Mortons Lane Wind Farm

Operational Brolga and Bat Monitoring - 2014

DRAFT REPORT

Prepared for Mortons Lane Wind Farm Pty Ltd

10 April 2015

Biosis offices

AUSTRALIAN CAPITAL TERRITORY

Canberra

Floor 1, Unit 3, 38 Essington Street
Mitchell ACT 2911

Phone: (02) 6241 2333
Fax: (03) 9646 9242
Email: canberra@biosis.com.au

NEW SOUTH WALES

Sydney

Unit 14 17-27 Power Avenue
Alexandria NSW 2015

Phone: (02) 9690 2777
Fax: (02) 9690 2577
Email: sydney@biosis.com.au

Wollongong

8 Tate Street
Wollongong NSW 2500

Phone: (02) 4229 5222
Fax: (02) 4229 5500
Email: wollongong@biosis.com.au

QUEENSLAND

Brisbane

Suite 4 First Floor, 72 Wickham Street
Fortitude Valley QLD 4006

Phone: (07) 3831 7400
Fax: (07) 3831 7411
Email: brisbane@biosis.com.au

VICTORIA

Ballarat

506 Macarthur Street
Ballarat VIC 3350

Phone: (03) 5331 7000
Fax: (03) 5331 7033
Email: ballarat@biosis.com.au

Melbourne (Head Office)

38 Bertie Street
Port Melbourne VIC 3207

Phone: (03) 9646 9499
Fax: (03) 9646 9242
Email: melbourne@biosis.com.au

Wangaratta

16 Templeton Street
Wangaratta VIC 3677

Phone: (03) 5721 9453
Fax: (03) 5721 9454
Email: wangaratta@biosis.com.au

Document information

Report to:	Mortons Lane Wind Farm Pty Ltd
Prepared by:	Gavin Thomas and Matthew Gibson
Biosis project no.:	18282

File name: 18282.MLWF.2014BirdAndBat.DRA.20150402.docx

Citation: Biosis 2015. Morton's Lane Wind Farm: Operational Bird and Bat Monitoring – 2015. Report for Mortons Lane Wind Farm Pty Ltd. Author: Thomas, G & Gibson, M. Biosis Pty Ltd, Ballarat . Project no 18282.

Document control

Version	Internal reviewer	Date issued
Draft version 01	IS	21/04/2015
Final version 02	XXX	XX/XX/XXXX

Acknowledgements

Biosis acknowledges the contribution of the following people and organisations in undertaking this study:

- Gold Wind Australia: Litsa Stavrakakis, John Aquilina, Steven Eldred.
- CGN Wind Energy Limited: Wang Xiaodong

The following Biosis staff were involved in this project:

- Clare McCutcheon and Martin Lee for assistance in the field

Contents

List of Figures

List of Tables

Summary

Biosis Pty Ltd was commissioned by Mortons Lane Wind Farm Pty Ltd to undertake Brolga utilisation monitoring and bat utilisation monitoring during autumn, spring and summer of 2014 at Morton's Lane Wind Farm (MLWF) in south-west Victoria. MLWF is located on the Victorian Volcanic Plain, approximately 20 km east of Penshurst.

Brolga utilisation was monitored at six points within the MLWF and at two reference sites outside the wind farm. Surveys were conducted during April and October 2014. Opportunistic survey for Brolgas of wetlands near the wind farm site was also conducted during each survey period.

During the May survey flocking activity was observed at Lake Blackwood approximately 6.5 km from the wind farm. Over several afternoons up to 120 Brolga were observed flying in at dusk and flocking at Lake Blackwood. Lake Blackwood is located to the west of the wind farm and is a well known flocking site for Brolgas and up to 300 Brolgas have been previously recorded flocking here.

No Brolgas were observed within the wind farm or at reference sites during the May survey. One adult, non-breeding Brolga was observed using the wind farm site on several occasions during October. Sixty one other native bird species including five introduced bird species were also recorded within MLWF during the surveys.

Micro-bat activity was monitored using ultrasonic detectors during May and December 2014. Detectors were installed at four turbine locations, with one detector placed on the ground (1 m high) and one mounted on the turbine nacelle.

At least seven bat species were recorded to species level during the bat call survey. A further two were identified to genus level only. Bat activity levels were highest during autumn 2014. Higher levels of bat activity were recorded from detectors at ground level compared to turbine-mounted detectors in both autumn and spring, and both ground and turbine-mounted detectors recorded ultrasonic noise from non-bat sources. Although very few shrubs and trees are present within the site, revegetated shelter-belts provide foraging habitat for several bat species which are unlikely to be present in completely cleared areas. No significant bat species were recorded

A review of the annual rainfall from 2012 - 2014 from the BOM weather station at Dunkeld indicated that 2014 was relatively 'dry' compared to the two previous years. Annual rainfall for 2014 was 545.5, while the long term average for the locality is 715.7 mm (BOM 2015).

1 Introduction

1.1 Project background

The 13 turbine Mortons Lane Wind Farm (MLWF) located near Woodhouse in south-western Victoria, commenced operation in January 2013. The Bird and Avifauna Management Plan (BAM Plan) (SKM 2011) specifies relevant monitoring and reporting requirements.

