

Appendix A Ecology Assessment

**Proposed Housing NSW developments -
Ambarvale and Rosemeadow
Preliminary ecological
assessment**

**Report Prepared for:
Urbis**

October 2010

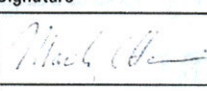
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**Prepared by:
STORM CONSULTING PTY LTD**

**UNDERGROUND WATER
STORMWATER RUNOFF
STREAMS & WATCOWAYS
ENVIRONMENTAL**

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TABLE OF CONTENTS

1.0 BACKGROUND	1
1.1. Background and Context.....	1
1.2. Objectives.....	1
2.0 METHODS.....	1
3.0 PLANNING CONTEXT	2
3.1. Threatened Species Conservation Act 1995	2
3.2. Environment Protection and Biodiversity Conservation Act 1999	2
3.3. Campbelltown LEP No 32 - Reg 16 Tree preservation	2
4.0 EXISTING ENVIRONMENT	3
4.1. General site characteristics.....	3
4.2. Flora species.....	3
4.3. Fauna habitat value	4
4.4. Vegetation condition and extent.....	5
4.5. EEC determination	11
5.0 CONCLUSION.....	12

APPENDIX A

THREATENED SPECIES DESKTOP EVALUATION

1.0 BACKGROUND

1.1. Background and Context

STORM CONSULTING (STORM) was engaged by Urbis to provide a preliminary ecological constraints assessment associated with planned housing developments at Ambarvale and Rosemeadow NSW (Figure 1).

A masterplan has been developed for both precincts yielding 170 lots at Rosemeadow and 453 lots at Ambarvale. This involves connection and upgrading of existing roads, civil works, upgrading of existing dwellings, creation of new lots, Torrens title subdivision, landscaping of gateway locations and rezoning of open space.

1.2. Objectives

The aims of this report is to:

1. Conduct preliminary level flora and fauna assessments at both sites to determine whether NSW or Commonwealth threatened species legislation would be triggered by the proposed action.
2. Where such legislation is triggered, provide a summary of the likely threatened species assessment and planning requirements that would need to be met as part of a development application.

2.0 METHODS

STORM conducted a site survey on May 1, 2010. Plant species were recorded within the proposed works sites. Determination of endangered ecological community (EEC) status was checked against descriptions in the DECCW NSW Scientific Committee Final Determinations.

A flora survey was conducted over a total of 1.5 person hours, with species recorded from all areas within the site containing woody vegetation and representative sections of grassed/lawn areas (remnant riparian vegetation directly to the north of the Ambarvale site was also surveyed to assess potential indirect impacts).

Fauna were assessed to an appropriate level for "gateway" planning via a combination of:

- A site habitat survey (recording the presence of habitat features including hollow bearing trees, feed trees, rocks, fallen branches and leaf litter and signs of nesting)
- Threatened species desktop database searches, followed by evaluation of the likelihood of each species using the site.

3.0 PLANNING CONTEXT

3.1. Threatened Species Conservation Act 1995

The *Threatened Species Conservation Act 1995* (TSC Act) specifies seven factors which must be considered by decision-makers regarding the effect of a proposed development or activity on threatened species, populations or ecological communities, or their habitats (DECC 2007). These factors form part of the threatened species assessment process under the *Environmental Planning and Assessment Act 1979* (EP&A Act) and are collectively referred to as the 'Seven-part Test' (DECC 2007).

Consent authorities have a statutory obligation, under Part 4 of the EP&A Act, to consider whether a proposal is likely to significantly affect threatened species, populations or ecological communities, or their habitats by applying the *Assessment of Significance* (7 part test). If the determination is made that there is likely to be a significant effect, then either:

- A Species Impact Statement (SIS) must be prepared and the concurrence of the Director-General of the Department of Environment, Climate Change and Water (DECCW) obtained prior to the consent authority making a determination, or
- The proposal may be modified such that a significant effect on threatened species, populations or ecological communities, or their habitats is unlikely (DEC 2004).

3.2. Environment Protection and Biodiversity Conservation Act 1999

The *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) enables the Australian Government to join with the states and territories in providing a national scheme of environment and heritage protection and biodiversity conservation.

Under the EPBC Act, actions that have, or are likely to have a significant impact on a matter of National Environmental Significance (NES) require approval from the Australian Government Minister for the Environment, Heritage and the Arts (DEH 2006).

The seven matters of NES that are protected under the EPBC Act are: World heritage properties; National heritage places; Wetlands of international importance; Listed threatened species and ecological communities; Migratory species protection under international agreements; Commonwealth marine areas; and Nuclear actions including uranium mines.

3.3. Campbelltown LEP No 32 - Reg 16 Tree preservation

Under this plan, a person shall not ringbark, cut down, top, lop or wilfully destroy any tree without the consent of the council.

