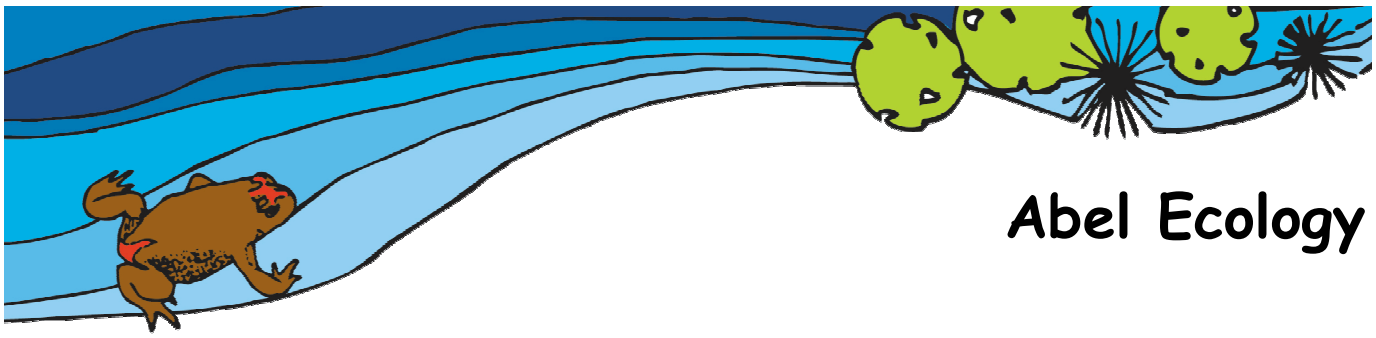

Abel Ecology

Bat Survey Report
For

Proposed Hospital

1614 Tathra Road, Bega

Date: 23 January 2013
Document No: 1106-REP-12-ISS-1
Prepared for: Health Infrastructure
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Report	Version	Prepared by	Checked by	Submission	
				Method	Date
Draft report	Draft A	Becky Southwell	Margot de Regt	Email	11 Jan 13
Final report	Issue 1	Becky Southwell		Email	23 Jan 13

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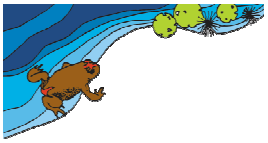

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List of Abbreviations

d.b.h.	Diameter at breast height (~1.3 metres)
EEC	Endangered Ecological Community
EPZ	Environmental Protection Zone
ESD	Ecologically Sustainable Development
TPZ	Tree Protection Zone
SRZ	Structural Root Zone
LEP	Local Environmental Plan
LGA	Local Government Area
NR	Nature Reserve
PDA	Principal Development Area
ROTAP	Rare or Threatened Australian Plant