Biosis Pty Ltd was commissioned by Mortons Lane Wind Farm Pty Ltd to undertake the 2014 bird and bat monitoring at MLWF, as specified in the BAM plan. This report presents the results of bird utilisation monitoring conducted during May and October 2014 and ultrasonic bat monitoring conducted in March and December 2014.

1.2 Scope of assessment

The objectives of this investigation are to:

- Undertake flocking (April) and breeding (October) Brolga utilisation monitoring
- Undertake autumn (March) and Summer (December) bat utilisation monitoring
- Provide results in this report

1.3 Previous studies

Pre-construction bird and bat utilisation studies were conducted at MLWF in 2006 by Biosis (formerly Biosis Research):

- Biosis Research (2006a). Bat Activity Report for the Proposed Morton's Lane Wind Farm, South West Victoria. Report prepared for NewEn Australia, July 2006.
- Biosis Research (2006b). Bird Utilisation Studies at the Proposed Morton's Lane Wind Farm, South West Victoria. Report prepared for NewEn Australia, July 2006.

Biosis also conducted the preliminary flora and fauna assessment of the proposed MLWF (Biosis Research 2005), and undertook a regional survey of Brolga utilisation in the area surrounding MLWF and the proposed Salt Creek Wind farm (Biosis Research 2006c).

Biosis undertook annual monitoring for birds and bats in 2013 (Biosis 2013). This included utilisations surveys for both birds and bats during autumn, spring and summer.

2 Methods

2.1 Brolga utilisation survey

The BAM plan specifies a program of monitoring Brolga utilisation, based on the methods applied by Biosis Research (2006b). Although Brolga is the primary species of interest, observations of all bird species were noted and are presented in this report.

2.1.1 Monitoring points

Monitoring was conducted at the same six point locations monitored in the pre-construction surveys (Biosis Research 2006) (Figure 2). Two reference points (RFN and RFS) were also established for the current surveys, as required by the BAM plan. The coordinates of the points are presented in Table 1.

2.1.2 Methods

Point count surveys were conducted at the eight monitoring points. During each survey the point was monitored by one stationary observer for a period of 20 minutes. Within this period, the following information was recorded:

- Start time and date
- Weather conditions
- For Brolga, the number of individual birds, height of observation, distance from the observer and behaviour.
- For all other species, the number of individual birds, behaviour, distance from observer and height of observation were recorded.

A copy of the datasheet, which includes details the classification systems used for weather conditions and bird behaviour is provided in Appendix 1.

Table 1: Bird utilisation monitoring points

Point code	Location description	Easting (MGA94)	Northing (MGA94)
RFN	Northern reference site - Mortons Lane	629399	5813413
RFS	Southern reference site - Estate Road	630030	5807555
B1	Near turbine ML09	628657	5810734
B2	Near turbine ML08	628054	5810721
B3	Near turbine ML07	627378	5810845
B4	Near turbine ML04	629199	5810667
B5	Near turbine ML12	629537	5810229
B6	Near turbine ML05	630541	5810677

