Proposed Development of

Bango Wind Farm

Southern Tablelands, New South Wales

Response to Submissions

May 2017

Prepared for Bango Wind Farm Pty Ltd by CWP Renewables Pty Ltd

This page is intentionally left blank.

Table of Contents

List of Figures

List of Tables

Appendices

1. INTRODUCTION

The Bango Wind Farm Environmental Impact Statement (EIS) (Project Application SSD 6866) considered a project of up to 118 wind turbines at a maximum tip height of 200 m, and associated ancillary infrastructure, located between the townships of Boorowa and Rye Park, about 45 km north of Yass, New South Wales (NSW). The EIS was placed on public exhibition over a period of 60 days during October to December 2016, over which time 106 submissions were received. Of those 106 submissions, approximately 34% were in support, 54% in opposition, and 12% provided comment. Among these submissions, common areas of concern included visual impacts to neighbouring non-involved landowners, impacts to roads and impacts to biodiversity. This Response to Submissions (RTS) report provides the Proponent's response to all submissions and aims to provide clarity on the key aspects of the Project raised during the public exhibition period.

Furthermore, in evaluating the submissions received during public exhibition, the Proponent has elected to amend the project Development Application (DA) and reduce the proposed maximum number of wind turbines to 75. This reduction of 43 (36%) of wind turbine locations is documented in the separate Amended DA submission. This Amended DA has been developed to address concerns raised during the public exhibition period, proactively respond to the NSW wind energy planning guidelines, and to avoid and minimise the environmental impacts associated with the amended Project.

1.2 Format of the Report

This RTS captures all comments made, questions put, and issues raised through the public exhibition phase of the Project assessment. Responses have been provided in two broad sections to address Agency / Interest Group Submissions and those received from the Public. These comments and responses are further categorised to mirror the original EIS Chapters (totalling 24). As such, this RTS should be read in conjunction with the Project EIS.

The appendices to this document contain additional technical and environmental assessments that were undertaken for this RTS.

This page is intentionally left blank.

2. SUBMISSIONS SUMMARY

2.1 Submissions Received

The Department of Planning and Environment (DPE) received and classified a total of 106 submissions during the public exhibition period (Table 1). In accordance with section 75H of the *Environmental Planning and Assessment Act 1979*, this RTS considers and responds to the issues raised in those submissions.

Type	Position	Number
Public	Support	33
	Comment	0
	Objection	56
Agency/Interest Group	Support	3
	Comment	13
	Objection	1
Total		**106**

Table 1: Submissions received for the Project

Of the 59 public objection submissions received, two pairs of objections (SSN: 175126 and 175097, 174956 and 175345) are duplicate submissions, and one (SSN: 175186) refers exclusively to Rye Park wind farm, with no mention of Bango Wind Farm or CWP Renewables. As such, 56 public submissions of objection have been considered in this Response to Submissions.

Figure 1 and Figure 2 summarise general public submissions by submission suburb, providing further context in which to understand and interpret submission issues. Distances between submission suburb and the Project were assessed as per Table 2.

Distance to the Project	Number of Submissions	
	Objection	Support
Within 10 km	26	9
10 - 50 km	17	7
Outside 50 km	13	17

Table 2: Proximity of submission suburbs to the Project

Agency / Interest Group submission comments were also summarised, to provide an overview of concern and relevance (**Error! Reference source not found.**).

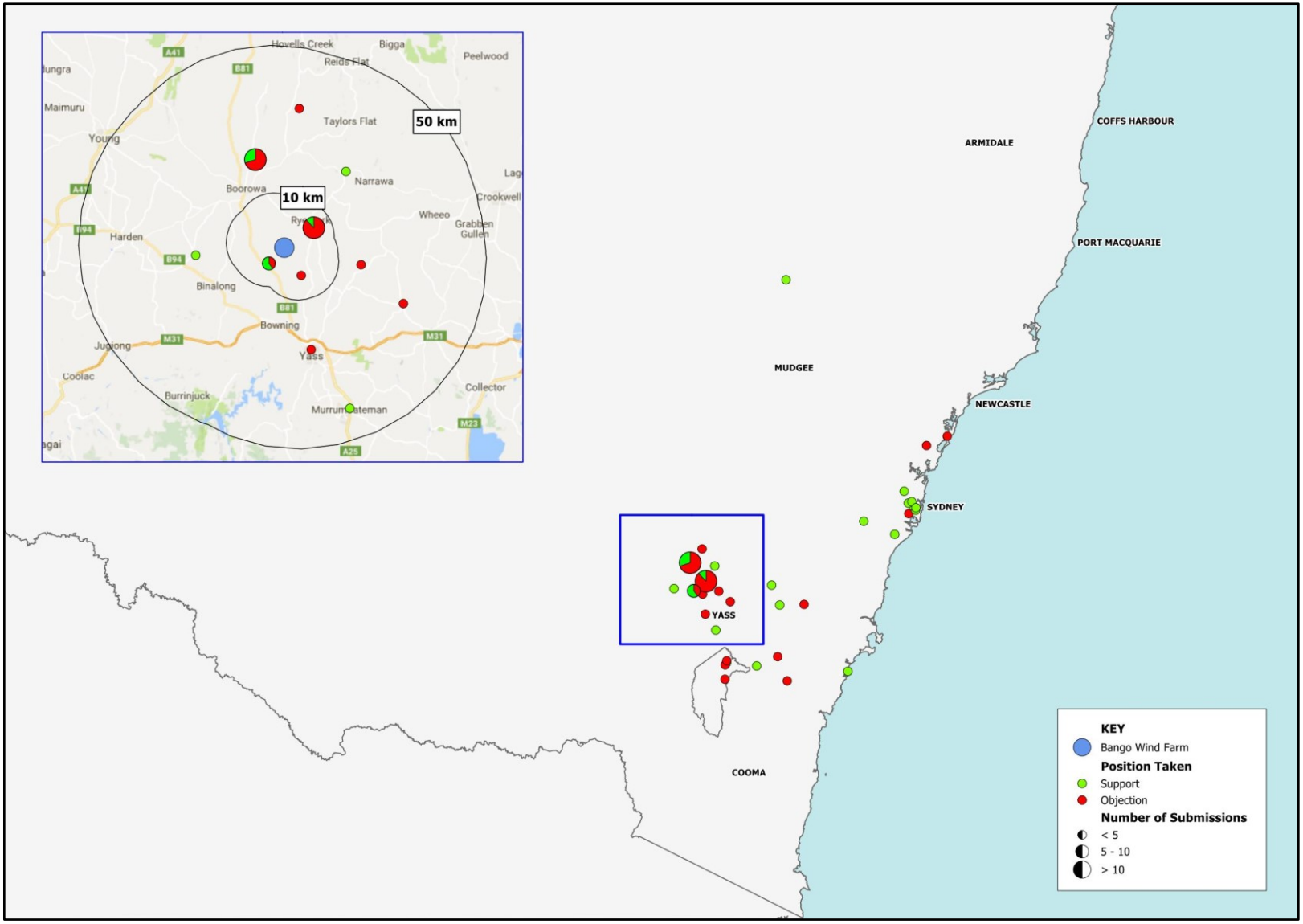


Figure 1: Summary of public submissions by location

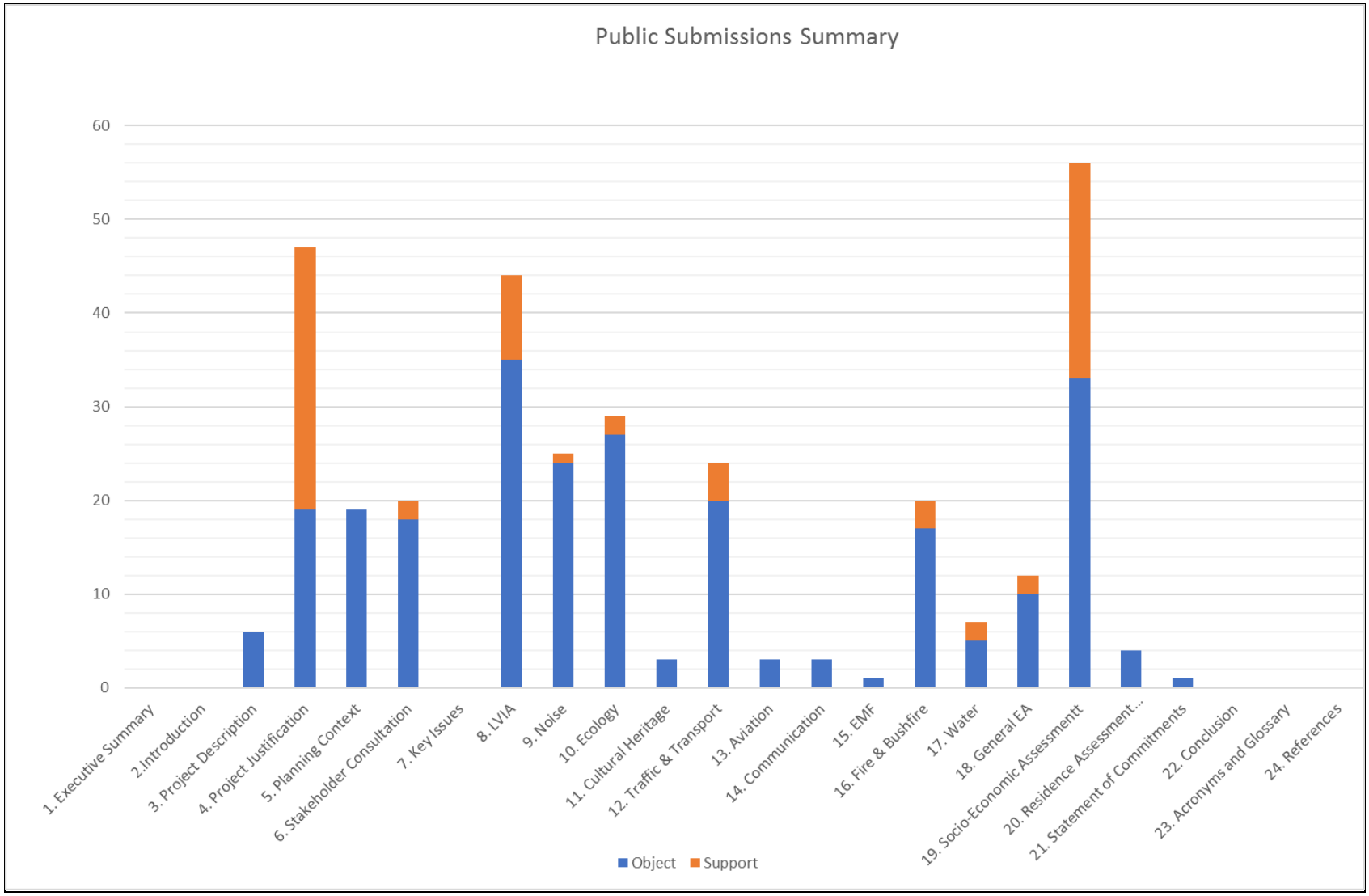


Figure 2: Public submission issues by EIS Chapter

Table 3: Agency submissions summary

Agency	Stance	1. Executive Summary	2.Introduction	3. Project Description	4. Project Justification	5. Planning Context	6. Stakeholder Consultation	7. Key Issues	8. LVIA	9. Noise	10. Ecology	11. Heritage	12. Traffic & Transport	13. Aviation	14. Communication	15. EMF	16. Fire & Bushfire	17. Water	18. General EA	19. Socio-Economic Assessment	20. Residence Assessment Summary	21. Statement of Commitments	22. Conclusion	23. Acronyms and Glossary	24. References
Office of Environment & Heritage	Comment						■				■	■													
Commonwealth Aviation Safety Authority	Comment													■											
Boorowa District Landscape Guardians	Object						■				■						■			■					
Ryde - Hunter's Hill Flora & Fauna Preservation Society	Support				■								■					■		■					
Yass Valley Council	Comment						■						■							■					
Department of Defence	Comment													■											
Heron Resources	Comment					■	■																		
Doctors for the Environment	Support				■															■					
Environmental Protection Agency	Comment			■						■								■	■			■			
Roads & Maritime Services	Comment												■									■			
NSW Department of Primary Industries	Comment																	■							
Climate Change Action Group	Support				■													■		■					
Hilltops Council	Comment						■			■			■					■	■	■					
NSW Health	Comment								■	■										■					
AirServices Australia	Comment													■											
WaterNSW	No comment																								
Department of Industry, Division of Resources & Energy	Support				■		■													■					

3. AGENCY SUBMISSION RESPONSE

Chapter 1: Executive Summary

No responses received.

Chapter 2: Introduction

No responses received.

Chapter 3: Project Description

3.3.1 *EPA*	**If any wind turbine is operated before the project is commissioned, then the proponent must perform a type test on each one of those turbines within three months of it coming in to operation. The type test must be performed in accordance with IEC 61400-11.**
	Response: Noted.
3.3.2 *EPA*	**Construction must only take place within the hours of 7:00am to 6:00pm Monday to Friday, 8:00am to 1:00pm Saturday. No construction may take place on Sundays or Public Holidays.**
	Response: Noted. However, it is the Proponent's intention to develop an out of hours works protocol, typical for wind farm developments, for inclusion in the project construction and operational management plans. This protocol deals with activities of low or nil audible impacts at surrounding non-involved residences – such as the completion of concrete pours or the hoisting of blades/rotors into place; two aspects of construction which are subject to weather impacts.

