

Level 4, Watt Street
Commercial Centre
45 Watt Street,
Newcastle NSW 2300
AUSTRALIA

PO Box 803,
Newcastle NSW 2300
AUSTRALIA

Telephone +61 2 4903 5500
Facsimile +61 2 4929 5363

www.erm.com

9 May, 2017

Kristin Old
CWP Renewables Pty Ltd
Floor 6, 45 Hunter St
NEWCASTLE, NSW, 2300

Our Reference: 0404134 BWF RTS_Draft V4

Attention: Kristin Old

Dear Kristin,

**RE: BANGO WIND FARM - BIODIVERSITY RESPONSE
TO SUBMISSIONS**



This letter details the biodiversity response to submissions (RtS) following public exhibition of the Bango Wind Farm (BWF) (the project). The letter is focussed on addressing the NSW Office of Environment (OEH) submission (DOC16/487191 dated 28/11/16). A number of public submissions relating to the ecological assessment were also been received during the public exhibition, and where these directly relate to the relevant OEH submissions we have included supportive comment in this letter.

We have also provided necessary detail to respond to matters raised by Department of Planning and Environment in their response to the EIS (2013), for the following key matters:

- Threatened and 'at risk' species - The following report and related Appendices consider any changes in possible impact on threatened or at risk species as a result of the revised wind turbine layout.
- Biobanking assessment - At this stage the Biobanking process has consisted of identifying candidate offset sites near the project, refining suitable candidate lands and the biodiversity characteristics of those lands, as well as confirming the willing participation of land owners. The results of this have been detailed in *Annex G*.
- Tanmangaroo & Wargeila Rds - ERM has completed a roadside vegetation task to identify vegetation types 10 m either side of any culverts, bridges and causeways (collectively referred to as drainage line crossings) that cross the roadways, and to identify any ecologically unconstrained areas of road verge that could potentially be used as passing areas.

Additional survey mapping and data analysis – The following report and related Appendices presents required updates to the Ecological Assessment (2013). Whilst no additional field surveys were completed (with the exception of Roadside vegetation mapping), re-analysis of existing data and associated mapping was conducted. The response detail is contained in the body of this letter and attachments under the following themes:

- Endangered Ecological Communities (EECs)
- Habitat Loss
- Offset Calculations and BioBanking Assessment
- Woodland Birds
- Superb Parrots
- Hollow Bearing Trees and Bats
- Diurnal Birds of Prey and Collision Risk Modelling (CRM)
- Golden Sun Moth (GSM)
- Reptiles
- Squirrel Glider and Habitat Fragmentation
- Cumulative and Indirect Impacts
- Other Threatened Species Issues

The project layout has changed and reduced in size since the layout was placed on public exhibition. The amended layout comprises a significant reduction in the number of wind turbine generators (WTGs), removed as an avoidance measure to avoid impacts to neighbouring residents and sensitive ecological features identified during the Ecological Assessment (EA) (ERM 2013 in CWPR 2013).

The project is proceeding through this RtS process with two layouts that differ slightly in the number of WTGs and associated proposed infrastructure layouts: Planning Layout (PL) 1 is for 75 turbines, and PL2 for 61 turbines. Both PL1 and PL2 are considered separately in the below analyses, and in some cases the layouts have been merged to produce a worst-case impact area scenario. The project changes include:

- Reduction of WTGs from 122 to 75 (PL1) and from 96 to 61 (PL2);
- Removal of the Langs Creek cluster of WTGs;
- Removal of various other WTGs;

- No wind turbine or substation component oversized vehicle access to project via Tangmangaroo Road and Wargeila Road; and
- All wind turbine or substation component oversized vehicle access would now enter site through a single access point along Lachlan Valley Way.

1. ENDANGERED ECOLOGICAL COMMUNITIES (EECS)

Refer to *Annex A* for more information on this matter.

2. HABITAT LOSS

A summary of all fauna habitat types equivalent to vegetation zones and the associated area impacted by the development footprint has been presented in *Table 2.1*. *Annex A* contains a description of vegetation mapping and assignment of Biometric Vegetation Types (BVTs) and related condition classes describing the various structural characteristics (the BVT and the condition class together comprise what is referred to as the 'vegetation zone'). This classification is suitable for the relevant species or species groups as there are clear vegetation structural rules that apply to categorising each vegetation zone.

Table 2.1 Fauna Habitat Type, Composite Vegetation Zone and Area Impacted by Development Footprint

Fauna Habitat Type	Equivalent Vegetation Zone Code	Component Vegetation Zone Name	ERM (2013) Exhibited Permanent Area (ha)	ERM (2013) Exhibited Temporary	ERM (2013) Exhibited Total	PL1 Permanent	PL1 Temporary	PL1 Total	PL1 Total Differential from Exhibited EA (ERM 2013)	PL2 Permanent	PL2 Temporary	PL2 Total	PL2 Total Differential from Exhibited EA (ERM 2013)	Merged ('Worst Case') Permanent	Merged ('Worst Case') Temporary	Merged ('Worst Case') Total	Merged ('Worst Case') Total Differential from Exhibited EA (ERM 2013)
Native Grassland	LA103_MG_P	Apple Box - Yellow Box dry grassy woodland of the South Eastern Highlands - Mod_Good - Poor	42.69	6.47	49.16	30.96	5.37	36.33	-12.83	29.90	4.34	34.24	-14.92	32.16	5.55	37.71	-11.45
Native Woodland	LA103_MG_C	Apple Box - Yellow Box dry grassy woodland of the South Eastern Highlands - Mod_Good - Roadside	6.58	2.04	8.62	4.77	3.64	8.41	-0.21	4.21	2.20	6.41	-2.21	5.13	3.74	8.87	0.25
	LA103_MG_S	Apple Box - Yellow Box dry grassy woodland of the South Eastern Highlands - Mod_Good - Medium															
	LA103_MG_H	Apple Box - Yellow Box dry grassy woodland of the South Eastern Highlands - Mod_Good - High															
	LA182_MG	Red Stringybark - Scribbly Gum - Red Box - Long-leaved Box shrub - tussock grass open forest of the NSW South Western Slopes Bioregion - Mod_Good															
Exotic Grassland	LA103_L	Apple Box - Yellow Box dry grassy woodland of the South Eastern Highlands - Low	55.5	15.42	70.92	24.77	6.77	31.53	-39.39	24.47	6.29	30.75	-40.17	26.37	6.60	32.96	-37.96
	LA182_L	Red Stringybark - Scribbly Gum - Red Box - Long-leaved Box shrub - tussock grass open forest of the NSW South Western Slopes Bioregion - Low															

Identification of fauna habitat areas (species or group) impacted by the project has been presented in *Table 2.2*. Specific threatened species habitat extent, quality and utility have been identified in the relevant sections below for the Golden Sun Moth, Superb Parrot and woodland birds.

Table 2.2 Fauna habitat areas (species or group)

Species	Impact	Habitat Type or Vegetation Zone	Totals in Area (ha) or Number (HBTs)*												
			ERM (2013) Exhibited Total**	PL1 Permanent	PL1 Temporary	PL1 Total	PL1 Permanent Differential from Exhibited EA (ERM 2013)***	PL2 Permanent	PL2 Temporary	PL2 Total	PL2 Total Differential from Exhibited EA (ERM 2013)***	Merged ('Worst Case') Permanent	Merged ('Worst Case') Temporary	Merged ('Worst Case') Total	Merged ('Worst Case') Total Differential from Exhibited EA (ERM 2013)***
Superb Parrot	Habitat removal	Refer Section 5													
Powerful Owl, Barking Owl	Habitat removal	LA103_MG_C	6.58	4.77	3.64	8.41	-1.81	4.21	2.20	6.41	-0.57	5.13	3.74	8.87	-1.45
		LA103_MG_H													
		LA103_MG_S													
		LA182_MG													
		HBTs	15	NA	NA	11	-4	NA	NA	9	-6	NA	NA	11	-4
Woodland Birds	Habitat removal	Refer Section 4													
Regent Honeyeater, Swift Parrot	Habitat removal (Foraging only)	LA103_MG_C	6.58	4.77	3.64	8.41	-1.81	4.21	2.20	6.41	-0.57	5.13	3.74	8.87	-1.45
		LA103_MG_H													
		LA103_MG_S													
		LA182_MG													
		HBTs	15	NA	NA	11	-4	NA	NA	9	-6	NA	NA	11	-4
Turquoise Parrot, Gang-gang Cockatoo	Habitat removal, HBTs	LA103_MG_C	6.58	4.77	3.64	8.41	-1.81	4.21	2.20	6.41	-0.57	5.13	3.74	8.87	-1.45
		LA103_MG_H													
		LA103_MG_S													
		LA182_MG													
		HBTs	15	NA	NA	11	-4	NA	NA	9	-6	NA	NA	11	-4
White-fronted Chat	Habitat removal	LA103_MG_P	42.69	30.96	5.37	36.33	-11.73	29.90	4.34	34.24	-12.79	32.16	5.55	37.71	-10.53
Squirrel Glider	Habitat removal, Fragmentation	LA103_MG_C	0.26												
		LA103_MG_H													
Koala	Habitat removal, Fragmentation	LA103_MG_C	6.58	4.77	3.64	8.41	-1.81	4.21	2.20	6.41	-0.57	5.13	3.74	8.87	-1.45
		LA103_MG_H													
		LA103_MG_S													
		LA182_MG													
		HBTs	15	NA	NA	11	-4	NA	NA	9	-6	NA	NA	11	-4
Striped Legless Lizard	Habitat removal, disturbance	LA103_MG_P	42.69	30.96	5.37	36.33	-11.73	29.90	4.34	34.24	-12.79	32.16	5.55	37.71	-10.53
Pink-tailed Worm lizard	Habitat removal, disturbance	LA103_MG_P	42.69	30.96	5.37	36.33	-11.73	29.90	4.34	34.24	-12.79	32.16	5.55	37.71	-10.53
Rosenbergs goanna	Habitat removal, disturbance	LA103_MG_C	6.58	4.77	3.64	8.41	-1.81	4.21	2.20	6.41	-0.57	5.13	3.74	8.87	-1.45
		LA103_MG_H													
		LA103_MG_S													
		LA182_MG													
		HBTs	15	NA	NA	11	-4	NA	NA	9	-6	NA	NA	11	-4

Spotted Harrier, Little Eagle, Square-tail Kite	Habitat removal, Blade strike	LA103_MG_C	6.58	4.77	3.64	8.41	-1.81	4.21	2.20	6.41	-0.57	5.13	3.74	8.87	-1.45
		LA103_MG_H													
		LA103_MG_S													
		LA182_MG													
		HBTs	15	NA	NA	11	-4	NA	NA	9	-6	NA	NA	11	-4
Golden Sun Moth	Habitat removal	Refer Section 8													
Bats	Habitat removal, Blade Strike	LA103_MG_C	6.58	4.77	3.64	8.41	-1.81	4.21	2.20	6.41	-0.57	5.13	3.74	8.87	-1.45
		LA103_MG_H													
		LA103_MG_S													
		LA182_MG													
		HBTs	15	NA	NA	11	-4	NA	NA	9	-6	NA	NA	11	-4

*HBTs not identified as temporarily lost and considered all as permanent

**permanent impacts only shown in Table 6.7 of exhibited EA (ERM 2013)

***differential provided comparing permanent impacts from Table 6.7 of exhibited EA (ERM 2013) to permanent impacts on the proposed footprints to provide comparative data

3. OFFSET CALCULATIONS AND BIOBANKING ASSESSMENT

Due to changes in the project footprint a revised BioBanking credit calculation would be required, which would replace the existing representations of the BioBanking impact assessment and credit profile. This would be completed on the merged PL1 and PL2 development footprint as a 'worst-case scenario' of impacts. The revised calculation would present the credit profile of the project using the current BioBanking Assessment Methodology (BBAM) which includes a module for linear assessments such as wind farms. Work is progressing on identifying candidate offset sites near the project, refining suitable candidate lands and the biodiversity characteristics of those lands, as well as confirming the willing participation of land owners. The results of this task have been detailed in *Annex G*. The reassessment of potential candidate offset sites shows that it is likely that sufficient sites are available, and it is expected that a selection of these would meet the requirements of offsetting impacts associated with the reduced layout. A revised BioBanking assessment would be undertaken upon finalisation of the to-be-built layout.

4. WOODLAND BIRDS

Refer to *Annex B* for more information on this matter.

5. SUPERB PARROTS

Generally, the removal of the Langs Creek cluster and other WTGs at the extremities of the project would likely lead to a reduced impact on this species. As shown in the reanalysis of flight path mapping (*Annex A* of *Annex C*) the majority of flight path activity occurs in the area adjacent to the removed Langs Creek cluster. Refer to *Annex C* for more information on this matter. *Section 7.1* contains information regarding revised collision risk model (CRM) for this species.

6. HOLLOW BEARING TREES AND BATS

A revised analysis was undertaken to identify the hollow bearing trees (HBTs) within 500 m of a WTG. The results are contained in *Annex D*. Data does exist covering woodland tree height, HBT height and tree hollow height. A WTG setback analysis would be undertaken as part of the detailed survey design and micro-siting. The results of this analysis would be considered to explore all opportunities to minimise impacts by ensuring micro-siting places WTG away from HBTs or woodland edges. These results would be considered in conjunction with other project factors and the project conditions of approval. Layouts PL1 and PL2 have considered a setback distance of 30 m.

7. DIURNAL BIRDS OF PREY AND COLLISION RISK MODELLING (CRM)

Refer to *Annex E* for detailed Bird Utilisation Survey (BUS) methods, results (raw data is presented including distance observations) and related discussion.

Generally, the reduction from a maximum of 122 WTGs to a maximum of 75 WTGs would lead to a much reduced impact on avian species. With the removal of the whole Langs Creek cluster and other WTGs at the farthest previous extent of the project the project is becoming smaller in spatial extent.

The revised separation distances of Wedge-tailed Eagle nests from WTGs is provided in *Table 7*.

Table 7. WTG and Wedge-tailed Eagle Nest Separation

Wedge-tailed Eagle Nest Identifier	PL1		PL2	
	WTG Identification Number	Separation Distance	WTG Identification Number	Separation Distance
1	-	-	-	-
	76	323	22	341
2	98	426	29	575
	41	574		
3	27	251	45	304
	14	304		
	73	542		
4	81	0	10	0
	83	285	64	304
	48	304	3	537
	55	537		
5	25	401	103	401
6	-	-	-	-

Notes: 1. A 600m cut-off has been used for separation distance. Blank data means no trees within 600m.

7.1 COLLISION RISK MODEL

The CRM has been rerun based on OEH's recommendation of a 90% avoidance rate. The full CRM has also been run at each of the other avoidance rates (95% and 99%) to present the relative difference between them, using the revised project layouts. The results for each planning layout are in *Table 3* and *Table 4*. An important note to accompany these collision calculations is that the spatial extent used in the EA (ERM 2013) is 41 km. To diminish the spatial extent used in the model to the revised north-south distance (12km) provides a false representation of concentrated impacts which ignores the fact that the area used in the EA (ERM 2013) would now, following revisions of project layouts, have less WTGs in the area used. Hence the same avian observation data over the original spatial extent (41km) has been used in this recalculation.

Table 3 Number of Bird Collisions per Month using Planning Layout 1

Month->	Nov			Dec			Jan			Feb		
Species												
Avoidance Factor	90%	95%	99%	90%	95%	99%	90%	95%	99%	90%	95%	99%
Superb Parrot	0.033	0.016	0.003	0	0	0	0	0	0	0	0	0
Little Eagle	0.033	0.017	0.003	0	0	0	0	0	0	0	0	0
Spotted Harrier	0	0	0	0.029	0.014	0.003	0	0	0	0	0	0
Wedge-tailed Eagle	0.055	0.027	0.005	0.024	0.012	0.002	0.260	0.130	0.026	0.168	0.084	0.017

Table 4 Number of Bird Collisions per Month using Planning Layout 2

Month->	Nov			Dec			Jan			Feb		
Species												
Avoidance Factor	90%	95%	99%	90%	95%	99%	90%	95%	99%	90%	95%	99%
Superb Parrot	0.018	0.009	0.002	0	0	0	0	0	0	0	0	0
Little Eagle	0.020	0.010	0.002	0	0	0	0	0	0	0	0	0
Spotted Harrier	0	0	0	0.018	0.009	0.002	0	0	0	0	0	0
Wedge-tailed Eagle	0.029	0.014	0.003	0.043	0.021	0.004	0.137	0.069	0.014	0.089	0.044	0.009

8. GOLDEN SUN MOTH (GSM)

Generally, the removal of the Langs Creek cluster and other WTGs at the extremities of the project would likely lead to a reduced impact on this species. Refer to *Annex F* for more information on this species.

9. REPTILES

Striped Legless Lizards were targeted using pitfall trapping and artificial habitat emplacement and checking (tile grids). Pink-tailed Worm-lizards were targeted using checking (tile grids). Notwithstanding the efficacy of reported methods, the EA (ERM 2011, section 4.9) states that the impact assessment uses a precautionary principle to consider the potential impacts to species using the presence of potential habitat. Impact to these species has been shown in *Table 2.2*.

10. SQUIRREL GLIDER AND HABITAT FRAGMENTATION

All wind turbine and substation component oversize vehicle access to the project would be through a single entry point along Lachlan Valley Way. The project would not require clearing of roadside vegetation along Harry's Creek Road and Wargeila Road to allow oversize vehicle access to the project via those roads. Impacts to roadside vegetation along Tangmangaroo Road would be limited to a maximum 60 m wide strip where the overhead transmission line crosses, and where access roads meet Tangmangaroo Road. No other vegetation clearing would be required for oversize vehicle access along Tangmangaroo Road. The 60 m wide transmission line strip is required for electrical clearance safety. If this clearance requires removal of all trees, this may hinder Squirrel Glider movement across the gap as it is beyond the 50 m gliding distance recognised for this species on relatively flat terrain (Australian Museum 2011). Mitigation measures would be required to maintain connectivity for the species across that 60 m transmission line strip which may include, reducing the span of clearance to 45 m, vegetation retention (as long as electrical clearance safety can be maintained) or installation of glider poles located so no gap exceeds 50 m.

11. CUMULATIVE AND INDIRECT IMPACTS

A WTG setback analysis has been provided in *Annex D*. WTG setback from ecological features would be considered, among other parameters, during detailed design and WTG micrositing.

No discussion has been provided on the potential added proliferation of foxes in the area due to the project, as this is difficult to fathom given the existing agricultural nature of the region. The region is generally characterised as a fragmented landscape with large areas of grassland and 'islands' of woodland. Infrastructure such as access roads would not be creating any linear access tracks through woodlands for predators such as foxes to utilise in any substantially different situation than currently exists. It is more than likely that the fox presence in the region is driven by livestock farming cycles, the climate (prey presence), and control measures (or lack of) undertaken by responsible landholders, Government agencies and industry bodies.

It is not possible to quantify the potential ecological impacts of agricultural expansion that could be caused by road upgrades related to the project because the scenario has too many uncertainties. It is not clear how many landholders' or farmers' agricultural expansion proposals are suppressed by lack of suitable quality roads, or the thresholds of road quality that would allow agricultural expansion. The ecological impacts of increased grazing pressure are better addressed by the agricultural industry.

12. OTHER THREATENED SPECIES ISSUES

The preceding sections of this report describe in more detail some of the targeted methods for threatened species. Notwithstanding the efficacy of reported methods, the EA (ERM 2011, section 4.9) states that the impact assessment uses a precautionary principle to consider the potential impacts to species using the presence of potential habitat. Impacts to these species have been shown in *Table 2.2*

Reuse of felled native vegetation and habitat resources would be guided by the project conditions of approval and a Construction Environmental Management Plan (CEMP).

13. REFERENCES

Australian Museum (2011). Animal Species: Squirrel Glider.

<https://australianmuseum.net.au/squirrel-glider>

Yours sincerely,

for Environmental Resources Management Australia Pty Ltd



Guy Williams
Principal Consultant



Murray Curtis
Partner

Annexures

<i>Annex A</i>	<i>Endangered Ecological Communities</i>
<i>Annex B</i>	<i>Woodland Birds</i>
<i>Annex C</i>	<i>Superb Parrot</i>
<i>Annex D</i>	<i>Hollow Bearing Trees and Bats</i>
<i>Annex E</i>	<i>Bird Utilisation Survey Results</i>
<i>Annex F</i>	<i>Golden Sun Moth</i>
<i>Annex G</i>	<i>Biobanking</i>

Annex A

Endangered Ecological Communities

INTRODUCTION

This report addresses:

- the extent of Endangered Ecological Communities across the Project Area;
- justification of the approach for classification of the extent of Apple Box - Yellow Box Dry Grassy Woodland of the South Eastern Highlands (vegetation type LA103); and
- provides a review of vegetation mapping and impact assessment.

1.1

BOX GUM WOODLAND IN THE STUDY AREA

Apple Box - Yellow Box dry grassy woodland of the South Eastern Highlands (LA103) has been mapped in the Study Area and Locality. Three of the four LA103 Vegetation Zones mapped in the Study Area comprise White Box Yellow Box Blakely's Red Gum Woodland (Box Gum Woodland) Endangered Ecological Community (EEC) as listed under the *Threatened Species Conservation Act 1995* (TSC Act) according to the identification guidelines provided in the *White Box Yellow Box Blakely's Red Gum Woodland Identification Guidelines* (NPWS undated) and the NSW Scientific Committee Final Determination (OEH 2011). These are shown in *Figure 1.1*.

Discussion is provided below on the Vegetation Zones that constitute the EEC and justification is provided as to why the modified form of the Vegetation Zone does not constitute the EEC.

1.1.1

Apple Box - Yellow Box Dry Grassy Woodland of the South Eastern Highlands - Mod_Good - Roadside (LA103_MG_C)

Vegetation zone Apple Box - Yellow Box Dry Grassy Woodland of the South Eastern Highlands - Mod_Good - Roadside (LA103_MG_C) occurs generally along the public roads of the Study Area and locality especially along Tangmangaroo Road, Wargeila Road and Harry's Creek Road. It does not constitute the *Environment Protection Biodiversity and Conservation Act 1999* (EPBC Act) listed Threatened Ecological Community (TEC) because the understorey is not predominantly native. It does comprise the TSC Act-listed EEC as it has an intact canopy layer, which although currently made up of a weedy understorey, would likely respond to assisted natural regeneration. It is a woodland dominated by Yellow Box, or Blakely's Red Gum with a non-native grassy understorey (generally pasture grasses used in neighbouring agricultural areas). The vegetation zone meet the identification guidelines provided in the *White Box Yellow Box Blakely's Red Gum Woodland Identification Guidelines* (NPWS undated) and the NSW Scientific Committee Final Determination (OEH 2011).

1.1.2 *Apple Box - Yellow Box Dry Grassy Woodland of the South Eastern Highlands - Mod_Good - Medium (LA103_MG_S)*

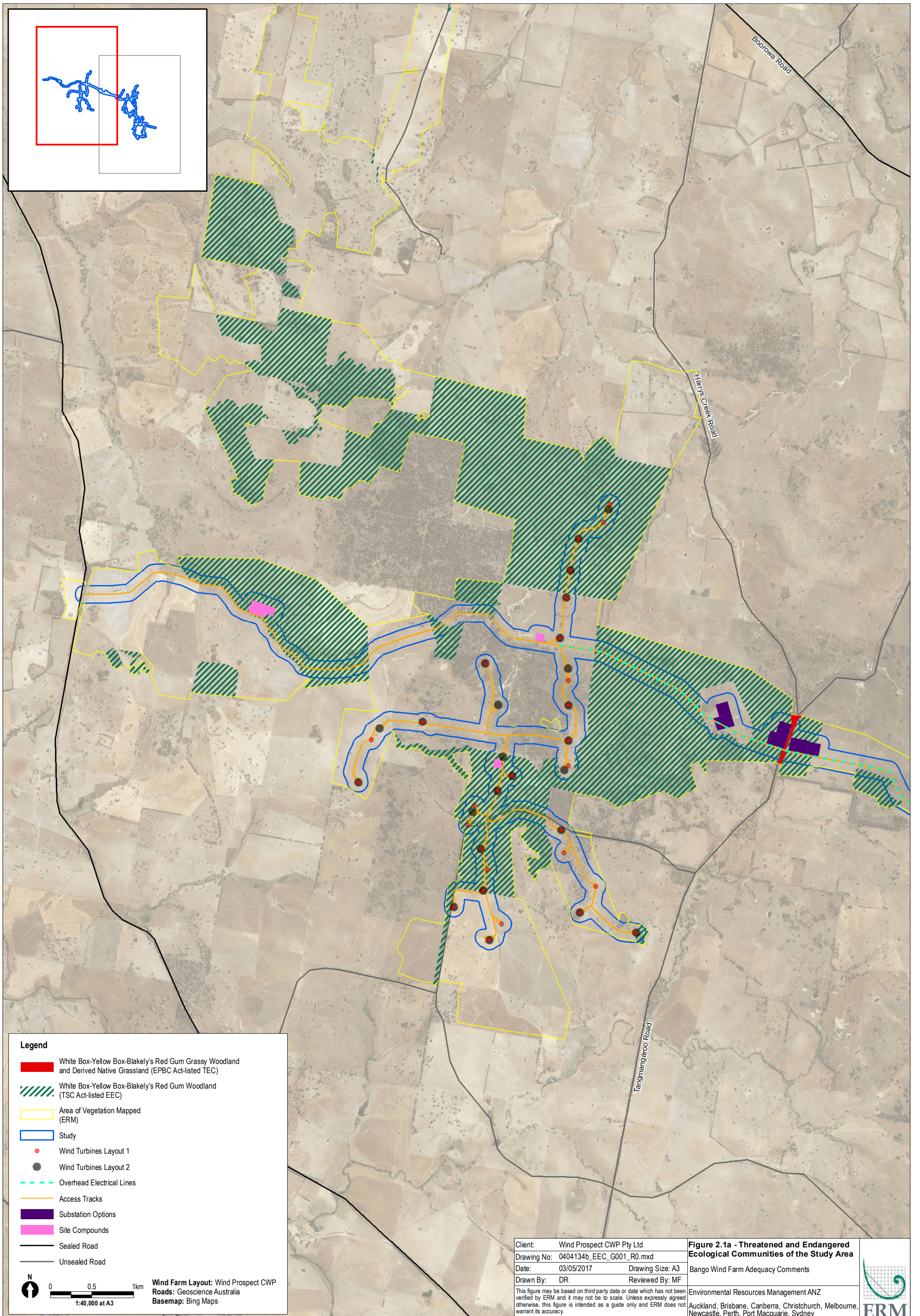
Vegetation zone Apple Box - Yellow Box Dry Grassy Woodland of the South Eastern Highlands - Mod_Good - Medium (LA103_MG_S) constitutes the TSC Act-listed EEC, as it is grassy woodland dominated by Yellow Box. However, it does not meet the identification guidelines for the EPBC listed TEC as it does not contain 12 or more native understorey species (excluding grasses) and does not have an average of 20 or more mature trees per hectare, or natural regeneration of the dominant overstorey eucalypts. The condition of the vegetation zone has been reduced due to past clearing and regular grazing and / or ploughing.

The vegetation zone meets the identification guidelines for the TSC Act-listed EEC provided in the *White Box Yellow Box Blakely's Red Gum Woodland Identification Guidelines* (NPWS undated) and the NSW Scientific Committee Final Determination (OEH 2011).

1.1.3 *Apple Box - Yellow Box Dry Grassy Woodland of the South Eastern Highlands - Mod_Good - Poor (LA103_MG_P)*

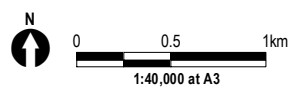
Vegetation zone Apple Box - Yellow Box Dry Grassy Woodland of the South Eastern Highlands - Mod_Good - Poor (LA103_MG_P) constitutes the TSC Act-listed EEC, as it is a Derived Native Grassland (DNG) previously dominated by Yellow Box trees. This vegetation zone includes areas that have undergone grazing and / or ploughing. It does not meet the identification guidelines for the EPBC listed TEC as it does not comprise 12 or more native understorey species (excluding grasses) and does not have an average of 20 or more mature trees per hectare. The condition of the vegetation zone has been reduced due to past clearing and regular grazing and / or ploughing.

The vegetation zone meets the identification guidelines for the TSC Act-listed EEC provided in the *White Box Yellow Box Blakely's Red Gum Woodland Identification Guidelines* (NPWS undated) and the NSW Scientific Committee Final Determination (OEH 2011). While the vegetation zone lacks a canopy layer, it has the potential to respond to assisted natural regeneration.



Legend

- White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland (EPBC Act-listed TEC)
- White Box-Yellow Box-Blakely's Red Gum Woodland (TSC Act-listed EEC)
- Area of Vegetation Mapped (ERM)
- Study
- Wind Turbines Layout 1
- Wind Turbines Layout 2
- Overhead Electrical Lines
- Access Tracks
- Substation Options
- Site Compounds
- Sealed Road
- Unsealed Road



Wind Farm Layout: Wind Prospect CWP
Roads: Geoscience Australia
Basemap: Bing Maps

Client:	Wind Prospect CWP Pty Ltd
Drawing No:	0404134b_EEC_G001_R0.mxd
Date:	03/05/2017
Drawn By:	DR
Reviewed By:	MF

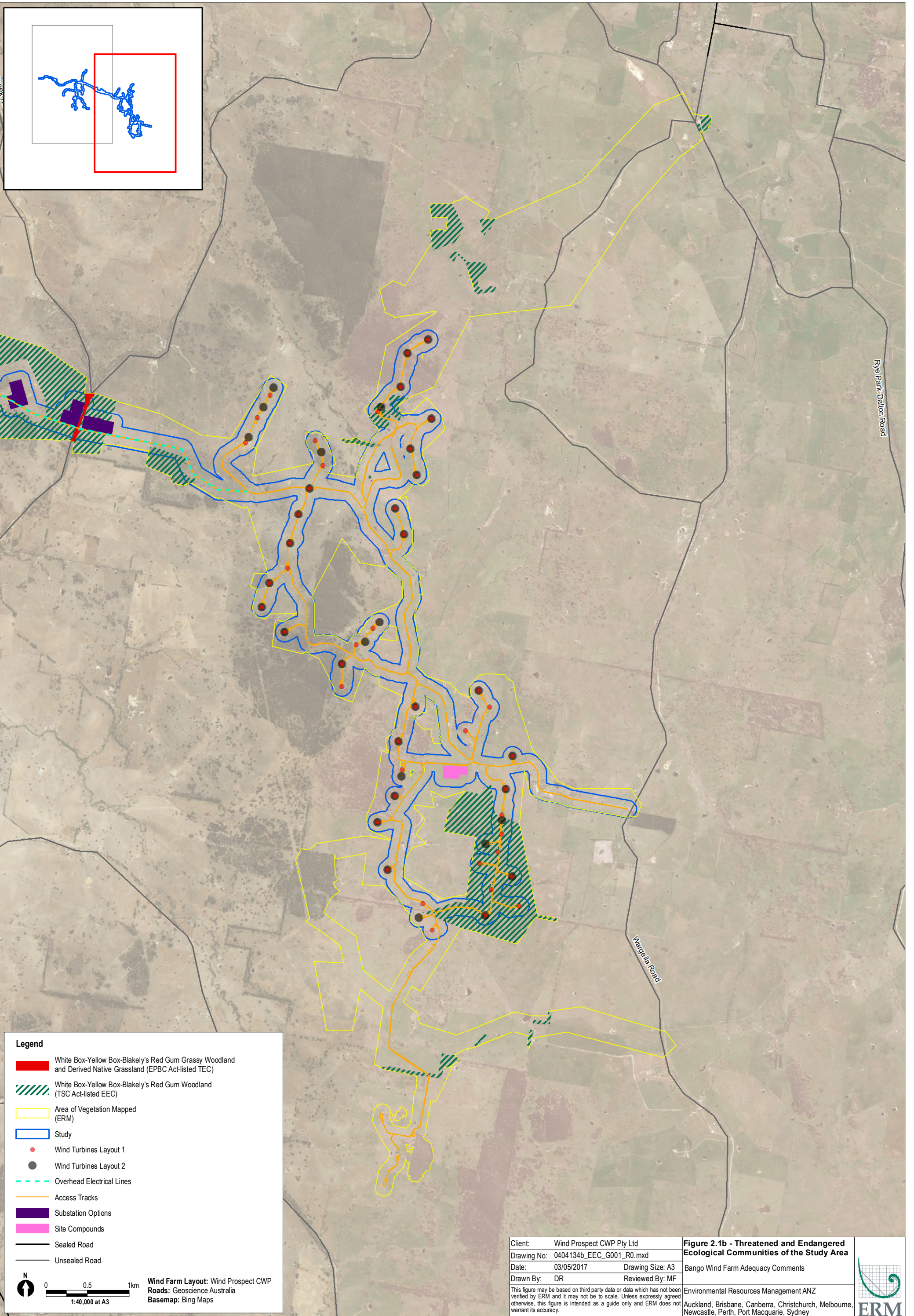
Figure 2.1a - Threatened and Endangered Ecological Communities of the Study Area

Bango Wind Farm Adequacy Comments

This figure may be based on third party data or data which has not been verified by ERM and it may not be to scale. Unless expressly agreed otherwise, this figure is intended as a guide only and ERM does not warrant its accuracy.