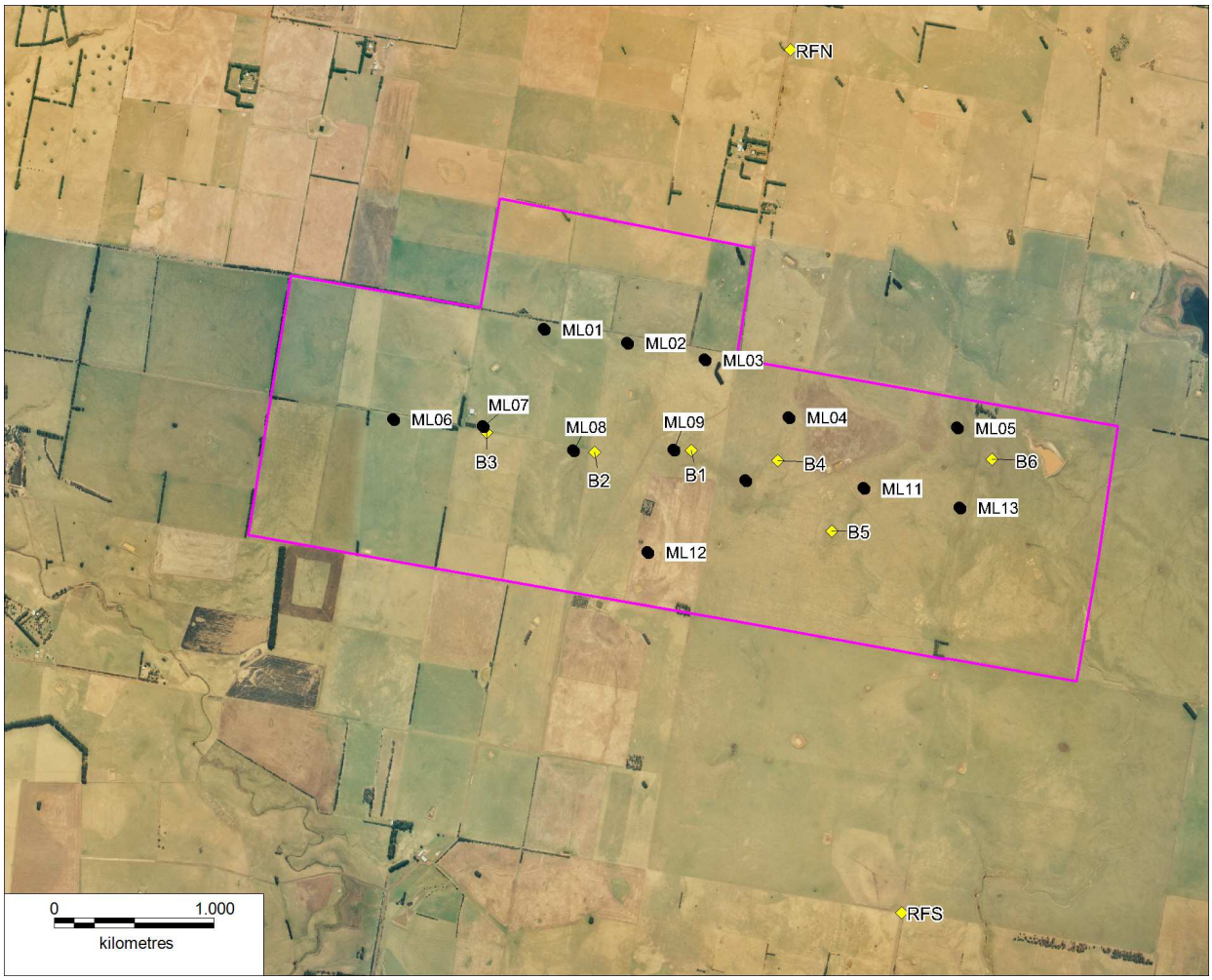

Figure 1: Location of Brolga monitoring points, Morton's Lane Wind Farm, Victoria

2.1.3 Timing and survey intensity

Surveys were conducted over two periods:

- 26/05/2014 –31/05/2014; and
- 20/11/2013 – 25/10/2014.

The number of surveys conducted at each survey point is summarised in Table 2.

Table 2: Bird utilisation monitoring points

Point code	Autumn 2014			Spring 2014			Grand total
	AM	PM	Total	AM	PM	Total	
B1	5	7	12	8	8	16	28
B2	6	5	11	8	9	17	28
B3	5	8	13	8	8	16	29
B4	5	4	9	8	9	17	26
B5	6	4	10	8	9	17	27
B6	5	4	9	8	8	16	25
RFN	5	10	15	10	8	18	33
RFS	4	5	9	5	7	12	21
Total	**41**	**47**	**88**	**62**	**67**	**129**	**217**

In relation to survey intensity and timing, the BAM Plan specifies that:

> *Two observers are to visit each of the eight points separately and carry out a survey twice on a single day. Surveys are to be completed at dawn and late afternoon prior to sunset. Surveys are to be repeated over four days during April (Flocking Season) and four days during October (Breeding Season).*

Our interpretation of this is that each observer should conduct 16 surveys each day over four days, resulting in a total of 128 surveys (16 surveys at each site). In practice, it was not possible for each observer to complete 16 surveys each day over four consecutive days taking into account the additional travel time taken to reach the reference sites outside of the wind farm. The survey period was lengthened for autumn and spring to account for this and the surveys were conducted over a period of six days. The reference sites, as stated previously are time consuming to access, however the additional field survey time allowed the majority of these to be completed as indicated in the table above.

2.2 Bat survey

2.2.1 Methods

Microbats were surveyed using ultrasonic detectors. Four detection sites were used, with one detector placed approximately 1 m above the ground and one detector placed on the turbine (82 m) at each location. Turbines were selected to ensure a spread of monitoring points across the site.

Ground detectors were mounted on fence posts, as close as possible to the base of the turbine (Plate 1).

Plate 1. SM2 detector mounted on a fence post.

Detectors at turbine height were mounted by Goldwind technicians on the galvanized steel mesh platform on the turbine nacelle (Plate 2). The microphone was aimed to the rear of the turbine.

Detectors were powered using internal D-cell batteries and calls were recorded onto 16GB SD cards. Detectors were configured to record in zero-crossing (ZC) format between 19:00 (7 pm) and 07:00 (7 am) (Table 3).

Table 3: SM2 configuration settings

Setting	Value
Sample rate	192000
Channels	Mono-L
File Format	ZC
Division Ratio	16
Location Prefix	MLWF
Start time	19:00
Stop time	7:00

Plate 2. SM2 ultrasonic bat detector mounted on the galvanised mesh platform located on the nacelle of the Goldwind turbines.

2.2.2 Monitoring points and survey timing

Turbines ML02, ML05, ML06 and ML10 were selected for monitoring (Table 4, Figure 2). Detectors were deployed in autumn and collected in summer on the dates outlined in Table 4 below. All sites were monitored for a minimum of five nights during each monitoring round.