3.3.3
EPA
	The following activities may be carried out outside the recommended construction hours:
	• **construction that causes LAeq(15minute) noise levels that are:**
	  ○ **no more than 5dB above Rating Background Level at any residence in accordance with the Interim Construction Noise Guideline (DECC, 2009); and**
	  ○ **no more than the Noise Management Levels specified in Table 3 of the Interim Construction Noise Guideline (DECC, 2009) at other sensitive land uses; or**
	• **for the delivery of materials required by the police or other authorities for safety reasons; or**
	• **where it is required in an emergency to avoid the loss of lives, property and/or to prevent environmental harm; or**
	• **as approved through the process outlined in condition 4 of this approval.**

	Response: Noted.

3.3.4 *EPA*	**The hours of construction activities specified under condition 1 of this approval may be varied with the prior written approval of the Secretary. Any request to alter the hours of construction shall be:** • **considered on a case-by-case or activity-specific basis** • **accompanied by details of the nature and justification for activities to be conducted during the varied construction hours** • **accompanied by written evidence that appropriate consultation with potentially affected sensitive receivers and notification of relevant Council(s) (and other relevant agencies) has been and will be undertaken** • **all feasible and reasonable noise mitigation measures have been put in place** • **accompanied by a noise impact assessment consistent with the requirements of the Interim Construction Noise Guideline (DECCW, 2009).**
	Response: Noted.

Chapter 4: Project Justification

3.4.1 *Ryde-Hunter's Hill FFPS*	**It is critical that renewable energy projects occur so that overall carbon emissions are reduced and the impacts of a changing climate on important natural bushland and waterways such as in the Field of Mars Reserve are minimised.** **We feel strongly that renewable energy projects such as the Bango Wind Farm are essential if carbon emissions are to be reduced.**
	Response: Noted.
Doctors for the Environment	**(DEA) Supports the urgent deployment of wind farms to enable the transition away from carbon-intensive energy generation, in order to minimise the impact of human-driven climate change on the vital, interdependent ecosystems of our planet**
	Response: Noted.
Ryde-Gladesville CCAG	**We think the most important reason the Bango Wind Farm should be approved is because the energy it produces will contribute to the RET for Australia and NSW. Providing power to 140,000 homes is a significant way of reducing our reliance on the burning of fossil fuels**
	Response: Noted.
DI-DRE	**Wind farms drive investment and growth in regional NSW and provide alternate, non-rainfall dependent income streams for traditional farming communities. Wind energy diversifies the energy mix and is supported under the Government's Renewable Energy Action Plan and recently announced**

	Climate Change Policy Framework. Increasing wind energy in NSW will also help the NSW Government meet its commitment to support the national Renewable Energy Target of 33,000 gigawatt hours (GWh) by 2020.
	Response: Noted.

Chapter 5: Planning Context

3.5.1 *Heron Resources*	**Heron Resources Limited (Heron) is a significant stakeholder in the Bango Wind Farm project area through its title Exploration Licence (EL) 8400.**
	Response: Noted. Consultation with Heron Resources Limited is ongoing.

Chapter 6: Stakeholder Consultation

3.6.1 *Hilltops Council*	**A PAC determination hearing should be held locally which would provide the opportunity for all submitters to address the members with their concerns before any determination is made. Ideally the hearing should be to receive representations from those submitters wishing to address the Commission following which the Commission should retire to properly consider these representations, the assessment report and make a considered and reasoned decision. Far too often the PAC has simply taken submissions and announced its decision, leaving local communities questioning the purpose of the hearing and the role of the Commission.**
	Response: Noted.
3.6.2 *Yass Council*	**The assessment report should be available to all submitters and the proponent prior to any hearing or determination by the Planning Assessment Commission (PAC).**
	Response: Noted.
3.6.3 *Yass Council*	**The PAC hearing should be held locally and provide the opportunity for all submitters to address the members with their concerns before any determination is made. Ideally the hearing should be to receive representations from those submitters wishing to address the Commission following which the Commission should retire to properly consider these representations, the assessment report and make a considered and reasoned decision. Far too often the PAC has simply taken submissions and announced its decision, leaving local communities questioning the purpose of the hearing and the role of the Commission.**

	Response: Noted.
3.6.4 *Heron Resources*	**Heron had not been informed of the Bango Wind Farm project and hence did not get the opportunity to make a submission in response to the Environmental Impact Statement (EIS) during the exhibition period.**
	Response: Noted. Consultation with Heron Resources Limited is ongoing. Please refer to the Amended DA submission.
3.6.5 *BDLG*	**It is also evident that there has been inadequate community consultation carried out by CWP Renewables from 2008 until now.**
	Response: The Proponent disagrees with this statement with consideration of all activities documented in Chapter Six of the EIS. Nonetheless, the Proponent is committed to consultative outcomes, and as such is proposing to modify the project in light of feedback received through the public exhibition phase. Please refer to the Amended DA submission.
3.6.6 *DI-DRE*	**The Division encourages the proponent to continue its attempts to consult with Ochre Resources Pty Ltd (holder of EL 8400) regarding the wind farm development and its impact on current exploration activities and future access to land for mineral exploration**
	Response: Noted. Consultation with Heron Resources Limited is ongoing. Please refer to the Amended DA submission.

Chapter 7: Assessment of Key Issues

No responses received.

Chapter 8: Landscape and Visual Impact Assessment

3.8.1 *NSW Health*	**The EIS appears to comprehensively address any potential public health issues, particularly in regard to noise, vibration, shadow flicker and blade glint.**
	Response: Noted.

Chapter 9: Noise Assessment

3.9.1	**The sensitive receiver locations (residences) BAN0019, BAN0035, and BAN0102 require review as the EPA's analysis of aerial imagery and topographic maps on SIX Maps**

EPA	**(accessed by EPA on 18 November 2016) indicates they are located between 45 metres and 90 metres from their marked locations in the EIS. In addition, receiver location BAN0097 appears to be a collection of farm sheds with no residence, based on aerial imagery and topographic maps on SIX Maps (accessed by EPA on 18 November 2016). This location should be reviewed as a potential sensitive receiver.** **The EPA recommends that the proponent should review confirm the names of residences (properties) and grid references of all sensitive receivers, particularly those identified above.**

Response: All dwellings within 5 km of the Project (EIS layout) were cross-checked using a combination of SIX Maps and Google Earth. Of these, 23 were found to be up to 110 m from their stated location. Of these 23, 20 were further from the wind farm than stated and so a conservative figure for noise predictions has been found. Of the 3 that are closer to the wind farm, details are included below.

Dwelling	Actual Dwelling location	Comments
BAN036	109 m from previous location and approximately 85 m closer to the Langs Creek cluster.	This is west of the Langs Creek cluster and so is now much further from the Project.
BAN155	39 m from previous location, up to 39 m closer to the wind farm.	Neighbour Agreement
BAN158	23 m from previous location, up to 23 m closer to the wind farm.	Shed, Neighbour Agreement

Sonus has revised the Noise Impact Assessment based on the updated coordinates of sensitive receiver locations provided by CWP Renewables.

(Note: BAN0097 is a caravan and has been removed; BAN0019, BAN0035, BAN0102, and several other locations have been updated)

This update is found in Appendix 3.

3.9.2 *EPA*	**For the purposes of the EPA's suggested noise limit conditions, wind speed is to be measured directly in accordance with a method nominated by the proponent and at a location nominated by the proponent, consistent with the method and location used to determine the background noise regression curves in the Noise Impact Assessment.** **The EPA recommends that the proponent nominate the location and method for wind speed monitoring, prior to any operations commencing.**

Response: Wind speed monitoring for correlation with operational noise data will be conducted at BAN02, which is the same wind mast referenced for the latest pre-construction background noise correlations. Hub height wind speeds will be derived based on extrapolation using wind shear coefficients determined from wind speed measurements at two anemometers height on the mast.

If BAN02 mast is determined to be affected by wake effects, an alternative wind mast or turbine nacelle anemometers will be considered but will be referenced back to the equivalent hub height wind speed at BAN02 to remain consistent with the pre-

	construction measurements. Details of the wind monitoring location and methodology will be development and described in the Noise Compliance Test Plan.
3.9.3 *EPA*	**The Proponent must prepare a revised noise impact assessment, for the final chosen turbine model and layout, prior to commissioning the wind turbines. The revised assessment must demonstrate, through appropriate modelling and in accordance with the Environmental Noise Guidelines: Wind Farms (SA EPA 2009), that the final turbine model and layout can meet the limits in this approval.**
	Response: Noted.
3.9.4 *EPA*	**Before using sector management or a noise management mode for any operational wind turbine, the proponent must provide a method by which the Department of Planning and Environment, EPA and community can easily verify that each wind turbine is operating in the correct mode at any time.**
	Response: Noted.
3.9.5 *EPA*	**Prior to commissioning of the turbines, the Proponent must prepare and implement a Noise Management Plan to manage noise emissions from the operation of the project. The Plan must include, but not necessarily be limited to:** • **compliance monitoring within one year of commissioning, in accordance with the Environmental Noise Guidelines: Wind Farms (SA EPA 2009)** • **procedures to certify noise** • **identification and implementation of best practice management techniques for minimisation of noise emissions where reasonable and feasible** • **measures to be undertaken to rectify annoying characteristics resulting from the operation of the project such as infrasound, tonality or adverse mechanical noise from component failure** • **procedures and corrective actions to be undertaken if non-compliance is detected.**
	Response: Noted.
3.9.6 *EPA*	**The proponent must prepare and implement a detailed construction noise management plan, prior to commencement of construction activities, including but not necessarily limited to:** • **identification of each work area, site compound and access route (both private and public)** • **identification of the specific activities that will be carried out and associated noise sources at the premises and access routes** • **identification of all potentially affected sensitive receivers** • **the construction noise and vibration objectives identified in accordance with the Interim Construction Noise Guideline and Assessing Vibration: A Technical Guideline**

	• **assessment of potential noise and vibration from the proposed construction methods (including noise from construction traffic) against the objectives identified in (d)** • **where the objectives are predicted to be exceeded an analysis of feasible and reasonable noise mitigation measures that can be implemented to reduce construction noise impacts** • **description of management methods and procedures and specific noise mitigation treatments that will be implemented to control noise and vibration during construction, including the early erection of operational noise control barriers.**
	Response: Noted.
3.9.7 *Hilltops Council*	**Whilst Council is not in a position to attest to the adequacy of the Noise assessment contained in the EIS, Council is aware of community concerns surrounding the potential noise impacts of the development, particularly in light of the recent approval of the nearby Rye Park Wind Farm. Council is concerned that should the proposal receive consent Council will be the recipient of noise complaints which present a significant administrative burden on Council resources.**
	Response: Once construction commences, a 24-hour hotline will be established. The community will be directed to this hotline for all complaints and enquiries about the Bango wind farm. The community will be made aware of the hotline via advertisements and letter drops.
3.9.8 *EPA*	**L6.1 - For wind speeds from cut in to rated power of the wind turbine generators, wind turbine noise generated from the premises must not exceed the greater of:** • **35 dBA or** • **the existing background noise level plus 5 dBA for each integer wind speed at 10 metres above ground level at the wind farm site** **at the nearest non-involved residential receivers.**
	Response: Noted.
3.9.9 *EPA*	**L6.2 - For the purpose of determining compliance with condition L6.1, the locations and noise limits in the table below apply. The locations referred to in the table below are defined in condition L6.4.**

Location	**L_{eq}(10minute) NOISE LIMITS (dBA)**									
Integer wind speed (m/s) at 120 metres above ground level	**3 or less**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12 or more**

142	35	35	35	35	35	35	35	35	35	37
19, 97, 170, 176, 282	35	35	35	35	35	35	35	35	36	37
128	35	35	35	35	35	35	35	36	37	39
144	35	35	35	35	35	35	35	36	37	40
26, 165, 166	35	35	35	35	35	35	37	38	40	42
106, 152, 243	35	35	36	36	37	37	38	39	40	42
35, 48	35	35	37	38	39	40	41	41	42	43
43, 222	35	36	36	37	37	37	37	38	39	40
60, 62, 76, 179, 181, 187, 235, 260	36	36	36	37	37	37	37	38	38	39
138	36	36	36	37	37	38	39	40	41	42
34, 102	36	37	38	38	38	38	39	39	40	41
Any other residence not subject to a negotiated agreement	35	35	35	35	35	35	35	35	35	35

Response: The noise limits above should be based on the results of background noise correlations conducted using BAN02 wind mast data, as summarised in Sonus Report S3958C10.

i. Locations 19, 34, 102 & 222 could be removed to reflect the latest turbine layout.

ii. Although the L_{eq} descriptor is used for predictions prior to construction, compliance measurements are conducted using the L_{90} descriptor. Therefore, reference to the L_{eq} descriptor for determination of compliance may cause confusion. The table would be more informative without a descriptor but rather by reference to measurements in accordance with the *Wind Energy: Noise Assessment Bulletin (December 2016)*.

