

**951 YANNATHAN ROAD, 30 GLOVERS ROAD &  
379 LANG LANG-POOWONG ROAD, NYORA**

**TARGETED SOUTHERN BROWN  
BANDICOOT SURVEY**

**Wallis Watson (Nyora) Pty Ltd  
C/ Beveridge Williams**



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## 1. EXECUTIVE SUMMARY

On behalf of Wallis Watson Pty Ltd, Beveridge Williams engaged Brett Lane & Associates Pty. Ltd. (BL&A) to conduct a targeted survey for the threatened Southern Brown Bandicoot *Isoodon obesulus obesulus* within a 103-hectare area of land in Nyora. The specific area investigated, referred to herein as the ‘study area’, comprised three large private lots defined in the planning scheme as 951 Yannathan Road, 30 Glovers Road and 379 Lang Lang-Poowong Road, Nyora, as well as the adjoining reserve of Glovers Road along the northern and eastern boundaries of the study area (Figure 1). Residential subdivision is proposed for the study area.

This investigation was commissioned to provide information on any potential impacts on the Southern Brown Bandicoot, a listed species under the state *Flora and Fauna Guarantee Act 1988* and the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999*. This report outlines any implications under relevant national, state and local legislation and policy frameworks.

The targeted Southern Brown Bandicoot survey was undertaken using best-practice methods – as set out in the Commonwealth Department of the Environment and Energy’s (DoEE) *EPBC Act draft referral guidelines for the endangered southern brown bandicoot (eastern) Isoodon obesulus obesulus* (DSEWPaC 2011) and the DELWP Biodiversity Precinct Planning Kit (DSE 2010) – to determine whether the species or its habitat was present in areas potentially impacted upon by the proposed development. Techniques used to detect the species included Infrared Cameras, Hair Tubes and Active Searching. A total of 28 hair tubes and five infrared cameras were set up over two survey periods from 3<sup>rd</sup> to 19<sup>th</sup> July 2018 and 20<sup>th</sup> August to 11<sup>th</sup> September 2018.

No Southern Brown Bandicoots were recorded during the current survey. As such, the species is now considered unlikely to occur in the study area and there are no implications regarding this species and the proposed development under Commonwealth, State or local legislation or policy.

Swamp Antechinus *Antechinus minimus maritimus* was unexpectedly detected in the study area through hair analysis at one of the hair tube stations during the first round of the survey. This species is known to inhabit dense wet heath, tussock grassland, sedgeland, heathy woodland and coastal heath and scrub, none of which occur in the study area or surrounds. So, it was initially deemed as unlikely to occur on the basis of no suitable habitat and no recent VBA records in the search region (see BL&A 2018).

It is possible that Swamp Antechinus occurs in all large contiguous habitat zones in the study area, particularly habitat zones associated with the drainage system and Habitat Zone E. As all habitat zones associated with the drainage system are proposed to be removed, the development will have an impact on this species.

Implications under the EPBC act for impacts on Swamp Antechinus as a result of the proposed development are currently being assessed in consultation with the proponent. There are no implications regarding this species and the proposed development under State or local legislation or policy.

## 2. INTRODUCTION

On behalf of Wallis Watson Pty Ltd, Beveridge Williams engaged Brett Lane & Associates Pty. Ltd. (BL&A) to conduct a targeted survey for the threatened Southern Brown Bandicoot *Isoodon obesulus obesulus* within a 103-hectare area of land in Nyora. The specific area investigated, referred to herein as the 'study area', comprised three large private lots defined in the planning scheme as 951 Yannathan Road, 30 Glovers Road and 379 Lang Lang-Poowong Road, Nyora, as well as the adjoining reserve of Glovers Road along the northern and eastern boundaries of the study area (Figure 1). Residential subdivision is proposed for the study area.

Access was not granted to the two smaller lots in the western section of the study area (951 Yannathan Road and 30 Glovers Road). Therefore, information presented on these two lots was limited to a combination of desktop assessment and observation from the neighbouring property and adjacent public roads.

An initial flora and fauna assessment of the site (BL&A 2018) determined that suitable habitat exists within the property for the Southern Brown Bandicoot (referred to herein as 'SBB'), a native mammal species listed as threatened under the State *Flora and Fauna Guarantee Act 1988* (FFG Act) and as endangered under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act).

As such, this investigation was commissioned to provide information on any potential impacts on the SBB. This report outlines any implications under relevant Commonwealth, State and local legislation and policy frameworks.

Specifically, the scope of the investigation included:

- A review of existing information on SBB in the area, including:
  - Victorian Biodiversity Atlas administered by the Department of Environment and Primary Industries (DELWP); and
  - The Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) Protected Matters Search Tool.
- A targeted survey for SBB, which involved the use of infrared cameras and hair tubes to survey at night and active searching for scats and diggings during the day. The survey for SBB occurred over two separate survey periods of three and four weeks respectively and involved:
  - Week 1 - Camera and hair tube set up, active searching and scat collection;
  - Week 2 - Re-baiting and repositioning of cameras, active searching and scat collection; and
  - Week 3/4 – Hair tube and camera decommission.

Note: Methods employed for the SBB targeted survey were in accordance with the Commonwealth Department of the Environment and Energy's (DoEE) *EPBC Act draft referral guidelines for the endangered southern brown bandicoot (eastern) Isoodon obesulus obesulus* (DSEWPac 2011) and the DELWP Biodiversity Precinct Planning Kit (DSE 2010).