Table 4: Locations and timing of ultrasonic bat monitoring

Turbine	Detector	Date deployed (autumn)	Date collected (autumn)	Date deployed (summer)	Date collected (summer)
ML02	Ground	26/05/2014	05/06/2014	17/12/2014	16/01/2015
	Turbine	27/05/2014	05/06/2014	18/12/2014	16/01/2015
ML05	Ground	26/05/2014	05/06/2014	17/12/2014	16/01/2015
	Turbine	27/05/2014	05/06/2014	18/12/2014	16/01/2015
ML06	Ground	26/05/2014	05/06/2014	17/12/2014	16/01/2015
	Turbine	27/05/2014	05/06/2014	18/12/2014	16/01/2015
ML10	Ground	26/05/2014	05/06/2014	17/12/2014	16/01/2015
	Turbine	27/05/2014	05/06/2014	18/12/2014	16/01/2015

2.2.3 Call identification and analysis

Bat calls were analysed using the automated identification software AnaScheme, developed by Matthew Gibson and widely used in the automated analysis of microbat vocalisations within Australia. The system allows for development of identification keys based on analysis of reference calls. The key used to analyse bat calls for this project was developed and tested by Lindy Lumsden and Peter Griffroen of Arthur Rylah Institute, Department of Environment, Land, Water and Planning (Key to bats of south-west Victoria, dated 20 June 2011).

The AnaScheme system applies a conservative approach to identifying calls in that only clear, high quality calls are assigned to a species. The system also counts recordings which match the criteria to be considered true bat calls, but may be of insufficient quality to identify to species level. This allows a measure of overall bat activity to be calculated.

Any calls identified by the system as significant or uncommon species are checked manually, by visual comparison with published reference calls by an experienced bat expert, to ensure accurate results.

3 Results

3.1 Bird utilisation survey

Seven-nine species, five of which were introduced species, were recorded within the wind farm during the annual surveys (Table 5). The most abundant species were the native Australian Magpie and Australian Raven followed by the introduced Eurasian Skylark and Common Starling.

Twenty-five of the species recorded are wetland dependent species. Most of these were recorded in the permanent wetland near point 6 or the seasonal wetland near point 4, but many were also recorded flying through the site, particularly cormorant and ibis species.

Table 5: Bird species recorded

Family	Common Name	Scientific Name	Status	2013	2014
Acanthizidae	Yellow-rumped Thornbill	*Acanthiza chrysorrhoa*	Native	✓	✓
Acanthizidae	Brown Thornbill	*Acanthiza pusilla*	Native	✓	✓
Acanthizidae	Striated Fieldwren	*Calamanthus fuliginosus*	Native	✓	✓
Acanthizidae	White-browed Scrubwren	*Sericornis frontalis*	Native	-	✓
Accipitridae	Collared Sparrowhawk	*Accipeter cirrhocephalus*	Native	-	✓
Accipitridae	Brown Goshawk	*Accipiter fasciatus*	Native	✓	✓
Accipitridae	Wedge-tailed Eagle	*Aquila audax*	Native	✓	✓
Accipitridae	Swamp Harrier	*Circus approximans*	Native	✓	✓
Accipitridae	Black-shouldered Kite	*Elanus axillaris*	Native	✓	✓
Accipitridae	Whistling Kite	*Haliastur sphenurus*	Native	-	✓
Accipitridae	Little Eagle	*Hieraaetus morphnoides*	Native	✓	✓
Alaudidae	Eurasian Skylark	*Alauda arvensis*	Native	✓	✓
Anatidae	Grey Teal	*Anas gracilis*	Native	✓	✓
Anatidae	Australasian Shoveler	*Anas rhynchotis*	Native – vulnerable (DEPI Advisory List)	-	✓
Anatidae	Pacific Black Duck	*Anas superciliosa*	Native	✓	✓
Anatidae	Hardhead	*Aythya australis*	Native – vulnerable (DEPI Advisory List)	✓	-
Anatidae	Australian Wood Duck	*Chenonetta jubata*	Native	✓	✓
Anatidae	Black Swan	*Cygnus atratus*	Native	✓	✓
Anatidae	Pink-eared Duck	*Malacorhynchus membranaceus*	Native	✓	✓
Anatidae	Blue-billed Duck	*Oxyura australis*	Native – endangered (DEPI Advisory List)	-	✓
Anatidae	Freckled Duck	*Stictonetta naevosa*	Native – endangered (DEPI Advisory	-	✓