Environmental Resources Management ANZ
 Auckland, Brisbane, Canberra, Christchurch, Melbourne, Newcastle, Perth, Port Macquarie, Sydney





Legend

- White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland (EPBC Act-listed TEC)
- White Box-Yellow Box-Blakely's Red Gum Woodland (TSC Act-listed EEC)
- Area of Vegetation Mapped (ERM)
- Study
- Wind Turbines Layout 1
- Wind Turbines Layout 2
- Overhead Electrical Lines
- Access Tracks
- Substation Options
- Site Compounds
- Sealed Road
- Unsealed Road

Wind Farm Layout: Wind Prospect CWP
Roads: Geoscience Australia
Basemap: Bing Maps

Scale: 1:40,000 at A3
 0 0.5 1km

Client: Wind Prospect CWP Pty Ltd	Figure 2.1b - Threatened and Endangered Ecological Communities of the Study Area
Drawing No: 0404134b_EEC_G001_R0.mxd	Bango Wind Farm Adequacy Comments
Date: 03/05/2017	Drawing Size: A3
Drawn By: DR	Reviewed By: MF
<small>This figure may be based on third party data or data which has not been verified by ERM and it may not be to scale. Unless expressly agreed otherwise, this figure is intended as a guide only and ERM does not warrant its accuracy.</small>	
Environmental Resources Management ANZ Auckland, Brisbane, Canberra, Christchurch, Melbourne, Newcastle, Perth, Port Macquarie, Sydney	



1.1.4

Apple Box - Yellow Box Dry Grassy Woodland of the South Eastern Highlands - Low (LA103_L)

ERM in their assessment (2013) considered whether the Apple Box - Yellow Box Dry Grassy Woodland of the South Eastern Highlands - Low (LA103_L) vegetation zone was representative of Box Gum Woodland EEC as it comprises sparsely distributed Yellow Box and, prior to clearing, would have comprised the Box Gum Woodland EEC. LA103_L includes the following areas:

- scattered Yellow Box over cropping; and
- scattered Yellow Box over pasture and ploughed areas.

In support of the EEC argument it is noted that the NSW Scientific Committee (2011) in their Final Determination regarding Box Gum Woodland state:

“Disturbed remnants are still considered to form part of the community including remnants where the vegetation, either understorey, overstorey or both, would, under appropriate management, respond to assisted natural regeneration, such as where the natural soil and associated seed bank are still at least partially intact.”
(NSW Scientific Committee 2011).

However, the *White Box Yellow Box Blakely’s Red Gum Woodland Identification Guidelines* (NPWS, undated) states:

“Sites where there is unlikely to be sufficient seed remaining in the soil for the understorey or overstorey to regenerate are not part of the EEC. For example, trees under which intensive cropping of annual crop species has occurred and is ongoing.....are unlikely to be part of the community.”

Areas comprising this vegetation zone were assessed as not comprising the TSC Act-listed EEC or the EPBC Act-listed TEC as they have undergone ongoing, intensive cropping or regular ploughing and pasture improvement. This history of agricultural land use has depleted the soil seed bank such that it would not respond to assisted natural regeneration. These areas were however included in the LA103 Biometric Vegetation Type (BVT) as, due to the presence of a native canopy layer, they meet the BioBanking definition for low condition vegetation and do not meet the BioBanking definition for cleared land.

1.2

VEGETATION IMPACT AREA CALCULATIONS

The area of vegetation zones (including Box Gum Woodland) in the Study Area and Development Footprints is provided in *Table 2.1*.

Table 1.1 Area of Box Gum Woodland EEC in the Study Area and Development Footprint

Vegetation Zone Code	Vegetation Zone Name	TEC/EEC Status	Exhibited EA (ERM 2013) Study Area (ha)	Exhibited EA (ERM 2013) Footprint	PL1 Study Area	PL1 Footprint	PL2 Study Area	PL2 Footprint	Merged 'Worst Case' Scenario Study Area	Merged 'Worst Case' Scenario Footprint
Native Vegetation										
LA103_L	Apple Box - Yellow Box Dry Grassy Woodland of the South Eastern Highlands - Low	NA	469.57	48.94	101.09	15.63	102.66	16.2	102.69	16.24
LA103_MG_P	Apple Box - Yellow Box Dry Grassy Woodland of the South Eastern Highlands - Mod_Good - Poor	Box Gum Woodland (TSC Act-listed EEC)	313	49.16	248.02	36.33	233.83	34.24	250.66	37.71
LA103_MG_C*	Apple Box - Yellow Box dry grassy woodland of the South Eastern Highlands - Mod_Good - Roadside	Box Gum Woodland (TSC Act-listed EEC)	0	0	2.5	0.26	2.5	0.26	2.5	0.26
LA103_MG_S	Apple Box - Yellow Box Dry Grassy Woodland of the South Eastern Highlands - Mod_Good - Medium	Box Gum Woodland (TSC Act-listed EEC)	65.27	3.08	50.4	2.25	48.2	2.19	52.93	2.8
LA103_MG_H	Apple Box - Yellow Box Dry Grassy Woodland of the South Eastern Highlands - Mod_Good - High	Box Gum Woodland (EPBC Act listed TEC & TSC Act-listed EEC)	2.27	0.26	0	0	0	0	0	0
LA182_L	Red Stringybark - Scribbly Gum - Red Box - Long-leaved Box shrub - tussock grass open forest of the NSW South Western Slopes Bioregion - Low	NA	238.72	21.98	206.75	15.9	197.47	14.55	209.55	16.72

Vegetation Zone Code	Vegetation Zone Name	TEC/EEC Status	Exhibited EA (ERM 2013) Study Area (ha)	Exhibited EA (ERM 2013) Footprint	PL1 Study Area	PL1 Footprint	PL2 Study Area	PL2 Footprint	Merged 'Worst Case' Scenario Study Area	Merged 'Worst Case' Scenario Footprint
LA182_MG	Red Stringybark - Scribbly Gum - Red Box - Long-leaved Box shrub - tussock grass open forest of the NSW South Western Slopes Bioregion - Mod_Good	NA	99.24	5.28	102.53	5.9	94.39	3.97	104.44	6.07
	Native Shrub Regeneration		NA**	NA**	0.01	0	0.01	0	0.01	0
	Planted Native Vegetation		NA**	NA**	4.59	0.18	4.54	0.18	4.59	0
Sum	Native Vegetation				715.89	76.45	683.6	71.59	727.37	79.8
Non-native Land Cover										
	Bare Ground		NA**	NA**	0.03	0	0.03	0	0.03	0
	Cropping		NA**	NA**	68.18	3	66.02	2.48	68.18	2.99
	Pasture		NA**	NA**	440.94	41.35	443.97	40.05	447.82	43.75
	Road		NA**	NA**	0.2	0	0.2	0	0.2	0
Sum	Non-native Land Cover				509.35	44.35	510.22	42.53	516.23	46.74
Total					1225.24	120.8	1193.82	114.12	1243.6	126.54

1. The BVT Code is provided with a suffix which is an abbreviation of the condition class.

2. Box Gum Woodland = White Box-Yellow Box-Blakely's Red Gum Woodland (TSC Act-listed EEC) and White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland (EPBC Act-listed TEC).

*denotes a vegetation not previously named in ERM (2013) - has been identified during more detailed roadside vegetation mapping

NA** denotes not reported as not relevant in ecological impact assessment

1.3

BOX GUM WOODLAND IN THE LOCALITY

Available vegetation mapping was used to map the extent of Box Gum Woodland in the Locality, ie within 10km of the Development Footprint. This comprised a desktop assessment only and as such, it is not confirmed whether the areas mapped as Box Gum Woodland, external to the Study Area, meet the description for the EPBC Act-listed TEC or the TSC Act-listed EEC.

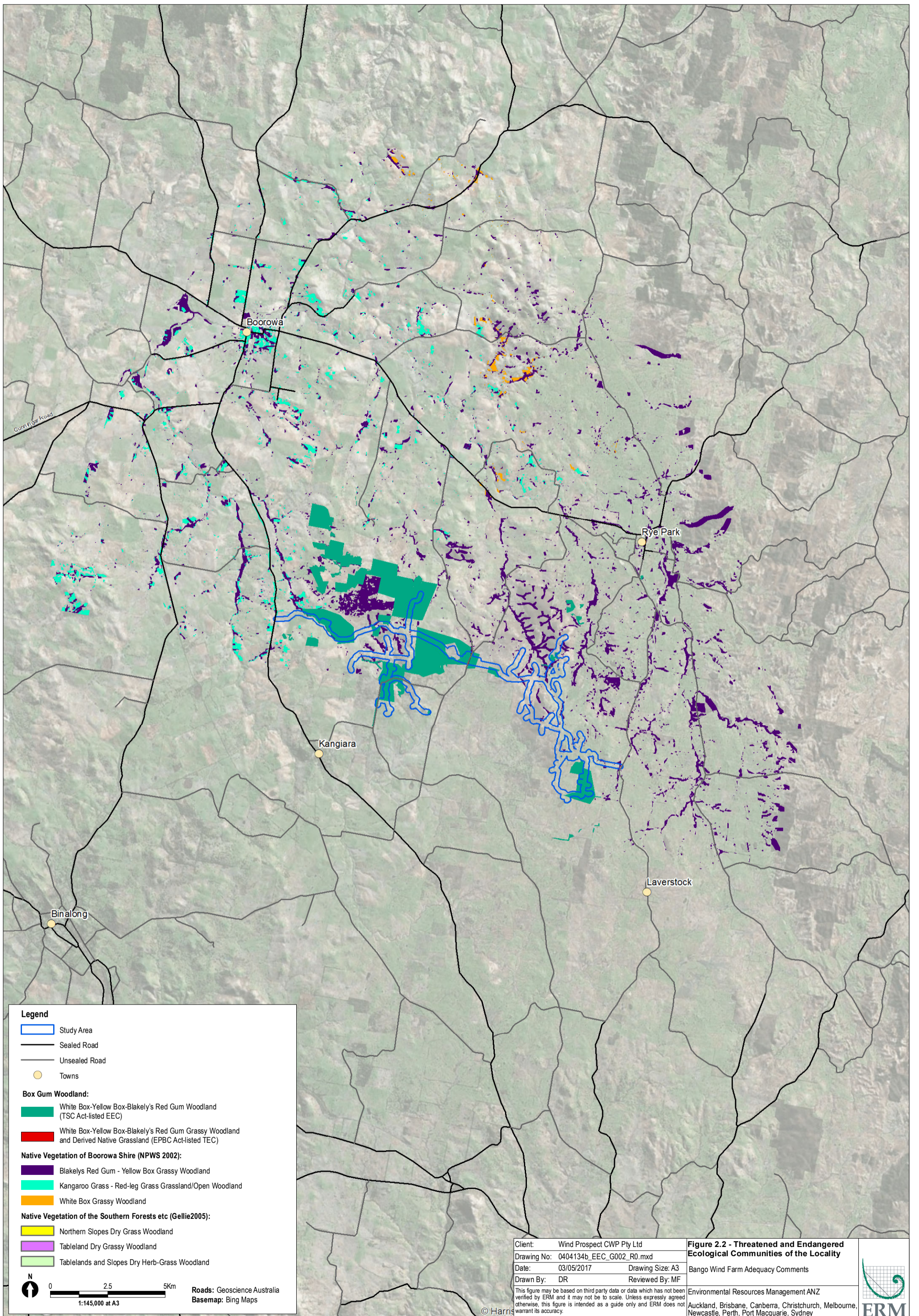
The following vegetation mapping was used:

- *Australian Alps, South west Slopes, and SE Corner Bioregions* (Gellie 2005); and
- *The Native Vegetation of Boorowa Shire* (NSW National Parks and Wildlife Service (NPWS) 2002).

Based on the vegetation community descriptions provided in the above documents, the following vegetation communities that occur in the Locality comprise Box Gum Woodland:

- Gellie 2005:
 - Northern Slopes Dry Grass Woodland;
 - Tableland Dry Grassy Woodland; and
 - Tablelands and Slopes Dry Herb-Grass Woodland.
- NPWS 2002:
 - Blakelys Red Gum – Yellow Box Grassy Woodland;
 - Kangaroo Grass – Red-leg Grass Grassland / Open Woodland; and
 - White Box Grassy Woodland.

Based on this, the extent of Box Gum Woodland in the Locality is estimated to be 1,713 hectare (ha) and is shown in *Figure 2.2*.



Legend

- Study Area
- Sealed Road
- Unsealed Road
- Towns

Box Gum Woodland:

- White Box-Yellow Box-Blakely's Red Gum Woodland (TSC Act-listed EEC)
- White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland (EPBC Act-listed TEC)

Native Vegetation of Boorowa Shire (NPWS 2002):

- Blakely's Red Gum - Yellow Box Grassy Woodland
- Kangaroo Grass - Red-leg Grass Grassland/Open Woodland
- White Box Grassy Woodland

Native Vegetation of the Southern Forests etc (Gellie2005):

- Northern Slopes Dry Grass Woodland
- Tableland Dry Grassy Woodland
- Tablelands and Slopes Dry Herb-Grass Woodland

Roads: Geoscience Australia
Basemap: Bing Maps

0 2.5 5Km
 1:145,000 at A3

Client: Wind Prospect CWP Pty Ltd
 Drawing No: 0404134b_EEC_G002_R0.mxd
 Date: 03/05/2017 Drawing Size: A3
 Drawn By: DR Reviewed By: MF

This figure may be based on third party data or data which has not been verified by ERM and it may not be to scale. Unless expressly agreed otherwise, this figure is intended as a guide only and ERM does not warrant its accuracy.

Figure 2.2 - Threatened and Endangered Ecological Communities of the Locality
 Bango Wind Farm Adequacy Comments
 Environmental Resources Management ANZ
 Auckland, Brisbane, Canberra, Christchurch, Melbourne, Newcastle, Perth, Port Macquarie, Sydney



Annex B

Woodland Birds

1 INTRODUCTION

This report provides details on woodland bird surveys and results.

2 METHODS

2.1 STRATIFICATION

To accurately survey the full range of potential habitats and vegetation types within the Study Area, the area was first assessed using aerial imagery. Areas of particular interest were then ground truthed and recorded as a stratification unit. This allowed the Study Area to be systematically sampled. Survey areas were stratified on biophysical attributes and by vegetation structure. Survey effort was then concentrated on those areas as stratification units.

Initially three main stratification units were observed: native grassland, native woodland and exotic grassland. These three major units (habitats) were stratified into sub-units according to their biophysical or vegetation structure attributes (refer *Table 2.1*).

Table 2.1 Stratification Units

Stratification Unit	Sub Unit
Native Woodlands	Apple Box - Yellow Box Grassy Woodland
	Yellow Box/ Blakely's Red Gum Open Woodland
	Red Stringybark Open Forest
	Scribbly Gum Woodland
	Stringybark Hilltop Low Woodland
	Scribbly Gum/Red Stringybark Woodland
	Yellow Box/Blakely's/Red Stringybark Open Woodland

2.2 PHYSICAL SURVEY METHOD

The native woodland stratification unit was targeted to survey for a number of threatened woodland birds identified from the literature and database review. Surveys for woodland birds were carried out during optimum times for the detection of woodland bird species in areas of suitable habitat when possible. A total of 17 surveys were undertaken within or adjacent to areas of woodland habitat. Each survey involved a two hectare area search for a minimum period of 20 minutes in early August due to cooler conditions and low activity; and 40 minutes in the optimal late Spring/early Summer season (refer *Table 2.2*, *Table 2.3* and *Table 2.4*). Bird surveys were completed by two observers. Birds were identified using 10 × 42mm binoculars and from characteristic calls. Within most stratification units a minimum of two bird surveys were completed on two separate days across the woodland survey sites.

During the survey period the same stratification unit was re-sampled on a number of occasions in a different location. This allowed for greater coverage of the woodland areas within the study area, thus producing a more detailed representation of the suite of woodland bird species.

This methodology is consistent with both the *Survey Guidelines for Australia's Threatened Birds* (DEWHA 2010) and the *Threatened Species Survey and Assessment: Guidelines for developments and activities (working draft)* (DEC 2004).

Table 2.2 *Survey Method Compliance*

DEC (2004)	DEWHA (2010)	ERM
Area search methods, where observers walk around an area of pre-determined size for a pre-determined length of time. A 1ha (200m x 500m) 20-minute search minimum.	Area searches are typically conducted over plots of about 1-3 ha, for 10-20 min, though larger plots may be surveyed over hours, days and even months.	Two hectare area search for a minimum period of 20 minutes in early August due to cooler conditions and low activity, to 40 minutes in the optimal late Spring/early Summer season.
DEC (2004) - Threatened Biodiversity Survey and Assessment: Guidelines for Developments and Activities.		
DEWHA (2010) - Survey guidelines for Australia's threatened birds.		






2.3 SURVEY SITE DETAILS







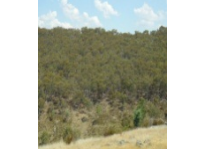
Table 2.4 describes the woodland bird survey locations by stratification sub units within the native woodland areas. Where sites had a similar vegetation community they were separated by levels of disturbance, structure and features.

Table 2.3 Woodland Bird Survey Timing and Locations

Point No	Date	Survey Type	Time Start	Time Finish	Location	Latitude	Longitude	Weather Conditions
WP001	1/08/2012	Bird Census	8:05	8:25	Cnr Tangamangaroo & Harrys Ck Rd	34.61175 S	148.8581 E	Still, 1°C, no cloud
WP002	1/08/2012	Bird Census	9:35	9:55	Taffs Hill	34.5166 S	148.7602 E	Light wind, 7°C, no cloud
WP003	1/08/2012	Bird Census	10:25	10:55	Taffs Hill	34.52608 S	148.7656 E	Light wind, 10°C, no cloud
WP016	2/08/2012	Bird Census	8:20	8:50	Thompson Property	34.58658 S	148.8523 E	Very light wind, 4°C, no cloud
WP018	2/08/2012	Bird Census	9:15	9:35	Willow Hill	34.58177 S	148.8562 E	Very light wind, 4°C, no cloud
WP022	2/08/2012	Bird Census	10:00	10:15	Yambacoona	34.56837 S	148.8384 E	Light wind, 14°C
WP024	2/08/2012	Bird Census	12:15	12:35	Yambacoona	34.57279 S	148.8395 E	Light wind, 14°C
31	21/11/2012	Bird Census	8:48	9:38	Taree	34.55528 S	148.8679 E	Calm, 8°C
34	21/11/2012	Bird Census	15:35	16:14	Taffs Hill	34.51265 S	148.7546 E	Calm, 22°C
36	22/11/2012	Bird Census	9:05	9:42	Pines	34.57336 S	148.7953 E	Light wind, 12°C
37	22/11/2012	Bird Census	10:35	11:32	Cnr Tangamangaroo & Harrys Ck Rd	34.56156 S	148.8264 E	Light wind, 21°C
31	22/11/2012	Bird Census	17:30	17:58	Taree	34.55528 S	148.8679 E	Light wind, 24°C
34	23/11/2012	Bird Census	7:21	8:07	Taffs Hill	34.51125 S	148.7536 E	Light wind, 10°C
-	5/12/2012	Bird Census	7:35	8:20	Hillview	34.55223 S	148.865 E	Moderate wind, 10°C
-	5/12/2012	Bird Census	16:25	17:10	Willow Hill	34.58071 S	148.8487 E	Moderate wind, 22°C
-	6/12/2012	Bird Census	16:20	17:05	Hillview	34.55223 S	148.865 E	Calm, 25°C
56	13/12/2012	Bird Census	12:07	13:00	Lloyd Davis	34.64377 S	148.8712 E	Calm, 20°C

Table 2.4 Woodland Bird Census Location Descriptions

Point No.	Location Name	Latitude	Longitude	Stratification Unit Description	Canopy Height	Understorey	Features	Disturbance	Image
31	Taree	34.55528 S	148.8679 E	Stringybark Hilltop Low Woodland	8m	Rocky substrate, patchy grassy understorey	Fallen Timber, some hollows	Moderate - high	
42	Taff's Hill	34.51125 S	148.7536 E	Yellow Box Blakleys Red Gum Open Woodland, semi riparian along creek line, scattered clusters of Red Gums	10-12m	Grassy understorey, weedy patches further up the slope	Some fallen timber and stags	High	
36	Pines	34.57336 S	148.7953 E	Scribbly Gum Woodland	8-10m	Patchy grassy understorey	Some fallen timber and stags	High	
56	Lloyd Davis	34.64377 S	148.8712 E	Stringybark Hilltop Low Woodland	10-12m	Grassy understorey,	Some fallen timber and stags. Rock outcrops on top of the slope	High	
WP001	Cnr Tangamangaroo & Harrys Ck Rd	34.56156 S	148.8264 E	Apple Box - Yellow Box Grassy Woodland	10-12m	Grassy understorey, some shrubs forbs and <i>Acacia</i> spp.	Some fallen timber and stags and hollows in the larger remnant trees	Moderate	
WP002	Taffs Hill (Greening Australia Block)	34.5166 S	148.7602 E	Yellow Box Open Woodland with revegetation mix of acacias and young eucalypt species	10-12m	Grassy	Some stags, little fallen timber	High	

Point No.	Location Name	Latitude	Longitude	Stratification Unit Description	Canopy Height	Understorey	Features	Disturbance	Image
WP003	Taffs Hill	34.52608 S	148.7656 E	Red Stringybark Woodland, open large remnant trees	12-14m	Grassy	Some fallen timber and stags scattered through this area	High	
WP016	Thompson Property	34.58658 S	148.8523 E	Red Stringybark Woodland, some semi mature and regrowth	8-12m	Dominant species Nodding Blue-lily and mixture of native and exotic grasses	Some fallen timber and stags scattered through this area	Moderate	
WP018	Willow Hill	34.58177 S	148.8562 E	Scribbly Gum/Red Stringybark Woodland	10-12m	Dominant species Nodding Blue-lily and mixture of native and exotic grasses	Some fallen timber and stags scattered through this area	Moderate	
WP022	Yambacooona	34.56837 S	148.8384 E	Yellow Box/Blakely's/Red Stringybark Open Woodland	8-10m	Grassy understorey some small shrubs Nodding Blue-lily and acacia species	Some fallen timber and stags scattered through this area	Moderate	
WP024	Yambacooona	34.57279 S	148.8395 E	Yellow Box/Blakely's/Red Stringybark open Woodland, semi mature some regrowth	8-10m	Grassy understorey some shrubs	Some fallen timber and stags scattered through this area	Moderate - high	
	Willow Hill	34.58071 S	148.8487 E	Stringybark Hilltop Low Woodland	6-8m	Rocky substrate, patchy grassy understorey some shrubs	Scattered fallen timber	High	
	Hillview	34.55223 S	148.865 E	Stringybark Hilltop Low Woodland	8m	Rocky substrate, patchy grassy understorey	Fallen Timber, some hollows	Low - moderate	

Bird surveys conducted in woodland or adjacent to woodland areas recorded 99 bird species (refer to ERM 2013 for a full list of the species recorded, results and figures showing locations).

Baker-Gabb, D. 2011. **National Recovery Plan for the Superb Parrot *Polytelis swainsonii***. Department of Sustainability and Environment, Melbourne.

Department of Sustainability, Environment, Water, Population and Communities (2013). ***Polytelis swainsonii* in Species Profile and Threats Database, Department of Sustainability, Environment, Water, Population and Communities, Canberra.** Available from: <http://www.environment.gov.au/sprat>.

Gibbons. P (2002). **Tree Hollows and Wildlife Conservation in Australia.** CSIRO.

Manning. et al. (2012) **Hollow futures? Tree decline, lag effects and hollow-dependent species.** Fenner School of Environment and Society, The Australian National University, Canberra, ACT, Australia. Animal Conservation.

Office of Environment and Heritage (OEH) (2012). **Threatened Species Profiles.** <http://www.environment.nsw.gov.au/threatenedspeciesapp/default.aspx?keywords=button>

Annex C

Superb Parrot

This report provides further analyses relating to the Superb Parrot (*Polytelis swainsonii*) and the project.

SPECIES BACKGROUND

The Superb Parrot is listed as a vulnerable species under both the TSC Act and the EPBC Act. The Superb Parrot is found throughout eastern inland NSW. The core breeding area for this species is roughly bounded by Cowra and Yass in the east, and Grenfell, Cootamundra and Coolac in the west. Birds breeding in this region are mainly absent during winter, when they migrate north to the region of the upper Namoi and Gwydir Rivers. The other main breeding sites are in the Riverina along the corridors of the Murray, Edward and Murrumbidgee Rivers where birds are present all year round (OEH 2012). This species is recognised as a significant species within the Study Locality and Boorowa is recognised as a stronghold for this species.

The preferred vegetation type of the Superb Parrot on the south west slopes is Box-Gum Grassy Woodland dominated by Yellow Box (*Eucalyptus melliodora*), Blakely's Red Gum (*E. blakelyi*) and White box (*E. albens*), often in conjunction with other species such as Apple Box (*E. bridgesiana*), Mealy Bundy (*E. nortonii*), Red Box (*E. polyanthemos*), Candlebark (*E. rubida*), Brittle Gum (*E. mannifera*), Grey Box (*E. macrocarpa*) and Red Stringybark (*E. macrorhyncha*) (Manning et al. 2012).

The Superb Parrot has a preference for medium to larger hollows of greater than 5cm in diameter and above one metre off the ground. This species prefers Blakely's Red Gum, Yellow Box, and Apple Box species and often nests in dead stags (Manning et al. 2012). The Superb Parrot often nests in clusters as they are a very colonial species (Gibbons 1968).

NSW OEH lists the threats to this species as including the removal of hollow bearing trees, clearing of woodland remnants, poor regeneration of nesting trees and food resources, feeding on grain spills and subsequently being struck by vehicles, loss of hollows to feral bees and native and exotic hollow-nesting birds, and illegal trapping which can also result in the destruction of hollows (OEH 2012).

Further to those threats listed by the NSW OEH, the EPBC Act also includes additional threats as including grazing stock as reducing the amount of food resources, hydrological changes impacting traditional breeding habitat, poisoning from pesticide sprays and beak and feather disease (DSEWPC 2013).

METHODS

To assess how the Superb Parrot utilises the Study Area a species utilisation and habitat based approach was undertaken. This methodology is consistent with Objective 2 of the National Recovery Plan for the Superb Parrot (*Polytelis swainsonii*) (Baker-Gabb 2011).

Objective 2; Increase the level of knowledge of the Superb Parrot's ecological requirements.

Performance criterion: Key ecological information collected, allowing potential colony sites, foraging sites and flight corridors to be identified, mapped and protected.

Action 2.1: Survey and map areas of River Red Gum forest in the Riverina and woodlands on the NSW/ACT slopes and tablelands with high potential to support breeding colonies.

Action 2.2: Investigate the foraging ecology of Superb Parrots.

Action 2.3: Identify and map all areas with high potential to be used for foraging during the breeding season, and areas used for foraging during the non-breeding season.

Action 2.4: Identify and map potential flight corridors between breeding colonies and potential or known foraging areas, and corridors used in the non-breeding season.

To assess the Superb Parrot's utilisation and preferred habitats across the Study Area a number of survey methods were used to record data, these are detailed below:

- BUS survey;
- Bird Census;
- Tree Hollow survey; and
- Habitat assessment.

2.1

Bus

BUS recorded the presence of this species and important flight path information. It was possible to construct an understanding of the daily movements of this species as surveys were conducted at various times of the day throughout and following the breeding season. The number of individuals recorded at each survey point provided information on areas that could be of greater value for foraging or breeding for this species.

2.2 *BIRD CENSUS*

The data from the bird census provides an insight into the stratification units preferred by this species within the landscape. This information was used to construct habitat preference maps for this species thus allowing a habitat based conservation approach to minimise impact to core habitat areas for this species within the area of disturbance.

2.3 *TREE HOLLOW SURVEY*

A hollow bearing tree survey was undertaken from January 2013 to February 2013 within an area bound by a 500m buffer around all proposed turbine locations. The survey was undertaken by two ecologists on foot and by vehicle. Hollow bearing trees were assessed visually, using binoculars. The total area surveyed for hollow bearing trees was approximately 4,981 hectares (ha). All hollow bearing trees with a diameter at breast height (DBH) greater than 50cm were mapped. The following information was collected:

- hollow size classes were recorded by diameter as follows;
- 0 - 5 cm = Small;
- 6 - 10 cm = Medium;
- 11 cm and above = Large;
- the height of the hollow from ground level;
- the species of tree;
- the height of the tree; and
- the DBH.

The information collected during the mapping of tree hollows was used to map the habitat resources (breeding and/or refuge), available for a range of hollow dependant species including Superb Parrots, large forest owls, small passerine birds, arboreal mammals and microbats. This information would be used to guide conservation decisions around areas that are recognised as potential Superb Parrot breeding habitat.

2.4 *HABITAT ASSESSMENT*

A habitat assessment was undertaken at the Study Area resolution. This enabled mapping of areas of known habitat utilised for foraging, i.e. grain fields, roosting and potential breeding habitat through the mapping of suitable hollow bearing trees. This information was able to be used to provide effective decisions to minimise any impacts the proposal may have on this species.

3.1 BUS RESULTS

3.1.1 Number of Records

The Superb Parrot was recorded 148 times from eight BUS locations. *Table 3.1* shows the number of Superb Parrots recorded from each BUS point during the survey period. The highest numbers of Superb Parrot recordings over the survey period were 64 from BUS 1 (Taff's) and 48 from BUS 2 (Hopefield). The next highest was 10 birds recorded from BUS 19 (Lavestock Rd. Montalta Gate) and nine recorded from BUS 10 (Springvale). The areas with the highest concentration of recordings coincided with those that were predominately croplands and where adjoining remnant native vegetation community was Box Gum woodland.

The absence of recordings from BUS locations in the south of the Study Area could be attributed to the land management practices i.e. grazing dominate land use in these areas thus limiting available foraging habitat, or that the vegetation communities within these areas are dominated by the Red Stringybark vegetation community and there is a noticeable lack of Box Gum Woodland in these areas. This difference in vegetation dominance could be related to lower soil quality on the rocky slopes in the south of the Study Area.

Table 3.1 Superb Parrot Records from BUS

BUS Number	BUS Location Name	No. Superb Parrots Recorded
1	BUS Taffs	64
2	BUS Hopefield	48
3	BUS Willow	0
4	BUS Wargeila	1
5	BUS Taree	0
6	BUS Taree 2	0
7	BUS Pines	5
8	BUS Yambacoona	6
9	BUS Glanmire	5
10	BUS Springvale	9
11	Springvale Property	0
12	BUS Mt Buffalo	0
13	BUS Lloyd Davis	0
14	Hopefield Lane	0
15	Hopefield Lane/Boorowa Rd	0
16	Harry's Ck Rd/Boorowa Rd	0
17	The Pines Property	0
18	Mt Buffalo Access Gate	0
19	Lavestock Rd. Montalta Gate	10
20	The Pines Access	0
Total		148

3.1.2

Flight Paths

During the survey period Superb Parrots were observed flying in all directions during the day, that being north, south, east and west. An analysis of the time of day which Superb Parrots were recorded was undertaken from the individual BUS points. Some correlations were observed regarding the species' movements.

The times of the BUS when Superb Parrots were recorded were categorised into morning (7:00 – 10:36 hours) (see *Table 3.2*) and afternoons (12:10 – 16:30 hours) (see *Table 3.3*). Surveys carried out between these times and later in the afternoons did not record any Superb Parrots. This information showed that 117 Superb Parrots were recorded at six BUS points in the mornings (including nine that were recorded perching and 10 that were foraging in a pasture and some perched in a tree), and a total of 31 were recorded at five BUS points in the afternoon (including one recorded perching).

A summary of the general flight paths over the landscape as recorded from each of the BUS points are shown in *Table 3.2* and *Table 3.3* and graphical representation of the data is shown in *Figure 3.1* and *Figure 3.2*. The morning flight path summary shows the highest number of Superb Parrots flying in a southeast direction from BUS 2 (Hopefield). The second highest number of movements were northwest from BUS 1 (Taff's) with notable north and east movements also from BUS 1 (Taff's). These movements could relate directly to the cropping regimes at the time of the surveys as birds were observed moving between fields to forage. The observation of 30 Superb Parrots recorded during one BUS was due to a flock of parrots feeding on grain adjacent to BUS 2 (Hopefield).

The Superb Parrot was generally recorded less frequently during afternoon surveys. The highest number of birds was recorded moving in a south direction was at BUS 1 (Taff's), with equal numbers moving north at BUS 1 (Taff's) as BUS 19 (Lavestock Rd. /Montalta Gate). BUS 19 at Lavestock Rd./Montalta Gate also recorded an equal number moving in a south direction as those moving north. BUS Taff's also recorded a four birds moving in an easterly Direction. These movements also appeared to be related to relevant crop regimes as birds were observed moving between fields to forage.

The analysis of the results shows that in the mornings at most BUS points (aside from BUS Hopefield) Superb Parrots were recorded moving to the north, northeast and northwest.

A trend was less readily observable in the afternoon movements, however there were notable movements to the south and southeast and nearly an equal number of birds recorded moving north from BUS 1 (Taff's), BUS 3 (Wargelia) and BUS 19 (Lavestock Rd/Montalta Gate).

The general and predicted flight paths of both the mornings (AM) and afternoons (PM) have been plotted on *Annex A* along with areas that are potential or known foraging areas of cropped grain fields. The general flight path mapping was put together from the BUS data and field observations of the following behaviour:

- Superb Parrots were recorded moving between grain resources at different times of the day;
- Superb Parrots were often seen using paddock trees as rest areas;
- Superb Parrots were observed generally following gullies or depressions;
- Superb Parrots were often observed moving along roadsides in proximity to roadside vegetation; and
- Superb Parrots were rarely observed crossing the top of ridgelines.

