

**Glenda Datson**

Report for  
Environmental Impact Statement:  
Expansion of Lubke Quarry  
'Cromer', Hume Highway, Holbrook  
Anabat survey and analysis

January 2007



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## 1. Introduction

GHD was engaged by Glenda Datson, Environmental and Horticultural Consultant to undertake Anabat analysis for a proposed quarry expansion site of approximately 12.5 hectares, 5 km north of Holbrook.

The following tasks were undertaken:

- ▶ Anabat analysis and summary of findings;
- ▶ Summary of the methods used and references cited; and
- ▶ Listing of bat species protected, threatened or listed under New South Wales or Commonwealth legislation, which are known from or likely to occur within the region of the subject site.

The information provided in this report is required for inclusion into an Assessment of Significance of the impacts upon flora and fauna of the proposed development. The Assessment of Significance is to be undertaken by Glenda Datson.



## 2. Methods

The echolocation calls of insectivorous bats were recorded at two locations within the subject site using ultrasonic detectors (Anabat II Bat Detectors) coupled with Compact Flash Zero Crossing Analysis Interface Modules (CF ZCAIMS; Titley Electronics, Ballina NSW) and stored on compact flash (CF) memory cards for later computer analysis. Prior to field placement each detector was calibrated and set to operate at the same sensitivity level (7, the maximum is 10). Detectors were orientated at a 45 ° angle on the ground.

Calls collected during the field survey were identified using zero-crossing analysis and Analook software by visually comparing call traits with reference calls. Reference calls were sourced from previous surveys conducted in the region by C. Grabham. No reference calls were collected during the survey. The *Bat calls of NSW: Region based guide to the echolocation calls of microchiropteran bats* (2004) was used as a guide to call analysis. Due to the lack of local reference calls, high level of intra-specific variability and inter-specific overlap in call characteristics, a conservative approach was taken when analysing calls.

A call was defined as a sequence of three or more consecutive pulses of similar frequency. Pulses separated from another sequence by a period of five seconds were considered to be separate calls. Scattered sequences, where intermittent pulses were not separated by more than five seconds, were recognised as a single pass. Where constant activity was recorded, a single pass was defined as 15 seconds (i.e. one full display screen comprising as Anabat sequence file). Although this method underestimates the number of bat passes when there is continuous activity, the standard unit of time remains consistent (Law *et al.* 1998; Law *et al.* 1999). Due to variability in the quality of calls and the difficulty in distinguishing some species each call was assigned a confidence rating (see Mills *et al.* 1996 & Duffy *et al.* 2000) as summarised in Table 2.

Nomenclature for bats will follow that of Churchill (1998) with the exception of *Tadarida australis* which has been used instead of *Nyctinomus australis* after Reardon (1999).



### 3. Results

Approximately 24.5 hours of survey was undertaken using two Anabat detectors for two nights within the subject site.

Analysis revealed the presence of eight species within the subject site. The threatened *Miniopterus schreibersii oceansis* was tentatively identified as a result of Anabat analysis, however the quality of the call and overlap with *Vespadelus* species prevented a positive identification. Given that this species has been recorded previously within the locality (Herring 2002) it is considered likely that this species would occur within the subject site.

**Table 1 Anabat analysis results.**

✓ = species group was recorded for that site. - = not recorded. Total number of species recorded for each site is based on probable and definite identification only.

Site and date	Card 1 – Area 2 9-10/12/06	Card 1 – Area 2 10-11/12/06	Card 2- Area 1 9-10/12/06
Species or group	approx 8 hrs, start 20:30 end 04:40	approx 8.5 hrs, start 20:30 end 05:00	approx 8 hrs, start 21:15 end 05:16
<i>T. australis</i>	D	D	D
<i>S. flaviventris</i> (TS)	-	-	-
<i>M. planiceps</i> (lpf)	D	D	D
<i>C. gouldii</i>	D	-	D
<i>M. planiceps</i> (spf)	-	-	-
<i>C. gouldii</i> / <i>M. planiceps</i> (lpf)	✓	✓	✓
<i>C. gouldii</i> / <i>M. planiceps</i> (spf)	-	-	-
<i>S. balstoni</i>	PR	PO	PO
<i>S. balstoni</i> / <i>C. gouldii</i>	✓	✓	✓
<i>M. schreibersii</i>	PO	-	-
<i>V. vulturnus</i>	D	D	-
<i>V. darlingtoni</i>	PR	PO	-
<i>V. regulus</i>	-	PR	-
<i>Vespadelus</i> sp.	✓	✓	✓
<i>M. schreibersii</i> / <i>Vespadelus</i> sp.	✓	-	-
<i>C. morio</i>	D	PR	D



