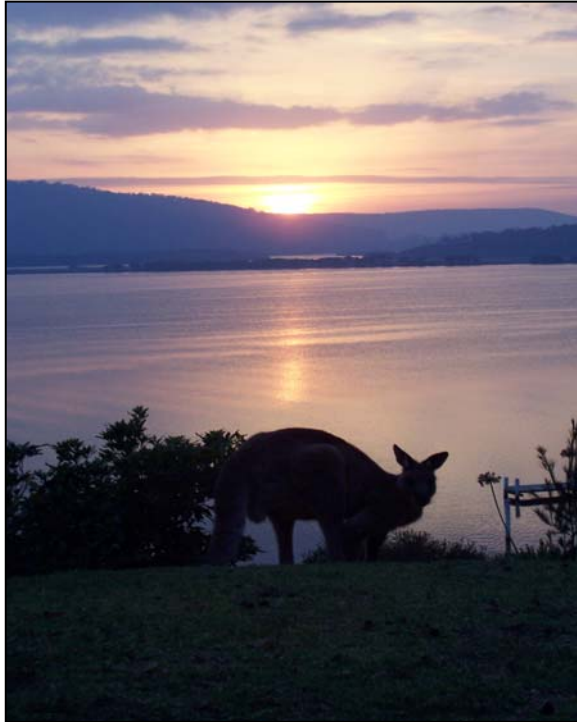


Flora and fauna survey, Picnic Point Subdivision, Lake Wonboyn.

**Picnic Point,
Lake Wonboyn,
NSW**



April 2008

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On behalf of the

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Please note that, given the dynamic nature of the relevant pieces of environmental legislation considered in this report, the authors consider that this report only has a 'shelf life' of six months. If a development application, review of environmental factors or statement of environmental effect is not submitted to a determining authority for consideration within this time frame, it is recommended that this report be reviewed and revised where required in light of any relevant legislative listings or changes.

EXECUTIVE SUMMARY

At the request of The Planning Group on behalf of Picnic Point Pty Ltd, a vascular flora and vertebrate fauna study has been undertaken within a property that fronts Wonboyn River north of the township of Wonboyn, New South Wales. The survey has been conducted as Picnic Point Pty Ltd is proposing to subdivide the site. The investigation has been conducted to consider the ecological impacts associated with the undertaking of the above Proposal. The flora and fauna investigation has been conducted to determine the diversity of plants and animals, vegetation communities and fauna habitats present within the area investigated. The survey concentrated on determining the presence of any species, populations or communities listed under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* and/or NSW *Threatened Species Conservation Act 1995* thereby assessing their reliance on the ecological resources present and any likely impacts on the viability of these animals and plants as a result of the undertaking the Proposal. During the field investigations a series of fauna and flora identification techniques were employed, these being selected based on the outcomes of a literature and database review of plants and animals that could be present.

By the completion of the field investigations, six vegetation communities were recognised these being: Silvertop Ash – Red Bloodwood Woodland, White Stringybark – Rough-barked Apple – Silvertop Ash Woodland, Coast Grey Box – Woollybutt – White Stringybark Tall Open Forest, Scented Paperbark Scrub/Closed Scrub, Saltmarsh and Bracelet Honey-myrtle Scrub. Of these, Saltmarsh and Bracelet Honey-myrtle Scrub correspond (respectively) to the state listed Endangered Ecological Communities, Coastal Saltmarsh and Swamp Oak Floodplain Forest. No flora species listed on the *Threatened Species Conservation Act 1995* or *Environment Protection and Biodiversity Conservation Act 1999* were found at the subject site. The Coastal Saltmarsh is potential habitat for Australian Saltgrass *Distichlis distichophylla* which is listed as endangered on the *Threatened Species Conservation Act 1995*. Impacts on this threatened species and the two endangered ecological communities recorded were considered using the assessment factors under Section 5A of the *Environmental Planning and Assessment Act 1979*. From this, it was found that the Proposal is unlikely to have a significant effect on *Distichlis distichophylla*, Coastal Saltmarsh and Swamp Oak Floodplain Forest, or their habitats.

One species, the White-bellied Sea-eagle (*Haliaeetus leucogaster*) listed under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* was identified as being present within the study area. In addition, seven state listed species, these being Yellow-bellied Glider (*Petaurus australis*), Eastern Bentwing-bat (*Miniopterus schreibersii*), Greater Broad-nosed Bat (*Scoteanax rueppellii*), Sooty Oystercatcher (*Haematopus fuliginosus*), Glossy Black-Cockatoo (*Calyptorhynchus lathami*), Gang-gang Cockatoo (*Callocephalon fimbriatum*), and Powerful Owl (*Ninox strenua*) were also recorded. Giving consideration to the assessment criteria provided by Section 5A of the *Environmental Planning and Assessment Act 1979* and the *Environment Protection and Biodiversity Conservation Act 1999* Significant Impact Guidelines, it was concluded that the Proposal would not have a significant impact on any of these species, their populations or any major components of their necessary habitats provided appropriate mitigation measures are implemented.

Based on the findings of the field investigations, combined with the results of the literature and database searches, it is considered that, with the adoption of those mitigation measures recommended, there are no ecological constraints to the Proposal proceeding as planned.

In line with the principles of Ecologically Sustainable Development identified in Schedule 2 of the Environmental Planning and Assessment Regulations, several mitigation measures have been recommended thereby ensuring that the Proposal is undertaken in an ecologically sustainable manner.

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I. Introduction.

At the request of The Planning Group on behalf of Picnic Point Pty Ltd, a vascular flora and vertebrate fauna survey has been undertaken on land that fronts Wonboyn Lake, Wonboyn, NSW (Figure 1a). The survey has been undertaken as Picnic Point Pty Ltd is proposing to subdivide Portion 14 into seven rural lots (6 of which will be more than 2 hectares in size and the remainder of the land retained within a larger, residual lot), as well as adjusting the boundary with the adjoining Lot B (Figure 1b). The subject site is located on private land that occurs two kilometres north-east of the township of Wonboyn Lake. The proposed subdivision and boundary adjustment includes the construction of:

- a new access carriageway; and
- a fire trail.

When sampling the proposed subdivision sites, the field investigation included those areas likely to be lost due to the direct affects of the development. Indirect impacts due to construction traffic and noise, vegetation dieback, microhabitat changes and so forth were also considered.

With reference to the definitions provided by the Department of Environment and Climate Change (DECC) (DECC 2004) it is noted that the:

- Subject site is defined as: the area(s) directly affected by the Proposal;
- Study area is defined as: the subject site and any additional areas that are likely to be affected by the Proposal, either directly or indirectly; and
- A local population is defined as: the population that occurs within the study area, unless the existence of contiguous or proximal occupied habitat and the movement of individuals or exchange of genetic material across the boundary can be demonstrated.

For the purposes of this investigation, the study region is considered to include the surrounding lands for a distance of up to 5 kilometres (km). When referring to the Proposal, this is considered to include all works associated with the development's construction and occupation.

In undertaking the field survey, the following assumptions have been made:

- 1) The proposed construction of dwellings will be setback approximately 75m from the shoreline;
- 2) All dwellings will be surrounded by a 20 metre (m) to 40m width Asset Protection Zone of (20m on the lake side/40m on three landward sides);
- 3) The extent of vegetation removal on each lot would be limited through the selection of an appropriate dwelling location;
- 4) The location of the dwellings would be such that, within the limits of safe living, the clearing of mature, hollow-bearing trees is avoided;
- 5) The dwelling locations selected would avoid, or minimise the disturbance of, any areas of national or state ecological significance; and
- 6) Vehicle movement would be restricted, where possible, to the existing unsealed road/fire trail network.

It is noted that, whilst conducting the field work, various matters of ecological significance were drawn to the proponent's attention (e.g. on site presence of Yellow-bellied Gliders [*Petaurus australis*] and the nearby occurrence of a Coastal Saltmarsh). As a result of this, the proponent has modified the development layout (including issues such as the sighting of homes and access roads) thereby ensuring habitat for these species and ecological communities are retained and protected.

The potential impacts associated with the Proposal have been considered with reference to Part 3A of the *Environmental Planning and Assessment Act 1979*. It is acknowledged that at the time of report preparation, only draft guidelines were available to assist with the assessment of threatened species under Part 3A. As such, the likely impact of the Proposal on these species is assessed using the criteria listed under Section 5A of the *Environmental Planning and Assessment Act 1979* (these commonly referred to as the 'seven part test'), this considered to meet the assessment requirements as provide within the draft Part 3A guidelines.

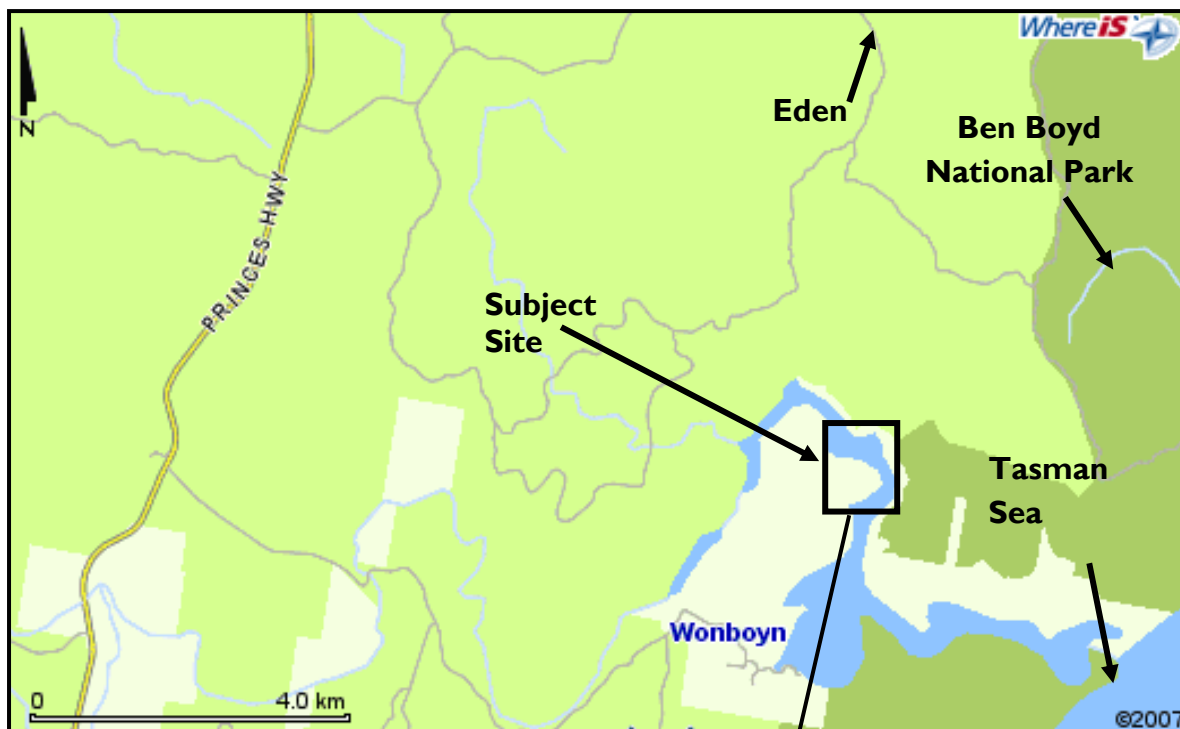


Figure 1a. Study area and location (Source: whereis.com.au 2008).

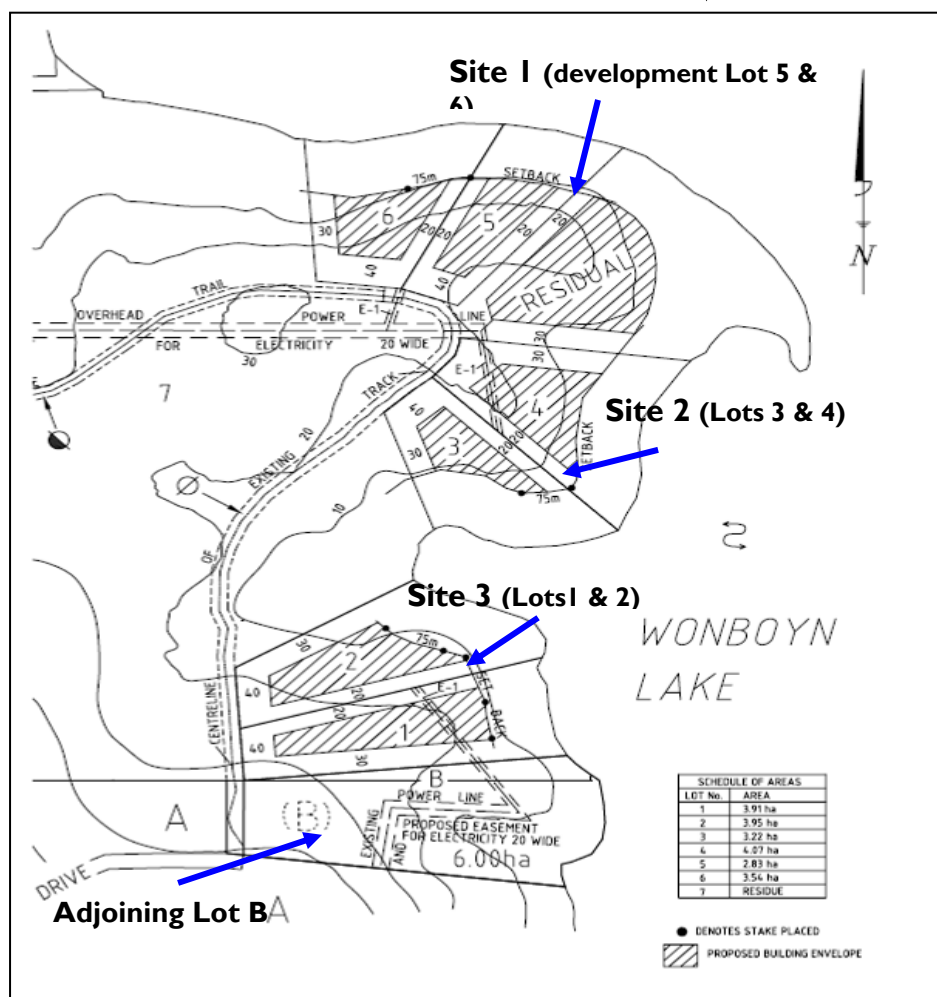


Figure 1b. Study area and proposed subdivision (Source: Picnic Point Pty Ltd).

Consideration has also been given to the objectives of, and where appropriate assessment criteria provided under, the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act), the NSW *Environmental Planning and Assessment Act 1979*, the NSW *National Parks and Wildlife Act 1974* (NPW Act) and NSW *Threatened Species Conservation Act 1995* (TSC Act).

The purpose of the flora and fauna investigation is to assess the direct and indirect ecological impacts associated with the resultant loss of habitat as a result of the proposed subdivision. To achieve the objectives of the terrestrial ecological investigation, a series of flora and fauna surveys of the subject site have been undertaken. During these investigations, the structure and diversity of those vegetation communities and fauna habitats present were identified along with the dominant plant and animal assemblages present. By identifying the diversity and health of those vegetation communities and fauna habitats present, along with their dominant assemblages, their value for species listed under the Schedules to the EPBC and TSC Acts can be identified.

2. Environmental setting.

The study site is located within the Bega Valley Shire Local Government Area (LGA), approximately 30km south of the town of Eden. The site is located at the eastern end of Ivor Jones Road (Figure 2), although the road does not give access to all the proposed building envelopes. Currently access to the remainder of the development sites is by boat. Forested land occurs to the west, the settlement of Wonboyn Lake and Wonboyn Lake itself to the south and Wonboyn River to the east and north (the shoreline abutting Sites 1, 2, and 3).

Landuses that occur in the vicinity of the study area include holiday homes, cleared areas, jetties, and relatively untouched woodland. Oyster leases are common within Wonboyn Lake. The subject site has experienced little human disturbance over time, but the western part of the subject site appears to have been regularly burnt. The eastern part of the subject site contains some stands of healthy forest, other portions having been cleared, underscrubbed and used for camping. Within the study area, the shoreline slopes are between 20 – 45 degrees. It is noted that only the eastern portion of the study area will undergo clearing and modification, and of that, only within the extent of the proposed building envelopes and associated Asset Protection Zones. The development of the site would affect a percentage of this vegetation, this totalling an area of around 6.1 hectares (ha) (Morse McVey 2005). The majority of the bushland on the western side of the study area (this totalling around 103ha) would be retained in its current state.

Being private land, with restricted public access, the bushland portions of the study area are relatively unspoiled. Whilst this is the case, it is noted that, within the areas likely to be affected by the Proposal (particularly Site 3), the road verges have been cleared for a total width of around 8m. Presumably these areas have been cleared and are regularly maintained as part of bushfire hazard reduction program. In addition, portions of Site 3 have been cleared and underscrubbed to permit camping opportunities.

For reference, a photographic record of the study area has been provided.

The annual average rainfall in the region is around 752.6 (mm) with the greatest falls being experienced during January (Bureau of Meteorology 2008). Average temperatures range from a winter low of approximately 2.0°C to a summer high of around 37.2°C (Bureau of Meteorology 2008).

Within the study region, several conservation reserves and other protected areas are present. These include:

- Ben Boyd National Park which is situated on the northern shores of Wonboyn Lake and covers an area of 10 709ha;
- Nadgee State Forest (28970ha) and Nadgee Nature Reserve (20671ha) to the south; and
- East Boyd State Forest (21248ha) to the north and west of Wonboyn Lake.

Farther west is a series of State Forests that create a solid tract of reserves that extend westward from Wonboyn Lake to Nungatta, a distance of approximately 45km.

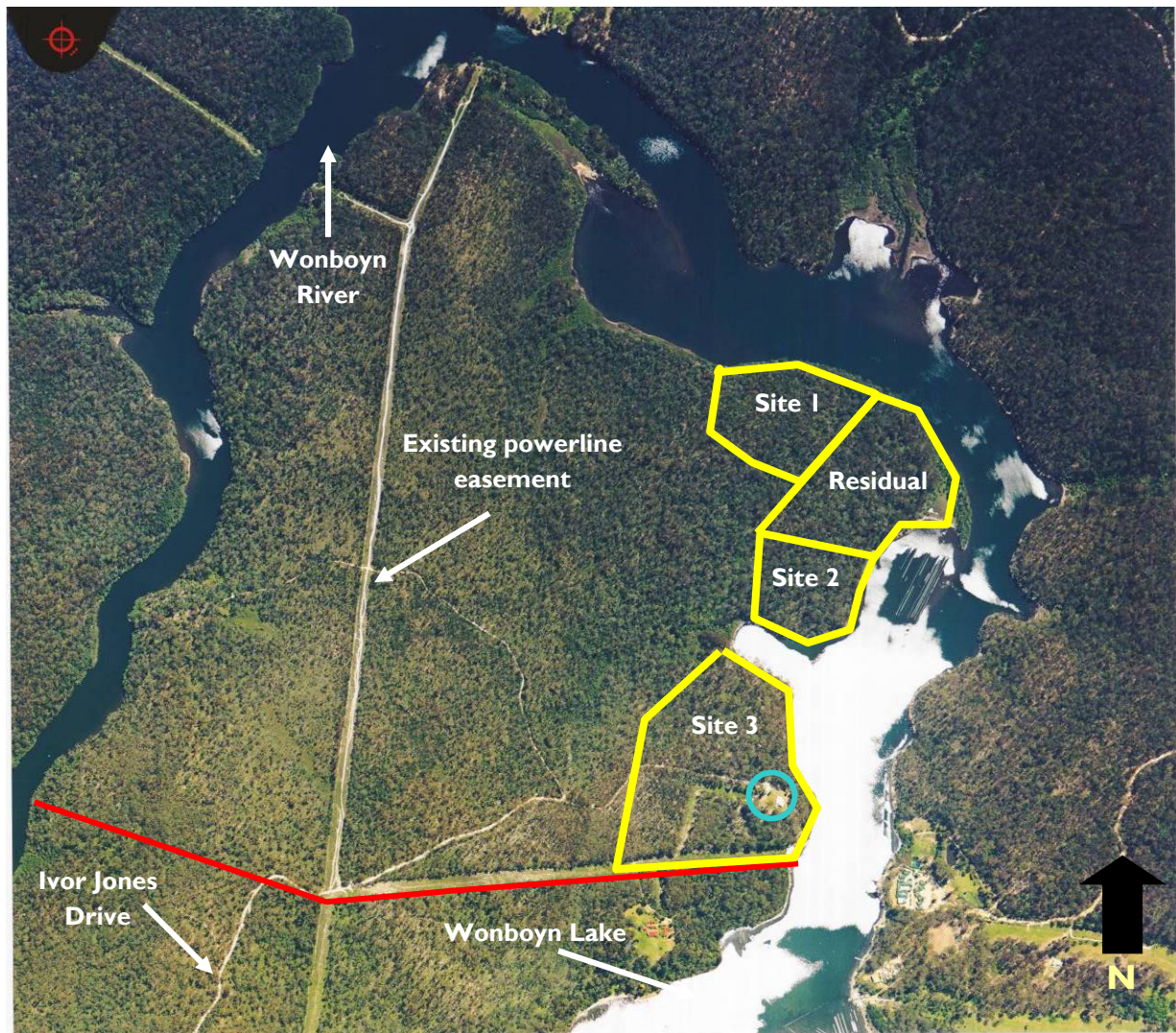


Figure 2. Study area and location of survey sites (subject sites).

KEY:	
—	Areas to be developed (approximate locations).
—	Existing residence.
—	Study area (generally north of red line).

Source: Department of Lands (2008). Not to scale.

One major river system is present in the study area, this being Wonboyn River (Figure 2). This river flows in an easterly direction, eventually draining into Wonboyn Lake. Wonboyn Lake discharges into the Tasman Sea around 3.5 km east of the subject site (Figure 1a).

Through reference to the listings provided under the *TSC Act*, it is noted that no areas of critical habitat for any flora or fauna species, populations or ecological communities occurs within the study area. Listed critical habitats are areas of land that are crucial to the survival of particular threatened species, populations and ecological communities, none being present within, or in close proximity to, the subject site.

Photographic record of the study area.



Plate 1: Shoreline characteristic of Site 1.



Plate 2: Typical structure of the eucalypt woodland that is present on Site 1 (photograph taken looking north-east).



Plate 3: Vegetation characteristic of the eucalypt woodland at Site 2.



Plate 4: Typical structure of the eucalypt woodland that occurs on Site 3.



Plate 5: Tall eucalypt woodland and incised Yellow-bellied Glider feed tree (pink tagged tree left side of picture) Site 3.

3. Literature review and field guides.

Prior to undertaking any fieldwork, previous studies conducted in the region and known databases were consulted to identify the diversity of flora and fauna species known for, or potentially occurring in, the study region. The identification of these native species, particularly those listed under the Schedules to the *EPBC* and *TSC* Acts, thereby permits the tailoring of the field surveys to the detection of these animals and plants, or their necessary vegetation communities and habitat types. By identifying likely species, the most appropriate species-specific survey techniques may be selected should their associated vegetation communities/fauna habitats be present. The undertaking of a literature search also ensures that the results from surveys conducted during different climatic, seasonal and date periods are considered and drawn upon as required. This approach therefore increases the probability of considering the presence of, and possible impacts on, all known and likely native species, particularly any plants and animals that are of regional, state or national conservation concern.

The studies and reports referred to include:

- Bega Valley Shire Council's State of the Environment Reports (Bega Valley Shire Council 2004);
- The Department of Environment, Water, Heritage, and The Arts (DEWHA) Online Database (DEWHA 2008);
- The Department of Environment and Climate Change's (DECC) Atlas of NSW Wildlife (DECC 2008a);
- The BioNet Database (NSW Government 2008); and
- The Australian Museum database (Australian Museum 2008).

Other reports and documents referred to are provided within the bibliography section of this report.

When accessing the DEWHA and DECC databases, the search area initially specified was 100km² centred on the study area. Due to the paucity of local records within this search area, another search with Ben Boyd National Park and Nadgee Nature Reserve defined as separate search criteria was undertaken and added to the records already obtained from the study area. The search area specified when consulting the Australian Museum and BioNet databases was Ben Boyd National Park, as Bega Valley Shire is far larger than required for the database searches. Threatened species recorded in the Bega Valley Shire LGA and listed in the Bega Valley Shire Council State of the Environment Report (Bega Valley Shire Council 2004) were nonetheless noted and added to the records listed in Appendix I.

All these databases and reports were reviewed and drawn upon where relevant. Particular attention was paid to identifying records of species listed (or currently being considered for listing) under the Schedules of the *EPBC* and *TSC* Acts, in addition to animals, plants and vegetation communities that have been recorded in the region and may occur within the vicinity of the study area.

Field guides and standard texts used were:

- Harden (1992, 1993, 2000 and 2002) and Costermans (1981) – for the identification of plants;
- Cogger (2000) – reptiles and frogs;
- Simpson and Day (2004) – birds;
- Churchill (1998) – bats;
- Strahan (1995) – mammals; and
- Triggs (1996) – identification of scats, tracks and markings.

The naming of those species recorded or known for the region follows the nomenclature presented in these texts or as described on the Schedules to the *EPBC* and *TSC* Acts.

The classification of vegetation communities found in the study area is described according to Specht (1981). Where applicable, Endangered Ecological Communities (EECs) were classified and named according to the NSW Scientific Committee Final and Preliminary Determinations (various dates).

The conservation significance of those flora and faunas recorded is made with reference to the:

-
- Schedules to the *EPBC* and *TSC* Acts;
 - Bega Valley Shire Council's State of the Environment Report (Bega Valley Shire Council 2004);
 - A description of the vegetation of the south-east forests of NSW (Keith and Bedward 1999); and
 - A publication of Rare or Threatened Australian Plants (ROTAP) (Briggs and Leigh 1996).

4. Results of the literature review.

4.1. Flora.

4.1.1. Previous vegetation studies.

In relation to land in the Bega Valley Shire, Miles (2002) reinterpreted and assessed the accuracy and usefulness of vegetation information made available as a result of the Comprehensive Regional Assessment (CRA) process undertaken in the Eden region (which was based largely on Keith and Bedward [1999]). She also assessed:

- the conservation status of the various vegetation types described for the Shire;
- identified threats to the existing vegetation;
- provided information about threatened plant species; and
- made recommendations regarding future vegetation management directions.

Vegetation classification and mapping has been undertaken at Regional and State scales and a State of the Vegetation Report has been produced for Bega Valley Shire.

At a state scale, a detailed overview of the vegetation of NSW has recently been completed by Keith (2004). This document brought together information regarding the vegetation of NSW collected over the recent past (such as the regional survey cited below), as well as historical information. From this an online vegetation map of NSW has been produced (<http://maps.environment.nsw.gov.au/stateveg/default.htm>), which indicates the percentage land cover class for each map unit (vegetation class) within grid cells. The online vegetation map indicates three vegetation classes as occurring at the subject site, these being:

- Saltmarsh;
- South East Dry Sclerophyll Forests; and
- South Coast Wet Sclerophyll Forests.

Keith and Bedward (1999) described and mapped at a 1:100,000 scale the native vegetation of the NSW south-east forests region. This covered the area between Bermagui and Numeralla in the north to Cape Howe and Craigie in the south. Keith and Bedward's map (refer to Figure 3) indicates that the site contains the following communities:

- Lowland Dry Shrub Forest;
- Eden Dry Shrub Forest;
- Coastal Foothills Dry Shrub Forest;
- Hinterland Wet Shrub Forest;
- Lowland Gully Shrub Forest; and
- Coastal Dry Shrub Forest.

4.1.2. Threatened species and communities.

Through the consultation of the DEWHA and DECC databases (DEWHA 2008a; DECC 2008a), and with reference to Council's State of the Environment Report (Bega Valley Shire Council 2006), it was identified that four (4) plants and two (2) ecological communities of conservation significance have been previously recorded within the study region (Table 1). Where applicable, giving consideration to the vegetation types and geology present within the study area during the field survey, targeted searches for these plants and communities were undertaken.



Figure 3. Vegetation mapping of the site and vicinity (as per Keith and Bedward 1999).

Table 1. Plant species and EEC's of conservation significance previously recorded in the study region.

Key

E = Endangered.

V = Vulnerable.

	EPBC Act	TSC Act	Habitat*
SPECIES			
Australian Saltgrass <i>Distichlis distichophylla</i>		E	Coloniser of damp saline soils; found at the edges of salt marshes and on low dunes. Though common in South Australia and Victoria it is only found in a few locations in NSW being Lake Cargelligo, Jervis Bay, Bermagui, Narooma, Bodalla and Nadgee Nature Reserve. The Nadgee Nature Reserve record was made in a saltmarsh that is located on the edge of Lake Wonboyn approximately 2km south of the south-eastern boundary of the subject site. When not flowering this species is difficult to distinguish from the common saltmarsh grass <i>Sporobolus virginicus</i> .
Narrabarba Wattle <i>Acacia constablei</i>	V	V	This shrub is confined to rhyolite outcrops with very poor soil development. It is a South Coast endemic known from only two localities. The largest population is found at Narrabarba Hill south of Eden. The other population is found on a rocky ridgetop 1.4km to the north on the other side of the Wonboyn River.
Parris' Pomaderris <i>Pomaderris parriisae</i>	V	V	Shrub only known from a few locations on skeletal soils in rocky shrubland, tall open forest or rainforest, chiefly on the escarpment ranges
Hidden Violet <i>Viola cleistogamoides</i>		E	Occurs in wet sandy coastal heaths, heathland, woodland with a heathy understorey and grassy forests. Disturbed sites such as tracks, firebreaks and even lawns have also been colonised. In NSW until recently it was only known from a collection at Wonboyn in 1954, the only habitat note accompanying this collection being "black peaty soils". Since then it has been found in heath within Nadgee Nature Reserve some 25km south of the subject site.
ECOLOGICAL COMMUNITIES			
Swamp Oak Floodplain Forest	NA	E	This community is associated with grey-black clay-loams and sandy loams, where the groundwater is saline or sub-saline, on waterlogged or periodically inundated flats, drainage lines, lake margins and estuarine fringes associated with coastal floodplains. South of Bermagui <i>Casuarina glauca</i> (Swamp Oak) is replaced as the dominant species by <i>Melaleuca ericifolia</i> (Swamp Paperbark).
Coastal Saltmarsh	NA	E	Occurs in the intertidal zone on the shores of estuaries and lagoons that are permanently or intermittently open to the sea. Characteristic plants include <i>Baumea juncea</i> , <i>Juncus kraussii</i> , <i>Sarcocornia quinqueflora</i> , <i>Sporobolus virginicus</i> , <i>Triglochin striata</i> , <i>Isolepis nodosa</i> , <i>Samolus repens</i> , <i>Selliera radicans</i> , <i>Suaeda australis</i> and <i>Zoysia macrantha</i> .