Table 3.2 Superb Parrot Morning Flight Directions

BUS No.	BUS Location	Date	Time	Numbers Recorded	Height Class Relative to the ground 0-40, 40-150, >150	Distance From Observer (m)	Flight Direction	Notes
1	BUS Taffs	6/12/2012	7:05	1	0-40	40	S	
1	BUS Taffs	6/12/2012	7:05	2	0-40	50	S	
1	BUS Taffs	23/11/2012	7:28	8	0-40	60	NW	
1	BUS Taffs	23/11/2012	7:28	5	0-40	70	NW	
1	BUS Taffs	23/11/2012	7:28	4	0-40	80	NW	
1	BUS Taffs	6/12/2012	7:05	2	0-40	50	N	
1	BUS Taffs	6/12/2012	7:05	1	0-40	20	N	
1	BUS Taffs	6/12/2012	7:05	3	0-40	50	N	
1	BUS Taffs	6/12/2012	7:05	3	0-40	90	N	
1	BUS Taffs	6/12/2012	7:05	8	0-40	100	E	
1	BUS Taffs	29/11/2012	7:38	6	-	-	-	Perched
1	BUS Taffs	6/12/2012	7:05	3	-	-	-	Perched
2	BUS Hopefield	14/11/2012	7:55	30	-	10	-	Foraging in pasture and perched in trees took flight when disturbed
2	BUS Hopefield	14/11/2012	7:55	2	0-40	5	SE	
2	BUS Hopefield	14/11/2012	7:55	3	0-40	10	SE	
2	BUS Hopefield	14/11/2012	7:55	4	0-40	30	SE	
2	BUS Hopefield	14/11/2012	7:55	1	0-40	40	S	
2	BUS Hopefield	14/11/2012	7:55	7	0-40	5	NW	
7	BUS Pines	5/12/2012	10:35	1	0-40	80	SW	Very Windy
7	BUS Pines	6/12/2012	8:45	1	0-40	10	S	
7	BUS Pines	6/12/2012	8:45	3	0-40	5	S	
8	BUS Yambacoona	22/11/2012	10:36	1	0-40	10	S	
8	BUS Yambacoona	22/11/2012	10:36	5	0-40	40	NE	Travelling along Rd
9	BUS Glanmire	16/11/2012	8:55	4	0-40	20	W	
9	BUS Glanmire	16/11/2012	8:55	1	0-40	10	NE	
10	BUS Springvale	14/11/2012	7:37	3	0-40	10	NE	
10	BUS Springvale	14/11/2012	7:37	5	0-40	40	N	

Table 3.3 Superb Parrot Afternoon Flight Directions

BUS No.	BUS Location	Date	Time	Numbers Recorded	Height Class Relative to the ground 0-40, 40-150, >150	Distance From Observer (m)	Flight Direction	Notes/Ob. Type
1	BUS Taffs	21/11/2012	13:38	1	0-40	110	W	
1	BUS Taffs	3/12/2012	16:00	3	0-40	0	W	
1	BUS Taffs	22/11/2012	15:00	3	0-40	40	S	
1	BUS Taffs	5/12/2012	12:10	4	0-40	0	S	
1	Bus Taffs	15/11/2012	12:58	2	0-40	50	N	
1	BUS Taffs	21/11/2012	13:38	3	0-40	140	N	
1	BUS Taffs	3/12/2012	16:00	1	0-40	100	E	
1	BUS Taffs	5/12/2012	12:10	1	-	100	-	Perched in stag
2	BUS Hopefield	3/12/2012	16:30	1	0-40	60	E	
4	BUS Wargeila	4/12/2012	15:35	1	0-40	50	N	
10	BUS Springvale Lavestock Rd.	5/12/2012	15:10	1	0-40	20	W	Very Windy
19	Montalta Gate Lavestock Rd.	6/12/2012	13:25	5	0-40	30	S	
19	Montalta Gate Lavestock Rd.	6/12/2012	13:25	2	0-40	20	N	
19	Montalta Gate	6/12/2012	13:25	3	0-40	10	N	

Figure 3.1 Morning Flight Path Summary

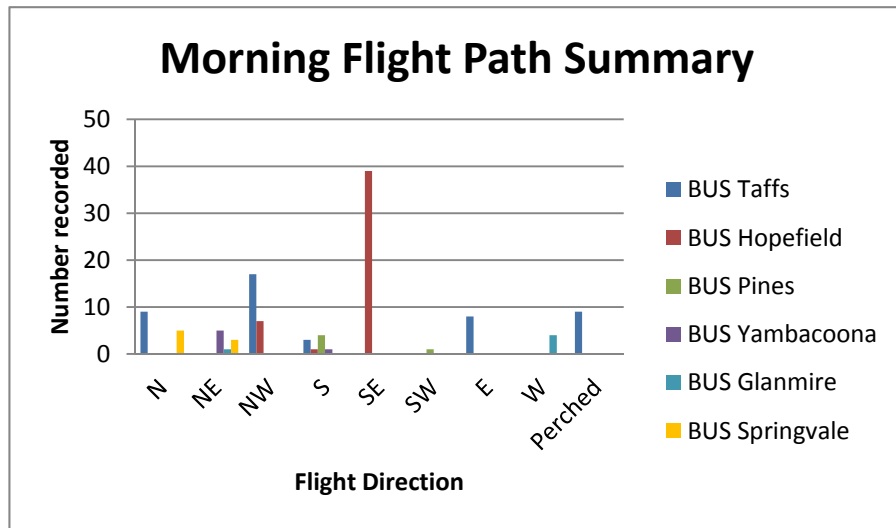
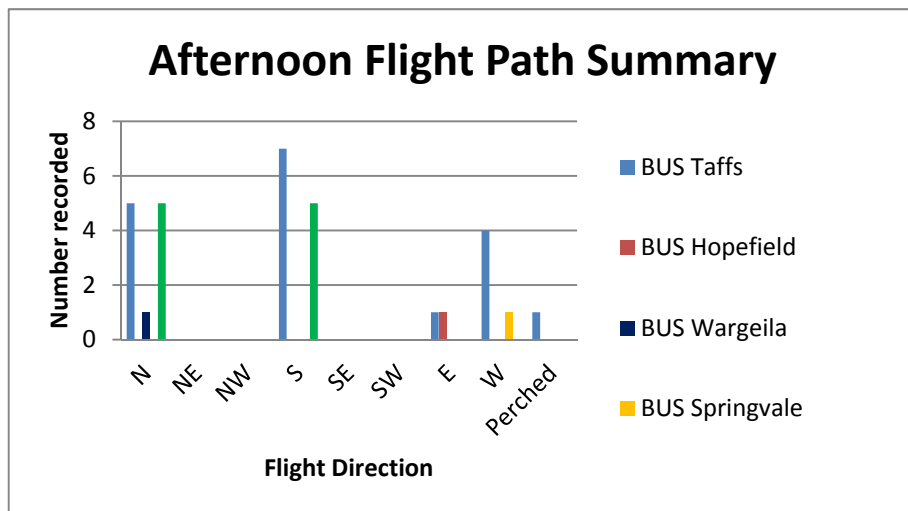


Figure 3.2 Afternoon Flight Path Summary



3.1.3 Flight Path Barriers

Plotting the general flight paths of the Superb Parrot in combination with the proposed turbine planning layouts it was observed that there are areas where turbines occur that could potentially impede or disrupt species movements through the landscape between potential nesting habitats and foraging resources (*Annex A*).

The following lines of turbines in *Table 3.4* have been identified as possibly creating flight path barriers for the Superb Parrot.

Table 3.4 Potential Flight Path Barriers

Planning Layout	Turbine Identification Number	Location	Barrier
130222_PL_1	113	Taff's Hill/ Hopefield	This line of Turbines may impede east - west movements between grain resources during the breeding season.
130222_PL_1	78	Taff's Hill/ Hopefield	
130222_PL_1	6	Taff's Hill/ Hopefield	
130222_PL_1	4	Taff's Hill/ Hopefield	
130222_PL_1	51	Taff's Hill/ Hopefield	
130222_PL_1	16	Taff's Hill/ Hopefield	
130222_PL_1	124	Taff's Hill/ Hopefield	
130222_PL_1	108	Taff's Hill	This line may impede the east -west flight path between grain resources and natural resources; this valley appeared to be a common flight path area.
130222_PL_1	116	Taff's Hill	
130222_PL_1	8	Taff's Hill	
130222_PL_1	126	Taff's Hill	This line of turbines may impede the east - west flight path following a small gully between resources.
130222_PL_1	127	Taff's Hill	
130222_PL_1	128	Taff's Hill	
130222_PL_1	31	Taff's Hill	May disrupt east - west flight path between resources, however birds may be inclined to follow the open woodland gully around the turbines.
130222_PL_1	20	Taff's Hill	
130222_PL_1	30	Taff's Hill	
130222_PL_1	132	Taff's Hill	May disrupt east - west flight path between resources, however birds may be inclined to follow the open woodland gully around the turbines.
130222_PL_1	131	Taff's Hill	
130222_PL_1	129	Taff's Hill	
130222_PL_2	86	Hopefield	May impede east - west flight path between resources.
130222_PL_2	37	Hopefield	
130222_PL_2	18	Hopefield	
130222_PL_2	70	Taff's Hill	This line may impede the east -west flight path between grain resources and natural resources, this valley appeared to be a common flight path area.
130222_PL_2	65	Taff's Hill	
130222_PL_2	35	Taff's Hill	
130222_PL_2	55	Pines	May impede east - west flight path between resources
130222_PL_2	49	Pines	
130222_PL_2	42	Pines	

The above information was compiled based on field observations and GIS analysis from a landscape resolution.

3.2 *BIRD CENSUS*

During the bird census, the Superb Parrot was recorded from two locations only: Taff's Hill, and the corner (cnr) of Tangamangaroo Road and Harrys Creek Road. The corresponding stratification units for these locations are Yellow Box Blakley's Red Gum Open Woodland and Apple Box - Yellow Box Grassy Woodland. Both of these areas represent preferred habitat for the Superb Parrot. Bird surveys were undertaken in both locations during Superb Parrot breeding season, no active nests were identified during the surveys.

3.3 *HABITAT ASSESSMENT*

A habitat assessment undertaken within the Study Area was aimed at identifying, recording and mapping areas that Superb Parrots were utilising during the survey period and mapping areas that are known to be preferred habitats for this species i.e. cropped fields for foraging and areas of Yellow Box Blakley's Red Gum Open Woodland and Apple Box - Yellow Box Grassy Woodland. *Annex A* shows the extent of these habitat areas.

The habitat assessment and mapping identified the northern areas toward Boorowa, and the north-western areas of the Study Area to be of higher value to the Superb Parrot throughout the breeding season than other parts of the Study Area. This is also evident from the numbers of birds recorded from this area. This is due to the abundance of foraging habitat from the grain cropping that is undertaken in these areas and the availability of preferred nectar from the blossoms of Yellow Box Blakely's Red Gum Open Woodland, and the Apple Box Yellow Box Grassy Woodland.

3.4 *TREE HOLLOW SURVEY*

A total of 1,237 hollows were recorded, comprised of 556 Small hollows (2-5cm), 509 medium hollows (6-10cm) and 172 large hollows (>11cm). The hollow bearing tree density in the area surveyed equates to an overall value of approximately 0.09 hollow bearing trees per hectare based on the survey results over the paddock areas. Compared to the density of hollow bearing trees in undisturbed (or remnant) woodland that is closer to 7-17 hollow bearing trees per hectare (OEH 2012), the numbers of hollows available for those species is very low. The dominant hollow bearing tree species were Scribbly Gum, Yellow Box, Blakely's Red Gum and Red Stringybark.

The preferred hollow size for the superb parrot is a medium hollow greater than five cm in diameter and approximately five to 13m off the ground (Manning et al. 2012). Preferred nesting trees are the Blakely's Red Gum, Yellow Box, Apple Box White Box species and dead stags (OEH 2012).

An analysis of the potential nesting habitat for the Superb Parrot has been undertaken. A total of 509 suitable sized hollows at preferred height above the ground were recorded. These were then grouped by species into primary species (Blakely's Red Gum, Yellow Box, Apple Box White Box and dead Stags) and secondary nesting trees (Red Stringybark).

A total of 48 primary nesting tree species, containing approximately 78 suitable hollows were recorded within 500m of turbine infrastructure. A further 13 secondary species containing 27 suitable hollows were also recorded. Also recorded were a total of 31 trees comprised of Inland Scribbly Gum and other eucalyptus species containing approximately 57 hollows of a suitable size. These hollow bearing trees have been plotted on a map (*Annex A*) along with proposed Turbine layouts. An analysis of the distance of these important hollows will be undertaken and mitigation measures such as appropriate set-backs from these features will be provided in subsequent reports in this series.

4

SUMMARY

From the information collected during desktop studies and from field surveys a comprehensive understanding of the habitats for woodland birds and Superb Parrot site utilisation within the Study Area and surrounds has been developed. Flight path mapping has provided important information to minimise any potential impacts to the Superb Parrot, decisions made around these flight paths would also flow on to the conservation of other species. The level of field investigation undertaken to date for the Superb Parrot and woodland birds has been sufficient to enable the impact assessment of threatened species.

The information collected has enabled the impact assessment to focus on a habitat preservation approach for the Superb Parrot and the listed threatened woodland bird species. This approach is consistent with Objective 2 of the *National Recovery Plan for the Superb Parrot* (Baker-Gabb 2011) and the required actions for the recovery of this species being: landscape retention and conservation of remaining trees both dead and alive, as large, dead trees have a vital ecological role to play in the conservation of many fauna species. Planning decisions following the mitigation hierarchy of 'Avoid, Mitigate and lastly Offset' were made to avoid impacts on areas of high quality habitat that have the potential to be impacted upon.

Baker-Gabb, D. 2011. **National Recovery Plan for the Superb Parrot *Polytelis swainsonii***. Department of Sustainability and Environment, Melbourne.

Department of Sustainability, Environment, Water, Population and Communities (2013). ***Polytelis swainsonii* in Species Profile and Threats Database, Department of Sustainability, Environment, Water, Population and Communities, Canberra.** Available from: <http://www.environment.gov.au/sprat>.

Gibbons. P (2002). **Tree Hollows and Wildlife Conservation in Australia.** CSIRO.

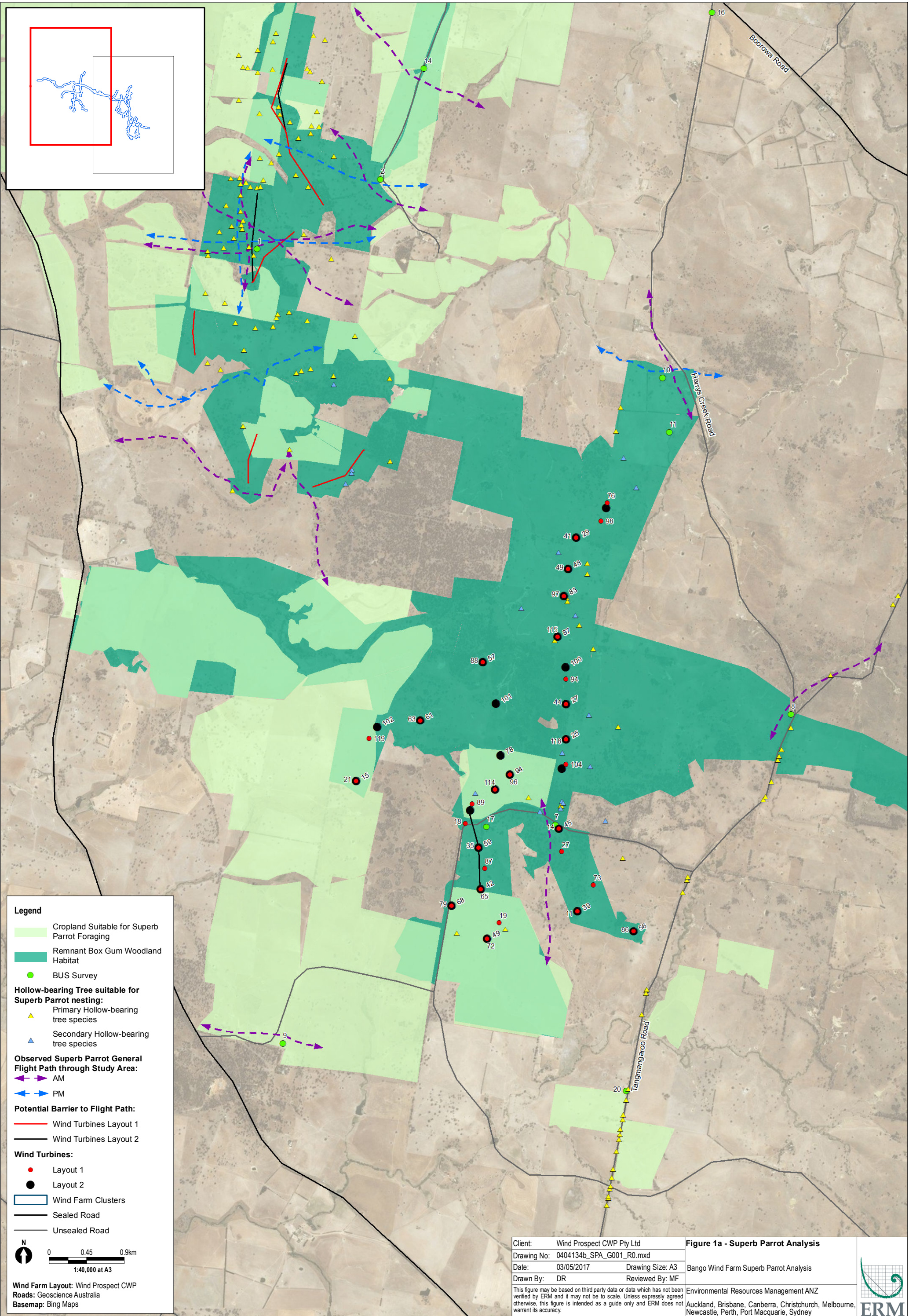
Manning. et al. (2012) **Hollow futures? Tree decline, lag effects and hollow-dependent species.** Fenner School of Environment and Society, The Australian National University, Canberra, ACT, Australia. Animal Conservation.

Office of Environment and Heritage (OEH) (2012). **Threatened Species Profiles.**

<http://www.environment.nsw.gov.au/threatenedspeciesapp/default.aspx?keywords=button>

Annex A

Flight Path Mapping



Legend

- Cropland Suitable for Superb Parrot Foraging
- Remnant Box Gum Woodland Habitat
- BUS Survey

Hollow-bearing Tree suitable for Superb Parrot nesting:

- Primary Hollow-bearing tree species
- Secondary Hollow-bearing tree species

Observed Superb Parrot General Flight Path through Study Area:

- AM
- PM

Potential Barrier to Flight Path:

- Wind Turbines Layout 1
- Wind Turbines Layout 2

Wind Turbines:

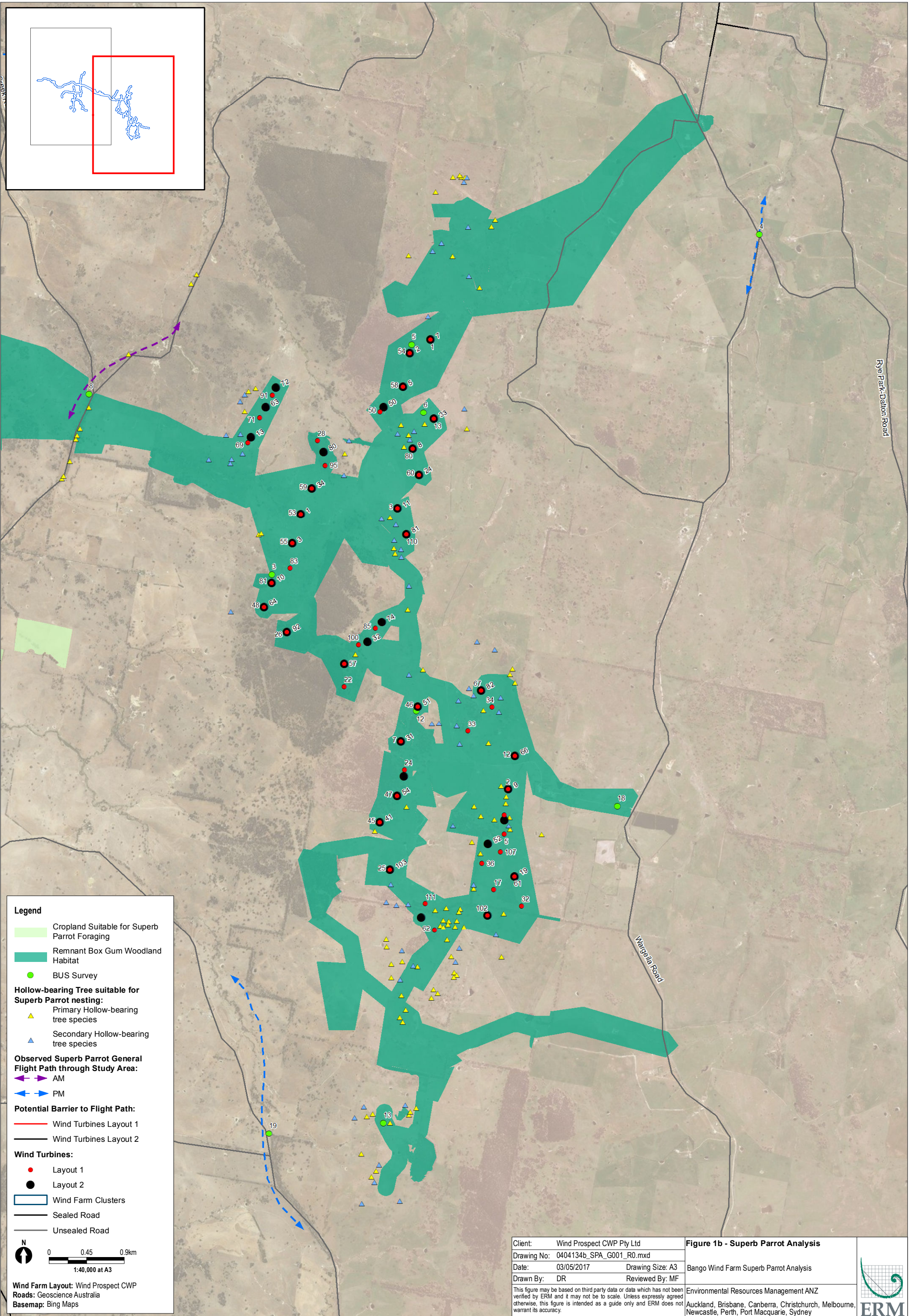
- Layout 1
- Layout 2
- Wind Farm Clusters
- Sealed Road
- Unsealed Road

Scale: 0 0.45 0.9km
1:40,000 at A3

Wind Farm Layout: Wind Prospect CWP
Roads: Geoscience Australia
Basemap: Bing Maps

<p>Client: Wind Prospect CWP Pty Ltd</p> <p>Drawing No: 0404134b_SPA_G001_R0.mxd</p> <p>Date: 03/05/2017 Drawing Size: A3</p> <p>Drawn By: DR Reviewed By: MF</p> <p><small>This figure may be based on third party data or data which has not been verified by ERM and it may not be to scale. Unless expressly agreed otherwise, this figure is intended as a guide only and ERM does not warrant its accuracy.</small></p>	<p>Figure 1a - Superb Parrot Analysis</p> <p>Bango Wind Farm Superb Parrot Analysis</p> <p>Environmental Resources Management ANZ</p> <p>Auckland, Brisbane, Canberra, Christchurch, Melbourne, Newcastle, Perth, Port Macquarie, Sydney</p>
---	---





Legend

- Cropland Suitable for Superb Parrot Foraging
- Remnant Box Gum Woodland Habitat
- BUS Survey
- Hollow-bearing Tree suitable for Superb Parrot nesting:**
 - Primary Hollow-bearing tree species
 - Secondary Hollow-bearing tree species
- Observed Superb Parrot General Flight Path through Study Area:**
 - AM
 - PM
- Potential Barrier to Flight Path:**
 - Wind Turbines Layout 1
 - Wind Turbines Layout 2
- Wind Turbines:**
 - Layout 1
 - Layout 2
 - Wind Farm Clusters
 - Sealed Road
 - Unsealed Road

Scale: 1:40,000 at A3
 0 0.45 0.9km

Wind Farm Layout: Wind Prospect CWP
 Roads: Geoscience Australia
 Basemap: Bing Maps

Client: Wind Prospect CWP Pty Ltd	Figure 1b - Superb Parrot Analysis
Drawing No: 0404134b_SPA_G001_R0.mxd	Bango Wind Farm Superb Parrot Analysis
Date: 03/05/2017	Drawing Size: A3
Drawn By: DR	Reviewed By: MF
<small>This figure may be based on third party data or data which has not been verified by ERM and it may not be to scale. Unless expressly agreed otherwise, this figure is intended as a guide only and ERM does not warrant its accuracy.</small>	
Environmental Resources Management ANZ Auckland, Brisbane, Canberra, Christchurch, Melbourne, Newcastle, Perth, Port Macquarie, Sydney	

Annex D

Hollow Bearing Trees and Bats

PL1 Table

PL1		
Wind Turbine Generator Identification Number	Hollow Tree Identification Number	Distance between WTG and HBT
		m
1	250	277.68
	249	380.51
2	263	86.48
	264	93.94
	265	152.92
	262	160.86
	268	174.44
	266	234.47
	274	255.32
	267	260.92
	261	321.45
	269	340.15
	273	402.15
	270	444.86
	275	458.48
	272	459.98
3	271	491.39
	276	495.69
	292	139.13
	291	195.27
	293	223.03
	289	382.37
	290	383.83
5	288	482.13
	287	497.75
	271	90.36
	270	114.89
	273	212.19
	269	215.78
	272	352.44
	334	367.79
	268	372.78
	339	398.28
	264	453.46
	333	453.53
	274	463.24
	265	464.63
7	267	482.57
	300	489.32
	275	493.67
12	279	412.93
	280	431.70
	262	310.91
	225	351.35
	261	392.47
	263	394.02
	222	454.97
13	240	491.46
	264	498.09
	258	123.35
	257	276.76
	255	356.57
	256	382.85
	259	392.47
	254	395.87
	260	421.71
	251	466.52
14	253	467.58
	252	490.86
	149	223.22
	148	242.58
	147	274.16
	146	281.23
	142	284.46
	139	295.12

PL1		
Wind Turbine Generator Identification Number	Hollow Tree Identification Number	Distance between WTG and HBT
	140	305.24
	143	311.41
	145	314.17
	144	331.58
17	337	237.25
	336	242.58
	335	259.22
	338	266.86
	329	315.69
	331	359.28
	332	393.88
	340	417.56
	328	429.29
	334	454.83
	356	460.94
	327	479.76
	357	493.47
	18	136
132		266.14
138		377.43
19	133	111.29
	134	273.45
22	248	409.68
24	278	443.02
	279	453.09
25	344	178.92
	345	199.37
	343	204.56
	348	391.22
	347	393.41
	341	396.46
	346	430.95
	349	471.00
27	342	496.94
	149	401.00
28	296	363.95
	298	375.61
	297	380.14
	295	398.69
32	330	136.38
	331	233.55
	329	234.28
	328	338.37
	332	343.59
	327	395.95
33	326	464.84
	238	146.04
	235	149.92
	237	166.59
	239	185.10
	236	185.79
	225	287.81
	282	300.30
	230	308.92
	234	341.63
	229	354.33
	281	358.70
	240	361.48
	233	386.27
	228	387.91
	231	434.03
	223	439.03
	224	439.03
280	444.18	
279	445.64	
232	464.93	

PL1		
Wind Turbine Generator Identification Number	Hollow Tree Identification Number	Distance between WTG and HBT
	227	494.98
34	228	69.05
	229	82.39
	223	108.97
	224	108.97
	230	111.19
	241	154.08
	227	207.03
	231	254.31
	222	285.99
	226	352.02
	232	352.39
	220	402.26
	234	405.31
	233	408.11
	225	439.30
	235	446.06
221	449.23	
238	480.03	
35	132	110.46
	136	347.72
36	334	114.45
	340	160.07
	335	178.95
	336	274.98
	339	279.65
	337	320.98
	338	338.58
41	158	273.72
	171	274.53
	170	313.52
	159	340.46
	160	453.49
44	173	308.71
	174	434.01
45	342	121.90
	341	240.93
	278	374.17
	345	402.41
46	280	268.39
	281	329.65
	246	394.99
	245	447.50
	236	487.88
	234	488.41
	233	496.79
47	278	172.09
	341	495.83
48	195	400.63
49	170	199.01
	171	226.30
	160	240.70
	159	246.47
	163	344.59
	161	389.46
	162	391.24
	158	401.96
50	254	298.55
	251	342.72
	255	446.48
	257	472.69
	256	493.27
54	250	487.46
55	192	390.36
	193	412.45
	194	415.24

PL1		
Wind Turbine Generator Identification Number	Hollow Tree Identification Number	Distance between WTG and HBT
57	248	177.69
58	254	459.25
59	294	422.80
60	253	344.24
	252	377.32
	256	433.06
	255	491.57
61	332	118.92
	331	165.46
	335	459.75
	329	465.78
	334	484.29
	336	495.01
	330	496.91
62	376	89.19
	377	114.35
	375	162.25
	378	175.71
	354	185.87
	381	190.16
	374	203.77
	358	204.69
	359	204.69
	380	210.15
	351	241.23
	355	243.35
	379	252.96
	373	292.56
	352	302.82
	353	302.82
	350	342.11
	371	357.88
	382	363.80
	383	363.80
	384	368.35
	357	369.22
	385	377.12
	356	404.28
	349	442.88
	386	460.98
	362	463.95
372	471.73	
390	481.39	
370	485.02	
67	227	30.58
	231	105.76
	226	146.89
	232	179.51
	230	244.43
	241	251.09
	233	297.26
	228	305.80
	229	309.62
	234	323.12
	223	341.37
	224	341.37
	221	398.52
	220	418.58
	219	456.99
	235	478.68
69	183	101.40
	185	132.47
	184	147.01
	186	187.50
	181	278.65
	182	279.50
	180	298.32

PL1		
Wind Turbine Generator Identification Number	Hollow Tree Identification Number	Distance between WTG and HBT
	179	323.62
	187	381.71
	178	470.84
71	187	194.03
	186	265.54
	185	302.85
	188	307.13
	189	331.36
	190	344.20
	191	359.43
	183	432.43
	182	453.23
	184	478.85
72	133	255.41
	135	366.49
	134	484.04
73	102	479.21
76	172	337.02
	157	395.92
79	135	337.61
80	253	50.38
	252	100.66
	256	110.25
	255	168.70
	257	211.55
	251	249.56
	254	317.35
	258	331.17
299	477.51	
81	193	447.86
83	193	454.55
85	248	393.19
	283	454.48
86	100	33.02
	101	183.38
87	132	335.26
89	138	133.06
	136	202.47
	137	342.20
	132	493.48
91	191	214.77
	190	285.82
	189	327.74
	187	380.49
	188	393.13
94	167	448.38
	168	480.98
	166	487.34
95	295	241.24
	294	257.93
	296	274.90
	297	414.98
	298	421.03
96	137	299.44
	141	357.21
	138	468.56
97	163	41.74
	162	81.58
	164	274.47
	160	389.17
	165	403.39
	159	483.88
	170	486.32
98	158	353.70
	172	423.01
100	248	120.16

PL1		
Wind Turbine Generator Identification Number	Hollow Tree Identification Number	Distance between WTG and HBT
	247	457.33
102	328	194.65
	329	200.95
	327	212.68
	326	258.57
	371	311.07
	356	331.13
	357	338.67
	337	357.82
	338	365.44
	373	369.69
	382	371.45
	383	371.45
	336	400.92
	379	407.47
	372	421.10
	380	461.78
	374	467.36
	335	480.55
	378	483.94
	330	499.31
104	153	142.61
	151	297.18
	152	312.87
	144	445.45
	145	464.43
	143	466.20
	142	492.61
	146	495.80
107	334	235.76
	271	294.31
	270	331.33
	339	359.03
	273	397.23
	340	409.86
	335	417.59
	332	418.04
	269	434.94
	272	488.61
	331	498.67
	110	290
289		163.51
291		167.94
287		194.16
288		224.76
285		267.40
292		278.76
286		282.92
293		349.33
111	350	27.67
	351	143.46
	354	196.79
	349	203.60
	355	242.23
	352	255.15
	353	255.15
	358	288.07
	359	288.07
	375	294.96
	376	321.13
	346	347.74
	374	349.83
	377	355.82
	378	372.67
	347	409.64
	357	418.35
356	425.15	

PL1		
Wind Turbine Generator Identification Number	Hollow Tree Identification Number	Distance between WTG and HBT
	373	431.26
	379	452.50
	380	455.81
	348	468.29
	344	471.47
114	137	178.17
	138	242.11
	141	415.23
	136	489.99
115	168	52.69
	167	76.01
	165	298.09
	164	339.49
	162	442.14
	166	457.87
	163	484.72
118	153	167.04
	174	346.59
	173	404.91
	151	441.93
	175	445.99
	152	479.59
122	269	70.75
	273	132.35
	268	138.40
	270	145.44
	271	194.06
	264	219.03
	265	237.19
	274	264.59
	272	279.95
	267	284.91
	263	348.04
	266	352.38
	275	377.78
	276	416.75
	262	447.49

