Glenda Datson

Report for Environmental Impact Statement:

Expansion of Lubke Quarry

'Cromer', Hume Highway, Holbrook

Anabat survey and analysis

January 2007

Contents

Table Index

Appendices

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 continuos 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**	**Card 1 – Area 2**	**Card 2- Area 1**
	9-10/12/06	**10-11/12/06**	**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**
T. australis	D	D	D
S. flaviventris (TS)	-	-	-
M. planiceps (lpf)	D	D	D
C. gouldii	D	-	D
M. planiceps (spf)	-	-	-
C. gouldii/M. planiceps (lpf)	✓	✓	✓
C. gouldii/M.planiceps (spf)	-	-	-
S. balstoni	PR	PO	PO
S. balstoni/C.gouldii	✓	✓	✓
M. schreibersii	PO	-	-
V. vulturnus	D	D	-
V. darlingtoni	PR	PO	-
V. regulus	-	PR	-
Vespadelus sp.	✓	✓	✓
M. schreibersii/Vespadelus sp.	✓	-	-
C. morio	D	PR	D

Site and date	Card 1 – Area 2	Card 1 – Area 2	Card 2- Area 1
	9-10/12/06	10-11/12/06	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
V.vulturnus/C.morio	✓	-	-
M. macropus	-	-	-
Scotorepens sp.	-	-	-
Nyctophilus sp.	✓	✓	✓
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	Call made by one of two or more species. Call characteristics overlap making it to difficult to distinguish between species. *C. gouldii/M. planiceps (lpf)* *C. gouldii/M. planiceps (spf)* *C. gouldii/S. balstoni.* *C. morio/V. vulturnus* *Nyctophilus sp.* The calls of *Nyctophilus geoffroyi* and *N. gouldi* cannot be distinguished during the analysis process and are therefore lumped together.

4. References

Australian Museum. Bats in Australian (online) http://www.amonline.net.au/bats/

[Accessed January 2005].

Churchill, S. 1998. *Australian Bats*. New Holland Publishers: Sydney.

Duffy, A.M., Lumsden, L.F., Caddle, C.R., Chick, R.R. and Newell G.R. 2000. The efficacy of Anabat ultrasonic detectors and harp traps for surveying microchiropterans in southeastern Australia. *Acta Chiropterologica* 2: 127-144.

Duncan A, G.B Baker & N Montgomery. 1999. *The Action Plan for Australian Bats*, National Parks and Wildlife Service, Canberra.

Hall LS. Richards, G.C. 1979. *Bats of eastern Australia*. Queensland Museum Booklet No. 12.

Lumsden, L.F. and Bennett, A.F. 1995. Bats of a semi-arid environment in south-eastern Australia: biogeography, ecology and conservation. *Wildlife Research* 22: 217-240.

NPWS. 1996. *Threatened Species Conservation Act 1995 – Information Circular No.1*. NSW National Parks and Wildlife Service, Hurstville.

Parnaby, H 1992. *An interim Guide to Identification of Insectivorous Bats of South-eastern Australia*. Technical Reports of the Australian Museum, Number 8.

Pennay, M., Law, B., Reinhold, L. 2004. *Bat calls of New South Wales: Region based guide to the echolocation calls of Microchiropteran bats*. NSW Department of Environment and Conservation, Hurstville. ISBN 0 7313 6786 3.

Reinhold, L., Law, B., Ford, G. and Pennay, M. 2001. *Key to the bat calls of south-east Queensland and north-east New South Wales*. NRM, NRIM, Indooroopilly.

Richards, G.C. 2001. Towards defining adequate bat survey methodology; why electronic call detection is essential throughout the night. *Australasian Bat Society Newsletter* 16: 24- 27.

Strahan R. (1983). *The Australian Museum Complete Book of Australian Mammals*. Angus and Robertson: Sydney.

Tidemann, C.R. and Loughland, R.A. 1993. A harp trap for large megachiropterans. *Wildlife Research* 20: 607-611.

Tidemann, C.R. and Woodside, D.P. 1978. A collapsible bat trap and a comparison of results obtained with the trap and mist nets. *Australian Wildlife Research* 5: 355-362.

Woodside, D.P. and Taylor, K.J. 1985. Echolocation calls of fourteen bats from eastern New South Wales. *Australian Mammalogy* 8: 279-297.

Appendix A - Microchiropteran bat species from the region

The conservation status of microchiropteran bat species known to or likely to occur 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
Chalinolobus gouldii	Gould's Wattled Bat	LR (lc)	-	-
Chalinolobus morio	Chocolate Wattled Bat	LR (lc)	-	-
Chalinolobus picatus	Little Pied Bat	-	-	Vulnerable (Schedule 2)
Miniopterus schreibersii oceanensis		LR (lc)	Vulnerable	Vulnerable (Schedule 2)
Myotis macropus	Southern Myotis	LR (nr)		Vulnerable (Schedule 2)
Scotoropens balstoni	Inland Broad-nosed Bat	LR (lc)	-	-
Vespadelus darlingtoni	Large Forest Bat	LR (lc)	-	-
Vespadelus vulturnus	Little Forest Bat	LR (lc)	-	-
Vespadelus regulus	Southern Forest Bat	LR (lc)	-	-
Nyctophilus geoffroyi	Lesser Long-eared Bat	LR (lc)	-	-
Nyctophilus gouldi	Gould's Long-eared Bat	LR (lc)	-	-
Nyctophilus timoriensis (south-eastern form)	Greater Long-eared Bat	VU	Vulnerable	Vulnerable (Schedule 2)
*Mormopterus planiceps (short penis form) species 2**	Eastern Free-tail Bat	LR (lc)	-	-
*Mormopterus planiceps (long penis form) species 4**	Southern Free-tail Bat	LR (lc)	-	-
Tadarida australis	White-striped Mastiff Bat	LR (lc)	-	-
Saccolaimus flaviventris	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

Document Status

Rev No.	Author	Reviewer		Approved for Issue		
		Name	Signature	Name	Signature	Date
0	C Grabham	A Buchan		John Ellwood		24/1/07
1	C Grabham	A Buchan		John Ellwood		31/1/07