This report presents the findings of the assessment, identifies issues and provides recommendations and mitigation options. It is divided into the sections described below:

**Section 3** presents the sources of information and biology of SBB.

**Section 4** presents the methods of the surveys.

**Section 5** presents the results of the assessments.

**Section 6** discusses the regulatory implications of the assessment results


This investigation was undertaken by a team from BL&A, comprising Beau Meney (Zoologist), Jackson Clerke (Zoologist), Curtis Doughty (Senior Zoologist) and Brett Macdonald (Senior Ecologist & Project Manager). Hair analysis was undertaken by Robyn Carter Hair Identification (Mammalian hair analysis expert).

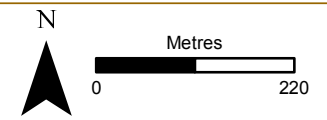
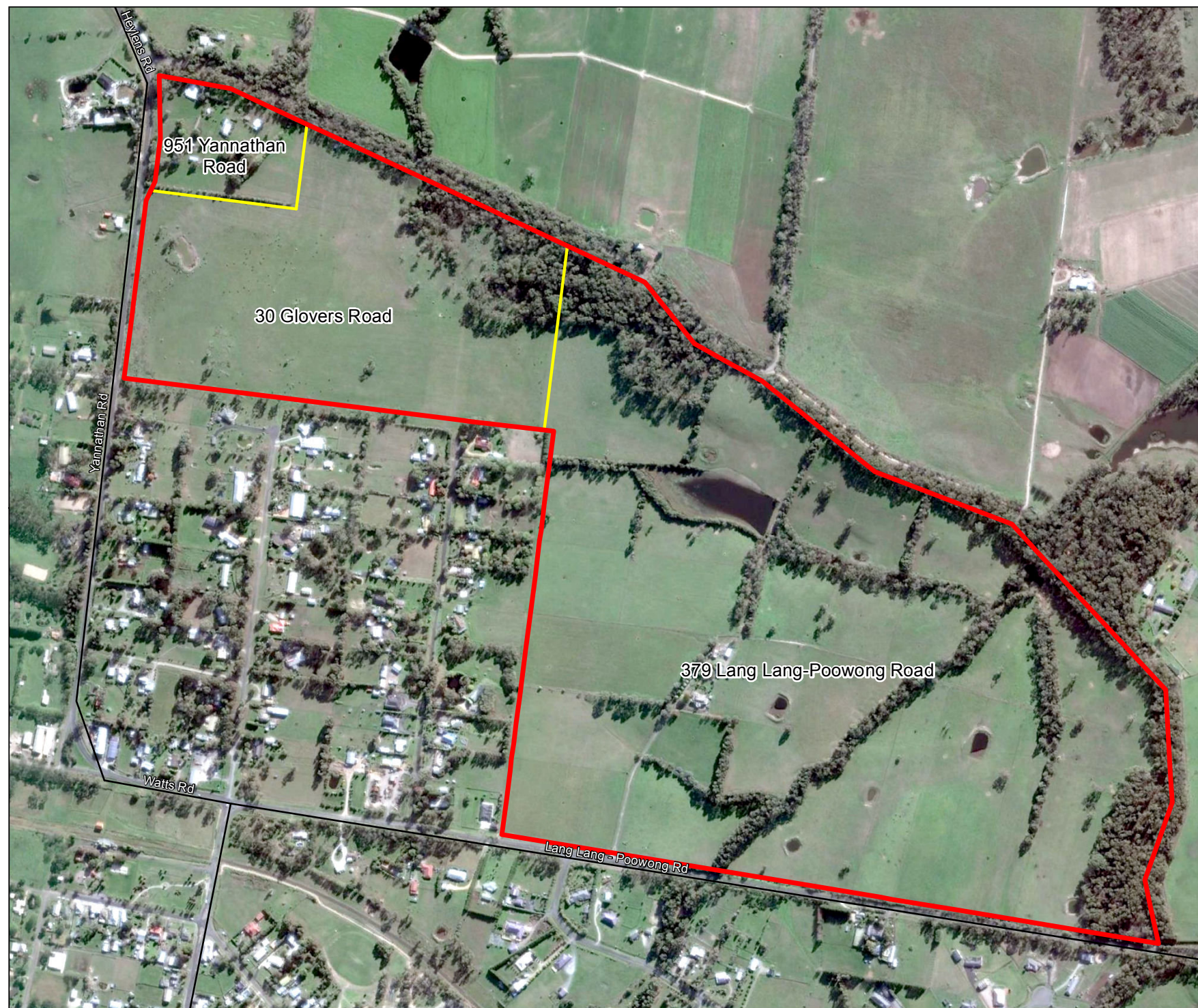


**Figure 1: Study area and properties**

**Project:** NYORA-POOWONG RD, NYORA  
**Client:** Beveridge Williams  
**Date:** 18/01/2018

**Legend**

 Study area



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### 3. SOUTHERN BROWN BANDICOOT

#### 3.1. Conservation status

The Southern Brown Bandicoot (*Isoodon obesulus obesulus*) is a listed threatened species under the state *Flora and Fauna Guarantee Act 1988* (FFG Act) and the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act). It is listed as Threatened in Victoria and Endangered at the national level.