PL2 Table

PL2		
Wind Turbine Generator Identification Number	Hollow Tree Identification Number	Distance between WTG and HBT
		m
2	250	487.46
3	192	390.36
	193	412.45
	194	415.24
5	254	459.25
6	248	177.69
7	250	277.68
	249	380.51
8	253	50.38
	252	100.66
	256	110.25
	255	168.70
	257	211.55
	251	249.56
	254	317.35
	258	331.17
	299	477.51
9	263	86.48
	264	93.94
	265	152.92
	262	160.86
	268	174.44
	266	234.47
	274	255.32
	267	260.92
	261	321.45
	269	340.15
	273	402.15
	270	444.86
	275	458.48
	272	459.98
	271	491.39
276	495.69	
10	193	447.86
11	292	139.13
	291	195.27
	293	223.03
	289	382.37
	290	383.83
	288	482.13
287	497.75	
13	185	122.93
	186	155.33
	183	174.70
	184	220.72
	182	296.04
	187	320.72
	181	349.01
	180	369.70
	179	395.43
188	449.37	
16	269	72.55
	270	93.41
	273	117.28
	271	140.57
	268	198.28
	264	278.98
	272	280.93
	265	293.88
	274	309.89
	267	330.14
	275	396.45
	266	403.49
263	407.77	
276	433.36	

PL2		
Wind Turbine Generator Identification Number	Hollow Tree Identification Number	Distance between WTG and HBT
	339	471.80
	333	488.39
	334	498.19
19	332	118.92
	331	165.46
	335	459.75
	329	465.78
	334	484.29
	336	495.01
	330	496.91
22	172	350.16
	157	441.33
24	253	344.24
	252	377.32
	256	433.06
	255	491.57
25	153	167.04
	174	346.59
	173	404.91
	151	441.93
	175	445.99
	152	479.59
27	173	308.71
	174	434.01
28	328	194.65
	329	200.95
	327	212.68
	326	258.57
	371	311.07
	356	331.13
	357	338.67
	337	357.82
	338	365.44
	373	369.69
	382	371.45
	383	371.45
	336	400.92
	379	407.47
	372	421.10
	380	461.78
	374	467.36
	335	480.55
	378	483.94
	330	499.31
29	158	273.72
	171	274.53
	170	313.52
	159	340.46
	160	453.49
31	279	412.93
	280	431.70
32	248	203.94
	247	406.19
33	258	123.35
	257	276.76
	255	356.57
	256	382.85
	259	392.47
	254	395.87
	260	421.71
	251	466.52
	253	467.58
	252	490.86
34	294	422.80
41	342	121.90
	341	240.93

PL2		
Wind Turbine Generator Identification Number	Hollow Tree Identification Number	Distance between WTG and HBT
	278	374.17
	345	402.41
43	153	187.76
	151	346.51
	152	355.47
	144	393.04
	143	411.84
	145	414.35
	142	440.13
	146	442.60
	147	450.69
	148	481.31
44	350	161.42
	351	192.44
	354	195.53
	349	219.49
	376	252.95
	375	271.79
	355	278.63
	358	290.85
	359	290.85
	377	293.29
	352	322.82
	353	322.82
	346	331.17
	374	335.38
	378	336.42
	347	400.28
	380	404.41
	381	413.02
	379	425.27
	373	432.92
	348	454.88
	362	462.96
	357	462.99
	356	484.07
	360	494.59
45	149	223.22
	148	242.58
	147	274.16
	146	281.23
	142	284.46
	139	295.12
	140	305.24
	143	311.41
	145	314.17
	144	331.58
48	170	199.01
	171	226.30
	160	240.70
	159	246.47
	163	344.59
	161	389.46
	162	391.24
	158	401.96
49	133	255.41
	135	366.49
	134	484.04
50	254	301.81
	251	366.57
	255	455.45
	257	470.49
51	280	268.39
	281	329.65
	246	394.99
	245	447.50
	236	487.88

PL2		
Wind Turbine Generator Identification Number	Hollow Tree Identification Number	Distance between WTG and HBT
	234	488.41
	233	496.79
52	334	146.73
	339	191.44
	273	303.85
	271	318.37
	270	332.80
	340	342.89
	272	343.18
	269	415.30
	335	421.34
	277	473.29
	275	480.95
	276	494.95
54	278	172.09
	341	495.83
55	136	124.17
	138	212.09
	132	417.57
	137	420.59
56	100	33.02
	101	183.38
59	132	110.46
	136	347.72
63	187	251.24
	191	254.80
	190	275.33
	189	288.56
	188	311.88
	186	398.54
	185	443.62
64	195	400.63
66	262	310.91
	225	351.35
	261	392.47
	263	394.02
	222	454.97
	240	491.46
	264	498.09
68	135	337.61
72	191	239.26
	190	326.76
	189	378.44
	188	458.64
	187	466.44
74	283	353.08
	248	498.40
76	137	178.17
	138	242.11
	141	415.23
	136	489.99
78	137	331.79
80	296	259.14
	295	271.88
	297	338.77
	298	339.82
	294	374.67
81	290	158.41
	289	163.51
	291	167.94
	287	194.16
	288	224.76
	285	267.40
	292	278.76
	286	282.92
	293	349.33

PL2		
Wind Turbine Generator Identification Number	Hollow Tree Identification Number	Distance between WTG and HBT
82	227	30.58
	231	105.76
	226	146.89
	232	179.51
	230	244.43
	241	251.09
	233	297.26
	228	305.80
	229	309.62
	234	323.12
	223	341.37
	224	341.37
	221	398.52
	220	418.58
	219	456.99
83	235	478.68
	163	41.74
	162	81.58
	164	274.47
	160	389.17
	165	403.39
	159	483.88
87	170	486.32
	168	52.69
	167	76.01
	165	298.09
	164	339.49
	162	442.14
	166	457.87
93	163	484.72
	278	366.97
94	137	299.44
	141	357.21
	138	468.56
100	167	311.90
	168	345.10
	166	397.43
103	344	178.92
	345	199.37
	343	204.56
	348	391.22
	347	393.41
	341	396.46
	346	430.95
	349	471.00
342	496.94	

Annex E

Bird Utilisation Surveys Results

Bird Utilisation Surveys (BUS) were undertaken in the period between 1 August 2012 to 23 February 2013 to capture data during the Superb Parrot breeding season and also record raptor species activity during this period.

METHODS

A fixed-point bird count method was utilised to conduct the BUS. This involved two observers stationed at a pre-determined point for a period of 15 minutes. Each observer undertook species sightings and identification of species with the aid of 10x42 mm binoculars. The following data was recorded:

- all small birds within 100m of the point;
- all large birds within 800m of the point;
- direction of flight the species is taking;
- distance from the survey point; and
- height the species is flying at measured in 20m vertical increments.

Twenty (20) BUS points were surveyed (see *Annex A*). BUS point locations were predominately on ridges or hills to gain optimum visibility of the surrounding area. BUS points were located at varying distances from habitat features such as hills/ridges, woodland and creeklines.

Twelve (12) of the points established were within the area of proposed disturbance footprint and the remaining eight (8) were control or reference BUS points, located outside the proposed disturbance footprint, in areas of representative habitat or areas that provided an unobscured view of the surrounding areas. Details of each BUS point are provided in *Table 1.1*.

Surveys were completed at different times of the day regardless of weather conditions and under optimum soaring conditions for raptor species (see *Table 1.2*). This provided an indication of the species that use the airspace under all conditions, and captured the early morning movements of woodland and parrot species.

The majority (17) of BUS points were surveyed on at least three different occasions, two BUS points were surveyed on two occasions, while one of the sites was visited once due to logistical challenges during the survey period.

The data collected from the BUS was used to assess the species at risk of collision with turbine rotors during wind farm operation, and the relative abundance of each species at risk.

Table 1.1 *BUS Location Descriptions*

BUS No.	BUS Location Name	Latitude (S)	Longitude (E)	Within Proposed Disturbance Footprint	Description	Altitude
1	BUS Taffs	-34.5117	148.7549	Yes	Top of ridge	594m
2	BUS Hopefield	-34.5039	148.7709	Yes	Adjacent to grain cropped fields	574m
3	BUS Willow	-34.5804	148.8503	Yes	Top of ridgeline adjacent to woodland patch	731m
4	BUS Wargeila	-34.5426	148.9133	No	Intersection Wargeila rd and Rye Park Rd, good visibility of surrounding landscape	551m
5	BUS Taree	-34.5552	148.8681	Yes	On ridgeline adjacent to woodland, good visibility	707m
6	BUS Taree 2	-34.5625	148.8698	Yes	On ridgeline, good visibility	639m
7	BUS Pines	-34.5736	148.7953	Yes	In paddock adjacent to woodland, good visibility	666m
8	BUS Yambacona	-34.5612	148.8259	Yes	Mild hill, good visibility of surrounding area	633m
9	BUS Glenmire	-34.5978	148.7601	Yes	On ridgeline, good visibility	606m
10	BUS Springvale	-34.5249	148.8083	Yes	On mild slope good visibility to surrounding ridglines	547m
11	Springvale property	-34.5308	148.8094	Yes	On ridgeline	574m
12	BUS Mt Buffalo	-34.5949	148.8696	No	On ridgeline good visibility	735m
13	BUS Lloyd Davis	-34.6397	148.8663	Yes	On ridgeline good visibility	712m
14	Hopefield Lane	-34.4918	148.7763	No	Adjacent to grain cropped fields	565m
15	Hopefield Lane/Boorowa Rd	-34.455	148.7851	No	Flat area – road intersection	503m
16	Harry's Ck Rd/Boorowa Rd	-34.4852	148.8139	No	Flat area – road intersection	497m

BUS No.	BUS Location Name	Latitude (S)	Longitude (E)	Within Proposed Disturbance Footprint	Description	Altitude
17	The Pines Property	-34.5739	148.7863	Yes	On mild rise, good visibility	667m
18	Mt Buffalo access gate	-34.6048	148.8961	No	At access gate, good visibility of surrounding landscape	641m
19	Lavestock Rd. Montalta gate	-34.641	148.8513	No	Good visibility of surrounding landscape	632m
20	The Pines access	-34.6023	148.8052	No	Intersection Tangamangaroo Rd, good visibility of surrounding ridges	575m

Table 1.2 *BUS Survey Times and Weather Conditions*

BUS No.	BUS Location Name	Date	Time	Temp (°C)	Approx. Wind Speed and Direction
1	BUS Taffs	15/11/2012	12:58	23	15kmh SW
1	BUS Taffs	21/11/2012	13:38	27	15kmh WNW
1	BUS Taffs	22/11/2012	15:00	28	Calm 6kmh
1	BUS Taffs	23/11/2012	7:28	10	15kmh SE
1	BUS Taffs	29/11/2012	7:38	17	Calm 6kmh SSE
2	BUS Hopefield	14/11/2012	7:55	10	Calm
2	BUS Hopefield	3/12/2012	16:30	26	Calm
2	BUS Hopefield	5/12/2012	13:25	20	9kmh NW
3	BUS Willow	2/08/2012	10:00	12	Calm, fine
3	BUS Willow	4/12/2012	9:05	20	13kmh W
3	BUS Willow	5/12/2012	16:40	20	Very windy, NW
3	BUS Willow	13/12/2012	17:57	21	Calm
3	BUS Willow	25/01/2013	10:00	24	16kmhNNE
4	BUS Wargeila	4/12/2012	15:35	22	13kmh W
4	BUS Wargeila	18/01/2013	8:42	24	Calm
4	BUS Wargeila	25/02/2013	7:23	23	Calm
4	BUS Wargeila	27/02/2013	9:50	22	13kmh N
5	BUS Taree	16/11/2012	11:15	23	15kmh SW
5	BUS Taree	21/11/2012	8:15	27	Calm
5	BUS Taree	28/11/2012	7:18	15	Calm 4kmh
5	BUS Taree	4/12/2012	13:25	22	13kmh W
5	BUS Taree	5/12/2012	8:25	20	Calm
6	BUS Taree 2	22/11/2012	17:30	28	Calm 6kmh
6	BUS Taree 2	5/12/2012	8:55	20	Calm
6	BUS Taree 2	6/12/2012	11:15	14	Calm
7	BUS Pines	1/08/2012	15:00	12	6Kmh S
7	BUS Pines	15/11/2012	17:23	26	15kmh SW

BUS No.	BUS Location Name	Date	Time	Temp (°C)	Approx. Wind Speed and Direction
7	BUS Pines	15/11/2012	17:23	26	15kmh SW
7	BUS Pines	21/11/2012	11:30	27	Calm
7	BUS Pines	5/12/2012	10:35	20	Calm
7	BUS Pines	6/12/2012	8:45	14	Calm
7	BUS Pines	11/12/2012	11:40	16	13kmh SE
9	BUS Glenmire	16/11/2012	10:36	16	Calm
8	BUS Yambacoona	14/11/2012	9:50	10	Calm
8	BUS Yambacoona	22/11/2012	10:36	28	Calm 6kmh
8	BUS Yambacoona	28/11/2012	12:30	26	Calm 4kmh
8	BUS Yambacoona	4/12/2012	16:50	22	13kmh W
10	BUS Springvale	14/11/2012	7:37	10	Calm
10	BUS Springvale	5/12/2012	15:10	20	9kmh NW
10	BUS Springvale	6/12/2012	14:57	24	6kmh W
10	BUS Springvale	27/02/2013	9:00	22	13kmh N
11	Springvale property	5/12/2012	15:35	20	9kmh NW
11	Springvale property	6/12/2012	14:35	24	6kmh W
12	BUS Mt Buffalo	15/11/2012	12:20	23	15kmh SW
12	BUS Mt Buffalo	4/12/2012	11:25	22	13kmh W
13	BUS Lloyd Davis	13/12/2012	13:50	21	Calm
13	BUS Lloyd Davis	17/12/2012	13:10	20	13kmh WNW
13	BUS Lloyd Davis	23/02/2013	15:25	21	26kmh
14	Hopefield Lane	3/12/2012	16:50	26	Calm
14	Hopefield Lane	5/12/2012	13:45	20	9kmh NW
14	Hopefield Lane	26/02/2013	17:37	27	9kmh WNW
14	Hopefield Lane	27/02/2013	8:00	22	13kmh N
15	Hopefield Lane/Boorowa Rd	5/12/2012	14:10	20	9kmh NW
15	Hopefield Lane/Boorowa Rd	18/01/2013	8:09	24	Calm
15	Hopefield Lane/Boorowa Rd	26/02/2013	17:07	27	9kmh WNW
15	Hopefield Lane/Boorowa Rd	27/02/2013	7:40	22	13kmh N
16	Hopefield Lane/Harry's Ck	5/12/2012	14:40	20	9kmh NW
16	Hopefield Lane/Harry's Ck	18/01/2013	11:38	27	Calm
16	Hopefield Lane/Harry's Ck	23/01/2013	17:55	30	13kmh WNW
16	Hopefield Lane/Harry's Ck	26/02/2013	16:40	27	9kmh WNW
17	The Pines Property	6/12/2012	9:15	14	Calm
17	The Pines Property	23/01/2013	16:50	30	13kmh WNW
17	The Pines Property	25/01/2013	11:20	24	16kmhNNE
18	Mt Buffalo Access Gate	6/12/2012	11:55	24	6kmh W
18	Mt Buffalo Access Gate	18/01/2013	9:22	24	Calm
18	Mt Buffalo Access Gate	27/02/2013	10:20	24	13kmh N
19	Lavestock Rd. Montalta Gate	6/12/2012	13:25	24	6kmh W
19	Lavestock Rd. Montalta Gate	18/01/2013	10:16	27	Calm

BUS No.	BUS Location Name	Date	Time	Temp (°C)	Approx. Wind Speed and Direction
19	Lavestock Rd. Montalta Gate	21/02/2013	17:26	22	22kmh E
19	Lavestock Rd. Montalta Gate	23/02/2013	16:20	21	26kmh
20	The Pines Access	6/12/2012	14:20	24	6kmh W
20	The Pines Access	17/01/2013	7:53	18	Calm
20	The Pines Access	18/01/2013	11:05	27	Calm
20	The Pines Access	23/01/2013	17:20	30	13kmh WNW
20	The Pines Access	25/01/2013	11:50	24	16kmhNNE

Climate data sourced from field observations and BOM 070358 Yass Station

1.2

RESULTS

This section details the results of the BUS undertaken from August 2012 to end of February 2013. The comprehensive results of the BUS are provided in *Annex D* of the Ecological Impact Assessment report (ERM 2013).

A total of 1335 birds were recorded from 76 surveys at 20 different sites. There were 68 different species identified, with the most abundant being the Australian Magpie (*Corvus coronoides*) (159), the Superb Parrot (*Polytelis swainsonii*) (148), Crimson Rosella (*Platycercus elegans*) (93), and Sulphur-crested Cockatoo (*Cacatua galerita*) (94). The Superb Parrot is listed as Vulnerable under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) and *Threatened Species Conservation Act 1995* (TSC Act).

The majority of birds observed during the BUS were flying moderate to short distances between trees, perching or moving on to the next tree or group of trees. Peak activity was generally recorded in the mornings or late afternoon BUS or on arrival to site when birds were flushed from the immediate area into the surrounding trees. Flocks of birds such as Eastern Rosellas (*Platycercus eximius*), Crimson Rosellas and Sulphur Crested Cockatoos were observed moving across the landscape generally following the contour of the landscape but often flying high over valleys, the Sulphur Crested Cockatoos were observed often flying much higher than the smaller parrot species. Birds were rarely observed to fly directly above, across or over the ridge tops.

1.2.1

Threatened Species

Threatened species listed under the EPBC Act and/or the TSC Act recorded during the BUS are listed in *Table 1.3* and include the Superb Parrot (*Polytelis swainsonii*), Brown Treecreeper (*Climacteris picumnus*), Spotted Harrier (*Circus assimilis*) and Diamond Firetail (*Stagonopleura guttata*). The Rainbow Bee-eater (*Merops ornatus*) was also recorded which is listed as Migratory under the EPBC Act.

Table 1.3 *Threatened Species Recorded during BUS*

Species	Common Name	Status TSC Act	Status EPBC Act
<i>Climacteris picumnus</i>	Brown Treecreeper	V	
<i>Merops ornatus</i>	Rainbow Bee-eater		Mi
<i>Polytelis swainsonii</i>	Superb Parrot	V	V
<i>Stagonopleura guttata</i>	Diamond Firetail	V	
<i>Circus assimilis</i>	Spotted Harrier	V	

V = Vulnerable; Mi = Migratory

Brown Treecreeper

The Brown Treecreeper was recorded from BUS Willow on one occasion only. A pair was observed in Stringybark Hilltop Low Woodland adjacent to the BUS point approximately 60m from the observers.

Rainbow Bee-eater

The Rainbow Bee-eater was recorded a total of 12 times from three BUS points: BUS 11 (Springvale property), BUS 10 (Springvale) and BUS 19 (Lavestock Rd. Montalta Gate). This species was commonly viewed perched in trees close to woodland edges foraging for insects.

Superb Parrot

The Superb Parrot was recorded 148 times from eight BUS locations (see Annex A). This was the most frequently recorded threatened species and the second most recorded species during the BUS. This species was most commonly observed in the areas where grain crops were being grown and in areas of Yellow Box Blakleys Red Gum Open Woodland and Apple Box - Yellow Box Grassy Woodland.

Diamond Firetail

The Diamond Firetail was recorded from one BUS only: BUS Springvale. This species was observed foraging on grass seeds in an open paddock in proximity to a fence line.

Spotted Harrier

The Spotted Harrier was observed from one BUS only, BUS Pines. This species was observed gliding over the open fields approximately 10m off the ground before settling on a fence post. This species was also regularly observed throughout the survey period in the same location.

Baker-Gabb, D. 2011. **National Recovery Plan for the Superb Parrot *Polytelis swainsonii***. Department of Sustainability and Environment, Melbourne.

Department of Sustainability, Environment, Water, Population and Communities (2013). ***Polytelis swainsonii* in Species Profile and Threats Database, Department of Sustainability, Environment, Water, Population and Communities, Canberra.** Available from: <http://www.environment.gov.au/sprat>.

Gibbons. P (2002). **Tree Hollows and Wildlife Conservation in Australia.** CSIRO.

Manning. et al. (2012) **Hollow futures? Tree decline, lag effects and hollow-dependent species.** Fenner School of Environment and Society, The Australian National University, Canberra, ACT, Australia. Animal Conservation.

Office of Environment and Heritage (OEH) (2012). **Threatened Species Profiles.**

<http://www.environment.nsw.gov.au/threatenedspeciesapp/default.aspx?keywords=button>

Annex A

Raw Bird Utilisation Survey Data

Table A.1 Raw Bird Utilisation Survey Data

Scientific Name	Common Name	Count	0-40, 40-150, >150	0-20, 20-40, 40-150, 150- 200, >200	Relative Height	Distance (m)	Flight Direction	BUS No.	BUS Location	Date	Time	Notes/ Observation Type
<i>Acanthiza reguloides</i>	Buff-rumped Thornbill	2	0-40	0-20	Below RSA	4	S	1	BUS Taffs	22/11/2012	15:00	
<i>Anthochaera carunculata</i>	Red Wattlebird	1	0-40	0-20	Below RSA	100	-	1	BUS Taffs	21/11/2012	13:38	Perched
<i>Artamus cyanopterus</i>	Dusky Woodswallow	1	0-40	0-20	Below RSA	30	SW	1	BUS Taffs	23/11/2012	7:28	
<i>Cacatua galerita</i>	Sulphur-crested Cockatoo	10	0-40	20-40	At RSA	150	S	1	BUS Taffs	6/12/2012	7:05	
<i>Cacatua galerita</i>	Sulphur-crested Cockatoo	1	0-40	0-20	Below RSA	50	E	1	Bus Taffs	15/11/2012	12:58	
<i>Cacatua galerita</i>	Sulphur-crested Cockatoo	1	0-40	0-20	Below RSA	100	N	1	Bus Taffs	15/11/2012	12:58	
<i>Cacatua galerita</i>	Sulphur-crested Cockatoo	2	0-40	0-20	Below RSA	30	SE	1	BUS Taffs	22/11/2012	15:00	
<i>Cacatua galerita</i>	Sulphur-crested Cockatoo	1	0-40	0-20	Below RSA	50	W	1	BUS Taffs	22/11/2012	15:00	
<i>Cacatua galerita</i>	Sulphur-crested Cockatoo	1	0-40	0-20	Below RSA	81-120	NE	1	BUS Taffs	22/11/2012	15:00	
<i>Cacatua galerita</i>	Sulphur-crested Cockatoo	1	0-40	0-20	Below RSA	20	N	1	BUS Taffs	22/11/2012	15:00	
<i>Cacatua galerita</i>	Sulphur-crested Cockatoo	1	0-40	0-20	Below RSA	60	S	1	BUS Taffs	22/11/2012	15:00	
<i>Cacatua galerita</i>	Sulphur-crested Cockatoo	1	0-40	0-20	Below RSA	100	N	1	BUS Taffs	23/11/2012	7:28	
<i>Cacatua galerita</i>	Sulphur-crested Cockatoo	1	0-40	0-20	Below RSA	50	N	1	BUS Taffs	23/11/2012	7:28	
<i>Cacatua galerita</i>	Sulphur-crested Cockatoo	1	0-40	0-20	Below RSA	20	NW	1	BUS Taffs	23/11/2012	7:28	
<i>Cacatua galerita</i>	Sulphur-crested Cockatoo	3	0-40	0-20	Below RSA	90	-	1	BUS Taffs	29/11/2012	7:38	
<i>Cacatua galerita</i>	Sulphur-crested Cockatoo	2	0-40	0-20	Below RSA	100	NE	1	BUS Taffs	3/12/2012	16:00	Observed/H eard call
<i>Coracina novaehollandiae</i>	Black-faced Cuckoo-shrike	5	0-40	20-40	At RSA	70	NE	1	BUS Taffs	23/11/2012	7:28	
<i>Cincloramphus mathewsi</i>	Rufous Songlark	4	0-40	0-20	Below RSA	30	-	1	Bus Taffs	15/11/2012	12:58	Flying from ground to trees
<i>Cincloramphus mathewsi</i>	Rufous Songlark	2	0-40	0-20	Below RSA	30	-	1	BUS Taffs	21/11/2012	13:38	Perched
<i>Cincloramphus mathewsi</i>	Rufous Songlark	1	0-40	0-20	Below RSA	30	S	1	BUS Taffs	21/11/2012	13:38	
<i>Cincloramphus mathewsi</i>	Rufous Songlark	1	0-40	0-20	Below RSA	40	-	1	BUS Taffs	22/11/2012	15:00	Perched
<i>Cincloramphus mathewsi</i>	Rufous Songlark	1	0-40	0-20	Below RSA	50	-	1	BUS Taffs	23/11/2012	7:28	Perched
<i>Cincloramphus mathewsi</i>	Rufous Songlark	2	0-40	0-20	Below RSA	30	-	1	BUS Taffs	29/11/2012	7:38	
<i>Cincloramphus mathewsi</i>	Rufous Songlark	1	-	0-20	Below RSA	40	-	1	BUS Taffs	6/12/2012	7:05	Perched
<i>Colluricincla harmonica</i>	Grey Shrike-thrush	1	-	0-20	Below RSA	80	-	1	BUS Taffs	6/12/2012	7:05	Calling in woodland
<i>Coracina novaehollandiae</i>	Black-faced Cuckoo-shrike	2	0-40	0-20	Below RSA	60	W	1	BUS Taffs	21/11/2012	13:38	
<i>Coracina novaehollandiae</i>	Black-faced Cuckoo-shrike	1	0-40	0-20	Below RSA	20	W	1	BUS Taffs	3/12/2012	16:00	Observed
<i>Coracina novaehollandiae</i>	Black-faced Cuckoo-shrike	1	0-40	0-20	Below RSA	10	S	1	BUS Taffs	5/12/2012	12:10	
<i>Coracina novaehollandiae</i>	Black-faced Cuckoo-shrike	1	0-40	0-20	Below RSA	40	N	1	BUS Taffs	6/12/2012	7:05	
<i>Coracina novaehollandiae</i>	Black-faced Cuckoo-shrike	1	0-40	0-20	Below RSA	80	S	1	BUS Taffs	6/12/2012	7:05	
<i>Corvus coronoides</i>	Australasian Raven	2	0-40	0-20	Below RSA	100	W	1	BUS Taffs	23/11/2012	7:28	
<i>Corvus coronoides</i>	Australasian Raven	2	0-40	0-20	Below RSA	40	-	1	BUS Taffs	29/11/2012	7:38	
<i>Corvus coronoides</i>	Australasian Raven	1	0-40	0-20	Below RSA	120	S	1	BUS Taffs	5/12/2012	12:10	
<i>Corvus coronoides</i>	Australasian Raven	2	-	0-20	Below RSA	120	-	1	BUS Taffs	6/12/2012	7:05	Perched
<i>Cracticus tibicen</i>	Australian Magpie	1	0-40	20-40	At RSA	100	N	1	Bus Taffs	15/11/2012	12:58	
<i>Cracticus tibicen</i>	Australian Magpie	3	0-40	20-40	At RSA	100	S	1	Bus Taffs	15/11/2012	12:58	
<i>Cracticus tibicen</i>	Australian Magpie	1	0-40	20-40	At RSA	50	NW	1	BUS Taffs	23/11/2012	7:28	
<i>Cracticus tibicen</i>	Australian Magpie	1	0-40	0-20	Below RSA	5	N	1	BUS Taffs	22/11/2012	15:00	
<i>Cracticus tibicen</i>	Australian Magpie	2	0-40	0-20	Below RSA	70	-	1	BUS Taffs	29/11/2012	7:38	
<i>Cracticus tibicen</i>	Australian Magpie	1	0-40	0-20	Below RSA	80	W	1	BUS Taffs	5/12/2012	12:10	
<i>Cracticus tibicen</i>	Australian Magpie	2	0-40	0-20	Below RSA	100	E	1	BUS Taffs	5/12/2012	12:10	
<i>Cracticus tibicen</i>	Australian Magpie	1	-	0-20	Below RSA	40	-	1	BUS Taffs	5/12/2012	12:10	Perched
<i>Cracticus tibicen</i>	Australian Magpie	4	-	0-20	Below RSA	80	-	1	BUS Taffs	6/12/2012	7:05	Perched
<i>Dacelo novaeguineae</i>	Laughing Kookaburra	1	0-40	0-20	Below RSA	50	-	1	BUS Taffs	22/11/2012	15:00	
<i>Dacelo novaeguineae</i>	Laughing Kookaburra	1	0-40	0-20	Below RSA	50	W	1	BUS Taffs	22/11/2012	15:00	
<i>Eolophus roseicapilla</i>	Galah	1	0-40	20-40	At RSA	80	S	1	BUS Taffs	21/11/2012	13:38	
<i>Eolophus roseicapilla</i>	Galah	1	0-40	0-20	Below RSA	140	N	1	BUS Taffs	21/11/2012	13:38	
<i>Eolophus roseicapilla</i>	Galah	1	0-40	0-20	Below RSA	30	N	1	BUS Taffs	22/11/2012	15:00	
<i>Eolophus roseicapilla</i>	Galah	2	0-40	0-20	Below RSA	50	E	1	BUS Taffs	22/11/2012	15:00	
<i>Eolophus roseicapilla</i>	Galah	3	0-40	0-20	Below RSA	70	S	1	BUS Taffs	23/11/2012	7:28	
<i>Eolophus roseicapilla</i>	Galah	2	0-40	0-20	Below RSA	20	-	1	BUS Taffs	29/11/2012	7:38	
<i>Eolophus roseicapilla</i>	Galah	1	0-40	0-20	Below RSA	60	E	1	BUS Taffs	6/12/2012	7:05	
<i>Falco berigora</i>	Brown Falcon	1	0-40	0-20	Below RSA	80	N	1	BUS Taffs	5/12/2012	12:10	
<i>Falco cenchroides</i>	Nankeen Kestrel	1	0-40	20-40	At RSA	70	N	1	BUS Taffs	15/11/2012	12:58	
<i>Falco peregrinus</i>	Peregrine Falcon	1	40-150	40-150	At RSA	50	W	1	Bus Taffs	15/11/2012	12:58	
<i>Falcunculus frontatus</i>	Crested Shrike-tit	2	0-40	0-20	Below RSA	30	-	1	BUS Taffs	23/11/2012	7:28	Perched
<i>Hirundo neoxena</i>	Welcome Swallow	2	0-40	0-20	Below RSA	10	N	1	Bus Taffs	15/11/2012	12:58	