4.0 EXISTING ENVIRONMENT

4.1. General site characteristics

The Ambarvale site consists of landscaped parkland, bordered by housing and roads. Numerous (single) rows of planted native trees are scattered throughout the site with lawns covering about 90% of the area. Remnant native vegetation is present along the riparian zone of the existing creek at the northern end of the site.

The Rosemeadow site consists of grassed parkland bordered by housing and roads, with only a small number of native trees and shrubs present.

4.2. Flora species

Thirty-five species were recorded at the Ambarvale site, comprising 16 native and 19 exotic species (Table 1). Fourteen species were recorded at the Rosemeadow site, comprising 7 native and 7 exotic species (Table 1).

No species of conservation significance listed under the NSW *Threatened Species Act 1995* (TSC Act), nor the Commonwealth *Environmental Protection and Biodiversity Conservation Act 2003* (EPBC Act) were recorded on site.

Table 1 Flora species list (* = exotic species)

Botanical name	Common name	Ambarvale	Rosemeadow
<i>Acacia decurrens</i>	Black Wattle	+	
<i>Allocasuarina littoralis</i>	Black She-Oak	+	
<i>Arctotheca calendula</i> *	Capeweed	+	
<i>Asparagus asparagoides</i> *	Bridal Creeper	+	
<i>Austrodanthonia tenuior</i>	A Wallaby Grass	+	+
<i>Bidens pilosa</i> *	Cobbler's Pegs	+	+
<i>Bothriochloa macra</i>	Red Grass		+
<i>Bursaria spinosa</i>	Native Blackthorn	+	
<i>Conyza bonariensis</i> *	Flaxleaf Fleabane	+	
<i>Corymbia maculata</i>	Spotted Gum	+	
<i>Cynodon dactylon</i> *	Couch, Bermudagrass	+	+
<i>Delairea odorata</i> *	Cape Ivy	+	
<i>Ehrharta erecta</i> *	Panic Veldtgrass	+	
<i>Einadia hastata</i>	Berry Saltbush	+	+
<i>Einadia nutans</i>	Climbing Saltbush	+	
<i>Eragrostis curvula</i> *	African Lovegrass	+	
<i>Eucalyptus bosistoana</i>	Coast Grey Box		+
<i>Eucalyptus consideniana</i>	Yertchuk	+	
<i>Eucalyptus fibrosa</i>	Red Ironbark	+	
<i>Eucalyptus moluccana</i>	Grey Box	+	
<i>Eucalyptus tereticornis</i>	Forest Red Gum	+	+
<i>Glycine microphylla</i>	Small-leaf Glycine		+
<i>Hardenbergia violacea</i>	False Sarsaparilla	+	
<i>Hypochaeris radicata</i> *	Catsear	+	+
<i>Ligustrum lucidum</i> *	Large-leaved Privet	+	
<i>Lycium ferocissimum</i> *	African Boxthorn	+	

<i>Malva parviflora</i> *	Small-flowered Mallow	+	
<i>Marsdenia rostrata</i>	Milk Vine	+	
<i>Melaleuca decora</i>		+	+
<i>Microlaena stipoides</i>	Weeping Grass	+	
<i>Olea europaea</i> *	Common Olive	+	
<i>Opuntia stricta</i> *	Common Prickly Pear	+	
<i>Paspalum urvillei</i> *	Vasey Grass	+	+
<i>Pennisetum clandestinum</i> *	Kikuyu Grass	+	+
<i>Setaria pumila</i> *	Pale Pigeon Grass	+	+
<i>Sida rhombifolia</i> *	Paddy's Lucerne	+	
<i>Sporobolus africanus</i> *	Parramatta Grass	+	+
<i>Tradescantia fluminensis</i> *	Wandering Jew	+	

4.3. Fauna habitat value

The Ambarvale site possesses some fauna habitat value in the local context. The main value is as bird habitat. However during the site survey, it was noted that only large, common birds were using the site. This is typical of urban (and rural) areas that lack complex vegetation structure. This lack of structure restricts the ability of small birds to find suitable habitat and protection from large birds.

The Rosemeadow site possesses no native fauna habitat, with only a small number of relatively young native trees and shrubs.

No habitat feature such as rocks, fallen logs or tree hollows were recorded within either of the sites.

In the regional context, both sites are clearly inferior in terms of fauna habitat compared to the large extent of alternative habitat (Figure 1), due to a lack of vegetation structure, a lack of tree hollows etc., the small, narrow and fragmented nature of each patch of trees and ongoing disturbance to fauna related to urban land use.