Figure 1. Air photo of the site and adjoining area

Study area

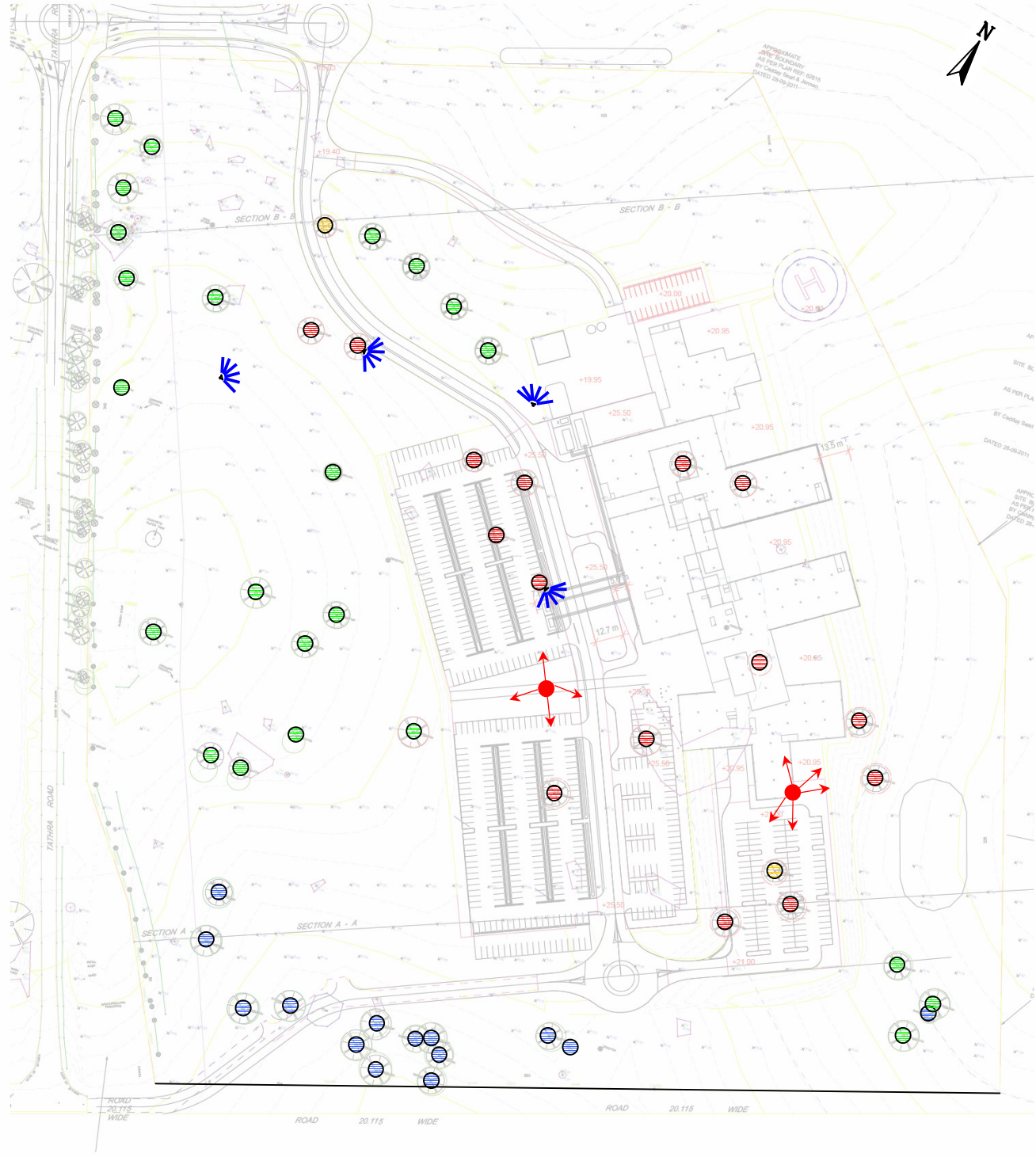


Figure 2. Proposal diagram and tree map with bat survey methodology

- Hollow-bearing trees to be removed
- Other trees to be removed
- Hollow-bearing trees to be retained and protected
- Other trees to be retained and protected
- Anabat locations
- Stag watch locations

Base map: © 360, Tree Removal/Retention Plan, No. LS-D-001, dated March 2012

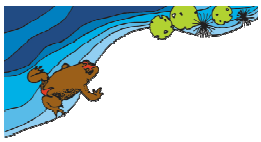
Figure 3. Replacement fauna habitat box plan

Potential revegetation areas

Area for 25 poles with two boxes each

Trees suitable for hanging fauna boxes

Base map: © Johnstaff, Tree Removal Plan, No. 360-LAN-B0-001 Iss D, dated 21-11 November 2012



1. Introduction

The proposal is to construct a new hospital.

An insectivorous microbat survey of the proposed development site at 1614 Tathra Road, Bega ('the site' – Figure 1) was undertaken between 12 and 13 December 2012 to assess the likely impacts of the hospital development on species present, including those that may potentially use hollow-bearing trees on the site. The main aim of this survey was to determine whether the present proposal is likely to cause a significant effect on any threatened species or their habitats. This assessment is based on the seven factors listed in Section 5A of the Environmental Planning and Assessment Act 1979, no. 203, (as amended), which are specifically addressed in the Flora and Fauna Report by Abel Ecology dated 20 September 2012.

This assessment addresses both 'endangered' and 'vulnerable', as required by the Threatened Species Conservation Act, 1995 (TSC Act 1995). Throughout this report 'threatened' refers to those species and communities listed as 'endangered' or 'vulnerable' in Schedules 1 & 2 of the TSC Act 1995. 'Protected fauna' refers to any native bird, mammal (except the dingo), reptile or amphibian in NSW.

2. Methodology

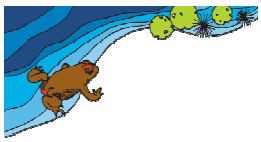
2.1 Field work

Over the two days of fieldwork a total of 39.5 hours were spent undertaking survey work on the site and surrounding habitat areas.

Table 1. Survey dates and weather conditions

Date	Times	Weather (˚C)	Task	Hours (hrs x no. people)
12 Dec 12	20:00-21:30	24˚C	Spotlighting and Stag watch	(1.5x 2) = 3
13 Dec 12	7:30- 16:00	22- 32.7 ˚C	Search Tree Hollows	(8.5 x 4) = 34
13 Dec 12	20:00- 21:15	23.7 ˚C	Spotlight and stag watch	(1.25 x 2) = 2.5
			Total	**39.5 hours**

Survey effort was concentrated within the site boundaries, although adjacent surrounding habitat was noted.