Scientific Name	Common Name	Count	0-40, 40-150, >150	0-20, 20-40, 40-150, 150- 200, >200	Relative Height	Distance (m)	Flight Direction	BUS No.	BUS Location	Date	Time	Notes/ Observation Type
<i>Malurus cyaneus</i>	Superb Fairywren	1	0-40	0-20	Below RSA	40	-	1	BUS Taffs	21/11/2012	13:38	Calling in dense grass
<i>Pardalotus striatus</i>	Striated Pardalote	1	0-40	0-20	Below RSA	15	N	1	BUS Taffs	22/11/2012	15:00	Perched in tree
<i>Pardalotus striatus</i>	Striated Pardalote	1	-	0-20	Below RSA	70	-	1	BUS Taffs	5/12/2012	12:10	Calling in woodland
<i>Pardalotus striatus</i>	Striated Pardalote	1	-	0-20	Below RSA	70	-	1	BUS Taffs	6/12/2012	7:05	Calling in woodland
<i>Phaps chalcoptera</i>	Common Bronzewing	1	0-40	0-20	Below RSA	80	S	1	BUS Taffs	6/12/2012	7:05	
<i>Philemon citreogularis</i>	Little Friarbird	1	0-40	0-20	Below RSA	60	-	1	Bus Taffs	15/11/2012	12:58	Perched in tree
<i>Philemon citreogularis</i>	Little Friarbird	1	0-40	0-20	Below RSA	40	-	1	BUS Taffs	21/11/2012	13:38	Calling in trees
<i>Philemon corniculatus</i>	Noisy Friarbird	1	0-40	0-20	Below RSA	50	SE	1	BUS Taffs	3/12/2012	16:00	Heard call
<i>Platycercus elegans</i>	Crimson Rosella	3	0-40	0-20	Below RSA	70	-	1	BUS Taffs	21/11/2012	13:38	Calling in trees
<i>Platycercus elegans</i>	Crimson Rosella	3	0-40	0-20	Below RSA	50	SW	1	BUS Taffs	23/11/2012	7:28	
<i>Platycercus elegans</i>	Crimson Rosella	2	-	0-20	Below RSA	50	-	1	BUS Taffs	5/12/2012	12:10	Perched in tree
<i>Platycercus eximius</i>	Eastern Rosella	1	0-40	0-20	Below RSA	40	SE	1	BUS Taffs	5/12/2012	12:10	
<i>Platycercus eximius</i>	Eastern Rosella	1	0-40	0-20	Below RSA	100	N	1	BUS Taffs	6/12/2012	7:05	
<i>Platycercus eximius</i>	Eastern Rosella	3	0-40	0-20	Below RSA	60	W	1	BUS Taffs	6/12/2012	7:05	
<i>Polytelis swainsonii</i>	Superb Parrot	2	0-40	0-20	Below RSA	50	N	1	Bus Taffs	15/11/2012	12:58	
<i>Polytelis swainsonii</i>	Superb Parrot	1	0-40	0-20	Below RSA	110	W	1	BUS Taffs	21/11/2012	13:38	
<i>Polytelis swainsonii</i>	Superb Parrot	3	0-40	0-20	Below RSA	140	N	1	BUS Taffs	21/11/2012	13:38	
<i>Polytelis swainsonii</i>	Superb Parrot	3	0-40	0-20	Below RSA	40	S	1	BUS Taffs	22/11/2012	15:00	
<i>Polytelis swainsonii</i>	Superb Parrot	8	0-40	0-20	Below RSA	60	NW	1	BUS Taffs	23/11/2012	7:28	
<i>Polytelis swainsonii</i>	Superb Parrot	5	0-40	0-20	Below RSA	70	NW	1	BUS Taffs	23/11/2012	7:28	
<i>Polytelis swainsonii</i>	Superb Parrot	4	0-40	0-20	Below RSA	80	NW	1	BUS Taffs	23/11/2012	7:28	
<i>Polytelis swainsonii</i>	Superb Parrot	6	0-40	0-20	Below RSA	70	-	1	BUS Taffs	29/11/2012	7:38	Perched
<i>Polytelis swainsonii</i>	Superb Parrot	3	0-40	0-20	Below RSA	0	W	1	BUS Taffs	3/12/2012	16:00	Observed/Heard call
<i>Polytelis swainsonii</i>	Superb Parrot	1	0-40	0-20	Below RSA	100	E	1	BUS Taffs	3/12/2012	16:00	Observed/Heard call
<i>Polytelis swainsonii</i>	Superb Parrot	4	0-40	0-20	Below RSA	0	S	1	BUS Taffs	5/12/2012	12:10	
<i>Polytelis swainsonii</i>	Superb Parrot	1	-	0-20	Below RSA	100	-	1	BUS Taffs	5/12/2012	12:10	Perched in stag
<i>Polytelis swainsonii</i>	Superb Parrot	3	-	0-20	Below RSA	40	-	1	BUS Taffs	6/12/2012	7:05	Perched
<i>Polytelis swainsonii</i>	Superb Parrot	2	0-40	0-20	Below RSA	50	N	1	BUS Taffs	6/12/2012	7:05	
<i>Polytelis swainsonii</i>	Superb Parrot	8	0-40	0-20	Below RSA	100	E	1	BUS Taffs	6/12/2012	7:05	
<i>Polytelis swainsonii</i>	Superb Parrot	1	0-40	0-20	Below RSA	20	N	1	BUS Taffs	6/12/2012	7:05	
<i>Polytelis swainsonii</i>	Superb Parrot	3	0-40	0-20	Below RSA	50	N	1	BUS Taffs	6/12/2012	7:05	
<i>Polytelis swainsonii</i>	Superb Parrot	3	0-40	0-20	Below RSA	90	N	1	BUS Taffs	6/12/2012	7:05	
<i>Polytelis swainsonii</i>	Superb Parrot	1	0-40	0-20	Below RSA	40	S	1	BUS Taffs	6/12/2012	7:05	
<i>Polytelis swainsonii</i>	Superb Parrot	2	0-40	0-20	Below RSA	50	S	1	BUS Taffs	6/12/2012	7:05	
<i>Psephotus haematonotus</i>	Red-rumped Parrot	5	0-40	0-20	Below RSA	80	E	1	BUS Taffs	6/12/2012	7:05	
<i>Rhipidura leucophrys</i>	Willie Wagtail	1	0-40	0-20	Below RSA	50	-	1	BUS Taffs	21/11/2012	13:38	Perched in tree
<i>Rhipidura leucophrys</i>	Willie Wagtail	1	0-40	0-20	Below RSA	10	S	1	BUS Taffs	21/11/2012	13:38	
<i>Rhipidura leucophrys</i>	Willie Wagtail	1	0-40	0-20	Below RSA	20	S	1	BUS Taffs	22/11/2012	15:00	
<i>Rhipidura leucophrys</i>	Willie Wagtail	2	0-40	0-20	Below RSA	50	SW	1	BUS Taffs	3/12/2012	16:00	Heard call
<i>Rhipidura leucophrys</i>	Willie Wagtail	2	-	0-20	Below RSA	5	-	1	BUS Taffs	6/12/2012	7:05	Perched
<i>Sturnus vulgaris</i>	Common Starling	10	0-40	0-20	Below RSA	60	-	1	BUS Taffs	29/11/2012	7:38	
<i>Sturnus vulgaris</i>	Common Starling	50	0-40	0-20	Below RSA	100	SW	1	BUS Taffs	3/12/2012	16:00	Observed
<i>Cacatua galerita</i>	Sulphur-crested Cockatoo	20	0-40	0-20	Below RSA	30	N	2	BUS Hopefield	3/12/2012	16:30	Observed
<i>Cacatua galerita</i>	Sulphur-crested Cockatoo	5	-	0-20	Below RSA	50	-	2	BUS Hopefield	5/12/2012	13:25	Perched
<i>Cacatua galerita</i>	Sulphur-crested Cockatoo	3	0-40	0-20	Below RSA	50	W	2	BUS Hopefield	5/12/2012	13:25	Perched
<i>Coracina novaehollandiae</i>	Black-faced Cuckoo-shrike	1	0-40	0-20	Below RSA	40	S	2	BUS Hopefield	3/12/2012	16:30	Observed
<i>Cracticus tibicen</i>	Australian Magpie	2	0-40	0-20	Below RSA	80	SE	2	BUS Hopefield	14/11/2012	7:55	
<i>Cracticus tibicen</i>	Australian Magpie	3	0-40	0-20	Below RSA	15	W	2	BUS Hopefield	14/11/2012	7:55	
<i>Cracticus tibicen</i>	Australian Magpie	2	0-40	0-20	Below RSA	20	N	2	BUS Hopefield	3/12/2012	16:30	Observed/Heard call
<i>Cracticus tibicen</i>	Australian Magpie	1	-	0-20	Below RSA	15	-	2	BUS Hopefield	5/12/2012	13:25	Perched on fence
<i>Cracticus tibicen</i>	Australian Magpie	1	-	0-20	Below RSA	50	-	2	BUS Hopefield	5/12/2012	13:25	Perched
<i>Egretta novaehollandiae</i>	White-faced Heron	2	0-40	0-20	Below RSA	10	E	2	BUS Hopefield	3/12/2012	16:30	Observed
<i>Eolophus roseicapilla</i>	Galah	2	0-40	0-20	Below RSA	20	S	2	BUS Hopefield	14/11/2012	7:55	
<i>Eolophus roseicapilla</i>	Galah	20	0-40	0-20	Below RSA	30	NE	2	BUS Hopefield	3/12/2012	16:30	Observed
<i>Eolophus roseicapilla</i>	Galah	6	-	0-20	Below RSA	10	-	2	BUS Hopefield	5/12/2012	13:25	On ground
<i>Eolophus roseicapilla</i>	Galah	2	-	0-20	Below RSA	50	-	2	BUS Hopefield	5/12/2012	13:25	Perched
<i>Eolophus roseicapilla</i>	Galah	6	-	0-20	Below RSA	50	-	2	BUS Hopefield	5/12/2012	13:25	Perched
<i>Eolophus roseicapilla</i>	Galah	20	0-40	0-20	Below RSA	80	S	2	BUS Hopefield	5/12/2012	13:25	
<i>Malurus cyaneus</i>	Superb Fairywren	1	0-40	0-20	Below RSA	5	S	2	BUS Hopefield	3/12/2012	16:30	Observed
<i>Pardalotus striatus</i>	Striated Pardalote	2	0-40	0-20	Below RSA	20	NW	2	BUS Hopefield	14/11/2012	7:55	
<i>Pardalotus striatus</i>	Striated Pardalote	2	0-40	0-20	Below RSA	30	N	2	BUS Hopefield	14/11/2012	7:55	

Scientific Name	Common Name	Count	0-40, 40-150, >150	0-20, 20-40, 40-150, 150- 200, >200	Relative Height	Distance (m)	Flight Direction	BUS No.	BUS Location	Date	Time	Notes/ Observation Type
<i>Pardalotus striatus</i>	Striated Pardalote	1	0-40	0-20	Below RSA	20	E	2	BUS Hopefield	14/11/2012	7:55	
<i>Platycercus elegans</i>	Crimson Rosella	2	0-40	0-20	Below RSA	100	NE	2	BUS Hopefield	3/12/2012	16:30	Observed
<i>Platycercus eximius</i>	Eastern Rosella	1	0-40	0-20	Below RSA	30	SE	2	BUS Hopefield	14/11/2012	7:55	
<i>Platycercus eximius</i>	Eastern Rosella	2	0-40	0-20	Below RSA	20	N	2	BUS Hopefield	3/12/2012	16:30	Observed
<i>Polytelis swainsonii</i>	Superb Parrot	30	0-40	0-20	Below RSA	10	SE	2	BUS Hopefield	14/11/2012	7:55	Foraging in pasture and hanging in trees
<i>Polytelis swainsonii</i>	Superb Parrot	2	0-40	0-20	Below RSA	5	SE	2	BUS Hopefield	14/11/2012	7:55	
<i>Polytelis swainsonii</i>	Superb Parrot	7	0-40	0-20	Below RSA	5	NW	2	BUS Hopefield	14/11/2012	7:55	
<i>Polytelis swainsonii</i>	Superb Parrot	3	0-40	0-20	Below RSA	10	SE	2	BUS Hopefield	14/11/2012	7:55	
<i>Polytelis swainsonii</i>	Superb Parrot	4	0-40	0-20	Below RSA	30	SE	2	BUS Hopefield	14/11/2012	7:55	
<i>Polytelis swainsonii</i>	Superb Parrot	1	0-40	0-20	Below RSA	40	S	2	BUS Hopefield	14/11/2012	7:55	
<i>Polytelis swainsonii</i>	Superb Parrot	1	0-40	0-20	Below RSA	60	E	2	BUS Hopefield	3/12/2012	16:30	Observed
<i>Rhipidura leucophrys</i>	Willie Wagtail	1	0-40	0-20	Below RSA	5	W	2	BUS Hopefield	3/12/2012	16:30	Observed/H eard call
<i>Rhipidura leucophrys</i>	Willie Wagtail	1	-	0-20	Below RSA	40	-	2	BUS Hopefield	5/12/2012	13:25	Perched
<i>Rhipidura leucophrys</i>	Willie Wagtail	2	-	0-20	Below RSA	10	-	2	BUS Hopefield	5/12/2012	13:25	Perched
<i>Sturnus vulgaris</i>	Common Starling	10	0-40	0-20	Below RSA	100	N	2	BUS Hopefield	5/12/2012	13:25	
<i>Acanthiza chrysorrhoa</i>	Yellow-rumped Thornbill	5	0-40	0-20	Below RSA	20	-	3	BUS Willow	4/12/2012	9:05	Perched in tree
<i>Cincloramphus mathewsi</i>	Rufous Songlark	2	0-40	0-20	Below RSA	100	NW	3	BUS Willow	25/01/2013	10:00	perched calling from tree
<i>Climacteris picumnus</i>	Brown Treecreeper	2	0-40	0-20	Below RSA	60	E	3	BUS Willow	25/01/2013	10:00	
<i>Coracina novaehollandiae</i>	Black-faced Cuckoo-shrike	2	0-40	0-20	Below RSA	200	NW	3	BUS Willow	13/12/2012	17:57	
<i>Corvus coronoides</i>	Australasian Raven	3	0-40	0-20	Below RSA	70	N	3	BUS Willow	25/01/2013	10:00	Perched
<i>Cracticus tibicen</i>	Australian Magpie	1	0-40	0-20	Below RSA	20	W	3	BUS Willow	4/12/2012	9:05	
<i>Cracticus tibicen</i>	Australian Magpie	2	0-40	0-20	Below RSA	120	S	3	BUS Willow	4/12/2012	9:05	
<i>Cracticus tibicen</i>	Australian Magpie	2	0-40	0-20	Below RSA	40	W	3	BUS Willow	5/12/2012	16:40	Very Windy
<i>Cracticus tibicen</i>	Australian Magpie	1	0-40	0-20	Below RSA	200	N	3	BUS Willow	13/12/2012	17:57	
<i>Cracticus tibicen</i>	Australian Magpie	2	0-40	0-20	Below RSA	50	NE	3	BUS Willow	25/01/2013	10:00	
<i>Dacelo novaeguineae</i>	Laughing Kookaburra	1	0-40	0-20	Below RSA	60	NW	3	BUS Willow	25/01/2013	10:00	perched
<i>Falco cenchroides</i>	Nankeen Kestrel	3	0-40	0-20	Below RSA	40	-	3	BUS Willow	5/12/2012	16:40	Hovering in wind
<i>Falco cenchroides</i>	Nankeen Kestrel	2	0-40	20-40	At RSA	80	NE	3	BUS Willow	25/01/2013	10:00	foraging Calling in trees
<i>Malurus cyaneus</i>	Superb Fairywren	2	0-40	0-20	Below RSA	20	-	3	BUS Willow	4/12/2012	9:05	
<i>Pardalotus striatus</i>	Striated Pardalote	1	0-40	0-20	Below RSA	30	S	3	BUS Willow	13/12/2012	17:57	
<i>Platycercus elegans</i>	Crimson Rosella	1	0-40	0-20	Below RSA	20	W	3	BUS Willow	5/12/2012	16:40	Very Windy
<i>Platycercus elegans</i>	Crimson Rosella	3	0-40	0-20	Below RSA	40	NW	3	BUS Willow	25/01/2013	10:00	
<i>Rhipidura leucophrys</i>	Willie Wagtail	2	0-40	0-20	Below RSA	70	W	3	BUS Willow	25/01/2013	10:00	perched
<i>Anthochaera carunculata</i>	Red Wattlebird	4	0-40	0-20	Below RSA	50	W	4	BUS Wargeila	18/01/2013	8:42	
<i>Artamus superciliosus</i>	White-browed Woodswallow	7	0-40	0-20	Below RSA	20	-	4	BUS Wargeila	4/12/2012	15:35	Circling
<i>Cacatua galerita</i>	Sulphur-crested Cockatoo	2	0-40	0-20	Below RSA	50	NE	4	BUS Wargeila	4/12/2012	15:35	
<i>Cacatua galerita</i>	Sulphur-crested Cockatoo	2	0-40	0-20	Below RSA	100	W	4	BUS Wargeila	4/12/2012	15:35	
<i>Cacatua galerita</i>	Sulphur-crested Cockatoo	5	0-40	0-20	Below RSA	80	NE	4	BUS Wargeila	18/01/2013	8:42	
<i>Cacatua galerita</i>	Sulphur-crested Cockatoo	2	0-40	0-20	Below RSA	60	E	4	BUS Wargeila	18/01/2013	8:42	
<i>Cacatua galerita</i>	Sulphur-crested Cockatoo	1	0-40	0-20	Below RSA	30	W	4	BUS Wargeila	18/01/2013	8:42	
<i>Cacatua galerita</i>	Sulphur-crested Cockatoo	3	0-40	0-20	Below RSA	150	NE	4	BUS Wargeila	25/02/2013	7:23	Perched
<i>Cacatua galerita</i>	Sulphur-crested Cockatoo	5	0-40	0-20	Below RSA	70	N	4	BUS Wargeila	27/02/2013	9:50	Perched
<i>Coracina novaehollandiae</i>	Black-faced Cuckoo-shrike	1	0-40	0-20	Below RSA	40	W	4	BUS Wargeila	4/12/2012	15:35	
<i>Coracina novaehollandiae</i>	Black-faced Cuckoo-shrike	1	0-40	0-20	Below RSA	30	W	4	BUS Wargeila	18/01/2013	8:42	
<i>Cormobates leucophaea</i>	White-throated Treecreeper	1	-	0-20	Below RSA	40	-	4	BUS Wargeila	4/12/2012	15:35	Calling in woodland
<i>Cracticus tibicen</i>	Australian Magpie	3	0-40	0-20	Below RSA	25	E	4	BUS Wargeila	18/01/2013	8:42	On ground
<i>Cracticus tibicen</i>	Australian Magpie	8	0-40	0-20	Below RSA	100		4	BUS Wargeila	25/02/2013	7:23	Perched
<i>Cracticus tibicen</i>	Australian Magpie	1	0-40	0-20	Below RSA	150	NE	4	BUS Wargeila	25/02/2013	7:23	Flying
<i>Cracticus tibicen</i>	Australian Magpie	2	0-40	0-20	Below RSA	150	NW	4	BUS Wargeila	25/02/2013	7:23	Flying
<i>Cracticus tibicen</i>	Australian Magpie	4	0-40	0-20	Below RSA	70	N	4	BUS Wargeila	27/02/2013	9:50	Perched
<i>Dacelo novaeguineae</i>	Laughing Kookaburra	1	0-40	0-20	Below RSA	50	N	4	BUS Wargeila	18/01/2013	8:42	
<i>Dacelo novaeguineae</i>	Laughing Kookaburra	1	0-40	0-20	Below RSA	150	E	4	BUS Wargeila	25/02/2013	7:23	Perched
<i>Eolophus roseicapilla</i>	Galah	2	0-40	0-20	Below RSA	10	N	4	BUS Wargeila	4/12/2012	15:35	
<i>Eolophus roseicapilla</i>	Galah	2	0-40	0-20	Below RSA	20	N	4	BUS Wargeila	4/12/2012	15:35	
<i>Eolophus roseicapilla</i>	Galah	2	0-40	0-20	Below RSA	200	SE	4	BUS Wargeila	25/02/2013	7:23	Flying
<i>Eolophus roseicapilla</i>	Galah	2	0-40	0-20	Below RSA	150	N	4	BUS Wargeila	25/02/2013	7:23	Flying
<i>Eurystomus orientalis</i>	Dollarbird	1	0-40	0-20	Below RSA	30	N	4	BUS Wargeila	18/01/2013	8:42	
<i>Grallina cyanoleuca</i>	Magpie Lark	1	0-40	0-20	Below RSA	100		4	BUS Wargeila	25/02/2013	7:23	Perched
<i>Malurus cyaneus</i>	Superb Fairywren	4	0-40	0-20	Below RSA	100	S	4	BUS Wargeila	25/02/2013	7:23	Perched
<i>Malurus cyaneus</i>	Superb Fairywren	4	0-40	0-20	Below RSA	30	E	4	BUS Wargeila	27/02/2013	9:50	Perched
<i>Pardalotus striatus</i>	Striated Pardalote	1	-	0-20	Below RSA	40	-	4	BUS Wargeila	4/12/2012	15:35	Calling in

Scientific Name	Common Name	Count	0-40, 40-150, >150	0-20, 20-40, 40-150, 150- 200, >200	Relative Height	Distance (m)	Flight Direction	BUS No.	BUS Location	Date	Time	Notes/ Observation Type
												woodland
<i>Phalacrocorax varius</i>	Pied Cormorant	2	0-40	0-20	Below RSA		S	4	BUS Wargeila	25/02/2013	7:23	Flying
<i>Philemon corniculatus</i>	Noisy Friarbird	1	0-40	0-20	Below RSA	50	W	4	BUS Wargeila	27/02/2013	9:50	
<i>Platycercus elegans</i>	Crimson Rosella	1	0-40	0-20	Below RSA	50	NE	4	BUS Wargeila	4/12/2012	15:35	
<i>Platycercus elegans</i>	Crimson Rosella	1	0-40	0-20	Below RSA	50	E	4	BUS Wargeila	18/01/2013	8:42	
<i>Platycercus elegans</i>	Crimson Rosella	1	0-40	0-20	Below RSA	50	N	4	BUS Wargeila	18/01/2013	8:42	
<i>Platycercus elegans</i>	Crimson Rosella	2	0-40	0-20	Below RSA	45	NW	4	BUS Wargeila	18/01/2013	8:42	
<i>Platycercus eximius</i>	Eastern Rosella	2	0-40	0-20	Below RSA	150	NW	4	BUS Wargeila	25/02/2013	7:23	Perched
<i>Polytelis swainsonii</i>	Superb Parrot	1	0-40	0-20	Below RSA	50	N	4	BUS Wargeila	4/12/2012	15:35	
<i>Rhipidura leucophrys</i>	Willie Wagtail	1	0-40	0-20	Below RSA	30	N	4	BUS Wargeila	18/01/2013	8:42	on ground
<i>Rhipidura leucophrys</i>	Willie Wagtail	1	0-40	0-20	Below RSA	20		4	BUS Wargeila	25/02/2013	7:23	Perched
<i>Acanthiza reguloides</i>	Buff-rumped Thornbill	2	0-40	0-20	Below RSA	-	N	5	BUS Taree	28/11/2012	7:18	
<i>Aquila audax</i>	Wedge-tailed Eagle	1	40-150	40-150	At RSA	300	N	5	BUS Taree	16/11/2012	11:15	Thermaling North
<i>Cacatua galerita</i>	Sulphur-crested Cockatoo	2	0-40	0-20	Below RSA	40	SW	5	BUS Taree	28/11/2012	7:18	
<i>Coracina novaehollandiae</i>	Black-faced Cuckoo-shrike	1	0-40	0-20	Below RSA	100	W	5	BUS Taree	16/11/2012	11:15	
<i>Coracina novaehollandiae</i>	Black-faced Cuckoo-shrike	1	0-40	0-20	Below RSA	30	SE	5	BUS Taree	16/11/2012	11:15	
<i>Coracina novaehollandiae</i>	Black-faced Cuckoo-shrike	1	0-40	0-20	Below RSA	40	-	5	BUS Taree	21/11/2012	8:15	Calling in woodland
<i>Coracina novaehollandiae</i>	Black-faced Cuckoo-shrike	1	0-40	0-20	Below RSA	-	SW	5	BUS Taree	28/11/2012	7:18	
<i>Cormobates leucophaea</i>	White-throated Trecreeper	2	0-40	0-20	Below RSA	80	-	5	BUS Taree	16/11/2012	11:15	Calling in trees
<i>Cormobates leucophaea</i>	White-throated Trecreeper	1	0-40	0-20	Below RSA	100	-	5	BUS Taree	21/11/2012	8:15	Calling, perched in tree
<i>Corvus coronoides</i>	Australasian Raven	2	0-40	0-20	Below RSA	100	S	5	BUS Taree	21/11/2012	8:15	
<i>Corvus mellori</i>	Little Raven	2	0-40	0-20	Below RSA	-	S	5	BUS Taree	28/11/2012	7:18	
<i>Cracticus nigrogularis</i>	Pied Butcherbird	1	0-40	0-20	Below RSA	60	N	5	BUS Taree	21/11/2012	8:15	
<i>Cracticus tibicen</i>	Australian Magpie	2	0-40	20-40	At RSA	70	E	5	BUS Taree	16/11/2012	11:15	
<i>Cracticus tibicen</i>	Australian Magpie	3	0-40	0-20	Below RSA	100	-	5	BUS Taree	16/11/2012	11:15	Perched in tree
<i>Cracticus tibicen</i>	Australian Magpie	1	0-40	0-20	Below RSA	60	-	5	BUS Taree	16/11/2012	11:15	Perched in tree
<i>Cracticus tibicen</i>	Australian Magpie	1	0-40	0-20	Below RSA	80	-	5	BUS Taree	16/11/2012	11:15	Perched in tree
<i>Cracticus tibicen</i>	Australian Magpie	1	0-40	0-20	Below RSA	90	-	5	BUS Taree	21/11/2012	8:15	Perched in tree
<i>Cracticus tibicen</i>	Australian Magpie	2	0-40	0-20	Below RSA	-	S	5	BUS Taree	28/11/2012	7:18	
<i>Cracticus tibicen</i>	Australian Magpie	2	0-40	0-20	Below RSA	100	NE	5	BUS Taree	4/12/2012	13:25	Very Windy
<i>Cracticus tibicen</i>	Australian Magpie	4	0-40	0-20	Below RSA	40	S	5	BUS Taree	5/12/2012	8:25	Very Windy
<i>Eopsaltria australis</i>	Eastern Yellow Robin	1	0-40	0-20	Below RSA	-	NW	5	BUS Taree	28/11/2012	7:18	
<i>Falco berigora</i>	Brown Falcon	1	0-40	0-20	Below RSA	20	W	5	BUS Taree	4/12/2012	13:25	Very Windy
<i>Falco cenchroides</i>	Nankeen Kestrel	1	0-40	0-20	Below RSA	110	S	5	BUS Taree	16/11/2012	11:15	
<i>Falco cenchroides</i>	Nankeen Kestrel	2	0-40	0-20	Below RSA	80	NE	5	BUS Taree	21/11/2012	8:15	
<i>Gerygone albugularis</i>	White-throated Gerygone	1	0-40	0-20	Below RSA	80	-	5	BUS Taree	16/11/2012	11:15	Calling in trees
<i>Gerygone albugularis</i>	White-throated Gerygone	1	0-40	0-20	Below RSA	80	-	5	BUS Taree	21/11/2012	8:15	Calling in woodland
<i>Pardalotus striatus</i>	Striated Pardalote	1	0-40	0-20	Below RSA	40	-	5	BUS Taree	21/11/2012	8:15	Perched in tree
<i>Pardalotus striatus</i>	Striated Pardalote	?	0-40	0-20	Below RSA	-	SW	5	BUS Taree	28/11/2012	7:18	
<i>Pardalotus striatus</i>	Striated Pardalote	1	-	0-20	Below RSA	40	-	5	BUS Taree	4/12/2012	13:25	Calling in woodland, Very Windy
<i>Pardalotus striatus</i>	Striated Pardalote	1	0-40	0-20	Below RSA	20	-	5	BUS Taree	5/12/2012	8:25	Very Windy
<i>Philemon citreogularis</i>	Little Friarbird	1	0-40	0-20	Below RSA	80	-	5	BUS Taree	16/11/2012	11:15	Calling in trees
<i>Philemon corniculatus</i>	Noisy Friarbird	4	0-40	0-20	Below RSA	80	-	5	BUS Taree	21/11/2012	8:15	Calling in woodland
<i>Philemon corniculatus</i>	Noisy Friarbird	1	0-40	0-20	Below RSA	-	W	5	BUS Taree	28/11/2012	7:18	
<i>Platycercus elegans</i>	Crimson Rosella	2	0-40	0-20	Below RSA	40	E	5	BUS Taree	16/11/2012	11:15	
<i>Platycercus elegans</i>	Crimson Rosella	1	0-40	0-20	Below RSA	100	S	5	BUS Taree	21/11/2012	8:15	
<i>Platycercus elegans</i>	Crimson Rosella	2	0-40	0-20	Below RSA	20	NE	5	BUS Taree	21/11/2012	8:15	
<i>Platycercus elegans</i>	Crimson Rosella	2	0-40	0-20	Below RSA	-	W	5	BUS Taree	28/11/2012	7:18	
<i>Platycercus elegans</i>	Crimson Rosella	2	0-40	0-20	Below RSA	30	NW	5	BUS Taree	28/11/2012	7:18	
<i>Platycercus elegans</i>	Crimson Rosella	1	0-40	0-20	Below RSA	10	E	5	BUS Taree	5/12/2012	8:25	Very Windy
<i>Acanthiza reguloides</i>	Buff-rumped Thornbill	3	0-40	0-20	Below RSA	20	NW	6	BUS Taree 2	22/11/2012	17:30	Foraging
<i>Coracina novaehollandiae</i>	Black-faced Cuckoo-shrike	1	0-40	0-20	Below RSA	80	W	6	BUS Taree 2	5/12/2012	8:55	Very Windy
<i>Cormobates leucophaea</i>	White-throated Trecreeper	1	0-40	0-20	Below RSA	30	NW	6	BUS Taree 2	22/11/2012	17:30	
<i>Cormobates leucophaea</i>	White-throated Trecreeper	1	-	0-20	Below RSA	50	-	6	BUS Taree 2	6/12/2012	11:15	Calling in woodland
<i>Cracticus tibicen</i>	Australian Magpie	6	0-40	0-20	Below RSA	20	W	6	BUS Taree 2	22/11/2012	17:30	Perched
<i>Cracticus tibicen</i>	Australian Magpie	2	0-40	0-20	Below RSA	60	NE	6	BUS Taree 2	22/11/2012	17:30	Foraging on ground
<i>Cracticus tibicen</i>	Australian Magpie	3	0-40	0-20	Below RSA	100	W	6	BUS Taree 2	5/12/2012	8:55	Very Windy
<i>Cracticus tibicen</i>	Australian Magpie	4	0-40	0-20	Below RSA	200	S	6	BUS Taree 2	6/12/2012	11:15	