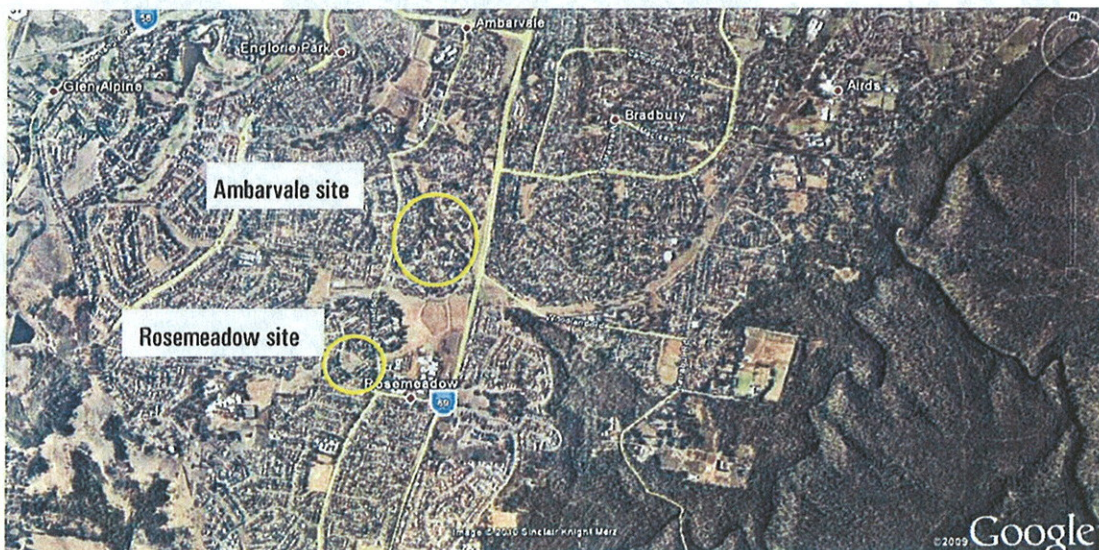


Figure 1: Site locations and regional extent of native vegetation/fauna habitat.

4.4. Vegetation condition and extent

Ambarvale

Approximately 90% of this site comprises exotic lawns (approx. 3.5ha), with the remaining 10% (approx. 0.4ha) consisting of rows of planted native trees. Most trees are relatively small and are unlikely to be between 10 and 20 years old. No hollow bearing trees are present. Weeds (mainly groundcovers) are common across the site. A small number of native understorey plants are present, although adjacent exotic lawn species have invaded the majority of the ground layer. The patch of woody vegetation shown in Figure 5 consists entirely of exotic species (African Olive and Wandering Jew).

Landform has been altered across the entire site, as illustrated in the site photographs.

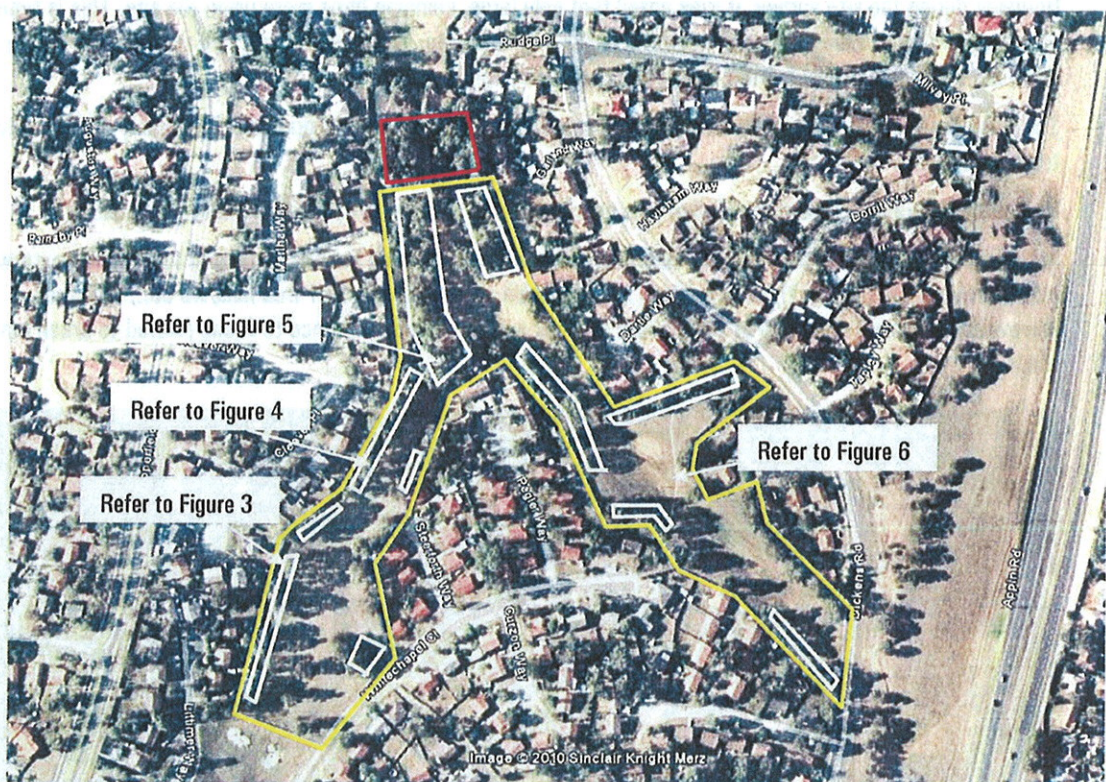


Figure 2 Ambarvale site boundary (yellow outline) and the extent of native vegetation plantings (white outline), and extent of remnant River-flat Eucalypt Forest EEC directly downstream of the site (red outline).