Family	Common Name	Scientific Name	Status	2013	2014
			List)		
Anatidae	Australian Shelduck	*Tadorna tadornoides*	Native	✓	✓
Ardeidae	White-necked Heron	*Ardea pacifica*	Native	✓	✓
Ardeidae	White-faced Heron	*Egretta novaehollandiae*	Native	✓	✓
Artamidae	Australian Magpie	*Cracticus tibicen*	Native	✓	✓
Cacatuidae	Sulphur-crested Cockatoo	*Cacatua galerita*	Native	-	✓
Cacatuidae	Long-billed Corella	*Cacatua tenuirostris*	Native	✓	✓
Cacatuidae	Yellow-tailed Black-cockatoo	*Calyptorhynchus funereus*	Native	✓	✓
Cacatuidae	Galah	*Eolophus roseicapillus*	Native	✓	✓
Charadriidae	Black-fronted Dotterel	*Elseyornis melanops*	Native	-	✓
Charadriidae	Masked Lapwing	*Vanellus miles*	Native	✓	✓
Cisticolidae	Golden-headed Cisticola	*Cisticola exilis*	Native	-	✓
Columbidae	Crested Pidgeon	*Oreoica gutturalis*	Native	✓	✓
Corvidae	Australian Raven	*Corvus coronoides*	Native	✓	✓
Corvidae	Little Raven	*Corvus mellori*	Native	-	✓
Cuculidae	Horsfield's Bronze-Cuckoo	*Chalcites basalis*	Native	-	✓
Falconidae	Brown Falcon	*Falco berigora*	Native	✓	✓
Falconidae	Nankeen Kestrel	*Falco cenchroides*	Native	✓	✓
Falconidae	Australian Hobby	*Falco longipennis*	Native	-	✓
Falconidae	Peregrine Falcon	*Falco peregrinus*	Native	-	✓
Fringillidae	European Goldfinch	*Carduelis carduelis*	Introduced	✓	✓
Fringillidae	Common Greenfinch	*Carduelis chloris*	Introduced	✓	✓
Gruidae	Brolga	*Grus rubicunda*	Native – vulnerable (DEPI Advisory List)	✓	✓
Hirundinidae	Welcome Swallow	*Hirundo neoxena*	Native	✓	✓
Hirundinidae	Fairy Martin	*Petrochelidon ariel*	Native	✓	-
Hirundinidae	Tree Martin	*Petrochelidon nigricans*	Native	-	✓
Laridae	Whiskered Tern	*Chlidonias hybrida*	Native	-	✓
Laridae	Silver Gull	*Chroicocephalus novaehollandiae*	Native	✓	✓
Maluridae	Superb Fairy-wren	*Malurus cyaneus*	Native	✓	✓
Megaluridae	Brown Songlark	*Cinclorhamphus cruralis*	Native	✓	✓
Meliphagidae	Eastern Spinebill	*Acanthorhynchus tenuirostris*	Native	-	✓
Meliphagidae	Red Wattlebird	*Anthochaera carunculata*	Native	✓	✓
Meliphagidae	White-fronted Chat	*Epthianura albifrons*	Native	✓	✓
Meliphagidae	Yellow-faced Honeyeater	*Lichenostomus chrysops*	Native	-	✓

Family	Common Name	Scientific Name	Status	2013	2014
Meliphagidae	White-plumed Honeyeater	*Lichenostomus penicillatus*	Native	-	✓
Meliphagidae	New Holland Honeyeater	*Phylidonyris novaehollandiae*	Native	✓	✓
Monarchidae	Magpie-lark	*Grallina cyanoleuca*	Native	✓	✓
Monarchidae	Restless Flycatcher	*Myiagra inquieta*	Native	✓	✓
Motacilidae	Australasian Pipit	*Anthus novaeseelandiae*	Native	✓	✓
Muscicapidae	Common Blackbird	*Turdus merula*	Introduced	✓	✓
Nectariniidae	Mistletoebird	*Dicaeum hirundinaceum*	Native	-	✓
Pachycephalidae	Grey Shrike-thrush	*Colluricincla harmonica*	Native	✓	✓
Passeridae	House Sparrow	*Passer domesticus*	Introduced	✓	✓
Phalacrocoracidae	Great Cormorant	*Phalacrocorax carbo*	Native	✓	✓
Phalacrocoracidae	Little Black Cormorant	*Phalacrocorax sulcirostris*	Native	✓	-
Phalacrocoracidae	Pied Cormorant	*Phalacrocorax varius*	Native	✓	-
Phasianidae	Stubble Quail	*Coturnix pectoralis*	Native	✓	✓
Podicipedidae	Hoary-headed Grebe	*Poliocephalus poliocephalus*	Native	✓	✓
Podicipedidae	Australasian Grebe	*Tachybaptus novaehollandiae*	Native	✓	✓
Psittacidae	Blue-winged Parrot	*Neophema chrysostoma*	Native	-	✓
Psittacidae	Crimson Rosella	*Platycercus elegans*	Native	-	✓
Psittacidae	Red-rumped Parrot	*Psephotus haematonotus*	Native	-	✓
Rallidae	Eurasian Coot	*Fulica atra*	Native	✓	✓
Rallidae	Purple Swamphen	*Porphyrio porphyrio*	Native	✓	-
Recurvirostridae	Banded Stilt	*Cladorhynchus leucocephalus*	Native	-	✓
Recurvirostridae	Black-winged Stilt	*Himantopus himantopus*	Native	✓	✓
Rhipiduridae	Grey Fantail	*Rhipidura albiscapa*	Native	✓	✓
Rhipiduridae	Willie Wagtail	*Rhipidura leucophrys*	Native	✓	✓
Scolopacidae	Latham's Snipe	*Gallinago hardwickii*	Native – Migratory species (EPBC Act)	✓	-
Sturnidae	Common Starling	*Sturnus vulgaris*	Introduced	✓	✓
Threskiornithidae	Yellow-billed Spoonbill	*Platalea flavipes*	Native	✓	✓
Threskiornithidae	Australian White Ibis	*Threskiornis molucca*	Native	✓	✓
Threskiornithidae	Straw-necked Ibis	*Threskiornis spinicollis*	Native	✓	✓
Timaliidae	Silvereye	*Zosterops lateralis*	Native	✓	✓

Open country and generalist species were most abundant within the site, but there were also some records of woodland-dependent species at points near planted shrubs and trees, including Grey Shrike-thrush, Red Wattlebird, Superb Fairy-wren, Silvereye, Brown Thornbill, Grey Fantail, New Holland Honeyeater and Restless Flycatcher.