Scientific Name	Common Name	Count	0-40, 40-150, >150	0-20, 20-40, 40-150, 150- 200, >200	Relative Height	Distance (m)	Flight Direction	BUS No.	BUS Location	Date	Time	Notes/ Observation Type
<i>Dacelo novaeguineae</i>	Laughing Kookaburra	1	-	0-20	Below RSA	100	-	6	BUS Taree 2	6/12/2012	11:15	Perched
<i>Falco berigora</i>	Brown Falcon	1	0-40	0-20	Below RSA	200	S	6	BUS Taree 2	6/12/2012	11:15	
<i>Gerygone albogularis</i>	White-throated Gerygone	1	0-40	0-20	Below RSA	-	E	6	BUS Taree 2	22/11/2012	17:30	Perched
<i>Gerygone albogularis</i>	White-throated Gerygone	2	-	0-20	Below RSA	70	-	6	BUS Taree 2	6/12/2012	11:15	Calling in woodland
<i>Grallina cyanoleuca</i>	Magpie Lark	1	-	0-20	Below RSA	100	-	6	BUS Taree 2	6/12/2012	11:15	Calling in woodland
<i>Pardalotus striatus</i>	Striated Pardalote	2	0-40	0-20	Below RSA	-	N	6	BUS Taree 2	22/11/2012	17:30	Heard
<i>Pardalotus striatus</i>	Striated Pardalote	1	-	0-20	Below RSA	50	-	6	BUS Taree 2	6/12/2012	11:15	Calling in woodland
<i>Philemon corniculatus</i>	Noisy Friarbird	1	0-40	0-20	Below RSA	5	N	6	BUS Taree 2	22/11/2012	17:30	
<i>Philemon corniculatus</i>	Noisy Friarbird	1	-	0-20	Below RSA	60	-	6	BUS Taree 2	6/12/2012	11:15	Calling in woodland
<i>Platycercus elegans</i>	Crimson Rosella	1	0-40	0-20	Below RSA	-	SE	6	BUS Taree 2	22/11/2012	17:30	Perched
<i>Platycercus elegans</i>	Crimson Rosella	2	0-40	0-20	Below RSA	10	N	6	BUS Taree 2	22/11/2012	17:30	
<i>Platycercus elegans</i>	Crimson Rosella	2	0-40	0-20	Below RSA	30	W	6	BUS Taree 2	6/12/2012	11:15	
<i>Strepera graculina</i>	Pied Currawong	1	0-40	0-20	Below RSA	-	E	6	BUS Taree 2	22/11/2012	17:30	Heard
<i>Strepera graculina</i>	Pied Currawong	1	0-40	0-20	Below RSA	-	E	6	BUS Taree 2	22/11/2012	17:30	Heard
<i>Anthochaera carunculata</i>	Red Wattlebird	1	0-40	0-20	Below RSA	40	-	7	BUS Pines	21/11/2012	11:30	Perched in woodland
<i>Anthochaera carunculata</i>	Red Wattlebird	2	0-40	0-20	Below RSA	50	NW	7	BUS Pines	22/11/2012	8:45	
<i>Anthochaera carunculata</i>	Red Wattlebird	1	0-40	0-20	Below RSA	50	-	7	BUS Pines	6/12/2012	8:45	Perched
<i>Aquila morphnoides</i>	Little Eagle	1	40-150	40-150	At RSA	0	NE	7	BUS Pines	15/11/2012	17:23	
<i>Cacatua galerita</i>	Sulphur-crested Cockatoo	1	0-40	0-20	Below RSA	100	NW	7	BUS Pines	15/11/2012	17:23	
<i>Cacatua galerita</i>	Sulphur-crested Cockatoo	1	0-40	0-20	Below RSA	100	E	7	BUS Pines	15/11/2012	17:23	
<i>Cacatua galerita</i>	Sulphur-crested Cockatoo	2	0-40	0-20	Below RSA	50	-	7	BUS Pines	22/11/2012	8:45	Calling in woodland
<i>Cacatua galerita</i>	Sulphur-crested Cockatoo	1	0-40	0-20	Below RSA	50	W	7	BUS Pines	5/12/2012	10:35	Very Windy
<i>Cacatua galerita</i>	Sulphur-crested Cockatoo	-	-	0-20	Below RSA	40	S	7	BUS Pines	11/12/2012	11:40	
<i>Colluricincla harmonica</i>	Grey Shrike-thrush	1	0-40	0-20	Below RSA	50	-	7	BUS Pines	6/12/2012	8:45	Perched in paddock tree
<i>Coracina novaehollandiae</i>	Black-faced Cuckoo-shrike	2	0-40	0-20	Below RSA	20	SW	7	BUS Pines	15/11/2012	17:23	
<i>Coracina novaehollandiae</i>	Black-faced Cuckoo-shrike	2	0-40	0-20	Below RSA	20	NW	7	BUS Pines	22/11/2012	8:45	
<i>Corvus coronoides</i>	Australasian Raven	2	0-40	20-40	At RSA	80	E	7	BUS Pines	15/11/2012	17:23	
<i>Coracina novaehollandiae</i>	Black-faced Cuckoo-shrike	1	0-40	0-20	Below RSA	50	E	7	BUS Pines	6/12/2012	8:45	
<i>Coracina novaehollandiae</i>	Black-faced Cuckoo-shrike	-	-	0-20	Below RSA	50	N	7	BUS Pines	11/12/2012	11:40	
<i>Cormobates leucophaea</i>	White-throated Treecreeper	1	0-40	0-20	Below RSA	50	-	7	BUS Pines	15/11/2012	17:23	Calling in woodland
<i>Cormobates leucophaea</i>	White-throated Treecreeper	1	0-40	0-20	Below RSA	60	-	7	BUS Pines	21/11/2012	11:30	Calling in woodland
<i>Cormobates leucophaea</i>	White-throated Treecreeper	1	0-40	0-20	Below RSA	70	-	7	BUS Pines	22/11/2012	8:45	Calling in trees
<i>Cormobates leucophaea</i>	White-throated Treecreeper	1	0-40	0-20	Below RSA	50	-	7	BUS Pines	6/12/2012	8:45	Calling in woodland
<i>Cormobates leucophaea</i>	White-throated Treecreeper	-	-	0-20	Below RSA	50	E	7	BUS Pines	11/12/2012	11:40	
<i>Corvus coronoides</i>	Australasian Raven	1	0-40	0-20	Below RSA	20	S	7	BUS Pines	15/11/2012	17:23	
<i>Corvus coronoides</i>	Australasian Raven	2	0-40	0-20	Below RSA	60	SW	7	BUS Pines	15/11/2012	17:23	
<i>Corvus coronoides</i>	Australasian Raven	1	0-40	0-20	Below RSA	50	S	7	BUS Pines	15/11/2012	17:23	
<i>Corvus coronoides</i>	Australasian Raven	2	0-40	0-20	Below RSA	50	W	7	BUS Pines	21/11/2012	11:30	
<i>Cracticus tibicen</i>	Australian Magpie	1	0-40	0-20	Below RSA	70	-	7	BUS Pines	6/12/2012	8:45	Perched
<i>Cracticus tibicen</i>	Australian Magpie	-	-	0-20	Below RSA	40	N	7	BUS Pines	11/12/2012	11:40	
<i>Cracticus torquatus</i>	Grey Butcherbird	-	-	0-20	Below RSA	50	NW	7	BUS Pines	11/12/2012	11:40	
<i>Eolophus roseicapilla</i>	Galah	2	0-40	0-20	Below RSA	50	W	7	BUS Pines	5/12/2012	10:35	Very Windy
<i>Falco berigora</i>	Brown Falcon	1	0-40	0-20	Below RSA	50	E	7	BUS Pines	6/12/2012	8:45	
<i>Gerygone albogularis</i>	White-throated Gerygone	1	0-40	0-20	Below RSA	60	-	7	BUS Pines	21/11/2012	11:30	Calling in woodland
<i>Gerygone albogularis</i>	White-throated Gerygone	1	0-40	0-20	Below RSA	80	-	7	BUS Pines	22/11/2012	8:45	Calling in woodland
<i>Gerygone albogularis</i>	White-throated Gerygone	-	-	0-20	Below RSA	100	E	7	BUS Pines	11/12/2012	11:40	
<i>Gerygone albogularis</i>	White-throated Gerygone	-	-	0-20	Below RSA	70	NW	7	BUS Pines	11/12/2012	11:40	
<i>Gerygone albogularis</i>	White-throated Gerygone	-	-	0-20	Below RSA	70	SE	7	BUS Pines	11/12/2012	11:40	
<i>Grallina cyanoleuca</i>	Magpie Lark	-	-	0-20	Below RSA	50	W	7	BUS Pines	11/12/2012	11:40	
<i>Pardalotus striatus</i>	Striated Pardalote	1	0-40	0-20	Below RSA	70	-	7	BUS Pines	21/11/2012	11:30	Calling in woodland
<i>Pardalotus striatus</i>	Striated Pardalote	1	0-40	0-20	Below RSA	40	-	7	BUS Pines	22/11/2012	8:45	Calling in trees
<i>Pardalotus striatus</i>	Striated Pardalote	1	0-40	0-20	Below RSA	50	-	7	BUS Pines	6/12/2012	8:45	Perched
<i>Pardalotus striatus</i>	Striated Pardalote	-	-	0-20	Below RSA	30	SE	7	BUS Pines	11/12/2012	11:40	
<i>Philemon citreogularis</i>	Little Friarbird	1	0-40	0-20	Below RSA	20	-	7	BUS Pines	6/12/2012	8:45	Perched
<i>Philemon corniculatus</i>	Noisy Friarbird	1	0-40	0-20	Below RSA	30	-	7	BUS Pines	22/11/2012	8:45	Perched
<i>Philemon corniculatus</i>	Noisy Friarbird	-	-	0-20	Below RSA	60	NE	7	BUS Pines	11/12/2012	11:40	
<i>Platycercus elegans</i>	Crimson Rosella	2	0-40	0-20	Below RSA	30	-	7	BUS Pines	21/11/2012	11:30	Feeding in woodland
<i>Platycercus elegans</i>	Crimson Rosella	1	0-40	0-20	Below RSA	40	-	7	BUS Pines	22/11/2012	8:45	Perched
<i>Platycercus elegans</i>	Crimson Rosella	2	0-40	0-20	Below RSA	30	W	7	BUS Pines	6/12/2012	8:45	

Scientific Name	Common Name	Count	0-40, 40-150, >150	0-20, 20-40, 40-150, 150- 200, >200	Relative Height	Distance (m)	Flight Direction	BUS No.	BUS Location	Date	Time	Notes/ Observation Type
<i>Platycercus elegans</i>	Crimson Rosella	-	-	0-20	Below RSA	30	N	7	BUS Pines	11/12/2012	11:40	
<i>Platycercus eximius</i>	Eastern Rosella	2	0-40	0-20	Below RSA	40	-	7	BUS Pines	15/11/2012	17:23	Perched in tree
<i>Platycercus eximius</i>	Eastern Rosella	1	0-40	0-20	Below RSA	30	W	7	BUS Pines	21/11/2012	11:30	
<i>Polytelis swainsonii</i>	Superb Parrot	1	0-40	0-20	Below RSA	80	SW	7	BUS Pines	5/12/2012	10:35	Very Windy
<i>Polytelis swainsonii</i>	Superb Parrot	1	0-40	0-20	Below RSA	10	S	7	BUS Pines	6/12/2012	8:45	
<i>Polytelis swainsonii</i>	Superb Parrot	3	0-40	0-20	Below RSA	5	S	7	BUS Pines	6/12/2012	8:45	
<i>Rhipidura albiscapa</i>	Grey Fantail	1	0-40	0-20	Below RSA	60	-	7	BUS Pines	21/11/2012	11:30	Calling in woodland
<i>Todiramphus sanctus</i>	Sacred Kingfisher	1	0-40	0-20	Below RSA	70	-	7	BUS Pines	22/11/2012	8:45	Calling in woodland
<i>Todiramphus sanctus</i>	Sacred Kingfisher	1	0-40	0-20	Below RSA	50	-	7	BUS Pines	6/12/2012	8:45	Calling in woodland
-	Unidentified Honeyeater	1	0-40	0-20	Below RSA	50	-	8	BUS Yambacoona	14/11/2012	9:50	Moving in trees
<i>Acanthiza lineata</i>	Striated Thornbill	10	0-40	0-20	Below RSA	50	-	8	BUS Yambacoona	14/11/2012	9:50	Foraging in trees
<i>Anthochaera carunculata</i>	Red Wattlebird	1	0-40	0-20	Below RSA	100	-	8	BUS Yambacoona	14/11/2012	9:50	Calling in trees
<i>Cormobates leucophaea</i>	White-throated Treecreeper	2	0-40	0-20	Below RSA	50	-	8	BUS Yambacoona	14/11/2012	9:50	Foraging in trees
<i>Corvus coronoides</i>	Australasian Raven	1	0-40	0-20	Below RSA	100	SE	8	BUS Yambacoona	14/11/2012	9:50	
<i>Cracticus tibicen</i>	Australian Magpie	1	0-40	0-20	Below RSA	70	S	8	BUS Yambacoona	14/11/2012	9:50	
<i>Eolophus roseicapilla</i>	Galah	1	0-40	0-20	Below RSA	20	N	8	BUS Yambacoona	4/12/2012	16:50	Observed/H eard call
<i>Gerygone olbogularis</i>	White-throated Gerygone	1	0-40	0-20	Below RSA	5	W	8	BUS Yambacoona	28/11/2012	12:30	
<i>Malurus cyaneus</i>	Superb Fairywren	5	0-40	0-20	Below RSA	30	-	8	BUS Yambacoona	14/11/2012	9:50	Foraging in grass
<i>Malurus cyaneus</i>	Superb Fairywren	3	0-40	0-20	Below RSA	3	W	8	BUS Yambacoona	28/11/2012	12:30	
<i>Malurus cyaneus</i>	Superb Fairywren	2	0-40	0-20	Below RSA	20	N	8	BUS Yambacoona	4/12/2012	16:50	Observed
<i>Pachycephala rufiventris</i>	Rufous Whistler	1	0-40	0-20	Below RSA	35	E	8	BUS Yambacoona	28/11/2012	12:30	
<i>Pachycephala rufiventris</i>	Rufous Whistler	1	0-40	0-20	Below RSA	10	W	8	BUS Yambacoona	4/12/2012	16:50	Observed/H eard call
<i>Petroica rosea</i>	Rose Robin	2	0-40	0-20	Below RSA	10	-	8	BUS Yambacoona	22/11/2012	10:36	Perched
<i>Petroica rosea</i>	Rose Robin	2	0-40	0-20	Below RSA	10	S	8	BUS Yambacoona	4/12/2012	16:50	Observed
<i>Philemon corniculatus</i>	Noisy Friarbird	2	0-40	0-20	Below RSA	70	-	8	BUS Yambacoona	14/11/2012	9:50	Perched
<i>Philemon corniculatus</i>	Noisy Friarbird	1	0-40	0-20	Below RSA	20	SE	8	BUS Yambacoona	22/11/2012	10:36	
<i>Philemon corniculatus</i>	Noisy Friarbird	1	0-40	0-20	Below RSA	30	S	8	BUS Yambacoona	28/11/2012	12:30	
<i>Platycercus elegans</i>	Crimson Rosella	1	0-40	0-20	Below RSA	50	E	8	BUS Yambacoona	14/11/2012	9:50	
<i>Platycercus elegans</i>	Crimson Rosella	1	0-40	0-20	Below RSA	30	S	8	BUS Yambacoona	14/11/2012	9:50	
<i>Platycercus elegans</i>	Crimson Rosella	3	0-40	0-20	Below RSA	20	S	8	BUS Yambacoona	22/11/2012	10:36	
<i>Platycercus elegans</i>	Crimson Rosella	2	0-40	0-20	Below RSA	30	S	8	BUS Yambacoona	22/11/2012	10:36	
<i>Platycercus elegans</i>	Crimson Rosella	1	0-40	0-20	Below RSA	5	S	8	BUS Yambacoona	22/11/2012	10:36	
<i>Platycercus elegans</i>	Crimson Rosella	1	0-40	0-20	Below RSA	5	N	8	BUS Yambacoona	22/11/2012	10:36	
<i>Platycercus elegans</i>	Crimson Rosella	2	0-40	0-20	Below RSA	20	SW	8	BUS Yambacoona	28/11/2012	12:30	
<i>Platycercus elegans</i>	Crimson Rosella	1	0-40	0-20	Below RSA	30	NW	8	BUS Yambacoona	28/11/2012	12:30	
<i>Platycercus elegans</i>	Crimson Rosella	2	0-40	0-20	Below RSA	40	N	8	BUS Yambacoona	4/12/2012	16:50	Observed
<i>Platycercus eximius</i>	Eastern Rosella	1	0-40	0-20	Below RSA	50	S	8	BUS Yambacoona	14/11/2012	9:50	
<i>Platycercus eximius</i>	Eastern Rosella	1	0-40	0-20	Below RSA	30	S	8	BUS Yambacoona	28/11/2012	12:30	
<i>Platycercus eximius</i>	Eastern Rosella	1	0-40	0-20	Below RSA	10	S	8	BUS Yambacoona	4/12/2012	16:50	Observed
<i>Polytelis swainsonii</i>	Superb Parrot	5	0-40	0-20	Below RSA	40	NE	8	BUS Yambacoona	22/11/2012	10:36	Travelling along rd
<i>Polytelis swainsonii</i>	Superb Parrot	1	0-40	0-20	Below RSA	10	S	8	BUS Yambacoona	22/11/2012	10:36	
<i>Rhipidura albiscapa</i>	Grey Fantail	1	0-40	0-20	Below RSA	30	-	8	BUS Yambacoona	14/11/2012	9:50	Perched in tree
<i>Rhipidura albiscapa</i>	Grey Fantail	2	0-40	0-20	Below RSA	20	S	8	BUS Yambacoona	22/11/2012	10:36	
-	Unidentified bird	1	0-40	20-40	At RSA	100	W	9	BUS Glanmire	16/11/2012	8:55	
<i>Cacatua galerita</i>	Sulphur-crested Cockatoo	2	0-40	20-40	At RSA	80	E	9	BUS Glanmire	16/11/2012	8:55	
<i>Cacatua galerita</i>	Sulphur-crested Cockatoo	1	0-40	20-40	At RSA	70	E	9	BUS Glanmire	16/11/2012	8:55	
<i>Cracticus tibicen</i>	Australian Magpie	2	0-40	0-20	Below RSA	100	NE	9	BUS Glanmire	16/11/2012	8:55	
<i>Cracticus tibicen</i>	Australian Magpie	2	0-40	0-20	Below RSA	100	NE	9	BUS Glanmire	16/11/2012	8:55	
<i>Eolophus roseicapilla</i>	Galah	2	40-150	20-40	At RSA	30	NW	9	BUS Glanmire	16/11/2012	8:55	
<i>Eolophus roseicapilla</i>	Galah	2	0-40	40-150	At RSA	80	N	9	BUS Glanmire	16/11/2012	8:55	
<i>Falco cenchroides</i>	Nankeen Kestrel	1	0-40	20-40	At RSA	10	N	9	BUS Glanmire	16/11/2012	8:55	
<i>Polytelis swainsonii</i>	Superb Parrot	1	0-40	20-40	At RSA	10	NE	9	BUS Glanmire	16/11/2012	8:55	
<i>Platycercus eximius</i>	Eastern Rosella	1	0-40	0-20	Below RSA	70	NE	9	BUS Glanmire	16/11/2012	8:55	
<i>Polytelis swainsonii</i>	Superb Parrot	4	0-40	0-20	Below RSA	20	W	9	BUS Glanmire	16/11/2012	8:55	

Scientific Name	Common Name	Count	0-40, 40-150, >150	0-20, 20-40, 40-150, 150- 200, >200	Relative Height	Distance (m)	Flight Direction	BUS No.	BUS Location	Date	Time	Notes/ Observation Type
-	Unidentified small bird	2	0-40	0-20	Below RSA	30	N	10	BUS Springvale	14/11/2012	7:37	
<i>Anas superciliosa</i>	Pacific Black Duck	1	0-40	0-20	Below RSA	20	W	10	BUS Springvale	14/11/2012	7:37	Flying along creek
<i>Cacatua galerita</i>	Sulphur-crested Cockatoo	1	0-40	0-20	Below RSA	100	NE	10	BUS Springvale	14/11/2012	7:37	
<i>Cacatua galerita</i>	Sulphur-crested Cockatoo	1	0-40	0-20	Below RSA	100	W	10	BUS Springvale	5/12/2012	15:10	Very Windy
<i>Cacatua galerita</i>	Sulphur-crested Cockatoo	4	0-40	0-20	Below RSA	200	E	10	BUS Springvale	27/02/2013	9:00	Perched
<i>Chenonetta jubata</i>	Australian Wood Duck	2	0-40	0-20	Below RSA	70	S	10	BUS Springvale	27/02/2013	9:00	
<i>Colluricincla harmonica</i>	Grey Shrike-thrush	3	0-40	0-20	Below RSA	20	W	10	BUS Springvale	14/11/2012	7:37	Flying along creek
<i>Corvus mellori</i>	Little Raven	2	0-40	20-40	At RSA	40	S	10	BUS Springvale	27/02/2013	9:00	
<i>Cracticus tibicen</i>	Australian Magpie	1	0-40	0-20	Below RSA	30	SE	10	BUS Springvale	14/11/2012	7:37	
<i>Cracticus tibicen</i>	Australian Magpie	2	0-40	0-20	Below RSA	70	W	10	BUS Springvale	5/12/2012	15:10	Very Windy
<i>Cracticus tibicen</i>	Australian Magpie	1	0-40	0-20	Below RSA	20	W	10	BUS Springvale	6/12/2012	14:57	
<i>Cracticus tibicen</i>	Australian Magpie	2	0-40	0-20	Below RSA	100	E	10	BUS Springvale	27/02/2013	9:00	Perched
<i>Cracticus tibicen</i>	Australian Magpie	4	0-40	0-20	Below RSA	200	E	10	BUS Springvale	27/02/2013	9:00	Perched
<i>Egretta novaehollandiae</i>	White-faced Heron	1	0-40	0-20	Below RSA	10	SE	10	BUS Springvale	14/11/2012	7:37	
<i>Egretta novaehollandiae</i>	White-faced Heron	1	0-40	0-20	Below RSA	50	W	10	BUS Springvale	5/12/2012	15:10	Very Windy
<i>Eolophus roseicapilla</i>	Galah	2	0-40	0-20	Below RSA	50	S	10	BUS Springvale	5/12/2012	15:10	Very Windy
<i>Eolophus roseicapilla</i>	Galah	2	0-40	0-20	Below RSA	10	-	10	BUS Springvale	6/12/2012	14:57	Perched
<i>Eolophus roseicapilla</i>	Galah	2	0-40	0-20	Below RSA	50	N	10	BUS Springvale	6/12/2012	14:57	
<i>Eolophus roseicapilla</i>	Galah	2	0-40	0-20	Below RSA	50	W	10	BUS Springvale	6/12/2012	14:57	
<i>Eolophus roseicapillus</i>	Galah	2	0-40	0-20	Below RSA	50	N	10	BUS Springvale	14/11/2012	7:37	
<i>Lichenostomus pencillatus</i>	White-plumed Honeyeater	2	0-40	0-20	Below RSA	10	W	10	BUS Springvale	6/12/2012	14:57	
<i>Malurus cyaneus</i>	Superb Fairywren	5	0-40	0-20	Below RSA	15	W	10	BUS Springvale	14/11/2012	7:37	Flying along creek
<i>Malurus cyaneus</i>	Superb Fairywren	6	0-40	0-20	Below RSA	10	-	10	BUS Springvale	6/12/2012	14:57	Perched
<i>Merops ornatus</i>	Rainbow Bee-eater	2	0-40	0-20	Below RSA	40	-	10	BUS Springvale	14/11/2012	7:37	Perched
<i>Merops ornatus</i>	Rainbow Bee-eater	1	0-40	0-20	Below RSA	30	W	10	BUS Springvale	5/12/2012	15:10	Very Windy
<i>Merops ornatus</i>	Rainbow Bee-eater	2	0-40	0-20	Below RSA	5	-	10	BUS Springvale	6/12/2012	14:57	Perched
<i>Pardalotus striatus</i>	Striated Pardalote	1	0-40	0-20	Below RSA	10	-	10	BUS Springvale	6/12/2012	14:57	Perched
<i>Petrochelidon ariel</i>	Fairy Martin	7	0-40	0-20	Below RSA	70	E	10	BUS Springvale	14/11/2012	7:37	Flying across grassland
<i>Phaps chalcoptera</i>	Common Bronzewing	1	0-40	0-20	Below RSA	10	E	10	BUS Springvale	27/02/2013	9:00	
<i>Platycercus elegans</i>	Crimson Rosella	2	0-40	0-20	Below RSA	40	-	10	BUS Springvale	6/12/2012	14:57	Perched
<i>Platycercus eximius</i>	Eastern Rosella	2	0-40	0-20	Below RSA	30	W	10	BUS Springvale	5/12/2012	15:10	Very Windy
<i>Platycercus eximius</i>	Eastern Rosella	1	0-40	0-20	Below RSA	50	-	10	BUS Springvale	6/12/2012	14:57	Perched
<i>Platycercus eximius</i>	Eastern Rosella	2	0-40	0-20	Below RSA	30	W	10	BUS Springvale	6/12/2012	14:57	
<i>Polytelis swainsonii</i>	Superb Parrot	3	0-40	0-20	Below RSA	10	NE	10	BUS Springvale	14/11/2012	7:37	
<i>Polytelis swainsonii</i>	Superb Parrot	5	0-40	0-20	Below RSA	40	N	10	BUS Springvale	14/11/2012	7:37	
<i>Polytelis swainsonii</i>	Superb Parrot	1	0-40	0-20	Below RSA	20	W	10	BUS Springvale	5/12/2012	15:10	Very Windy
<i>Stagonopleura guttata</i>	Diamond Firetail	1	0-40	0-20	Below RSA	10	-	10	BUS Springvale	6/12/2012	14:57	Perched
<i>Egretta novaehollandiae</i>	White-faced Heron	1	0-40	20-40	At RSA	100	N	11	Springvale property	5/12/2012	15:35	
<i>Cracticus tibicen</i>	Australian Magpie	1	0-40	0-20	Below RSA	60	E	11	Springvale property	5/12/2012	15:35	
<i>Cracticus tibicen</i>	Australian Magpie	2	-	0-20	Below RSA	40	-	11	Springvale property	5/12/2012	15:35	On ground
<i>Cracticus tibicen</i>	Australian Magpie	1	0-40	0-20	Below RSA	50	E	11	Springvale property	6/12/2012	14:35	
<i>Elanus axillaris</i>	Black-shouldered Kite	1	0-40	0-20	Below RSA	150	-	11	Springvale property	5/12/2012	15:35	Hovering in wind
<i>Eolophus roseicapilla</i>	Galah	2	0-40	0-20	Below RSA	20	W	11	Springvale property	5/12/2012	15:35	
<i>Malurus cyaneus</i>	Superb Fairywren	4	0-40	0-20	Below RSA	20	-	11	Springvale property	6/12/2012	14:35	Along creek
<i>Merops ornatus</i>	Rainbow Bee-eater	2	0-40	0-20	Below RSA	30	E	11	Springvale property	6/12/2012	14:35	
<i>Neochmia temporalis</i>	Red-browed Finch	1	-	0-20	Below RSA	20	-	11	Springvale property	5/12/2012	15:35	On ground
<i>Platycercus elegans</i>	Crimson Rosella	1	0-40	0-20	Below RSA	30	SW	11	Springvale property	5/12/2012	15:35	
<i>Platycercus elegans</i>	Crimson Rosella	2	0-40	0-20	Below RSA	20	S	11	Springvale property	5/12/2012	15:35	
<i>Platycercus elegans</i>	Crimson Rosella	2	0-40	0-20	Below RSA	80	N	11	Springvale property	5/12/2012	15:35	
<i>Platycercus elegans</i>	Crimson Rosella	4	-	0-20	Below RSA	40	N	11	Springvale property	5/12/2012	15:35	
<i>Platycercus elegans</i>	Crimson Rosella	2	0-40	0-20	Below RSA	40	N	11	Springvale property	6/12/2012	14:35	
<i>Rhipidura leucophrys</i>	Willie Wagtail	1	-	0-20	Below RSA	40	-	11	Springvale property	5/12/2012	15:35	Perched
<i>Rhipidura leucophrys</i>	Willie Wagtail	2	0-40	0-20	Below RSA	20	-	11	Springvale property	6/12/2012	14:35	Along creek
<i>Sturnus vulgaris</i>	Common Starling	4	0-40	0-20	Below RSA	30	W	11	Springvale property	5/12/2012	15:35	
<i>Sturnus vulgaris</i>	Common Starling	1	0-40	0-20	Below RSA	50	S	11	Springvale property	5/12/2012	15:35	
<i>Sturnus vulgaris</i>	Common Starling	1	0-40	0-20	Below RSA	30	E	11	Springvale property	6/12/2012	14:35	
<i>Sturnus vulgaris</i>	Common Starling	1	0-40	0-20	Below RSA	50	W	11	Springvale property	6/12/2012	14:35	

Scientific Name	Common Name	Count	0-40, 40-150, >150	0-20, 20-40, 40-150, 150- 200, >200	Relative Height	Distance (m)	Flight Direction	BUS No.	BUS Location	Date	Time	Notes/ Observation Type
<i>Sturnus vulgaris</i>	Common Starling	1	0-40	0-20	Below RSA	50	W	11	Springvale property	6/12/2012	14:35	
<i>Threskiornis spinicollis</i>	Straw-necked Ibis	2	-	0-20	Below RSA	40	-	11	Springvale property	5/12/2012	15:35	On ground
<i>Anthus novaeseelandiae</i>	Australasian Pipit	1	0-40	0-20	Below RSA	30	E	12	BUS Mt Buffalo	4/12/2012	11:25	Very Windy
<i>Cracticus tibicen</i>	Australian Magpie	1	0-40	20-40	At RSA	80	NE	12	BUS Mt Buffalo	15/11/2012	12:20	
<i>Cracticus tibicen</i>	Australian Magpie	2	0-40	0-20	Below RSA	50	-	12	BUS Mt Buffalo	15/11/2012	12:20	Perched in tree
<i>Cracticus tibicen</i>	Australian Magpie	1	0-40	0-20	Below RSA	90	NW	12	BUS Mt Buffalo	15/11/2012	12:20	
<i>Cracticus tibicen</i>	Australian Magpie	1	0-40	0-20	Below RSA	90	NE	12	BUS Mt Buffalo	15/11/2012	12:20	
<i>Cracticus tibicen</i>	Australian Magpie	5	0-40	0-20	Below RSA	80	-	12	BUS Mt Buffalo	15/11/2012	12:20	Flying between trees
<i>Cracticus tibicen</i>	Australian Magpie	1	0-40	0-20	Below RSA	80	NE	12	BUS Mt Buffalo	15/11/2012	12:20	
<i>Cracticus tibicen</i>	Australian Magpie	1	0-40	0-20	Below RSA	90	SW	12	BUS Mt Buffalo	15/11/2012	12:20	
<i>Cracticus tibicen</i>	Australian Magpie	2	0-40	0-20	Below RSA	80	E	12	BUS Mt Buffalo	4/12/2012	11:25	Very Windy
<i>Cracticus tibicen</i>	Australian Magpie	1	0-40	0-20	Below RSA	100	S	12	BUS Mt Buffalo	4/12/2012	11:25	Very Windy
<i>Aquila audax</i>	Wedge-tailed Eagle	2	0-40	20-40	At RSA	100	E	13	BUS Loyde Davis	23/02/2013	15:25	Flying
-	Unidentified small bird	3	0-40	0-20	Below RSA		W	13	BUS Loyde Davis	23/02/2013	15:25	
-	Unidentified Thornbill	1	0-40	0-20	Below RSA	30	NW	13	BUS Loyde Davis	23/02/2013	15:25	Foraging on ground
-	Unidentified Thornbill	1	0-40	0-20	Below RSA	40	NW	13	BUS Loyde Davis	23/02/2013	15:25	Flying
<i>Acanthiza chrysorrhoa</i>	Yellow-rumped Thornbill	2	0-40	0-20	Below RSA	40	W	13	BUS Loyde Davis	13/12/2012	13:50	
<i>Anthus novaeseelandiae</i>	Australasian Pipit	1	0-40	0-20	Below RSA	20	W	13	BUS Loyde Davis	13/12/2012	13:50	
<i>Coracina novaehollandiae</i>	Black-faced Cuckoo- shrike	1	0-40	0-20	Below RSA	60	NE	13	BUS Loyde Davis	13/12/2012	13:50	
<i>Coracina novaehollandiae</i>	Black-faced Cuckoo- shrike	1	0-40	0-20	Below RSA	75	NE	13	BUS Loyde Davis	17/12/2012	13:10	
<i>Falco cenchroides</i>	Nankeen Kestrel	1	0-40	20-40	At RSA	80	W	13	BUS Loyde Davis	13/12/2012	13:50	
<i>Falco cenchroides</i>	Nankeen Kestrel	1	0-40	0-20	Below RSA	200	W	13	BUS Loyde Davis	13/12/2012	13:50	
<i>Hirundo neoxena</i>	Welcome Swallow	1	0-40	0-20	Below RSA	100	NE	13	BUS Loyde Davis	23/02/2013	15:25	Flying
<i>Hirundo neoxena</i>	Welcome Swallow	1	0-40	0-20	Below RSA	10	S	13	BUS Loyde Davis	23/02/2013	15:25	Flying
<i>Hirundo neoxena</i>	Welcome Swallow	5	0-40	0-20	Below RSA	30	S	13	BUS Loyde Davis	23/02/2013	15:25	Flying
<i>Malurus cyaneus</i>	Superb Fairywren	2	0-40	0-20	Below RSA	20	NE	13	BUS Loyde Davis	17/12/2012	13:10	
<i>Rhipidura leucophrys</i>	Willie Wagtail	1	0-40	0-20	Below RSA	30	NW	13	BUS Loyde Davis	23/02/2013	15:25	Foraging on ground
<i>Acanthiza chrysorrhoa</i>	Yellow-rumped Thornbill	10	0-40	0-20	Below RSA	70	E	14	Hopefield Lane	27/02/2013	8:00	
<i>Acanthiza chrysorrhoa</i>	Yellow-rumped Thornbill	1	0-40	0-20	Below RSA	25	E	14	Hopefield Lane	27/02/2013	8:00	
<i>Anthus novaeseelandiae</i>	Australasian Pipit	2	0-40	0-20	Below RSA	10	NW	14	Hopefield Lane	26/02/2013	17:37	Flying
<i>Aquila audax</i>	Wedge-tailed Eagle	2	40-150	40-150	At RSA	50	S	14	Hopefield Lane	3/12/2012	16:50	Observed
<i>Cacatua galerita</i>	Sulphur-crested Cockatoo	1	0-40	0-20	Below RSA	70	S	14	Hopefield Lane	27/02/2013	8:00	Perched
<i>Circus assimilis</i>	Spotted Harrier	1	40-150	40-150	At RSA	50	S	14	Hopefield Lane	3/12/2012	16:50	Observed
<i>Coracina novaehollandiae</i>	Black-faced Cuckoo- shrike	2	0-40	0-20	Below RSA	60	E	14	Hopefield Lane	26/02/2013	17:37	Perched
<i>Coracina novaehollandiae</i>	Black-faced Cuckoo- shrike	1	0-40	0-20	Below RSA	100	N	14	Hopefield Lane	27/02/2013	8:00	Perched
<i>Coracina novaehollandiae</i>	Black-faced Cuckoo- shrike	1	0-40	0-20	Below RSA	70	N	14	Hopefield Lane	27/02/2013	8:00	Flying between trees
<i>Corvus coronoides</i>	Australasian Raven	5	40-150	40-150	At RSA	50	S	14	Hopefield Lane	3/12/2012	16:50	Observed
<i>Cracticus tibicen</i>	Australian Magpie	2	0-40	0-20	Below RSA	60	W	14	Hopefield Lane	26/02/2013	17:37	Perched
<i>Cracticus tibicen</i>	Australian Magpie	3	0-40	0-20	Below RSA	80	NE	14	Hopefield Lane	27/02/2013	8:00	Perched
<i>Cracticus tibicen</i>	Australian Magpie	1	0-40	0-20	Below RSA	70	N	14	Hopefield Lane	27/02/2013	8:00	
<i>Eolophus roseicapilla</i>	Galah	2	0-40	0-20	Below RSA	40	E	14	Hopefield Lane	3/12/2012	16:50	Observed
<i>Eolophus roseicapilla</i>	Galah	3	0-40	0-20	Below RSA	50	E	14	Hopefield Lane	26/02/2013	17:37	On ground
<i>Falco berigora</i>	Brown Falcon	2	40-150	40-150	At RSA	50	S	14	Hopefield Lane	3/12/2012	16:50	Observed
<i>Falco berigora</i>	Brown Falcon	1	0-40	0-20	Below RSA	25	S	14	Hopefield Lane	27/02/2013	8:00	
<i>Grallina cyanoleuca</i>	Magpie Lark	1	0-40	0-20	Below RSA	70	W	14	Hopefield Lane	26/02/2013	17:37	Perched
<i>Hirundo neoxena</i>	Welcome Swallow	2	0-40	0-20	Below RSA	20	S	14	Hopefield Lane	5/12/2012	13:45	Very Windy Calling in trees
<i>Malurus cyaneus</i>	Superb Fairywren	1	-	0-20	Below RSA	10	-	14	Hopefield Lane	5/12/2012	13:45	
<i>Platycercus elegans</i>	Crimson Rosella	1	0-40	0-20	Below RSA	70	E	14	Hopefield Lane	26/02/2013	17:37	Perched
<i>Platycercus eximius</i>	Eastern Rosella	1	0-40	0-20	Below RSA	70	W	14	Hopefield Lane	26/02/2013	17:37	Perched
<i>Platycercus eximius</i>	Eastern Rosella	3	0-40	0-20	Below RSA	60	W	14	Hopefield Lane	27/02/2013	8:00	Perched
<i>Platycercus eximius</i>	Eastern Rosella	2	0-40	0-20	Below RSA	5	E	14	Hopefield Lane	27/02/2013	8:00	
<i>Platycercus eximius</i>	Eastern Rosella	6	0-40	0-20	Below RSA	25	E	14	Hopefield Lane	27/02/2013	8:00	
<i>Psephotus haematonotus</i>	Red-rumped Parrot	6	0-40	0-20	Below RSA	10	E	14	Hopefield Lane	27/02/2013	8:00	
<i>Sturnus vulgaris</i>	Common Starling	10	0-40	0-20	Below RSA	70	W	14	Hopefield Lane	26/02/2013	17:37	Perched
-	Unidentified small bird	1	0-40	0-20	Below RSA	50	SE	15	Hopefield Lane/Boorowa Rd	5/12/2012	14:10	Very Windy
<i>Anthus</i>	Australasian Pipit	1	0-40	0-20	Below RSA	5	W	15	Hopefield	26/02/2013	17:07	