Figure 3. South-western arm of Ambarvale site. Refer to Figure 2 for location.



Figure 4. Northern arm of Ambarvale site. Refer to Figure 2 for location.



Figure 5. Patch of non-native vegetation at the Ambarvale site, which is dominated by the weeds African Olive and Wandering Jew. Refer to Figure 2 for location.



Figure 6. Eastern arm of the Ambarvale site. Refer to Figure 2 for location.

Rosemeadow

Approximately 99% of the site comprises exotic lawns (approx. 0.99ha), with the remaining 1% (approx. 0.01ha) consisting of scattered plantings of native trees and shrubs. Most trees are relatively small and are unlikely to be greater than 10 -15 years old. Few native shrubs are present and the ground layer is dominated by exotic grasses. No hollow bearing trees, or other fauna habitat such as fallen timber, rocks or leaf litter are present.



Figure 7. Julius Reserve, Rosemeadow (Lot 33, DP 700703) site boundary (yellow outline), showing that the site is almost entirely covered with maintained lawn, with scattered plantings of native trees (white outline). Refer to Figures 8 - 11 for site photographs.



Figure 8. Native planting at the western end of the Rosemeadow site



Figure 9. Native planting at the north-western end of the Rosemeadow site



Figure 10. Typical view of the Rosemeadow site, showing that it is almost entirely covered by managed lawns



Figure 11. A clump of planted native trees at the south-western corner of the Rosemeadow site

4.5. EEC determination

The tree plantings within the subject land (i.e. both Ambarvale and Rosemeadow sites) contain species that are endemic to the Cumberland Plain. However, these plantings comprise single rows of trees flanked by managed exotic lawns, with a resultant lack of vegetation structure and understorey complexity that normally characterises the Cumberland Plain Woodland ecological community. Point 4 in the Scientific Committee Final Determination for Cumberland Plain Woodland states: "The understorey is generally grassy to herbaceous with patches of shrubs, or if disturbed, contains components of indigenous native species sufficient to re-establish the characteristic native understorey", while Point 5 states: "The Cumberland Plain Woodland includes regrowth which is likely to achieve a near natural structure or is in a seral stage towards that structure". Occurring in discontinuous single rows within parkland comprising exotic lawns, the vegetation within the subject land does not currently possess the above characteristics and is unlikely to develop towards such structure and species composition due to current land use, management and disturbance.

Fauna habitat values of the vegetation are low, with only limited roosting and foraging habitat present and little or no shrub habitat for small birds. Therefore, the subject land represents little of the potential native fauna component of Cumberland Plain Woodland.

Therefore, it is deemed that this vegetation does not constitute *Cumberland Plain Woodland endangered ecological community* (as listed under the NSW Threatened Species Conservation Act 1995), nor *Cumberland Plain Shale Woodlands and Shale-Gravel Transition Forest critically endangered ecological community* (as listed under the Commonwealth Environment Protection and Biodiversity Conservation Act 1999)

5.0 CONCLUSION

Threatened flora species

No threatened flora species were found at the sites. It is highly unlikely that any such species would be found during other seasons due to the highly disturbed condition of the sites (refer also to the desktop assessment (Appendix A)).

Threatened fauna species

A site habitat assessment found that both sites to be of low fauna habitat value due to: their highly disturbed condition; lack of complex vegetation structure; the relatively young age of the trees; the lack of tree hollows, rock and fallen logs; the close proximity of the sites to human disturbance; and regular disturbance/predation from pets. A desktop evaluation (Appendix A) found that the site provides suitable roosting or foraging habitat for a small proportion of threatened fauna species known or predicted to occur in the region. Future stages of the planning process would require more thorough fauna studies, including site surveys and associated significance assessments under the TSC Act or EPBC Act. Development of mitigation measures would form part of this process to minimise potential impacts on threatened fauna.

Endangered Ecological Communities

Both areas of land contain rows of planted trees with species that are endemic to the Cumberland Plain. However, these plantings comprise single rows of trees that are separated by managed exotic lawns, with an associated lack of vegetation structure/understorey complexity that typifies the Cumberland Plain Woodland EEC. Under current land management, the vegetation is unlikely to "re-establish the characteristic native understorey" of the EEC, or to be "likely to achieve a near natural structure or a seral stage towards that structure". Both of these descriptions are criteria under the NSW Scientific Committee Final Determination for Cumberland Plain Woodland.

Therefore, it is deemed that this vegetation does not constitute *Cumberland Plain Woodland endangered ecological community* (as listed under the NSW Threatened Species Conservation Act 1995), nor *Cumberland Plain Shale Woodlands and Shale-Gravel Transition Forest critically endangered ecological community* (as listed under the Commonwealth Environment Protection and Biodiversity Conservation Act 1999).