3.1.1 Significant species

Four significant species were recorded:

- **Australasian Shoveler** is considered endangered within Victoria (DSE 2013). This duck species was observed from point 6 during one count during autumn 2014. Two birds were observed flying over the permanent wetland to the east of point 6 at approximately 40 m from the ground.
- **Blue-billed Duck** is considered endangered within Victoria (DSE 2013). This duck species was observed from point 6 during five of the counts conducted at that point. All observations were of birds on the permanent wetland to the east of point 6. No flights were observed.
- **Freckled Duck** is considered endangered within Victoria (DSE 2013). This duck species was observed from point 6 during one count. The bird was observed foraging on the surface of the permanent wetland to the east of point six. It was not observed flying.
- **Brolga** is considered vulnerable within Victoria (DSE 2013) and is listed under the *Flora and Fauna Guarantee Act 1988*. Observations of Brolga within the site are described in section 3.1.2.

3.1.2 Brolga

One Brolga was during October east of point 6 near the permanent wetland located outside the boundary of the wind farm. The bird was observed between the 20th and 24th of October (Table 6). No Brolgas were observed during the autumn monitoring round (May 26-31st).

All nine of the records were of a single bird and were from near the permanent wetland located east of point 6. The bird was observed sitting, preening, walking or foraging. No flight activity was observed. No Brolgas were observed inside the wind farm boundary.

The Brolga observed during the October survey was not observed associating with any other birds and there was no evidence of any recent nesting activity associated with the wetland. The bird may be the same bird that Biosis has recorded previously within the wind farm on previous surveys but this was not able to be confirmed through observation during the survey.

Approximately 120 Brolga were recorded anecdotally at the nearby Blackwood Lake. This is a known significant flocking site where a large proportion of the Victorian population congregates each year during the flocking season. DELWP carry out annual flock counts at this location.

Table 6: Brolga records

Point	Date	Time	Behaviour	Flight observed
B6	20/10/2014	16:04	Preening. Foraging in paddock 100m east of wetland. Circling movement.	-
B6	22/10/2014	16:38	Brolga south east of wetland (below bank) foraging amongst sheep.	-
B6	21/10/2014	15:25	Foraging between 2 small wetlands to the NE of nearest wetland.	-
B6	23/10/2014	12:40	On ground – no flights	-
B6	24/10/2014	15:25	On ground – no flights	-
B6	23/10/2014	15:30	On edge of wetland and foraging out to the east	-

Point	Date	Time	Behaviour	Flight observed
B6	24/10/2014	11:20	Feeding in paddock about 250m east of wetland. Covering small area during survey.	-
B6	24/10/2014	16:29	Resting about 50m east of wetland. "Tucked up" and asleep.	-
B6	25/10/2014	11:17	Foraging and resting. Sitting amongst sheep 250m east of wetland	-

3.1.3 Raptors

Table 7: Raptor records for 2013 and 2014

Scientific Name	Common Name	Status	2013	2014	No of records autumn 2014	No of records spring 2014	Total No of records
Accipiter cirrhocephalus	Collared Sparrowhawk	Native	-	✓		1	1
Accipiter fasciatus	Brown Goshawk	Native	✓	✓		1	1
Aquila audax	Wedge-tailed Eagle	Native	✓	✓	2	8	10
Circus approximans	Swamp Harrier	Native	✓	✓		1	1
Elanus axillaris	Black-shouldered Kite	Native	✓	✓	9	18	27
Haliastur sphenurus	Whistling Kite	Native	-	✓		4	4
Hieraaetus morphnoides	Little Eagle	Native	✓	✓		5	5
Falco berigora	Brown Falcon	Native	✓	✓	27	22	49
Falco cenchroides	Nankeen Kestrel	Native	✓	✓	12		12
Falco longipennis	Australian Hobby	Native	-	✓	7		7
Falco peregrinus	Peregrine Falcon	Native	-	✓	4		4
Totals			7	11			

Eleven raptor (bird of prey) species were recorded during the surveys. The five species in decreasing order of the number of records were: Brown Falcon, Black-shouldered Kite, Nankeen Kestrel, Wedge-tailed Eagle and Australian Hobby.

- **Brown Falcons** were recorded on 49 occasions throughout the wind farm. Birds were observed flying at a range of heights, up to approximately 200 m, and perching either on rock piles or on power lines.
- The **Black-shouldered Kite** was recorded on 27 occasions and was recorded nine times during autumn and 18 times during spring. It was recorded from a range of locations within and outside the wind farm at heights ranging from 10 m to 120 m.
- The **Nankeen Kestrel** was recorded 12 occasions, typically observed flying up to 30 m in height.
- The **Wedge-tailed Eagle** was recorded during10 point counts, flying at a range of heights between ground level and approximately 200 m above the ground.

- The **Australian Hobby** was recorded on seven occasions during autumn flying at a range of heights from 2 m to 20 m.
- A **Little Eagle** was recorded five times near points 1, 2 and 3, flying at heights ranging from 20 -100 m.
- A **Whistling Kite** was recorded on four occasions during spring at heights ranging from 20 m to 100 m.
- A **Peregrine Falcon** was recorded on four occasions on one day during autumn. The bird was observed flying low over cropped paddocks within the wind farm near point 1 and 2.
- A **Brown Goshawk** was observed once from the northern reference point hovering approximately 10 m above the ground.
- A **Collared Sparrowhawk** was observed near point 5 flying approximately 50 m above the ground.
- The **Swamp Harrier** was recorded during one count in October foraging over water east of point 6. The bird was observed flying low over water harassing waterfowl.

