.

This woodland lacks any natural shrub layer and has a highly modified understorey. Parts of the area with deeper soils and free of rock have been pasture improved. However, large parts of the site unsuitable for pasture improvement retain an understorey of predominantly native grasses, particularly the Wallaby Grass, *Austrodanthonia racemosa*. The TSR also has a population of Winged Everlasting Daisy (*Ammobium alatum*), now very uncommon in the Orange district.

Table 3
Analysis of Habitat Suitability of the Study area for Threatened Fauna Species.
(X = factor missing or unsuitable, √ = factor present, NA = not applicable)

Species	Factor					Special Requirements	Comments	Habitat Suitable?
	Area	Shrub Layer	Ground Cover	Tree Canopy	Hollows			
Bathurst Copper Butterfly	NA	X	NA	NA	NA	Larvae feed on <i>Bursaria spinosa</i> foliage.	Larval food source is absent from Study area	No
Blue-billed Duck	√	NA	√	NA	NA	Large areas of open water and marshy vegetation for breeding	Known to occur on main dam when full. Breeding may have occurred in the past.	Yes
Freckled Duck	√	NA	√	NA	NA	Large areas of open water. Lignum or aquatic shrubs or trees for breeding	Known to occur on main dam when full. Not likely to breed	Yes
Painted Snipe	√	NA	√	NA	NA	Open marshy areas	Mostly nocturnal, feeds in soft mud. Nests on mud amongst marsh vegetation	Possible
Superb Parrot	√	NA	√	√	√	Forages on ground mainly	Nests in high tree hollows	Yes
Swift Parrot	NA	NA	NA	√	NA	Requires winter flowering eucalypts	Migratory species, favoured food trees in the NSW Central West, Red Ironbark and White Box, are not in the Study area	No
Barking Owl	√ (30-200 ha)	NA	NA	√ (for roosting)	√	Need open spout-like hollows for nesting	Could use Study area	Possible
Masked Owl	X	NA	NA	√	X	Large vertical hollow in tall eucalypt	Forests and dense woodlands, sedentary and territorial	No
Powerful Owl	X (800-1000 ha)	NA	NA	√	X	Nests in very large trees	Feeds mainly on tree dwelling possums and gliders. Needs large tracts of bushland.	No
Speckled Warbler	√	X	X	√	NA	Nests on rough ground below grass cover	A bird of open eucalypt woodlands in rocky country	No
Diamond Firetail	√	√	X	√	NA	Native grass seed	Open, grassy native woodlands	No

Species	Factor					Special Requirements	Comments	Habitat Suitable?
	Area	Shrub Layer	Ground Cover	Tree Canopy	Hollows			
Brown Treecreeper	?	NA	X	√	NA	Requires leaf litter, fallen branches for foraging	Open, grassy native woodlands and dry forests with rough-barked trees.	No
Painted Honeyeater	NA	NA	NA	√	NA	Needs large supply of mistletoe flowers and fruits	Nomadic species	No
Regent Honeyeater	NA	NA	NA	√	NA	Flowering eucalypts	Nomadic, feeds mainly on nectar	Possible visitor only
Koala	X	NA	NA	√	NA	Preferred food trees, which include <i>Eucalyptus viminalis</i> , must be present	Food trees present in Study area, but too few in number and area. Species obvious, but not recorded	No
Squirrel Glider	X	√	NA	X	X	Requires old growth Box woodlands	Requires numerous hollows within an area for nesting and refuge	No
Yellow-bellied Glider	X	NA	NA	√	√	Feeds mainly on sap, nectar and pollen	Nests in high tree hollows	No
Eastern Bent-wing Bat	?	NA	NA	√	NA	Obligate cave-dweller, maternal roost at Borenore Caves	Nomadic	May forage in Study area, but not dependent on it.
Large-eared Pied Bat	?	NA	NA	√	NA	Caves for roosting and breeding	Forages in continuous forests and woodlands, not found in more open habitats	No
Yellow-bellied Sheath-tail Bat	X	NA	NA	√	√	Roosts communally in large tree hollows in tall trees	Requires extensive patches of dense vegetation	No

The mature old growth trees have abundant hollow limbs suitable for a wide range of hollow-dependent wildlife, including owls, parrots, possums, gliders and bats. This woodland is particularly attractive to parrots including White Cockatoos, Galahs (*Eolophus roseicapillus*), Eastern Rosellas (*Platycercus adscitus eximius*), Crimson Rosellas (*Platycercus elegans*), Red-rumped Parrots (*Psephotus haematonotus*) and the threatened Superb Parrot (*Polytelis swainsonii*). These species were abundant in the area in spring 2007 and there is little doubt they use the trees for nesting.