2.2 Fauna survey method

Targeted surveys were made for insectivorous bats, of which eight are threatened species found within the Bega Valley region (Table 3).

The methods of survey undertaken to detect the various habitats are outlined below in 2.2.1. Locations for specific survey methodologies are shown in Figure 2.

Spotlighting was undertaken by two people for a total of 5.5 man hours on 12 and 13 December 2012, each person using a 12-volt, 50-watt spotlight and 10 x 50 binoculars.

A stag watch was conducted for likely hollow habitat trees. This consisted of quiet watching of a hollow tree for 30 minutes before dusk and 1 hour after dusk to see what fauna emerged.

Specialist tree climbers were employed to investigate hollows and were assisted by the use of an LED torch and a 2 m optical fibre probe with illumination source (Light Scope™), which is a long, flexible fibre optic device, used to look into hollows within trees, to see what fauna were sheltering there. The use of the tree climbers enabled tree hollows to be assessed that may otherwise be unseen from the ground.

Dates, weather and temperatures of all fieldwork were recorded and are tabulated in Section 2.1 above.

2.2.1 Microbat ultrasonic call recording

The method for identifying free-flying bats by their species-specific echolocation calls is one that has become standard in the last decade (Richards 2001). Insectivorous bats were surveyed on this site by Anabat recordings directly to cf storage zcaim, for four hours from dusk (Duffy *et al.* 2000). Any other bat survey methodology, such as tape recorded calls, and brief survey time, is certain to miss bat species scheduled by the TSC Act 1995. Scheduled species are recorded on average within 1.5 hours (94 ±64 minutes) of recording but up to four hours is required to record all threatened species present (Richards 2001). Of the eight threatened species in the Bega Valley region, Yellow-bellied Sheathtail-bat *Saccolaimus flaviventris* has the largest home range and takes up to four hours to reliably appear at any point in its range. For a small site, any bats that appear in the first half hour are likely to be roosting nearby, with probability of recording 57% in the first half hour and 68% in the first whole hour (Richards 2001). Storage to zcaim provides high quality call recordings with very little noise, enabling high reliability in call identification, as opposed to storage to magnetic tape. Flying-foxes and insectivorous bats were sought by nocturnal spotlight transects and searching for roost sites, and Anabat recordings were analysed by Alison Towerton. Opportunistic observations during fieldwork were noted.

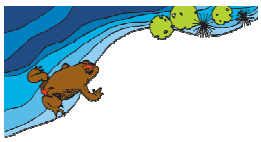


Table 2. Anabat recording dates and weather conditions

Date	Times	Temperatures	Weather
12 Dec 12	8 pm to 7 am	15.2°C to 26.6°C	Clear skies with little cloud and slight breeze
13 Dec 12	8pm to 9:15 pm	23.7 °C	Skies clear becoming cloudy and raining overnight

2.3 Species likely to occur

Studies undertaken by the NPWS (OEH) in 2003 and 2005 identified 19 species of microbat present in the Bega Valley region, including six listed under the Threatened Species Conservation Act 1995 (TSC Act), and two under both the TSC Act and the Environmental Protection Biodiversity Conservation Act 1997 (EPBC Act)

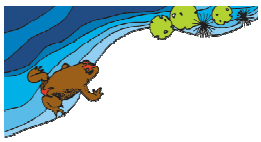
Species identified as historically occurring in the region are shown in Table 3 below.

Table 3. Microbat species identified in the Bega Valley region

Common Name	Scientific name	Threatened species listing
Golden-tipped Bat	*Kerivoula papuensis*	TSC Vul EPBC Near threatened
Common Bentwing-bat	*Miniopterus schreibersii*	TSC Vul
Eastern Bentwing-bat	*Miniopterus schreibersii oceanensis*	TSC Vul EPBC Lower risk
Eastern Freetail-bat	*Mormopterus norfolkensis*	TSC Vul
Eastern False Pipistrelle	*Falsistrellus tasmaniensis*	TSC Vul
Greater Broad-nosed Bat	*Scoteanax rueppellii*	TSC Vul
Little Bentwing-bat	*Miniopterus australis*	TSC Vul
Large-footed Myotis	*Myotis adversus*	TSC Vul
Chocolate Wattled Bat	*Chalinolobus morio*	Protected, NPW Act
Gould's Wattled Bat	*Chalinolobus gouldii*	Protected, NPW Act
Little Mastiff-bat	*Mormopterus planiceps*	Protected, NPW Act
White-striped Freetail-bat	*Nyctinomus australis*	Protected, NPW Act
Lesser Long-eared Bat	*Nyctophilus geoffroyi*	Protected, NPW Act
Gould's Long-eared Bat	*Nyctophilus gouldi*	Protected, NPW Act
Eastern Horseshoe-bat	*Rhinolophus megaphyllus*	Protected, NPW Act
Eastern Broad-nosed Bat	*Scotorepens orion*	Protected, NPW Act
Large Forest Bat	*Vespadelus darlingtoni*	Protected, NPW Act
Southern Forest Bat	*Vespadelus regulus*	Protected, NPW Act
Little Forest Bat	*Vespadelus vulturnus*	Protected, NPW Act