* - as per DECC (2008b) and other botanical texts listed in the bibliography section of this report.

4.2. Fauna.

Fauna surveys and compilation lists prepared for the region have identified 20 native mammals, 35 native birds, 4 frogs, and one invertebrate species listed under the Schedules to the EPBC and/or TSC Acts that have been previously recorded in the vicinity of the study area (Table 2). As such, targeted surveys for these species, or their necessary habitats, were undertaken during the field investigations. A number of protected (as per the NPW Act) native animals and introduced animals have also been recorded, and are shown in Appendix 1.

For reference, the main habitat requirements of the 59 threatened fauna species previously recorded in either the study area or surrounding region, and a consideration of the likely impacts of the Proposal on the local viability of these animals, has been provided in Appendix 2. When assessing the extent of likely impacts of the Proposal on the local and regional presence of those species listed in Appendix 2, including their movement patterns and interbreeding needs, the assessment criteria provided under Section 5A of the NSW *Environmental Planning and Assessment Act 1979* have been referred to and drawn upon.

Giving consideration to the habitat requirements and vegetation associations of those species listed in Table 2 above, there is the potential that a number of these animals may occur as locally viable populations within the study area. This is due to:

- A consideration to their habitat requirements and vegetation associations;
- The observation of the fauna habitats present within the subject site; and
- The development history of the area.

As such, targeted surveys for the species or their necessary habitats/communities were undertaken during the field investigations.

It is noted, that a number of birds species previously recorded within the study area are listed as migratory under the EPBC Act (refer to Appendix 1). Giving consideration of the habitat requirements of these species it is not considered that the current Proposal (i.e. the removal of a small percentage of woodland) would have any significant affect on these birds. Most, if not all of these migratory birds, nest/forage on offshore islands/coastal waters/at sea and therefore are not likely to be affected by the disturbance of those terrestrial environments present. In addition, no mudflats or salt marshes would be adversely affected by the Proposal, thereby limiting the extent of foraging resources available. As these species would not be directly or indirectly affected by the Proposal, their habitat requirements etc have not been provided in Appendix 2.

4.3. Priorities Action Statement, Recovery and Threat Abatement Plans.

The DECC has prepared a Priorities Action Statement to promote the recovery of threatened species and the abatement of key threatening processes in NSW. The Priorities Action Statement identifies 25 broad recovery strategies, of which habitat management, protection and restoration would be applicable to the current proposal. Whilst this is the case, it is noted that the habitats likely to be adversely affected by the implementation of the Proposal are not considered important to the occurrence of any of the threatened fauna listed in Table 2 and therefore no further action in regards to this matter is considered necessary.

The NPWS has prepared, or is in the process of preparing, recovery plans for the following threatened species that have been previously recorded within this portion of the Bega Valley LGA:

- Koala (*Phascolarctos cinereus*);
- Brush-tailed Rock-Wallaby (*Petrogale penicillata*);
- Long-footed Potoroo (*Potorous longipes*);
- Yellow-bellied Glider (*Petaurus australis*);
- Southern Brown Bandicoot (*Isodon obesulus*);
- Green and Golden Bell Frog (*Litoria aurea*);
- Barking Owl (*Ninox connivens*);
- Large Forest Owls;
- Little Tern (*Sterna albifrons*); and
- Bush-stone Curlew (*Burhinus grallarius*),

Table 2. Threatened fauna species previously recorded in the study region.**Legislation**

EPBC Act M – Listed as migratory under the EPBC Act.

EPBC Act TM – Listed as both threatened and migratory under the EPBC Act.

Common Name	Scientific Name	Legislation
MAMMALS		
Spotted-tailed Quoll	<i>Dasyurus maculatus</i>	EPBC and TSC Acts
Brush-tailed Phascogale	<i>Phascogale tapoatafa</i>	TSC Act
White-footed Dunnart	<i>Sminthopsis leucopus</i>	TSC Act
Southern Brown Bandicoot	<i>Isodon obesulus</i>	EPBC and TSC Acts
Koala	<i>Phascolarctos cinereus</i>	TSC Act
Eastern Pygmy Possum	<i>Cercartetus nanus</i>	TSC Act
Yellow-bellied Glider	<i>Petaurus australis</i>	TSC Act
Squirrel Glider	<i>Petaurus norfolcensis</i>	TSC Act
Long-nosed Potoroo	<i>Potorous tridactylus</i>	EPBC and TSC Acts
Long-footed Potoroo	<i>Potorous longipes</i>	EPBC and TSC Acts
Brush-tailed Rock-Wallaby	<i>Petrogale penicillata</i>	EPBC and TSC Acts
Grey-headed Flying-fox	<i>Pteropus poliocephalus</i>	EPBC and TSC Acts
Eastern False Pipistrelle	<i>Falsistrellus tasmaniensis</i>	TSC Act
Eastern Bentwing-bat	<i>Miniopterus schreibersii</i>	TSC Act
Large-footed Myotis	<i>Myotis adversus</i>	TSC Act
Golden-tipped Bat	<i>Kerivoula papuensis</i>	TSC Act
Greater Broad-nosed Bat	<i>Scoteanax rueppellii</i>	TSC Act
Eastern Freetail Bat	<i>Mormopterus norfolkensis</i>	TSC Act
Smoky Mouse	<i>Pseudomys fumeus</i>	EPBC and TSC Acts
BIRDS		
Blue-billed Duck	<i>Oxyura australis</i>	TSC Act
Eastern Reef Egret	<i>Egretta sacra</i>	EPBC Act M
Great Egret	<i>Ardea alba</i>	EPBC Act M
Australasian Bittern	<i>Botaurus poiciloptilus</i>	TSC Act
Black Bittern	<i>Ixobrychus flavicollis</i>	TSC Act
Osprey	<i>Pandion haliaetus</i>	EPBC and TSC Acts
Square-tailed Kite	<i>Lophoictinia isura</i>	TSC Act
White-bellied Sea-eagle	<i>Haliaeetus leucogaster</i>	EPBC Act M
Grey Falcon	<i>Falco hypoleucos</i>	TSC Act
Bush-stone Curlew	<i>Burhinus grallarius</i>	TSC Act
Pied Oystercatcher	<i>Haematopus longirostris</i>	TSC Act
Sooty Oystercatcher	<i>Haematopus fuliginosus</i>	TSC Act
Superb Fruit-dove	<i>Ptilinopus superbus</i>	TSC Act
Glossy Black-Cockatoo	<i>Calyptorhynchus lathami</i>	TSC Act
Gang-Gang Cockatoo	<i>Callocephalon fimbriatum</i>	TSC Act
Ground Parrot	<i>Pezoporus wallicus</i>	TSC Act
Swift Parrot	<i>Lathamus discolor</i>	EPBC and TSC Acts
Turquoise Parrot	<i>Neophema pulchella</i>	TSC Act
Powerful Owl	<i>Ninox strenua</i>	TSC Act
Barking Owl	<i>Ninox connivens</i>	TSC Act
Sooty Owl	<i>Tyto tenebricosa</i>	TSC Act
Masked Owl	<i>Tyto novaehollandiae</i>	TSC Act
White-throated Needletail	<i>Hirundapus caudacutus</i>	EPBC Act M
Fork-tailed Swift	<i>Apus pacificus</i>	EPBC Act M
Brown Treecreeper	<i>Climacteris picumnus</i>	TSC Act
Eastern Bristlebird	<i>Dasyornis brachypterus</i>	EPBC and TSC Acts
Striated Fieldwren	<i>Calamanthus fuliginosus</i>	TSC Act
Speckled Warbler	<i>Chthynicola sagittata</i>	TSC Act
Regent Honeyeater	<i>Xanthomyza phrygia</i>	EPBC and TSC Acts
Pink Robin	<i>Petroica rodinogaster</i>	TSC Act
Hooded Robin	<i>Melanodryas cucullata</i>	TSC Act
Olive Whistler	<i>Pachycephala olivacea</i>	TSC Act
Rufous Fantail	<i>Rhipidura rufifrons</i>	EPBC Act M
Black-faced Monarch	<i>Monarcha melanopsis</i>	EPBC Act M
Diamond Firetail	<i>Stagonopleura guttata</i>	TSC Act
AMPHIBIANS		
Green and Golden Bell Frog	<i>Litoria aurea</i>	EPBC and TSC Acts
Stuttering Frog	<i>Mixophyes balbus</i>	EPBC and TSC Acts
Giant Burrowing Frog	<i>Heleioporus australiacus</i>	EPBC and TSC Acts
Littlejohns Tree Frog	<i>Litoria littlejohni</i>	EPBC and TSC Acts
INSECTA		
Giant Dragonfly	<i>Petalura gigantean</i>	TSC Act

As part of these recovery plans, certain objectives have been established. Given the scope of works proposed, the size of those habitats likely to be affected, the presence and distribution of these habitats within the surrounding region and the results of the field investigations, it is considered that the undertaking of the Proposal would not breach any of the recovery plan objectives such that there would be a significant impact on these animals or their habitats.

5. Field survey methods.

A survey of the study area was undertaken by Deryk Engel ^(B.Env.Sc.HONS), Paul Burcher ^(BApp.Sc.), Corrine de Mestre ^(BSc.HONS), and Melissa Starling ^(BSc.HONS) between the 16th and 20th of April 2007. For reference, the weather conditions, survey methods and survey effort experienced during the survey period are provided in Table 3.

Table 3. Weather conditions experienced during the field surveys and programme of survey techniques employed.

Key

DE = Deryk Engel [fauna ecologist], CDM = Corrine de Mestre [research assistant fauna], MS = Melissa Starling [research assistant fauna], PB = Paul Burcher [botanist].

Date (2007) and Researcher(s)	Weather	Technique(s) employed during each investigation.	Survey effort (person hours)
16 th April DE, CDM, MS	15.1-23°C, clear skies, still conditions.	- Site inspection and orientation; - Establishment of trapping transects; - Direct and indirect observations of fauna species; - Echolocation detection using Anabat II detectors; and - Diurnal call identification.	9
17 th April DE, CDM, MS, PB	18.9-23°C, clear skies, still conditions.	- Flora surveys; - Direct and indirect observations of fauna species; - Diurnal call identification; - Trapping checking; - Collection of indirect evidence; - Echolocation detection using Anabat II detectors; - Harp trapping; - Call playbacks for threatened owls and the Koala; - Spotlighting; and - Habitat identification.	29
18 th April DE, CDM, MS, PB	22°C, 6/8 cloud cover, slight breeze.	- Flora transects; - Direct and indirect observations of fauna species; - Diurnal call identification; - Trap checking; - Collection of indirect evidence; - Echolocation detection using Anabat II detectors; - Call playbacks for threatened owls and the Koala; - Harp trapping; and - Spotlighting.	33
19 th April DE, CDM, PB	20°C, 6/8 cloud cover, still conditions.	- Flora transects; - Direct and indirect observations of fauna species; - Diurnal call identification; - Trap checking; - Collection of indirect evidence; - Echolocation detection using Anabat II detectors; - Harp trapping; - Call playbacks for threatened owls and the Koala; - Spotlighting; and - Flora transects.	22
20 th April DE, CDM, PB	18.9°C, clear skies, still conditions.	- Direct and indirect observations of fauna species; - Diurnal call identification; - Collection of indirect evidence; - Habitat identification; and - Trap checking and clearing transects.	5
TOTAL SURVEY EFFORT			98

The investigation of the study area involved foot traverses along existing roads, tracks or within penetrable bushland. During these investigations the diversity of plants, animals and vegetation communities present was recorded, the purpose being to locate any plants, animals or vegetation communities that are of state and/or national conservation significance. When conducting the field investigation, the 'Random Meander Method' (as per Cropper 1993), [or a modification of this that is suitable for fauna surveys] was employed. This method is suitable for covering large areas and for locating any rare species (and their associated vegetation communities/habitat types) that may occur within a survey site. The method involves walking randomly across a particular survey area whilst sampling all of the various habitat types and vegetation communities present until no new species have been recorded for at least thirty minutes. In addition to this, species-specific survey methods were employed to target those animals and plants that may potentially occur. For reference, the species specific survey methods employed during the flora and fauna investigations are provided in Sections 5.1 and 5.2.

It is noted that, whilst the entire study area was broadly investigated (either by boat or by driving along the transmission line), detail surveys were only undertaken within those portions of the site that would be directly or indirectly affected by the works. As such, areas to the west of the transmission line were not thoroughly investigated (though some fauna work was undertaken within the immediate areas of the transmission line itself). Similarly, areas to the west / north west of Site 1 were not surveyed or traversed by foot.

By the completion of the field surveys, approximately ninety-eight (98) person hours of active searches had been accumulated, active searches being defined as the time spent actively searching for observations/evidence of fauna and flora species. Given the physical condition and size of the study area this length of time is considered more than adequate when endeavouring to determine the diversity of native species present, their associated habitats and conservation status. During the field surveys, no limitations to the outcomes of the site investigation, including adverse seasonal or climatic conditions, were encountered. Access to all parts of the proposed development area was possible (either by foot, motor vehicle or boat), thereby ensuring that all portions of the subject site were sampled.

5.1. Flora investigation.

The flora investigation of the site was done by recording all plants and vegetation communities present along walked transects that were established within the subject site. Specific targeted searches were also undertaken for those threatened plant species, vegetation communities and populations previously recorded in the region. The survey was concentrated in that part of the site that would be affected by the proposed development.

In addition to the transects, six 400m² survey plots were established (Figure 4). The survey plots were selected as they sampled in detail the range of topographies and aspects represented by the site. In each plot, the cover-abundance of all species was recorded using the modified Braun-Blanquet scale, as was the composition, height and projective foliage cover of each stratum.

5.2. Fauna investigation.

Based on the outcomes of the literature review and database searches conducted prior to the undertaking of the field survey, combined with a review of the NSW Animal Ethics Survey Guidelines and NSW Department of Environment and Climate Change's publication: *Threatened species survey & assessment: guidelines for developments and activities; Working Draft 2003* (DECC 2004), the fauna survey methods selected for use during the field investigation were:

- The direct observation of any fauna species present within, or adjacent to, the subject site;
- The identification of the structure of those fauna habitats present;
- Diurnal and nocturnal call identifications of fauna species;
- Analysis of any carnivore scats, particularly those containing hair and bone material;
- The identification of indirect evidence, such as tracks, scats, diggings and scratchings;
- Litter and ground debris searches for reptiles and amphibians;
- Spotlighting for nocturnal species;
- Echolocation detection and harp trapping targeting insectivorous bats (microchiropterans);
- Call playbacks targeting nocturnal birds and mammals;
- Elliot, Cage and hairtube trapping; and

- Targeted searches for those species of state and national conservation concern, or their likely habitat areas, that were identified during the literature review stage of the project.

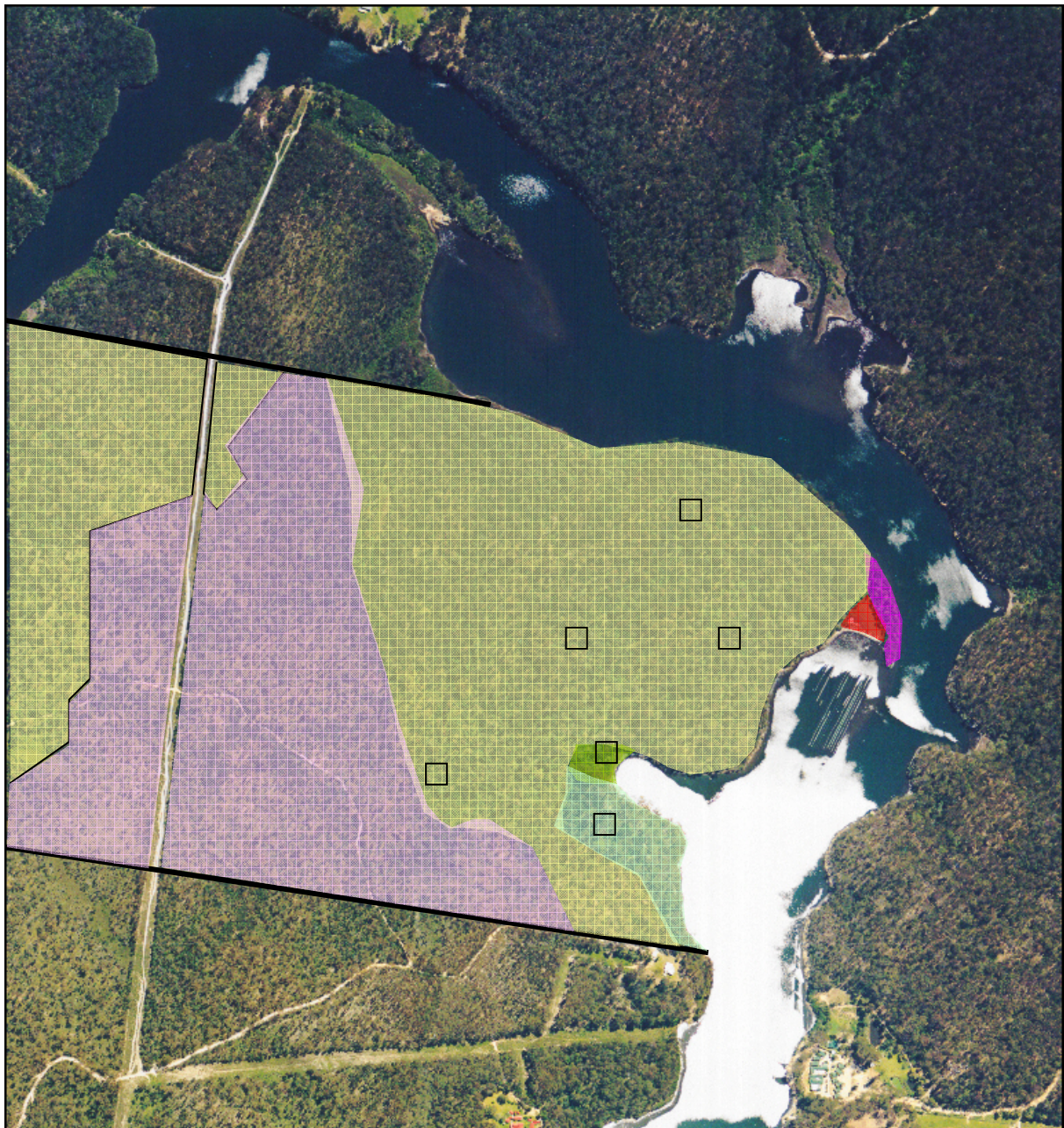


Figure 4. Vegetation communities.

Legend

- | | |
|---|---|
|  | Silvertop Ash – Red Bloodwood Woodland. |
|  | White Stringybark – Rough-barked Apple – Silvertop Ash Woodland. |
|  | Coast Grey Box – Woollybutt – White Stringybark Tall Open Forest. |
|  | Scented Paperbark Scrub/Closed Scrub. |
|  | Saltmarsh. |
|  | Bracelet Honey-myrtle Scrub. |
|  | Quadrat location. |

Where required, greater detail on several of these fauna survey methods is provided below.

Elliott trapping involved establishing three linear transects within the subject site (Figure 5). Within each transect Elliott (size A) traps were set either on the ground (at intervals of around 10m apart) or arboreally. The arboreal traps were placed on wooden brackets that were attached to mature, hollow bearing trees at heights of around 2-3m. All arboreal trapping sites were sprayed with a diluted solution of honey, thereby enticing any species to investigate those traps present. All of the traps used were baited with the standard rolled oats, peanut butter and honey mixture. Each trap was checked in the early morning period and, for any captured animal, morphometric measurements were taken, the sex determined and the animal released at its point of capture.

In addition to the Size A Elliotts, 2 wire cage traps and 4 large Elliotts (size B) were also placed within the subject site. These traps were located randomly within each of the likely development areas, the sites selected corresponding to those habitat features that may be used by ground traversing native species (e.g. hollow logs and fallen limbs).

A total of 77 live traps were placed within the subject site, thereby totalling 308 trapping nights. For reference, the exact GPS location of each live trapping site is provided in Appendix 3.

Hairtube trapping was undertaken between the 17th and 20th of April 2007. The hairtube transects were placed perpendicular to those Elliott transects established at Sites 1 and 2. Sites 1 and 2 were selected for hairtubing due to the presence of dense understorey and ground cover vegetation (these habitat features being absent at Site 3). During this period, twelve (12) Faunatech™ hairtubes were used, the general locations of these being noted on Figure 5, whilst their exact location are provided in Appendix 3. The hairtube traps were placed on the ground thereby targeting those ground dwelling mammals that may be present. Six (6) traps were baited with the standard rolled oats, peanut butter and honey mixture whilst the remainder were baited with sardines. This 50/50 spread of baiting was adopted to target both herbivorous and carnivorous species. By the completion of the trapping period, a total of 36 hairtube trapping nights¹ had been accumulated.

Any hair samples obtained through use of the hairtubes were sent to Robyn Carter of Robyn Carter Hair Identification, Buckland, Victoria for identification. Robyn is a recognised expert in the field of scat identification and hair analysis. Whilst conducting the diurnal investigations, attention was also paid to the collection of any carnivore scats that contained bone and hair material. These scats were also sent to Robyn for analysis. For the purposes of this study, it is assumed that any species highlighted through the analysis of those scats collected constitute resident populations within the study area.

During the daytime investigations, systematic herpetofauna searches were undertaken. These searches involved actively lifting or visually checking weathered rocks, logs, fallen limbs, crevices, sheltered sunlit areas and other suitable herpetofauna sites. These habitat features were searched to identify any sheltering frogs or reptiles. Particular attention was paid to locating and assessing habitats that might be suitable for those reptiles and frogs listed under the Schedules to the EPBC and/or TSC Acts that have been previously recorded, or could potentially occur, in the study region.

Based on the outcomes of the diurnal investigations no call playbacks for any threatened amphibians were undertaken. Threatened frogs were not targeted during the nocturnal surveys as the necessary habitats for those species of conservation concern previously recorded in the study region are not present within the subject site.

Nocturnal surveys of the site were undertaken on the evenings of the 16th, 17th, 18th, and 19th of April 2007. During the nocturnal surveys, spotlighting (using 100 watt hand held spotlights) was undertaken. The spotlighting transects selected were chosen as they sampled the majority of vegetation types present. The transects were either walked on foot, or surveyed by boat or motor vehicle (refer to Figure 5). The spotlighting sessions commenced on dusk and lasted for approximately two hours. During the spotlighting sessions, efforts were made to target those habitats considered suitable for nocturnal animals, particularly those species of conservation significance identified during the literature review process.

¹ Number of traps used/left open on one night multiplied by the number of nights trapping undertaking. For example, if 25 traps are used on one night, trapping nights = 25 (i.e. 25 x 1); if 25 traps are used for two nights, trapping nights = 50 (i.e. 25 x 2) and so forth.

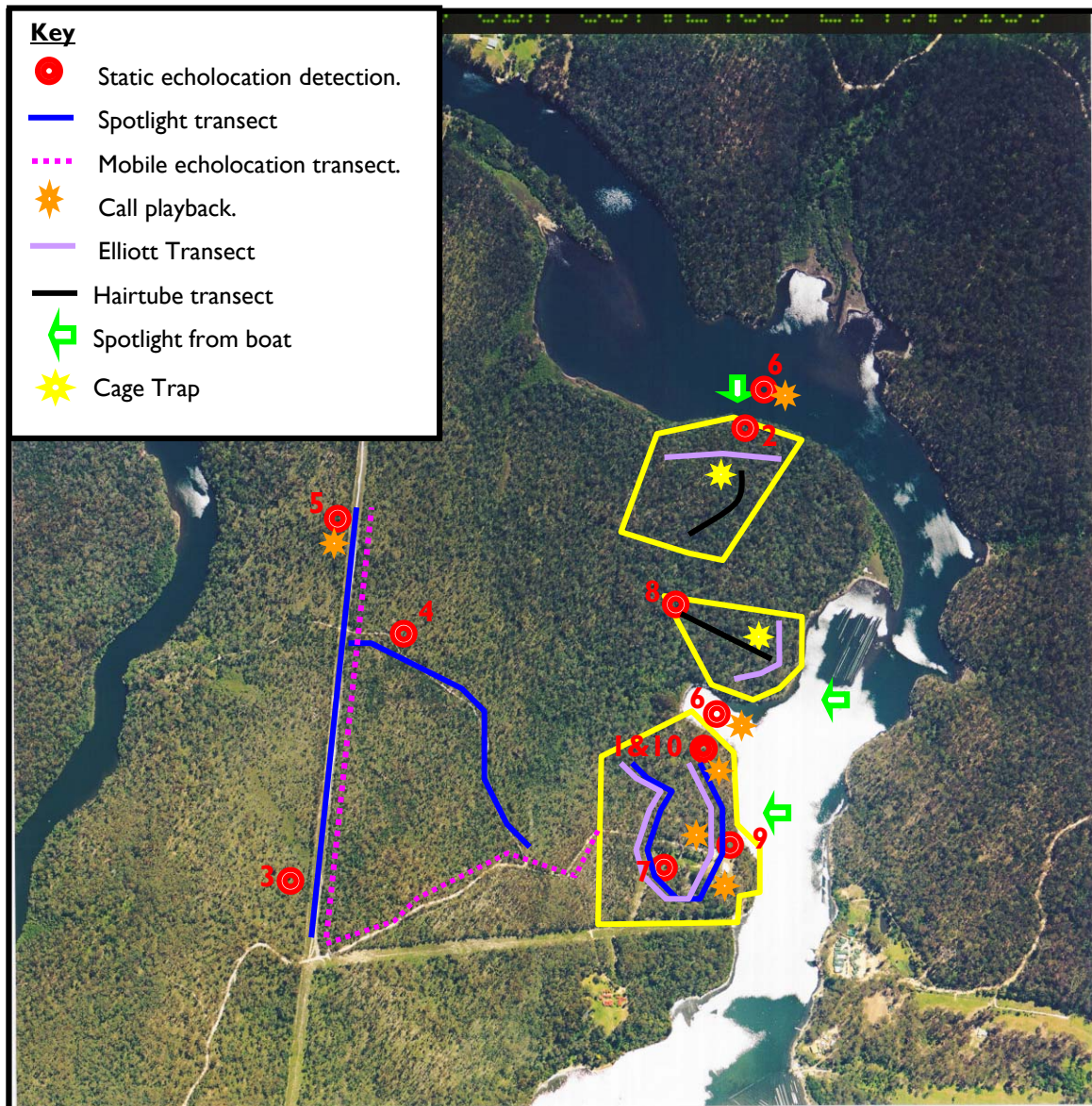


Figure 5: Fauna sampling sites.

Note: Symbols are only indicative of actual survey locations.

Source: Department of Lands (2008). Not to scale



During the nocturnal surveys, the identification of microchiropterans, using Anabat II and Anabat ZCAIM echolocation detectors, was undertaken. The detectors used to identify the possible presence of these species within the study area were placed at several locations (Figure 5). These sites were selected as they corresponded to those habitats likely to be used by microchiropterans as roosting sites (i.e. woodland stands), or during their foraging and dispersal periods (i.e. woodlands, waterways and habitat ecotones). The stationary echolocation detectors were turned on fifteen minutes prior to dusk (thereby endeavouring to detect any microbats that were leaving those likely roosting sites targeted) and were left in place for either two (2) hours (during the spotlighting transect) or overnight. In relation to those detectors that were connected to tape recorders, these were set for voice activation. Within the study area, walking transects were also undertaken during which time the echolocation detectors were activated when a call was detected. Any calls recorded were analysed using Anabat 6.3 computer software. By the completion of the field investigation, approximately ninety-five (95) hours of echolocation recording had been accumulated.

In addition to the Anabat detectors, to target those microchiropterans present a harp trap was set up across a likely flyway that was observed within Site 3 (Figure 5). Each morning the harp trap was checked and any bats removed. Captured bats were identified and were released at their point of capture.

Based on the results of the literature review, call playbacks targeting the presence of the Yellow-bellied Glider (*Petaurus australis*), Koala (*Phascolarctos cinereus*), Powerful Owl (*Ninox strenua*), Barking Owl (*Ninox connivens*), Sooty Owl (*Tyto tenebricosa*) and Masked Owl (*Tyto novaehollandiae*) were undertaken during the spotlighting sessions (Figure 5). During the call playback sessions, the calls (which were taken from Buckingham and Jackson 1990, and Stewart 1999 and lasted for five minutes per species) of these threatened species were broadcast through a megaphone connected to a compact disc player. To detect any calls or responses made by those threatened species targeted during the call playbacks, prior to, and after, the call playbacks, a ten minute listening period was undertaken. After the call playbacks and subsequent listening periods, spotlighting of the area was also undertaken to detect any owls or mammals that may have been attracted to the calls, but which did not respond vocally. By the completion of this component of the field investigation, a total survey effort of approximately 270 minutes had been accumulated.