#### 3.2. Description

Southern Brown Bandicoot (SBB) is a medium sized, ground dwelling marsupial with brindled grey-brown, buff and black fur, long, pointed snout, small eyes, short rounded ears, a compact body, large rump and sparsely furred short, thin tail approximately half of the body length (Menkhorst 1995). Southern Brown Bandicoot is largely solitary and usually forages alone at night.

#### 3.3. Habitat

SBB require a dense ground layer (which may include introduced species such as Blackberry). In Victoria generally, the species requires heath, shrubland and heathy forest and woodland; the common elements are dense ground cover to protect it from predators such as foxes and cats. Often they occur in areas of well-drained soils (Menkhorst 1995).

#### 3.4. Distribution

SBB is primarily found in New South Wales, Victoria and South Australia. Victorian populations are presently found in five major groups or loose sub-populations centred around Portland – Mt Gambier, Grampians National Park, Otway Ranges, South-central (Port Phillip – Western Port – Wilson’s Promontory) and East Gippsland. With the exception of the Grampians region, the species is normally not found further than 100 kilometres inland from the coast. Figure 22 shows the distribution of SBB within Victoria.

The home-range area of SBB varies with habitat type, quality and availability of food resources. Home ranges of SBB have been recorded between 0.5 hectares up to 6 hectares (Brown & Main 2010).



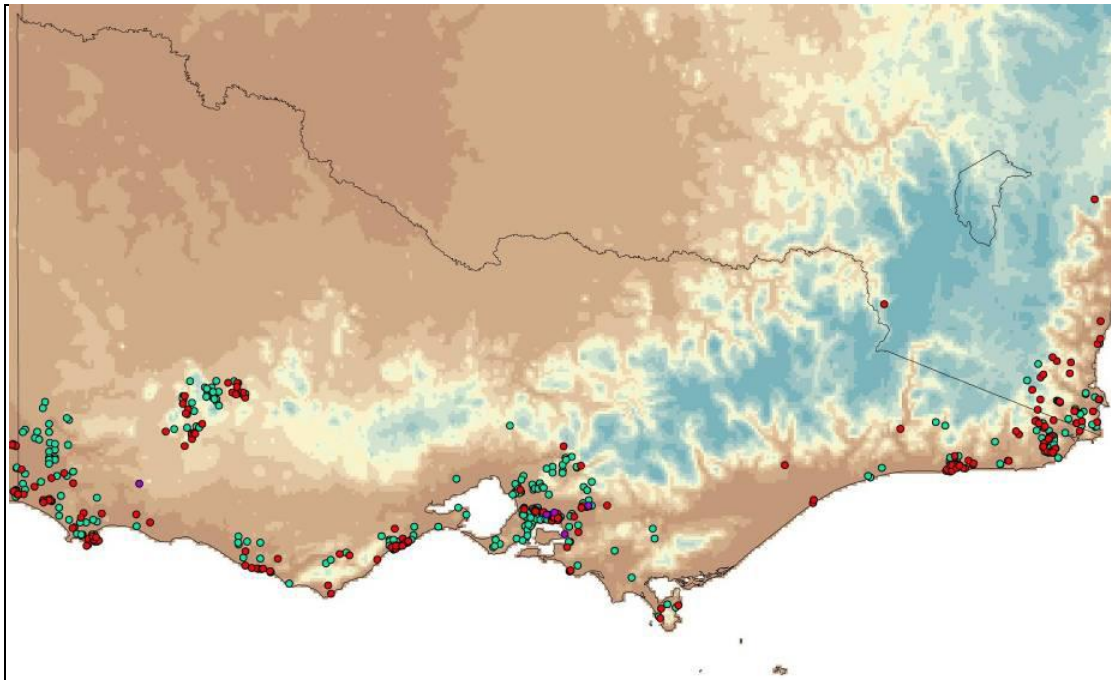


Figure 2: Southern Brown Bandicoot distribution map (source: Brown and Main 2010).

Green dots represent a record before 1990; red dots represent records from 1990 to 2010.

### 3.5. Threats

The EPBC Act Referral guidelines for the SBB (DSEWPaC 2011), the Action Plan for the SBB (Maxwell *et al.* 1996) and the strategic management plan for SBB at Koo-wee-rup Swamp in west Gippsland (Ecology Australia 2009) identify the primary threats to the species as follows.

- Predation by introduced carnivores
- Habitat loss, fragmentation and isolation
- Inappropriate fire regimes
- Introduction of weeds and disease
- Grazing pressures
- Changes in hydrological regimes
- Broad-scale removal of important exotic habitat, and
- Road mortality.

The presence of the species relies heavily on habitat quality and opportunities for dispersal between sites. Habitat fragmentation has the effect of not only reducing the area of available habitat, but isolating remaining habitat patches from each other. In recent decades, SBB has disappeared from areas of intensive agriculture and urban development.

## 4. METHODS

### 4.1. Existing information

Existing SBB records were obtained from an area termed the ‘search region’, defined here as an area with a radius of ten kilometres from the approximate centre point of the study area (coordinates: latitude 38° 19’ 45” S and longitude 144° 40’ 55” E).