An updated table based on the above is provided below:

Location	**NOISE LIMITS (dBA) when measured in accordance with the** *Wind Energy: Noise Assessment Bulletin (December 2016)*									
Integer wind speed (m/s) at 120 metres above ground level	**3 or less**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12 or more**

142, 170	35	35	35	35	35	35	35	35	36	38
176, 282	35	35	35	35	35	35	35	35	35	37
128	35	35	35	35	35	35	35	36	37	39
144, 276	35	35	35	35	35	35	35	36	37	40
26, 165, 166	35	35	35	35	35	35	36	38	39	42
106, 152, 243	35	35	36	36	37	37	38	39	40	42
35, 48	35	35	37	38	39	40	40	41	42	43
43	35	35	36	37	37	37	37	38	39	40
60, 238	35	35	35	35	35	35	35	35	37	39
62, 76, 181, 187, 235, 260	36	36	36	37	37	37	37	38	38	40
138	36	36	36	36	37	37	38	39	40	42
Any other residence not subject to a negotiated agreement	35	35	35	35	35	35	35	35	35	35

3.9.10 *EPA*

L6.3 - The noise limits specified in conditions L6.1 and L6.2 do not apply to any sensitive receiver location (residence) where a noise agreement is in place between the licensee and the respective land owner(s) in respect to noise impacts and/or noise limits.

Response: Noted.

3.9.11 *EPA*

L6.4 - For the purpose of condition L6.2, locations are defined in the table below. Grid references (eastings and northings) refer to the Map Grid of Australia 1994 (MGA94), zone 55.

Location	Name	Easting (m)	Northing (m)
19	Glenorie[a]	663726[a]	6182989[a]
26		667373	6168710
34	Dovers Flat	658197	6178590
35	Stonehaven[a]	674957[a]	6174740[a]
43	Ryandale	658490	6173393
48	Glenwood	674793	6177078
60	Montalta	668962	6166711
62		661390	6169789

76	Laverstock	663854	6169306
97	1595 Tangmangaroo Rd Rye Park	671321[b]	6178301[b]
102	Badenville[a]	660877[a]	6185232[a]
106	Rockview	674765	6172626
128	Whealgrace	676659	6168997
138	Ballandarra	674728	6164928
142		670364	6177556
144	Letona	668769	6167707
152	Eversleigh	674475	6171888
165		667447	6168827
166		667440	6168580
170	Back Creek	669036	6176903
176	Sunbury	665662	6180278
179	Ingleside	663462	6168501
181	Long Gully	661493	6168919
187	11 Charles Street, Kangiara	661093	6169533
222	Gilray	657693	6175627
235		663846	6169475
243		674789	6172958
260	Jora	661457	6169844
282		666714	6178407

These locations were between 45 metres and 90 metres from the nearest residence, based on aerial imagery and topographic maps on SIX Maps (18 November 2016).
This location appears to be a collection of farm sheds with no residence, based on aerial imagery and topographic maps on SIX Maps (18 November 2016).

Response: The table should be revised based on the revised sensitive receiver locations and the latest turbine layout, as provided below.

(Note: Locations 97, 19, 34, 102 & 222 have been removed; Locations 238 & 276 added)

Location	Name	Easting (m)	Northing (m)
26		667373	6168710
35	Stonehaven	675013	6174765
43	Ryandale	658490	6173393
48	Glenwood	674793	6177078
60	Montalta	668962	6166711
62		661390	6169789
76	Laverstock	663854	6169306
106	Rockview	674765	6172626
128	Whealgrace	676659	6168997
138	Ballandarra	674728	6164928
142		670364	6177556
144	Letona	668769	6167707
152	Eversleigh	674475	6171888
165		667447	6168827
166		667440	6168580
170	Back Creek	669036	6176903
176	Sunbury	665662	6180278
179	Ingleside	663462	6168501
181	Long Gully	661493	6168919
187	11 Charles Street, Kangiara	661093	6169533
235		663846	6169475
238		670657	6166162
243		674789	6172958
260	Jora	661457	6169844
276		668772	6167753
282		666714	6178407

3.9.12 *EPA*	**L6.5 - For the purpose of condition L6.1, noise must be determined in accordance with the methodology in the Environmental Noise Guidelines: Wind Farms (SA EPA 2009). The modification factors in Section 4 of those guidelines must be applied, as appropriate, to the noise levels measured by the noise monitoring equipment.**
	Response: Recommend change to NSW Bulletin.
3.9.13 *EPA*	**L6.6 - For the purpose of condition L6.5, the presence of excessive tonality (a special noise characteristic) must be determined in accordance with ISO 1996.2:2007 Acoustics - Description, measurement and assessment of environmental noise - Determination of environmental noise levels.**
	Response: Recommend that condition be changed to: L6.6 - For the purpose of condition L6.5, the presence of excessive tonality (a special noise characteristic) must be determined in accordance with the Wind Energy: Noise Assessment Bulletin (December 2016)
3.9.14 *EPA*	**L6.6 - If tonality is found to be a repeated characteristic of the wind turbine noise, 5 dBA should be added to measured noise level from the wind farm. If tonality is only identified for certain wind directions and speeds, the penalty is only applicable under these conditions.**
	Response: Noted.

3.9.15 *EPA*	**L6.6 - The tonal characteristic penalty applies only if the tone from the wind turbine is audible at the relevant receiver. Absence of tone in noise emissions measured at an intermediate location is sufficient proof that the tone at the receiver is not associated with the wind farm's operation.**
	Response: Noted.
3.9.16 *EPA*	**L6.6 - The assessment for tonality should only be made for frequencies of concern from 25 Hz to 10 kHz and for sound pressure levels above the threshold of hearing (as defined in ISO 389.7:2005 *Acoustics - Reference zero for the calibration of audiometric equipment - Part 7: Reference threshold of hearing under free-field and diffuse-field listening conditions*.**
	Response: Noted
3.9.17 *EPA*	**L6.6 - The maximum penalty to be added to the measured noise level from the wind farm for any special noise characteristic individually or cumulatively is 5 dB(A).**
	Response: Noted
3.9.18 *EPA*	**L6.7 - For the purposes of condition L6.1, wind speed is to be measured directly in accordance with a method nominated by the proponent and at a location nominated by the proponent, consistent with the method and location used to determine the background noise regression curves in the Noise Impact Assessment.**
	Response: Noted

3.9.19
EPA
	L6.8 - To determine compliance:
	• **with the L_{eq}(10 minute) noise limits in conditions L6.1 and L6.2, the noise measurement equipment must be located:**
	  ○ **approximately on the property boundary, where any dwelling is situated 20 metres or less from the property boundary closest to the premises; or**
	  ○ **within 20 metres of a dwelling façade, but not closer than 5m, where any dwelling on the property is situated more than 20 metres from the property boundary closest to the premises.**
	• **with the noise limits in conditions L6.1 and L6.2, the noise measurement equipment must be located:**
	  ○ **at the most affected point at a location where there is no dwelling at the location; or**
	  ○ **at the most affected point within an area at a location prescribed by condition L6.8(a).**

	Response: For compliance testing, the L90 noise levels will be measured and correlated with the wind speed data, in accordance with NSW Bulletin and the SA Wind Farm Guidelines. For direct comparison, the noise limits should also be specified in terms of the L90 noise level rather than the LAeq, which cannot be practicably measured.

	The second dot point is ambiguous and could be interpreted as requiring noise compliance measurements on vacant land, at the closest point to the wind farm. Ideally, this condition would be removed and replaced with a reference to the NSW Bulletin.
3.9.20	**L6.9 - A non-compliance of condition L6.1 or L6.2 will still occur where noise generated from the premises in excess of the appropriate limit is measured:** • **at a location other than an area prescribed by conditions L6.8(a) and L6.8(b); and/or** • **at a point other than the most affected point at a location.**
	Response: The condition needs to be clearer to be effective. Reference to measurement positions in accordance with the Bulletin is preferred.
3.9.21 *EPA*	**L7.1 - The air blast overpressure level from blasting operations at the premises must not exceed 120dB (Lin Peak) at any time at any noise sensitive locations. Error margins associated with any monitoring equipment used to measure this are not to be taken into account in determining whether or not the limit has been exceeded.**
	Response: Noted. The overpressure from blasting (if required) will be included in the Noise Compliance Test Plan to achieve the required limits.
3.9.22 *EPA*	**L7.2 - The air blast overpressure level from blasting operations at the premises must not exceed 115dB (Lin Peak) at any noise sensitive locations for more than five per cent of the total number of blasts over each reporting period. Error margins associated with any monitoring equipment used to measure this are not to be taken into account in determining whether or not the limit has been exceeded.**
	Response: Noted. The overpressure from blasting (if required) will be included in the Noise Compliance Test Plan to achieve the required limits.
3.9.23 *EPA*	**L7.3 - Ground vibration peak particle velocity from the blasting operations at the premises must not exceed 10mm/sec at any time at any noise sensitive locations. Error margins associated with any monitoring equipment used to measure this are not to be taken into account in determining whether or not the limit has been exceeded.**
	Response: Noted. The vibration from blasting (if required) will be included in the Noise Compliance Test Plan to achieve the required limits.
3.9.24 *EPA*	**L7.4 - Ground vibration peak particle velocity from the blasting operations at the premises must not exceed 5mm/sec at any noise sensitive locations for more than five per cent of the total number of blasts over each reporting period. Error margins associated with any monitoring equipment used to measure this are not to be taken into account in determining whether or not the limit has been exceeded.**
	Response: Noted. The vibration from blasting (if required) will be included in the Noise Compliance Test Plan to achieve the required limits.

3.9.25 *EPA*	**L7.5 - Blasting is not permitted on public holidays.**
	Response: Noted.
3.9.26 *EPA*	**L7.6 - Blasting outside of the hours specified in L7.5 can only take place with the written approval of the EPA.**
	Response: Noted.
3.9.27 *EPA*	**L7.7 - The air blast overpressure and ground vibration levels in conditions L7.1 to L7.4 do not apply at noise sensitive locations that are owned by the licensee or subject to a private agreement, relating to air blast overpressure and ground vibration levels, between the licensee and land owner.**
	Response: Noted.

Chapter 10: Ecological Assessment

3.10.1 *OEH*	**The submission from the OEH addressed several concerns with the EIS regarding biodiversity, BioBanking and Cultural Heritage issues.**
	Response: The Biodiversity and Biobanking questions and issues raised that relate to Chapter 10 of the EIS, have been addressed in the 'Biodiversity Response to Submissions' by ERM Environmental Consultants and included in Appendix 2.
3.10.2 *BDLG*	**The EA states that the project will have an impact on the Golden Sun Moth; however it does not detail sufficient key avoidance, mitigation or offset measures for those impacts**
	Response: See Appendix 2, Annex F for consideration of GSM and related habitat.
3.10.3 *BDLG*	**The EA states that the proposed project will not have a significant impact on the Superb Parrot. We have doubts about** **the survey periods and survey effort used to reach this conclusion** **the lack of breeding and foraging habitat (constraint) mapping; and** **errors in the data used to model the collision risk.**
	Response: See Appendix 2, Annex C for consideration of Superb Parrot.
3.10.4 *BDLG*	**The EA does not appear to comply with the guidelines provided by the Australian Department of Environment and Energy (DoEE) for 'Matters of National Environmental Significance' and the processes set out in SEPP 44 for koalas:**

	Response: Noted. Matters of National Environmental Significance will be addressed in Commonwealth approval dealings.
3.10.5 *BDLG*	**Studies have been completed for Biobanking assessments, but the data are investigative and have not been approved.**
	Response: Please see Appendix 2, Annex G for status of works in relation to project Biobanking assessment.
3.10.6 *BDLG*	**Details of study area surveyed are inaccurate or inconsistent.**
	Response: This comment is unspecific, and not easily answered, however the Proponent disagrees with the statement.
3.10.7 *BDLG*	**There is a lack of figures to illustrate habitat type, habitat surveyed and disturbance from project components.**
	Response: Please see Appendix 2, Table 2.1 and 2.2 and all Annexes for data and figures relating to revised project layout and potential impact on key habitat areas.
3.10.8 *BDLG*	**Maps to show how important high constraint areas have been avoided are lacking, or to note where turbines have been sited close to high constraint areas (e.g. buffer to important habitat).**
	Response: See response to 213.10.7.
3.10.9 *BDLG*	**Data for several surveys are not supplied.**
	Response: Please contact the Proponent with details of specific surveys required. Please understand that not all data can be published due to the sheer volume of information.
3.10.10 *BDLG*	**Methodology is not described clearly or not sufficient detail for detecting species.**
	Response: See response to 213.10.9.