Whilst conducting the fauna survey, efforts were made to document the diversity, structure and value of those habitats present within the areas surveyed for those protected and threatened species (as defined under the NPW Act) recorded or potentially occurring. This involved assessing the structure of the fauna habitats present and determining their significance for native species. Whilst conducting the habitat assessments, efforts were made to identify features such as known feed trees, mature trees with hollows, connectivity of fauna corridors, aquatic environments and other habitat features important to the life cycle needs of those threatened species known or likely to occur in the study region.

6. Results.

6.1. Flora survey.

6.1.1. Vegetation communities.

Six terrestrial vegetation communities were recognised at the subject site (Figure 4). Their distribution on site is influenced by soil type, topography and aspect. Their distribution at the site is illustrated in Figure 4 and a brief description of each is provided below.

6.1.1.a Silvertop Ash – Red Bloodwood Woodland.

This community occurs on the drier, more exposed soils of the upper ridge in the centre of the site. This roughly corresponds to the distribution of the Timbillica soil landscape of Tulau (2005) illustrated in Passfield (2007). The canopy is dominated by Silvertop Ash (*Eucalyptus sieberi*), and Red Bloodwood (*Corymbia gummifera*) with occasional Yertchuk (*E.consideniana*), 10-20m in height with a projective foliage cover of 10-30%.

The shrub layer is dominated by Black She-oak (*Allocasuarina littoralis*) and occasionally Old Man Banksia (*Banksia serrata*) to 8m with lower Paperbark Tea-tree (*Leptospermum trinervium*), Yellow Tea-tree (*L.polygalifolium*), Geebungs (*Persoonia spp*) and Sydney Golden Wattle (*Acacia longifolia*).

The groundcover is moderately dense and dominated by Bracken, graminoids such as Sword Sedge, *Gahnia radula*, Purple Flag (*Patersonia sericea*) and Curly Sedge (*Caustis flexuosa*) along with the sub-shrubs Coral Heath (*Epacris impressa*), Beard-heath (*Leucopogon ericoides*) and Guinea Flower (*Hibbertia empetrifolia*) which are also common.

6.1.1.b White Stringybark – Rough-barked Apple – Silvertop Ash Woodland.

This community occurs on somewhat deeper, moister soils than the woodland described above. As such, the canopy tends to be denser and the shrub layer sparser. Along with White Stringybark and Silvertop Ash, Rough-barked Apple (*Angophora floribunda*) is common to abundant in the canopy and Woollybutt may also be present. Black She-oak again forms a small tree layer to 10m that in some places is dense. The groundcover is similar to the other woodland community though some areas have a dense cover of Rainbow Fern (*Calochlaena dubia*), indicating high soil moisture.

6.1.1.c Coast Grey Box – Woollybutt – White Stringybark Tall Open Forest.

An open forest that is to a height of 40m occurs on what appears to be deeper soils within the area proposed for Lots 1, 2 and 3. It is dominated by Coast Grey Box (*Eucalyptus bosistoana*), Woollybutt (*E.longifolia*) and White Stringybark with some Yellow Stringybark (*E.muelleriana*) present near the south-eastern boundary. There is a sparse small tree layer to 8m of Black She-oak, Black Wattle (*Acacia mearnsii*) and Sydney Golden Wattle. The shrub stratum is also sparse with Narrow-leaf Geebung (*Persoonia linearis*) and Dwarf Currant Bush (*Exocarpus stricta*) common. The groundcover is moderately dense and composed of Bracken (*Pteridium esculentum*), *Gahnia radula*, Sword Sedge (*Lepidosperma laterale*), Snowgrass (*Poa meionectes*) and Guinea Flower.

6.1.1.d Scented Paperbark Scrub/Closed Scrub.

This community occurs in two patches along the ephemeral creek that runs from west to east in the middle of the subject site. The lower and better-developed patch occurs at the mouth of the creek on deep organically enriched soil. Here there is a canopy of Scented Paperbark (*Melaleuca squarrosa*) to 10m in height with a projective foliage cover of up to 90%. Below this a dense shrub layer to 2m of Saw Sedge (*Gahnia clarkei*) and the Tree Fern *Dicksonia antarctica*.

Further up the creekline (Quadrat 5, Figure 4) there is Scented Paperbark, 2m to 4m tall with a projective foliage cover of 60%. Here there is also emergent White Stringybark and Black She-oak 8m to 12m tall and Paperbark Tea-tree (*Leptospermum trinervium*) to 6m. The groundcover at 1m to 2m tall is dense and composed of Saw Sedge, Black Bog-rush and Wiry Ricegrass (*Tetrarrhena juncea*).

6.1.1.e Saltmarsh.

Due to the deposition of silt and sand from the Wonboyn River, a small sandspit has formed within the subject site at the most eastern point that protrudes into Lake Wonboyn. Here there is low, dense growth of Samphire (*Sarcocornia quenequeflora*), along with Ruby Saltbush (*Enchylaena tomentosa*), *Gahnia filum*, Club-rush (*Baumea juncea*), Beach Fescue (*Austrofestuca littoralis*) and Fan-flower (*Scaevola calendulacea*).

6.1.1.f Bracelet Honey-myrtle Scrub.

This community occurs on the slightly higher ground of a sand bar adjacent to the saltmarsh. The structure is open scrub to 8m tall, the dominant species being Bracelet Honey-myrtle (*Melaleuca armillaris*) along with Mangrove Boobialla (*Myoporum acuminatum*). The groundcover is sparse and composed of Hop-leaved Goodenia (*Goodenia ovata*), Swamp Selaginella (*Selaginella uliginosa*), Beach Fescue and the succulents *Atriplex prostrata* and *Einadia hastata*.

Bracelet Honey-myrtle and Mangrove Boobialla also occur intermittently along the shoreline elsewhere at the subject site.

6.1.1.g Seagrass Meadow.

A comprehensive survey of aquatic vegetation adjacent to the subject site was not undertaken. However, it was noted that a seagrass meadow dominated *Zostera capricorni* occurred between the saltmarsh and an oyster lease that is present to the south.

6.1.2 Conservation status of the vegetation communities.

Table 4 summarises the relationship between the subjects site's vegetation communities and, the vegetation classifications and conservation assessments done at a regional and state scale.

Table 4: Conservation significance of those vegetation communities located within the subject site.

Study Area Vegetation Community	Regional Community (Keith and Bedward 1999)	Priority for protection (Miles 2002)	State Community & % cleared (Keith 2004)	EEC?
Silvertop Ash – White Stringybark – Red Bloodwood Woodland	Lowland Dry Shrub Forest	No	South East Dry Sclerophyll Forests (<30%)	No
White Stringybark – Rough-barked Apple – Silvertop Ash Woodland	Eden Dry Shrub Forest	No		No
Coast Grey Box - Woollybutt Tall Open Forest	Coastal Gully Shrub Forest	No	Southern Hinterland Dry Sclerophyll Forests (<30%)	No
Scented Paperbark Scrub/Closed Scrub	Lowland Swamp	No	Coastal Heath Swamps (<30%)	No
Saltmarsh	Saltmarsh ²	Yes	Saltmarsh (30 -70%) ³	Yes – Coastal Saltmarsh ⁴
Bracelet Honey-myrtle Scrub	Estuarine Wetland Scrub ⁵	Yes	Coastal floodplain wetlands (>70%)	Yes - Swamp Oak Floodplain Forest ⁶
Seagrass Meadow	Seagrass Meadow (<i>Zostera</i>)	No	Seagrass Meadow	No ⁷

6.1.3 Flora Species

A list of flora species detected during the survey is provided in Appendix 4. No species listed as threatened on the EPBC or TSC Acts were found during the survey. It is possible that Australian Saltgrass, which is listed as Endangered on the TSC Act occurs in the subject site's saltmarsh and was not detected due to its cryptic nature and similarity to the common saltmarsh grass *Sporobolus virginicus* when not flowering.

The only species of conservation significance detected during the field survey was Ruby Saltbush (*Enchylaena tomentosa*), which is common in the saltmarsh. This species is considered uncommon in the region (Keith *et al.* 1999).

² Wonboyn estuary has the fifth largest area of saltmarsh in southern NSW (i.e. the coast south of the Clyde River), totaling 0.483 km² (McAlister *et al.* 2003).

³ Pre-clearing extent likely to be underestimated; clearing may be >70% (Keith 2004).

⁴ Coastal saltmarsh in the NSW North Coast, Sydney Basin and South East Corner bioregions (TSC Act).

⁵ Generally, the dominant species in Estuarine Wetland Scrub is swamp paperbark (*Melaleuca ericifolia*). Occasionally, possibly on more steeply sloping shores where inundation is very uncommon, *Melaleuca armillaris* (Bracelet Honey-myrtle) replaces *M.ericifolia* (Miles 2002).

⁶ Swamp Oak Floodplain Forest of the NSW North Coast, Sydney Basin and South East Corner bioregions (TSC Act).

⁷ Protected from "harm" under the Fisheries Management Act 1994.

6.2. Fauna survey.

6.2.1. Fauna species recorded during the field investigations.

By the completion of the field surveys, 21 native mammals, 53 native birds, 4 reptiles and 4 frogs had been recorded within the study area (Appendix I).

In regards to the detection of these species:

- The Powerful Owl (*Ninox strenua*), Southern Boobook (*Ninox novaeseelandiae*), Barn Owl (*Tyto alba*), Tawny Frogmouth (*Podargus strigoides*), and Australian Owlet-Nightjar (*Aegotheles cristatus*) were all detected during the nocturnal surveys;
- The remainder of the birds recorded, including those state and nationally listed threatened species, were observed within, adjacent to or flying over the subject site, or identified from their distinct calls;
- The Common Brushtail Possum (*Trichosurus vulpecular*), Common Ringtail Possum (*Pseudocheirus peregrinus*), Long-nosed Bandicoot (*Perameles nasuta*), Sugar Glider (*Petaurus breviceps*), Yellow-bellied Glider (*Petaurus australis*), and Common Wombat (*Vombatus ursinus*) were all observed during the spotlighting sessions;
- The Eastern Grey Kangaroo (*Macropus giganteus*), Swamp Wallaby (*Wallabia bicolor*) and Red-necked Wallaby (*Macropus rufogriseus*) were all observed whilst traversing the site;
- The Agile Antechinus (*Antechinus agilis*) and Black Rat (*Rattus rattus*) were both identified through their capture (Table 5);
- The Agile Antechinus (*Antechinus agilis*) was also identified through the analysis of material collected from the hair tube traps;
- The microchiropterans were identified through the analysis of those echolocation calls recorded (Table 6),
- The characteristic calls of the White-striped Freetail Bat (*Nyctinomus australis*) was heard at several locations throughout the study area;
- Single representatives of each of the three species; the Little Forest Bat (*Vespadelus vulturnus*), Wattled Bat (*Chalinolobus sp.*), and the Lesser Long-eared Bat (*Nyctophilus geoffroyi*) were identified through their capture within the harp trap;
- The Grey-headed Flying-fox was heard calling near Wonboyn Lake caravan park;
- All of the reptiles recorded were seen during the ground debris searches, or whilst traversing the site; and
- All frogs were heard calling during the targeted amphibian studies.

Of those native species recorded:

- Eight, the Yellow-bellied Glider (*Petaurus australis*), Eastern Bentwing-bat (*Miniopterus schreibersii*), Greater Broad-nosed Bat (*Scoteanax rueppellii*), Grey-headed Flying-fox (*Pteropus poliocephalus*), Sooty Oystercatcher (*Haematopus fuliginosus*), Glossy Black-Cockatoo (*Calyptorhynchus lathami*), Gang-gang Cockatoo (*Callocephalon fimbriatum*), and Powerful Owl (*Ninox strenua*) are listed as vulnerable under the TSC Act;
- The Grey-headed Flying-fox is also listed as vulnerable on the EPBC Act; and
- The White-bellied Sea-eagle (*Haliaeetus leucogaster*) is listed as Migratory under the EPBC Act.

For reference, more comprehensive habitat descriptions of the threatened species recorded are provided below, whilst their detection locations are shown on Figure 6.



Figure 6. Location of those threatened fauna species recorded within the study area (Note: Sooty Oystercatcher and Gang-gang Cockatoo were both recorded beyond the limits of the subject site).

Table 5. Trapping results.

	Elliot Transect Site 1	Elliott Transect Site 2	Elliott Transect Site 3	Harp Trap
17th April	2 x Black Rats <i>Rattus rattus</i> 4 x Agile Antechinus <i>Antechinus agilis</i>	3 x Agile Antechinus <i>Antechinus agilis</i>	3 x Agile Antechinus <i>Antechinus agilis</i>	NA
18th April	4 x Agile Antechinus <i>Antechinus agilis</i> 2 x Black Rat <i>Rattus rattus</i>	1 x Agile Antechinus <i>Antechinus agilis</i>	NA	1 x Little Forest Bat <i>Vespadelus vulturnus</i> 1 x Wattled Bat <i>Chalinolobus sp.</i>
19th April	3 x Agile Antechinus <i>Antechinus agilis</i> Arboreal trap - 1 x Agile Antechinus <i>Antechinus agilis</i> 1 x Black Rat <i>Rattus rattus</i>	1 x Black Rat <i>Rattus rattus</i> 1 x Agile Antechinus <i>Antechinus agilis</i>	1 x Agile Antechinus <i>Antechinus agilis</i> 1 x Black Rat <i>Rattus rattus</i>	1 x Lesser Long-eared bat <i>Nyctophilus geoffroyi</i>
20th April	1 x Black Rat <i>Rattus rattus</i> 1 x Agile Antechinus <i>Antechinus agilis</i>	1 x Agile Antechinus <i>Antechinus agilis</i>	2 x Agile Antechinus <i>Antechinus agilis</i> 1 x Black Rat <i>Rattus rattus</i>	NA
Total	13 Agile Antechinus <i>Antechinus agilis</i> 4 Black Rat <i>Rattus rattus</i>	6 Agile Antechinus <i>Antechinus agilis</i> 1 x Black Rat <i>Rattus rattus</i>	6 x Agile Antechinus <i>Antechinus agilis</i> 2 x Black Rat <i>Rattus rattus</i>	3 microchiropterans

Table 6. Results of echolocation call analysis.

Survey Location		Common Name	Scientific Name	Call Confidence	No. of Passes
Site 1	Location 2	No Calls	No Calls	No Calls	No Calls
	Location 6	Gould's Wattled Bat	<i>Chalinolobus gouldii</i>	C	5
		Eastern Bentwing-bat	<i>#Miniopterus schreibersii</i>	P	8
		Long-eared Bats	<i>Nyctophilus sp.</i>	C	5
		Large Forest Bat	<i>Vespadelus darlingtoni</i>	P	19
		Little Forest Bat	<i>Vespadelus vulturnus</i>	P	1
		Eastern Freetail Bat	<i>Mormopterus sp. 2 (in Adams et al 1988)</i>	P	12
		Southern Freetail Bat	<i>Mormopterus planiceps</i>	Po	6
Site 2	Location 8	No Calls	No Calls	No Calls	No Calls
Site 3	Location 1	Large Forest Bat	<i>Vespadelus darlingtoni</i>	P	2
		Little Forest Bat	<i>Vespadelus vulturnus</i>	P	1
	Location 7	No Calls	No Calls	No Calls	No Calls
	Location 9	Gould's Wattled Bat	<i>Chalinolobus gouldii</i>	C	3
		Chocolate Wattled Bat	<i>Chalinolobus morio</i>	C	53
		Eastern Bentwing-bat	<i>#Miniopterus schreibersii</i>	P	2
		Large Forest Bat	<i>Vespadelus darlingtoni</i>	P	14
		Little Forest Bat	<i>Vespadelus vulturnus</i>	P	2
	Location 10	No Calls	No Calls	No Calls	No Calls
Transmission line	Location 3	No Calls	No Calls	No Calls	No Calls
	Location 5	Eastern Bentwing-bat	<i>#Miniopterus schreibersii</i>	P	5
		Greater Broad-nosed Bat	<i>#Scoteanax rueppellii</i>	Po	1
		Large Forest Bat	<i>Vespadelus darlingtoni</i>	P	1
Access road off transmission line	Location 4	Chocolate Wattled bat	<i>Chalinolobus morio</i>	C	3
		Eastern Bentwing-bat	<i>#Miniopterus schreibersii</i>	P	1
		Little Forest Bat	<i>Vespadelus vulturnus</i>	P	5
		Long-eared bats	<i>Nyctophilus sp.</i>	Po	1

- indicates species listed under the TSC Act.

Note:

In relation to the analysis of those microchiropteran calls obtained, it is noted that some insectivorous bat species have distinctive echolocation calls that are unlikely to be confused with those of other species. Other bat species overlap in both call frequency and structure making identification problematic in some cases. The degree of confidence attached to call identifications will depend on the quality of the recordings as well as the activity of the bat at the time of recording and its direction of flight. In some instances a particular species may be identified with confidence, while at other times its identification will be less certain. For this report, echolocation call identifications have been assigned to two categories with regard to certainty of identification. These are:

- C - Confident Identification. Small possibility of confusion of calls with those of other bat species;
- P - Probable Identification. Some possibility of confusion of calls with those of other bat species; and
- Po - Possible Identification. Likely to be confused with calls with those of other bat species.

It is noted that five (5) of the species recorded within the study area occur within the *Families* (Families as in the Taxonomic classification system) of birds listed as migratory under the EPBC Act. These species were observed in association with their documented habitat types, these records being made within, or in association with, the eucalypt woodlands, aquatic environments and surrounding environs. The native 'migratory' species recorded were the Pacific Black Duck (*Anas superciliosa*), the Australian Wood Duck (*Chenonetta jubata*), Black Swan (*Cygnus atratus*), Whistling Kite (*Haliastur sphenurus*), and Masked Lapwing (*Vanellus miles*), none of which are considered to be migratory in Australia (Frith 1997). In relation to these species, it is considered that the Proposal would not result in the significant removal of any areas of importance for these 'migratory' birds.

The remainder of the native species recorded are all protected, as defined by the NSW *National Parks and Wildlife Act 1974*, but considered to be common to abundant throughout both the surrounding region and their documented distributions. The species recorded are characteristic of the forests and woodlands that have formed on those geological formations present, the occurrence of these animals permitting the determination of other likely native species. The protected species recorded would not be solely reliant upon the habitats provided by the subject site, such that the removal or disturbance of these would threaten the occurrence of these animals. The species recorded are all likely to be observed at other locations within the study area and are known to occur in the surrounding region

Post-development, the species recorded are all likely to be observed within both the study area and surrounding region, the Proposal not considered to have an overall impact on the biodiversity of this area. Whilst it is acknowledged that some individuals may be displaced or lost during the construction phase of the project, post-development, these animals are expected to be replaced and/or reoccupy the woodland portions of the site. Due to their ability to adapt to, and be tolerant of, human modified environments, none of these native species recorded would be adversely affected by the Proposal such that the long-term viability of a local population of these animals would be placed at risk of extinction.

During the construction phase of the Proposal, there is the potential that several ground traversing animals may be struck as a result of an increased number of vehicles movements along the firetrails and access roads. In addition, individuals, particularly hollow-dependant animals, may be affected during the course of vegetation removal. Whilst not considered to have a detrimental impact on the overall status of those populations present, mitigation measures have been presented in an attempt to reduce the number of road kills and incidental deaths.

6.2.1. (a) Yellow-bellied Glider (*Petaurus australis*).

The Yellow-bellied Glider (*Petaurus australis*) is distributed from eastern Victoria through to central Queensland (Strahan 1983). This distribution is not continuous but patchy, the Yellow-bellied Glider being restricted to areas of tall, mature eucalypts and the availability of suitable feed trees (Strahan 1983). A nocturnal species, the Yellow-bellied Glider sleeps during the day in large, mature trees (Strahan 1992). This species is an exudivorous feeder, feeding predominantly on sap (Goldingay 1989, Strahan 1992). This sap is extracted from incisions gnawed into the trunks of eucalyptus trees (Goldingay 1989, Strahan 1992). Preferred feed trees include *Eucalyptus gummifera*, *E. maculata* and *E. piperita* with *E. saligna*, *E. viminalis* and *E. fastigata* also being utilised (Goldingay 1989, Goldingay and Kavanagh 1991, Goldingay and Kavanagh 1993). As these food resources undergo seasonal variations in abundance, the Yellow-bellied Glider will modify its home range to utilise other food resources including nectar, pollen and insect honeydew (Goldingay 1989, Van Dyck 1992).

The Yellow-bellied Glider is a highly mobile species, moving around by either gliding or climbing through the forest canopy (Braithwaite 1983, Goldingay and Kavanagh 1991). Where tree cover is of sufficient height and density to provide for unobstructed movement, glide distances can be quite considerable. Distances of 70m to 100m are known for this species (Engel and Fanning 1995, Goldingay 1989, Goldingay and Kavanagh 1991). Where the forest is lower, thereby providing no opportunities for high take-off points, glide distances will obviously be shorter or, in some cases, not possible.

Glider groups usually comprise 3 to 4 individuals, often consisting of an adult breeding pair and several subadults (Goldingay and Kavanagh 1993). This group will inhabit an exclusive home range, the size of which is variable, with estimates from 20ha to 85ha (Henry and Craig 1984, Craig 1985, Goldingay 1992, Goldingay and Kavanagh 1993, Goldingay *et al.* 2001, Lindenmayer 2002).

The Yellow-bellied Glider is threatened by habitat clearing and fragmentation, including the removal of hollow-bearing trees utilized for nesting, certain fire regimes which may isolate populations or affect food resources and predation by feral animals such as foxes and cats (NPWS 1999).

This species was heard calling during the spotlighting sessions, the calls being detected within Lots 1 and 2. An active incised feed tree was also located on Lot 2 (refer to Figure 6). In the locality, individuals of this species were also heard calling in proximity to Wonboyn Village Caravan Park (indicating that this species is tolerant of urban developments, as long as suitable corridors and habitats are maintained). During the nocturnal surveys, efforts were made to identify the movement patterns of this species, through the placement of researchers at various points within Lots 1 and 2. Based on the identification of this species characteristic calls, it appears that the animals are roosting within a mature tree that is located within the southern portions of Lot 1, dispersing northwards from this on dusk to feed on the sap tree that is located within Lot 2. Both the area of the roost tree and sap / feed tree are present within the 75m set back area. As such neither will be removed. Individuals were also noted to disperse westward from the sap tree, into those portions of the site that occur beyond the development footprint. Given the retention of tall mature trees around the proposed Site 3 developments, the retention of hollow bearing plants within both the set back areas and residual portions of this site and the ability of the Yellow-bellied Gliders to traverse canopy gaps, it is not considered that any fragmentation, isolation or significant modification of their habitat areas would occur. Recommendations have been presented in Section 9.0 of this report to ensure the unrestricted movement of this species in this locality. Whilst the Proposal is not considered to have an adverse impact on the occurrence of this species, an assessment drawing on the criteria provided under Section 5A of the *NSW Environmental Planning and Assessment Act 1979* (these commonly called the seven part test) has been undertaken in Section 7.2.2. of this report.

Presumably due to the reduced height of those plants present, no Yellow-bellied Gliders were recorded within Sites 1 and 2. The limited height of those plants present within this portion of the study site is considered to negate the presence of the Yellow-bellied Gliders at these locations.

6.2.1. (b) Eastern Bentwing-bat (*Miniopterus schreibersii*).

The Eastern Bentwing-bat is the dominant cave-dwelling bat in south-eastern Australia (Parnaby 1992). Occurring along the east coast and ranges of Australia from south-eastern South Australia through to Queensland, and the northern parts of Western Australia and the Northern Territory, this species roosts in caves, storm water channels, mines, houses and other cave substitutes (Hall and Richards 1979, Strahan 1995). Estimates of home ranges for the Eastern Bentwing-bat are in the order of 10Km², a distance this species may travel from its roosting site during its foraging periods (G. Hoyer, FBN Bat Surveys, pers.comm.). This species forages within habitats that are well timbered, though they have been recorded in heavily developed urban areas (author's field notes) and open grasslands (Churchill 1998). They are confined to areas generally near the coast (Strahan 1995). Large distances, usually to 300 km, are travelled between different roosts within each population's specific territory according to this species' seasonal requirements (Hall and Richards 1979, Strahan 1995, Churchill, 1998). During winter, cold roosts are sought to allow for hibernation (Strahan 1995) where periods of torpor may last for at least 12 days (Hall 1982). Annually discrete populations of females will travel great distances (up to 300 Km) to a nursery cave where the temperature, humidity and physical dimensions permit breeding and rearing of young (Churchill, 1998). Nursery caves may support up to 150,000 females and juveniles and these may be used by a number of groups year after year (Reardon and Flavel 1987).

The Eastern Bentwing-bat was identified through the analysis of those echolocation calls obtained at Sites 1 and 3, and along and adjacent to the transmission line (Table 5, Figure 6). Given the absence of caves or cave substitutes within the study region, it is not considered that the Proposal will affect any resources essential for the roosting needs of this species. Additionally, the removal of a percentage of the existing habitat as a result of the Proposal would not have an adverse effect on the foraging needs

of this species. As such, the Proposal is not considered to affect the local or regional viability of the Eastern Bentwing-bat, or any major areas of its necessary habitat. Whilst this is the case, further legislative considerations, that draw on the assessment criteria provided under Section 5A of the *NSW Environmental Planning and Assessment Act 1979*, have been undertaken in Section 7.2.2. of this report.

6.2.1. (c) Greater Broad-nosed Bat (*Scoteanax rueppellii*).

This species is distributed from southern coastal Queensland through to south-eastern NSW, though its strong hold appears to be the gullies and river systems draining the Great Dividing Range (Strahan 1995). This species does not occur above 500m, except in the very north of its range (Strahan 1995). Preferring habitats that range from rainforests through to woodlands, the Greater Broad-nosed Bat usually roosts in tree hollows, though some individuals have been found in the roof spaces of old buildings (Strahan 1995). The Greater Broad-nosed Bat feeds on large insects such as beetles, and is also known to take small vertebrates such as mice and other microchiropterans (Strahan 1995). Foraging habitats include open areas such as water bodies, tree-lined creeks (which are both favoured corridors), open woodlands and forests, the junction of woodlands and cleared paddocks, and both natural and human-made openings through and along which the Greater Broad-nosed Bat can fly. These areas are utilised and favoured because the Greater Broad-nosed Bat usually flies slowly and directly having poor manoeuvrability (Strahan 1995).

The Greater Broad-nosed Bat was identified through the analysis of those echolocation calls recorded at Location 5 (transmission line) (refer to Figure 6). Suitable habitat for this species is present both adjacent to, and beyond the limits of, the subject site. Portions of the subject sites development would require the removal of habitat currently available for this species, though in the context of what will remain, this loss is considered minimal. Whilst the extent of disturbance as a result of the Proposal on this species and its foraging/roosting habitats are considered to be negligible, to further consider the impacts of the development on the Greater Broad-nosed Bat the assessment criteria provided under Section 5A of the *NSW Environmental Planning and Assessment Act 1979* have been drawn upon and referred to (see Section 7.2.2.).

6.2.1. (d) Grey-headed Flying-fox (*Pteropus poliocephalus*).

The Grey-headed Flying-fox utilises aural and visual signals, having good eyesight and vocal communications. This mega-bat is a canopy-feeding frugivore, blossom-eater and nectarivore of rainforests, open forests, woodlands, Melaleuca swamps and Banksia woodlands. This species has an important ecosystem function in these habitats through seed dispersal and pollination of many indigenous tree species (NSW Scientific Committee 2008). The Grey-headed Flying-fox also feeds on introduced trees including commercial fruit crops.

The Grey-headed Flying-fox roosts and breeds communally with “camps” containing from 500 to 10,000 individuals (Churchill 1998). The camps are usually located in the branches of large trees in forests, thick scrub, swamps or mangroves. The selection criteria of particular areas as roosting and breeding sites by Flying-foxes has not yet been identified but may include issues such as protection from strong winds, seclusion, occurrence of a particular topographical feature which assists in navigation, proximity to food sources and/or access to up-draughts for flight (Eby 1995). Individuals generally exhibit a high fidelity to traditional camps and return annually to give birth, and rear offspring. Foraging occurs opportunistically, often at distances of up to 30km from camps, and occasionally up to 60–70km per night, in response to patchy food resources (NSW Scientific Committee 2008).

The Grey-headed Flying-fox is threatened through the clearing or modification of native vegetation (including both potential camp habitats and foraging resources), uncontrolled culling using destructive methods such as shooting and electrocution, by direct harassment via shooting at roosts and the destruction of camps (NSW Scientific Committee 2008).

The distinct calls of the Grey-headed Flying-fox were heard within the vicinity of the Wonboyn Township Caravan Park. During the diurnal surveys, no active Flying-fox camps were observed, however camps are known to occur in Victoria including Mallacoota and a recently established camp in Melbourne's Botanical Gardens (Museum Victoria 2008). The proposed works would require the removal of a number of trees, these (when in flower) currently being available for use by this species. Whilst the works would result in the loss of these plants, it is acknowledged that similar resources would remain adjacent to, and beyond the limits of, the proposed works, including those stands that are present within the regions network of conservation reserves and other protected areas. Given the limited extent of vegetation that would required removal, the level of impact on the foraging requirements of the Grey-headed Flying-fox is considered to be minimal.

Whilst no threats to the presence of this species are considered to arise, to further consider the potential for the Proposal to have an adverse impact on the Grey-headed Flying-fox, an assessment using the criteria provided within both the EPBC Act's Significant Impact Guidelines and Section 5A of the *Environmental Planning and Assessment Act 1979* has been undertaken (refer to Section 7.2.).

6.2.1. (e) Sooty Oystercatcher (*Haematopus fuliginosus*).

The Sooty Oystercatcher commonly occupies rocky shores, headlands, wave-cut platforms and coral reefs (Frith 1997). Within these areas, it forages on limpets, periwinkles and mussels (Frith 1997). Breeding occurs between August and January, the bird's nesting site being constructed in a shallow depression in sand above the high water mark (Frith 1997). Generally, due to the presence of introduced predators such as foxes, breeding is restricted to off shore islands (P. Straw, avian ecologist, pers.comm., Nov 2003).