A list of the SBB records in the search region was obtained from the Victorian Biodiversity Atlas (VBA), a database administered by DELWP (2018).

The online *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) Protected Matters Search Tool (DoEE 2018) was consulted to determine whether nationally listed species or communities potentially occurred in the search region based on habitat modelling.

The following existing report on the study area was reviewed prior to the current site inspection:

- Flora and Fauna Assessment, 951 Yannathan Rd, 30 Glovers Rd & 379 Lang Lang-Poowong Rd, Nyora (BL&A 2018).

### 4.2. Habitat assessment

#### 4.2.1. 379 Lang Lang-Poowong Road, Nyora

Within this property and the adjoining reserve of Glovers Road, the vegetation type, structure and habitat quality were examined on the 3<sup>rd</sup> July 2018 at the commencement of the survey. The habitat potentially available to SBB on the site was restricted to two areas of forest, approximately 3 and 2.5 hectares each on the property and a narrow creek line and riparian area running through the middle. Roadside vegetation was also suitable along Glovers Rd. which bordered the property to the north and east.

In total, an area of approximately 10.3 hectares was surveyed. Habitat components considered important in influencing the distribution of SBB were used to place hair tubes and cameras.

#### 4.2.2. 951 Yannathan Road and 30 Glovers Road

As direct access was not provided to assess these properties, they were examined instead from the boundaries of the adjoining property and road reserves to ascertain whether or not suitable SBB habitat was present within.

### 4.3. Survey methodology

The targeted survey was conducted over two periods; from 3<sup>rd</sup> to 19<sup>th</sup> July 2018 and 20<sup>th</sup> August to 11<sup>th</sup> September 2018 using methods consistent with the DELWP Biodiversity Precinct Planning Kit (DSE 2010) and EPBC Act Draft Referral Guidelines for SBB (DSEWPaC 2011).

Potential SBB habitat was previously identified across the areas of Lowland Forest that form the eastern and northern boundary of the study area during a Flora and Fauna Assessment (BL&A 2018). The survey targeted the most likely SBB habitat within the study area.

The following three techniques, described below, were used during the targeted survey over both periods:

- Infrared camera;
- Hair tube traps; and
- Active searching

All field work undertaken was conducted in accordance with the Wildlife Act 1975 (Permit number: 10008762).

#### **4.3.1. Infrared Camera**

Five infrared cameras were used to detect SBB in the study area. DSEWPaC (2011) recommends one camera per two hectares for areas greater than 10 hectares. Three types of infrared camera used for this targeted survey, namely three CAMERA-DTC-530, one LTL-5210 and one Bushnell Trophy Camera. All cameras used were triggered by animal movements using a Passive Infrared motion sensor.

Cameras were set to detect motion between 18:00 and 7:00 hours. The cameras were placed approximately 30 to 50 centimetres from the ground in areas not obscured by vegetation. A baiting station was situated approximately 50 centimetres to one metre from the camera to attract animals. Baits were renewed after seven days in the field. Upon collections of the cameras pictures were viewed to identify which species had frequented the baiting station. The locations of the five cameras are shown in Figure 33 for the first survey period and Figure 4 for the second period.

#### **4.3.2. Hair Tubes**

Twenty-eight hair tubes were placed in suitable habitat, along roadside vegetation and along the creek line within the study area (Figure 3). This survey was repeated, which totalled 56 hair tube samples. DSEWPaC (2011) recommends 10 hair tubes per two hectares in areas greater than 10 hectares. This can be done over two periods, if required. The area surveyed was approximately 10.3 hectares, therefore requiring 50 hair tubes.

Bait used for the infrared camera and hair tube methods, comprised a mixture of oats, peanut butter and golden syrup – a combination which has been found to successfully attract bandicoots in previous surveys. The bait was placed in a snap spoon tea infuser secured to the ground with a tent peg in each hair tube, which allowed the animals to be attracted to the bait without removing it from the site.

The hair tubes were left out for 17 consecutive nights during the first survey period and 23 over the second period. Hair samples were sent to an expert mammalian hair analyst – Robyn Carter of Robyn Carter Hair Identification. The locations of the hair tubes are shown in Figure 3 for the first survey period and Figure 4 for the second period.

#### **4.3.3. Active Searching**

Active searching was undertaken whilst setting-up the survey equipment, changing the camera positions and renewing baits, on four occasions: 3<sup>rd</sup> and 10<sup>th</sup> July 2018, and 20<sup>th</sup> and 28<sup>th</sup> August 2018. The hair tube transects and the vicinity of camera locations were walked slowly and searched for diggings, scratchings and scats. Any signs encountered were attributed to species, where possible.

All scats collected were sent to Robyn Carter to be analysed for species identification of any hairs contained within them. This may include fox scats for example, a species which is known to predate upon SBB.

#### **4.4. Limitations of field assessment**

Where feasible, all efforts are made to schedule Southern Brown Bandicoot field surveys in optimal weather conditions and times of year. DSEWPaC (2011) recommends surveys should ideally take place during Autumn to avoid reptile and amphibian by-catch and to target dispersing juveniles. However, due to timing constraints this was not possible and the survey was conducted during Winter, which still avoids by-catch of most reptiles and frogs. SBB are active year-round, and despite missing the juvenile dispersal window, survey efforts outlined in the methods would be sufficient to detect SBB, if they were present at the site.