Scientific Name	Common Name	Count	0-40, 40-150, >150	0-20, 20-40, 40-150, 150- 200, >200	Relative Height	Distance (m)	Flight Direction	BUS No.	BUS Location	Date	Time	Notes/ Observation Type
<i>novaeseelandiae</i>									Lane/Boorowa Rd			
<i>Corvus coronoides</i>	Australasian Raven	2	0-40	0-20	Below RSA	120	SE	15	Hopefield Lane/Boorowa Rd	5/12/2012	14:10	Very Windy
<i>Corvus coronoides</i>	Australasian Raven	3	0-40	0-20	Below RSA	80	NW	15	Hopefield Lane/Boorowa Rd	18/01/2013	8:09	
<i>Corvus coronoides</i>	Australasian Raven	5	40-150	40-150	At RSA	100	NW	15	Hopefield Lane/Boorowa Rd	18/01/2013	8:09	
<i>Corvus mellori</i>	Little Raven	2	0-40	0-20	Below RSA	60	E	15	Hopefield Lane/Boorowa Rd	27/02/2013	7:40	
<i>Cracticus tibicen</i>	Australian Magpie	1	0-40	0-20	Below RSA	120	W	15	Hopefield Lane/Boorowa Rd	26/02/2013	17:07	Perched on fence
<i>Cracticus tibicen</i>	Australian Magpie	1	0-40	0-20	Below RSA	40	W	15	Hopefield Lane/Boorowa Rd	26/02/2013	17:07	Flying
<i>Cracticus tibicen</i>	Australian Magpie	1	0-40	0-20	Below RSA	60	E	15	Hopefield Lane/Boorowa Rd	27/02/2013	7:40	
<i>Cracticus tibicen</i>	Australian Magpie	4	0-40	0-20	Below RSA	100	W	15	Hopefield Lane/Boorowa Rd	27/02/2013	7:40	Flying
<i>Elanus axillaris</i>	Black-shouldered Kite	1	0-40	0-20	Below RSA	70	SW	15	Hopefield Lane/Boorowa Rd	18/01/2013	8:09	
<i>Eolophus roseicapilla</i>	Galah	2	0-40	0-20	Below RSA	60	N	15	Hopefield Lane/Boorowa Rd	5/12/2012	14:10	Very Windy
<i>Eolophus roseicapilla</i>	Galah	1	40-150	40-150	At RSA	70	W	15	Hopefield Lane/Boorowa Rd	18/01/2013	8:09	
<i>Grallina cyanoleuca</i>	Magpie Lark	2	0-40	0-20	Below RSA	100	W	15	Hopefield Lane/Boorowa Rd	27/02/2013	7:40	
<i>Malurus cyaneus</i>	Superb Fairywren	4	0-40	0-20	Below RSA	5	-	15	Hopefield Lane/Boorowa Rd	18/01/2013	8:09	
<i>Malurus cyaneus</i>	Superb Fairywren	2	0-40	0-20	Below RSA	3	E	15	Hopefield Lane/Boorowa Rd	26/02/2013	17:07	
<i>Malurus cyaneus</i>	Superb Fairywren	3	0-40	0-20	Below RSA	5	E	15	Hopefield Lane/Boorowa Rd	27/02/2013	7:40	Perched
<i>Platycercus elegans</i>	Crimson Rosella	4	0-40	0-20	Below RSA	4	W	15	Hopefield Lane/Boorowa Rd	26/02/2013	17:07	
<i>Rhipidura leucophrys</i>	Willie Wagtail	1	-	0-20	Below RSA	15	-	15	Hopefield Lane/Boorowa Rd	18/01/2013	8:09	
<i>Rhipidura leucophrys</i>	Willie Wagtail	3	0-40	0-20	Below RSA	5	E	15	Hopefield Lane/Boorowa Rd	27/02/2013	7:40	Perched
-	Unidentified small bird	6	0-40	0-20	Below RSA	150	-	16	Harry's ck rd/Boorowa Rd	5/12/2012	14:40	Circling
<i>Ardea pacifica</i>	White-necked Heron	1	40-150	40-150	At RSA	100	E	16	Harry's ck rd/Boorowa Rd	18/01/2013	11:38	
<i>Chenonetta jubata</i>	Australian Wood Duck	29	0-40	0-20	Below RSA	200	W	16	Harry's ck rd/Boorowa Rd	26/02/2013	16:40	In and around dam
<i>Coracina novaehollandiae</i>	Black-faced Cuckoo-shrike	1	0-40	0-20	Below RSA	100	S	16	Harry's ck rd/Boorowa Rd	5/12/2012	14:40	
<i>Cracticus tibicen</i>	Australian Magpie	3	-	0-20	Below RSA	50	-	16	Harry's ck rd/Boorowa Rd	5/12/2012	14:40	On ground
<i>Cracticus tibicen</i>	Australian Magpie	1	-	0-20	Below RSA	120	-	16	Harry's ck rd/Boorowa Rd	5/12/2012	14:40	Perched on powerline
<i>Eolophus roseicapilla</i>	Galah	10	0-40	0-20	Below RSA	250	W	16	Harry's ck rd/Boorowa Rd	23/01/2013	17:55	
<i>Falco cenchroides</i>	Nankeen Kestrel	1	0-40	20-40	At RSA	200	-	16	Harry's ck rd/Boorowa Rd	5/12/2012	14:40	Hovering in wind
<i>Hirundo neoxena</i>	Welcome Swallow	15	0-40	0-20	Below RSA	70	N	16	Harry's ck rd/Boorowa Rd	18/01/2013	11:38	Flying over dam
<i>Ocyphaps lophotes</i>	Crested Pigeon	1	0-40	0-20	Below RSA	100	N	16	Harry's ck rd/Boorowa Rd	23/01/2013	17:55	Perched on powerline
<i>Cacatua galerita</i>	Sulphur-crested Cockatoo	1	0-40	0-20	Below RSA	100	S	17	The Pines Property	6/12/2012	9:15	
<i>Coracina novaehollandiae</i>	Black-faced Cuckoo-shrike	1	0-40	0-20	Below RSA	5	S	17	The Pines Property	6/12/2012	9:15	
<i>Corvus coronoides</i>	Australasian Raven	1	0-40	0-20	Below RSA	80	-	17	The Pines Property	6/12/2012	9:15	Perched
<i>Cracticus tibicen</i>	Australian Magpie	3	0-40	0-20	Below RSA	30	SW	17	The Pines Property	6/12/2012	9:15	
<i>Cracticus tibicen</i>	Australian Magpie	1	0-40	0-20	Below RSA	70	SE	17	The Pines Property	23/01/2013	16:50	Perched
<i>Cracticus tibicen</i>	Australian Magpie	5	0-40	0-20	Below RSA	60	W	17	The Pines Property	25/01/2013	11:20	Perched
<i>Grallina cyanoleuca</i>	Magpie Lark	1	0-40	0-20	Below RSA	70	S	17	The Pines Property	23/01/2013	16:50	Perched
<i>Microeca fascians</i>	Jacky Winter	2	-	0-20	Below RSA	30	-	17	The Pines Property	6/12/2012	9:15	Perched
<i>Pachycephala rufiventris</i>	Rufous Whistler	1	-	0-20	Below RSA	10	-	17	The Pines Property	6/12/2012	9:15	Perched
<i>Pardalotus striatus</i>	Striated Pardalote	1	-	0-20	Below RSA	50	-	17	The Pines Property	6/12/2012	9:15	Calling in trees
<i>Platycercus elegans</i>	Crimson Rosella	2	-	0-20	Below RSA	20	-	17	The Pines Property	6/12/2012	9:15	Perched
<i>Platycercus elegans</i>	Crimson Rosella	2	0-40	0-20	Below RSA	100	SW	17	The Pines Property	23/01/2013	16:50	Perched

Scientific Name	Common Name	Count	0-40, 40-150, >150	0-20, 20-40, 40-150, 150- 200, >200	Relative Height	Distance (m)	Flight Direction	BUS No.	BUS Location	Date	Time	Notes/ Observation Type
<i>Platycercus elegans</i>	Crimson Rosella	4	0-40	0-20	Below RSA	40	N	17	The Pines Property	25/01/2013	11:20	Perched
<i>Platycercus eximius</i>	Eastern Rosella	5	0-40	0-20	Below RSA	20	W	17	The Pines Property	6/12/2012	9:15	
<i>Platycercus eximius</i>	Eastern Rosella	2	0-40	0-20	Below RSA	100	W	17	The Pines Property	23/01/2013	16:50	Perched
<i>Anthus novaeseelandiae</i>	Australasian Pipit	1	-	0-20	Below RSA	10		18	Mt Buffalo Access Gate	6/12/2012	11:55	Perched
<i>Anthus novaeseelandiae</i>	Australasian Pipit	2	0-40	0-20	Below RSA	25	S	18	Mt Buffalo Access Gate	18/01/2013	9:22	
<i>Aquila audax</i>	Wedge-tailed Eagle	1	40-150	40-150	At RSA	80	NE	18	Mt Buffalo Access Gate	18/01/2013	9:22	
<i>Aquila audax</i>	Wedge-tailed Eagle	1	40-150	40-150	At RSA	100	E	18	Mt Buffalo Access Gate	18/01/2013	9:22	
<i>Cacatua galerita</i>	Sulphur-crested Cockatoo	16	0-40	20-40	At RSA	100	E	18	Mt Buffalo Access Gate	18/01/2013	9:22	
<i>Corvus coronoides</i>	Australasian Raven	1	40-150	40-150	At RSA	100	E	18	Mt Buffalo Access Gate	18/01/2013	9:22	Chaseing WTE
<i>Cracticus tibicen</i>	Australian Magpie	3	0-40	0-20	Below RSA	70	N	18	Mt Buffalo Access Gate	18/01/2013	9:22	in tree
<i>Cracticus tibicen</i>	Australian Magpie	5	0-40	0-20	Below RSA	80	W	18	Mt Buffalo Access Gate	27/02/2013	10:20	Perched
<i>Dacelo novaeguineae</i>	Laughing Kookaburra	1	0-40	0-20	Below RSA	100	W	18	Mt Buffalo Access Gate	27/02/2013	10:20	Perched
<i>Falco berigora</i>	Brown Falcon	1	0-40	0-20	Below RSA	5	W	18	Mt Buffalo Access Gate	6/12/2012	11:55	
<i>Grallina cyanoleuca</i>	Magpie Lark	2	0-40	0-20	Below RSA	80	E	18	Mt Buffalo Access Gate	27/02/2013	10:20	Perched
<i>Pardalotus striatus</i>	Striated Pardalote	1	-	0-20	Below RSA	80		18	Mt Buffalo Access Gate	6/12/2012	11:55	Perched
<i>Platycercus elegans</i>	Crimson Rosella	1	0-40	0-20	Below RSA	70	N	18	Mt Buffalo Access Gate	18/01/2013	9:22	
<i>Sturnus vulgaris</i>	Common Starling	1	0-40	0-20	Below RSA	40	E	18	Mt Buffalo Access Gate	6/12/2012	11:55	
<i>Anthochaera carunculata</i>	Red Wattlebird	1	0-40	0-20	Below RSA	30	W	19	Lavestock rd. Montalta Gate	18/01/2013	10:16	
<i>Cacatua galerita</i>	Sulphur-crested Cockatoo	1	0-40	0-20	Below RSA	40	-	19	Lavestock rd. Montalta Gate	6/12/2012	13:25	Perched
<i>Cacatua galerita</i>	Sulphur-crested Cockatoo	1	0-40	0-20	Below RSA	100	N	19	Lavestock rd. Montalta Gate	6/12/2012	13:25	
<i>Cacatua galerita</i>	Sulphur-crested Cockatoo	2	0-40	0-20	Below RSA	120	NW	19	Lavestock rd. Montalta Gate	18/01/2013	10:16	perched
<i>Cacatua galerita</i>	Sulphur-crested Cockatoo	1	0-40	0-20	Below RSA	50	S	19	Lavestock rd. Montalta Gate	21/02/2013	17:26	Flying
<i>Cacatua galerita</i>	Sulphur-crested Cockatoo	1	0-40	0-20	Below RSA	70	E	19	Lavestock rd. Montalta Gate	23/02/2013		Flying
<i>Colluricincla harmonica</i>	Grey Shrike-thrush	1	0-40	0-20	Below RSA	20		19	Lavestock rd. Montalta Gate	23/02/2013		Perched
<i>Corvus mellori</i>	Little Raven	1	0-40	0-20	Below RSA	120	N	19	Lavestock rd. Montalta Gate	23/02/2013		Flying
<i>Cracticus tibicen</i>	Australian Magpie	2	0-40	0-20	Below RSA	30	-	19	Lavestock rd. Montalta Gate	6/12/2012	13:25	Perched
<i>Cracticus tibicen</i>	Australian Magpie	1	0-40	0-20	Below RSA	20	S	19	Lavestock rd. Montalta Gate	6/12/2012	13:25	
<i>Cracticus tibicen</i>	Australian Magpie	2	0-40	0-20	Below RSA	70	W	19	Lavestock rd. Montalta Gate	21/02/2013	17:26	Flying
<i>Cracticus tibicen</i>	Australian Magpie	4	0-40	0-20	Below RSA	100	W	19	Lavestock rd. Montalta Gate	23/02/2013		Flying
<i>Falco cenchroides</i>	Nankeen Kestrel	1	0-40	0-20	Below RSA	100	NW	19	Lavestock rd. Montalta Gate	18/01/2013	10:16	perched Took off from perch
<i>Haliastur sphenurus</i>	Whistling Kite	1	40-150	40-150	At RSA	60	E	19	Lavestock rd. Montalta Gate	18/01/2013	10:16	
<i>Manorina melanocephala</i>	Noisy Miner	1	0-40	0-20	Below RSA	20	N	19	Lavestock rd. Montalta Gate	6/12/2012	13:25	
<i>Merops ornatus</i>	Rainbow Bee-eater	1	0-40	0-20	Below RSA	30	SW	19	Lavestock rd. Montalta Gate	21/02/2013	17:26	Flying
<i>Merops ornatus</i>	Rainbow Bee-eater	3	0-40	0-20	Below RSA	0		19	Lavestock rd. Montalta Gate	21/02/2013	17:26	Perched
<i>Merops ornatus</i>	Rainbow Bee-eater			0-20	Below RSA			19	Lavestock rd. Montalta Gate	23/02/2013		Heard
<i>Philemon corniculatus</i>	Noisy Friarbird	1	0-40	0-20	Below RSA	30	N	19	Lavestock rd. Montalta Gate	6/12/2012	13:25	
<i>Platycercus elegans</i>	Crimson Rosella	2	0-40	0-20	Below RSA	30	-	19	Lavestock rd. Montalta Gate	6/12/2012	13:25	Perched Perched in tree
<i>Platycercus elegans</i>	Crimson Rosella	6	0-40	0-20	Below RSA	70	NW	19	Lavestock rd. Montalta Gate	21/02/2013	17:26	
<i>Platycercus elegans</i>	Crimson Rosella	1	0-40	0-20	Below RSA	20	NW	19	Lavestock rd. Montalta Gate	23/02/2013		Flying
<i>Platycercus eximius</i>	Eastern Rosella	4	0-40	0-20	Below RSA	20	S	19	Lavestock rd. Montalta Gate	6/12/2012	13:25	
<i>Platycercus eximius</i>	Eastern Rosella	4	0-40	0-20	Below RSA	20	N	19	Lavestock rd. Montalta Gate	6/12/2012	13:25	
<i>Platycercus eximius</i>	Eastern Rosella	4	0-40	0-20	Below RSA	100	S	19	Lavestock rd. Montalta Gate	23/02/2013		Flying
<i>Platycercus eximius</i>	Eastern Rosella	2	0-40	0-20	Below RSA	100	N	19	Lavestock rd. Montalta Gate	23/02/2013		Flying
<i>Platycercus eximius</i>	Eastern Rosella	7	0-40	0-20	Below RSA	100	W	19	Lavestock rd. Montalta Gate	23/02/2013		Flying
<i>Platycercus eximius</i>	Eastern Rosella	2	0-40	0-20	Below RSA	80	E	19	Lavestock rd. Montalta Gate	23/02/2013		Flying
<i>Platycercus eximius</i>	Eastern Rosella	6	0-40	0-20	Below RSA	15	N	19	Lavestock rd. Montalta Gate	23/02/2013		Flying
<i>Polytelis swainsonii</i>	Superb Parrot	2	0-40	0-20	Below RSA	20	N	19	Lavestock rd. Montalta Gate	6/12/2012	13:25	
<i>Polytelis swainsonii</i>	Superb Parrot	3	0-40	0-20	Below RSA	10	N	19	Lavestock rd. Montalta Gate	6/12/2012	13:25	
<i>Polytelis swainsonii</i>	Superb Parrot	5	0-40	0-20	Below RSA	30	S	19	Lavestock rd. Montalta Gate	6/12/2012	13:25	
<i>Rhipidura albiscapa</i>	Grey Fantail	1	0-40	0-20	Below RSA	12		19	Lavestock rd. Montalta Gate	23/02/2013		Perched

Scientific Name	Common Name	Count	0-40, 40-150, >150	0-20, 20-40, 40-150, 150- 200, >200	Relative Height	Distance (m)	Flight Direction	BUS No.	BUS Location	Date	Time	Notes/ Observation Type
<i>Rhipidura albiscapa</i>	Grey Fantail	1	0-40	0-20	Below RSA	8		19	Lavestock rd. Montalta Gate	23/02/2013		Perched
-	Unidentified Thornbill	4	-	0-20	Below RSA	20	-	20	The Pines Access	6/12/2012	14:20	Calling in road reserve
<i>Anthus novaeseelandiae</i>	Australasian Pipit	1	0-40	0-20	Below RSA	20	E	20	The Pines Access	23/01/2013	17:20	
<i>Ardea pacifica</i>	White-necked Heron	1	0-40	0-20	Below RSA	100	W	20	The Pines Access	25/01/2013	11:50	foraging in paddock
<i>Cacatua galerita</i>	Sulphur-crested Cockatoo	8	-	0-20	Below RSA	50		20	The Pines Access	17/01/2013	7:53	Perched
<i>Cacatua galerita</i>	Sulphur-crested Cockatoo	1	0-40	0-20	Below RSA	200	W	20	The Pines Access	25/01/2013	11:50	
<i>Cracticus tibicen</i>	Australian Magpie	1	0-40	0-20	Below RSA	40	N	20	The Pines Access	6/12/2012	14:20	
<i>Cracticus tibicen</i>	Australian Magpie	2	-	0-20	Below RSA	50		20	The Pines Access	17/01/2013	7:53	On ground
<i>Cracticus tibicen</i>	Australian Magpie	3	0-40	0-20	Below RSA	90	NW	20	The Pines Access	18/01/2013	11:05	Perched
<i>Egretta novaehollandiae</i>	White-faced Heron	3	0-40	0-20	Below RSA	100	W	20	The Pines Access	25/01/2013	11:50	foraging in paddock
<i>Eolophus roseicapilla</i>	Galah	2	-	0-20	Below RSA	40		20	The Pines Access	17/01/2013	7:53	Perched in trees
<i>Eolophus roseicapilla</i>	Galah	10	0-40	0-20	Below RSA	60		20	The Pines Access	17/01/2013	7:53	
<i>Eolophus roseicapilla</i>	Galah	1	0-40	0-20	Below RSA	10		20	The Pines Access	17/01/2013	7:53	
<i>Grallina cyanoleuca</i>	Magpie Lark	1	0-40	0-20	Below RSA	50	SE	20	The Pines Access	23/01/2013	17:20	Perched
<i>Malurus cyaneus</i>	Superb Fairywren	3	-	0-20	Below RSA	20	-	20	The Pines Access	6/12/2012	14:20	Calling in road reserve
<i>Malurus cyaneus</i>	Superb Fairywren	3	-	0-20	Below RSA	30		20	The Pines Access	17/01/2013	7:53	Calling in road reserve
<i>Malurus cyaneus</i>	Superb Fairywren	2	0-40	0-20	Below RSA	25	E	20	The Pines Access	18/01/2013	11:05	In Acacia thicket
<i>Malurus cyaneus</i>	Superb Fairywren	2	0-40	0-20	Below RSA	50	SE	20	The Pines Access	23/01/2013	17:20	Perched
<i>Malurus cyaneus</i>	Superb Fairywren	3	0-40	0-20	Below RSA	10	E	20	The Pines Access	25/01/2013	11:50	Perched
<i>Pachycephala rufiventris</i>	Rufous Whistler	1	0-40	0-20	Below RSA	50	SE	20	The Pines Access	23/01/2013	17:20	Perched
<i>Pardalotus striatus</i>	Striated Pardalote	1	-	0-20	Below RSA	50	-	20	The Pines Access	6/12/2012	14:20	Perched
<i>Platycercus elegans</i>	Crimson Rosella	2	-	0-20	Below RSA	40		20	The Pines Access	17/01/2013	7:53	Perched
<i>Platycercus elegans</i>	Crimson Rosella	2	0-40	0-20	Below RSA	20		20	The Pines Access	17/01/2013	7:53	Along road reserve
<i>Platycercus eximius</i>	Eastern Rosella	1	0-40	0-20	Below RSA	30		20	The Pines Access	17/01/2013	7:53	
<i>Rhipidura leucophrys</i>	Willie Wagtail	1	-	0-20	Below RSA	20		20	The Pines Access	17/01/2013	7:53	Calling from trees
<i>Rhipidura leucophrys</i>	Willie Wagtail	1	0-40	0-20	Below RSA	20	NE	20	The Pines Access	18/01/2013	11:05	Perched
<i>Rhipidura leucophrys</i>	Willie Wagtail	1	0-40	0-20	Below RSA	50	SE	20	The Pines Access	23/01/2013	17:20	Perched
<i>Rhipidura leucophrys</i>	Willie Wagtail	2	0-40	0-20	Below RSA	10	E	20	The Pines Access	25/01/2013	11:50	Perched

Annex F

Golden Sun Moth

1 INTRODUCTION

This report provides further details relating to the Golden Sun Moth (GSM) (*Synemon plana*) and the project.

2 METHOD

Meandering transects targeting GSM were undertaken over a total of eight suitable days (refer to *Figure 2.1* and *Table 2.1*). Opportunistic observations were recorded over a total of 13 days.

Table 2.1 *Survey Details*

Date	Time
23/11/12	9:15 – 15:15
11/12/12	10:30 – 16:00
12/12/12	10:20 – 16:20
13/12/12	11:15 – 14:00
14/12/12	11:45 – 14:00
18/12/12	10:00 – 16:10
19/12/12	9:25 – 17:15
20/12/12	10:00 – 14:00

Weather conditions during survey days are provided in *Table 2.2*.

Table 2.2 *Weather Conditions during Survey*

Date	Rain (mm)	9:00 AM				3:00 PM			
		Temp (°C)	Cloud Cvr (8 th)	Wind Dir	Spd (km)	Temp (°C)	Cloud Cvr 8 th	Wind Dir	Spd (km)
23/11/12	0	16.5	1	SE	15	27	2	SE	19
11/12/12	0	16.5	4	SE	13	24	2	ESE	15
12/12/12	0	19.5	4	NE	17	27	4	E	7
13/12/12	0	21	0		Calm	27		-	-
14/12/12	0	21	8		Calm	29.5	8	NW	6
18/12/12	0	16.5	0		Calm	27.5	0	WNW	13
19/12/12	0	21	0	W	15	33.7	1	W	9
20/12/12*	0	-	-	-	-	-	-	-	-

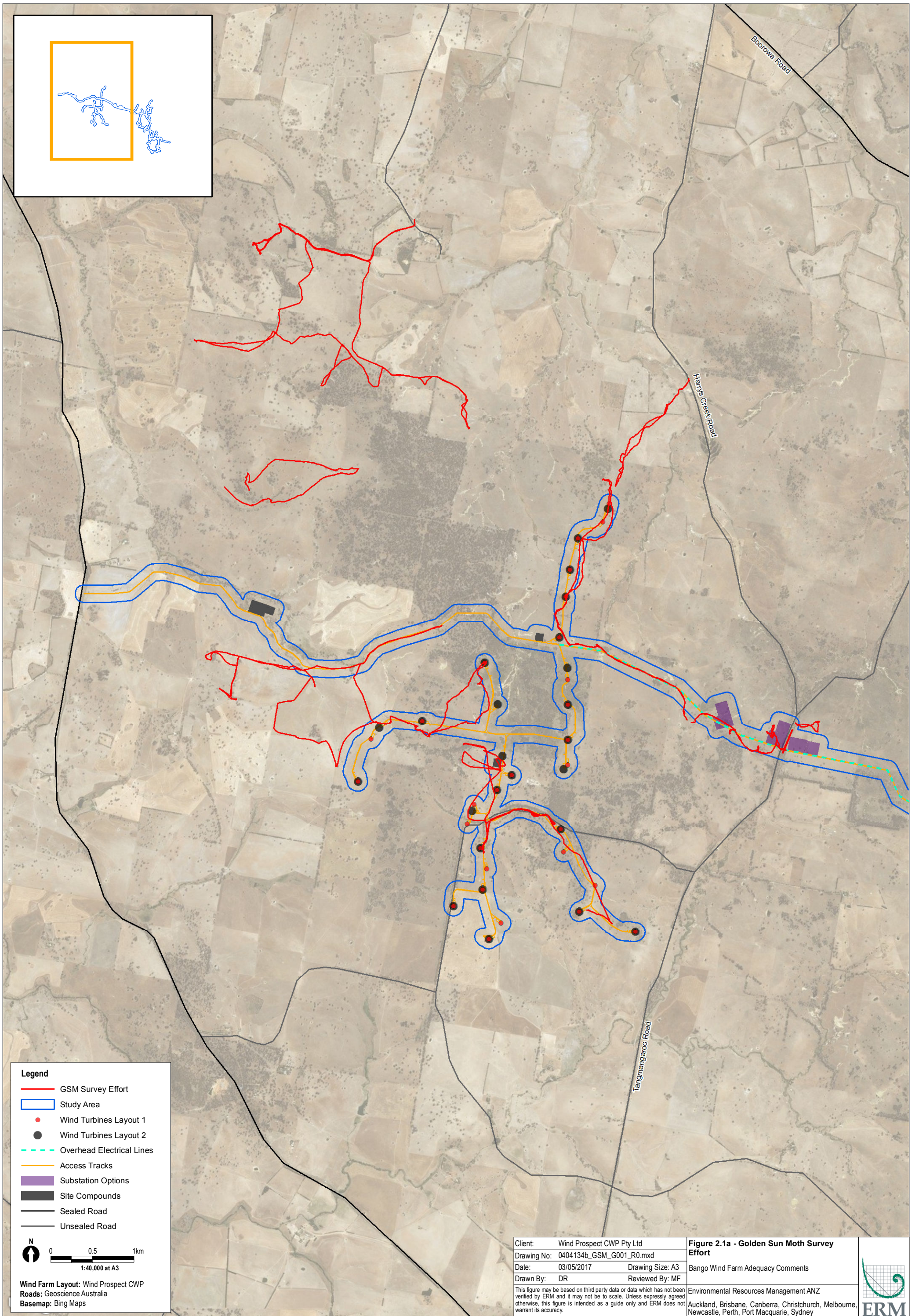
Source: Australian Government Bureau of Meteorology (Yass: Rural Fire Service)

*Data not available.

Optimal weather conditions for observing GSM are:

- warm to hot (above 20°C by 10:00 am);
- clear or mostly cloudless skies;
- still or relatively still wind conditions; and
- at least two days since rain.

The weather during the GSM survey days generally met these conditions. There was little rainfall during the survey season, however, GSM were observed on all of the survey days.



- Legend**
- GSM Survey Effort
 - Study Area
 - Wind Turbines Layout 1
 - Wind Turbines Layout 2
 - Overhead Electrical Lines
 - Access Tracks
 - Substation Options
 - Site Compounds
 - Sealed Road
 - Unsealed Road

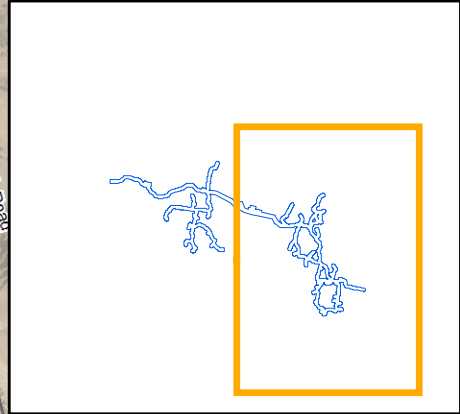
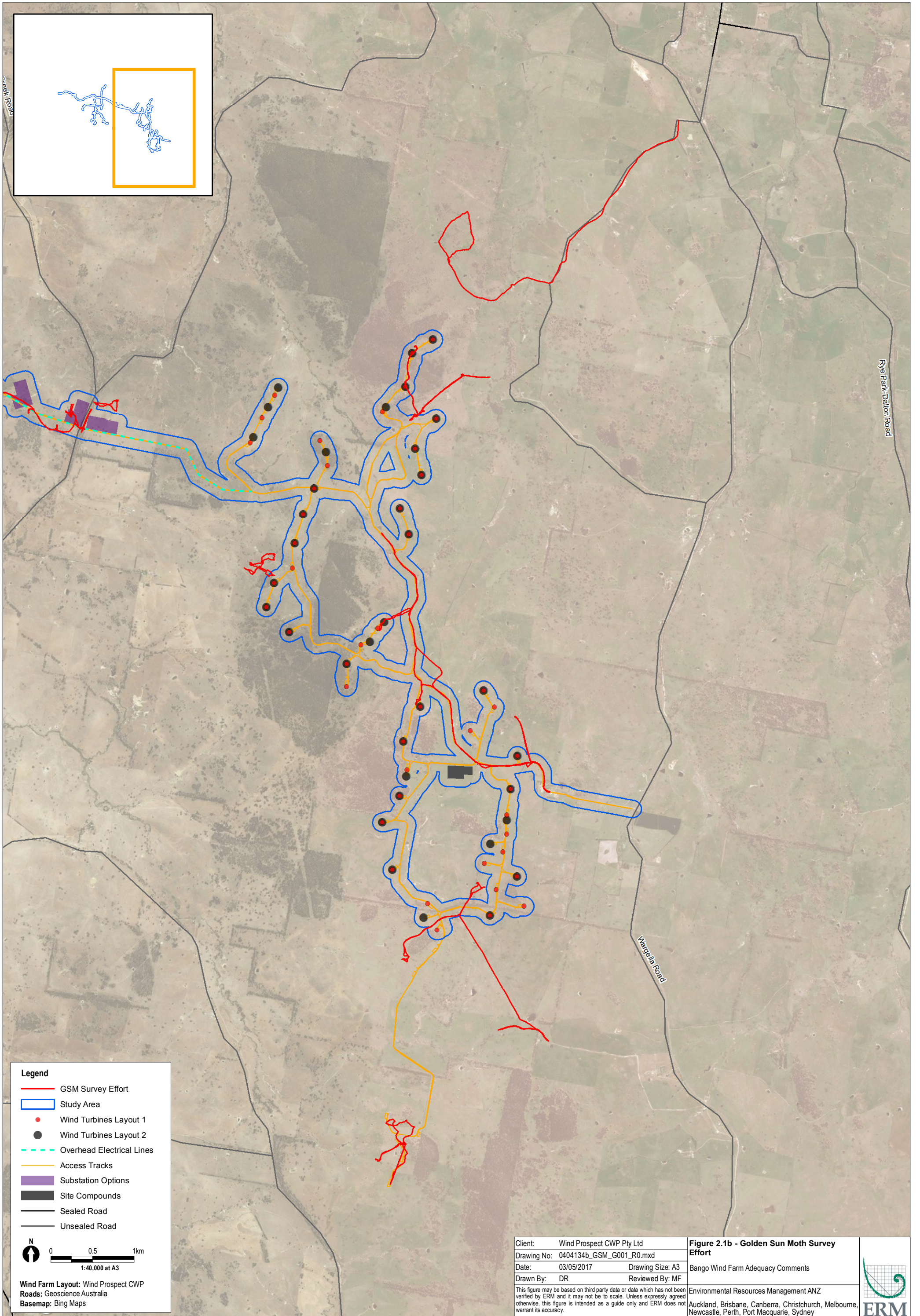
0 0.5 1km

 1:40,000 at A3

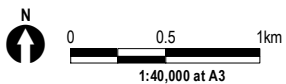
Wind Farm Layout: Wind Prospect CWP
 Roads: Geoscience Australia
 Basemap: Bing Maps

Client: Wind Prospect CWP Pty Ltd	Figure 2.1a - Golden Sun Moth Survey Effort
Drawing No: 0404134b_GSM_G001_R0.mxd	Bango Wind Farm Adequacy Comments
Date: 03/05/2017	Reviewed By: MF
Drawn By: DR	Reviewed By: MF
<small>This figure may be based on third party data or data which has not been verified by ERM and it may not be to scale. Unless expressly agreed otherwise, this figure is intended as a guide only and ERM does not warrant its accuracy.</small>	
Environmental Resources Management ANZ Auckland, Brisbane, Canberra, Christchurch, Melbourne, Newcastle, Perth, Port Macquarie, Sydney	





- Legend**
- GSM Survey Effort
 - Study Area
 - Wind Turbines Layout 1
 - Wind Turbines Layout 2
 - Overhead Electrical Lines
 - Access Tracks
 - Substation Options
 - Site Compounds
 - Sealed Road
 - Unsealed Road



Wind Farm Layout: Wind Prospect CWP
 Roads: Geoscience Australia
 Basemap: Bing Maps

Client:	Wind Prospect CWP Pty Ltd
Drawing No:	0404134b_GSM_G001_R0.mxd
Date:	03/05/2017
Drawn By:	DR

Figure 2.1b - Golden Sun Moth Survey Effort
Bango Wind Farm Adequacy Comments
Reviewed By: MF

This figure may be based on third party data or data which has not been verified by ERM and it may not be to scale. Unless expressly agreed otherwise, this figure is intended as a guide only and ERM does not warrant its accuracy.