Chapter 11: Cultural Heritage Assessment

3.11.1 *OEH*	**OEH is concerned about the adequacy of the current assessment, some areas of the proposal were not surveyed as part of the assessment undertaken for the preparation of the ACHAR (pages 27 and 30). OEH advises it is concerned with proposals to undertake further heritage assessment after Project approval, due to the reduced capacity to consider all Aboriginal heritage values, including cumulative aspects, up**

	front and thereby allow for appropriate consideration of management measures prior to proposed impacts.
	Response: This matter has been discussed with Jackie Taylor, OEH, on 12/4/17, who indicates that given the unsurveyed areas are small in area and that the known and predicted archaeological sensitivity is well documented in the ACHAR, this matter is not significant. These regions are indicated in Appendix 7.
3.11.2 *OEH*	**While the ACHAR assesses the Project area to be generally low archaeological significance, based on the relevant predictive model of site distribution and the results of the field survey, additional archaeological assessment is recommended in any areas which are proposed for impacts that have not been surveyed during the current assessment (page 80).**
	Response: There are six small areas that are currently unsurveyed (due to slight changes in layout – see Appendix 7). These areas will be subject to a field inspection after Development Consent is issues and well before construction would occur. Jackie Taylor, OEH, agreed during the discussion on 12/4/17 that this would be appropriate.
3.11.3 *OEH*	**The ACHAR also states that significant Aboriginal objects can occur anywhere in the landscape and, accordingly, they need to be identified and impact mitigation strategies implemented prior to impacts (page 80).** **As such, OEH seeks further clarification about how any new Aboriginal site recordings, that may occur as a result of additional survey required, will be adequately considered and managed within the Project after Project Approval has been issued.**
	Response: Any new site recordings are unlikely to be of such significance that appropriate mitigation and management strategies cannot feasibly and easily be implemented. The majority of unsurveyed areas are for proposed access tracks where avoidance strategies could easily be implemented, if required. Otherwise, any sites of significance could be subject to salvage if impacts were unavoidable if this was warranted.
3.11.4 *OEH*	**OEH advises it cannot currently comment on the adequacy of the consultation process as copies of the Registered Aboriginal Party responses, received as part of comments on the draft ACHAR, have not been included in the copy of the ACHAR, dated May 2013, which was submitted with the EA.**
	Response: These have been provided to Jackie Taylor, OEH, via email 5/4/17, and are included in Appendix 7.
3.11.5 *OEH*	**OEH advises that no Aboriginal Site Recording Forms have been submitted to the Aboriginal Heritage Information Management System (AHIMS) for the fourteen sites recorded during the archaeological heritage assessment. This is a requirement under Section 89A of the *National Parks and Wildlife Act 1974* which is not turned off by revision to the *Environmental Planning and Assessment Act 1979.* Data from these site recordings also contributes to the body of knowledge about site distribution patterns associated with Aboriginal use of the Project area and assists with the assessment of**

	cumulative impacts to Aboriginal Cultural Heritage values within the region. Aboriginal Site Recording Forms should be forwarded to OEH as soon as possible.
	Response: These were provided to OEH in 2013.
3.11.6 *OEH*	**OEH is concerned that draft statements of commitments (page 307) do not adequately incorporate the Aboriginal cultural heritage recommendations listed within the ACHAR into the EA so as to formulate appropriate management and mitigation measures for the Aboriginal cultural heritage values recorded to date as well as the requirement to undertake additional archaeological assessment.**
	Response: Statement of Commitment #020 has been updated in the Amended DA to address this.
3.11.7 *OEH*	**An updated archaeological and assessment of Aboriginal cultural heritage values should also be considered for any plans that are required to be prepared as part of the CEMP – such as the sediment and erosion control plan, traffic management plan, etc, to ensure Aboriginal cultural heritage values are not inadvertently impacted during any necessary control works or access road maintenance works.**
	Response: This will be done.
3.11.8 *OEH*	**With regard to any further archaeological investigations that may be required as part of this Project, OEH advises that copies of any subsequent survey assessment or investigations reports, along with associated OEH Aboriginal site recording forms, must be submitted to the OHE for inclusion on the Aboriginal Heritage Information Management System (AHIMS) database.**
	Response: This will be done.

Chapter 12: Traffic and Transport Assessment

3.12.1 *Hilltops Council*	**Council has concerns that it is the heavy vehicles associated with the transport of gravel, sand, cement, etc during construction that account for a significant amount of damage to local road infrastructure. The oversized vehicles carrying the turbines and towers in fact do minimal damage in comparison. The local road infrastructure is adequate to cater for the existing low levels of low traffic; however the addition of construction traffic has the potential to significantly compromise road safety and infrastructure. It is for this reason that upgrades as defined by Council need to be upgraded prior to any construction works commencing, should the development receive consent.**
	Response: The concern raised by Council is duly noted. Further discussions were held between the Proponent and both Hilltops and Yass Valley Council on 26th April 2017, with

	subsequent consideration of each of Councils concerns captured in the Amended DA, Section 3.
3.12.2 *Hilltops Council*	**The local road network must be maintained by the development throughout the entire construction phase as local traffic will contribute only a minor portion of road deterioration impacts. The majority of the roads proposed for use are not of a suitable standard and will deteriorate quickly requiring regular and ongoing maintenance raising economic, safety, and public relations concerns for both Council and the applicant. Council believes it is most cost efficient to for upgrades to occur prior to construction rather than regular and ongoing repair during construction. Council suggests the following standards for road upgrades, subject to site constraints: sealed road standard = 8.5m wide formation with 7m wide 14/7mm double/double seal, 200mm thick road base pavement with drainage structures to be upgraded as required; unsealed road standard = minimum 6m wide with minimum gravel thickness of 100mm.**
	Response: Refer to response 3.12.1.
3.12.3 *Hilltops Council*	**Whilst the proponent has identified roads that are to be utilised as part of this proposal, this does not appear to take account of the roads to be utilised to win gravel material for both on site road construction and upgrading of Council's local road infrastructure.**
	Response: Refer to response 3.12.1.
3.12.4 *Hilltops Council*	**Whilst the proponent has identified roads that are to be utilised as part of this proposal, this does not appear to take account of the roads to be utilised to win gravel material for both on site road construction and upgrading of Council's local road infrastructure.**
	Response: Refer to response 3.12.1.
3.12.5 *Hilltops Council*	**It is necessary for the proponent to identify the source of the gravel in order that Council can be satisfied that the resource site has the appropriate approvals in place and is contributing to the maintenance and upgrading of the local road infrastructure network utilised by that resource site. Council has concerns that the proponent may source gravel from a site that is not appropriately approved and that additional negative impacts to the local road network may result for which the developer will not be required to make a contribution or undertake remediation works.**
	Response: Refer to response 3.12.1.
3.12.6 *Hilltops Council*	**It is anticipated that impacts on the road network during decommissioning will be similar, albeit reduced, to those during the construction phase of the project. The mitigation of these impacts needs to be resolved prior to construction.**
	Response: Refer to response 3.12.1.
3.12.7 *RMS*	**The documentation identifies the proposed haulage route for the components of the wind turbines and ancillary structures as being along the Hume Highway exiting the**

	highway at its intersection with Lachlan Valley Way and the western intersection with the Yass Valley Way. All routes attempt to bypass the built up urban areas within Yass and Boorowa. The submitted reports appear to define the haulage routes for the large components to the site from the road network, however the source of other products, such as the concrete and gravels has not been addressed.
	Response: The location and source of construction materials will be determined by the chosen contractor prior to and during construction with resultant road and traffic management measures to be developed within associated Traffic and Transport Management Plans. This was discussed with both Council's at the 26th April 2017 meeting, refer to response 3.12.1.
3.12.8 *RMS*	**Whilst the loads required for the transportation of the large components of the wind turbines and electrical transmission infrastructure present issues it is the frequency and volumes of the smaller construction vehicles such as cement trucks that can represent issues for the road network. These issues need to be finalised to allow for the proper assessment of the impacts on the road network. Therefore any consent for this development will require the preparation of an appropriate Traffic Management Plan for construction activities in consultation with the relevant road authorities (Roads and Maritime Services and Council).**
	Response: Noted and agreed. Refer to Section 3 of the Amended DA for a complete appreciation of revised road use and associated impacts.
3.12.9 *RMS*	**Of particular concern to Roads and Maritime is the location of construction compounds and concrete batching plants which will be reliant on access via the proposed access intersection with the Lachlan Valley Way within a 100km/h speed zone. Given the reliance on this access for a significant part of the development for an extended period of time and future maintenance works it is considered appropriate that the intersection with Lachlan Velley Way be located, designed and constructed so as to comply with the Austroads Guide to Road Design as amended by the supplements adopted by Roads and Maritime Services.**
	Response: Noted. Refer to Section 3 of the Amended DA.
3.12.10 *RMS*	**The submitted documentation identifies the primary transport routes for the construction related traffic however it is considered appropriate that further planning and consultation with Councils and the Roads and Maritime Services be undertaken to ensure the safe passage of vehicles entering and leaving the site.**
	Response: Noted. This will be addressed through the preparation of the TMP.
3.12.11 *RMS*	**The Traffic and Transport Assessment indicates that to ensure adequate road safety is maintained, a comprehensive Construction Traffic Management Plan (CTMP) would be prepared in conjunction with the chosen transport contractor and relevant road authorities. The construction management plan needs to be finalised prior to the commencement of any works for the project on the site.**

	Response: Noted, however the Proponent proposes road dilapidation surveys are undertaken prior to the relevant stage of works, rather than prior to construction. This is to ensure the impacts of construction are appropriately apportioned to the project.
3.12.12 *RMS*	**If any parts of the proposed transport routes are not suitable to cater for the project related traffic and transport, the proponent shall be required to improve such part of the road to safely cater for the length, size and volume of vehicles and their loads, and to protect the integrity of the road network. This may include the proponent constructing stopping bays (suitable hard stand areas) at distances and dimensions on the haulage route determined by the relevant road authority. These areas would be required along the proposed route to allow the following vehicle queue to pass.**
	Response: Noted. This will be addressed through the preparation of the TMP.
3.12.13 *RMS*	**The submitted reports identify that there will be a need for modification to some of the existing road intersections and the potential need for modification or removal of road structures or furniture to allow for the movement of the larger components. These issues will need to be authorised by the relevant road authority (Council or the Roads and Maritime Services). Further to this it is would be appropriate to require a road dilapidation report to be completed in consultation with the relevant road authorities prior to the commencement of construction and again after construction is complete.**
	Response: Noted, however with regard to the earlier response, the Proponent proposes that with regard to associated road dilapidation surveys that may form part of a Traffic Management Plan, that these are undertaken prior to the relevant stage of works, rather than prior to construction. This is to ensure the impacts of construction are appropriately apportioned to the project.
3.12.14 *RMS*	**Roads and Maritime emphasises the need, in the design and construction of the development, to minimise the impacts on the existing road network and maintain the safety, efficiency and standard of maintenance along the existing road network and to minimise the distraction to the road user. To achieve this, the logistics associated with the transportation of materials and equipment for the development and access to the site from the Classified Road network is of high importance.**
	Response: Noted. This will be addressed through the preparation of the TMP.
3.12.15 *RMS*	**A Construction Traffic Management Plan shall be prepared in consultation with the relevant road authorities (Council and Roads and Maritime Services) to outline measures to manage traffic related issues associated with delivery and construction of the turbines or ancillary structures, any construction or excavated materials, any machinery and personnel involved in the construction or decommissioning process. The plan shall detail the potential impacts associated with the development, the measures to be implemented, and the procedures to monitor and ensure compliance. This plan shall address, but not necessarily be limited to;**

	• **Details of traffic routes to be used by heavy vehicles associated with the project, and any associated impacts and any required changes to the existing road environment along the proposed routes such as intersection upgrade, road widening, temporary street closures, removal and replacement of road infrastructure, etc required in order for the necessary materials and machinery to be delivered to site.** • **Details of measures to be employed to ensure safety of road users and minimise potential conflict with haulage vehicles such as necessary route or time restrictions for oversized vehicles, use of traffic diversions, changes to speed zones, potential extended delay periods for motorists due to haulage vehicles etc,** • **Proposed hours for construction activities, as night time construction presents additional traffic related issues to be considered.** • **The management and coordination of the movement of construction and workers vehicles to the site and to limit disruption to other motorists, emergency vehicles and school bus timetables,** • **Scheduling of heavy vehicles movement to deny the need for access through school zones during school zone operating times** • **Scheduling of haulage vehicle movement to minimise convoy length or platoons,** • **loads, weights and lengths of haulage and construction related vehicles and the number of movements of such vehicles,** • **procedures for informing the public where any road access will be restricted as a result of the project,** • **Details of measures to be employed to ensure traffic volumes, acoustic and amenity impacts along the haulage routes is minimised,** • **the provision of hard stand areas for parking of transport vehicles in the case that unsealed sections of road are closed due to adverse weather or to allow for loads to be disassembled for transportation along the remainder of the route. This is not permitted in heavy vehicle rest areas, and** • **any proposed precautionary measures such as signage to warn road users such as motorists about the construction activities for the project.**
	Response: Noted. These aspects will be addressed through the preparation of the TMP.
3.12.16 *RMS*	**The preparation of the detailed traffic and transport planning for the project and the Construction Traffic Management Plan is required to involve the appointed transport contractor and is to be undertaking in conjunction with the Roads and Maritime Services and the Councils to determine the final details of haulage, including exact transport routes, Road-specific mitigation measures, haulage timing.**
	Response: Noted. Please see Section 3 of the Amended DA for more detail.
3.12.17 *RMS*	**An intersection of any proposed access road with the Lachlan Valley Way shall comply with the following:** • **The intersection of the Lachlan Valley Way and proposed access road is to be located and the roadside maintained so as to provide the required Safe**

Intersection Sight Distance (SISD) in either direction in accordance with the Austroads Publications as amended by the Roads and Maritime Services supplements for the posted speed limit. Compliance with this requirement is to be certified by an appropriately qualified person prior to construction of the vehicular access.