Conducting an intensive targeted Southern Brown Bandicoot investigation with multiple survey techniques increased the chance of detecting the presence of this threatened species. The overall survey effort of 28 hair tubes over 40 nights (1,120 trap-nights) and 60 camera nights (5 cameras x 40 nights = 200 camera nights) was considered sufficient to detect a population of SBB in the study area, should it exist there.

It should be noted that any species identified through scat collection indicate presence within the region only and not strictly within the study area as animals leaving such scats may range over a large area.

Wherever appropriate, a precautionary approach has been adopted in the discussion of implications. That is, where insufficient evidence is available on the occurrence or likelihood of occurrence of a species, it is assumed that it could be in an area of habitat, if suitable, and the implications under legislation and policy are considered accordingly.



### Figure 3: Southern Brown Bandicoot Survey 1

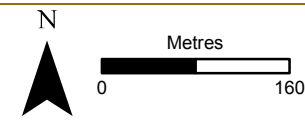
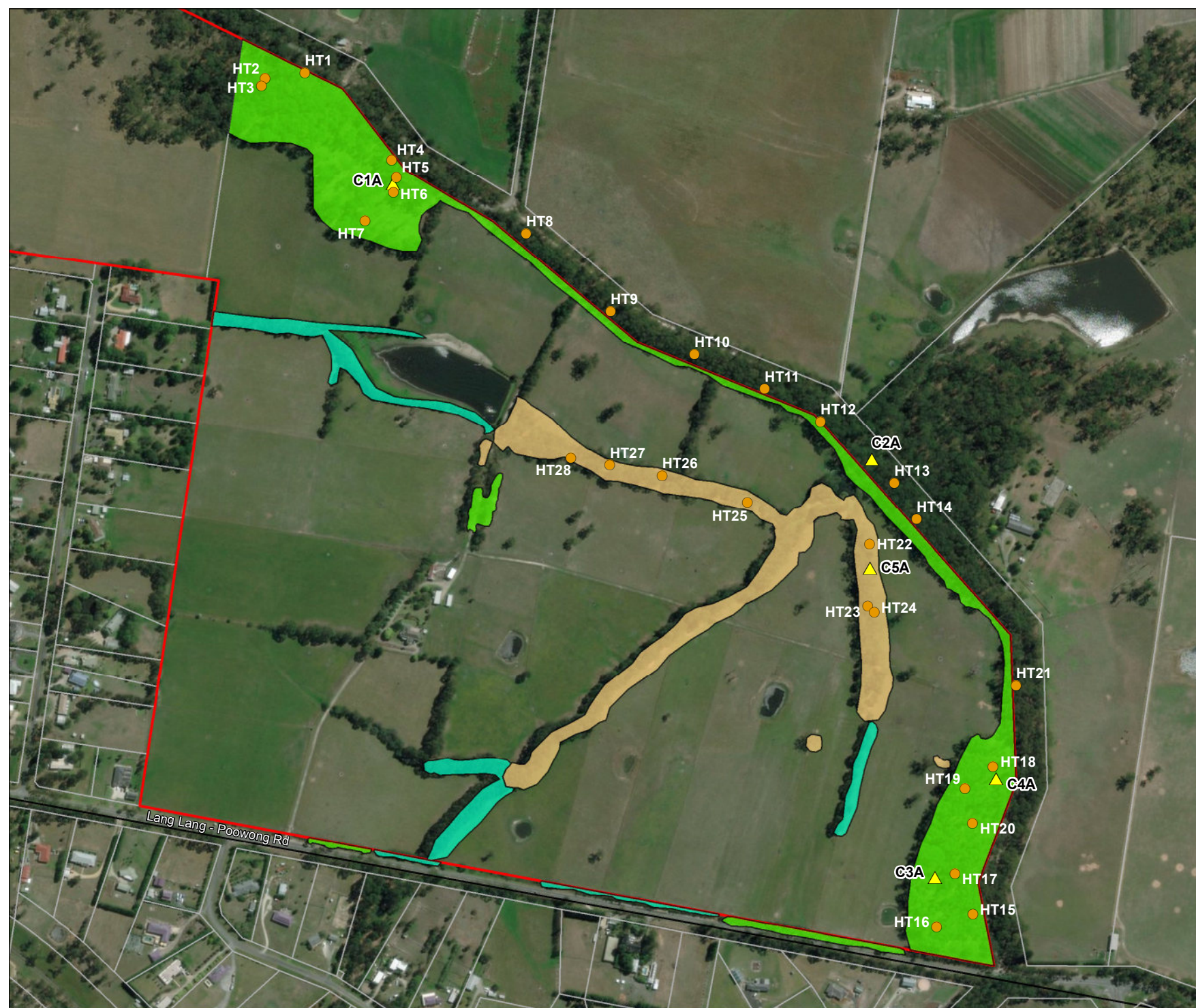
**Project:** NYORA-POOWONG RD, NYORA  
**Client:** Beveridge Williams  
**Date:** 21/09/2018

#### Legend

- Study area
- Camera
- Hair tubes

#### Native vegetation

- Lowland Forest (EVC 16)
- Swamp Scrub (EVC 53)
- Swampy Riparian Woodland (EVC 83)



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# Figure 4: Southern Brown Bandicoot Survey 2