This species was observed within the study area on the shores of Wonboyn Lake (east of the township of Wonboyn on the southern shores of Wonboyn Lake). Potential foraging habitat for this species does occur along the rocky shoreline that borders the study area, however the Proposal will have no impact on this environment. As no Oystercatcher foraging or breeding habitat will be removed, it is judged that the Proposal will have no significant effect on this species. Whilst this is the case, further legislative considerations that draw on the assessment criteria provided under Section 5A of the NSW *Environmental Planning and Assessment Act 1979* have been undertaken in Section 7.2.2. of this report.

6.2.1. (f) Glossy Black-Cockatoo (*Calyptorhynchus lathami*).

The Glossy Black-Cockatoo is a thinly distributed species in central and south-eastern Australia, living in Eucalypt woodland and feeding almost exclusively on *Casuarina* fruit. Within its range it is tied to groves of its food trees, *Casuarina* spp. and *Allocasuarina* spp. (Schodde et al. 1993, Garnett 1993). Ripping and crushing the cones to extract the seeds, this species dependence on one type of food makes it vulnerable to habitat loss (Blakers et al. 1984). Nesting and roosting in hollows of large eucalypt trees this bird can spend up to 88% of each day foraging (Garnett 1992, Garnett 1993). The cause of population decline has been attributed to loss of suitable habitat for agricultural and residential purposes, burning of habitat, competition for nesting hollows and fragmentation of habitat size resulting in areas not large enough to sustain a viable population (Garnett 1992, Schodde et al 1993).

Characteristic feeding signs of this species were observed on Site 3. Within this site, several *Casuarina* feed trees were recorded, these all occurring within the proposed 75m setback area. The retention of this 'foreshore' strip, whilst placing any residential development to the landward side of these feed trees, would ensure that no direct impacts on the feeding resources of this animal occur. Within the subject site, no individuals were heard calling, particularly on dusk. It is therefore considered that no resident animals are present, this species only foraging within the study area on occasion. Within the surrounding bushland, suitable foraging resources available to this species are present, as are hollow bearing trees that would meet its breeding requirements. Given the retention of identified feed trees within the set back areas, the ability for this bird to traverse open space areas and the presence of suitable breeding and foraging sites beyond the limits of the development, it is not considered that the

local or regional presence of this species would be adversely affected by the scope of works proposed. The works would not reduce or significantly limit the extent of foraging or breeding sites available, similarly it would not present any barriers to the interbreeding or dispersal needs of this cockatoo. Whilst the Proposal is not considered to have an adverse impact on the occurrence of this species, a further assessment drawing on the criteria provided under Section 5A of the *NSW Environmental Planning and Assessment Act 1979* has been undertaken in Section 7.2.2 of this report.

6.2.1. (g) Gang-gang Cockatoo (*Callocephalon fimbriatum*).

The Gang-gang Cockatoo is distributed from southern Victoria through south and central eastern NSW (Shields and Crome 1992). The Gang-gang Cockatoo prefers tall montane forests and woodlands, particularly in heavily timbered and mature wet sclerophyll forests during summer, these being at higher altitudes (Frith 1997). In winter, the Gang-gang Cockatoo occurs at lower altitudes in drier, more open eucalypt forests and woodlands, particularly in box-ironbark assemblages, or in dry forest in coastal areas (Shields and Crome 1992). This species has been observed within urban areas including parks and gardens (Morcombe 1986). The breeding requirements of the Gang-gang Cockatoo include tree hollows within the trunks or large limbs of large trees (Gibbons 1999, Gibbons and Lindenmayer 2000). Nests are most commonly found within large live eucalypt trees, close to water (Beruldsen 1980). Breeding occurs between October and January (Frith 1997). The primary food source of this Cockatoo includes fruits of native shrubs and trees, although they have been known to take fruits off exotic trees (Frith 1997). The main threat to their survival is habitat destruction, with the alteration of fire regimes contributing to this threat (NSW Scientific Committee 2008).

Individuals of this species were heard calling within the vicinity of the private residence on the southern shores of Wonboyn Lake (beyond the limits of the subject site). Although this species was not recorded within the vicinity of the current Proposal there is the potential that it may occupy the subject site on occasion as suitable habitat is present. It is acknowledged that portions of the sites development would result in the loss of some potential Gang-gang Cockatoo foraging and sheltering/breeding sites. Whilst this is the case, during the field surveys, no evidence of any occupation of the subject site by this species was obtained. The loss of a percentage of the habitat available to this species is not considered to present a significant reduction at a local or regional level, due to the presence of suitable habitat adjacent to and beyond the limits of the subject site. Whilst no threats to the presence of the Gang-gang Cockatoo are considered to arise, to further consider the potential for the Proposal to have an adverse impact on this species, an assessment using the criteria provided within Section 5A of the *Environmental Planning and Assessment Act 1979* has been undertaken (refer to Section 7.2.2).

6.2.1. (h) Powerful Owl (*Ninox strenua*).

The Powerful Owl favours gullies and gorges that are unlogged to lightly logged (Debus and Chafer 1994). These gullies usually consist of wet to dry sclerophyll forest with a dense understorey (Garnett 1993). This species nests in large hollows, nearly always in the trunk or top of a broken eucalypt. When not breeding, the Powerful Owl will roost during the day within the shelter provided by a dense overstorey canopy, such as a bushy eucalypt or vine forest, usually clutching the remains of the previous evening's meal (Pavey 1995). Information on the size of this species' home range is scant with estimates ranging from 300ha to more than 1000ha (Garnett 1993, Kavanagh 2004). The Powerful Owl breeds from June - September with pairs being faithful to particular roost trees (C. Chafer, researcher, pers.comm.). The close proximity of roosts to residential and/or recreational areas does not appear to affect the breeding success of Powerful Owls (Pavey *et al.* 1994). This species is able to traverse open country therefore not being affected by habitat fragmentation and isolation (Garnett 1993). The main prey of this species are medium-sized arboreal marsupials, particularly the Ringtail Possum (Pavey *et al.* 1994, Pavey 1995). However, the Common Brushtail Possum, Greater Glider, Sugar Glider, birds, rodents, fruit bats and rabbits will also be taken (Pavey *et al.* 1994, Kavanagh 2004). The main threat to the survival of this species is the loss of old-growth forest elements, particularly trees that are large enough for the owl to use for nesting (Garnett 1993).

One Powerful Owl responded to the call playbacks undertaken along the main transmission line (refer to Figure 6). This animal appeared to originate from a gully that is located to the west of the transmission line. At this location, particularly beyond the limits of the road reserve, a number of large, mature, hollow bearing trees are present. Similarly, dense understorey vegetation is also available. Whilst recorded within the study area, it is noted that no individuals of this species responded to those calls broadcast from within the subject site itself. Given the mobility of this species, it is likely it would occupy and forage within/over the subject site itself. Whilst this is the case, retention of vegetation within the set back areas and around the developments would ensure that the extent of foraging habitat removed is minimised. The ability of the Powerful Owl to traverse open space areas would ensure that no barriers to its movement or breeding patterns arise. Similarly, its ability to tolerate urban environments would ensure that its local presence is not significantly affected. Due to the presence of suitable habitat adjacent to, and beyond the limits of, the subject site it is considered that no threats to the presence of the Powerful Owl will arise. Whilst this is the case, to further consider the potential for the Proposal to have an adverse impact on this species, an assessment using the criteria provided within Section 5A of the *Environmental Planning and Assessment Act 1979* has been undertaken in Section 7.2.2 of this report.

As an aside it is noted that a Powerful Owl was also heard calling from a gully that is located in the vicinity of the Wonboyn Lake Caravan Park. The location of this animal is beyond the limits of the proposed works.

6.2.1. (i) White-bellied Sea-eagle (*Haliaeetus leucogaster*).

The White-bellied Sea-eagle is found throughout coastal Australia (Frith 1997). This species feeds on fish, tortoises, rabbits and nestlings (Frith 1997). Breeding occurs between May and October with nesting sites often being repeatedly used over a period of several years (Frith 1997, Chafer *et al.* 1999). White-bellied Sea-eagles build a large stick nest, which is used for many seasons in succession. The nest can be located in a tree up to 30m above the ground, but may also be placed on the ground or on rocks, where there are no suitable trees.

The White-bellied Sea-eagle was observed flying over the study site several times, particularly favouring the water bodies of Wonboyn Lake and Wonboyn River. The proposed development would not impact on the quality of these aquatic environments, nor the foraging resources they provide. Within the study area, no characteristic Sea-eagle nests were found. The retention of the eucalypt woodland habitat that lines Wonboyn Lake and Wonboyn River would ensure that no direct impacts on the roosting or foraging needs of this animal arise. The proposed development would not cause the local extinction of this species. To further consider the impact of the proposed development on the White-bellied Sea-eagle, an assessment using the criteria provided within the *EPBC Acts Significant Impact Guidelines* has been undertaken (Section 7.2.1).

6.2.2. Habitat types present within the subject site.

Four habitats available for use by native fauna were recorded within the area surveyed, these being:

- Low eucalypt woodland – this habitat type corresponds to the White Stringybark – Rough-barked Apple – Silvertop Ash Woodland described in the botanical section of this report;
- Tall eucalypt woodland (corresponds to the vegetation community Coast Grey Box – Woollybutt – White Stringybark Tall Open Forest);
- Aquatic environment; and
- Saltmarsh (vegetation community – Saltmarsh).

For reference, general descriptions for each of these are provided below, it being recommended that these be read in conjunction with a review of the photographic record provided.

It is noted that these are broad descriptions of the dominant habitat types present, it being acknowledged that intergrades and “variations” within each are present. For the purposes of this study (i.e. the identification of ecologically sensitive areas), and to permit an assessment of the likely impacts of the works on those species recorded or expected, it is considered that the provision of these broad descriptions is appropriate.

6.2.2. (a) Low eucalypt woodland.

This habitat type dominates the area surveyed. It consists of trees that are approximately 15m in height, the canopy of which is continuous throughout the study area. Some hollow bearing trees are present within this habitat type. The understorey is a medium to high-density layer of native shrubs and saplings, these being around 3m in height. The ground cover is variable and dependant upon factors such as light penetration and soil moisture. Where present, it consists of native grasses, forbs and, in portions of the site, ferns. Leaf litter, ground debris and fallen timber is common, as is the occasional small outcropping of surface rock material.

6.2.2. (b) Tall eucalypt woodland.

This habitat was recorded within, and adjacent to, Site 3. The tall eucalypt woodland appears to dominate the foreshore areas occurring as a band that is approximately 100m wide. The tall woodland supports trees that are approximately 40m in height, a number of which support hollows suitable for the roosting and breeding needs of hollow-dependant native animals. Within, and beyond, the tall eucalypt woodland tree canopy connectivity is generally continuous. The middle and understorey layers are either cleared or consist of isolated shrubs and saplings. The ground cover is variable throughout this habitat ranging from cleared to isolated occurrence of native grasses and forbs. Leaf litter, ground debris and fallen timber are common.

6.2.2. (c) Aquatic environment.

Within the limits of the areas proposed for subdivision and development no creek lines, wetlands or any other aquatic features were observed. Two aquatic environments were recorded within the study area, these being a series of ephemeral drainage lines and Lake Wonboyn. The ephemeral drainage lines occur beyond the limits of any direct impact and were dry at the time of the study. Occurring within stands of low eucalypt woodland, the ephemeral drainage lines are vegetated by similar vegetation.

Lake Wonboyn is a tidally influenced body of water. Within the vicinity of the proposed development areas, limited occurrences of emergent reed beds were observed, though these are present at locations beyond the proposed subdivisions (for example where the ephemeral drainage lines discharge into Lake Wonboyn). Foreshore areas are generally rocky, with the occasional fallen or deposited snag.

Due to the presence of seagrass beds, mangroves, and estuarine wetlands Lake Wonboyn is considered an important nursery area. Runoff from the proposed development and on-site treatment of effluent should be managed to ensure that the overall quality of this water body is not adversely affected.

6.2.2. (d) Saltmarsh.

The saltmarsh was observed east of Site 2. The saltmarsh covers an area that is approximately 1000m sq in size and is dominated by plants that are to a height of 10 cm. The salt marsh area occurs beyond the limits of the proposed development and would not be adversely affected by the scope of works proposed.

6.2.3. Wildlife corridors and vegetation links.

Based on a review of topographic maps and aerial photography, combined with a visual assessment of the study area undertaken at the time of the field investigation, it is noted that the subject site forms a component of the region's extensive network of national parks and bushland corridors. These corridors provide connectivity between the various water catchment areas and the surrounding network of national parks, conservation reserves and other protected lands. The corridors would be important for the dispersal, interbreeding and foraging needs of a range of flying and ground traversing animals, the general level of connectivity permitting the unobstructed movement of both flying and ground traversing native species.

This extensive network of reserves includes Ben Boyd National Park about 2km north-east, Nadgee Nature Reserve/State Forest directly south south-east on the southern limits of Lake Wonboyn, East Boyd State Forest to the north, Mount Imlay National Park ~16 km north-west – in addition to several well forested areas west to Nungatta. It is noted that the coastal wildlife corridor extends south south-east from Wonboyn, past the NSW/Victorian border all the way west to Lakes Entrance (~170 km).

Whilst occurring within a major regional corridor, given the scope of work proposed, it is not expected that the development of the subject site would have an adverse impact on the overall value of this corridor (either at a local or regional level). With the retention of vegetation along the foreshore area and between the development sites themselves, the animals recorded or present are expected to easily negotiate and traverse across both the study site and subject site. The provision of movement corridors within the development layout, combined with the presence of additional bushland stands immediately west of the subject site and the ability of those species recorded or expected to occur to easily traverse both open space areas and strips of bushland vegetation, is expected to ensure that no fragmentation or isolation of any fauna habitats would occur.

The development of the subject site will not present any barriers that would restrict or negate the movement of those native species recorded or expected across the study area.

7. Ecological assessments.

7.1. Flora.

Approximately 6.1ha of vegetation would be removed or modified due to the undertaking of the Proposal. Most of the vegetation that would be affected is representative of widespread and adequately conserved vegetation communities.

The exception to this is the Scented Paperbark Scrub/Closed Scrub, which has a naturally restricted distribution. On advice from LesryK, the proponent has reconfigured the proposed fire trail thereby avoiding any removal or modification of this community's occurrence near the north-western boundary of Site 3.

On behalf of the proponent, a detailed water cycle management study has been prepared by Passfield (2007). This includes an investigation into how the proposed development will affect the site (in terms of water quality), a series of measures to offset the potential impacts and fix any major existing issues and modelling to justify the proposed measures. It is considered that adoption and implementation of Passfield's recommendations will ensure that modification to retained native vegetation is kept to a minimum. Whilst there is likely to be some colonisation of tracks edges and cleared areas by perennial grasses and herbs such as African Love Grass (*Eragrostis curvula*) and Dandelion (*Taraxacum officinale*), it is unlikely that these plants will spread into retained intact vegetation. Therefore, the site's generally weed-free status will be maintained.

7.1.1. Commonwealth legislative considerations.

No flora species or ecological communities listed on the *EPBC Act* were detected or considered likely to occur at the subject site. Further consideration in regards to the *EPBC Act* is therefore not required. Similarly, referral of the matter to the Federal Minister for further consideration or approval is not needed.

7.1.2. State legislative considerations.

Two EEC listed on the *TSC Act* occur at the subject site. These are:

- Swamp Oak Floodplain Forest; and
- Coastal Saltmarsh.

It is also possible that the endangered flora species Australian Saltgrass also occurs in the Coastal Saltmarsh. Based on a precautionary approach, due to its cryptic nature and similarity to the common saltmarsh grass *Sporobolus virginicus* when not flowering, it is assumed that this plant is present. As such, consideration has also been given in to the likely impacts of the Proposal on this species.

The Department of Planning is yet to issue guidelines on flora and fauna impact assessments in relation to those Proposals prepared under part 3A of the *Environmental Planning and Assessment Act 1979*. In the absence of such guidelines, the criteria provided by Section 5A of the *Environmental Planning and Assessment Act 1979* are used to determine whether the proposed development is likely to have a significant effect on threatened species and communities.

7.1.2. (a). Swamp Oak Floodplain Forest - Seven Part Test.

(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,

Swamp Oak Floodplain Forest is an EEC, not a threatened species.

(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,

Swamp Oak Floodplain Forest is an EEC, not endangered population.

(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,*
- (ii) or 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,*

A small area of Swamp Oak Floodplain Forest, covering approximately 1000m² and dominated by Bracelet Honeymyrtle, occurs at the eastern edge of the site. As it is distant from the proposed building envelopes, the subject stand is unlikely to be adversely affected as a direct result of the Proposal. Increased human disturbance (which may arise from the proximity of nearby dwellings) may over time lead to modifications to the community. To allay this possibility it is recommended that signage be erected at the landward and lakeside edges of the community providing information on its conservation significance.

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

It is considered that no Swamp Oak Floodplain Forest will be removed, modified or fragmented provided the recommendations in (c) above are implemented.

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

Critical habitat of Swamp Oak Floodplain Forest has not yet been defined.

- (f) *whether the action proposed is consistent with the objectives or actions of a recovery plan or threat abatement plan,*

No recovery plan or threat abatement plan has been prepared for Swamp Oak Floodplain Forest. However, eight recovery strategies have been identified by DECC (http://www.threatenedspecies.environment.nsw.gov.au/tsprofile/pas_profile.aspx?id=10945), the following of which are relevant to the Proposal:

- *Community and land-holder liaison/ awareness and/or education: Enhance the capacity of persons involved in the assessment of impacts on this EEC to ensure the best informed decisions are made; and Liaise with landholders and undertake and promote programs that ameliorate threats such as grazing and human disturbance;*
- *Habitat management: Ongoing EIA (Environmental Impact Assessment)- Advice to consent and planning authorities. Prepare identification and impact assessment guidelines and distribute to consent and determining authorities;*
- *Habitat management: Site Protection (eg Fencing/Signage). Identify and prioritise other specific threats and undertake appropriate on-ground site management strategies where required; and*
- *Habitat Protection (inc vcal jma/ critical habitat nomination etc.) Use mechanisms such as Voluntary Conservation Agreements to promote the protection of this EEC on private land.*

There is the opportunity to implement a Voluntary Conservation Agreement over the Swamp Oak Floodplain Forest (and Coastal Saltmarsh) should the proponent wish to do so.

To date, no guidelines have been prepared in relation to ongoing EIA.

It is recommended that signage be erected at the landward and lakeside edges of this community (and the adjacent Coastal Saltmarsh) to inform residents and the public of its conservation significance.

- (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.*

Currently 29 Key Threatening Processes for mainland NSW are listed under Schedule 3 of the TSC Act. In relation to its interaction with Swamp Oak Floodplain Forest, the Proposal is unlikely to contribute in any appreciable sense to the operation of any of these Key Threatening Processes

7.1.2. (b). Expected impact on Swamp Oak Floodplain Forest.

The Proposal would not result in the removal of any Swamp Oak Floodplain Forest. However, a pattern of increased human habitation in the Wonboyn Lake area may contribute to pressure on the community due to possible increases in human disturbance. To mitigate against this possible impact it is recommended that appropriate signage be erected at the landward and lakeside edges of the community to inform residents and the wider community of its conservation significance.

7.1.2. (c). Coastal Saltmarsh - Seven Part Test.

- (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,*

Coastal Saltmarsh is an EEC, not a threatened species.

- (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,*

Coastal Saltmarsh is an EEC, not endangered population.

- (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,*
- (ii) *or 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,*

A small area of Coastal Saltmarsh covering approximately 1000m² occurs at the eastern edge of the site. As it is distant from the proposed building envelopes, it is unlikely to be adversely affected as a direct result of the proposed development. Increased human disturbance (which may arise from the proximity of nearby dwellings) may over time lead to modifications to the community. To allay this possibility it is recommended that signage be erected at the landward and lakeside edges of the community providing information on its conservation significance. The provision of low fencing (located on the landward side of the site), or some other form of clear delineation of the communities location, should also be considered.

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

It is considered that no Coastal Saltmarsh will be removed, modified or fragmented provided the recommendations in (c) above are implemented.

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

Critical habitat of Coastal Saltmarsh has not yet been defined.

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

No recovery plan or threat abatement plan has been prepared for Coastal Saltmarsh. However, nine recovery strategies have been identified by DECC (http://www.threatenedspecies.environment.nsw.gov.au/tsprofile/pas_profile.aspx?id=10866), the following of which are relevant to the proposal:

- *Community and land-holder liaison/ awareness and/or education: Enhance the capacity of persons involved in the assessment of impacts on this EEC to ensure the best informed decisions are made; and Liaise with landholders and undertake and promote programs that ameliorate threats such as grazing and human disturbance;*
- *Habitat management: Ongoing EIA (Environmental Impact Assessment)- Advice to consent and planning authorities. Prepare identification and impact assessment guidelines and distribute to consent and determining authorities;*
- *Habitat management: Site Protection (eg Fencing/Signage). Identify and prioritise other specific threats and undertake appropriate on-ground site management strategies where required; and*
- *Habitat Protection (inc vcal/ jmal/ critical habitat nomination etc. Use mechanisms such as Voluntary Conservation Agreements to promote the protection of this EEC on private land.*

There is the opportunity to implement a Voluntary Conservation Agreement over the Coastal Saltmarsh (and Coastal Saltmarsh) should the proponent wish to do so.

To date, no guidelines have been prepared in relation to ongoing EIA.

It is recommended that signage be erected at the landward and lakeside edges of this community (and the adjacent Swamp Oak Floodplain Forest) to inform residents and the public of its conservation significance. The provision of low fencing (located on the landward side of the site), or some other form of clear delineation of the communities location, should also be considered.

(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.*

Currently 29 Key Threatening Processes for mainland NSW are listed under Schedule 3 of the TSC Act. In relation to its interaction with Coastal Saltmarsh, the Proposal is unlikely to contribute in any appreciable sense to the operation of any of these Key Threatening Processes.

7.1.2. (d). Expected impact on Coastal Saltmarsh.

The Proposal would not result in the removal of any Coastal Saltmarsh. However, as part of a pattern of increased human habitation in the Wonboyn Lake area it may contribute to pressure on the community due to possible increases in human disturbance with resultant modification. To mitigate against this possible impact it is recommended that appropriate signage be erected at the landward and lakeside edges of the community to inform resident and the wider community of its conservation significance.

7.1.2. (e). Australian Saltgrass - Seven Part Test.

- (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,*

Although not detected during the survey, Australian Saltgrass has been detected elsewhere in Wonboyn Lake. It may occur in the subject site's Coastal Saltmarsh and evaded detection due to its similarity to Common Saltgrass when not flowering. Given that the proposed building envelopes are well a way from the saltmarsh it is unlikely that any individuals or habitat of Australian Saltgrass would be removed (if this species is present). However, as with the saltmarsh there is the risk that increased human activity may lead to disturbances of habitat, for instance from trampling. Signage highlighting the significance of the Coastal Saltmarsh will assist in mitigating any impacts on this species' habitat at the subject site.

- (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,*

Australian Saltgrass is a threatened species, not an endangered population.

- (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,*

(ii) *or 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,*

Australian Saltgrass is a threatened species, not an EEC.

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

It is considered that no Australian Saltgrass habitat would be removed, modified or fragmented provided the recommendations in (a) above are implemented.

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

Critical habitat of Australian Saltgrass has not yet been defined.

- (f) *whether the action proposed is consistent with the objectives or actions of a recovery plan or threat abatement plan,*

No recovery plan or recovery strategies have been prepared in relation Australian Saltgrass.

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- (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.

Currently 29 Key Threatening Processes for mainland NSW are listed under Schedule 3 of the *TSC Act*. In relation to its interaction with Australian Saltgrass, the Proposal is unlikely to contribute in any appreciable sense to the operation of any of these Key Threatening Processes.

7.1.2. (f). Expected impact on Australian Saltgrass.

The Proposal would not result in the removal of any Australian Saltgrass. However, the pattern of increased human habitation in the Wonboyn Lake area may contribute to pressure on the species due to possible increases in human disturbance of the Coastal Saltmarsh community. To mitigate against this possible impact it is recommended that appropriate signage be erected at the landward and lakeside edges of the community to inform residents and the wider community of its conservation significance. The provision of low fencing (located on the landward side of the site), or some other form of clear delineation of the communities location, should also be considered.

7.2. Fauna.

7.2.1. Commonwealth legislative considerations.

Two species listed under the *EPBC Act*, the White-bellied Sea-eagle (*Haliaeetus leucogaster*) and Grey-headed Flying-fox (*Pteropus poliocephalus*), were recorded during the field survey. Consideration into the likely impact of the Proposal on the local and regional occurrence of these animals has been given below, this drawing on the relevant criteria provided in association with the *EPBC Act* Significant Impact Guidelines.

The White-bellied Sea-eagle is listed as migratory under the *EPBC Act*. With reference to the Significant Impact Guidelines as provided in association with the *EPBC Act* for a *migratory species* it is considered that the Proposal would not:

- substantially modify (including by fragmenting, altering fire regimes, altering nutrient cycles or altering hydrological cycles), destroy or isolate an area of important habitat for the White-bellied Sea-eagle;
- result in an invasive species that is harmful to the White-bellied Sea-eagle becoming established in an area of important habitat for the migratory species; or
- Seriously disrupt the lifecycle (breeding, feeding, migration or resting behaviour) of an ecologically significant proportion of the population of the White-bellied Sea-eagle.

With reference to the scope of works proposed, it is considered that the White-bellied Sea-eagle, its populations or habitats would not be adversely affected. The works would not destroy, modify or isolate habitat important to this species. Similarly, the works would not disrupt its life cycle or further promote the development of invasive species.

In relation to the Grey-headed Flying-fox, an endangered species listed under the *EPBC Act*, the Proposal is not considered to:

- lead to a long-term decrease in the size of its population, or
- reduce the area of occupancy of this species, or
- fragment an existing Grey-headed Flying-fox population into two or more populations, or
- adversely affect habitat critical to the survival of the Grey-headed Flying-fox, or
- disrupt the breeding cycle of a Grey-headed Flying-fox, or
- modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that this species is likely to decline, or
- result in invasive species that are harmful to a critically endangered or endangered species becoming established in the endangered or critically endangered species' habitat, or
- interfere with the recovery of the Grey-headed Flying-fox.

It is considered that the Proposal will have a significant impact on either the White-bellied Sea-eagle or Grey-headed Flying-fox. Therefore, the Proposal can proceed as planned without requiring referral of the matter to the Federal Minister for the Environment and Water, Heritage and the Arts for further consideration or approval.

7.2.2. State legislative considerations.

By the completion of the field investigations, eight state-listed fauna species, the Yellow-bellied Glider (*Petaurus australis*), Eastern Bentwing-bat (*Miniopterus schreibersii*), Greater Broad-nosed Bat (*Scoteanax rueppellii*), Grey-headed Flying-fox (*Pteropus poliocephalus*), Sooty Oystercatcher (*Haematopus fuliginosus*), Glossy Black-Cockatoo (*Calyptorhynchus lathami*), Gang-gang Cockatoo (*Callocephalon fimbriatum*), and Powerful Owl (*Ninox strenua*) had been recorded within the study area. The potential impacts associated with the Proposal on the local viability of these species has been considered with reference to Part 3A of the *Environmental Planning and Assessment Act 1979*. As noted, at the time of report preparation only draft guidelines were available to assist with the assessment of threatened species under Part 3A. As such, an assessment using the seven part test as provided under Section 5A of the *Environmental Planning and Assessment Act 1979*, has been undertaken on each of these species, this considered to meet the Part 3A assessment requirements. These criteria are used to determine "whether there is likely to be a significant effect on these species, their populations, ecological communities or habitats".

Excluding the Eastern Bentwing-bat, Grey-headed Flying-fox and Sooty Oystercatcher, each of the threatened species recorded is considered to be a hollow-dependant animal. In relation to this, it is noted that the "loss of hollow-bearing trees" and "removal of dead wood and dead trees" are listed as a Key Threatening Process on Schedule 3 of the *TSC Act*. The Proposal will require the removal of some hollow-bearing and dead trees, though the impact of this, in comparison with the extent of similar resources retained adjacent to and beyond the limits of the subject site, is considered to be minimal. In relation to these Key Threatening Processes it is noted that recommendations have been presented to ensure that the proposal minimises the impact of the development on these habitat features.

7.2.2. (a) Yellow-bellied Glider – Seven Part Test.

(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..."

The detection of several Yellow-bellied Gliders in association with their necessary habitat would indicate that a locally viable population of this species is present in the study area. Whilst it is acknowledged that a percentage of the tall eucalypt woodland would be lost, this area is considered to be minimal in comparison with the extent of similar resources retained both within, and adjacent to, the study area. The Yellow-bellied Gliders were only recorded in the vicinity of Site 3, this portion of the study area considered to be utilised both for sheltering and foraging. The retention of mature hollow bearing trees within the locality where this species was detected on dusk, the retention of the incised feed tree, and the provision of corridors along which this animal can disperse/move, will ensure that no adverse effects on the life cycle of this animal arise, such that the local population would be placed 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..."

An 'endangered population' is defined as a "population specified in Part 2 of Schedule 1" of the *TSC Act*. Therefore the Yellow-bellied Glider is not an endangered population.

(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...”*

An EEC means an ecological community specified in Part 3 of Schedule 1 of the TSC Act. The Yellow-bellied Glider is not listed as an EEC.

(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*

The Proposal would result in the removal of a portion of habitat type in which this species was detected (that being the tall eucalypt woodland). The resultant clearing would remove/disturb some hollow bearing trees and plants upon which this animal may seasonally.

Recommendations have been presented that a suitable location for the residential development and access carriageway be selected, one that minimises the disturbance of the tall open woodland. As such, if these recommendations are adopted the impacts of the works on this species and its habitat will be minimised.