- **As a minimum the intersection of the Lachlan Valley Way and proposed access road shall be constructed to the standard of a public road intersection with a Basic Right Turn (BAR) and Basic Left Turn (BAL) intersection treatment in accordance with the Austroads Guide to Road Design for a B-Double route as amended by the supplements adopted by Roads and Maritime Services for the prevailing speed zone on the Lachlan Valley Way.**
- **The intersection of any proposed access road with the Lachlan Valley Way shall be designed and constructed so that any vehicles entering or exiting the development are not required to cross to the opposing travel lane of the highway in order to perform the access or egress manoeuvre to/from the proposed access road. As a minimum the proposed access road is to be line marked to separate the swept path of vehicles entering and exiting the development. Associated directional marking and signage is to be installed and maintained in accordance with Australian Standards.**
- **Any proposed access road shall be bitumen sealed for a minimum length of 50 metres from the carriageway of the Lachlan Valley Way. A management plan to provide measures to suppress dust generation from the development site and the access road shall be prepared and implemented to the satisfaction of Council and Roads and Maritime Services.**
- **The intersection of a proposed access road with the Lachlan Valley Way is to be designed, constructed and maintained to prevent water from proceeding onto, or ponding within, the carriageway of the highway. If a culvert is be installed and is to be located within the clear zone of the Lachlan Valley Way for the prevailing speed zone it is to be constructed with a traversable type headwall.**
- **The pavement standard for the works to the Lachlan Valley Way shall be appropriately designed for the through traffic and the proposed turning traffic to the satisfaction of Roads and Maritime Services,**
- **Appropriate signage and line marking shall be installed and maintained for all road works in accordance with relevant Australian Standards and the requirements of Roads and Maritime Services.**
- **As the Lachlan Valley Way is part of the State Road network the developer is required to enter into a Works Authorisation Deed (WAD) with Roads and Maritime Services before finalising the design or undertaking any construction work within or connecting to the road reserve. The applicant is to contact the Manager Land Use for the South West Region on Ph. 02 6923 6611 for further detail.**
- **The design and construction of the works, including pavement works, within the carriageway of the Lachlan Valley Way shall be in accordance with the requirements of Roads and Maritime Services. The developer will be required to**

	submit detailed design plans and all relevant additional information including cost estimates and pavement design details for the works, as may be required in the Works Authorisation Deed documentation, for each specific change to the state road network for assessment and approval by Roads and Maritime Services. The developer is encouraged to submit concept plans of the proposed works for concurrence by Roads and Maritime Services prior to undertaking the detailed design phase.
	Response: Noted. Refer to Section 3 of the Amended DA.
3.12.18 *RMS*	**Conditions relevant to the construction of the intersection and access road are to be completed prior to issue of any Construction Certificate for any works associated with the proposed windfarm. This is to ensure safe access arrangements are provided for the construction activities on the development site.**
	Response: Noted, however the Proponent proposes that consideration is given to the relevant stage of construction in determining what 'works' can be undertaken. For instance, a requirement to have an intersection upgraded to accommodate wind turbine equipment prior to construction commencing is inefficient in terms of the overall construction program. Wind turbine deliveries typically occur at a period of c. six months or greater post commencement of construction, and therefore greater program efficiency (i.e. reduced construction program period) can be gained by allowing such activities to be undertaken in parallel with project construction. Refer to Section 3 of the Amended DA for further clarification.
3.12.19 *RMS*	**The Proponent must engage an appropriately qualified person to prepare a Road Dilapidation Report for all road routes to be used during the construction (and decommissioning) activities, in consultation with the relevant road authority (Roads and Maritime Services and Council). This report is to address all road related infrastructure. Reports must be prepared prior commencement of, and after completion of, construction (and decommissioning). Any damage resulting from the construction (or decommissioning) traffic, except that resulting from normal wear and tear, must be repaired at the Proponent's cost. Such work shall be undertaken at a time as agreed upon between the Proponent and relevant road authorities.**
	Response: Noted, however again the Proponent proposes consideration of timing with regard to road dilapidation surveys, i.e. they are undertaken prior to the relevant stage of works during construction (wind turbine component delivery, for example) rather than prior to commencement of construction.
3.12.20 *RMS*	**The Proponent shall commit to restore all relevant roads to a state, described in the original Road Dilapidation Report where the dilapidation is attributable to construction traffic. The cost of any restorative work described in the subsequent Report or recommended by the relevant road authorities after review of the subsequent Report, shall be funded by the Proponent. The applicant is accountable for this process, rather**

	than the proposed haulage contractor. Such work shall be undertaken at a time as agreed to by the relevant road authorities.
	Response: Noted.
3.12.21 *RMS*	**A full and independent risk analysis and inspection of the transport route will be required to be undertaken by an appropriately qualified person and a copy provided to the relevant road authority. Further analysis and reporting to assess possible damage to, and repair of the route will be required on a regular basis.**
	Response: Noted.
3.12.22 *RMS*	**Prior to the commencement of construction, the Proponent must undertake all works to upgrade any road, its associated road reserve and any public infrastructure in that road reserve, to a standard suitable for use by heavy vehicles to meet any reasonable requirements that may be specified by the relevant roads authority. The design and specifications, and construction, of these works must be completed and certified by an appropriately qualified person to be to a standard to accommodate the traffic generating requirements of the project. On Classified Roads the geometric road design and pavement design must be to the satisfaction of the Roads and Maritime Services.**
	Response: The Proponent proposes that consideration is given to construction works which can occur in parallel to road upgrades. Flexibility in this regard drives efficacy in the construction program, which in turn reduces the impacts of the project to local residents. The Proponent has engaged with Hilltops and Yass Valley Councils with regard to the types of vehicle movements and associated onsite activities which the Proponent has requested to be undertaken in parallel with road upgrades. Refer to Section 3 of the Amended DA for further clarification.
3.12.23 *RMS*	**Any disturbances to the road infrastructure within the road reserve of a classified road are to be reinstated to pre-existing or better condition. This includes any impact on the road pavement, culverts, bridges, causeways, stock grids, signage, drainages structures and traffic islands.**
	Response: Noted.
3.12.24 *RMS*	**No external lighting at night of any infrastructure associated with the project including wind turbine generators that may cause distraction to road users is permitted other than low intensity security lighting.**
	Response: Noted, except for lighting required under appropriate Australian Standards, construction or operational work practices or those required by aviation authorities.
3.12.25 *RMS*	**Any specific details for construction of, access to and signage associated for any proposed viewing areas along the classified road network are to be developed to the satisfaction of the Roads and Maritime Services.**
	Response: Noted.

3.12.26 *RMS*	**All works associated with the project shall be at no cost to the Roads and Maritime Services or the relevant road authority.**
	Response: Noted.
3.12.27 *RMS*	**The conditions of development consent do not guarantee consent from Roads and Maritime Services to specific road work, traffic control facilities and other structures and works on the classified road network. The developer is required to obtain approval under Section 138 from Council with concurrence from Roads and Maritime Services for any works within the road reserve of a Classified Road prior to the commencement of any work.**
	Response: Noted.
3.12.28 *RMS*	**Prior to the commencement of any work within the classified road reserve, the Proponent may require a Road Occupancy Licence from Roads and Maritime Services. The application must be accompanied by a Traffic Management Plan (TMP) prepared by a person who is certified to prepare Traffic Control Plans.**
	Response: Noted.
3.12.29 *RMS*	**All arrangements for the traffic control on classified roads are to be in accordance with the publication *Traffic Control at Work Sites*. Where any works are required on or adjacent to a public road a Traffic Control Plan providing details of all warning signs, lights, barriers, etc. to be provided and maintained in accordance with AS 1742 "Manual of Uniform Traffic control devices" and the RMS's Guideline *Traffic Control at Work Sites.***
	Response: Noted.
3.12.30 *RMS*	**A formal agreement in the form of a Works Authorisation Deed (WAD) may be required between the developer and Roads and Maritime Services should the developer wish to undertake "private financing and construction" of improvement works on Classified Roads such as the Hume highway or Lachlan Valley Way. This agreement is necessary for works in which the Roads and Maritime Services has a statutory interest.**
	Response: Noted.
3.12.31 *RMS*	**Any work undertaken on the Hume Highway or Lachlan Valley Way must be undertaken by a qualified contractor that has been approved by the Roads and Maritime Services. A list of pre-qualified contractors may be found on the Roads and Maritime Services's website, currently located at:** **www.rta.nsw.gov.au/doingbusinesswithus/tenders/prequalifiedcontractors.html**
	Response: Noted.

3.12.32 *RMS*	**The requirements outlined in the Publication "Operating Conditions: Specific permits for oversize and over mass vehicles and loads" are to be followed. This publication is available online at:** **http://www.rta.nsw.gov.au/heavyvehicles/oversizeovermass.html.** **Where required, the applicant is required to obtain permits for any oversized and over-mass load from the Special Permits Unit.**
	Response: Noted.
3.12.33 *RMS*	**Under the provisions of the Environmental Panning & Assessment Act, the Consent Authority, is responsible to consider any likely impacts on the natural or built environment. Depending on the level of environmental assessment undertaken to date and nature of the works, it may be necessary for the developer to undertake further environmental assessment for any ancillary road works required as a condition on the development.**
	Response: Noted.
3.12.34 *Yass Valley Council*	**From experience with other wind farms in the region significant road damage occurs with heavy vehicles associated with gravel, sand, cement and water haulage. The oversized vehicles account for little damage. While the existing conditions of local roads is suitable for existing low level local traffic the construction traffic can compromise road safety for existing users. Local roads should therefore be upgraded (including alignment, width, pavement, drainage, culverts and bridges) to a suitable standard prior to any on-site construction if the proposal is approved.**
	Response: The concern raised by Council is duly noted. Further discussions were held between the Proponent and both Hilltops and Yass Valley Council on 26th April 2017, with subsequent consideration of each of Councils concerns captured in the Amended DA, Section 3.
3.12.35 *Yass Valley Council*	**The local roads should be maintained by the company over the entire construction phase – existing local traffic has a negligible impact on the roads in comparison to all construction traffic (particularly heavy vehicles).**
	Response: Refer to response 3.12.1.
3.12.36 *Ryde-Hunters Hill FFPS*	**Local roads will be improved by the development as is consistent with other wind farm developments**
	Response: Noted.

Chapter 13: Aviation Assessment

3.13.1 *AsA*	**Airservices has based its assessment on the information provided which includes the Lambert & Rehbein Report dated 6 September 2016 and the Bango Wind Farm Turbine Coordinates excel spreadsheet. In both these document, the tables and spreadsheet contained the maximum wind turbine tip height to be 944m AHD, rather than the 952m AHD mentioned in the report's executive summary. Therefore please consider this assessment to be based on the 944m AHD height for our Communications/Navigation/Surveillance (CNS) Facilities engineering assessment.**
	Response: Noted, notice of assessment included in Appendix 6.
3.13.2 *AsA*	**With respect to procedures designed by Airservices in accordance with ICAO PANS-OPS and Document 9905, at a maximum tip height of 952m (3124ft) AHD, the wind farm will not affect any sector or circling altitude, nor any instrument approach or departure procedure at Young Airport. The wind farm will also not affect any nearby air routes.**
	Response: Noted.
3.13.3 *AsA*	**Note that procedures not designed by Airservices at Young Airport were not considered in this assessment.**
	Response: Noted, and in accordance with standard consent conditions, if the Project is approved due notice of final to-be-built and final as-built coordinates will be provided to locally licenced airport operators.
3.13.4 *AsA*	**Based on the information contained in the spreadsheet provided to Airservices, the Bango Wind Farm to a maximum wind turbine tip height of 944m AHD will not adversely impact the performance of Airservices Precision/Non-Precision Nav Aids, HF/VHF Comms, A-SMGCS, Radar, PRM, ADS-B, WAM or Satellite/Links.**
	Response: Noted, updated assessment included in Appendix 6.
3.13.5 *CASA*	**Based on the information provided, CASA recommends that the project should be lit at night consistent with the provisions of the National Airports Safeguarding Framework Guideline D: Managing the Risk of Wind Turbine Farms as Physical Obstacles to Air Navigation.**
	Response: Noted. Upon determining the final Project layout to be built, further consideration of the need for night lighting will be undertaken in consultation with CASA.
3.13.6 *Defence*	**Defence has seen an earlier iteration of this proposal and has previously provided comments to the proponent. Defence is pleased that its comments have been**

	acknowledged in the EIS, and overall, the Department of defence has no concerns with the proposal at this time.
	Response: Noted.
3.13.7 *Defence*	**As previously advised, the proposed structures will meet the definition of tall structure. Defence therefore requests that the applicant provide AsA "as constructed" details.**
	Response: This has been done and the resultant letter of assessment can be found in Appendix 6.

Chapter 14: Communications Assessment

No responses received.

Chapter 15: Electromagnetic Fields

No responses received.

Chapter 16: Fire and Bushfire Assessment

3.16.1 *BDLG*	**The general conclusion drawn by the BDLG at that time from the assessment of the Bango Turbine Development EIS is that it is grossly inadequate in identifying the impact and risk to both people and the environment, in relation to flora and fauna, human health and real estate prices, and imposition on agricultural and firefighting practises.**
	Response: The comments from Boorowa District Landscape Guardians (BDLG) are noted, however the Proponent disagrees with this conclusion. Nonetheless, a number of modifications to the project have been made to address the residual impacts identified in the EIS, as outlined in the Amended DA.