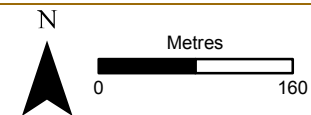
**Project:** NYORA-POOWONG RD, NYORA  
**Client:** Beveridge Williams  
**Date:** 21/09/2018

## Legend

- Study area
- Hair tubes
- ▲ Camera

## Native vegetation

- Lowland Forest (EVC 16)
- Swamp Scrub (EVC 53)
- Swampy Riparian Woodland (EVC 83)



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## 5. RESULTS AND DISCUSSION

### 5.1. Historical records

The review of existing information indicated that SBB has previously been recorded in the region. A total of 32 records exist for the 10-kilometre radius search region (Appendix 1) as recently as 2013. These records primarily occurred in Adams Creek Nature Conservation reserve, approximately five kilometres to the west of the site.

### 5.2. Habitat assessment

#### 5.2.1. 379 Lang Lang-Poowong Road, Nyora

The vast majority of habitat within this property and the adjoining reserve of Glovers Road comprised Lowland Forest along the northern and eastern boundaries of the property and along the Glovers Road reserve, and Swampy Riparian Woodland and Swamp Scrub along the drainage system within the property. The rest of the site comprised exotic grassland for grazing purposes (pasture).

The forest habitat provided **moderate** quality SBB habitat, occurring on north and east borders of the site. The canopy was dominated by Narrow-leaf Peppermint, although also included Messmate Stringybark and Rough-barked Manna-gum. Mid layer comprised a sparse to moderate density of trees and shrubs. Ground layer was dense and comprised a high cover of Austral Bracken and Thatch Saw-Sedge. The understorey formed dense thickets in some areas, providing potential shelter for SBB, but was inconsistent throughout the area. Habitat components such as logs and leaf litter were also present which would provide shelter.

Swampy Riparian Woodland and Swamp Scrub areas formed **moderate to low** quality habitat along drainage lines. These consisted of a linear area of woodland that occurred along a natural drainage line, distinguished by the presence of remnant Swamp Gums in the canopy, many of which were large old trees and another linear area comprised of Swamp Paperbark. The understorey component of both comprised a mixture of remnant ground flora (sedges and rushes) and introduced Blackberry in some areas. While habitat components suitable for SBB existed, the area occupied was very narrow and lacking understorey in many places and would be unlikely to be utilised often by any resident SBB.

The Exotic grassland habitat consisted predominantly of pasture paddocks and occupied the vast majority of the property. This provided **low** quality SBB habitat and was dominated by exotic grass species such as Couch and Kikuyu. This vegetation was heavily grazed by cattle and logs and leaf litter were very scarce, providing little or no habitat for SBB. Limited foraging opportunities may be provided for SBB close to the edges of the dense patches of native vegetation, however, SBB are known to avoid open ground.

In terms of habitat connectivity at the site scale, individual patches of Lowland Forest, Swamp Scrub and Swampy Riparian Woodland within the study area were well connected to each other to form large contiguous patches. Habitat connectivity at the broader landscape scale exists, but is limited to patches within agricultural landscapes connected primarily by roadside vegetation. Connectivity to the larger contiguous vegetated areas such as; Adams Creek Nature Conservation Reserve is limited to narrow strips of road side vegetation.



### 5.2.2. 951 Yannathan Road and 30 Glovers Road

No habitat suitable for SBB exists within the 951 Yannathan Road property, although the adjoining reserve of Glovers Road supports the same forest vegetation as that described above for the 379 Lang Lang-Poowong Road property, i.e. **moderate** quality SBB habitat.

While the 30 Glovers Road property does support a large patch of forest in the north east corner, it is not fenced off from cattle and the understorey vegetation has been reduced to primarily introduced grass. This vegetation was considered **low** quality for SBB. The adjoining reserve of Glovers Road supports the same forest vegetation as that described above for the 379 Lang Lang-Poowong Road property, i.e. **moderate** quality SBB habitat.

### 5.3. Survey results

Ten native species were recorded in the study area during targeted survey, including eight mammal and two bird species. A further three introduced species were identified, including two mammal and one bird species:

#### *Native species:*

- Swamp Wallaby (*Wallabia bicolor*)
- Brushtail Possum (*Trichosurus vulpecular*)
- Common Ringtail Possum (*Pseudocheirus peregrines*) (Probable)
- Southern Bush Rat (*Rattus fuscipes*)
- Brush Tailed Possum (*Trichosurus* sp.)
- Common Wombat (*Vombatus ursinus*)
- Eastern Grey Kangaroo (*Macropus giganteus*)
- Raven spp. (*Corvus* spp.)
- Magpie Lark (*Grallina cyanoleuca*)
- Swamp Antechinus (*Antechinus minimus maritimus*) - EPBC Act Vulnerable, FFG Act Listed

#### *Introduced species:*

- Red Fox (*Vulpes vulpes*)
- European Rabbit (*Oryctolagus cuniculus*)
- Common Blackbird (*Turdus merula*)

No Southern Brown Bandicoot was recorded during the targeted survey.

Swamp Antechinus was identified via hair tube and is listed under EPBC Act as Vulnerable and FFG Act Listed. Table 1 presents the results for all vertebrate fauna that were recorded during the targeted hair tube survey.