3.2 Bat survey

Seven bat species were identified to species level during the ultrasonic survey:

- **Gould's Wattled Bat** *Chalinolobus gouldii*
- **Chocolate Wattled Bat** *Chalinolobus morio*
- **White-striped Freetail Bat** *Austronomus australis*
- **Large Forest Bat** *Vespadelus darlingtoni*
- **Southern Forest Bat** *Vespadelus regulus*
- **Little Forest Bat** *Vespadelus vulturnus*
- **Western Broad-nosed Bat** *Scotorepens balstoni*

Two other groups of bats could only be identified to genus (group) level, due to overlapping call characteristics:

- **Freetail Bats** *Mormopterus* sp.
  Calls recorded during this study are most likely to be calls of the Southern Freetail Bat *Mormopterus* sp. 4 (undescribed) (Churchill 2008).
- **Long-eared Bats** *Nyctophilus* sp.
  Ultrasonic calls of the three Victorian Long-eared Bat species cannot be reliably distinguished. Most or all of the calls recorded at Morton's Lane are likely to be from the Lesser Long-eared Bat *Nyctophilus geoffroyi*. Gould's Long-eared Bat *Nyctophilus gouldi* may also be present but this species is less likely to inhabit open habitats. In Victoria, the threatened Greater Long-eared Bat *Nyctophilus corbeni* is limited to the north-west of the State.

The number of recordings of these species and species-groups is shown in Table 7, which lists the numbers of calls recorded by each detector during the spring and autumn survey periods. A large number of poor-quality calls could not be identified to species or species-group level. These recordings are clearly bat calls, but are of insufficient duration or quality to allow confident identification. Additionally, most detectors recorded high levels of extraneous noise, which may have limited the potential for these detectors to record bat calls. Noise

may be generated by a range of factors, including background noise, insects and potentially electrical interference.

Minimum and maximum daily temperatures for the survey periods from the Hamilton monitoring station are presented in Table 8.

Table 8: Raptor records for 2013 and 2014

a) Autumn 2014

Species	Common name	Ground detectors				Turbine mounted detectors				Totals
		ML2	ML5	ML6	ML10	ML2	ML5	ML6	ML10	
Austronomus australis	White-striped Freetail Bat	14			27					**41**
Chalinolobus gouldii	Gould's Wattled Bat	76	195		36		3			**310**
Chalinolobus morio	Chocolate Wattled Bat	24	148		77		2			**251**
Mormopterus species 4	Freetail Bats	132	11		278		1			**422**
Nyctophilus sp.	Long-eared Bats	49	21		101					**171**
Scotorepens balstoni	Western Broad-nosed Bat		2		5					**7**
Vespadelus darlingtoni	Large Forest Bat		16							**16**
Vespadelus regulus	Southern Forest Bat		7							**7**
Vespadelus vulturnus	Little Forest Bat	11	41		55					**107**
Totals		**306**	**441**		**579**		**6**			

b) Spring 2014

Species	Common name	Ground detectors				Turbine mounted detectors				Totals
		ML2	ML5	ML6	ML10	ML2	ML5	ML6	ML10	
Austronomus australis	White-striped Freetail Bat			6	3		3		2	**14**
Chalinolobus gouldii	Gould's Wattled Bat			16	1				1	**18**
Chalinolobus morio	Chocolate Wattled Bat			59	2		3			**64**
Mormopterus species 4	Freetail Bats			22	1					**23**
Nyctophilus sp.	Long-eared Bats			18	4					**22**
Vespadelus darlingtoni	Large Forest Bat			5						**5**
Vespadelus regulus	Southern Forest Bat			3						**3**
Vespadelus vulturnus	Little Forest Bat	1		1	3		1			**5**
Totals		**1**		**130**	**11**		**7**		**3**	

Minimum and maximum daily temperatures for the survey periods from the Hamilton monitoring station are presented in Table 8.

Table 9: Minimum and maximum temperatures for Hamilton, Victoria recorded during periods of bat survey

Minimum (°C)	Maximum (°C)	Minimum (°C)	Maximum (°C)	Minimum (°C)	Maximum (°C)
December 16 -23rd 2013		May 26 – 2 June 2014		December 12 – 19 2014	
9.5	23.1	10.6	19.3	6.4	29.2
10.0	26.1	13.2	16.8	10.4	33.8
9.3	33.7	9.2	14.8	10.0	27.3
16.1	39.2	5.9	16.9	7.5	28.4
13.0	23.9	5.7	17.1	9.0	22.8
11.2	20.5	6.2	13.5	4.2	21.1
11.5	26.9	7.7	15.3	4.6	20.2
10.4	18.1	8.8	14.1	6.5	21.7

3.2.1 Bat activity

Generally, higher numbers of identifiable calls were recorded on the ground detectors than the turbine mounted detectors, but care must be applied when comparing activity levels, as the turbine mounted detectors appear to be more affected by interference.

The species most represented within the identifiable recordings were the two species of Wattled bat and the Southern Freetail Bat (*Mormopterus* species 4). The Long-eared Bats were also relatively well represented in the ground recordings, but none were recorded by the turbine mounted detectors.