Chapter 17: Water Assessment

3.17.1 *Hilltops Council*	**Water consumption during construction and the source of that water draw are a concern for Council. The proposal will require significant water resources during the construction phase and the source of that water has the potential for consequential impacts upon the water availability for agricultural and potable water supplies.**

	Response: The Proponent will work closely with Council in determining suitable water supplies for the project. This goes to not only the sources and volume of the water to be used by its contractors, but also the transport of water to the Project, and the potential resultant impacts to Council roads.
3.17.2 *WaterNSW*	**WaterNSW has reviewed the information provided and noted that the development site is located outside of the Sydney declared catchment and is far removed from any WaterNSW infrastructure. As such, WaterNSW has no specific comments to make on this Environmental Impact Statement.**
	Response: Noted.
3.17.3 *DPI*	**The proponent should confirm the source and extraction point of water to meet the demands of the project and undertake an assessment of the impact of taking that water. Where entitlement is required the proponent should ensure there is sufficient market depth and that a trade of entitlement can be consistent with the rules of the relevant Water Sharing Plan.**
	Response: The source and extraction point of water will be determined prior to the commencement of works in a manner consistent with contemporary rules and practices.
3.17.4 *DPI*	**The proponent should consult further with DPI Water to ensure relevant licensing requirements are met.**
	Response: Noted.
3.17.5 *DPI*	**The proponent should seek confirmation from WaterNSW that Lake Burrinjuck is an appropriate water source for the project. The proponent should also seek confirmation of available water from relevant Council authorities where their water is to be utilised.**
	Response: Noted.
3.17.6 *DPI*	**The following Conditions of Consent should be included in any determination for the project:** • **A Construction Environmental Management Plan should be developed in consultation with DPI Water prior to commencement of construction.** • **The design of waterway crossings for access roads and cable installations, and any associated instream works should be prepared in accordance with DPI Water's Guidelines for Controlled Activities on Waterfront Land (2012).** • **The proponent must obtain relevant licensing under the Water Management Act 2000 before commencing any works which intercept or extract groundwater or surface water.**

	• **If rock anchoring is selected for wind tower foundations the proponent should undertake a groundwater assessment in consultation with DPI Water. The assessment should assess the risk of impact on existing licensed groundwater users and groundwater dependent ecosystems, and provide suitable mitigation measures.**
	Response: Noted.
3.17.7 *EPA*	**The proponent should note that an Environment Protection Licence is not required for concrete batching plants, though it is correct that "crushing, grinding or separating" of more than 150 tonnes of rock per day does require licensing. In any event, and as stated in the cover letter to this submission, large scale wind farms that have a capacity for generating more than 30 megawatts of electricity and/or approved as a major project will require a Licence from the EPA for both the construction and operational phases. The activity of "crushing, grinding or separating" should be listed on any application for a Licence made by the proponent, as it does not require a separate licence.**
	Response: Noted.
3.17.8 *Ryde-Hunters Hill FFPS*	**Local waterways and creeks will remain untouched and the installation of wind turbines only cause minimal disturbance to natural vegetation.**
	Response: Noted. Potential impacts to waterways and creeks will be managed through an appropriate construction management plan.
3.17.9 *Ryde-Gladesville CCAG*	**Importantly as well, water in the local rivers and creeks will remain untouched as the wind turbines do not require water in their operation unlike coal mines which require vast amounts of water.**
	Response: Noted.

Chapter 18: General Environmental Assessment

3.18.1 *EPA*	**Air quality in and around the project area is expected to be good because of the rural setting with no industrial facilities or point source emissions of air pollutants. The main expected air quality issue for the project is dust emissions. The ridge system on which the wind farm is proposed will be exposed to high wind energy.**
	Response: Appropriate dust suppression measures and activities will be developed in coordination with the selected construction and operation contractors.

3.18.2 *EPA*	**The traffic generation for an expected 18-24 month construction period for the project is significant, and potential dust impacts along the transport route utilising unsealed roads and newly constructed access tracks has the potential to increase dust deposition at nearby receivers and is an environmental risk.**
	Response: Please see response 3.18.1.
3.18.3 *EPA*	**The EPA notes that an Air Quality Assessment has not been undertaken for the proposed project. Given the extent of unsealed access roads and tracks, and the potential for adverse weather conditions (e.g. high winds and low rainfall) during the construction period, the EPA advises that the proponent should ensure sufficient water is allocated for dust suppression during the construction phase.**
	Response: Noted. This matter will be addressed in the Environmental Management Strategy for the construction program.
3.18.4 *EPA*	**The EPA recommends the proponent prepare an Air Quality and Management Plan (AQMP) to be incorporated into the Construction Environment Management Plan (CEMP) to manage dust impacts during the construction period, as per the Statement of Commitments (064 – 068).** **The AQMP should (at a minimum):** • **Be prepared and implemented prior to the commencement of construction activities;** • **Ensure that the proponent maintains a water cart onsite at all times for the purposes of dust suppression on all unsealed roads and exposed surfaces;** • **Provide that all stockpiles be maintained in a manner that prevents the generation of dust.**
	Response: Appropriate dust suppression measures and activities will be developed in coordination with the selected construction and operation contractors.
3.18.5 *EPA*	**It is noted that the Statement of Commitments contained in the EIS includes a commitment to preparing a CEMP which will address the construction phase environmental impacts of the proposal. The EPA considers this an important component, and it should provide details of drainage works and associated infrastructure to divert 'clean water' around the construction site(s) and collect and treat 'dirty water' from the construction areas of the project.**
	Response: Noted.
3.18.6 *EPA*	**Any proposed storages and settling/containment ponds should be designed with available capacity to prevent uncontrolled discharges to surface waters and be developed in accordance with the principles and management practices consistent with the 'Blue Book' – Managing Urban Stormwater: Soils and Construction Vol.1 (Landcom 2004).**

	Response: Noted.
3.18.7 *EPA*	**The EPA recommends the proponent prepare a Soil and Water Management Plan to be incorporated into the CEMP to manage soil and water impacts as per the Statement of Commitments (069 and 070).**
	Response: Appropriate soil and erosion management measures will be developed in coordination with the selected construction and operation contractors.
3.18.8 *EPA*	**The EIS provides limited detail in relation to waste management and disposal in Chapter 18.4, but includes reference to a proposed sub-plan of the CEMP which will outline procedures to be followed. Chapter 18.6 also mentions that soil contamination, hazardous material and waste management will be addressed in the CEMP.** **The EPA recommends the proponent develop a waste sub-plan in the Waste section of the Statement of Commitments (072 - 076) to address the above.**
	Response: Appropriate waste management measures will be developed in coordination with the selected construction and operation contractors.
3.18.9 *Hilltops Council*	**Waste generation during construction, operation and decommissioning has the potential to negatively impact upon Council's waste facility and ability to manage such waste is limited. Council's preference is that the developer funnels all non-recyclable waste through the regional waste facility, rather than Council's local facility.**
	Response: Noted. The Proponent will work with Council to determine appropriate use of local waste facilities.
3.18.10 *Hilltops Council*	**Council would like assurances that conditions and checks are in place to ensure that when the life of the turbines are exhausted there is sufficient funds and authority for the towers and turbines to be removed, the area rehabilitated and that the community of the day does not bear the cost of such removal.**
	Response: Noted. The Proponents approach to funding decommissioning is outlined in Chapter 18 of the EIS.

Chapter 19: Socio-Economic Assessment

3.19.1 *Hilltops Council*	**Council believes that the developer should enter into a Voluntary Planning Agreement with Council, similar to that of the Rye Park Wind Farm. The Planning Agreement should be negotiated equitably across the three local government areas of Hilltops, Yass Valley and Upper Lachlan. The proponent is proposing a contribution of $2,500 however given that the Rye Park Wind Farm has this amount with a CPI annual increase it is not unreasonable for the imposition of a**

	figure commensurate with that proposed by Yass Valley Council of $2,825 per turbine with a CPI Annual increase provision.
	Response: Noted, and based on the current transparent working relationship with Council, the Proponent has no objection to this.
3.19.2 *DI-DRE*	**The 326 megawatt (MW) project has a capital investment value of $326 million and is expected to inject considerable funds into the local community of Yass and support up to 120 jobs during construction and a further 12 during operation. CWP Renewables has committed to a Community Enhancement Fund of $2,500 per turbine per year and has also established a shared benefits scheme with near-neighbours.**
	Response: Noted, refer to response 3.19.1.
3.19.3 *Yass Council*	**The proponents are proposing a Community Enhancement Fund of $2,500 per turbine with the allocation of funds to be determined by a committee.** **Council's Community Enhancement Fund Policy provides for $2,825 per turbine with the contribution rate increasing if the turbine generating capacity increases. The policy requires the fund to be administered by Council through a s355 Committee.** **If approved the proposal should be adjusted to provide for a Community Enhancement Fund in line with Council policy.**
	Response: Noted, and based on the current transparent working relationship with Council, the Proponent has no objection to this.
3.19.4 *Yass Council*	**A Community Consultative Committee has been established for the Bango Wind Farm. The Committee provides a mechanism to oversee the community consultation for:** **The development of the proposal (including key issues for assessment)** **The operational performance of the project (should it be approved)** **Membership of the Committee comprises of:** • **Independent Chair** • **3 to 5 community representatives** • **One Council representative** • **2 or 3 company representatives** **Council was previously represented by former Councillor Ann Daniel. A replacement representative is now required and consideration should also be given to nominating an alternate delegate.**
	Response: Noted.
3.19.5	**The EIS appears to comprehensively address any potential public health issues, particularly in regard to noise, vibration, shadow flicker and blade glint. The**

NSW Health	**proposed monitoring, controls and mitigation measures for affected properties within 1 km of the turbines (involved landholders), and affected properties within 2km of the turbines (non-involved landholders) appear to be adequate.**
	Response: Noted.
3.19.6 *NSW Health*	**Provided the proposed development complies with the recommendations of the Environmental Impact Statement, including the development of and adherence to comprehensive Construction Environmental Management Plans, and Operational Environmental Plans, and meets the requirements of the Draft NSW Planning Guidelines: Wind Farms, this office would raise no objection to the proposed development.**
	Response: Noted.
3.19.7 *BDLG*	**The general conclusion drawn by the BDLG at that time from the assessment of the Bango Turbine Development EIS is that it is grossly inadequate in identifying the impact and risk to both people and the environment, in relation to flora and fauna, human health and real estate prices, and imposition on agricultural and firefighting practises**
	Response: The comments from BDLG are noted. Refer to 3.16.1.
3.19.8 *Ryde-Hunters Hill FFPS*	**This project has additional benefits for local farmers and their families:** **It will provide an injection of money into the local community around Boorowa, Yass and Rye Park;** **Local farmers hosting the wind turbines will receive regular payments which will help them manage drought times and commodity price fluctuations; …** **It will create a range of job opportunities for residents in the surrounding area…**
	Response: Noted.
3.19.9 *Doctors for the Environment*	**That the small number of people living near wind turbines that have suffered from ill health should be taken seriously. However, based on current medical literature there is no credible evidence to suggest that wind farms cause significant harm to human health.**
	Response: Noted.
3.19.10 *Doctors for the Environment*	**In order to minimise the impact of human-driven climate change on the vital, interdependent ecosystems of our planet, and the confirmed health problems associated with coal fired power stations, the development of new wind farms, with appropriate community consultation, such as Bango is a matter of urgency.**
	Response: Noted.

3.19.11 *Ryde-Gladesville* *CCAG*	**The wind farm will boost the local economy through jobs associated with the construction and maintenance of the turbines as well as people who live in the area. It has the capacity to inject millions of dollars into the local economy for decades.**
	Response: Noted.

Chapter 20: Residence Assessment Summary

No responses received.

Chapter 21: Statement of Commitments

3.21.1 *EPA*	**Statement of Commitment 013 refers to the "control of perennial weed grasses within the disturbance zone for three to five years after construction". Chapter 3.8.9 also refers to "chemical clearing methods" to manage regrowth and existing vegetation during construction and operations.** **As the use of pesticides is therefore likely, the EPA suggests the addition of a Statement of Commitment to the effect:** **All pesticide applications must be carried out in accordance with the requirements of the NSW Pesticides Act 1999 and the Pesticides Regulation 2009.**
	Response: Noted, and will be subject to liaison with affected landowners.

Refer to the Amended DA for revised Statement of Commitments.

Chapter 22: Conclusion

No responses received.

This page is intentionally left blank.

4. PUBLIC SUBMISSION RESPONSE

Chapter 1: Executive Summary

No responses received.

Chapter 2: Introduction

No responses received.