- (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*

The Yellow-bellied Glider is a highly agile species, moving around by either gliding or climbing through the forest canopy (Goldingay and Kavanagh 1991). Although a small percentage of the eucalypt woodland will be removed, the Yellow-bellied Glider is known to easily negotiate (glide across) open space areas that are between 70m and 100m wide (Engel and Fanning 1995). Therefore, the clearing of a portion of the tall eucalypt woodland (to permit both the construction of the dwellings, firetrail and other infrastructure) would not result in the isolation of any interconnecting habitat available to this species.

- (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...”*

The portion of tall eucalypt woodland proposed to be removed is not considered important to the long-term survival of this species at this location. Similarly resources are to be retained both within, and adjacent to, the subject site, thereby meeting the life cycle need of this animal. The retention of suitable foraging, roosting and breeding sites, plus this animals tolerance of urban modified areas, will ensure its local presence in the long term.

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

The study area is not listed as critical habitat under Part 3, Division 1 of the TSC Act. Critical habitat for the Yellow-bellied Glider is yet to be defined.

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

A recovery plan has not yet been drafted or finalised for the Yellow-bellied Glider. Fourteen priority actions have been identified that would be applicable to this species (DECC 2008b). Of these the following would be relevant to the current Proposal:

- **Habitat Management:** Identification, protection and management of regionally significant habitat, develop impact assessment guidelines to ensure adequate level of surveys are undertaken and protection of species habitat including hollow bearing trees and sap trees.
- **Habitat Protection:** Consider species in reserve management and planning to protect and enhance habitat and connection corridors, liaise with Catchment Management Authorities and Department of Natural Resources with respect to identification and protection of species' habitat through Property Vegetation Plans (PVPs) and land owner incentives.

Given the amount of habitat likely to be disturbed by the Proposal, its undertaking is not considered that the resultant development would threaten the presence of any Yellow-bellied Glider individuals, populations or their necessary habitat areas.

(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..."

Currently 29 Key Threatening Processes for mainland NSW are listed under Schedule 3 of the TSC Act. Of these, in regards to the presence of the Yellow-bellied Glider, the "clearing of native vegetation", the "loss of hollow bearing trees" and the "removal of dead wood and dead trees" would be applicable to the Proposal. Whilst the Proposal would result in the permanent loss of a small percentage of bushland, this including a number of hollow-bearing trees, given the extent of similar resources within both the study area and surrounding network of conservation reserves / other protected areas, it is not considered that the Proposal would result in a significant loss of habitat for this species from the region. As such, it is not considered that the Proposal would constitute a significant Key Threatening Process such that the life cycle requirements of the Yellow-bellied Glider would be compromised.

7.2.2 (b) Expected impact on the Yellow-bellied Glider.

The undertaking of the Proposal would not disturb, remove, modify or fragment any habitats critical to the life cycle requirements of the Yellow-bellied Glider. A small portion of available foraging and potential roosting/breeding habitat would be removed, though this, when compared to the extent of similar resources in the surrounding region, is not considered to be significant. At site 3, the appropriate sighting of the residential development, the retention of scattered trees within the site itself, the maintenance of canopy connectivity within the foreshore strip and the retention of the sap feed tree and mature hollow bearing plants within the foreshore strip, will ensure that the Proposal does not have any impacts on any of Yellow-bellied Glider dispersal or movement corridors, nor would it adversely affect any significant areas of this species local or regional habitat. Therefore, based on the results of the field surveys, combined with the consultation of known literature sources, it is not considered that the Proposal would have a significant impact on this threatened species, its population, ecological community or habitat.

7.2.2. (c) Eastern Bentwing-bat– Seven Part Test.

(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..."

The Eastern Bentwing-bat is a cave dependant species that forms discrete populations centred on a maternity cave. This cave is used on an annual basis during the spring and summer months (DECC 2008b). Outside of the breeding season, Eastern Bentwing-bat individuals disperse and occupy other suitable cave and cave substitute roosting sites, these generally being within 300km of the maternity cave (DECC 2008b). Given the absence of any caves or cave substitutes within the subject site, the proposed development is not expected to remove any roosting areas utilised by this microchiropteran. The Proposal will remove up to 6.1ha of insect attracting bushland that would be used by this animal during its foraging periods. Whilst this is the case, similar resources would be retained within the remainder of the study area. In addition, suitable foraging resources would be

retained within the network of nearby conservation reserves. As such, the Proposal is not considered to limit the extent of any resources available to this species, such that it would be placed at risk of local 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..."*

An 'endangered population' is defined as a "population specified in Part 2 of Schedule 1" of the TSC Act. Therefore the Eastern Bentwing-bat is not an endangered population.

(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..."*

An EEC means an ecological community specified in Part 3 of Schedule 1 of the TSC Act. The Eastern Bentwing-bat is not listed as an EEC.

(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*

The Proposal would result in the removal of around 6.1ha of bushland that supports insect attracting plants. Being an insectivorous species, the Proposal would remove a percentage of foraging resources available to this microchiropteran.

- (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*

The Eastern Bentwing-bat is known to traverse large distances when dispersing from a central maternity site. In the south-east region of NSW, a known maternity site is present within Bungonia State Recreation Area (Southern Highlands) (and in north-east Victoria Nargun Cave in East Gippsland). Within a radius of 300km of the maternity cave, when not breeding, the Eastern Bentwing-bat will occupy a number of other caves and suitable cave substitutes. Dispersal to these additional sheltering and roosting sites would involve individuals negotiating and traversing over a range of habitat types. Therefore the loss of those resources provided by the study area combined with this species known ability to traverse large distances, open space areas and urban infrastructure is not considered to result in the isolation of any currently interconnecting or proximate areas of habitat suitable for this species.

- (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..."*

The 6.1ha of insect attracting plants that would be lost due to the undertaking of the development is not considered important to the local occurrence of the Eastern Bentwing-bat. The loss of this vegetation would not significantly reduce the extent of foraging or roosting habitats available to this species such that its long-term survival in this locality would be jeopardised.

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

No critical habitat would be adversely affected by the Proposal. The study area is not listed as critical habitat under Part 3 Division 1 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 has not yet been drafted or finalised for the Eastern Bentwing-bat. Twenty-five priority actions have been identified for this species (DECC 2008b). Of these the following may be relevant:

- Habitat Protection; and
- Habitat Management.

However, given the amount of habitat likely to be disturbed by the Proposal, its undertaking is not considered to threaten the presence of any Eastern Bentwing-bat individuals, populations or their necessary habitat areas.

(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..."

Currently 29 Key Threatening Processes for mainland NSW are listed under Schedule 3 of the TSC Act. Of these, the "clearing of native vegetation" would be applicable to the Proposal. Whilst the Proposal would result in the permanent loss of approximately 6.1ha of insect attracting plant, given the extent of similar resources both adjacent to the subject site, and within the surrounding network of conservation reserves / other protected areas, it is not considered that the Proposal would result in a significant loss of foraging habitat for this microchiropteran from the region. As such, it is not considered that the Proposal would constitute a significant Key Threatening Process such that the life cycle requirements of the Eastern Bentwing-bat would be compromised.

7.2.2. (d) Expected impact on the Eastern Bentwing-bat.

The undertaking of the Proposal would not disturb, remove, modify or fragment any habitats critical to the life cycle requirements of the Eastern Bentwing-bat. A small portion of available foraging habitat would be removed this, when compared to the extent of similar resources in the surrounding area, not considered to be significant. Given the small amount of foraging habitat to be removed the Proposal would not have an impact on any Eastern Bentwing-bat dispersal or movement corridors, nor would it adversely affect any significant areas of this species local or regional habitat. Therefore, based on the results of the field survey combined with the consultation of known literature sources, it is not considered that the Proposal would have a significant impact on this threatened species, its population, ecological community or habitat.

7.2.2. (e) Greater Broad-nosed Bat – Seven Part Test.

a) "...in the case of a threatened species, whether the life cycle of the species is likely to be disrupted such that a viable local population of the species is likely to be placed at risk of extinction..."

The Greater Broad-nosed Bat was detected within the study area, but beyond the limits of the subject site. Within the study area, suitable foraging and roosting habitat would be retained, thereby ensuring the local viability of this species. The development of the subject site, this resulting in the loss of around 6.1ha of bushland, would not cause the extinction of the local Greater Broad-nosed Bat population.

(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..."

An 'endangered population' is defined as a "population specified in Part 2 of Schedule 1" of the TSC Act. The Greater Broad-nosed Bats are not listed as an endangered population.

(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..."

An EEC means an ecological community specified in Part 3 of Schedule 1 of the TSC Act. The Greater Broad-nosed Bat is not listed as an EEC.

(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

The Proposal would result in the removal of around 6.1ha of bushland that supports both hollow bearing trees and insect attracting plants. Whilst this is the case, within the remainder of the study area, it is acknowledged that around 103ha of similar habitat would be retained in its current condition.

- (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

Greater Broad-nosed Bat can easily negotiate open areas and has been recorded flying over water bodies (author's field notes). The loss of a small percentage of vegetation is not expected to result in the disturbance to this species dispersal patterns, nor would it fragment or isolate any of its habitat areas. Woodlands available for the dispersal needs of this species would be retained, these providing connectivity with the surrounding network of conservation reserves and other protected areas. Therefore, no isolation or fragmentation of the habitats of the Greater Broad-nosed Bat would arise.

- (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..."

The 6.1ha (approximately) of bushland that would be lost due to the undertaking of the development is not considered important to the local occurrence of the Greater Broad-nosed Bat. The loss of this vegetation would not significantly reduce the extent of foraging or roosting habitats available to this species such that its long-term survival in this locality would be jeopardised.

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

No critical habitat would be adversely affected by the Proposal. The subject site is not listed as critical habitat under Part 3 Division 1 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 has not yet been drafted or finalised for the Greater Broad-nosed Bat. Nineteen priority actions have been identified for this species (DECC 2008b). Of these the following may be relevant:

- Habitat management; and
- Habitat Protection.

However, given the amount of habitat likely to be disturbed by the Proposal, its undertaking is not considered to threaten the presence of any Greater Broad-nosed Bat individuals, populations or their necessary habitat areas.

(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..."

Currently 29 Key Threatening Processes for mainland NSW are listed under Schedule 3 of the TSC Act. Of these, in regards to the presence of the Greater Broad-nosed Bat, the "clearing of native vegetation", the "loss of hollow bearing trees" and the "removal of dead wood and dead trees" would be applicable to the Proposal. Whilst the Proposal would result in the permanent loss of a small percentage of bushland, this including a number of hollow-bearing trees, given the extent of similar resources within both the study area and surrounding network of conservation reserves / other protected areas, it is not considered that the Proposal would result in a significant loss of habitat for this species from the region. As such, it is not considered that the Proposal would constitute a significant Key Threatening Process such that the life cycle requirements of the Greater Broad-nosed Bat would be compromised.

7.2.2. (f) Expected impact on the Greater Broad-nosed Bat.

The undertaking of the Proposal would not disturb, remove, modify or fragment any habitats critical to the life cycle requirements of the Greater Broad-nosed Bat. A small portion of available foraging and roosting habitat would be removed due to the undertaking of the Proposal, this, when compared to the extent of similar resources retained adjacent to and beyond the limits of the subject site not considered to be significant. Given the extent of clearing expected to occur, the Proposal would not have any impacts on any Greater Broad-nosed Bat dispersal or movement corridors, nor would it adversely affect any significant areas of their local or regional habitat. Therefore, based on the results of the field survey combined with the consultation of known literature sources, it is not considered that the Proposal would have a significant impact on the Greater Broad-nosed Bat, its population, ecological community or habitat.

7.2.2. (g) Grey-headed Flying-fox (*Pteropus poliocephalus*).

(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..."

Whilst heard calling near Wonboyn Lake Caravan Park, no individuals of this species were observed or detected within the study area. Although this is the case, it is expected that this animals would occupy the study area on occasion, particularly when any of the eucalypts are in flower. Whilst it is acknowledged that the Proposal would result in the removal of around 6.1ha of vegetation, it is not considered that the plants that are to be removed would constitute a significant resource upon which the Grey-headed Flying-fox would be reliant. No active Flying-fox camps are known within the study area therefore this species is only likely to use the study area for foraging purposes. The Proposal would not significantly reduce the extent of foraging opportunities available to this species, nor would it result in the erection of any barriers to the dispersal, foraging or interbreeding needs of this

species. As such, the viability of the local Grey-headed Flying-fox population would not be adversely affected thereby resulting in the local extinction of this species.

(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..."*,

An 'endangered population' is defined as a "population specified in Part 2 of Schedule 1" of the TSC Act. Therefore the Grey-headed Flying-fox is not an endangered population.

(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..."*

An EEC means an ecological community specified in Part 3 of Schedule 1 of the TSC Act. The Grey-headed Flying-fox is not listed as an EEC.

(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

The Proposal would result in the removal of around 6.1ha of bushland that supports flowering plants. Whilst this is the case, within the remainder of the study area, it is acknowledged that around 103ha of similar habitat would be retained in its current condition.

- (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

The Grey-headed Flying-fox is known to easily negotiate urban infrastructure, including urban areas, roads, open fields, water bodies and paddocks (LesryK Environmental Consultants 2004). As such, the Proposal would not present a barrier to the movement patterns of this species such that any of its habitat areas are likely to become isolated.

- (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..."*

The vegetation proposed to be removed would not be important for the long-term survival of the Grey-headed Flying-fox. Adjacent to the Proposal, and throughout the surrounding region, numerous stands of similar vegetation are present, these providing foraging opportunities for this species thereby guaranteeing the long-term presence of the Grey-headed Flying-fox.

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

No critical habitat would be adversely affected by the Proposal. The study area is not listed as critical habitat under Part 3, Division 1 of the TSC Act. Critical habitat for the Grey-headed Flying-fox is yet to be defined. Nevertheless, any remnant of the size of the study area is unlikely to constitute critical habitat in any future declaration.

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

A recovery plan has not yet been drafted or finalised for the Grey-headed Flying-fox. Thirty-one priority actions have been identified for this species (DECC 2008b). Of these the following would be relevant:

- **Habitat Protection:** Protect and enhance priority foraging habitat for Grey-headed Flying-foxes, for example through management plans, local environmental plans and development assessments, and through volunteer conservation programs for privately owned land.

Given the amount of habitat likely to be disturbed by the Proposal, it is considered unlikely that this vegetation would be identified as a priority foraging area.

(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.

Currently 29 Key Threatening Processes for mainland NSW are listed under Schedule 3 of the TSC Act. Of these, "clearing of native vegetation" would be applicable to the Proposal. Whilst it is acknowledged that the Proposal would result in the clearing of some native vegetation potentially available for the foraging needs of the Grey-headed Flying-fox, it is not considered that the clearance that would take place would result in a significant loss of habitat for this species from the region. As such, it is considered that the Proposal would not constitute, or increase the impact of, a significant Key Threatening Process such that the life cycle requirements of this species would be compromised.

7.2.2. (h) Expected impact on the Grey-headed Flying-fox.

The Proposal is not considered to have a significant impact on the local status of the Grey-headed Flying-fox. The works would not remove any significant portions of this species' roosting or breeding sites and no major foraging areas would be significantly affected. The works would not present a barrier to the dispersing or movement patterns of this species, the Grey-headed Flying-fox expected to easily negotiate those environments present within the study area. Therefore, it is not considered that the Proposal would have a significant impact on this threatened species, its population, ecological community or habitats.

7.2.2. (g) Sooty Oystercatcher – Seven Part Test.

(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..."

Individuals of this species were recorded during the field survey, the observations of these being made beyond the limits of any direct or indirect disturbance. The Proposal is therefore not considered to have an adverse effect on the Sooty Oystercatcher or its local population, such that it would be placed 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..."

An 'endangered population' is defined as a "population specified in Part 2 of Schedule 1" of the TSC Act. Therefore the Sooty Oystercatcher is not an endangered population.

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..."

An EEC means an ecological community specified in Part 3 of Schedule 1 of the TSC Act. The Sooty Oystercatcher is not listed as an EEC.

(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

No habitat available to this species would be removed by the scope of works proposed.

- (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

The Sooty Oystercatcher's ability to traverse open expanses of water during its foraging, dispersal and breeding periods is expected to negate any impacts associated with the proposed development. As such, no areas of known habitat available for the foraging, sheltering or breeding needs of this species are likely to become isolated or fragmented.

- (iv) "...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..."

No habitat suitable for the foraging needs of the Sooty Oystercatcher will be removed as a result of this Proposal.

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

The study area is not listed as critical habitat under Part 3, Division 1 of the TSC Act. Critical habitat for the Sooty Oystercatcher is yet to be defined.

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

A recovery plan has not yet been drafted or finalised for the Sooty Oystercatcher. Seven Priority Actions have been identified for this species (DECC 2008b), most focusing on the offshore Islands breeding grounds of the Sooty Oystercatcher. Given that no habitat important for this species is likely to be disturbed, none of these Priority Actions are relevant to this Proposal. The Proposals undertaking is not considered to threaten the presence of any Sooty Oystercatcher individuals, populations or their necessary habitat areas.

(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..."

Currently 29 Key Threatening Processes for mainland NSW are listed under Schedule 3 of the TSC Act. In relation to the Proposals interaction with the Sooty Oystercatcher, the resultant development is unlikely to contribute in any appreciable sense to the operation of any of these Key Threatening Processes.

7.2.2 (h) Expected impact on the Sooty Oystercatcher.

The undertaking of the Proposal would not disturb, remove, modify or fragment any habitats critical to the life cycle requirements of the Sooty Oystercatcher. No habitats were observed within the area of possible impact (including both direct and indirect impacts) that would be considered significant for the conservation and preservation of this species. Due to its ability to negotiate open space areas, water bodies and urban infrastructure, no Sooty Oystercatcher dispersal or movement corridors would be disturbed, and no significant areas of local or regional habitat would be removed or isolated. During the field survey, no breeding populations of this species were recorded within the study area, the observations made being of foraging and sheltering individuals. Therefore, based on the results of the field survey combined with the consultation of known literature sources, it is not considered that the Proposal would have a significant impact on any Sooty Oystercatchers, their populations, ecological communities or habitats.

7.2.2. (i) Glossy Black-Cockatoo – Seven part test

(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...”*

The Proposal would result in the removal of around 6.1ha of bushland in which hollow bearing trees and Casuarina plants are present. Whilst this is the case, within the remainder of the study area, around 103ha of similar habitat would be retained. Within the subject site, no evidence of any breeding animals was recorded, the presence of this species only indicated through the observation of characteristic feeding signs. The sighting of the proposed developments such that they avoid the identified feed trees and minimise the loss of hollow bearing plants will ensure that the local viability of this species is not placed at risk of extinction. The Glossy Black-Cockatoo is a species tolerant of urban infrastructure (authors field notes), this animal expected to continue to utilise the study area post-development.

(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...”*

An ‘endangered population’ is defined as a “population specified in Part 2 of Schedule 1” of the TSC Act. Therefore the Glossy Black-Cockatoo is not an endangered population.

(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...”*

An EEC means an ecological community specified in Part 3 of Schedule 1 of the TSC Act. The Glossy Black-Cockatoo is not listed as an EEC.

(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

The Proposal would result in the removal of around 6.1ha of bushland that supports both hollow bearing trees and Casuarina feed trees. Whilst this is the case, within the remainder of the study area, it is acknowledged that around 103ha of similar habitat would be retained in its current condition. In

addition, those feed trees detected all occur within the 75m setback area, thereby ensuring their retention.

- (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

This species is highly mobile and can traverse open spaces and woodland canopies. The loss of a small percentage of woodland is not expected to result in the disturbance to this species dispersal patterns. Wooded corridors available for the dispersal needs of this species would be retained, these providing connectivity with the surrounding reserves and other protected areas. As such the Proposal would not isolate any currently interconnecting or proximate areas of habitat available for use by the Glossy Black-Cockatoo.

- (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...”*

The Proposal is not considered to remove, modify, fragment or isolate a significant amount of vegetation such that the long-term survival of the Glossy Black-Cockatoo would be jeopardised. The habitats within the study area extend well beyond the boundaries of the Proposal. At a regional level, the resources present would not be considered to constitute a significant area of habitat in relation to either the local or regional requirements of the Glossy Black-Cockatoo. As such, given the selection of a rural development and road footprint that limits the number of hollow bearing and Casuarina trees that require clearing, combined with the extent of the surrounding vegetated areas and fauna corridors, the long-term survival of the Glossy Black-Cockatoo within, and in close proximity to, the study area is ensured.

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

The study area is not listed as critical habitat under Part 3, Division 1 of the TSC Act. Critical habitat for the Glossy Black-Cockatoo is yet to be defined.

- (f) *“...whether the action proposed is consistent with the objectives or actions of a recovery plan or threat abatement plan...”*

A recovery plan has not yet been drafted or finalised for the Glossy Black-Cockatoo. Nine Priority Actions have been identified for this species (DECC 2008b). Of these, “Habitat Rehabilitation/Restoration and/or Regeneration - Encourage the restoration of foraging habitat that has been cleared or degraded by previous impacts” would be relevant to the current Proposal. However, given the amount of habitat likely to be disturbed by the resultant developments, it is considered unlikely that this vegetation would be identified as a priority foraging area. As such, the Proposal is not considered to threaten the presence of any Glossy Black-Cockatoo individuals, populations or their necessary habitat areas.

- (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...”*

Currently 29 Key Threatening Processes for mainland NSW are listed under Schedule 3 of the TSC Act. Of these, in regards to the presence of the Glossy Black-Cockatoo, the “clearing of native vegetation”, the “loss of hollow bearing trees” and the “removal of dead wood and dead trees” would be applicable to the Proposal. Whilst the Proposal would result in the permanent loss of approximately 6.1ha of bushland, this including a number of hollow-bearing trees and Casuarina plants, given the extent of similar resources retained within both the study area and surrounding network of conservation reserves / other protected areas, it is not considered that the Proposal would result in a significant loss of habitat for this species from the region. As such, it is not considered that the Proposal would constitute a significant Key Threatening Process such that the life cycle requirements of the Glossy Black-Cockatoo would be compromised.

7.2.2. (l) Expected impact on the Glossy Black-Cockatoo.

The undertaking of the Proposal would not disturb, remove, modify or fragment any habitats critical to the life cycle requirements of the Glossy Black-Cockatoo. A small portion of potential roosting, nesting and foraging habitat available to this species would be removed this, when compared to the extent of similar resources in the surrounding region not considered to be significant. Given the extent of clearing expected to occur, the Proposal would not have any impacts on any Glossy Black-Cockatoo dispersal or movement corridors, nor would it adversely affect any significant areas of this species local or regional habitat. Therefore, based on the results of the field survey combined with the consultation of known literature sources, it is not considered that the Proposal would have a significant impact on this threatened species, its population, ecological community or habitats.

7.2.2. (k) Gang-gang Cockatoo - Seven Part Test.

(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...”*

No individuals of this species were observed or heard calling from within the study area itself, this species only being detected to the south of Lake Wonboyn. Whilst this is the case, it is expected that this animals would occupy the study area on occasion, particularly when any of the eucalypts are in flower. Within the study area, resources suitable for the breeding, foraging and sheltering needs of the Gang-gang Cockatoo were observed. The development of the site would remove around 6.1ha of bushland available to the life cycle needs of this species, this, when compared with the extent of similar habitat being retained within the remainder of the study area, not considered to be significant. The loss of this vegetation is not considered to compromise the viability of a local population of the Gang-gang cockatoo, such that it would be placed 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...”*

An ‘endangered population’ is defined as a “population specified in Part 2 of Schedule 1” of the TSC Act. Therefore the Gang-gang Cockatoo is not an endangered population.

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

- (iii) *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*
- (iv) *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...”*

An EEC means an ecological community specified in Part 3 of Schedule 1 of the TSC Act. The Gang-gang Cockatoo is not listed as an EEC.

(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*

The Proposal would result in the removal of around 6.1ha of bushland that supports both hollow bearing trees and plants that are available to the foraging needs of the Gang-gang Cockatoo. Whilst this is the case, within the remainder of the study area, it is acknowledged that around 103ha of similar habitat would be retained in its current condition.

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- (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

This species is highly mobile and can traverse open spaces. The loss of a small percentage of woodland is not expected to result in the disturbance to this species dispersal patterns. Wooded corridors available for the dispersal needs of this species would be retained, these providing connectivity with the surrounding reserves and other protected areas. As such the Proposal would not isolate any currently interconnecting or proximate areas of habitat available for use by the Gang-gang Cockatoo.

- (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...”*

The Proposal is not considered to remove, modify, fragment or isolate a significant amount of vegetation such that the long-term survival of the Gang-gang Cockatoo would be jeopardised. The habitats within the study area extend well beyond the boundaries of the Proposal. At a regional level, the resources present within the subject site would not be considered to constitute a significant area of habitat in relation to either the local or regional requirements of the Gang-gang Cockatoo. As such, given the extent of works proposed combined with the extent of the surrounding vegetated areas and fauna corridors, the long-term survival of the Gang-gang Cockatoo within, and in close proximity to, the study area is ensured.

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

The study area is not listed as critical habitat under Part 3, Division 1 of the TSC Act. Critical habitat for the Gang-gang Cockatoo is yet to be defined.

- (f) *“...whether the action proposed is consistent with the objectives or actions of a recovery plan or threat abatement plan...”*

A recovery plan has not yet been drafted or finalised for the Gang-gang Cockatoo. Eight Priority Actions have been identified for this species (DECC 2008b). Of these, the following would be relevant to the current Proposal:

- Habitat Rehabilitation/Restoration and/or Regeneration - Develop a strategy that includes street tree or other planting, browse plant species within reserves and private residences; and
- Provide supplementary hollows/nest boxes within the primary habitat areas.

Recommendations have been provided to ensure the Proposal complies with these Priority Actions.

- (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...”*

Currently 29 Key Threatening Processes for mainland NSW are listed under Schedule 3 of the TSC Act. Of these, in regards to the presence of the Gang-gang Cockatoo, the “clearing of native vegetation”, the “loss of hollow bearing trees” and the “removal of dead wood and dead trees” would be applicable to the Proposal. Whilst the Proposal would result in the permanent loss of around 6.1 ha of bushland, this including a number of hollow-bearing trees and foraging plants, given the extent of similar resources retained within both the study area and surrounding network of conservation reserves / other protected areas, it is not considered that the Proposal would result in a significant loss of habitat for this species from the region. As such, it is not considered that the Proposal would constitute a significant Key Threatening Process such that the life cycle requirements of the Gang-gang Cockatoo would be compromised.

7.2.2. (l). Expected impact on the Gang-gang Cockatoo.

The Proposal is not considered to have a significant impact on the local status of the Gang-gang Cockatoo. The works would not remove any significant portions of this species roosting or breeding sites and no major foraging areas would be significantly affected. The works would not present any barriers to the dispersing or movement patterns of this species, the Gang-gang Cockatoo considered to easily negotiate open areas, rural and urban environments and infrastructure. Therefore, it is not considered that the Proposal would have a significant impact on this threatened species, its population, ecological community or habitat.

7.2.2 (m). Powerful Owl.

(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..."

The Proposal would result in the removal of around 6.1ha of bushland in which hollow bearing trees and Powerful Owl prey species were observed. Whilst this is the case, within the remainder of the study area, around 103ha of similar habitat would be retained. Within the subject site, no evidence of any breeding animals was recorded, the Powerful Owl only being recorded within the central portion of the site. Within the subject site itself, no individuals responded to the call playbacks undertaken. The Powerful Owl is a species tolerant of urban and semi-rural areas, this animal expected to adapt to the resultant development. The sighting of the proposed developments such that they minimise the removal of hollow bearing plants will ensure that the local viability of this species is not placed 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..."

An 'endangered population' is defined as a "population specified in Part 2 of Schedule 1" of the TSC Act. Therefore the Powerful Owl is not an endangered population.

(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..."*

An EEC means an ecological community specified in Part 3 of Schedule 1 of the TSC Act. The Powerful Owl is not listed as an EEC.

(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

The Proposal would result in the removal of around 6.1ha of bushland that supports both hollow bearing trees and mammal species upon which the Powerful Owl may forage. Whilst this is the case, within the remainder of the study area, it is acknowledged that around 103ha of similar habitat would be retained in its current condition. Within the subject site, no roosting individuals of this species were detected, the animal recorded being present to the west of the transmission line. Retention of these adjacent bushland areas will ensure both the local occurrence of this animal and its habitat area.

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- (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*

The Powerful Owl requires large tracts of forest and/or woodland, though it can also occur in fragmented landscapes. This species is able to traverse open country therefore not being affected by habitat fragmentation and isolation. The Proposal would therefore not isolate any currently interconnecting or proximate areas of habitat available for use by this species. Similarly, no barriers between any breeding populations would be erected.

- (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...”*

The “limited amount” of vegetation proposed to be removed would not be important for the long-term survival of the Powerful Owl at this locality. Adjacent to the subject site, numerous stands of similar native vegetation are present, these providing foraging, breeding and sheltering opportunities for this species. Within the study area the Powerful Owl was recorded, its detection location being beyond the limits of any direct or indirect disturbance. As such, it is considered that the long-term presence of the local Powerful Owl population would not be compromised.

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

The study area is not listed as critical habitat under Part 3, Division 1 of the TSC Act. Critical habitat for the Powerful Owl is yet to be defined.

- (f) *“...whether the action proposed is consistent with the objectives or actions of a recovery plan or threat abatement plan...”*

A recovery plan has been prepared for the Large Forest Owls, this including the Powerful Owl. The overall objective of the Large Forest Owls recovery plan is to ensure that viable populations of these species continue in the wild in NSW. Depending on the full implementation and success of the proposed actions, a further objective is to reassess the conservation status of the species and down list them from Vulnerable to secure if appropriate.

In line with the overall objectives of the Large Forest Owl's recovery plan, the Proposal, given its limited size and minimal extent of impact, is not considered to affect the status of the local Powerful Owl population.