The riparian area directly to the north of the Ambarvale site comprises remnant vegetation (albeit highly disturbed) that represents the River-flat Eucalypt Forest EEC, which is listed under the TSC Act. Due to the potential for development to impact on this EEC, an Assessment of Significance under the TSC Act would be required as part of a development application. Development of mitigation measures are typically required to minimise potential impacts associated with the development.

APPENDIX A

Threatened species desktop evaluation

Legend for Table 1:

Likelihood of occurring within study area:

No (no suitable habitat based on known habitat requirements within the study area and species has limited mobility; in the case of flora, site extensively searched during an appropriate time of year for detection and species not present)

Unlikely (no suitable habitat is present, but there are records in the locality and the species is highly-mobile)

Possible (recorded in the locality, suitable habitat within the study area)

Yes (recorded during the field survey).

V = Vulnerable

E = Endangered

CE = Critically Endangered

M = Migratory

POP = Endangered Population

TSC = NSW *Threatened Species Conservation Act 1995*

EPBC = *Commonwealth Environment Protection and Biodiversity Conservation Act 1999*

Species	Scientific Name	Legal Status	Habitat	Recorded previously in locality	Potential habitat in the study area	Likelihood of species occurring within study area
Birds						
Barking Owl	<i>Ninox connivens</i>	V TSC	Inhabits woodland and open forest, including fragmented remnants and partly cleared farmland. Requires very large permanent territories in most habitats due to sparse prey densities. Monogamous pairs hunt over as much as 6000 hectares, with 2000 hectares being more typical in NSW habitats.	Yes	No	Unlikely
Black-chinned Honeyeater (eastern subspecies)	<i>Melithreptus gularis gularis</i>	V TSC	Occupies mostly upper levels of drier open forests or woodlands dominated by box and ironbark eucalypts, especially Mugga Ironbark (<i>Eucalyptus sideroxylon</i>), White Box (<i>E. albens</i>), Inland Grey Box (<i>E. microcarpa</i>), Yellow Box (<i>E. melliodora</i>) and Forest Red Gum (<i>E. tereticornis</i>).	Yes	No	No
Black-necked Stork	<i>Ephippiorhynchus asiaticus</i>	E TSC	Mainly found on shallow, permanent, freshwater terrestrial wetlands, and surrounding marginal vegetation.	Yes	No	No
Black-tailed Godwit	<i>Limosa limosa</i>	V TSC	Primarily a coastal species. Further inland, it can also be found on mudflats and in shallow water, around muddy lakes and swamps.	Yes	No	No
Brown Treecreeper	<i>Climacteris picumnus</i>	V TSC	Found in eucalypt woodlands (including Box-Gum Woodland) and dry open forest of the inland slopes and plains inland of the Great Dividing Range; mainly inhabits woodlands dominated by stringybarks or other rough-barked eucalypts, usually with an open grassy understorey, sometimes with one or more shrub species; also found in mallee	Yes	Yes	Possible

Species	Scientific Name	Legal Status	Habitat	Recorded previously in locality	Potential habitat in the study area	Likelihood of species occurring within study area
			and River Red Gum (<i>Eucalyptus camaldulensis</i>) Forest bordering wetlands with an open understorey of acacias, saltbush, lignum, cumbungi and grasses; usually not found in woodlands with a dense shrub layer; fallen timber is an important habitat component for foraging; also recorded, though less commonly, in similar woodland habitats on the coastal ranges and plains. Sedentary, considered to be resident in many locations throughout its range; present in all seasons or year-round at many sites; territorial year-round, though some birds may disperse locally after breeding.			
Bush Stone-curlew	<i>Burhinus grallarius</i>	E TSC	Inhabits open forests and woodlands with a sparse grassy groundlayer and fallen timber.	Yes	No	No
Diamond Firetail	<i>Stagonopleura guttata</i>	V TSC	Feeds exclusively on the ground, on ripe and partly-ripe grass and herb seeds and green leaves, and on insects (especially in the breeding season). Found in grassy eucalypt woodlands, including Box-Gum Woodlands and Snow Gum <i>Eucalyptus pauciflora</i> Woodlands. Also occurs in open forest, mallee, Natural Temperate Grassland, and in secondary grassland derived from other communities. Often found in riparian areas (rivers and creeks), and sometimes in lightly wooded farmland.	Predicted to occur	Yes	Unlikely, populations mostly sedentary, with no local records to date