2.4 Limitations of the survey

This survey was conducted in the summer season. This was suitable for the majority of species that would be expected to be present. The weather conditions were clear and fine for the most part with warm nights, and considerable insect activity.



3. Survey results

3.1 Species of conservation concern

3.2 Microbats

Five common bat species and five threatened bat species were detected and are listed in Table 2. Where calls were easily identifiable to species, they were classed as Confident. Where the calls were most likely to represent a particular species, they were classed as Probable. Where calls were likely to belong to a species but the quality or length of the call precluded a confident identification, they were classed as Possible. Where the calls could have belonged to two or more species, they were classified into a species group. Any calls of very poor quality, which could not be reliably placed into any species or species group category, were classified as Unknown. The vast majority of calls were of very good quality and the poor ones most likely represented bats flying just within the bat detector's outer detection limits.

Foraging Habitat

This site provides potentially suitable foraging habitat for six of the eight possible threatened species. *Myotis macropus* (syn. *Myotis adversus*) has no suitable foraging habitat in the form of open water bodies. However this resource is abundant off site in various wetland areas. *Kerivoula papuensis* is only likely to forage in areas within a few kilometres of rainforest or rainforest gullies.

Roosting Habitat

This site supports substantially high numbers of tree hollows, which provide potential suitable roosting habitat for *Falsistrellus tasmaniensis, Mormopterus norfolkensis, Scoteanax rueppellii* and *Myotis adversus*. This site has bridges, buildings and other suitable (often human-made) structures that provide potentially suitable roosting habitat for *Chalinolobus dwyeri*, *Miniopterus schreibersii, Myotis adversus* and *Myotis macropus*.

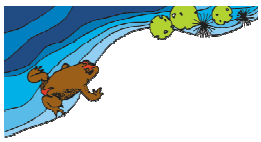


Table 2. List of fauna detected on the site

Common Name	Scientific Name	Conservation Status	Recorded AE
Mammals			
Grey-headed Flying-fox	*Pteropus poliocephalus*	Sch. 2, Vul. , EPBC Vul.	O
White-striped Free-tail bat	*Tadarida australis*		A-C
Gould's Wattled Bat	*Chalinolobus gouldii*		A-C
Greater Broad-nosed Bat	*Scoteanax rueppellii*	Sch. 2, Vul.	A-C
Lesser Long-eared Bat	*Nyctophilus geoffroyi*		A-P
Eastern Bentwing-bat	*Miniopterus schreibersii oceanensis*	Sch. 2, Vul.	A-Po
Eastern False Pipistrelle	*Falsistrellus tasmaniensis*	Sch. 2, Vul.	A-C
Eastern Freetail-bat	*Mormopterus norfolkensis*	Sch. 2, Vul.	A-C
Large-footed Myotis	*Myotis adversus*	Sch. 2, Vul.	A-C
Large Forest Bat	*Vespadelus darlingtoni*		A-C
Little Forest Bat	*Vespadelus vulturnus*		A-C

Key

A – P = Anabat – Probable
A – C = Anabat – Confident
A – Po = Anabat – Possible
O = Observed

4. Discussion of results

Evidence suggests that bats have a reasonably high ability to persist in heavily disturbed rural environments, which some avifauna and mammal species appear to be less tolerant of. Activity levels of bats in roadside vegetation and scattered trees have been found to be similar to those in open forest, with the highest activity levels around streamside vegetation. Preferred roost sites for many tree hollow roosting species, such as Gould's Wattled Bat *Chalinolobus gouldii* and Lesser Long-eared Bat *Nyctophilus geoffroyi*, include dead limbs and fissures in old River Red Gums such as those that occur on the site.

While bats were recorded foraging on the site none were observed exiting any tree at dusk, nor were they detected during concentrated investigations. The trees proposed for removal were thoroughly inspected by a qualified climbing arborist, who confirmed no occupation by bats in these particular trees. However, there are many other trees of suitable age class and size to produce valuable habitat within the locality including off site.

Studies have shown that many bat species move large distances between their roost sites, thus it is highly likely that individuals detected on site by the ultra sonic recording were feeding in the locality. Bats will generally return to the same roost sites. They are known to move regularly

within an area, which might require upwards of 20-30 suitable roost sites to support a colony. Maternity roost sites are highly specialised and often lacking across the landscape.