Environmental Resources Management ANZ
 Auckland, Brisbane, Canberra, Christchurch, Melbourne, Newcastle, Perth, Port Macquarie, Sydney



3.1 GSM HABITAT

GSM habitat in the Study Area was assigned based on field observations and vegetation mapping. Two GSM habitat types were assigned in the Study Area:

- **Known and Optimal:** treated as the identified best quality and optimal, supported by field observations. Optimal habitat within the area is patches of Speargrass and Wallaby Grass that are relatively short with spaces between the tussocks.
- **Potential:** based on field observation of habitats of a lower suitability than the 'known and optimal' habitats.

Using a precautionary approach, all these habitat types are combined and considered as GSM habitat for the impact assessment (refer *Figure 3.1*).

Prediction of the extent of GSM habitat in the locality beyond the Study Area is based upon a review of OEH's derived native grassland modelling for the south-western slopes (refer *Figure 3.1* labelled as 'potential - OEH native grassland modelling'). The modelling consists of two datasets: woody grassland; and non-woody grassland (DECC 2007). The non-woody grassland modelling mapped extent of grassland and provides a probability rank to identify where areas of non-woody grassland have a 'moderate' to 'high' probability of supporting native grassland either native grassland or native grassland derived from clearance of woodland.

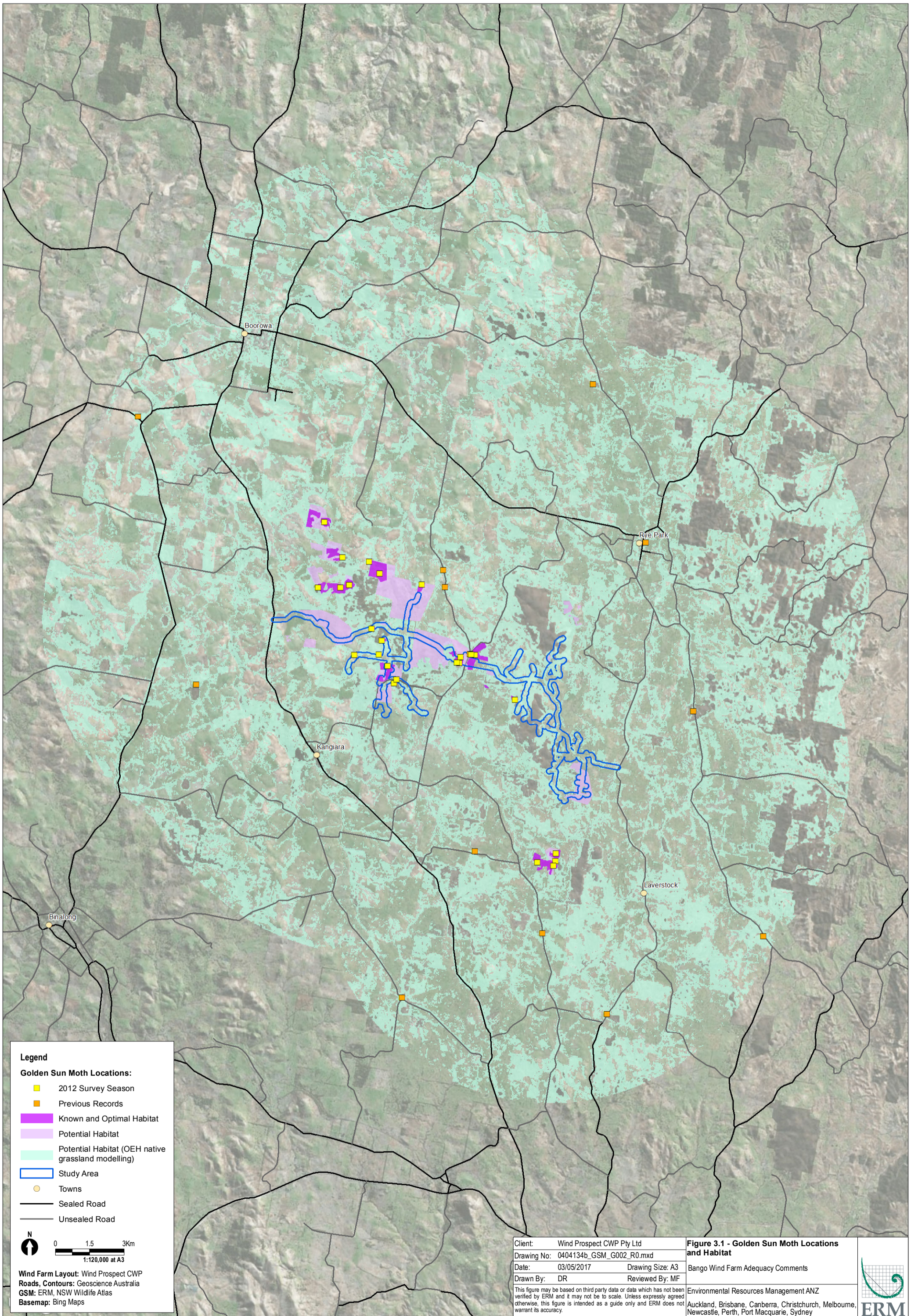
The non-woody grassland modelling for the Study Area identifies areas with a moderate to high probability of containing native grasslands of conservation significance. For the purposes of the desktop assessment of potential grassland habitats supporting GSM in the locality, these areas have been assumed to comprise native grassland and accordingly provide potential GSM habitat. The area of grassland predicted to have a moderate to high probability of being native grasslands of conservation significance within the Locality is 44,507ha. It should be noted that this extent value has been determined purely on the basis of a desktop assessment, and accordingly only provides an indication of 'potential' GSM habitat in the Locality.

3.1.1 Habitat Extent

The extent of habitat in the Study Area and Development Footprint for each of PL1, PL2 and the merged 'worst-case' development footprint is shown in *Table 3.1*.

Table 3.1 Area (ha) of GSM Habitat Impacted by the Development Footprints

	ERM (2013) Exhibited Permanent	ERM (2013) Exhibited Temporary	ERM (2013) Exhibited Total	PL1 Permanent	PL1 Temporary	PL1 Total	PL1 Total Differential from Exhibited EA (ERM 2013)	PL2 Permanent	PL2 Temporary	PL2 Total	PL2 Total Differential from Exhibited EA (ERM 2013)	Merged (‘Worst Case’) Permanent	Merged (‘Worst Case’) Temporary	Merged (‘Worst Case’) Total	Merged (‘Worst Case’) Total Differential from Exhibited EA (ERM 2013)
Known and optimal habitat				11.39843	1.710613	13.109043		11.44259	1.514282	12.956872		11.716629	1.637846	13.354475	
Potential				21.319448	3.7373	25.056748		20.217726	2.895825	23.113551		22.204488	3.981703	26.186191	
Sum	82.48	18.4	100.88	32.717878	5.447913	38.165791	-62.714209	31.660316	4.410107	36.070423	-64.809577	33.921117	5.619549	39.540666	-61.339334



Legend

Golden Sun Moth Locations:

- 2012 Survey Season
- Previous Records
- Known and Optimal Habitat
- Potential Habitat
- Potential Habitat (OEH native grassland modelling)
- Study Area
- Towns
- Sealed Road
- Unsealed Road

N

0 1.5 3Km
1:120,000 at A3

Wind Farm Layout: Wind Prospect CWP
 Roads, Contours: Geoscience Australia
 GSM: ERM, NSW Wildlife Atlas
 Basemap: Bing Maps

Client: Wind Prospect CWP Pty Ltd	Figure 3.1 - Golden Sun Moth Locations and Habitat
Drawing No: 0404134b_GSM_G002_R0.mxd	Bango Wind Farm Adequacy Comments
Date: 03/05/2017 Drawing Size: A3	Environmental Resources Management ANZ
Drawn By: DR Reviewed By: MF	Auckland, Brisbane, Canberra, Christchurch, Melbourne, Newcastle, Perth, Port Macquarie, Sydney
<small>This figure may be based on third party data or data which has not been verified by ERM and it may not be to scale. Unless expressly agreed otherwise, this figure is intended as a guide only and ERM does not warrant its accuracy.</small>	



4 IMPACTS

4.1 AVOIDANCE

The revised impacts presented as part of this RtS are 39.54 ha (worst case footprint) compared to 100.87 as reported in ERM (2011). The presence of GSM habitat and where possible avoidance will be incorporated into the final layout as much as possible through micro-siting of wind farm infrastructure.

Other avoidance measures include siting of infrastructure in areas that are already cleared (such as existing farm access tracks), or areas of the landscape that do not provide suitable habitat (such as depressions in paddocks where the increased moisture produces dense grasslands that are not suitable for GSM). Paddocks in the Study Area generally comprise a mosaic of optimal and sub-optimal habitats. Therefore, in some cases micro-siting to avoid areas of optimal habitat can occur.

4.2 IMPACTS OF SHADING

The impacts of shading were considered in the ERM (2013) and have been further investigated through application of a shadow model.

To determine the duration over which a wind turbine generator (WTG) would cause shadow, shadow modelling was undertaken using FindMyShadow.com.

The following parameters were used in the model:

- Location: 34.565312° S, 148.828697° E;
- Date: 01 November 2013 (this date is early in the GSM flying season, however, it has been selected to represent the worst case scenario as shadows are longer at this time than later in the season);
- Time: 6:00 – 18:00; and
- Feature dimensions: 3m (width) x 3m (length) x 10m (height). The model uses a square structure, whereas the WTG bases are circular. A 3m x 3m square provides the closest area to the circular base of the largest WTGs under consideration for the Project (4.5 m at their base).

The modelling showed that shadows that linger over an area for greater than two hours between 10:00 and 15:00 are restricted to within 11m of the WTG base (see *Annex A*). This falls within the hardstand area of the WTG footings (25m x 25m). While the WTGs are taller than the 10m used in the model, this does not change the area in which shadows linger for longer than 2 hours. Furthermore, the WTGs become narrower towards their top and therefore, the shadows cast by the upper sections of the tower would linger over a shorter time period.

REFERENCES

Department of Environment and Heritage (DEH (now DSEWPC)) (2006) **EPBC Act Policy Statement: White Box - Yellow Box - Blakelys Red Gum grassy woodlands and derived native grasslands.** <http://www.environment.gov.au/epbc/publications/pubs/box-gum.pdf>

ERM (2013) **Bango Wind Farm: Ecological Impact Assessment** Report prepared for WPCWP.

Gellie N.J.H. (2005) 'Native Vegetation of the Southern Forests: South-east Highlands, Australian Alps, South-west Slopes, and SE Corner Bioregions'. **Cunninghamia**, volume 9 (2), pp 219 - 253.

National Parks and Wildlife Service (NPWS), June 2002. **The Native Vegetation of Boorowa Shire.** <http://www.environment.nsw.gov.au/resources/nature/sbsNssScopeBoorowa.pdf>

OEH (2011) **White Box Yellow Box Blakely's Red Gum Woodland - endangered ecological community listing: NSW Scientific Committee - final determination.** <http://www.environment.nsw.gov.au/determinations/BoxgumWoodlandEndComListing.htm>

Annex A

WTG Shading Model

Bespoke Shadow Plotting

Select Location :: Select Date :: Draw your Scene :: **Calculate Shadows** :: Print Report

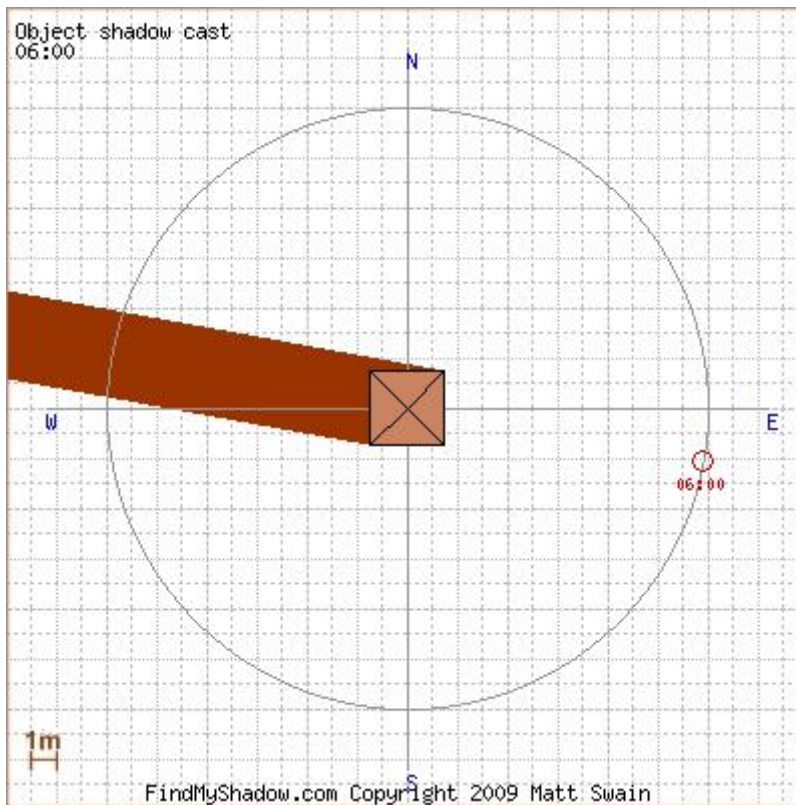
This page shows the shadows cast by the objects you just drew, at a sample of times on the date you selected where the sun is above the horizon, at the location you defined.



Your Results

You specified the following details:

Location: 34.565312° S Date: 01-11-2013 Timezone: (GMT +10.0) True North Offset: 0°
 148.828697° E



Animated view - hover over an hour in the table t

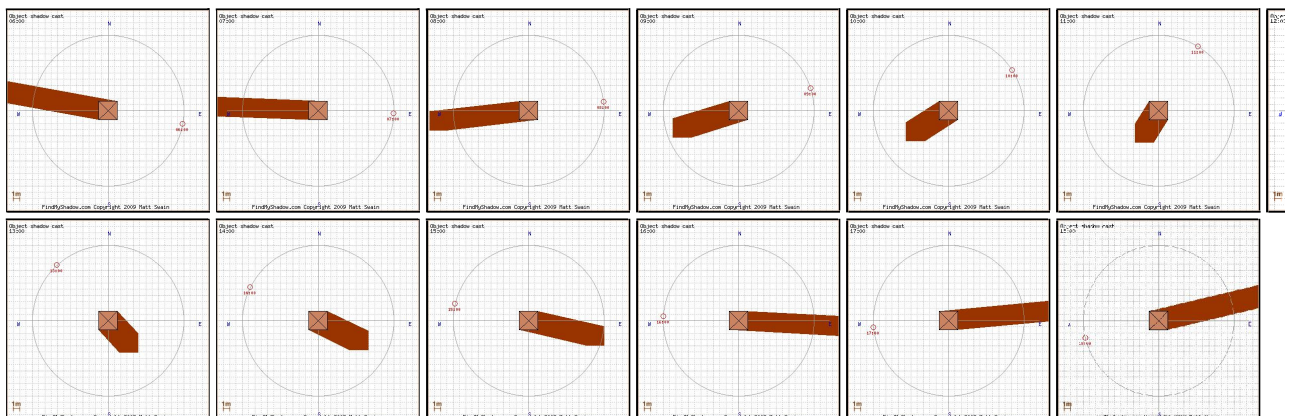
Sun-up hours:

- 06
- 07
- 08
- 09
- 10
- 11
- 12
- 13
- 14
- 15
- 16
- 17
- 18

Notes:

All angles (azimuth) relative to true north, and not magnetic north, which varies by location

Times are in the local timezone set (GMT +10.0)



Object shadow cast
18:00

N

14:00

13:00

12:00

10:00

14:00

09:00

15:00

08:00

W

16:00

E

17:00

07:00

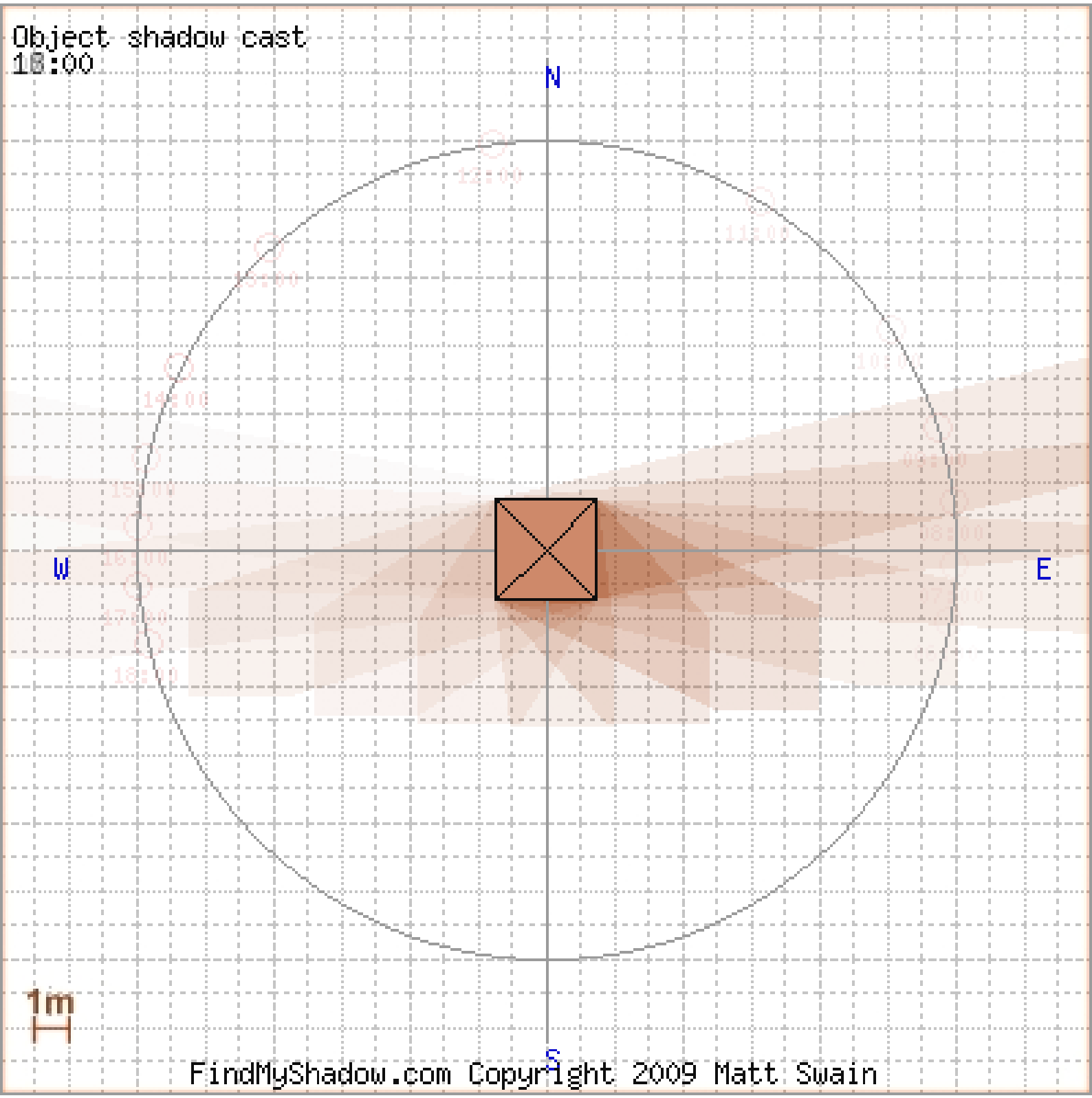
18:00

06:00

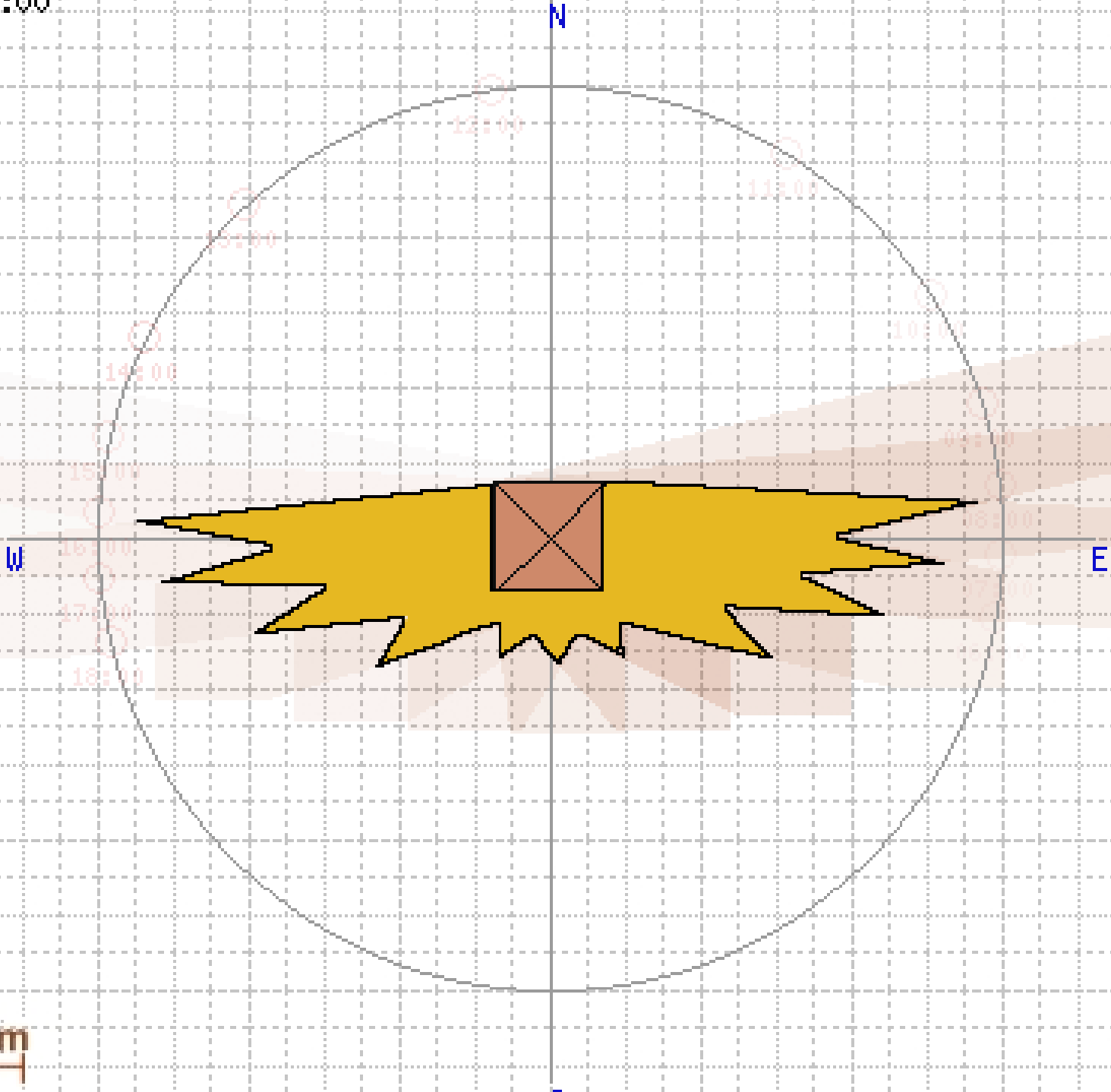
1m

S

FindMyShadow.com Copyright 2009 Matt Swain



Object shadow cast
18:00



FindMyShadow.com Copyright 2009 Matt Swain

Annex G

Biobanking

9 May, 2017

Kristin Old
CWP Renewables
Floor 6, 45 Hunter St
NEWCASTLE, NSW, 2300

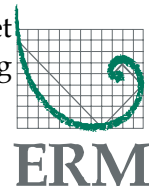
Our Reference: 0404134L01 Potential Offset Sites_F

Attention: Kristin Old

Dear Kristin,

RE: BANGO WIND FARM - CANDIDATE OFFSET PROPERTIES

This letter provides an outline of the methods and results of the candidate offset properties vegetation investigation. The process has been undertaken using desktop information only.



1. METHOD

Cadastral properties offered by interested land holders CWPR provided to ERM were intersected with available vegetation mapping products:

- *Australian Alps, South west Slopes, and SE Corner Bioregions* (Gellie 2005); and
- *The Native Vegetation of Boorowa Shire* (NSW National Parks and Wildlife Service (NPWS) 2002).

Those products have different spatial scales and representations/nomenclature of the diversity of vegetation types in the coverage area, although as a desktop exercise provides the best available information. *Table 1* contains the equivalents applied.

Table 1 Mapping Product Vegetation Type and Potential Equivalent Biometric Vegetation Type (BVT)

Boorowa LGA (NPWS 2002) Vegetation Type	BVT Equivalent Code	BVT Equivalent
Blakleys Red Gum - Yellow Box Grassy Woodland	LA103	Apple Box - Yellow Box dry grassy woodland of the South Eastern Highlands
Red Stringybark - Joycea tussock grass dry shrub open forest	LA182	Red Stringybark - Scribbly Gum - Red Box - Long-leaved Box shrub - tussock grass open forest of the NSW South Western Slopes Bioregion

Southern Forests (Gellie 2005) Vegetation Type*	BVT Equivalent Code	BVT Equivalent
Northern Slopes Dry Grass Woodland	LA103	Apple Box - Yellow Box dry grassy woodland of the South Eastern Highlands
Tableland Dry Grassy Woodland	LA182	Red Stringybark - Scribbly Gum - Red Box - Long-leaved Box shrub - tussock grass open forest of the NSW South Western Slopes Bioregion
Tablelands and Slopes Dry Herb-Grass Woodland	LA103	Apple Box - Yellow Box dry grassy woodland of the South Eastern Highlands
Tableland Woodland/forest	LA182	Red Stringybark - Scribbly Gum - Red Box - Long-leaved Box shrub - tussock grass open forest of the NSW South Western Slopes Bioregion

Notes: 1. note equivalents difficult to make from Gellie (2005)

The number of credits required has been reproduced from Tables 6.14 and 6.15 from ERM (2013) to demonstrate the required areas for offsetting that were calculated at that time with that proposed footprint.

Table 2 Ecosystem Credit requirements and their equivalent in hectares (Table 6.14 from ERM 2013)

BVT Code	BVT name	Area in Development Footprint (ha)	Required Credits	Equivalent Hectares required
LA103	Apple Box - Yellow Box dry grassy woodland of the South Eastern Highlands	83.63	1428	153.5
LA182	Red Stringybark - Scribbly Gum - Red Box - Long-leaved Box shrub - tussock grass open forest the NSW South Western Slopes Bioregion	21.14	399	42.9

1. Data are based on the Credit Report provided in Annex H and the BioBanking Credit Converter

Table 3 Species Credit requirements and their equivalent in hectares

Species Name	Common Name	TSC Act Status	Extent of impact	Number of credits required	Equivalent hectares required
<i>Hieraaetus morphnoides</i>	Little Eagle	Vulnerable	6.58	89	15
<i>Circus assimilis</i>	Spotted Harrier	Vulnerable	6.58	89	15
<i>Synemon plana</i>	Golden Sun Moth	Endangered	82.48	2062	344

1.1 LIMITATIONS

Limitations to this desktop assessment for candidate offset properties include:

- Vegetation type equivalents are not certain and based on an estimate.
- Areas required for offsets are derived from the credit to hectare calculator (ERM 2013) using the development footprint as was exhibited in the EA. No recalculation has been undertaken.
- Cadastral intersect and sum of areas completed – no appraisal of actual site attributes, or whether the land areas are useable as offsets.
- Cadastral intersect used whole cadastral parcel and all vegetation within it, with no direction of a landholder’s desired land areas.
- No species credit species analyses are possible as their presence must be determined by survey.

2. RESULTS

The areas of vegetation types on each landholder’s properties are shown in *Annex A*. There are a number of limitations on the reliability of this desktop analysis and further work is required to refine the suitability of the candidate offset lands, including spatial and aerial photo analyses to rank site suitability using (but not limited to):

- Patch sizes
- Mapped polygon accuracy with visible bushland
- Connectivity to reserves or other bushland
- Verify composition of cadastral parcels and bushland areas

Once these data are known a selection of the top ranked or preferred offset lands could be field verified. The reassessment of potential candidate offset sites shows that it is likely that sufficient sites are available, and it is expected that a selection of these would meet the requirements of offsetting impacts associated with the reduced layout. Discussions and negotiations would be required with the land holder to discuss roles, responsibilities and obligations; and with the Office of Environment and Heritage and Department of Planning and Environment to ascertain their complicity with this approach. Refinement of candidate sites and a clear strategy to obtain an offset for the project would be the conclusion of the above work, a precursor to preparing an offset package detailing the offset.

Yours sincerely,
for Environmental Resources Management Australia Pty Ltd

Guy Williams
Principal Ecologist

Annex A

Landholders and Vegetation Types Present

Landowner	Vegetation Type	Area (ha)
John McGrath	Blakleys Red Gum - Yellow Box Grassy Woodland	47.04
John McGrath	Tableland Woodland/forest	22.68
Malcolm Curthoys	Blakleys Red Gum - Yellow Box Grassy Woodland	5.86
Malcolm Curthoys	Red Stringybark - Joycea tussock grass dry shrub open forest	8.23
Malcolm Curthoys	Tableland Woodland/forest	0.09
Margaret & Jenny Dwyer	Blakleys Red Gum - Yellow Box Grassy Woodland	11.22
Margaret & Jenny Dwyer	Red Stringybark - Joycea tussock grass dry shrub open forest	5.44
Margaret & Jenny Dwyer	Tableland Woodland/forest	4.29
Margaret, Daniel & Dermot McGrath	Blakleys Red Gum - Yellow Box Grassy Woodland	21.82
Margaret, Daniel & Dermot McGrath	Red Stringybark - Joycea tussock grass dry shrub open forest	24.15
Margaret, Daniel & Dermot McGrath	Tableland Woodland/forest	49.10
Peter Thompson	Blakleys Red Gum - Yellow Box Grassy Woodland	1.97
Peter Thompson	Red Stringybark - Joycea tussock grass dry shrub open forest	4.14
Peter Thompson	Tableland Woodland/forest	3.45
Terence James McGrath	Blakleys Red Gum - Yellow Box Grassy Woodland	7.41
Terence James McGrath	Red Stringybark - Joycea tussock grass dry shrub open forest	1.29
Terence James McGrath	Tableland Woodland/forest	4.42
Tom Gunthorpe	Blakleys Red Gum - Yellow Box Grassy Woodland	7.86
Tom Gunthorpe	Red Stringybark - Joycea tussock grass dry shrub open forest	31.83
Tom Gunthorpe	Tableland Woodland/forest	7.02
Giles	Tablelands and Slopes Dry Herb-Grass Woodland	462.231
Bush	Tablelands Dry Shrub-Tussock Grass Forest	31.3798
Bush	Northern Slopes Dry Grass Woodland	21.6541
Day	Northern Slopes Dry Grass Woodland	52.9243
Day	Tablelands Acacia-Grass-Herb Dry Forest	0.94327
Day	Tablelands and Slopes Dry Herb-Grass Woodland	73.2296
Day	Tablelands and Slopes Herb Grassland/Woodland	110.306
Day	Tablelands Dry Shrub-Tussock Grass Forest	17.0932
Medway	Central North Slopes Dry Grass Woodland	44.8854
Medway	Northern Slopes Dry Grass Woodland	314.25
Medway	Northern Tablelands and Slopes Dry Shrub-Grass Forest	198.878
Medway	Tablelands and Slopes Dry Herb-Grass Woodland	2.35496
Medway	Western Slopes Moist Herb-Sedge-Grass Woodland	7.73453
Middleton	Tablelands and Slopes Dry Herb-Grass Woodland	430.727
Moorby	Northern Tablelands and Slopes Dry Shrub-Grass Forest	75.6076
Moorby	Tableland Dry Grassy Woodland	48.4758
Moorby	Tablelands and Slopes Dry Herb-Grass Woodland	180.576