Chapter 3: Project Description

4.3.1 **I object to the `Bango' Windfarm on the grounds that it is a misnomer that can be seen as a ploy to fool the people who will be most affected by the windfarm into believing that they are not even close to the area they will be built in and, as such, will reduce the number of people who will submit objections. The EA describes the project as being "20 km north of Yass, 7 km south-east of Boorowa, 4 km south-west of Rye Park". Even if the project was originally going to start near Bango, which has a very low number of residents, it still should have been called the Boorowa Wind Farm to demonstrate transparency of purpose.**

Response: The Bango wind farm site was first identified by the proponent in 2009. At the time, the area of interest included the locality of Bango, which is to the south of the current project area, and the proposed wind farm project was given the name "Bango". Since that time, and as a result of further investigations, the project area has changed and no longer includes the locality of Bango – primarily due to the smaller lot sizes and subsequently higher concentration of dwellings in the area. The name "Bango" was kept for consistency over the life of the project.

4.3.2 **Description of site ground conditions.**

"The shale type escarpment designated for the construction is questionable."

***"*It is stated the proposed sites for turbine towers are "Basa*lt' based – this is incorrect!* This area is mainly shale, if the Tower contractors start making trails along tops of the hills, there will be massive erosion with the hilltops being washed away by rain."**

Response: Detailed geological surveys have not yet been conducted. The design of the wind turbine foundations will be fit for purpose, but cannot be specified until these surveys have been done. Foundation options are described in section 3.3.5 of the EIS, but final designs will be based upon the results of geotechnical surveys of each foundation site prior to construction.

4.3.3 **Concern about the capacity of the 132 kV overhead transmission lines connecting the wind farm to the electricity grid.**

Response: There are 2 x 123kV overhead power lines crossing the Bango wind farm site. One of those power lines currently has available capacity for approximately 140 MW. The other power line has less capacity. There is potential to upgrade this second line to accommodate

the entire wind farm. If this is done, the cost will be borne by the developer in consultation with TransGrid.

4.3.4 Concerns about network reliability

"Will there be sufficient local network stability to avoid circumstances like that which occurred in South Australia recently and which apparently led to sustained major blackouts?"

Response: The system black in South Australia in September 2016 was investigated by the Australian Energy Market Operator (AEMO) who identified the cause as a combination of extreme weather events, damaged transmission infrastructure, network frequency fluctuations and generator fault ride-through settings. A review of fault ride-through settings has subsequently been undertaken and the wind farm will adopt the updated standards required by the AEMO to ensure grid stability.

The EIS contains commentary on the effect of the Bango wind farm on local network stability in section 3.3.12 of the EIS. It states, *'The SS [switching station] could potentially increase network reliability and security of supply in the region and therefore TransGrid and / or Essential Energy may wish to retain each SS beyond the operational life of the Project.'*

4.3.5 "Neither the Introduction or the Project Description mentions the height of the proposed turbines. Is this a deliberate ploy to make sure we do not know how large these structures will be?"

Response: The maximum total tip height of the proposed turbine blades, 200 m AGL, is described in Chapter Three – 'Project Description', section 3.3.3 Blade Tip on page 40 of the EIS. It is described again in 3.9 Summary on page 70 of the same document. There are subsequent descriptions of the maximum blade tip height throughout the document.

Chapter 4: Project Justification

4.4.1 Support for increased renewable energy production at the state and national level.

"For many years it has been reported that our reliance on fossil fuels is too great and a newer way of generating energy needs to be in place. It is time for a shift in our reliance. I believe the shift to renewable energy is the answer for ours and future generations."

"This project supports the recently released NSW Government paper on the path way to change our energy mix to a more sustainable one and one that in the longer term is cheaper than burning fossil fuels."

"I am a farmer from Rye Park and a strong supporter of wind farms for Australia's future for renewable energy. The Bango wind farm will join others across the Southern Tablelands region to secure the region as a very important part of NSW's clean energy industry…"

"The Bango wind farm will join others across the Southern Tablelands region to secure the region as a very important part of NSW's clean energy industry."

"I live in NSW and I can't wait to see the transition to 100% renewable energy in NSW."

"At a national level Bango wind farm will assist the National goals of transitioning the country to a renewable energy economy"
"I KNOW THIS AREA. I APPROVE OF A WINDFARM HERE AND CONSIDER ALL WIND FARMS AND SIMILAR RENEWABLE EFFORTS TO BE BOTH URGENT AND ESSENTAIL FOR SURVIVAL."

"Wind Energy is a big part of the Renewable mix and as such all wind farm projects should be approved without fail."

"I am a huge supporter of clean energy and look forward to the day when all our energy needs are met by sun, wind, geothermal and other natural sources."
"Bango wind farm will contribute about 3% of the renewable energy generation required to meet Australia's renewable energy target (RET)."

Response: The actual amount of renewable energy produced the wind farm cannot be known until after it has been produced. It cannot be accurately predicted until the wind turbine model and size has been decided. Due to the reduced turbine layout, Bango wind farm will produce less renewable energy than the layout proposed in the EIS, but it is still likely to meet approximately 2.5% of Australia's Renewable Energy Target.

4.4.2 Concern about the finite nature of coal resources for energy.
"Coal is a finite resource, it's better we think about the next step now, rather than in the future, when we will inevitably be forced to turn to other means."

Response: Noted.

4.4.3 Appropriate land use
"… I can see no other potential developments that would allow this sort of economic benefit to the area, whilst allowing current agricultural operations to continue."
"The strong and consistent wind in the region where the Bango Wind Farm is proposed makes this wind farm an efficient use of agricultural land."

Response: Noted.

4.4.4 Concern about Climate Change

"For farming to remain viable long term we need to contribute to keeping the planet at no more than 1.5 degrees C increase and for Australia to do it's bit we need to increase our renewable levels.

People directly benefiting from this proposed project that I have spoken to are progressive farmers and realise that climatic change is happening and are keen to do their bit to assist the global community deal with the issue. "

"I have been a GP for the past 16 years. My interest in clean energy is therefore informed by my concerns about the effect climate change - and the associated extreme weather events caused - will have on my patients. As the mother of a five year old, the expected flow on effects caused by climate change over his lifetime cause me great distress."

"My biggest concern is global warming and the future of my children and grandchildren. The climate is changing and if even some of the extreme events occur that have been predicted it will be a scary place. We need to reduce and hopefully soon stop emitting

carbon dioxide into our air to be able to slow and stop global warming. By replacing coal power with wind is a good place to start, so we should be building as many wind power installations as possible."

"… wind energy makes a positive contribution to reducing greenhouse gas emissions"

Response: Noted.

4.4.5 Wind in comparison to solar energy production.

"Solar should be the alternate clean energy source considered due to its very low impact on visual, health, wildlife, fire fighting."

"A solar farm would need to cover about 700 ha's with solar panels to produce the same amount of energy as this project. By contrast, this project impacts less than 100 ha's of the total project site."

"Support should be for greater innovation and, if anything, in solar energy where there is significantly less impact on the environment and people's amenity and where the energy generation is more predictable and constant."

"Solar power by comparison, could for example be installed and commissioned using existing infrastructure, be located in remote, less inhabited areas, have less visual impact, with significant reduction in land use, yet with higher output."

"Solar power is the answer and with the money these people will be subsidised for wind power we could all be given solar panels and have the same affect without the need for destroying our environment."

"Why not solar?"

"I do not approve or agree with the establishment of a wind farm. I do not understand why solar panels cannot be used as a renewable power source."

Response: While it is agreed that solar power is an excellent option for renewable power generation, it is also more expensive than wind and has a much larger footprint per kWh of energy produced.

The footprint of 1MW (capacity) of solar panels is approximately 20,000 – 25,000 m^2 (2-2.5 ha). Taking into account access tracks, hardstands and foundations, the footprint per MW (capacity) for the Bango wind farm is approximately 2,000 m^2 (0.2 ha).

In addition, the average capacity factor for solar electricity production in NSW is about 22%, the equivalent capacity factor for wind is about 35%. So not only does 1 MW wind have about 10% of the footprint of 1MW solar, but it also produces about 13% more electricity.

4.4.6 Wind compared to other energy production - support.

"Here we have free energy we are able to harvest with negligible impact to the environment."

"In summary wind is still the only technology available to provide this amount of energy with little or no impact on the environment."

"The wind farm will I believe have significant benefits and minimal negative impacts and produce clean energy from an untapped resource."

Response: Noted.

4.4.7 Wind in comparison to other renewable energy production - concern.

"A further point to note is that wind turbines are a crude and obsolescent technology. Much better results can be obtained using newer technologies like molten salt heat storage etc. and they are far less intrusive in the environment."

Response: Wind energy is a highly efficient method of electricity production, which relies solely upon the natural movement of air currents to generate electricity. These air currents, or the 'wind resource', is extensively analysed by a developer to ensure that wind speeds, directions and the consistent movement of the wind resource are sufficient to justify the large economic investment required to build a wind farm.

The Proponent has conducted intensive studies of the wind resource in the area and determined that the wind resource at the site is very well suited for large scale wind power generation.

The NSW Department of Environment Climate Change and Water has produced some information regarding efficiency generally, which is set out in their Wind Energy Fact Sheet:

"Efficiency measures how much of the primary energy source (e.g. wind, coal, gas) is converted into electricity. NSW coal-fired power stations convert 29 % to 37 % of the coal into electricity, and NSW gas plants convert 32 % to 50 % of gas processed into electricity. Wind turbines convert around 45 % of the wind passing through the blades into electricity (and almost 50 % at peak efficiency).

Over time, coal power stations operate at around 85 % of full capacity (known as the capacity factor). Gas power station capacity factors vary from as high as 85 % to less than 10 % (if designed only to supply electricity at peak periods). The average capacity factor for a large solar plant that produces electricity during daylight hours is around 20 - 25 %. The average capacity factor for a wind farm in Australia is around 35 %, and can range from 25 % - 45 %. Wind farm capacity factors are lower than coal and baseload gas plants, but they use their energy source more efficiently and can be large-scale suppliers of electricity."

4.4.8 "Climate change: Was there no consideration of these huge sized wind turbines extended from 176m proposed to a massive 200m and what process consideration/consultative process examined recent weather events in SA effects from tornados on infrastructure as a risk to health and safety?"

Response: Please refer to response 4.3.4.

4.4.9 Environmental costs compared to benefits – carbon footprint

"The carbon footprint of the wind farm will be paid back in about 9 months. "

"The life cycle assessments (LCA's) conducted to ascertain the "pay-back" period alone proves the development fails to meet its stated objective. If more carbon is used in the

manufacture, transport and construction of the turbines then what's the point? (Consideration needs to be taken into account for the mining of all raw materials, overseas manufacturing of steel towers, reinforcement steel, concrete, road construction, all transport need, ongoing maintenance requirements and dismantling/reinstatement at the end of the project's life etc)."

"Numerous studies have determined that wind power is the least efficient renewable power generation, especially with regard to the utilisation of natural resources, and in particular use of prime land. "

Response: The Life Cycle Assessment model of a wind turbine is described in Section 4.5.6 of the Project EIS. This assessment and other studies referred to in this Chapter have found that the usual time required for a wind turbine to repay the energy used in construction is six to eight months. Of the processes involved, manufacturing has the largest impact. However, it is balanced by the decommissioning and wind turbine disposal stages which consist mainly of recycling, with its associated positive benefits for the environment (Martinez et al. 2009; Tremeac & Meunier 2009).

4.4.10 Appropriate site selection

"I feel that it is a very well planned and socially responsible project that is sited in an optimum position for most people and wind."

"The site is a good wind tunnel and well thought out."

"This area is a great area for wind and I do not know of any locals that do not support this venture."

"My father, on his back under a car or tractor for repairs while wiping dust from his eyes, used to complain 'this is a bugger of a place for wind'."

Response: Noted.

4.4.11 Inappropriate site selection

"Australia has vast, un-inhabited space which should be utilised to full effect.

"Location should correlate to the social driver of ACT, not be imposed on NSW, where the majority of landowners object."

"While preparing to build our home we were advised that this area had a fault line passing through here going to Dalton. … There does not appear to be any coverage of soil stability checks or anything else on this subject in the CWP EIS project information handouts. "

Response: In order to meet the Australian Renewable Energy Target of 20 % by 2020, renewable energy projects are required all over Australia. Renewable energy projects, including wind farms, are in various stages of development all over the country – not just in NSW. As well as a good wind resource, a wind farm needs to be accessible, and close to the

electricity network. Much of the vast, uninhabited space in Australia is too far from the electricity grid, or has limited accessibility.

Independent research conducted in 2010 by AMR Interactive on behalf of the Office of Environment and Heritage led to the report *Community attitudes to wind farms and renewable energy in NSW*. This report found strong support for wind farms in NSW. Wind farms are generally developed in areas of sparse population. In the case of the Bango wind farm, the proponent has approached all dwellings within 2.7 km of the wind turbines for neighbour agreements. Where agreements have not been made within 2 km, turbines have been removed. Some agreements are still under negotiation.

All neighbours within 4km of the wind farm are candidates to request screening, such as landscape plantings, commensurate with the visual impact on their existing dwelling.

Further, detailed geotechnical assessments will be carried out further into the development process. These studies will reveal any geotechnical issues, including the identification of any local fault lines, and planning adjustments will be made as required.

4.4.12 Sterilisation of land with Dwelling Entitlements

"With regards to plans for the titled block for which my parents were planning to allow me to build on, I now fall within the two-kilometre radius of about 5 turbine towers meaning that because this proposal will have been submitted ahead of any DA by me, my long standing dreams will likely never be permitted due to planning implications and rulings."