It has been shown that bats are able to utilise revegetated areas much sooner than many other species due their mobility. Thus the restoration of habitat by means of planting suitable trees has the potential to increase the structural habitat available for bat species in the locality.

The placement of habitat boxes as recommended in this report further increases the potential roosting habitat for bats within an urban landscape. These may be placed around buildings or within the landscape as shown in Figure 3.

During the survey a large colony (>10,000) of Grey-headed Flying-fox were observed flying over the site and foraging in many of the flowering *Angophora floribunda* trees that were present. These flying-foxes were based in a camp north-west of the site in Glebe Park, and appeared to be a localised dispersal at dusk for feeding.

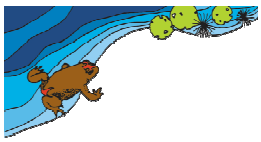
5. Impact on Insectivorous bats

5.1 Short and long term impacts

The short and long term impacts for the site with the removal of the specified trees will see a reduction in available natural hollows available for fauna species. Furthermore, it will potentially reduce the available food resource for Grey-headed Flying-fox in the immediate locality in the short-term until the revegetation plantings reach flowering maturity. Grey-headed Flying-fox is known to travel extensive distances in search of food, which is provided elsewhere on site and within the region. However, in contrast, introduction of lighting within the hospital grounds has the potential to increase food resources for insectivorous bats, which are often observed gleaning insects from around urban lighting.

5.2 Impact amelioration recommendations

In order to reduce the potential impacts on fauna within the site, it is recommended that prior to removal of trees, any fauna identified be allowed sufficient time to relocate (e.g. breeding birds, etc.) or be relocated. A qualified climbing arborist inspecting hollow-bearing trees on the day of removal may identify the presence of fauna. A qualified ecologist must supervise the hollow-bearing tree removal process.



5.3 Habitat enhancement recommendations

A total of 94 habitat boxes of various sizes are to be placed within the site. This number is based on the quantity and occupancy rate of hollows that are to be removed. Of these boxes, 47 are to be for birds and 47 for bats, the specifications for which are outlined in section 6.1.

The areas within the lot outside the principle development area, as shown in Figure 3 as potential revegetation areas, or alternatively locations on the site as determined by the landscape architect, are to be replanted with River Red Gum *Eucalyptus tereticornis* at a ratio of 2:1 for trees removed.

Locations of the 94 habitat boxes may be determined by discussions between the landscape architect and the ecologist. Recommended locations include; the remaining mature River Red Gum *Eucalyptus tereticornis* within the lot trees as identified in Figure 3, which would suitably accommodate a ratio of two per tree. Additional habitat boxes must be hung on poles, at a maximum ratio of four boxes per pole, suitable locations for these are along the boundary fence adjacent to Tathra Road, or outside areas staged for future development.

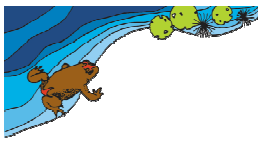
5.4 Environment Protection and Biodiversity Conservation Act 1999

Grey-headed Flying-fox is protected under Commonwealth legislation by the EPBC Act 1999 and is listed as Vulnerable. The provisions of the EPBC Act apply to this proposal. The outcome is not significant, however, and does not require referral to the Commonwealth.

5.4.1 Criteria for Vulnerable Species

An action has, will have, or is likely to have a significant impact on a Vulnerable Species if it does, will, or is likely to:

a) lead to a long-term decrease in the size of an important population of a species, or
b) reduce the area of occupancy of an important population, or
c) fragment an existing important population into two or more populations, or
d) adversely affect habitat critical to the survival of a species, or
e) disrupt the breeding cycle of an important population, or
f) modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline, or
g) result in invasive species that are harmful to a vulnerable species becoming established in the vulnerable species' habitat,* or
h) interfere substantially with the recovery of the species.



An Important Population is one that is necessary for a species' long-term survival and recovery. This may include populations that are:

i) key source populations either for breeding or dispersal,
j) populations that are necessary for maintaining genetic diversity, and/or
k) populations that are near the limit of the species range.

(*Introducing an invasive species into the habitat may result in that species becoming established. An invasive species may harm a vulnerable species by direct competition, modification of habitat, or predation.)