The Superb Parrots were investigating tree hollows in a large overmature Ribbon Gum in September 2007 and a total of four pairs were seen in the woodland (Bower (2007). Harcombe (2007) reports that Superb Parrots were also seen in the rifle range reserve in 2007, are known to utilise the Bloomfield Hospital area and have been observed in the central woodland on the Orange Agricultural Institute (her mapping area 10). The central woodland area appears to be the focal area of a viable Superb Parrot population in the study area and surrounds.

The central woodland area clearly has important natural values and should be retained and managed sympathetically for low impact recreation and nature conservation. It is recommended that all of Harcombe's (2007) mapping areas 4 and 10 be retained in a reserve linked to the rifle range reserve on the northern boundary of the study area.

Superb Parrots are known to nest in small colonies (DECC 2005), often with multiple nests per tree. The tree being investigated for nesting hollows in September 2007 had multiple hollows suitable for colonial nesting and is therefore an important habitat tree for this species. Superb Parrots also spend a great deal of time foraging on the ground for grass seeds and herbaceous plants. Therefore, suitable habitat for Superb Parrots must include mature trees with nesting hollows and open grassy woodland of sufficient area to provide food resources for the colony through the breeding season. While it is known that Superb Parrots may fly relatively large distances from nesting areas to feed (up to 10 km), it is preferable to have feeding habitat close to nest sites. Increasing development on the outskirts of Orange is likely to gradually reduce feeding opportunities for these birds which prefer open grassy woodlands for foraging. In addition it is important that disturbance and noise close to the nest tree is minimised. The site of the nest tree is indicated on Figure 1. Development, including access roads, should preferably not occur within 50 m of this tree.

It is understood that an access road from Forest Road to the proposed development area is desirable to the north of the old drive-in theatre site. Such an access would split the woodland and may entail significant traffic volumes through the area when the site is fully developed. Least disruption to the integrity of the woodland would be achieved by routing the access to the north of the old Travelling Stock Reserve. It should then be routed to avoid proximity to the known nesting tree by going to the west of both the existing stockyards and the western small dam on the southern edge of the woodland. However, the precise route should be subject to further survey and assessment to avoid any other significant habitat trees as far as possible.

The above option would entail both the loss of some woodland and the introduction of traffic hazards for the Superb Parrot population, and should be adopted only if no alternatives are available.

Suitability of the Study Area for Potential Threatened Species

No threatened plant species are known to occur on the study area. All except two of the threatened flora species listed in Table 1 as possibly occurring in the study area pre European settlement, are trees or shrubs, and hence would have been detectable during the inspection on 28 April 2008, if they were present. No threatened plants were recorded by Bower (2007) or Harcombe (2007), although neither conducted comprehensive surveys of the area. Two species in Table 1, Narrow-leaf Goodenia and Silky Swainson Pea, are small, relatively inconspicuous native herbs. As such, they could have been overlooked by casual inspections.

The threatened fauna species listed in Table 2 can be analysed to determine whether suitable habitat currently exists for them on the Study area. This analysis, given in Table 3 shows that for most threatened fauna species, one or more critical habitat requirements are missing from the study area. Consequently, most of the threatened fauna species are considered unlikely to utilise the study area, or to be able to establish viable populations in it.

Table 4 lists the threatened fauna species that may possibly inhabit the study area because the necessary resources appear to be available. Three species are known to occur and four others are possible occurrences. In addition, some nomadic threatened species may occasionally visit and utilise the study area temporarily.

Confirmation of the presence or absence of potentially occurring flora and fauna species would require field surveys in suitable seasons, which is beyond the scope of this study. Before any development of the site occurs further survey and impact assessment would be required to determine the status of threatened flora and fauna on the study area. Nevertheless, this review has shown that three threatened bird species are known to utilise the area, and that four other fauna species and two plants may potentially use it.

Table 4
Threatened Fauna Species that Actually (A) or Possibly (P) Inhabit
or Utilise the Study area

Scientific Name	Common Name
<i>Oxyura australis</i>	Blue-billed Duck (A)
<i>Stictonecta naevosa</i>	Freckled Duck (A)
<i>Rostratula australis</i>	Painted Snipe (P)
<i>Polytelis swainsonii</i>	Superb Parrot (A)
<i>Ninox connivens</i>	Barking Owl (P)
<i>Xanthomyza phrygia</i>	Regent Honeyeater (P)
<i>Miniopterus schreibersii</i>	Eastern Bent-wing Bat (P)

SEPP 44

State Environmental Planning Policy 44 (SEPP 44) aims to protect habitat utilised by the Koala, *Phascolarctos cinereus*, which is known to have occurred formerly in the Orange area, and still occurs in isolated parts of the Cabonne Shire. Ribbon Gum, *Eucalyptus viminalis*, is a favoured Koala food tree listed in Schedule 2 of SEPP 44. A large patch of remnant natural Ribbon Gum woodland occurs on the study area. SEPP 44 requires consideration of the study area as potential Koala habitat.