Table 1: Results of the hair tube survey

Sample	Definite	Probable	Comments
<b>Survey 1: 3rd - 19th July 2018 (Figure 3)</b>			
H1	<i>Trichosurus sp.</i> (Brush-tailed Possum)		
H2	<i>Trichosurus sp.</i> (Brush-tailed Possum)		
H3			No hair
H4	<i>Rattus sp.</i>	<i>Rattus fuscipes</i> (Southern Bush-rat)	
H5	<i>Rattus fuscipes</i> (Southern Bush-rat)		
H6		Possible whisker	undiagnostic
H7			No hair
H8	<i>Trichosurus sp.</i> (Brush-tail Possum)		
H9			No hair
H10		<i>Antechinus sp.</i>	One hair
H11	<i>Rattus fuscipes</i> (Southern Bush-rat)		
H12	<i>Rattus fuscipes</i> (Southern Bush-rat)		
H13	<i>Rattus fuscipes</i> (Southern Bush-rat)		
H14	<i>Rattus fuscipes</i> (Southern Bush-rat)		
H15			No hair
H16	Human		one hair
		<i>Trichosurus sp.</i> (Brush-tailed Possum)	one hair
	Rodent		One very short hair, prob facial
H17		Possum sp.	One minor hair
H18	<i>Rattus sp.</i>	<i>Rattus fuscipes</i> (Southern Bush-rat)	
H19	<i>Rattus fuscipes</i> (Southern Bush-rat)		
H20	Human		
H21	<i>Rattus sp.</i>	<i>Rattus fuscipes</i> (Southern Bush-rat)	

Sample	Definite	Probable	Comments
H22	<i>Rattus</i> sp.	<i>Rattus fuscipes</i> (Southern Bush-rat)	
H23	<i>Trichosurus</i> sp. (Brush-tailed Possum)		
H24	<b><i>Antechinus minimus</i> (Swamp Antechinus)</b>		
	<i>Rattus fuscipes</i> (Southern Bush-rat)		
H25	Whisker		undiagnostic
H26			No hair
H27	<i>Rattus</i> sp.	<i>Rattus fuscipes</i> (Southern Bush-rat)	
H28	<i>Rattus</i> sp.		
#1 SCAT	<i>Wallabia bicolor</i> (Swamp Wallaby)		
	Insect remains		
#2 SCAT	Leporidae (Rabbit/Hare)		
	Insect remains		Lots
#3 SCAT		<i>Pseudocheirus peregrinus</i> (Common Ringtail Possum)	Lots
<b>Survey 2: 20th August - 11th September 2018 (Figure 4)</b>			
H1	<i>Homo sapiens</i> (human)		
H2	<i>Homo sapiens</i> (human)		
H3			No hair
H4	Rodent	<i>Rattus</i> sp.	
H5	Small hair		undiagnostic
H6	Rodent	<i>Rattus</i> sp.	
H7	<i>Homo sapiens</i> (human)		
H8			No hair
H9	<i>Homo sapiens</i> (human)		
H10	<i>Homo sapiens</i> (human)		
H11			No hair

Sample	Definite	Probable	Comments
H12	<i>Homo sapiens</i> (human)		
	<i>Rattus</i> sp.		
H13	Possum		
	<i>Rattus</i> sp.		
H14	<i>Rattus fuscipes</i> (Southern Bush-rat)		
H15			No hair
H16	<i>Rattus</i> sp.		
H17	<i>Trichosurus</i> sp. (Brush-tail Possum)		
	<i>Rattus</i> sp.		
H18	<i>Homo sapiens</i> (human)		
H19	Small hair		
H20			Undiagnostic
H21			No hair
H22			No hair
H23			No hair
H24	<i>Rattus</i> sp.		
H25	<i>Homo sapiens</i> (human)	<i>Wallabia bicolor</i> (Swamp Wallaby) or <i>Macropus giganteus</i> (Eastern Grey Kangaroo)	
	Macropod		
H26	<i>Homo sapiens</i> (human)		
	Macropod	<i>Wallabia bicolor</i> (Swamp Wallaby) or <i>Macropus giganteus</i> (Eastern Grey Kangaroo)	
H27	Rodent		
H28	<i>Rattus</i> sp.		

Table 2 shows a general agreement between the hair tubes and camera results in that the common mammals of the study area were the Southern Bush Rat, Brush-tailed Possum and Swamp Wallaby. The cameras also indicated high levels of wombat activity within the study area which were not detected in hair tubes, likely due to the animal's large size not allowing them to get inside hair tubes. Some smaller mammals detected via camera were difficult to identify to species level from photos collected and could potentially have been Southern Bush Rat, Antechinus or Black Rat. Given the high abundance of Southern Bush Rat hair samples, it was considered likely that it was this species.