Species	Scientific Name	Legal Status	Habitat	Recorded previously in locality	Potential habitat in the study area	Likelihood of species occurring within study area
Flame Robin	<i>Petroica phoenicea</i>	V TSC	Breeds in upland tall moist eucalypt forests and woodlands, often on ridges and slopes. In winter, birds migrate to drier more open habitats in the lowlands.	Yes	Yes	Possible
Gang-gang Cockatoo	<i>Callocephalon fimbriatum</i>	V TSC	In summer, generally found in tall mountain forests and woodlands, particularly in heavily timbered and mature wet sclerophyll forests. In winter, may occur at lower altitudes in drier more open eucalypt forests and woodlands, and often found in urban areas.	Yes	Yes	Possible
Glossy Black-cockatoo	<i>Calyptorhynchus lathami</i>	V TSC	Open forest and woodlands of the coast, Great Divide (to 1000m) and western NSW where stands of she-oak species provide feed resources, particularly Black She-oak (<i>Allocasuarina littoralis</i>), Forest She-oak (<i>A. torulosa</i>) or Drooping She-oak (<i>A. verticillata</i>) occur. Dependent on large hollow-bearing eucalypts for nest sites.	Yes	Yes	Unlikely, very few She-oaks in the site.
Hooded Robin (south-eastern form)	<i>Melanodryas cucullata cucullata</i>	V TSC	Prefers lightly wooded country, usually open eucalypt woodland, acacia scrub and mallee, often in or near clearings or open areas. Requires structurally diverse habitats featuring mature eucalypts, saplings, some small shrubs and a ground layer of moderately tall native grasses. Often perches on low dead stumps and fallen timber or on low-hanging branches, using a perch-and-pounce method of hunting	Predicted to occur	No	No, insufficient habitat

Species	Scientific Name	Legal Status	Habitat	Recorded previously in locality	Potential habitat in the study area	Likelihood of species occurring within study area
			insect prey.			
Little Eagle	<i>Hieraaetus morphnoides</i>	V TSC	Occupies open eucalypt forest, woodland or open woodland. Sheoak or acacia woodlands and riparian woodlands of interior NSW are also used. Nests in tall living trees within a remnant patch, where pairs build a large stick nest in winter.	Yes	No	Unlikely
Little Lorikeet	<i>Glossopsitta pusilla</i>	V TSC	Forages primarily in the canopy of open Eucalyptus forest and woodland, yet also finds food in Angophoras, Melaleucas and other tree species. Riparian habitats are particularly used, due to higher soil fertility and hence greater productivity.	Yes	No	Unlikely
Painted Honeyeater	<i>Grantiella picta</i>	V TSC	Inhabits Boree, Brigalow and Box-Gum Woodlands and Box-Ironbark Forests. A specialist feeder on the fruits of mistletoes growing on woodland eucalypts and acacias. Prefers mistletoes of the genus <i>Amymma</i> . Insects and nectar from mistletoe or eucalypts are occasionally eaten. Nest from spring to autumn in a small, delicate nest hanging within the outer canopy of drooping eucalypts, she-oak, paperbark or mistletoe branches.	Yes	No	No, no mistletoe in the area
Painted Snipe (Australian subspecies)	<i>Rostratula benghalensis australis</i>	E TSC V EPBC M EPBC	Prefers fringes of swamps, dams and nearby marshy areas where there is a cover of grasses, lignum, low scrub or open timber.....	Predicted to occur	No	No

Species	Scientific Name	Legal Status	Habitat	Recorded previously in locality	Potential habitat in the study area	Likelihood of species occurring within study area
Powerful Owl	<i>Ninox strenua</i>	V TSC	Inhabits a range of vegetation types, from woodland and open sclerophyll forest to tall open wet forest and rainforest. The Powerful Owl requires large tracts of forest or woodland habitat but can occur in fragmented landscapes as well. The species breeds and hunts in open or closed sclerophyll forest or woodlands and occasionally hunts in open habitats.	Yes	Yes	Unlikely
Regent Honeyeater	<i>Xanthomyza phrygia</i>	E TSC E EPBC	Regent Honeyeaters inhabit woodlands that support a significantly high abundance and species richness of bird species. These woodlands have significantly large numbers of mature trees, high canopy cover and abundance of mistletoes.	Yes	No	Unlikely
Scarlet Robin	<i>Petroica boodang</i>	V TSC	The Scarlet Robin is primarily a resident in forests and woodlands, but some adults and young birds disperse to more open habitats after breeding	Yes	Yes	Possible
Spotted Harrier	<i>Circus assimilis</i>	V TSC	Occurs in grassy open woodland including acacia and mallee remnants, inland riparian woodland, grassland and shrub steppe. It is found most commonly in native grassland, but also occurs in agricultural land, foraging over open habitats including edges of inland wetlands. Builds a stick nest in a tree and lays eggs in spring (or sometimes autumn), with young remaining in the nest for several months.	Yes	Yes	Unlikely