6. Replacement fauna habitat box plan

6.1 Box specifications

There are several manufacturers of habitat boxes and they come in a range of sizes suited to the target species. Habitat boxes to suit the following species are to be installed in the recommended locations; insectivorous bats (47), other fauna (47) including Kookaburra, Rosella sp., Lorikeet sp., Galah and Wood Duck. Birds Australia have produced a table of recommended dimensions for these species, which can be found in Appendix 1

6.2 Proposed box locations

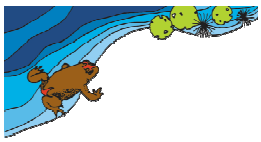
The boxes are to be located in the positions as determined through discussions with the landscape architect and the ecologist; suggested locations are shown in Figure 3. Installation of boxes is to be supervised by an experienced ecologist and the minimum distance for bat box entry to the ground must be seven metres.

6.3 Maintenance and monitoring schedule

The following outlines the monitoring and maintenance required for the management of habitat boxes. The average life span of habitat boxes is approximately 10 years but this will depend on design and materials used in construction. Feral bees and other pests are known to occupy habitat boxes installed for native species. The best method to limit impacts from feral species is to check the boxes regularly during the breeding season for feral occupation, say 1-2 monthly. In addition to feral occupation boxes must be inspected for the following:

a) Damage; replace damaged boxes,

b) Excessive bedding and debris, remove from unoccupied boxes to allow use of box, and



c) Drainage, ensure drainage in the bottom of the box is not blocked.

7. References

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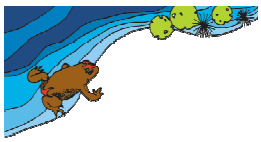
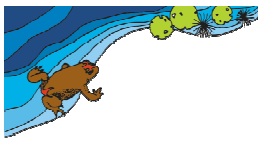


8. Locally occurring insectivorous bat habitat requirements

Common Name ***Scientific Name*** Schedule Listing	**Preferred Habitat**	**Comments**
Eastern False Pipistrelle *Falsistrellus tasmaniensis* TSC Act, Sch. 2, Vul.	Little known of habitat. Has been found roosting in stem holes of living Eucalypts	Suitable natural habitat occurs on the site.
Golden-tipped Bat *Kerivoula papuensis* TSC Act, Sch. 2, Vul. EPBC Act, Lower risk (near threatened)	Unclear, but probably coastal wet forests, often in areas where wet and dry forests meet. Sometimes roosts in tree hollows, but mainly in disused bird nests.	No suitable natural habitat occurs on the site.
Eastern Freetail-bat *Mormopterus norfolkensis* TSC Act, Sch. 2, Vul.	Unclear, but most records from dry Eucalypt forests and woodlands. Roosts in tree hollows.	Suitable natural habitat occurs on the site.
Eastern Bentwing-bat *Miniopterus schreibersii* TSC Act, Sch. 2, Vul.	Well-timbered valleys. Roosts in caves and storm-water channels and similar structures. Does not roost in tree hollows.	Suitable natural habitat occurs on the site.
Little Bentwing-bat *Miniopterus australis* TSC Act, Sch. 2, Vul.	Well-timbered habitats incl. rainforest, Melaleuca swamps and dry sclerophyll forests. Roosts in caves and storm-water channels and similar structures. Does not roost in tree hollows.	No suitable natural habitat occurs on the site.
Large-footed Myotis *Myotis adversus* TSC Act, Sch. 2, Vul.	Requires open areas of water over which it hunts. Roosts in caves, under bridges and buildings and sometimes in dense foliage in rainforests. May roost in tree hollows.	Suitable natural habitat occurs on the site.
Greater Broad-nosed Bat *Scoteanax rueppellii* TSC Act, Sch. 2, Vul. EPBC Act, Lower risk (near threatened)	Found in woodlands, moist and dry sclerophyll forests and rainforests. Prefers gullies. Roosts in tree hollows only.	Suitable natural habitat occurs on the site.
Yellow-bellied Sheathtail-bat *Saccolaimus flaviventris* TSC Act, Sch. 2, Vul.	Found in a variety of Eucalypt habitats including tall forests and mallee. Roosts in tree hollows and occasionally abandoned Sugar Glider nests	Suitable natural habitat occurs on the site.
Southern Forest Bat *Vespadelus regulus*	Found in a variety of Eucalypt habitat including, wet and dry sclerophyll forest, low shrub woodland and temperate woodlands. Roosts in tree hollows of sometimes up to 100 or more individuals	Suitable natural habitat occurs on the site.
Grey-headed Flying-fox *Pteropus poliocephalus* TSC Act, Sch. 2, Vul. EPBC Act, Vul.	Found in rainforest, wet and dry sclerophyll forest and mangroves. Camps are usually in gullies, close to water and in vegetation with a dense canopy. Feeds on a wide variety of flowering and fruiting plants.	Suitable natural habitat occurs on the site.