Threats to the Large Forest Owls listed in the Recovery Plan are, Habitat clearing and fragmentation, Logging, Fire, Grazing, Predation, Human Hazards, Pest Control, Disease and Drought, of which 'habitat clearing', 'fragmentation' and to a lesser extent, 'logging' would be applicable to the current Proposal. Whilst containing components of identified Powerful Owl threats, the scale of the works proposed is not considered to significantly threaten the occurrence of this species, thereby constituting a Key Threatening Process.

- (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...”*

Currently 29 Key Threatening Processes for mainland NSW are listed under Schedule 3 of the TSC Act. Of these, in regards to the presence of the Powerful Owl, the "clearing of native vegetation", the "loss of hollow bearing trees" and the "removal of dead wood and dead trees" would be applicable to the Proposal. Whilst the Proposal would result in the permanent loss of around 6.1ha of bushland, this including a number of hollow-bearing trees and areas in which this species prey species were recorded, given the extent of similar resources retained within both the study area (this including an area where this species is expected to be roosting) and surrounding network of conservation reserves / other protected areas, it is not considered that the Proposal would result in a significant loss of habitat for the Powerful Owl from the region. As such, it is not considered that the Proposal

would constitute a significant Key Threatening Process such that the life cycle requirements of the Powerful Owl would be compromised.

7.2.2. (n) Expected impact on the Powerful Owl.

The undertaking of the Proposal would not disturb, remove, modify or fragment any habitats critical to the life cycle requirements of the Powerful Owl. Although a small portion of its habitat would be lost due to the undertaking of the Proposal, this, when compared to the extent of similar habitats retained in the study area not considered to be significant. Given the scope of works proposed, the proposed development would not have any impacts on the Powerful Owl's dispersal or movement corridors, nor would it adversely affect any significant areas of this species local or regional habitat. Therefore, based on the results of the field surveys combined with the consultation of known literature sources, and the assumption that the recommendations provided are followed, it is not considered that the Proposal would have a significant impact on the Powerful Owl, its populations, ecological communities or habitats.

8. Conclusions.

Based on the results of the flora and fauna surveys, combined with a review of known literature and database sources, it is considered that there are no ecological constraints to the Proposal proceeding as planned. With the adoption of those recommendations presented, the Proposal would not have a significant impact on any populations of any native flora or fauna (including those species of state and/or national conservation recorded) such that they are placed at risk of extinction. Similarly the Proposal would not remove or significantly affect any habitats of local, regional, state or national conservation concern.

The Proposal is not considered to affect, threaten or have an adverse impact on any of those plants or animals listed under the *EPBC Act*. Within the study area, no nationally listed Endangered Ecological Communities or threatened flora species were recorded. Therefore, it is not considered that the matter would require referral to the Federal Minister for the Environment, Water, Heritage and the Arts for further consideration or approval.

With regard to the *TSC Act*, two Endangered Ecological Communities were recorded, these being Coastal Saltmarsh and Swamp Oak Floodplain Forest. A consideration of likely impacts on these communities drawing on the criteria listed under Section 5A of the *NSW Environmental Planning and Assessment Act 1979*, concluded that the Proposal would not result in the local occurrences of these communities being impacted upon such that they would be placed at risk of extinction. Seven animals listed under the *TSC Act* were also detected, these being Yellow-bellied Glider (*Petaurus australis*), Eastern Bentwing-bat (*Miniopterus schreibersii*), Greater Broad-nosed Bat (*Scoteanax rueppellii*), Sooty Oystercatcher (*Haematopus fuliginosus*), Glossy Black-Cockatoo (*Calyptorhynchus lathami*), Gang-gang Cockatoo (*Callocephalon fimbriatum*), and Powerful Owl (*Ninox strenua*). With reference to the assessment criteria listed under Section 5A of the *Environmental Planning and Assessment Act 1979*, it was considered that any of these state listed threatened species, or their habitats, would be significantly affected. Similarly, the Proposal would not present any additional barrier to the movement patterns of these animals nor would it isolate any of their necessary habitat areas. The proposed development would not adversely affect the local presence of the state listed threatened fauna recorded or expected. No individuals or populations of these animals would be placed at risk of local or regional extinction.

Based on the outcomes of the field surveys, combined with the results of the literature and database review, it is considered that the Proposal could proceed as planned. Within the subject site, no major ecological constraints were identified that would prevent the undertaking of the proposed development occurring.

9. Recommendations.

The following recommendations are provided to ensure that the Proposal does not have an adverse impact on those habitats that occur beyond the limits of the proposed developments. These recommendations are also provided to ensure that the works are undertaken in an ecologically sustainable manner:

- The impact of any infrastructure on the flora and fauna communities should be such that it minimises the extent of disturbance. In order to minimise vegetation clearing and soil disturbance on site, and to avoid any possible impact on Wonboyn Lake, the recommendations of Morse McVey (Passfield 2007) should be implemented and their efficacy monitored.
- Prior to the works on Site 3 commencing, the Yellow-bellied Glider sap tree should be clearly marked to ensure it is not directly or indirectly (i.e. through the compaction of its root ball) affected.
- Similarly, the likely location of the Yellow-bellied Glider roost tree should be identified (both on site and on those plans provided to the works contractor), thereby ensuring this area is not directly or indirectly affected.
- A layout for the proposed dwelling should be selected that minimises the loss of mature hollow bearing trees. Similar, the alignment of the proposed access road/firetrail should avoid the removal of any hollow bearing trees.
- The alignment of the proposed access road/firetrail should avoid any removal or modification of the Scented Paperbark Scrub/Closed Scrub community that occurs near the north-western boundary of Site 3.
- The Glossy Black-Cockatoo feed trees identified within Site 1 should be clearly marked on site to ensure that are not indirectly affected by the scope of works proposed. No works should be undertaken in the vicinity of these plants.
- Supplementary hollows/nest boxes should be erected within the study area. These should be designed so they meet the roosting/breeding requirements of birds, arboreal mammals and microchiropterans. The nesting boxes should be monitored for a period of no less than 12 months. Any boxes damaged or occupied by exotic species (e.g. European Honeybees) should be removed and replaced.
- In relation to the EEC' Coastal Saltmarsh and Swamp Oak Floodplain Forest, signage should be erected at their landward and lakeside edges outlining their conservation significance and related penalties for their destruction. Similarly, the provision of low fencing (located on the landward side of the site), or some other form of clear delineation of the communities location, should be considered.
- The placement of any infrastructure associated with the development (including site compounds and storage areas) should be located where possible within areas previously disturbed and cleared, or areas that only support low, understorey vegetation.
- The extent of vegetation removal required to permit the undertaking of the Proposal should be governed by the safe operation and occupation of the site. Where possible, storage sheds, stockpiles, compounds and so forth should be located in sites that are cleared, or have been previously disturbed.
- In woodland areas, the extent of permissible clearing should be clearly defined on site through the erection of temporary fencing or the placement of clearly visible pegs. No vehicles, machinery or equipment should be permitted beyond these defined limits.

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- All areas that occur beyond the limits of the proposed works should be clearly identified to ensure they are not disturbed. These areas should include those stands of native vegetation that occur beyond the limits of the Proposal.
 - Cleared and disturbed areas should be stabilised with suitable native grasses and ground cover plants as soon as possible to prevent soil erosion.
 - All vehicles should restrict their movements to both the development areas and the existing network of tracks and roads.
 - Where possible, the removal of the study areas vegetation, particularly any hollow bearing plants, should occur during the late summer early autumn months. This period is outside of a) the main breeding times for native species; b) the majority of plant flowering periods and c) prior to any animals (e.g. the microchiropterans) entering hibernation.
 - If any mature hollow bearing trees are to be removed from the works area (including the construction sites) these should be checked for the presence of sheltering animals prior to their clearing. The recommended method for the checking of any hollow occupying species is: a) knock tree with excavator bucket several times; b) examine hollow for any disturbed fauna; c) fell tree and d) re-examine any hollows once the tree is on the ground (this method has proved effective during other tree removal projects overseen by the authors). If any disturbed animals are observed at the hollow entrances, the tree should not be removed but left in place for 24 hours, thereby permitting any animals with the opportunity to leave the site. The knocking process etc should be repeated the next day. If during the course of the hollow investigations (once the tree is on the ground) any animals are identified, these should be removed and relocated locally. If injured, these animals should be removed and taken to a projects nominated veterinarian and/or wildlife carer.
 - A qualified ecologist should be present on site during the course of all tree removals (only hollow bearing plants) to provide direction for the plants removal and assist with the relocation of any animals (if required).
 - Protocols should be developed and included into the project's environmental management documentation in relation to the handling and treatment of injured wildlife. All protocols should be included into the project's environmental obligations as provided to any works contractors and their subconsultants.
 - Cleared vegetation should be mulched and used in the site's stabilisation works post-trenching.
 - The quality of any water discharges from the works site should be such that they do not have an adverse impact on the ecology of Lake Wonboyn directly adjacent to the Proposal area.

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Appendix I. Fauna species recorded or previously detected in the vicinity of the study area.

Source of Records

1 = Species recorded during present study.

2 = DECC (2008a).

3 = Bega Valley Shire Council (2004).

4 = DECC (2008c).

Key

A – indicates species listed under the EPBC Act.

B – indicates species listed under the TSC Act.

V – Species is listed as being vulnerable.

E – Species is listed as being endangered.

F – migratory Family listed under the EPBC Act.

M – Species listed as migratory listed under the EPBC Act.

Xp – denotes species possibly present.

* - indicates introduced species.

A	B	Common Name	Scientific Name	1	2	3	4
		MAMMALS					
			Tachyglossidae				
		Short-beaked Echidna	<i>Tachyglossus aculeatus</i>		x		x
			Dasyuridae				
V	V	Spotted-tailed Quoll	<i>Dasyurus maculatus</i>			x	x
		Brown Antechinus	<i>Antechinus stuartii</i>		x		x
		Dusky Antechinus	<i>Antechinus swainsonii</i>				x
		Agile Antechinus	<i>Antechinus agilis</i>	x			
	V	Brush-tailed Phascogale	<i>Phascogale tapoatafa</i>			x	
	V	White-footed Dunnart	<i>Sminthopsis leucopus</i>		x	x	x
			Peramelidae				
E	E	Southern Brown Bandicoot	<i>Isodon obesulus</i>		x		x
		Long-nosed Bandicoot	<i>Perameles nasuta</i>	x	x		x
			Phascolarctidae				
	V	Koala	<i>Phascolarctos cinereus</i>		x	x	x
			Vombatidae				
		Common Wombat	<i>Vombatus ursinus</i>	x	x		x
			Burramyidae				
	V	Eastern Pygmy Possum	<i>Cercartetus nanus</i>			x	x
			Petauridae				
	V	Yellow-bellied Glider	<i>Petaurus australis</i>	x	x	x	x
		Sugar Glider	<i>Petaurus breviceps</i>	x	x		x
	V	Squirrel Glider	<i>Petaurus norfolcensis</i>			x	
			Pseudocheiridae				
		Greater Glider	<i>Petauroides volans</i>		x		x
		Common Ringtail Possum	<i>Pseudocheirus peregrinus</i>	x	x		x
			Acrobatidae				
		Feathertail Glider	<i>Acrobates pygmaeus</i>				x
			Phalangeridae				
		Mountain Brushtail Possum	<i>Trichosurus caninus</i>				x
		Common Brushtail Possum	<i>Trichosurus vulpecula</i>	x	x		x
			Potoroidae				
V	V	Long-nosed Potoroo	<i>Potorous tridactylus</i>		x		x
E	E	Long-footed Potoroo	<i>Potorous longipes</i>			x	
			Macropodidae				
		Eastern Grey Kangaroo	<i>Macropus giganteus</i>	x	x		x
		Red-necked Wallaby	<i>Macropus rufogriseus</i>	x	x		x
V	E	Brush-tailed Rock-Wallaby	<i>Petrogale penicillata</i>			x	

A	B	Common Name	Scientific Name	1	2	3	4
		Swamp Wallaby	<i>Wallabia bicolor</i>	x	x		x
			Pteropodidae				
V	V	Grey-headed Flying-fox	<i>Pteropus poliocephalus</i>	x		x	x
			Rhinolophidae				
		Eastern Horseshoe Bat	<i>Rhinolophus megaphyllus</i>				x
			Vespertilioidae				
		Chocolate Wattled Bat	<i>Chalinolobus morio</i>	x	x		x
		Gould's Wattled Bat	<i>Chalinolobus gouldi</i>	x			x
	V	Eastern False Pipistrelle	<i>Falsistrellus tasmaniensis</i>			x	x
	V	Golden-tipped Bat	<i>Kerivoula papuensis</i>			x	x
	V	Eastern Bentwing-bat	<i>Miniopterus schreibersii</i>	x		x	
	V	Large-footed Myotis	<i>Myotis adversus</i>			x	x
		Lesser Long-eared Bat	<i>Nyctophilus geoffroyi</i>	x	x		x
		Gould's Long-eared Bat	<i>Nyctophilus gouldi</i>	xp	x		x
	V	Golden-tipped Bat	<i>Phoniscus papuensis</i>			x	
	V	Greater Broad-nosed Bat	<i>Scoteanax rueppellii</i>	x		x	
		Eastern Broad-nosed Bat	<i>Scotorepens orion</i>		x		
		Large Forest Bat	<i>Vespadelus darlingtoni</i>				x
		Southern Forest Bat	<i>Vespadelus regulus</i>		x		x
		Little Forest Bat	<i>Vespadelus vulturnus</i>	x	x		x
			Molossidae				
	V	East-Coast Freetail Bat	<i>Mormopterus norfolkensis</i>			x	
		Southern Freetail Bat	<i>Mormopterus planiceps</i>	xp			
		Eastern Freetail Bat	<i>Mormopterus sp.2</i>	x			x
		White-striped Freetail Bat	<i>Nyctinomus australis</i>	x			x
			Muridae				
		Water Rat	<i>Hydromys chryogaster</i>				x
E	E	Smoky Mouse	<i>Pseudomys fumeus</i>			x	
		* House Mouse	<i>Mus musculus</i>		x		x
		Bush Rat	<i>Rattus fuscipes</i>		x		x
		Swamp Rat	<i>Rattus lutreolus</i>				x
		* Black Rat	<i>Rattus rattus</i>	x	x		x
			Canidae				
		* Fox	<i>Vulpes vulpes</i>	x	x		x
		* Dog	<i>Canis familiaris</i>		x		x
			Felidae				
		* Feral Cat	<i>Felis catus</i>		x		x
			Leporidae				
		* Brown Hare	<i>Lepus capensis</i>				x
		* Rabbit	<i>Oryctolagus cuniculus</i>		x		
			Bovidae				
		* European Cattle	<i>Bos taurus</i>				x
		BIRDS					
			Dromaiidae				
		Emu	<i>Dromaius novaehollandiae</i>		x		x
			Phasianidae				
		Stubble Quail	<i>Coturnix pectoralis</i>		x		x
		Brown Quail	<i>Coturnix ypsilophora</i>				x
F			Anatidae				
		Black Swan	<i>Cygnus atratus</i>	x			x
		Chestnut Teal	<i>Anas castanea</i>				x
		Grey Teal	<i>Anas gracilis</i>				x
		Australasian Shoveler	<i>Anas rhynchotis</i>				x
		Pacific Black Duck	<i>Anas superciliosa</i>	x	x		x
		Hardhead	<i>Aythya australis</i>				x
		Musk Duck	<i>Biziura lobata</i>				x

A	B	Common Name	Scientific Name	1	2	3	4
		Australian Wood (Maned) Duck	<i>Chenonetta jubata</i>	x	x		x
	V	Blue-billed Duck	<i>Oxyura australis</i>			x	
		Australian Shelduck	<i>Tadorna tadornoides</i>				x
			Podicipedidae				
		Hoary-headed Grebe	<i>Poliocephalus poliocephalus</i>		x		x
		Australian Grebe	<i>Tachybaptus novaehollandiae</i>				x
			Procellariidae				
		Cape Petrel	<i>Daption capense</i>				x
M		Black Petrel	<i>Procellaria parkinsoni</i>			x	
M	V	Providence Petrel	<i>Pterodroma solandri</i>			x	
M	V	Flesh-footed Shearwater	<i>Puffinus carneipes</i>			x	
		White-faced Storm-petrel	<i>Pelagodroma marina</i>				x
		Common Diving-Petrel	<i>Pelecanoides urinatrix</i>				x
V		Fairy Prion	<i>Pachyptila turtur</i>				x
		Fluttering Shearwater	<i>Puffinus gavia</i>				x
M		Wedge-tailed Shearwater	<i>Puffinus pacificus</i>				x
M		Short-tailed Shearwater	<i>Puffinus tenuirostris</i>				x
			Turnicidae				
		Painted Button-quail	<i>Turnix varia</i>				x
			Diomedidae				
M	V	Black-browed Albatross	<i>Diomedea melanophrys</i>			x	
MV		Wandering Albatross	<i>Diomedea exulans</i>			x	x
MV	V	Shy Albatross	<i>Diomedea cauta</i>			x	
			Phalacrocoracidae				
		Pied Cormorant	<i>Phalacrocorax varius</i>	x	x		x
		Little Pied Cormorant	<i>Phalacrocorax melanoleucos</i>	x	x		x
		Great Cormorant	<i>Phalacrocorax carbo</i>	x	x		x
		Little Black Cormorant	<i>Phalacrocorax sulcirostris</i>		x		x
			Pelecanidae				
		Australian Pelican	<i>Pelecanus conspicillatus</i>	x	x		x
			Sulidae				
		Australasian Gannet	<i>Morus serrator</i>				x
			Rallidae				
		Eurasian Coot	<i>Fulica atra</i>				x
		Dusky Moorhen	<i>Gallinula tenebrosa</i>				x
		Lewin's Rail	<i>Rallus pectoralis</i>				x
			Ardeidae				
		White-faced Heron	<i>Egretta novaehollandiae</i>	x	x		x
M		Great Egret	<i>Ardea alba</i>		x		x
		Intermediate Egret	<i>Egretta intermedia</i>	x			x
M		Eastern Reef Egret	<i>Egretta sacra</i>		x		x
		Striated Heron	<i>Butorides striatus</i>	x			
	V	Black Bittern	<i>Ixobrychus flavicollis</i>			x	x
	V	Australasian Bittern	<i>Botaurus poiciloptilus</i>			x	
		Nankeen Night Heron	<i>Nycticorax caledonicus</i>				x
			Threskiornidae				
		Australian White (Sacred) Ibis	<i>Threskiornis molluca</i>		x		x
		Straw-necked Ibis	<i>Threskiornis spinicollis</i>				x
		Yellow-billed Spoonbill	<i>Platalea flavipes</i>				x
F			Accipitridae				
M	V	Osprey	<i>Pandion haliaetus</i>		x	x	x
	V	Square-tailed Kite	<i>Lophoictinia isura</i>			x	x
		Whistling Kite	<i>Haliastur sphenurus</i>	x	x		x
M		White-bellied Sea-eagle	<i>Haliaeetus leucogaster</i>	x	x		x
		Wedge-tailed Eagle	<i>Aquila audax</i>		x		x
		Little Eagle	<i>Hieraaetus morphnoides</i>		x		x

A	B	Common Name	Scientific Name	1	2	3	4
		Grey Goshawk	<i>Accipiter novaehollandiae</i>		x		x
		Brown Goshawk	<i>Accipiter fasciatus</i>				x
		Collared Sparrowhawk	<i>Accipiter cirrocephalus</i>				x
		Swamp Harrier	<i>Circus approximans</i>		x		x
		Black-shouldered Kite	<i>Elanus axillaris</i>				x
F			Falconidae				
		Peregrine Falcon	<i>Falco peregrinus</i>		x		x
		Nakeen Kestrel	<i>Falco cenchroides</i>				x
		Australian Hobby	<i>Falco longipennis</i>				x
	V	Grey Falcon	<i>Falco hypoleucos</i>			x	
		Brown Falcon	<i>Falco berigora</i>		x		x
F			Scolopacidae				
M		Eastern Curlew	<i>Numenius madagascariensis</i>		x		x
M	V	Black-tailed Godwit	<i>Limosa limosa</i>			x	
M	V	Sanderling	<i>Calidris alba</i>			x	x
M		▽ Common Sandpiper	<i>Actitis hypoleucos</i>				x
M		▽ Ruddy Turnstone	<i>Arenaria interpres</i>				x
M		▽ Sharp-tailed Sandpiper	<i>Calidris acuminata</i>				x
M		Red Knot	<i>Calidris canutus</i>				x
M		▽ Curlew Sandpiper	<i>Calidris ferruginea</i>				x
M		Grey-tailed Tattler	<i>Heteroscelis brevipes</i>				x
M		▽ Bar-tailed Godwit	<i>Limosa lapponica</i>				x
M		▽ • Latham's Snipe	<i>Gallinago hardwickii</i>				x
M		▽ Common Greenshank	<i>Tringa nebularia</i>				x
		▽ Whimbrel	<i>Numenius phaeopus</i>				x
M		▽ Red-necked Stint	<i>Calidris ruficollis</i>				x
			Rostratulidae				
MV	E	Australian Painted Snipe	<i>Rostratula benghalensis australis</i>			x	x
			Jacaniidae				
	V	Comb-crested Jacana	<i>Irediparra gallinacea</i>			x	
			Burhinidae				
	E	Bush-stone Curlew	<i>Burhinus grallarius</i>			x	
			Haematopodidae				
	V	Pied Oystercatcher	<i>Haematopus longirostris</i>		x	x	x
	V	Sooty Oystercatcher	<i>Haematopus fuliginosus</i>	x	x	x	x
F			Charadriidae				
		Masked Lapwing	<i>Vanellus miles</i>	x	x		x
	E	Hooded Plover	<i>Thinornis rubricollis</i>		x	x	x
		Grey Plover	<i>Pluvialis squatarola</i>				x
M	V	Lesser Sand Plover	<i>Charadrius mongolus</i>			x	
		Double-banded Plover	<i>Charadrius bicinctus</i>		x		x
		Red-capped Plover	<i>Charadrius ruficapillus</i>		x		x
		Black-fronted Dotterel	<i>Eseyornis melanops</i>				x
		Red-kneed Dotterel	<i>Erythronyx cinctus</i>				x
			Laridae				
M		Arctic Jaeger	<i>Stercorarius parasiticus</i>			x	x
M		Pomarine Jaeger	<i>Stercorarius pomarinus</i>				x
		Great Skua	<i>Catharacta skua</i>				x
		Silver Gull	<i>Larus novaehollandiae</i>	x	x		x
		Pacific Gull	<i>Larus pacificus</i>				x
M		Caspian Tern	<i>Sterna caspia</i>		x		x
M	E	Little Tern	<i>Sterna albifrons</i>			x	x
		Crested Tern	<i>Sterna bergii</i>		x		x
		Common Tern	<i>Sterna hirundo</i>				x

A	B	Common Name	Scientific Name	1	2	3	4
		White-fronted tern	<i>Sterna striata</i>				x
			Columbidae				
	V	Superb Fruit-dove	<i>Ptilinopus superbus</i>			x	
		White-headed Pigeon	<i>Columba leucomela</i>		x		x
		Peaceful Dove	<i>Geopelia placida</i>				x
		Brown-cuckoo Dove	<i>Macropygia ambionensis</i>				x
		Common Bronzewing	<i>Phaps chalcoptera</i>		x		x
		Brush Bronzewing	<i>Phaps elegans</i>		x		x
		Wonga Pigeon	<i>Leucosarcia melanoleuca</i>	x	x		x
			Cacatuidae				
		Sulphur-crested Cockatoo	<i>Cacatua galerita</i>				x
	V	Glossy Black-Cockatoo	<i>Calyptorhynchus lathami</i>	x	x	x	x
		Yellow-tailed Black Cockatoo	<i>Calyptorhynchus funereus</i>	x	x		x
	V	Gang-Gang Cockatoo	<i>Callocephalon fimbriatum</i>	x	x		x
		Galah	<i>Eolophus roseicapilla</i>	x			
			Psittacidae				
		Rainbow Lorikeet	<i>Trichoglossus haematodus</i>	x	x		x
		Musk Lorikeet	<i>Glossopsitta concinna</i>	x	x		x
		Little Lorikeet	<i>Glossopsitta pusilla</i>		x		x
		Australian King Parrot	<i>Alisterus scapularis</i>	x	x		x
	V	Ground Parrot	<i>Pezoporus wallicus</i>		x	x	x
E	E	Swift Parrot	<i>Lathamus discolor</i>			x	x
		Crimson Rosella	<i>Platycercus elegans</i>	x	x		x
		Eastern Rosella	<i>Platycercus eximius</i>		x		x
	V	Turquoise Parrot	<i>Neophema pulchella</i>			x	
		Blue-winged Parrot	<i>Neophema chrysostoma</i>				x
			Cuculidae				
		Horsfield's Shining Cuckoo	<i>Chalcites basalus</i>				x
		Pallid Cuckoo	<i>Cuculus pallidus</i>		x		x
		Brush Cuckoo	<i>Cuculus variolosus</i>		x		x
		Fan-tailed Cuckoo	<i>Cuculus flabelliformis</i>		x		x
		Shining Bronze-Cuckoo	<i>Chrysococcyx lucidus</i>		x		x
			Strigidae				
	V	Powerful Owl	<i>Ninox strenua</i>	x	x	x	x
		Southern Boobook	<i>Ninox novaeseelandiae</i>	x	x		x
	V	Barking Owl	<i>Ninox connivens</i>		x	x	x
			Tytonidae				
	V	Sooty Owl	<i>Tyto tenebricosa</i>		x	x	x
	V	Masked Owl	<i>Tyto novaehollandiae</i>		x	x	x
		Barn Owl	<i>Tyto alba</i>	x			x
			Podargidae				
		Tawny Frogmouth	<i>Podargus strigoides</i>	x			x
			Caprimulgidae				
		White-throated Nightjar	<i>Eurostopodus mysticallis</i>		x		x
			Aegothelidae				
		Australian Owlet-nightjar	<i>Aegotheles cristatus</i>	x	x		x
			Apodidae				
M		White-throated Needletail	<i>Hirundapus caudacutus</i>		x		x
M		Fork-tailed Swift	<i>Apus pacificus</i>		x		x
			Alcedinidae				
		Azure Kingfisher	<i>Alcedo azurea</i>		x		x
			Halcyonidae				
		Sacred Kingfisher	<i>Todiramphus sanctus</i>		x		x
		Laughing Kookaburra	<i>Dacelo naxaeguineae</i>	x	x		x
			Coraciidae				
		Dollarbird	<i>Eurystomus orientalis</i>				x

A	B	Common Name	Scientific Name	1	2	3	4
			Menuridae				
		Superb Lyrebird	<i>Menura novaehollandiae</i>	x	x		x
			Neosittidae				
		Varied Sittella	<i>Daphoenositta chrysoptera</i>				x
			Climacteridae				
		White-throated Treecreeper	<i>Cormobates leucophaeus</i>	x	x		x
	V	Brown Treecreeper	<i>Climacteris picumnus</i>		x	x	
		Red-browed Treecreeper	<i>Climacteris erythrops</i>				x
			Maluridae				
		Superb Fairy-wren	<i>Malurus cyaneus</i>	x	x		x
		Southern Emu-wren	<i>Stipiturus malachurus</i>		x		x
			Pardalotidae				
		Spotted Pardalote	<i>Pardalotus punctatus</i>	x	x		x
		Striated Pardalote	<i>Pardalotus striatus</i>		x		x
E	E	Eastern Bristlebird	<i>Dasyornis brachypterus</i>			x	x
		Pilotbird	<i>Pycnoptilus floccosus</i>		x		x
		Large-billed Scrubwren	<i>Sericornis magnirostris</i>		x		x
		White-browed Scrubwren	<i>Sericornis frontalis</i>	x	x		x
	V	Striated Fieldwren	<i>Calamanthus fuliginosus</i>			x	x
		Chestnut-rumped Heathwren	<i>Hylacola pyrrhopygia</i>				x
	V	Speckled Warbler	<i>Chthinicola sagittata</i>			x	
		Brown Gerygone	<i>Gerygone mouki</i>		x		x
		White-throated Gerygone	<i>Gerygone olivacea</i>				x
		Yellow-rumped Thornbill	<i>Acanthiza chrysorrhoa</i>				x
		Brown Thornbill	<i>Acanthiza pusilla</i>	x	x		
		Striated Thornbill	<i>Acanthiza lineata</i>	x	x		x
		Yellow Thornbill	<i>Acanthiza nana</i>				x
		Buff-rumped Thornbill	<i>Acanthiza reguloides</i>		x		x
			Meliphagidae				
		Red Wattlebird	<i>Anthochaera carunculata</i>	x	x		x
		Little (Brush) Wattlebird	<i>Anthochaera chrysoptera</i>		x		x
		White-fronted Chat	<i>Epthianura albifrons</i>				x
		Tawny-crowned Honeyeater	<i>Gliciphilia melanops</i>				x
		Noisy Friarbird	<i>Philemon corniculatus</i>		x		x
M	E	Regent Honeyeater	<i>Xanthomyza phrygia</i>			x	
		Bell Miner	<i>Manorina melanophrys</i>	x	x		x
		Noisy Miner	<i>Manorina melanocephala</i>	x			x
		Lewin's Honeyeater	<i>Meliphaga lewinii</i>	x	x		x
		Yellow-faced Honeyeater	<i>Lichenostomus chrysops</i>	x	x		x
		White-eared Honeyeater	<i>Lichenostomus leucotis</i>		x		x
		Yellow-tufted Honeyeater	<i>Lichenostomus melanops</i>				x
		White-naped Honeyeater	<i>Melithreptus lunatus</i>		x		x
		Brown-headed Honeyeater	<i>Melithreptus brevirostris</i>				x
		Crescent Honeyeater	<i>Phylidonyris pyrrhoptera</i>		x		x
		New Holland Honeyeater	<i>Phylidonyris novaehollandiae</i>	x	x		x
		White-cheeked Honeyeater	<i>Phylidonyris nigra</i>				x
		Eastern Spinebill	<i>Acanthorhynchus tenuirostris</i>	x	x		x
		Scarlet Honeyeater	<i>Myzomela sanguinolenta</i>		x		x
			Petroicidae				
		Rose Robin	<i>Petroica rosea</i>		x		x
	V	Pink Robin	<i>Petroica rodinogaster</i>			x	x
		Flame Robin	<i>Petroica phoenicea</i>		x		x
		Scarlet Robin	<i>Petroica multicolor</i>		x		x
	V	Hooded Robin	<i>Melanodryas cucullata</i>			x	
		Eastern Yellow Robin	<i>Eopsaltria australis</i>	x	x		x
		Jacky Winter	<i>Microeca fascians</i>		x		x