Since the vegetated parts of the study area exceed one hectare in size and may have 15 percent or more coverage by Ribbon Gums, the study area is considered to be potential Koala habitat. However, the area does not have an extant Koala population, and none is known to occur nearby. Accordingly, the study area is not 'core' Koala habitat and a SEPP 44 plan of management is not required.

EPBC Act

No matters requiring referral to the Commonwealth Department of Environment and Water Resources relating to Commonwealth listed threatened species and ecological communities, migratory species or wetlands of international importance, were revealed by this study.

CONCLUSION

Despite its use for grazing over many years and the consequent degradation of the natural communities that formerly occurred there, the study area retains significant value for flora and fauna conservation. The value resides primarily in two areas of remnant forest and woodland, and the large dam in the north west corner of the site (Figure 1). The woodland areas are retained natural features having historical and genetic continuity with the original biodiversity of the site, while the dam is a new feature that has been adopted by wildlife. The dam and associated wetland support at least two

threatened species, Blue-billed Duck and Freckled Duck, of which the former is likely to have used the area for breeding. The forest remnants have a breeding population of Superb Parrots, which are also listed as Vulnerable under the NSW *Threatened Species Conservation Act 1995*. It is therefore recommended that the areas supporting these threatened species should be excluded from any proposed residential or commercial development. However, provided no other alternatives are available, an access road through the woodland to the northern parts of the residential development area may not have a significant impact, if carefully designed and placed. Recommended boundaries for the proposed reserved areas are shown on Figure 1. Any development of the site should incorporate the protection of these features as an integral part of the planning. Because the prime concern should be the protection of biodiversity, recreational use of the area should be passive and low key. In particular, the wetland area should not be accessible to the public or to dogs, although a discrete bird hide could be accommodated.

REFERENCES

- Austin, M.P., Cawsey, E.M., Baker, B.L., Yialeloglou, M.M., Grice, D.J. and Briggs, S.V. (2000). *Predicted Vegetation Cover in the Central Lachlan Region*. Final Report of Project AA1368.97, Natural Heritage Trust. 162 pp. + appendices.
- Bower, C.C. (2007). *Flora and Fauna Impact Assessment -Proposed Orange Private Hospital Forest Road, Orange*. Report to Forest Road Syndicate Pty. Ltd.
- Bower, C., Semple, B. and Harcombe, L. (2002). *Eucalypts of the Central West of NSW*. NSW Department of Land and Water Conservation, Orange.
- DECC (2005). *Superb Parrot – Profile*.
<http://www.threatenedspecies.environment.nsw.gov.au/tsprofile/profile.aspx?id=10645>
Department of Environment and Climate Change, NSW
- Fisher, A.M. and Goldney, D.C. (1995). Fauna. Appendix E, *Cadia Gold Mine Environmental Impact Statement*. Volume 2. Newcrest Mining Limited, Belmont, WA
- Gibbons, P., Ayers, D., Seddon, J., Doyle, S. and Briggs, S. (2005). *Operational Manual for Biometric – A terrestrial Biodiversity Assessment Tool for the NSW Property Vegetation Plan Developer*. NSW Department of Environment and Conservation, Hurstville.
- Giles, W.E. (1961). A census of the flora of the south-western corner of the Orange district. *Australian Wildlife*. 4: 63-71.
- Goldney, D.C. and Bowie, I.J.S. (1987). *Scenic and Scientific Survey of the Central Western Region*. A Report to the Australian Heritage Commission by The National Trust of Australia (NSW). Volume 1. Mitchell College of Advanced Education, Bathurst.
- Harcombe, L. (2007). *Assessment of Crown Lands at Bloomfield, Orange*. NSW Department of Lands.
- Hunter, J.T. (2002). Vegetation and floristics of Canobolas State Recreation Area, Orange, New South Wales. *Cunninghamia* 7: 501-526.
- Keith, D. (2004). *Ocean Shores to Desert Dunes – The Native Vegetation of New South Wales and the ACT*. NSW Department of Environment and Conservation, Hurstville.
- Resource Strategies (2000). *Ridgeway Project Fauna Survey and Assessment Summary Report*. Appendix K, Ridgeway Project Environmental Impact Statement. Cadia Holdings Pty. Ltd., Orange, NSW.