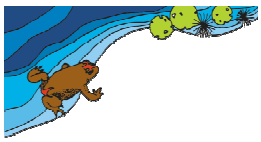


Appendix 1. Nest box specifications

Recommended Dimensions for Nestboxes

SPECIES	INT DIAM	DEPTH/LENGTH	ENT DIAM	VERT/HOR	HEIGHT	SEASON	REF
Antechinus, Yellow-footed	-	-	20-25 mm	-	-	-	Trainor (1995)
Bat sp.	70-100 x 150-240 mm	200-250 mm	15-20 mm slit	v	-	-	BFNC (n.d.)
Bat, Chocolate Wattled	-	-	10 mm slit	-	-	-	Trainor (1995)
Bat, Gould's Wattled	-	-	10 mm slit	-	-	-	Trainor (1995)
Bat, Lesser Long-eared	-	-	10 mm slit	-	-	-	Trainor (1995)
Black-Cockatoo, Glossy	300 mm	870-1000 mm	160 x 200 mm	v	-	-	Pedler (1996)
Boobook, Southern	-	-	150 mm	h	-	-	Trainor (1995)
Brushtail-Possum sp.	320 mm	400 mm	120-150 mm	v	4-8 m	Autumn	MZES (n.d.)
Brushtail-Possum sp.	210 x 240 mm	380 mm	c.120 mm	v	-	-	RSPCA (n.d.)
Brushtail-Possum sp.	-	-	90 mm	-	-	-	Trainor (1995)
Cockatoo, Sulphur-crested	-	-	150 mm	v	-	-	Trainor (1995)
Corella, Little	-	-	150 mm	-	-	-	Trainor (1995)
Corella, Long-billed	-	-	150 mm	-	-	-	Trainor (1995)
Duck, Australian Wood	200 mm	500 mm	120 mm	v	-	-	Trainor (1995)
Duck, Pacific Black	450 x 300 mm	-	120 mm	-	-	-	Elliot (1994)
Duck, Pacific Black	-	-	120 mm	h	-	-	Trainor (1995)
Duck, Pink-eared	-	-	-	-	-	-	Elliot (1994)
Galah	200 mm	650 mm	120 mm	v	6 m	Aug-Nov	Adams (1980)
Galah	200 mm	650 mm	120 mm	v	6 m	Sep-Jan	MZES (n.d.)
Galah	-	-	150 mm	-	-	-	Trainor (1995)
Glider, Feather-tailed	-	-	20-25 mm	-	-	-	Trainor (1995)
Glider, Squirrel	-	-	60 mm	-	-	-	Trainor (1995)
Glider, Sugar	250 mm	300 mm	50 mm	v	4-8 m	Jun-Dec	MZES (n.d.)
Glider, Sugar	200 mm	450 mm	35-40 mm	v	-	-	BFNC (n.d.)
Glider, Sugar	-	-	25-30 mm	-	-	-	Trainor (1995)
Kestrel, Nankeen	400 mm	750 mm	100 mm	v	5 m	Aug-Nov	Adams (1980)
Kingfisher, Sacred	130 mm	600-900 mm	75 mm	h	5-10 m	Sep-Mar	Adams (1980)
Kookaburra sp.	300 mm	500 mm	>130 mm	h	5-10 m	Sep-Jan	Adams (1980)
Kookaburra sp.	400 mm	-	130 mm	h	5-10 m	Sep-Jan	MZES (n.d.)
Kookaburra sp.	300 x 150-200 mm	600 mm	open	h	-	-	BFNC (n.d.)
Kookaburra, Laughing	150-300 mm	>400 mm	80-120 mm	h	-	-	Elliot (1994)
Kookaburra, Laughing	-	-	120 mm	h	-	-	Trainor (1995)
Lorikeet sp.	120 mm	600 mm	60 mm	h	5 m	Aug-Jan	Adams (1980)
Lorikeet, Little	-	-	25-30 mm	-	-	-	Trainor (1995)
Lorikeet, Musk	-	-	25-30 mm	-	-	-	Trainor (1995)
Lorikeet, Purple-crowned	-	-	25-30 mm	-	-	-	Trainor (1995)
Owl, Barn	400 mm	750 mm	open	h	5 m	Aut-Spr	Adams (1980)
Owl, Barn	-	-	150 mm	h	-	-	Trainor (1995)
Owlet-nightjar, Australian	100-150 mm	300-350 mm	60-80 mm	v	5 m	Sep-Dec	Adams (1980)
Owlet-nightjar, Australian	150 mm	>150 mm	70-120 mm	v	-	-	Elliot (1994)
Owlet-nightjar, Australian	150 mm	400 mm	50 mm	v	-	Sep-Dec	BFNC (n.d.)
Owlet-nightjar, Australian	-	-	40 mm	-	>5 m	-	Trainor (1995)
Owlet-nightjar, Australian	-	-	25-30 mm	-	-	-	Trainor (1995)
Pardalote sp.	120 mm	400-500 mm	30-45 mm	h	5 m	Jul-Jan	Adams (1980)
Pardalote sp.	120 mm	450 mm	30-45 mm	h	5 m	Jul-Jan	MZES (n.d.)
Pardalote, Striated	200 x 120-150 mm	-	25-35 mm	v/h	-	-	Elliot (1994)
Pardalote, Striated	90 x 120-140 mm	200 mm	30 mm	h	-	Aug-Feb	BFNC (n.d.)