**Table 2: Results of the camera trap survey**

Survey 1: 3rd - 19th July 2018		Survey 2: 20th August to 11th September 2018	
Camera	Results	Camera	Results
C1A	Red Fox* Swamp Wallaby Wombat Brush-tailed Possum Raven sp.	C1B	Brush-tailed Possum Australian Magpie Wombat Swamp Wallaby Red Fox*
C2A	Red Fox* Swamp Wallaby Wombat Southern Bush Rat (potential) Eastern Grey Kangaroo	C2B	Black Bird* Magpie Lark Eastern Grey Kangaroo
C3A	European Rabbit* Swamp Wallaby Eastern Grey Kangaroo Red Fox*	C3B	Brush-tailed Possum Swamp Wallaby Wombat Red Fox*
C4A	Red Fox* Swamp Wallaby Southern Bush Rat (likely) Eastern Grey Kangaroo Wombat	C4B	Southern Bush Rat Red Fox* European Rabbit* Brush Tailed Possum
C5A	Swamp Wallaby Brush-tailed Possum Swamp Wallaby Southern Bush Rat (likely) Antechinus spp. (potential)	C5B	Wombat European Rabbit* Southern Bush Rat Eastern Grey Kangaroo Red Fox Swamp Wallaby

\* = introduced species.

Table 3 presents species identified from scats collected within the study area on 3<sup>rd</sup> July 2018. One additional species, Common Ringtail Possum, was identified from scat hair analysis. This species was not identified through camera or hair tube traps. The scat collection also shows the proliferation of European Rabbits in the area which appear to be a common prey for local predators. These were not picked up often in the hair and camera surveys as the species is unlikely to be attracted to the baits used.



**Table 3 Results from scat collection hair analysis**

Scats collected	Species Identified
3/7/2018	Common Ringtail Possum
	Swamp Wallaby
	*European Rabbit

\* = introduced species.

## 6. IMPLICATIONS OF FINDINGS

In this section, the implications of the targeted survey findings are discussed in relation to the Commonwealth EPBC Act, for potential impacts on Southern Brown Bandicoot and Swamp Antechinus as a result of developing the study area. Implications under the State FFG Act and the State *Guidelines for the removal, destruction or lopping of native vegetation* (the ‘Guidelines’) DELWP 2017a) are detailed in the flora and fauna assessment report for the site (BL&A 2018) and summarised in the following sections.

### 6.1. Southern Brown Bandicoot

No evidence of Southern Brown Bandicoot utilising the study area was detected during the targeted survey. The targeted SBB survey was undertaken using best-practice methods (DSE 2010, DSEWPaC 2011) to determine whether the species or its habitat were present in areas potentially impacted upon by the proposed subdivision development of the study area.

There is a possibility that Southern Brown Bandicoot is resident in the study area, but wasn’t detected during the survey, given the presence of suitable, moderate quality habitat. However, given the targeted survey effort and negative result of the survey, this is considered unlikely.

#### 6.1.1. EPBC Act

There won’t be any implications under the EPBC Act for the proposed development with regard to Southern Brown Bandicoot, as it is now considered unlikely to occur in the study area.

#### 6.1.2. FFG Act

There won’t be any implications under the FFG Act for the proposed development with regard to Southern Brown Bandicoot, as it is now considered unlikely to occur in the study area.

#### 6.1.3. Guidelines

A species offset for Southern Brown Bandicoot under the Guidelines is not required for the proposed development.

### 6.2. Swamp Antechinus

Hair samples analysed by Robyn Carter confirmed, as definite, the hair of the species Swamp Antechinus *Antechinus minimus maritimus* from Hair Tube Station 24 (Figure 3).

It is also possible that Camera Station C5A photographed a Swamp Antechinus, as we couldn’t determine the identity of one of the small mammals photographed, due to poor photo quality. It is however likely to be a rodent, based on all other camera results.

Given that Swamp Antechinus was only identified at one hair tube station over two survey periods and could not be confirmed from the Camera Station C5A photograph, there is a possibility that identification of the hair sample/s was an error. From discussion with Robyn Carter however, she is highly confident in determining the identification of the hair sample as Swamp Antechinus, and her technical justification for this was valid in our opinion. In accordance with the EPBC Act precautionary principle, Swamp Antechinus must be considered resident in the study area given the evidence presented for this above.

The one VBA record in the 10-kilometre search region is from 1998, approximately nine kilometres west of the study area.

The closest known population is in the Gurdies Nature Conservation Reserve, some 12 kilometres south-west of the study area.

Based on the survey results, it is considered possible that Swamp Antechinus occurs in all large contiguous habitat zones in the study area, particularly habitat zones associated with the drainage system and Habitat Zone E. As all habitat zones associated with the drainage system are proposed to be removed, the development will have an impact on this species. The implications of this under the relevant legislation and policy are discussed in the following sections.

#### **6.2.1. EPBC Act**

Implications under the EPBC act for impacts on Swamp Antechinus as a result of the proposed development are currently being assessed in consultation with the proponent.

#### **6.2.2. FFG Act**

There won't be any implications under the FFG Act for the proposed development with regard to Swamp Antechinus, as the proposed impacts on any potential habitat for the species are on freehold private land, where the FGG Act does not apply.

#### **6.2.3. Guidelines**

A species offset for Swamp Antechinus under the Guidelines is not required for the proposed development.

## 7. REFERENCES

- Brett Lane and Associates (BL&A) 2018, *Flora and Fauna Assessment, 951 Yannathan Rd, 30 Glovers Rd & 379 Lang Lang- Poowong Rd, Nyora, Report 17032 (2.0)*, prepared for Wallis Watson (Nyora) Pty. Ltd. C/ Beveridge Williams
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### Appendix 1: Historical Southern Brown Bandicoots records from the search region