Site and date	Card 1 – Area 2 9-10/12/06	Card 1 – Area 2 10-11/12/06	Card 2- Area 1 9-10/12/06
Species or group	approx 8 hrs, start 20:30 end 04:40	approx 8.5 hrs, start 20:30 end 05:00	approx 8 hrs, start 21:15 end 05:16
<i>V.vulturnus/C.morio</i>	✓	-	-
<i>M. macropus</i>	-	-	-
<i>Scotorepens sp.</i>	-	-	-
<i>Nyctophilus sp.</i>	✓	✓	✓
Total no. species recorded each site	7	5	4

**Table 2 Confidence ratings applied to calls**

Identification	Description
D - Definite	Species identification not in doubt.
PR - Probable	Call most likely to represent a particular species. There exists a low probability of confusion with species of similar call types.
PO - Possible	Call characteristics are comparable with the species, but there exists a reasonable probability of confusion with one or more similar species or quality or length of call prohibits a confident identification.
Species Group	<p>Call made by one of two or more species. Call characteristics overlap making it to difficult to distinguish between species.</p> <p><i>C. gouldii/M. planiceps (lpf)</i></p> <p><i>C. gouldii/M. planiceps (spf)</i></p> <p><i>C. gouldii/S. balstoni.</i></p> <p><i>C. morio/V. vulturnus</i></p> <p><i>Nyctophilus sp.</i> The calls of <i>Nyctophilus geoffroyi</i> and <i>N. gouldi</i> cannot be distinguished during the analysis process and are therefore lumped together.</p>



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## Appendix A - Microchiropteran bat species from the region

The conservation status of microchiropteran bat species known to or likely to occur within the region after Duncan A. et al. 1999, NSW Threatened Species Conservation Act 1995 and the Commonwealth Environmental Protection and Biodiversity Conservation Act 1999. Species distribution follows that of Churchill 1998 and Strahan 1995. APAB: Action Plan for Australian Bats.

Scientific name	Common name	Conservation Status		
		APAB	National	NSW
<i>Chalinolobus gouldii</i>	Gould's Wattled Bat	LR (lc)	-	-
<i>Chalinolobus morio</i>	Chocolate Wattled Bat	LR (lc)	-	-
<i>Chalinolobus picatus</i>	Little Pied Bat	-	-	Vulnerable (Schedule 2)
<i>Miniopterus schreibersii oceanensis</i>		LR (lc)	Vulnerable	Vulnerable (Schedule 2)
<i>Myotis macropus</i>	Southern Myotis	LR (nr)		Vulnerable (Schedule 2)
<i>Scotorepens balstoni</i>	Inland Broad-nosed Bat	LR (lc)	-	-
<i>Vespadelus darlingtoni</i>	Large Forest Bat	LR (lc)	-	-
<i>Vespadelus vulturnus</i>	Little Forest Bat	LR (lc)	-	-
<i>Vespadelus regulus</i>	Southern Forest Bat	LR (lc)	-	-
<i>Nyctophilus geoffroyi</i>	Lesser Long-eared Bat	LR (lc)	-	-
<i>Nyctophilus gouldi</i>	Gould's Long-eared Bat	LR (lc)	-	-
<i>Nyctophilus timoriensis</i> (south-eastern form)	Greater Long-eared Bat	VU	Vulnerable	Vulnerable (Schedule 2)
<i>Mormopterus planiceps</i> (short penis form) species 2*	Eastern Free-tail Bat	LR (lc)	-	-
<i>Mormopterus planiceps</i> (long penis form) species 4*	Southern Free-tail Bat	LR (lc)	-	-
<i>Tadarida australis</i>	White-striped Mastiff Bat	LR (lc)	-	-
<i>Saccolaimus flaviventris</i>	Yellow-bellied Sheath-tail Bat	LR (lc)	-	Vulnerable (Shedule2)





**GHD Pty Ltd** ABN 39 008 488 373

Suite 5, 105 Hume Street

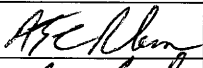
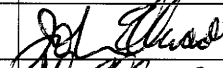


Wodonga VIC 3690 Australia

T: 61 2 6056 7501 F: 61 2 6056 7503 E: abxmail@ghd.com.au

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