3.2.2 Records from turbine-mounted detectors

The turbine mounted detectors successfully recorded bat calls. Although most of these calls were poor quality recordings which could not be identified to species level, clear calls of several species were recorded, including Gould's Wattled Bat, Chocolate Wattled Bat, Freetail bats, White-striped Freetail Bat and Little Forest Bat.

4 Conclusions and recommendations

4.1 Conclusions

4.1.1 Brolga

A single Brolga was recorded outside the eastern boundary near point 6 over successive days during October. The bird was observed walking, foraging, preening and sitting. No flight was observed during the survey period. No Brolgas were recorded from reference sites. Brolgas were observed flocking in large numbers near Lake Blackwood west of the wind farm during the May monitoring period. Up to 120 Brolga were observed flying in from various directions over successive evenings at dusk. A range of other wetlands outside of the wind farm boundary were monitored during the autumn and spring surveys to assess Brolga presence. No Brolgas were observed at any other wetlands except Lake Blackwood. Monitoring of Lake Blackwood during each monitoring period remains a valuable tool to assessing the status of Brolgas in the general vicinity of the wind farm.

4.1.2 Bats

At least nine bat species were recorded during the bat call survey, and five of these were recorded by turbine-mounted detectors. No significant species were recorded.

Activity levels were highest during warm conditions. Higher activity levels were generally recorded at ground level detectors, although both ground and turbine-mounted detectors recorded high levels of ultrasonic noise from non-bat sources. Although very few shrubs and trees are present within the site, revegetated shelter-belts provide foraging habitat for several species which are unlikely to be present in completely cleared areas.

Bat calls were successfully recorded from turbine-mounted detectors. It is recommended that future monitoring follows a similar approach, using SM2 detectors mounted near the ground and on turbines, to further evaluate the value of the approach, which has been relatively un-tested to-date in Australia.

4.1.3 Significant impacts

No bird or bat deaths were recorded during the Brolga and Bat utilisation studies.

4.2 Recommendations

The following recommendations are made in relation to the approaches to Brolga and Bat monitoring, for consideration during future reviews of the BAM plan:

- Future surveys of Brolga utilisation should be timed to coincide with the peak of the breeding season and flocking season within the region. Exact timing will vary from year to year, but higher levels of breeding activity are generally noted from September to November and flocking can occur from late summer until May/June. We recommend monitoring known breeding sites in the region to align onsite surveys with other known breeding events. A flocking site which regularly supports up to 300 individuals is located at Blackwood approximately 5 kilometres west of MLWF. This flocking site provides and excellent opportunity to monitor MLWF while flocking activity nearby is highest. This site should be included in future monitoring programs.

References

Biosis Research (2005). Preliminary Flora and Fauna Assessment of the Proposed Morton's Lane Wind Farm Site, South West Victoria. Report prepared for NewEn Australia.

Biosis Research (2006a). Bat Activity Report for the Proposed Morton's Lane Wind Farm, South West Victoria. Report prepared for NewEn Australia, July 2006.

Biosis Research (2006b). Bird Utilisation Studies at the Proposed Morton's Lane Wind Farm, South West Victoria. Report prepared for NewEn Australia, July 2006.

Biosis Research (2006c). Regional Brolga survey for the Proposed Salt Creek and Morton's Lane Wind Farms, Chatsworth, Victoria. Report prepared for NewEn Australia, October 2006.

Churchill, S (2008). Australian Bats – second edition. Jacana Books, Crows Nest NSW.

DSE 2013. *Advisory List of Threatened Vertebrate Fauna in Victoria – 2013.* Victorian Government Department of Environment & Primary Industries, Melbourne.

SKM 2011. Morton's Lane Wind Farm. Bat and Avifauna Management Plan. Sinclair Knight Merz, Malvern.

Appendices

Appendix 1: Bird Utilisation Data Sheet

POINT ____ OBSERVER _____ GPS _____ DATE _____ START TIME _____

Temperature: _____ Wind direction (from): _____ Wind strength: **1** – Calm, **2** - Light (leaves rustle) **3** - Moderate (moves branches), **4** - Strong (impedes progress)	Precipitation: **1** – Nil, **2** - Drizzle/light rain, **3** - Heavy rain Cloud Cover: **1** – <10%, **2** – 10-30%, **3** – 30-70%, **4** – 70-100%

Species (code)	Number. of movements	Number of birds	Height above ground	Distance from observer	Behaviour (code)

BEHAVIOUR

Code	Description	Code	Description
FL-M	Flying in a single direction	FO-G	Foraging/feeding actions on ground
FL-C	Circling around in flight (e.g. swallow and martin flight behaviour)	FO-T	Foraging/feeding actions in tree/shrub
FL-H	Hovering over a single point (e.g. raptor, skylark)	FO-W	Foraging/feeding actions in water (ie: sea-eagles fishing, swans feeding in water)
P-G	Perching/roosting on ground, no movement	LO-G	any movement across the ground, not associated with foraging
P-T	Perching/roosting in tree/shrub, no movement	SW	Swimming, not associated with active foraging
P-F	Perching/roosting on a fenceline, no movement	OT	Behaviour not listed, describe the behaviour in NOTES