Species	Scientific Name	Legal Status	Habitat	Recorded previously in locality	Potential habitat in the study area	Likelihood of species occurring within study area
			Preys on terrestrial mammals (eg bandicoots, bettongs, and rodents), birds and reptile, occasionally insects and rarely carrion.			
Swift Parrot	<i>Lathamus discolor</i>	E TSC E EPBC	Migrates to the Australian south-east mainland between March and October. On the mainland they occur in areas where eucalypts are flowering profusely or where there are abundant lerp (from sap-sucking bugs) infestations. Favoured feed trees include winter flowering species such as Swamp Mahogany <i>Eucalyptus robusta</i> , Spotted Gum <i>Corymbia maculata</i> , Red Bloodwood <i>C. Gummifera</i> , Mugga Ironbark <i>E. Sideroxylon</i> , and White Box <i>E. Albens</i> .	Yes	No	Unlikely
White-fronted Chat	<i>Epthianura albigrons</i>	V TSC E POP TSC	Found in saltmarsh and mangrove habitats occasionally foraging on open fields	Yes	No	No
Frogs						
Green and Golden Bell Frog	<i>Litoria aurea</i>	E TSC V EPBC	Inhabits marshes, dams and stream-sides, particularly those containing bulrushes (<i>Typha</i> spp.) or spikerushes (<i>Eleocharis</i> spp.).	Yes	Yes, in drainage line downstream of site	Unlikely, highly disturbed site
Red-crowned Toadlet	<i>Pseudophryne australis</i>	V TSC	Occurs in open forests, mostly on Hawkesbury and Narrabeen Sandstones. Inhabits periodically wet drainage lines below sandstone ridges that often have	Yes	Yes, in drainage line downstream	Unlikely, highly disturbed site



Species	Scientific Name	Legal Status	Habitat	Recorded previously in locality	Potential habitat in the study area	Likelihood of species occurring within study area
			shale lenses or cappings.		area of site	
Invertebrates						
Cumberland Plain Land Snail	<i>Meridolum comeovirens</i>	E TSC	Primarily inhabits Cumberland Plain Woodland. This community is a grassy, open woodland with occasional dense patches of shrubs.	Yes	No	No
Mammals						
Spotted-tailed Quoll	<i>Dasyurus maculatus</i>	V TSC E EPBC	Recorded across a range of habitat types, including rainforest, open forest, woodland, coastal heath and inland riparian forest, from the sub-alpine zone to the coastline. Recorded across a range of habitat types, including rainforest, open forest, woodland, coastal heath and inland riparian forest, from the sub-alpine zone to the coastline.	Yes	No	No, insufficient habitat extent, quality and connectivity
Koala	<i>Phascolarctos cinereus</i>	V TSC	Inhabit eucalypt woodlands and forests. Home range size varies with quality of habitat, ranging from less than two ha to several hundred hectares in size.	Yes	No	No, insufficient habitat extent, quality and connectivity
Eastern Pygmy-possum	<i>Cercartetus nanus</i>	V TSC	Found in a broad range of habitats from rainforest through sclerophyll (including Box-ironbark) forest and woodland to heath, but in most areas woodlands and heath appear to be preferred.	Yes	No	No
Grey-headed Flying-fox	<i>Pteropus poliocephalus</i>	V TSC V EPBC	Occur in subtropical and temperate rainforests, tall sclerophyll forests and woodlands, heaths and swamps as well as	Yes	No	No

Species	Scientific Name	Legal Status	Habitat	Recorded previously in locality	Potential habitat in the study area	Likelihood of species occurring within study area
			urban gardens and cultivated fruit crops. Roosting camps are generally located within 20 km of a regular food source and are commonly found in gullies, close to water, in vegetation with a dense canopy.			
Yellow-bellied Sheath-tail-bat	<i>Saccolaimus flaviventris</i>	V TSC	Roosts singly or in groups of up to six, in tree hollows and buildings; in treeless areas they are known to utilise mammal burrows.	Yes	No	Unlikely
Eastern Freetail-bat	<i>Mormopterus norfolkensis</i>	V TSC	Occur in dry sclerophyll forest, woodland, swamp forests and mangrove forests east of the Great Dividing Range.	Yes	No	Unlikely
Eastern False Pipistrelle	<i>Falsistrellus tasmaniensis</i>	V TSC	Prefers moist habitats, with trees taller than 20 m.	Yes	No	No
Eastern Bentwing-bat	<i>Miniopterus schreibersii oceanensis</i>	V TSC	Caves are the primary roosting habitat, but also use derelict mines, storm-water tunnels, buildings and other man-made structures.	Yes	No	Unlikely
Large-footed Myotis	<i>Myotis macropus</i>	V TSC	Generally roost in groups of 10 - 15 close to water in caves, mine shafts, hollow-bearing trees, storm water channels, buildings, under bridges and in dense foliage. Forage over streams and pools catching insects and small fish by raking their feet across the water surface.	Yes	No	Unlikely
Greater Broad-nosed Bat	<i>Scoteanax rueppellii</i>	V TSC	Utilises a variety of habitats from woodland through to moist and dry eucalypt forest and rainforest, though it is most commonly found in tall wet forest.	Yes	No	Unlikely