A	B	Common Name	Scientific Name	1	2	3	4
			Orthonychidae				
		Eastern Whipbird	<i>Psophodes olivaceus</i>		x		x
			Cinclosomatidae				
		Spotted Quail-thrush	<i>Cinclosoma punctatum</i>				x
			Pachycephalidae				
		Crested Shrike-tit	<i>Falcunculus frontatus</i>		x		x
		Grey Shrike-thrush	<i>Colluricincla harmonica</i>	x	x		x
		Golden Whistler	<i>Pachycephala pectoralis</i>	x	x		x
	V	Olive Whistler	<i>Pachycephala olivacea</i>		x	x	x
		Rufous Whistler	<i>Pachycephala rufiventris</i>		x		x
			Dicruridae				
		Grey Fantail	<i>Rhipidura fuliginosa</i>	x	x		x
M		Rufous Fantail	<i>Rhipidura rufifrons</i>		x		x
		Williw Wagtail	<i>Rhipidura leucophrys</i>				x
		Leaden Flycatcher	<i>Myiagra rubecula</i>		x		x
		Restless Flycatcher	<i>Myiagra inquieta</i>				x
M		Black-faced Monarch	<i>Monarcha melanopsis</i>		x		x
		Magpie Lark	<i>Grallina cyanoleuca</i>		x		x
			Campephagidae				
		Black-faced Cuckoo-shrike	<i>Coracina novaehollandiae</i>		x		x
		White-bellied Cuckoo-shrike	<i>Coracina papuensis</i>				x
		White-winged Triller	<i>Lalage sueurii</i>		x		
			Oriolidae				
		Olive-backed Oriole	<i>Oriolus sagittatus</i>		x		x
			Artamidae				
		Dusky Woodswallow	<i>Artamus cyanopterus</i>		x		x
		White-browed Woodswallow	<i>Artamus superciliosus</i>				x
		Grey Butcherbird	<i>Cracticus torquatus</i>	x	x		x
		Australian Magpie	<i>Gymnorhina tibicen</i>	x	x		x
		Pied Currawong	<i>Strepera gracula</i>	x	x		x
		Grey Currawong	<i>Strepera versicolor</i>				x
			Corvidae				
		Australian Raven	<i>Corvus coronoides</i>	x	x		
			Corcoracidae				
		White-winged Chough	<i>Corcorax melanorhamphos</i>				x
			Ptilonorhynchidae				
		Satin Bowerbird	<i>Ptilonorhynchus violaceus</i>	x	x		x
			Ploceidae				
		Red-browed Finch	<i>Neochmia temporalis</i>	x	x		x
		Beautiful Firetail	<i>Stagonopleura bella</i>		x		x
	V	Diamond Firetail	<i>Stagonopleura guttata</i>			x	x
		Double-barred Finch	<i>Taeniopygia bichenovii</i>				x
			Fringillidae				
		* European Goldfinch	<i>Carduelis carduelis</i>		x		x
			Hirundinidae				
		Welcome Swallow	<i>Hirundo neoxena</i>	x	x		x
		Fairy Martin	<i>Petrochelidon ariel</i>				x
		Tree Martin	<i>Petrochelidon nigricans</i>				x
			Motacillidae				
		Richard's Pipit	<i>Anthus naovaeseelandiae</i>				x
			Alaudidae				
		* Skylark	<i>Alauda arvensis</i>				x
F			Sylviidae				
		Little Grassbird	<i>Megalurus gramineus</i>		x		x
		Rufous Songlark	<i>Cincloramphus mathewsi</i>				x
		Clamorous Reed-warbler	<i>Acrocephalus stentoreus</i>				x

A	B	Common Name	Scientific Name	1	2	3	4
			Dicaeidae				
		Mistletoebird	<i>Dicaeum hirundinaceum</i>				x
			Zosteropidae				
		Silvereye	<i>Zosterops lateralis</i>		x		x
			Muscicapidae				
		Bassian (Ground) Thrush	<i>Zoothera lunulata</i>				x
		* Common Blackbird	<i>Turdus merula</i>				x
			Sturnidae				
		* Common Starling	<i>Sturnus vulgaris</i>				x
		REPTILES					
			Chelidae				
		Eastern Snake-necked Turtle	<i>Chelodina longicollis</i>		x		x
			Varanidae				
		Lace Monitor	<i>Varanus varius</i>	x	x		x
			Pygopodidae				
		Common Scaly-foot	<i>Pygopus lepidopodus</i>				x
			Agamidae				
		Jacky Lizard	<i>Amphibolurus muricatus</i>		x		x
		Eastern Water Dragon	<i>Physignathus lesueurii</i>				x
		Gippsland Water Dragon	<i>Physignathus lesueurii howitti</i>				x
			Scincidae				
		Eastern Three-lined Skink	<i>Acritoscincus duperreyi</i>				x
		'No Common Name'	<i>Cyclodomorphus michaeli</i>				x
		Black Rock Skink	<i>Egernia saxatilis</i>		x		x
		White's Skink	<i>Egernia whitii</i>		x		x
		Eastern Water Skink	<i>Eulamprus quoyii</i>				x
		Heatwole's Water Skink	<i>Eulamprus heatwolei</i>		x		x
		Cool-temperate Water-skink	<i>Eulamprus tympanum</i>		x		x
		Grass Skink	<i>Lampropholis delicata</i>	x	x		x
		Garden Skink	<i>Lampropholis guichenoti</i>	x	x		x
		Weasel Skink	<i>Saproscincus mustelinus</i>		x		x
		Eastern Blue-tongued Lizard	<i>Tiliqua scincoides</i>		x		x
			Boidae				
		Carpet and Diamond Pythons	<i>Morelia spilota</i>				x
			Elapidae				
		Common Death Adder	<i>Acanthophis antarcticus</i>		x		x
		Lowland Copperhead	<i>Austrelaps superbus</i>				x
		White-lipped Snake	<i>Drysdalia coronoides</i>				x
		Eastern Tiger Snake	<i>Notechis scutatus</i>		x		x
		Red-bellied Black Snake	<i>Pseudechis porphyriacus</i>		x		x
		Eastern Brown Snake	<i>Pseudonaja textilis</i>				x
		Eastern Small-eyed Snake	<i>Rhinoplocephalus nigrescens</i>	x	x		x
		AMPHIBIANS					
			Myobatrachidae				
		Common Eastern Froglet	<i>Crinia signifera</i>		x		x
		Eastern Smoot Frog	<i>Geocrinia victoriana</i>				x
V	V	Giant Burrowing Frog	<i>Heleioporus australiacus</i>			x	x
		Eastern Banjo Frog	<i>Limnodunastes dumerilii</i>				x
		Striped Marsh Frog	<i>Limnodynastes peronii</i>	x			x
		Spotted Grass Frog	<i>Limnodynastes tasmaniensis</i>	x			x
V	E	Stuttering Barred Frog	<i>Mixophyes balbus</i>			x	
		Haswell's Froglet	<i>Paracrinia haswelli</i>				x
		Brown Toadlet	<i>Pseudophryne bibronii</i>	x	x		x
		Southern Toadlet	<i>Pseudophryne dendyi</i>				x
		Tyler's Toadlet	<i>Uperoleia tyleri</i>				x
			Hylidae				

A	B	Common Name	Scientific Name	1	2	3	4
V	E	Green and Golden Bell Frog	<i>Litoria aurea</i>			x	x
		Blue Mountains Tree Frog	<i>Litoria citropa</i>				x
		Brown Tree Frog	<i>Litoria Ewingii</i>				x
		Jervis Bay Tree Frog	<i>Litoria jervisiensis</i>				x
		Lesueur's Frog	<i>Litoria lesueuri</i>				x
V	V	Littlejohns Tree Frog	<i>Litoria littlejohni</i>			x	x
		Peron's Tree Frog	<i>Litoria peronii</i>	x	x		x
		Leaf Green Tree Frog	<i>Litoria phyllochroa</i>		x		x
		INSECTA					
	E	Giant Dragonfly	<i>Petalura gigantea</i>			x	x

Appendix 2. Habitat requirements for those threatened fauna species known to have been previously recorded within this portion of the Bega Valley Shire LGA.

* - habitat requirements were generally extracted from Frith (1997), Cogger (2000), Strahan (1995), NPWS (1999) and the NSW Scientific Committee (2008), with other references used being identified in the bibliography.

Common and Scientific Name	Legislation	Habitat Requirements*	Likely Impacts
MAMMALS			
Spotted-tailed Quoll <i>Dasyurus maculatus</i>	EPBC & TSC Act	The Spotted-tailed Quoll occurs within a variety of habitats including wet and dry sclerophyll forests through to rainforests. The Quoll is nocturnal and shelters during the day in tree hollows, dense undergrowth, and hollow logs or under rock outcrops. Home range sizes for this species are known to be considerably large (between 3 and 15 km ² /night).	Though targeted, this species was not observed or indirectly indicated during any of the field investigations. Given the extent of habitat available beyond the Proposal, the Proposal is not considered to have an impact on the possible local or regional presence of this species if present.
Brush-tailed Phascogale <i>Phascogale tapoatafa</i>	TSC Act	The Brush-tailed Phascogale inhabit dry forest and woodlands, especially box, ironbark and stringybark eucalypts with an annual rainfall in between 500 and 2000 mm. The understorey and groundcover often consist only of scattered tussocks and forest litter and they are also known to utilise roadsides with remnant tree cover. The home range of the Brush-tailed Phascogale is quite large with the females occupying areas that are between 20 and 70ha and males up to 100ha. The Brush-tailed Phascogale is a carnivore that feeds on cockroaches, beetles, centipedes, spiders and ants. This species mainly forages within large trees alive or dead and it moves from tree to tree by leaping up to 2m. The Brush-tailed Phascogale nests in tree hollows with an opening between 25 and 40 mm in diameter, widening out into a larger hollow section that holds a female and up to nine young.	Though targeted, this species was not observed or indirectly indicated during any of the field investigations. Given the extent of habitat available beyond the Proposal, the Proposal is not considered to have an impact on the possible local or regional presence of this species if present.
White-footed Dunnart <i>Sminthopsis leucopus</i>	TSC Act	The White-footed Dunnart occurs in Tasmania and along the Victorian and southern NSW coast. The Shoalhaven area is the species' northern-most limit. The White-footed Dunnart is found in coastal dune vegetation, coastal forest, tussock grassland and sedgeland, heathland, woodland and forest. In NSW, the species seems to favour vegetation communities with an open understorey structure. Adult females usually have small, discrete home ranges, approximately 80m in length. Adult males have overlapping home ranges, approximately 100m in length. Mating occurs in late July and August. The White-footed Dunnart is an opportunistic carnivore that feeds on a variety of ground-dwelling invertebrates and, occasionally, small lizards. They shelter in bark nests in hollows under standing or fallen timber, burrows in the ground, piles of logging debris, large grass clumps such as provided by Grass Trees <i>Xanthorrhoea</i> sp. and <i>Macrozamia</i> s and rock crevices.	Though targeted, this species was not observed or indirectly indicated during any of the field investigations. Given the extent of habitat available beyond the Proposal, the Proposal is not considered to have an impact on the possible local or regional presence of this species if present.

Common and Scientific Name	Legislation	Habitat Requirements*	Likely Impacts
Southern Brown Bandicoot <i>Isodon obesulus</i>	EPBC & TSC Act	The species occurs within dry eucalypt forests, grasslands and heathlands. This species prefers areas which are burnt out from time to time, which results in an abundance of food resources as the vegetation starts to regenerate. This is a nocturnal species, sheltering during the day within a nest constructed on the ground by collecting grass and other plant material. Requires a suitable shrub layer in which to forage for plants and invertebrates. Adults appear to live for up to three years and during this time will occupy a home range of up to 7ha.	Though targeted, this species was not observed or indirectly indicated during any of the field investigations. Given the extent of habitat available beyond the Proposal, the Proposal is not considered to have an impact on the possible local or regional presence of this species if present.
Koala <i>Phascolarctos cinereus</i>	TSC Act	The Koala occupies areas of acceptable food trees in open eucalypt forests and woodlands. Areas of preferred feed trees appear to be restricted to sites that support high nutrient soils, areas that have historically been converted to farmland.	Though targeted, this species was not recorded or detected during any of the field investigations. Given the extent of habitat available beyond the Proposal, the development is not considered to have an impact on the possible local or regional presence of this species if present.
Eastern Pygmy Possum <i>Cercartetus nanus</i>	TSC Act	Occupies a wide range of habitats from rainforest through to woodlands and heath lands in which it is solitary. Feeds mostly on the pollen and nectar from banksias, eucalypts and understorey plants and will also eat insects, seeds and fruit. Nests and breeds in tree hollows. Home range size of between 0.35 and 0.68ha. Breeds throughout the year.	Though targeted, this species was not recorded or detected during any of the field investigations. Given the extent of habitat available beyond the Proposal, the development is not considered to have an impact on the possible local or regional presence of this species if present.
Yellow-bellied Glider <i>Petaurus australis</i>	TSC Act	The Yellow-bellied Glider is restricted to areas of tall, mature eucalypts. This species occupies tree hollows during the day and feeds at night predominantly on the sap that is collected from incisions that are gnawed into the trunks of specific species of eucalypts. The Yellow-bellied Glider occupies a home range area that is between 30 and 64ha in size. This arboreal possum is a highly mobile species that is able to glide across open space areas that are in the order of 70 to 100m.	The Yellow-bellied Glider was observed utilizing the subject site. As such, an assessment, using the seven part test as provided under Section 5A of the <i>Environmental Planning and Assessment Act 1979</i> , has been provided within Section 7.2.2.
Squirrel Glider <i>Petaurus norfolcensis</i>	TSC Act	Inhabits woodlands and dry sclerophyll forests, usually in diverse stands of shrubs and trees. Shelters and breeds in tree hollows, and is primarily an insectivorous animal but, has also been known to ingest plant exudates. Family groups occupy a home range of 2ha – 4ha. Where trees are up to 20m in height, this species is known to traverse across open space areas 40m wide.	Though targeted, this species was not observed or indirectly indicated during any of the field investigations. Given the extent of habitat available beyond the Proposal, the Proposal is not considered to have an impact on the possible local or regional presence of this species if present.
Long-nosed Potoroo <i>Potorous tridactylus</i>	EPBC & TSC Act	The Long-nosed Potoroo is generally restricted to areas with an annual rainfall greater than 760 mm, it inhabits coastal heath and dry and wet sclerophyll forests with dense cover which provides diurnal sheltering sites and protection from predators. This mammal forages in adjacent, open areas and feeds predominantly on fungi, which is dug for within soft and sandy soil. Also known to feed on roots, fruits, seeds and soft bodied animals in the soil.	Though targeted, this species was not observed or indirectly indicated during any of the field investigations. Given the extent of habitat available beyond the Proposal, the Proposal is not considered to have an impact on the possible local or regional presence of this species if present.

Common and Scientific Name	Legislation	Habitat Requirements*	Likely Impacts
Long-footed Potoroo <i>Potorous longipes</i>	EPBC & TSC Act	The Long-footed Potoroo has a very limited distribution and is extremely rare. Two core populations occur in Victoria and a much smaller population has also been found in far south-eastern NSW, approximately 20km north of the Victorian border in the South East. All known NSW populations now exist entirely within the South East Forests National Park. The Long-footed Potoroo typically inhabits moist forest types from montane wet sclerophyll forests over 1000m altitude to lowland forests at 150m. This species feeds on fruit-bodies of hypogeous fungi which make up about 90% of its diet. Fruit and some small invertebrates are also eaten. During the day it shelters in a crude nest under dense understorey vegetation. Home range size varies according to habitat quality, ranging from about 10ha up to 40ha. Breeding occurs throughout the year, with single young born in winter, spring and early summer.	Unlikely to be present within the subject site due to a lack of its necessary habitat requirements and outside limit of existing known population. Therefore, this species would not be affected as a result of the undertaking of the Proposal.
Brush-tailed Rock-Wallaby <i>Petrogale penicillata</i>	EPBC & TSC Act	The Brush-tailed Rock-Wallaby is found in suitably rocky areas within a variety of habitats such as rainforest gullies, wet and dry sclerophyll forest, open woodland and rock outcrops in semi-arid country. Sites with numerous ledges, caves and crevices are favoured.	Though targeted, this species was not observed or indirectly indicated during any of the field investigations. Given the extent of habitat available beyond the Proposal, the Proposal is not considered to have an impact on the possible local or regional presence of this species if present.
Grey-headed Flying-fox <i>Pteropus poliocephalus</i>	EPBC & TSC Act	The Grey-headed Flying-fox is a canopy-feeding frugivore, blossom-eater and nectarivore that inhabits a variety of habitats. Roosts and breeds communally in 'camps', with these camps containing between 500 to 5,000 individuals. Individuals generally exhibit a high fidelity to traditional camps and return annually to give birth and rear offspring. Foraging occurs opportunistically on both native and exotic plants, often at distances between 30 and 70km from camps.	Although species was targeted during field survey no individuals of this animal were observed or heard calling. No significant impacts on this species are considered to occur as a result of the Proposal. The Proposal would not significantly reduce the extent of any resources available to this mammal.
Eastern False Pipistrelle <i>Falsistrellus tasmaniensis</i>	TSC Act	Usually roosts in hollow trunks of eucalypt trees although they have also been known to roost in caves and buildings. The Eastern False Pipistrelle usually inhabits sclerophyll woodlands with insect attracting plants and a relatively continuous canopy. They prefer wet habitats with trees of more than 20m in height. The Eastern False Pipistrelle eats a variety of invertebrates including moths, weevils and ants. They tend to fly within or just below the canopy. They have been known to forage 12km from roosting sites.	Though targeted, this species was not recorded or detected during any of the field investigations. Given the extent of habitat available beyond the Proposal, the Proposal is not considered to have an impact on the possible local or regional presence of this species.
Eastern Bentwing-bat <i>Miniopterus schreibersii</i>	TSC Act	This species is the dominant cave-dwelling bat in south-eastern Australia. It occupies a variety of habitats and roosts in caves, storm water channels, mines and houses. Feeds on insects caught on the wing from within eucalypt woodlands and forests.	The Eastern Bentwing-bat was observed utilizing the subject site. As such, an assessment, using the seven part test as provided under Section 5A of the <i>Environmental Planning and Assessment Act 1979</i> , has been provided within Section 7.2.2.
Large-footed Myotis <i>Myotis adversus</i>	TSC Act	The Large-footed Myotis is generally found where there is permanent and/or flowing water. This species roosts in caves, disused tunnels, tree hollows and dense riparian foliage, nearly always in the vicinity of suitable water bodies. The Large-footed Myotis emerges at dusk to feed on aquatic insects "raked" off the waters surface.	Though targeted, this species was not recorded or detected during any of the field investigations. Given the extent of habitat available beyond the Proposal, the Proposal is not considered to have an impact on the possible local or regional presence of this species.

Common and Scientific Name	Legislation	Habitat Requirements*	Likely Impacts
Golden-tipped Bat <i>Kerivoula papuensis</i>	TSC Act	The Golden-tipped Bat is distributed along the east coast of Australia in scattered locations from Cape York Peninsula in Queensland to Bega in southern NSW. Found in rainforest and adjacent sclerophyll forest. This species roosts in abandoned hanging Yellow-throated Scrubwren and Brown Gerygone nests located in rainforest gullies on small first- and second-order streams. They will fly up to 2 km from roosts to forage in rainforest and sclerophyll forest on upper-slopes. Specialist feeder on small web-building spiders.	Unlikely to be present within the subject site due to a lack of its necessary habitat requirements and outside limit of existing known population. Therefore, this species would not be affected as a result of the undertaking of the Proposal.
Greater Broad-nosed Bat <i>Scoteanax rueppellii</i>	TSC Act	Preferring habitats which range from rainforests through to woodlands, this species usually roosts in tree hollows, though some individuals have been found in the roof spaces of old buildings. Feeding on large insects such as beetles, and is also known to take small vertebrates such as mice and other small bats.	The Greater Broad-nosed Bat was recorded within the subject site. As such, an assessment, using the seven part test as provided under Section 5A of the <i>Environmental Planning and Assessment Act 1979</i> , has been provided within Section 7.2.2.
East-coast Freetail Bat <i>Mormopterus norfolkensis</i>	TSC Act	This species is known to predominantly roost during the day in tree hollows. Emerging after dusk to feed on flying insects, the East-coast Freetail Bat hawks through the forest canopy, or in clearings at its edges.	Though targeted, this species was not recorded or detected during any of the field investigations. Given the extent of habitat available beyond the Proposal, the Proposal is not considered to have an impact on the possible local or regional presence of this species.
Smoky Mouse <i>Pseudomys fumeus</i>	EPBC & TSC Act	The Smoky Mouse is currently limited to a small number of sites in western, southern and eastern Victoria, south-east NSW and the ACT. The Smoky Mouse appears to prefer heath habitat on ridge tops and slopes in sclerophyll forest, heathland and open-forest from the coast (in Victoria) to sub-alpine regions of up to 1800m, but sometimes occurs in ferny gullies. Seeds and fruits from leguminous shrubs form the main summer and autumn diet, with some invertebrates. Hypogeal (truffle-like) fungi predominate in winter and spring, with some flowers, seeds and soil invertebrates. Breeding is in spring with one or two litters produced of up to four young. Nesting burrows have been found in rocky localities among tree roots and under the skirts of Grass Trees <i>Xanthorrhoea</i> spp. The persistence of colonies appears to be very ephemeral. It is not known how much this is due to natural fluctuations in food availability, but predation from feral carnivores appears to be implicated.	Unlikely to be present within the subject site due to a lack of its necessary habitat requirements and outside limit of existing known population. Therefore, this species would not be affected as a result of the undertaking of the Proposal.

Common and Scientific Name	Legislation	Habitat Requirements*	Likely Impacts
BIRDS			
Blue-billed Duck <i>Oxyura australis</i>	TSC Act	The Blue-billed Duck is endemic to south-eastern and south-western Australia. It is widespread in NSW, but most common in the southern Murray-Darling Basin area. Birds disperse during the breeding season to deep swamps up to 300 km away. It is generally only during summer or in drier years that they are seen in coastal areas. The Blue-billed Duck prefers deep water in large permanent wetlands and swamps with dense aquatic vegetation. The species is completely aquatic, swimming low in the water along the edge of dense cover.	Unlikely to be present within the subject site due to a lack of its necessary habitat requirements. Therefore, this species would not be affected as a result of the undertaking of the Proposal.
Eastern Reef Egret <i>Egretta sacra</i>	EPBC Act	The Eastern Reef Egret is distributed throughout coastal Australia except southern Victoria and Tasmania breeding any time of year, but mostly August to April (Frith 1997). The nest is a simple platform of sticks in a tree, on low shrub or on the ground on the edge of their feeding grounds (Frith 1997). Coral reefs, tidal flats and rock platforms are its foraging grounds where they will eat mostly small fish and occasionally crustaceans and insects both day and night (Frith 1997).	Unlikely to be present within the subject site due to a lack of its necessary habitat requirements. Therefore, this species would not be affected as a result of the undertaking of the Proposal.
Great Egret <i>Ardea alba</i>	EPBC Act	Utilises lakes, swamps and dams. Forages on molluscs, frogs, aquatic insects and crustaceans but fish make up the bulk of its diet. Great Egrets prefer shallow water, particularly when flowing, but may be seen on any watered area, including damp grasslands. Great Egrets can be seen alone or in small flocks, often with other egret species, and roost at night in groups. In Australia, the breeding season of the Great Egret is normally October to December in the south and March to May in the north. This species breeds in colonies, and often in association with cormorants, ibises and other egrets. Both sexes construct the nest, which is a large platform of sticks, placed in a tree over the water. The previous years' nest may often be re-used.	Though targeted, this species was not recorded or detected during any of the field investigations. Given the aquatic nature of this species combined with the nature of the Proposal and those habitats to be affected will ensure that no impacts on the possible presence of this species arise.
Black Bittern <i>Ixobrychus flavicollis</i>	TSC Act	Terrestrial and estuarine wetlands, generally in areas of permanent water and dense vegetation. Feed at dusk and during the night on invertebrates, reptiles, fish and so on. Roosts during the day in trees or on the ground amongst dense reeds. Builds its nests on a branch overhanging water. When not breeding, generally solitary.	Unlikely to be present within the subject site due to a lack of its necessary habitat requirements. Therefore, this species would not be affected as a result of the undertaking of the Proposal.
Australasian Bittern <i>Botaurus poiciloptilus</i>	TSC Act	Shallow, vegetated freshwater or brackish swamps, usually dominated by tall, dense reed beds of <i>Typha</i> sp, <i>Juncus</i> sp and <i>Phragmites</i> sp. Nests on platforms of reeds and rushes, usually built over water in dense cover. Feeds on aquatic invertebrates, small fish and frogs, usually caught in shallow water or wet mud.	Unlikely to be present within the subject site due to a lack of its necessary habitat requirements. Therefore, this species would not be affected as a result of the undertaking of the Proposal.

Common and Scientific Name	Legislation	Habitat Requirements*	Likely Impacts
Square-tailed Kite <i>Lophoictinia isura</i>	TSC Act	The Square-tailed Kite's primary habitat includes coastal and sub-coastal open forests and woodlands. In south-eastern Australia it is a spring-summer breeding migrant, probably wintering in the tropics. Estimates of home ranges for breeding pairs varies depending on geographical location but appear to be in the order of 5 - 10 km. A specialised raptor of the tree canopy, the Square-tail Kite appears to only feed on small birds, their eggs and nestlings. The Square-tail Kite is normally found hunting over vegetation communities, such as open eucalypt forests, woodlands and mallees, that are rich in passerines (small birds).	Though targeted, this species was not recorded or detected during any of the field investigations. Given the extent of habitat available beyond the Proposal, the Proposal is not considered to have an impact on the possible local or regional presence of this species.
Osprey <i>Pandion haliaetus</i>	EPBC & TSC Act	A fish eating raptor, the Osprey inhabits mainly coastline areas. Nests are usually constructed in a large, dead tree, though rocky outcrops and artificial structures are also known to be used. This bird is usually loyal to its nesting sites. Within NSW only 60 breeding pairs are known to occur (pers.comm. A. Morris).	Though targeted, this species was not recorded or detected during any of the field investigations. Given the extent of habitat available beyond the Proposal, the Proposal is not considered to have an impact on the possible local or regional presence of this species.
White-bellied Sea-eagle <i>Haliaeetus leucogaster</i>	EPBC Act	Found throughout coastal Australia and large lowland rivers and lakes. Feeds on fish, tortoises, rabbits and nestlings. Breeding usually occurs from May through to October with nest constructed in inland water systems being located in tall live or dead trees of which River Red Gums, Forest Red Gum and Southern Mahogany are commonly used.	The White-bellied Sea-eagle was observed flying over the subject site. As such, an assessment of the likely impact of the Proposal on this species has been considered in Section 7.2.1.
Grey Falcon <i>Falco hypoleucos</i>	TSC Act	Flat mainly treeless or lightly timbered plains with open, drier vegetation such as tussock grassland. Nest in large eucalypt trees near, or overhanging dry or wet watercourses. Forages in wooded area adjacent to water bodies where prey species drink. Feeds on species caught on the ground, such as ground birds, small mammals and reptiles.	Though targeted, this species was not recorded or detected during any of the field investigations. Given the extent of habitat available beyond the Proposal, the Proposal is not considered to have an impact on the possible local or regional presence of this species.
Bush-stone Curlew <i>Burhinus grallarius</i>	TSC Act	The Bush-stone Curlew occupies grassy woodlands or lightly timbered open country. They feed on invertebrates such as beetles and grasshoppers. This bird nests on a scrape or small clearing on ground. Rare to extinct in closely settled areas.	Unlikely to be present within the subject site due to a lack of its necessary habitat requirements. Therefore, this species would not be affected as a result of the undertaking of the Proposal.
Pied Oystercatcher <i>Haematopus longirostris</i>	TSC Act	Found along beaches and estuaries of Australia feeding on molluscs. Nests on sandy beaches well above the high water mark. Found throughout Australian waters.	Though targeted, this species was not recorded or detected during any of the field investigations. Given the aquatic nature of this species combined with the nature of the Proposal and those habitats to be affected will ensure that no impacts on the possible presence of this species arise.
Sooty Oystercatcher <i>Haematopus fuliginosus</i>	TSC Act	Commonly found along exposed rocky shores, wave cut platforms, reefs and stony beaches. Feeds mainly on limpets, periwinkles and mussels picked off rocks. They usually fly to offshore islands to breed. Found throughout Australian waters.	The Sooty Oystercatcher was recorded within the subject site. As such, an assessment, using the seven part test as provided under Section 5A of the <i>Environmental Planning and Assessment Act 1979</i> , has been provided within Section 7.2.2.
Superb Fruit-dove <i>Ptilinopus superbus</i>	TSC Act	Inhabiting rainforests, and occasionally nesting in nearby eucalypt forests. Feeds on a range of rainforest fruits, particularly the laurels. It is generally sedentary or locally nomadic.	Unlikely to be present within the subject site due to a lack of its necessary habitat requirements. Therefore, this species would not be affected as a result of the undertaking of the Proposal.