Parrot, Red-rumped	100 mm	600 mm	75 mm	v/h	5 m	Aug-Jan	Adams (1980)
Parrot, Red-rumped	100-150 mm	400 mm	70-120 mm	h	-	-	Elliot (1994)
Parrot, Red-rumped	200-240 mm	400 mm	60-70 mm	v	-	-	BFNC (n.d.)
Parrot, Red-rumped	-	-	25-30 mm	-	-	-	Trainor (1995)
Phascogale, Brush-tailed	-	-	25-30 mm	-	-	-	Trainor (1995)
Ringtail-Possum sp.	250 mm	350 mm	80 mm	v	4-8 m	Apr-Nov	MZES (n.d.)
Ringtail-Possum sp.	250 mm	400 mm	60-80 mm	v	-	Mar-Nov	BFNC (n.d.)
Ringtail-Possum sp.	-	-	90 mm	-	-	-	Trainor (1995)
Rosella sp.	120-150 mm	>400 mm	70-120 mm	-	-	-	Elliot (1994)
Rosella sp.	150-200 mm	350-600 mm	75-100 mm	v/h	5 m	Aug-Jan	MZES (n.d.)
Rosella sp.	c.130 x 180 mm	c.400 mm	80 mm	v	-	-	Morrison (1996)
Rosella, Crimson	150-200 mm	350-600 mm	75-100 mm	v/h	5-6 m	Sep-Jan	Adams (1980)
Rosella, Eastern	135-150 mm	350-600 mm	75-100 mm	v/h	5-6 m	Aug-Jan	Adams (1980)
Rosella, Eastern	240 mm	400 mm	70 mm	v	-	-	BFNC (n.d.)
Rosella, Eastern	-	>500 mm	60 mm	-	>5 m	-	Trainor (1995)
Shrike-thrush, Grey	150-200 mm	200-300 mm	150 mm	-	-	-	Elliot (1994)
Shrike-thrush, Grey	150-200 x 200-300 mm	150-200 mm	open	h	-	-	BFNC (n.d.)
Swallow, Welcome	130 mm	-	open	h	3 m	Aug-Dec	Adams (1980)
Teal, Chestnut	200-400 mm	450-750 mm	100-120 mm	v	1.5 m	Sep-Dec	Adams (1980)
Teal, Chestnut	450 x 300 mm	-	80-100 mm	-	-	-	Elliot (1994)
Teal, Grey	200-400 mm	450-750 mm	100-120 mm	v	1.5 m	All year	Adams (1980)
Teal, Grey	450 x 300 mm	-	80-100 mm	-	-	-	Elliot (1994)
Teal, Grey	-	-	90 mm	-	-	-	Trainor (1995)
Treecreeper sp.	90-150 mm	100-150 mm	50-80 mm	v	-	-	Elliot (1994)
Treecreeper sp.	150 mm	400 mm	50 mm	v	-	-	BFNC (n.d.)
Treecreeper, White-throated	75-100 mm	300-400 mm	50-70 mm	v	5 m	Aug-Jan	Adams (1980)

Supplement to Birds Australia Information Sheet 5: Nestboxes for Natives



Appendix 2. Company Profile

Abel Ecology has been in the flora and fauna consulting business since 1991, starting in the Sydney Region, and progressively more state wide in New South Wales since 1998, and now also in Victoria. During this time extensive expertise has been gained with regard to Master Planning, Environmental Impact assessments including flora and fauna, bushfire reports, Vegetation Management Plans, Management of threatened species, Review of Environmental Factors, Species Impact Statements and as Expert Witness in the Land and Environment Court. We have done consultancy work for industrial and commercial developments, golf courses, civil engineering projects, tourist developments as well as residential and rural projects. This process has also generated many connections with relevant government departments and city councils in NSW. Our team consists of four scientists and two administrative staff, plus casual assistants as required.

Licences

NPWS s132C Scientific licence number is SL100780 expires 30 April 2013
NPWS GIS data licence number is CON95034
DG NSW Agriculture Animal Care and Ethics Committee approval AW 95/082
DG NSW Agriculture Animal Research Authority AW 95/082

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