Species	Scientific Name	Legal Status	Habitat	Recorded previously in locality	Potential habitat in the study area	Likelihood of species occurring within study area
Reptiles						
Broad-headed Snake	<i>Hoplocephalus bungaroides</i>	E TSC V EPBC	Largely confined to Triassic and Permian sandstones, including the Hawkesbury, Narrabeen and Shoalhaven groups, within the coast and ranges in an area within approximately 250 km of Sydney. Shelters in rock crevices and under flat sandstone rocks on exposed cliff edges during autumn, winter and spring. Moves from the sandstone rocks to shelters in hollows in large trees within 200 m of escarpments in summer.	Predicted to occur	No	No
Rosenberg's Goanna	<i>Varanus rosenbergi</i>	V TSC	Found in heath, open forest and woodland.	Yes	No	No

Flora

Species	Scientific Name	Legal Status	Habitat	Recorded during survey	Recorded previously in locality	Potential habitat in the study area	Likelihood of species occurring within study area
Flora							
Woronora Beard-heath	<i>Leucopogon exolasius</i>	V TSC V EPBC	The plant occurs in woodland on sandstone.	No	Yes	No	No, wrong habitat, highly disturbed site
Matted Bush-pea	<i>Pultenaea pedunculata</i>	E TSC	The Matted Bush-pea occurs in a range of habitats. NSW populations are generally among woodland vegetation but plants have also been found on road batters and coastal cliffs. It is largely confined to loamy soils in dry gullies in populations in the Windellama area.	No	Yes	No	No, highly disturbed site
Downy Wattle	<i>Acacia pubescens</i>	V TSC V EPBC	Occurs in open woodland and forest, in a variety of plant communities, including Cooks River/ Castlereagh Ironbark Forest, Shale/ Gravel Transition Forest and Cumberland Plain Woodland. The soils are characteristically gravely soils, often with ironstone.	No	Yes	No	No, large species that would have been found if present, highly disturbed site
	<i>Gyrostelemon</i>	E TSC	Within NSW, has only	No	Yes	No	No, large species

Species	Scientific Name	Legal Status	Habitat	Recorded during survey	Recorded previously in locality	Potential habitat in the study area	Likelihood of species occurring within study area
	<i>thesioides</i>		ever been recorded at three sites, to the west of Sydney, near the Colo, Georges and Nepean Rivers. Grows on hillsides and riverbanks and may be restricted to fine sandy soils.				that would have been found if present, highly disturbed site, requires sandy riparian area
Netted Bottlebrush	<i>Callistemon linearifolius</i>	V TSC	Grows in dry sclerophyll forest on the coast and adjacent ranges.	No	Yes	No	No, large species that would have been found if present, highly disturbed site
Deane's Paperbark	<i>Melaleuca deanei</i>	V TSC V EPBC	The species grows in heath on sandstone.	No	Yes	No	No, large species that would have been found if present, highly disturbed site
Magenta Lilly Pilly	<i>Syzygium paniculatum</i>	ETSC V EPBC	Magenta Lilly Pilly occurs on gravels, sands, silts and clays in riverside gallery rainforests and remnant littoral rainforest communities.	No	Yes	No	No, wrong habitat, large species that would have been found if present, highly disturbed site
Sydney Plains Greenhood	<i>Pterostylis saxicola</i>	E TSC E EPBC	Most commonly found growing in small pockets of shallow soil in depressions on sandstone rock shelves above cliff lines. The	No	Yes	No	No, highly disturbed site

Species	Scientific Name	Legal Status	Habitat	Recorded during survey	Recorded previously in locality	Potential habitat in the study area	Likelihood of species occurring within study area
			vegetation communities above the shelves where the species occurs are sclerophyll forest or woodland on shale/sandstone transition soils or shale soils.				
Small-flower Grevillea	<i>Grevillea parviflora subsp. parviflora</i>	V TSC V EPBC	Grows in sandy or light clay soils usually over thin shales. Occurs in a range of vegetation types from heath and shrubby woodland to open forest.	No	Yes	Possible	No, large species that would have been found if present, highly disturbed site
Nodding Geebung	<i>Persoonia nutans</i>	E TSC E EPBC	Confined to aeolian and alluvial sediments and occurs in a range of sclerophyll forest and woodland vegetation communities, with the majority of individuals occurring within Agnes Banks Woodland or Castlereagh Scribbly Gum Woodland.	No	Yes	No	No, wrong habitat, large species that would have been found if present, highly disturbed site
Spiked Rice-flower	<i>Pimelea spicata</i>	E TSC E EPBC	On the inland Cumberland Plain sites it is associated with Grey Box and Ironbark. The species is threatened by Mowing, grazing or other	No	Yes	Possible	Unlikely. Study Area was extensively searched at an appropriate time of year for

Species	Scientific Name	Legal Status	Habitat	Recorded during survey	Recorded previously in locality	Potential habitat in the study area	Likelihood of species occurring within study area
			types of habitat modification such as weed invasion, rubbish dumping or urban runoff.				detection and species not present, highly disturbed site