Common and Scientific Name	Legislation	Habitat Requirements*	Likely Impacts
Glossy Black-Cockatoo <i>Calyptorhynchus lathami</i>	TSC Act	The Glossy Black-Cockatoo is a thinly distributed species in central and south eastern Australia, living in Eucalypt woodlands and feeding almost exclusively on Casuarina fruits. Within its range it is tied to groves of its food trees, <i>Casuarina</i> spp. and <i>Allocasuarina</i> spp. Nesting and roosting in hollows of large eucalypt trees this bird can spend up to 88% of each day foraging. This species dependence on one type of food makes it vulnerable to habitat loss. The cause of population decline has been attributed to loss of suitable habitat for agricultural and residential purposes, burning of habitat, competition for nesting hollows and fragmentation of habitat size resulting in areas not large enough to sustain a viable population.	The Glossy Black-Cockatoo was recorded within the subject site. As such, an assessment, using the seven part test as provided under Section 5A of the <i>Environmental Planning and Assessment Act 1979</i> , has been provided within Section 7.2.2.
Gang-gang Cockatoo <i>Callocephalon fimbriatum</i>	TSC Act	The Gang-gang Cockatoo is distributed from southern Victoria through south and central eastern NSW. This species prefers tall montane forests and woodlands, particularly in heavily timbered and mature wet sclerophyll forests during summer, these being at higher altitudes. In winter, the Gang-gang Cockatoo occurs at lower altitudes in drier, more open eucalypt forests and woodlands, particularly in box-ironbark assemblages, or in dry forest in coastal areas. This species has also been observed within urban areas including parks and gardens. The breeding requirements of the Gang-gang Cockatoo include tree hollows within the trunks or large limbs of large trees. Nests are most commonly found within large live eucalypt trees, close to water. The primary food source of this Cockatoo includes fruits of native shrubs and trees, although they have been known to take fruits off exotic trees.	The Gang-gang Cockatoo was observed during the field survey. As such, an assessment, using the seven part test as provided under Section 5A of the <i>Environmental Planning and Assessment Act 1979</i> , has been provided within Section 7.2.2.
Ground Parrot <i>Pezoporus wallicus</i>	TSC Act	The eastern subspecies <i>P. wallicus wallicus</i> inhabits south-eastern Australia from southern Queensland through NSW to western Victoria. The largest populations occur on the NSW south coast, particularly Barren Grounds NR, Budderoo NP, the Jervis Bay area and Nadgee NR. Small numbers are recorded at Morton and Ben Boyd NP and other areas on the south coast. The Ground Parrot occurs in high rainfall coastal and near coastal low heathlands and sedgeland, generally below 1m in height and very dense. Ground Parrots feed mostly on seeds from a large range of plant species, which varies seasonally. Other plant material and invertebrates may be ingested. Ground Parrots breed from September to December with eggs laid in a shallow bowl of fine sticks and grass, well hidden under overhanging tall, coarse grass, sedge or low, heathy shrubs.	Unlikely to be present within the subject site due to a lack of its necessary habitat requirements. Therefore, this species would not be affected as a result of the undertaking of the Proposal.

Common and Scientific Name	Legislation	Habitat Requirements*	Likely Impacts
Swift Parrot <i>Lathamus discolor</i>	EPBC & TSC Act	The Swift Parrot over-winters on the mainland and breeds in Tasmania in spring/summer. The Swift Parrot inhabits eucalypt forests, feeds on eucalypt nectar, and possibly lerps, and breeds in the hollows of mature and senescent trees. When over-wintering on the mainland, this species is dependent on winter-flowering eucalypt species, communities of which it will often return to regularly.	Though targeted, this species was not recorded or detected during any of the field investigations. Given the extent of habitat available beyond the Proposal, the Proposal is not considered to have an impact on the possible local or regional presence of this species.
Turquoise Parrot <i>Neophema pulchella</i>	TSC Act	The Turquoise Parrot spends most of the day on the ground searching for, and feeding upon, seeds or vegetable matter. The preferred habitat of this species consists of the ecotone between woodland and grassland areas. The Turquoise Parrot breeds from August to December, this species utilising tree hollows that are often in a dead tree or branch low to the ground. This species drinks daily and therefore does not venture far from water.	Unlikely to be present within the subject site due to a lack of its necessary habitat requirements. Therefore, this species would not be affected as a result of the undertaking of the Proposal.
Powerful Owl <i>Ninox strenua</i>	TSC Act	The Powerful Owl favours wet to dry eucalypt forests with a dense understorey. Nesting in large hollows, nearly always in the trunk or top of a mature eucalypt. When not breeding, this bird will roost during the day within the shelter provided by a dense understorey, such as a bushy eucalypt or vine forest.	The Powerful Owl was heard calling during the field survey. As such, an assessment, using the seven part test as provided under Section 5A of the <i>Environmental Planning and Assessment Act 1979</i> , has been provided within Section 7.2.2.
Barking Owl <i>Ninox connivens</i>	TSC Act	Inhabits the timbered hills, forests and savanna woodlands of coastal and subcoastal eastern and northern Australia. Hunts within the woodlands, picking arboreal and small ground dwelling mammals from the air. Usually always found in pairs occupying a range of between 30 and 200ha year round. Within their territories, numerous roosts may be used during the day.	Though targeted, no individuals of this species were recorded during the field surveys. Given the extent of habitat available beyond the Proposal, the disturbance of a small percentage of vegetation is not considered to have an impact on the possible local or regional presence of this species.
Sooty Owl <i>Tyto tenebricosa</i>	TSC Act	Inhabits tall, wet, old-growth forests on fertile soils with a dense understorey. Has a home range area of between 200 and 800ha in which a permanently bonded pair occurs. Breeds in the trunks of mature Eucalypts and appears to be loyal to nesting sites. Roosts apart by day on a number of set perches throughout their territory. Prey species mainly include arboreal mammals.	Though targeted, no individuals of this species were recorded during the field surveys. Given the extent of habitat available beyond the Proposal, the disturbance of a small percentage of vegetation is not considered to have an impact on the possible local or regional presence of this species.
Masked Owl <i>Tyto novaehollandiae</i>	TSC Act	The Masked Owl inhabits heavily timbered forests, woodlands and watercourses, never more than 300km from the coast. This species has a large home range area of 500 to 1000ha per pair. Roosts and breeds in big hollows in trees, these usually being 40-500cm deep and around 10-30m above the ground. Pairs are permanently bonded and hold the same territory all year round (and occasionally over successive years). Preys on small to medium sized mammals and birds, as well as some insects.	Though targeted, no individuals of this species were recorded during the field surveys. Given the extent of habitat available beyond the Proposal, the disturbance of a small percentage of vegetation is not considered to have an impact on the possible local or regional presence of this species.

Common and Scientific Name	Legislation	Habitat Requirements*	Likely Impacts
White-throated Needletail <i>Hirundapus caudacutus</i>	EPBC Act	The White-throated Needletail breeds in the northern hemisphere and arrives in Australia in October. Most commonly associated with the east coast highlands, coastal plains and the hinterlands of arid inland Australia. Within this are, becomes locally nomadic in response to local weather changes. Drinks and feeds on insects while on the wing. Roost during the night in trees in forests.	Unlikely to be present within the subject site due to a lack of its necessary habitat requirements. Therefore, this species would not be affected as a result of the undertaking of the Proposal.
Fork-tailed Swift <i>Apus pacificus</i>	EPBC Act	The Fork-tailed Swift flies across southeastern Australia several times a year following the eastward low pressure systems in the atmosphere. They spend the majority of the day and night on the wing. The Fork-tailed Swift preys on flying insects such as termites, ants, flies and bugs. This bird drinks from inland lakes, and rain water puddles, skimming over the surface.	Though targeted, this species was not recorded or detected during any of the field investigations. Given the extent of habitat available beyond the Proposal, the disturbance of a small percentage of vegetation is not considered to have an impact on the possible local or regional presence of this species.
Brown Treecreeper <i>Climacteris picumnus</i>	TSC Act	The Brown Treecreeper occupies eucalypt woodlands, mallee and dry open forests. Open forests are preferred which contain much open ground and fallen timber. The group occupies a home range of 5 to 10ha. Most of the day is spent foraging in the open ground and amongst leaf litter and timber debris for beetles, bugs, larvae and ants. Nests are built in a hollow limb or trunk for the breeding season between June and December.	Though targeted, no individuals of this species were recorded during the field surveys. Given the extent of habitat available beyond the Proposal, the disturbance of a small percentage of vegetation is not considered to have an impact on the possible local or regional presence of this species.
Eastern Bristlebird <i>Dasyornis brachypterus</i>	EPBC & TSC Act	The distribution of the Eastern Bristlebird has contracted to three disjunct areas of south-eastern Australia: southern Queensland/northern NSW, the Illawarra Region and in the vicinity of the NSW/Victorian border. Habitat is characterised by dense, low vegetation including heath and open woodland with a heathy understorey; in northern NSW occurs in open forest with tussocky grass understorey; all of these vegetation types are fire prone. Shy and cryptic and rarely flies, although can be seen scampering over the ground; when approached, may move to a lookout perch 1 m or more above the ground, then retreat into dense vegetation. Feeds on a variety of insects, particularly ants. Nests are elliptical domes constructed on or near the ground amongst dense vegetation.	Unlikely to be present within the subject site due to a lack of its necessary habitat requirements. Therefore, this species would not be affected as a result of the undertaking of the Proposal.
Striated Fieldwren <i>Calamanthus fuliginosus</i>	TSC Act	The Striated Fieldwren is found in coastal swamp heaths and tussock fields of south-eastern NSW, into southern Victoria and the south-east of South Australia. It is mainly a bird of ground and understorey vegetation, and can be found in swampy, coastal heathlands, tussocky grasslands, low shrubby vegetation and margins of swamps. Forages by working through the undergrowth and over the ground, feeding on insects and seeds.	Unlikely to be present within the subject site due to a lack of its necessary habitat requirements. Therefore, this species would not be affected as a result of the undertaking of the Proposal.

Common and Scientific Name	Legislation	Habitat Requirements*	Likely Impacts
Speckled Warbler <i>Chthinicola Sagittata</i>	TSC Act	Distributed from Suttor Creek in south east Queensland, through central and eastern NSW to the Grampians in Victoria. Occupies eucalypt and cypress woodlands with an open grassy and shrubby understorey often associated with gullies and rocky ridges. Has a home range area of between 6 to 12ha. Foraging for seeds, insects, larvae and other invertebrates occurs amongst leaf litter and under shrubs, trees and grasses. The breeding season is from August to January. Generally not being present in areas of habitat less than 100ha in size.	Though targeted, no individuals of this species were recorded during the field surveys. Given the extent of habitat available beyond the Proposal, the disturbance of a small percentage of vegetation is not considered to have an impact on the possible local or regional presence of this species.
Regent Honeyeater <i>Xanthomyza phrygia</i>	EPBC & TSC Act	Open forests, woodlands, timbered watercourses, and a variety of other habitat types but mainly box-ironbark woodlands. Also known to rely on remnant stands of timber. Constructs grass nest in trees or saplings between July and February. Feeds primarily on nectar from various box and ironbark eucalypts, and occasionally banksias. Other food sources are lerps, insects and honeydew. The proportions of each component of food changes with availability. This species typically feeds in the tallest trees in their environment.	Though targeted, no individuals of this species were recorded during the field surveys. Given the extent of habitat available beyond the Proposal, the disturbance of a small percentage of vegetation is not considered to have an impact on the possible local or regional presence of this species.
Hooded Robin <i>Melanodryas cucullata</i>	TSC Act	Inhabits lightly timbered country from eucalypt and open woodlands to acacia shrublands. Most frequently it occupies areas of dead and fallen timber. It also forages along the bare ground and amongst leaf litter for insects. Foraging ranges are often extended to cleared land during winter. Establishes pairs which keep a home range of 10 to 20ha, and is not known to form flocks. Shortly after breeding (from July to December), the Hooded Robin can be found in small family groups. Species appears to be unable to survive in woodland areas less than 100-200ha in size.	Though targeted, no individuals of this species were recorded during the field surveys. Given the extent of habitat available beyond the Proposal, the disturbance of a small percentage of vegetation is not considered to have an impact on the possible local or regional presence of this species.
Pink Robin <i>Petroica rodinogaster</i>	TSC Act	The Pink Robin is found in Tasmania and the uplands of eastern Victoria and far south-eastern NSW. On the mainland, the species disperses north and west and into more open habitats in winter, regularly as far north as the ACT area, and sometimes being found as far north as the central coast of NSW. Inhabits rainforest and tall, open eucalypt forest, particularly in densely vegetated gullies. Insects and spiders are the main dietary items. Breeds between October and January. The nest is a deep, spherical cup made of green moss bound with cobweb and adorned with camouflaging lichen, and is lined with fur and plant down in deep undergrowth.	Though targeted, no individuals of this species were recorded during the field surveys. Given the extent of habitat available beyond the Proposal, the disturbance of a small percentage of vegetation is not considered to have an impact on the possible local or regional presence of this species.
Olive Whistler <i>Pachycephala olivacea</i>	TSC Act	The Olive Whistler inhabits the wet forests on the ranges of the east coast. It has a disjunct distribution in NSW chiefly occupying the beech forests around Barrington Tops and the MacPherson Ranges in the north and wet forests from Illawarra south to Victoria. Mostly inhabits wet forests above about 500m. During the winter months they may move to lower altitudes. Forage in trees and shrubs and on the ground, feeding on berries and insects. Makes nests of twigs and grass in low forks of shrubs.	Though targeted, no individuals of this species were recorded during the field surveys. The disturbance of road side areas that are essentially cleared is not considered to have an adverse impact on the presence of this species.

Common and Scientific Name	Legislation	Habitat Requirements*	Likely Impacts
Rufous Fantail <i>Rhipidura rufifrons</i>	EPBC Act	The Rufous Fantail migrates south from north-eastern Queensland and New Guinea to breed within the southern states during the summer months (October to February). Generally this species inhabits rainforests, moist sclerophyll forests and vegetated riparian corridors along the eastern coast and ranges. This bird forages on a variety of insects that occur within the shrub layers of its preferred habitat type.	Though targeted, no individuals of this species were recorded during the field surveys. Given the extent of habitat available beyond the Proposal, the disturbance of a small percentage of vegetation is not considered to have an impact on the possible local or regional presence of this species.
Black-faced Monarch <i>Monarcha melanopsis</i>	EPBC Act	The Black-faced Monarch prefers wet eucalypt forests and rainforests. They nest in sheltered gullies or within rainforests, foraging within the middle storey layers. This species migrates in March/April as far as New Guinea and returns September.	Unlikely to be present within the subject site due to a lack of its necessary habitat requirements. Therefore, this species would not be affected as a result of the undertaking of the Proposal.
Diamond Firetail <i>Stagonopleura guttata</i>	TSC Act	This species occupies open eucalypt woodlands and fringing mallee where a grassy understorey is present. Must drink frequently throughout the day therefore requires a permanent water supply. Feeds almost exclusively on seeds (both native and exotic plants are consumed), though occasionally the green vegetation of leaves and shoots will also be consumed. Diamond Firetail populations appear unable to persist in areas which lack remnants of native vegetation larger than 200ha in size.	Though targeted, no individuals of this species were recorded during the field surveys. Given the extent of habitat available beyond the Proposal, the disturbance of a small percentage of vegetation is not considered to have an impact on the possible local or regional presence of this species.
AMPHIBIANS			
Giant Burrowing Frog <i>Heleioporus australiacus</i>	EPBC & TSC Act	The Giant Burrowing Frog is mostly restricted to areas of Hawkesbury Sandstone. This association with sandstone outcrops appears to be quite an important feature of this species ecology being found in association with hanging sandstone shelves and the upper laterals of creeks that run through heathland and woodland. The species has also been found within Button Grass Swamps. This species lives in small semi-permanent to slightly flowing streams, breeding in sandy river bank burrows during the summer and autumn months. The larval stage of this species requires semi-permanent to permanent pools during their larval stage. Giant Burrowing Frogs are not found in creeks affected by stormwater or other pollutants, and this species of frog is not found in urbanised areas.	Though targeted, this species was not recorded or detected during any of the field investigations. Given the habitat requirements of this species combined with the nature of the Proposal and those habitats to be affected will ensure that no impacts on the possible presence of this species arise.
Stuttering Frog <i>Mixophyes balbus</i>	EPBC & TSC Act	The Stuttering Frog is a terrestrial inhabitant of rain, arctic birch and wet sclerophyll forests. Usually found near permanently running water, the Stuttering Frog lays its eggs on rocks or gravel near the edge of flowing streams. This species feed on insects and smaller frogs.	Though targeted, this species was not recorded or detected during any of the field investigations. Given the aquatic nature of this species combined with the nature of the Proposal and those habitats to be affected will ensure that no impacts on the possible presence of this species arise.
Green and Golden Bell Frog <i>Litoria aurea</i>	EPBC & TSC Act	The habitat requirements of this species include water bodies that lack well developed emergent vegetation, are free of chemical contamination and do not support introduced fish species. In addition this species needs the presence of diurnal shelter, basking sites and refuge sites for hibernation over winter (non-mown areas or other dense vegetation in which to shelter), feeding areas, aquatic breeding and spawning areas.	Though targeted, this species was not recorded or detected during any of the field investigations. Given the aquatic nature of this species combined with the nature of the Proposal and those habitats to be affected will ensure that no impacts on the possible presence of this species arise.

Common and Scientific Name	Legislation	Habitat Requirements*	Likely Impacts
Littlejohns Tree Frog <i>Litoria littlejohni</i>	EPBC & TSC Act	Littlejohn's Tree Frog has a distribution that includes the plateaus and eastern slopes of the Great Dividing Range from Watagan State Forest south to Buchan in Victoria. It occurs along permanent rocky streams with thick fringing vegetation associated with eucalypt woodlands and heaths among sandstone outcrops. Eggs are laid in loose gelatinous masses attached to small submerged twigs.	Though targeted, this species was not recorded or detected during any of the field investigations. Given the aquatic nature of this species combined with the nature of the Proposal and those habitats to be affected will ensure that no impacts on the possible presence of this species arise.
INVERTEBRATES			
Giant Dragonfly <i>Petalura gigantean</i>	TSC Act	The Giant Dragonfly is found along the east coast of NSW from the Victorian border to northern NSW. It is not found west of the Great Dividing Range. Live in permanent swamps and bogs with some free water and open vegetation. Adults are short-lived surviving for one summer after emerging in October. Adults spend most of their time settled on low vegetation on or adjacent to the swamp. Females lay eggs into moss or other soft vegetation bordering swamps. Larvae dig long branching burrows under the swamp. Larvae are slow growing and the larval stage may last up to 10 years.	Unlikely to be present within the subject site due to a lack of its necessary habitat requirements. Therefore, this species would not be affected as a result of the undertaking of the Proposal.

Appendix 3: GPS locations.

	GPS LOCATION	
	Easting	Northing
Threatened species recorded		
Call playback location 1, transmission line out west	758988	5875805
Bat location 3, transmission line out west	759165	5875356
Bat location 4, transmission line out west	758801	5874867
Bat location 5, transmission line out west	759048	5876056
Glossy Black-Cockatoo Feed tree	759755	5875789
Glossy Black-Cockatoo Feed tree	759722	5875791
Glossy Black-Cockatoo Feed tree	759898	5875685
Yellow-bellied Glider Feed tree	758987	5875805
Powerful Owl (transmission line out west)	758988	5875805
Site 1		
Hair tube 1	759859	5875636
Hair tube 2	759856	5875657
Hair tube 3	759861	5875675
Hair tube 4	759869	5875696
Hair tube 5	759869	5875726
Hair tube 6	759862	5875752
Elliott B 1	759854	5875755
Cage trap	759845	5875782
Elliott 1	759690	5875785
Elliott 2	759690	5875785
Elliott 3	759705	5875791
Elliott 4	759719	5875775
Elliott 5	759726	5875777
Elliott 6	759744	5875777
Elliott 7	759756	5875786
Elliott 8	759766	5875792
Elliott 9	759771	5875798
Elliott 10	759792	5875809
Elliott 11	759806	5875803
Elliott 12	759828	5875799
Elliott 13 - arboreal	759869	5875823
Elliott 14	759828	5875805
Elliott 15 – arboreal	759888	5875795
Elliott 16	759896	5875785
Elliott 17	759902	5875772
Elliott 18	759919	5875749
Elliott 19 – arboreal	759935	5875741
Elliott 20	759954	5875718
Elliott 21	759966	5875707
Elliott 22	759977	5875695
Elliott 23 - arboreal	759988	5875680
Elliott 24	759995	5875671
Elliott 25	759993	5875658
Call Playback from boat	759888	5875896
Anabat Location 2	759870	5875815
Anabat Location 6a	759888	5875896
Site 2		
Hair tube 1	759782	5875578
Hair tube 2	759800	5875548
Hair tube 3	759829	5875524
Hair tube 4	759833	5875496
Hair tube 5	759847	5875441
Hair tube 6	759861	5875418
Cage Trap	759844	5875466
Elliott B 1	759889	5875393
Elliott B 2	759905	5875382
Elliott 1	759985	5875529
Elliott 2	759977	5875532

	GPS LOCATION	
	Easting	Northing
Elliott 3	759980	5875532
Elliott 4	759981	5875517
Elliott 5	759968	5875501
Elliott 6	759957	5875487
Elliott 7	759952	5875466
Elliott 8	759950	5875447
Elliott 9	759937	5875422
Elliott 10	759937	5875420
Elliott 11	759937	5875417
Elliott 12	759939	5875408
Elliott 13	759932	5875377
Elliott 14	759852	5875340
Elliott 15	759855	5875342
Elliott 16	759360	5875342
Elliott 17	759873	5875333
Elliott 18	759881	5875337
Elliott 19 – arboreal	759883	5875350
Elliott 20	759899	5875352
Elliott 21	759919	5875352
Elliott 22	759931	5875353
Elliott 23 – arboreal	759916	5875361
Elliott 24	759921	5875366
Elliott 25 - arboreal	759927	5875374
Bat location 8	759784	5875556
Call Playback	759818	5875263
Site 3		
Elliott 1 – Size B	759746	5875175
Elliott 2	759749	5875163
Elliott 3	759742	5875143
Elliott 4	759740	5875123
Elliott 5	759745	5875109
Elliott 6	759744	5875098
Elliott 7	759734	5875081
Elliott 8	759722	5875071
Elliott 9	759709	5875081
Elliott 10	759697	5875099
Elliott 11	759695	5875097
Elliott 12	759690	5875108
Elliott 13	759701	5875132
Elliott 14	759700	5875134
Elliott 15	759694	5875148
Elliott 16	759704	5875159
Elliott 17	759701	5875166
Elliott 18	759712	5875176
Elliott 19	759704	5875193
Elliott 20 – Arboreal	759729	5875221
Elliott 21 – Arboreal	759664	5875250
Elliott 22 - Arboreal	759693	5875233
Anabat 6b from boat	759750	5875250
Anabat 7	759650	5974950
Anabat 9	759771	5974982
Anabat location 1 and 10 (foreshore)	759740	5872510
Anabat track into “Don’s place”	759664	5874996
Owl playback near harp trap	759739	5875091
Owl Playback	759750	5875250
Owl Playback	759771	5974982
Harp trap	759739	5875091

Appendix 4: Plant species recorded during the surveys of vegetation at Lake Wonboyn.

Key

* = Introduced (weed) species

FAMILY	SPECIES
LYCOPSIDA – Club Mosses	
Lycopodiaceae	<i>Lycopodium deuterodensum</i>
Selaginellaceae	<i>Selaginella uliginosa</i>
FILICOPSIDA - Ferns	
Adiantaceae	<i>Adiantum aethiopicum</i>
Aspidiaceae	<i>Polystichum austrliense</i>
Cyatheaceae	<i>Cyathea australis</i>
Dicksoniaceae	<i>Calochlaena dubia</i>
	<i>Dicksonia antarctica</i>
Dennstaedtiaceae	<i>Histiopteris incisa</i>
	<i>Hypolepis muelleri</i>
	<i>Pteridium esculentum</i>
Gleicheniaceae	<i>Gleichenia dicarpa</i>
MAGNOLIOPSIDA – Flowering Plants	
Magnoliidae – Dicotyledons	
Apiaceae	<i>Apium prostratum</i>
	<i>Platysace lanceolata</i>
	<i>Xanthosia pilosa</i>
Apocynaceae	<i>Tylophora barbata</i>
Araliaceae	<i>Polyscias sambucifolia</i>
Asteraceae	<i>Cassinia aculeata</i>
	<i>Cassinia longifolia</i>
	<i>Ozothamnus diosmifolium</i>
	<i>Taraxacum officinale*</i>
Cassythaceae	<i>Cassytha pubescens</i>
Casuarinaceae	<i>Allocasuarina littoralis</i>
Cassythaceae	<i>Cassytha pubescens</i>
Chenopodiaceae	<i>Atriplex prostrata</i>
	<i>Einadia hastata</i>
	<i>Enchylaena tomentosa</i>
	<i>Sarcocornia quenuqueflora</i>
Convolvulaceae	<i>Dichondra repens</i>

FAMILY	SPECIES
Dilleniaceae	<i>Hibbertia aspera</i>
	<i>Hibbertia empetrifolia</i>
Eleocarpaceae	<i>Eleocarpus reticulatus</i>
Epacridaceae	<i>Epacris impressa</i>
	<i>Leucopogon ericoides</i>
	<i>Leucopogon lanceolatus</i>
	<i>Lissanthe strigosa</i>
	<i>Monotoca ledifolia</i>
Euphorbiaceae	<i>Phyllanthus hirtellus</i>
	<i>Ricinocarpus pinifolius</i>
Fabaceae: Faboideae	<i>Aotus ericoides</i>
	<i>Bossiaea ensata</i>
	<i>Bossiaea heterophylla</i>
	<i>Dillwynia floribunda</i>
	<i>Glycine clandestina species complex</i>
	<i>Pultenaea daphnoides</i>
Fabaceae: Mimosoideae	<i>Acacia mearnsii</i>
	<i>Acacia longifolia</i>
	<i>Acacia suaveolens</i>
Goodeniaceae	<i>Goodenia ovata</i>
	<i>Scaevola calendulacea</i>
Haloragaceae	<i>Gonocarpus teucrioides</i>
Hypericaceae	<i>Hypericum gramineum</i>
Myoporaceae	<i>Myoporum acuminatum</i>
Myrtaceae	<i>Angophora floribunda</i>
	<i>Callistemon citrinus</i>
	<i>Corymbia gummifera</i>
	<i>Eucalyptus agglomerata</i>
	<i>Eucalyptus bosistoana</i>
	<i>Eucalyptus consideniana</i>
	<i>Eucalyptus cypellocarpa</i>
	<i>Eucalyptus globoidea</i>
	<i>Eucalyptus longifolia</i>
	<i>Eucalyptus muelleriana</i>
	<i>Eucalyptus sieberi</i>
	<i>Kunzea ambigua</i>
	<i>Leptospermum polygalifolium</i>
	<i>Leptospermum trinervium</i>
	<i>Melaleuca armillaris</i>
	<i>Melaleuca squarrosa</i>
Oleaceae	<i>Notelaea longifolia</i>
Oxalidaceae	<i>Oxalis perrenans</i>
Pittosporaceae	<i>Bursaria spinosa</i>

FAMILY	SPECIES
	<i>Billardiera scandens</i>
Proteaceae	<i>Banksia paludosa</i>
	<i>Banksia serrata</i>
	<i>Lomatia ilicifolia</i>
	<i>Persoonia levis</i>
	<i>Persoonia linearis</i>
Rubiaceae	<i>Opercularia varia</i>
Rutaceae	<i>Correa reflexa</i>
Santalaceae	<i>Leptomeria acida</i>
	<i>Exocarpus cupressiformis</i>
	<i>Exocarpus strictus</i>
Sapindaceae	<i>Dodonaea triquetra</i>
Thymeliaceae	<i>Pimelea linifolia</i> subsp. <i>linifolia</i>
Verbenaceae	<i>Clerodendrum tomentosum</i>
Violaceae	<i>Viola hederacea</i>
Liliidae - Monocotyledons	
Cyperaceae	<i>Baumea rubiginosa</i>
	<i>Carex appressa</i>
	<i>Caustis flexuosa</i>
	<i>Eleocharis sphacelata</i>
	<i>Gahnia clarkei</i>
	<i>Gahnia radula</i>
	<i>Isolepis nodosa</i>
	<i>Lepidosperma laterale</i>
	<i>Ptilothrix deusta</i>
	<i>Schoenus melanostachys</i>
	<i>Schoenus minimus</i>
Iridaceae	<i>Patersonia glabrata</i>
	<i>Patersonia sericea</i>
Juncaceae	<i>Juncus krausii</i>
Lomandraceae	<i>Lomandra filiformis</i>
	<i>Lomandra glauca</i>
	<i>Lomandra longifolia</i>
Philesiaceae	<i>Eustrephus latifolius</i>
	<i>Geitonoplesium cymosum</i>
Phormiaceae	<i>Dianella caerulea</i>
Poaceae	<i>Anisopogon avenaceus</i>
	<i>Austrostipa</i> sp
	<i>Chionochloa pallida</i>
	<i>Cynodon dactylon</i>

FAMILY	SPECIES
	<i>Cymbopogon refractus</i>
	<i>Danthonia tenuior</i>
	<i>Entolasia stricta</i>
	<i>Festuca littoralis</i>
	<i>Imperata cylindrica</i> var. <i>major</i>
	<i>Microlaena stipoides</i> var. <i>stipoides</i>
	<i>Poa meionectes</i>
	<i>Tetrarrhaena juncea</i>
Smilacaceae	<i>Smilax australis</i>
Uvulariaceae	<i>Schelhammera undulata</i>