Response: From section 4.6.1 of the EIS, p.83: *Having DE rights does not mean that a dwelling will be constructed on the land. Future impacts to neighbouring lots have therefore been considered in this light and mitigation measures have been discussed between the Proponent and any affected landowners where a DE is known to be actively progressed.*

However, the five turbines mentioned by in submission 174900 and 174902 have been removed. Three of the closest turbines of concern in submissions 174990 and 174992 have also been removed.

4.4.13 Preference for a focus on reducing the need for electricity

"Studies have proven that a small increase in electricity prices have had a far more effective impact in reducing the need for electricity, and therefore reducing carbon emissions, than investing in unreliable renewable energy, such as wind turbines."

Response: A price on carbon was introduced in Australia in 2011 to increase electricity prices, taxing Australia's highest emitters and allocate funding to climate change mitigation measures. This carbon tax was then repealed by the Abbott Government in 2014 and the RET was subsequently affirmed by the Turnbull Government to enable investment and mitigate the primary cause of climate change in Australia: electricity generation.

4.4.14 "The viability of the proposal must be assessed against recommendation #15 of the 2015 Senate Select Committee on Wind Turbines where the business case must be evaluated on renewable energy certificates for a period of no more than five years."

Response: The viability of the proposal will be assessed by those who are investing into the project, who in doing so, conduct thorough due diligence and appropriate scenario analysis to ensure the project would succeed.

4.4.15 "The proposal should be summarily rejected as contrary to the economic and security interests of NSW, its citizens and its industry."

Response: The Proponent wholeheartedly disagrees with this statement based on the Socioeconomic benefits identified in section 19 of the EIS.

4.4.16 "To add to the failings of this submission is the decision by the proponents to use the fact that their submission was lodged prior to the new government Windfarm Guidelines where the mandated distance of wind turbines to dwellings was extended from 1.6 kilometers to 2 kilometers."

Response: The 2011 Planning Guidelines: Wind Farms is defined within the Project Assessment Requirements issued by the NSW DPE. In December 2016, new Guidelines were released, recommending a distance of 2.7 km within which further assessment should be undertaken at non-associated dwellings. The location and response to concerns raised by the community owing to proximity of proposed wind turbine sites to their dwellings is considered in Chapter 20 Residence Assessment Summary of the EIS, and revised in accordance with the modified Project in Section 4 of the Amended DA.

4.4.17 Wind energy is inefficient.

Response: Please see response 4.4.5 and 4.4.6.

4.4.18 Cost to tax payers

"I object to … the cost of turbines being subsidised by the Federal Government through the RET scheme."

Response: Historically, new and emerging technologies have required investment in order to develop greater efficiencies and become competitive in their markets. In electricity generation, industries such as coal, natural gas and oil all benefited from significant state investment during development to become the large industries they are today.

Despite the maturity of those industries and technologies, governments worldwide continue to spend billions of dollars each year subsidising fossil fuels. In 2008, this figure was $557 billion, compared to $46 billion to renewable energy and biofuel in 2010.

The price distortion created by these subsidies, as well as other indirect subsidies, means that the true cost of fossil fuel electricity production is not reflected in the market price.

In Australia, support for renewable energy sources and technology comes solely through the Renewable Energy Target and Renewable Energy Certificates. The Renewable Energy Target sets a goal for the contribution of renewable energy to national energy consumption, which requires electricity retailers to purchase Renewable Energy Certificates from producers of renewable energy, including solar power and wind farms.

The cost of these Renewable Energy Certificates is passed on by the electricity retailers to consumers according to their energy use. This follows the "polluter pays" principle – the more energy you use, the more you pay. Renewable Energy Certificates are issued only for actual production – so there is every incentive for producers to ensure maximum production and efficiency.

The Renewable Energy Target legislation, which creates Renewable Energy Certificates, had bipartisan support for its passage through parliament in 2001, with amendments setting the current target in 2009. Both major political parties have indicated their ongoing support for the Renewable Energy Target.

The merits or otherwise of this or any other policy or legislation are matters for political debate and action. The Proponent and DPE are both bound to consider and act in accordance with the legal and policy framework which currently exists for renewable energy and the wind farm industry. Further discussion on this point is not relevant to the Project EIS.

4.4.19 Wind farms rely on government subsidies for viability.

"The costs of purchasing land, building and operating and maintaining turbines are not viable without Government subsidies and high energy costs to the consumer. "

Response: See the response to 4.4.18.

Chapter 5: Planning Context

4.5.1 Concern that the standards and guidelines applied are outdated or inadequate.

"There appears to be minimal guidelines and standards applied with a policy still in draft not being applied to this proposal?"

Response: The Project has been prepared consistent with the SEARS issued by the Department of Planning and the Environment, in accordance with Part 4 of the Environmental Planning and Assessment Act 1979. Like any other planning or development application, it and must be assessed in accordance with the laws and regulations in force at the time of submission. The Proponent and the DPE are bound to consider and act in accordance with the legal and policy framework which currently exists and applies to the Project. It is not sensible or, in some cases, possible for a proponent to make a development application on the basis of planning instruments that are not currently in effect.

4.5.2 Proximity to Rye Park and Kangiara village areas

"it is too close in proximity of the "village" area "

"I object to the turbines being so close to the village of Rye Park."

"There are 200 residents living in and around the village of Rye Park ,which I feel will affect there lifestyle/health which will be so heavily impacted from this construction."

"There are far too many Turbines visible from the village of Rye Park and are to close to populated areas"

"no State Significance component or benefit from locating wind farms in areas of lifestyle settlement and close proximity to towns and villages"

Response: Due to concern that the proposed Project was too close to village areas/localities, the closest turbines to Rye Park and Kangiara have been removed from the Bango layout. Refer to the Amended DA.

4.5.3 The EIS should be rejected

"the EIS submitted for Bango wind farm does not provide an unequivocal certification that "the information contained in the statement is neither false nor misleading" nor that "the statement contains all available information that is relevant to the environmental assessment of the development, activity or infrastructure to which the statement relates"."

Response: The Proponent does not consider this grounds for rejection, however determination will be made by the DPE in this regard.

4.5.4 Objection to the density of wind farms in the area.

"…our home will literally be surrounded from both the east and the west. "

"I feel the density of wind turbines within the Rye Park area is extreme. "

Response: The Rye Park area is one of high wind and low housing density, with transport accessibility and grid connectivity. As such it is a suitable area for consideration of wind energy projects and this is reflected in the interest shown by wind farm developers based on annual wind monitoring data. The density of wind farms will be appropriate as long as the proper planning processes are followed.

4.5.5 Concern for 'non-associated' dwellings within 2 km of a wind turbine.

Response: There were four non-associated residences within 2 km of a wind turbine in the EIS. With regard to the Amended DA, there is now only one at 1.9 km from the nearest turbine. The Amended DA also outlines the current status of consultation with affected neighbours, including progress towards Neighbour Agreements.

4.5.6 "I also wonder about the actual planning of this proposal and doubt if a development of this size can be built to the rules when their application is not even accurate, and things such as permissions to access properties has not even been sought or given."

Response: As described in Chapter 2 of the EIS, the proponent has experience developing and constructing projects up to 270 MW in NSW, and has reached agreements with all landowners from whom access is required for construction of the wind farm. An example of this is the Sapphire Wind Farm in northern NSW. This 270 MW project was developed through the CWP Renewables portfolio and us now fully financed and under construction.

4.5.7 Concern that turbines will be untested and there will be no one responsible for their successful installation.

"CWP were not able to supply any details of test trials — efficiency, safety, noise etc., let alone results of tests in local areas. CWP emphatically states that the Company has NO responsibility whatsoever for the suitability, safety, efficiency etc. of these models regardless of the outcomes."

Response: The purchase of a wind turbine is a significant financial commitment. To provide confidence that the product will be fit for purpose, a guarantee will be sought from the manufacturer as part of the procurement and installation process.

Chapter 6: Stakeholder Consultation

4.6.1 Discontent with level of community consultation.

"I feel there has been no consultation with the land owners and complete disregard to our concerns."

"It was only in October 2016 that we became aware of such a major project"

"The proponents continue to place their efforts with the "host" properties and not "…on those wind farm associated community members who live in proximity to the site". "

"At the Open Day when questioned about the lack of public consultation, the Project Manger said she had organised a letter box drop along local roads.

That method of communication is an extremely poor one, as many including myself do not have a letter box! Also a lot of properties are not on the main roads."

"There has been minimal consultation regarding the submission."

"CWP Renewable have had no presence in Boorowa or Rye Park, there has been no signage or notifications of the proposal and no consultation with anyone but those possibly receiving monetary advantage (and the occasional CCC meeting) until the EIS went on Public Exhibition… "

"Lack of ongoing communication if scrutinised carefully, eg one day between newsletter dates and open days, very late to update website with details, many many months of zero communication."

Response: Please refer to Chapter 6 of the EIS for information about the stakeholder consultation undertaken prior to the exhibition of the EIS. In summary, extensive public consultation has taken place since the initial stages of the Project and has targeted all interested and potentially affected parties. Consultation took the form of:

- Establishment of a Project website (www.bangowindfarm.com.au) for general information dissemination, announcements, feedback requests and document distribution;

- Letters of notification to various stakeholders, including local, state and national groups and agencies;
- Face-to-face notification (or letter drop where necessary) of neighbouring residents within approximately 3 km of the Project;
- Project newsletters distributed during development to the local community (x2),
- A Public Opinion Survey (POS), A Landscape Values survey, advertisements, media releases and press / radio interviews;
- A Public Open Day held at Boorowa Bowling Club, Boorowa;
- The Project Community Consultative Committee;
- Door knocking in the Project locality; and
- Ongoing consultation and meetings with various stakeholders throughout the Project planning and design stages.

The Proponent has maintained the Project website since the Project's inception and has continued to maintain an 'open door' policy for consultation. The provision of the Project Manager's contact details on the website ensures that stakeholders can find out information about the Project at any stage of the development.

It is regretful that the author of SN174877 only became aware of the project in October 2016. As is acknowledged in this submission, in March 2015 they received in their mailbox, a letter about the Bango project and a business card from the Development Manager. At the time they dismissed it.

The author of SN174960 has a dwelling 7.9 km from the nearest Bango wind turbine. Attempts had been made to contact this resident, but as he mentions he doesn't have a letter box and the circulation of information throughout the community (as outlined above and in the EIS) had not reached this person as early as it had reached others. Fortunately, he did hear before the EIS exhibition period ended.

The Proponent does not have a shop front in the local area, but have felt it is a better use of resources to ensure we are always contactable via telephone and email, and with appointments for face to face meetings.

4.6.2 I am a supporter of clean energy projects and value this community consultation step in the development process. I believe that where people have, perhaps legitimately, felt there was no consultation anti-wind energy views became more entrenched.

Response: Noted. The step this submission refers to is the opportunity for the public to ask questions of, or request verification from, the Proponent regarding the project, via the NSW DPE. The Proponent then has an opportunity to respond to these submissions, which is the purpose of this current document. The next step is for the DPE to make a recommendation to the Planning Assessment Commission as to whether the project should be approved, and if approved, what conditions should be imposed upon it.

4.6.3 "It is our understanding that a cluster known as the Kangiara cluster, as we are only recently informed, we have only heard mention of Rye Park or the Bango Wind Farm further north closer to Boorowa, why has this changed??? this has not been clearly consulted!!"

Response: The Kangiara cluster is the description given to one of the three clusters of the Bango wind farm. Advice on this distinction has been provided to the respondent via email and telephone correspondence during November 2016.

4.6.4	**"CWP Renewables has not even tried to meet or communicate with us, we had to chase them to find out what was being proposed and where their rumoured Wind Farm was located, which turned out to be very near Rye Park, and our property."**

Response: The Proponent understands that this property is 8 km from the nearest proposed wind turbine location. Whilst it is regrettable to receive comments like this to our projects, a thorough and genuine consultation process has been undertaken, which is evidenced most notably in the Amended DA.

Consultation with neighbouring residents and the local community is outlined in Chapter Six of the EIS.

4.6.5	**Concern there has been insufficient consultation with and representation from the network provider.** **"I am interested to understand why Proponents facilitating consultation meetings in Boorowa recently and also previously over the many years of on again off again consultation for this project have never had representatives of Essential Energy or TransGrid on site to both respond to the many questions raised but also to hear and make representations with sound operational knowledge of their systems and the nature of connection as a large number of statements were made by the Proponent referencing the impacts and arrangements of these organisations. "** **"Page 139 gives the list of key consultants but Essential Energy, the areas main energy supplier, is not listed."**

Response: Network service providers are consulted with directly through the design and planning process to ensure appropriate scale developments are proposed. In this instance, TransGrid have provided advice directly to the Proponent on the suitability of the local network where the project connection point has been proposed.

4.6.6	**"We wrote to CWP in November 2013 requesting further assessment of our future development lots, but we have had no reply."**

Response: A letter dated 6th December 2013 was sent from the Proponent to these residents. The letter provided information regarding the subject lots identified by the respondent within the property. The letter noted those subject lots were further from the turbines than the current dwelling. Text from that letter is presented below:

"Consideration of subdivision potential and dwelling entitlements is also included within the EA. Given the remainder of your lots are to the west of the current residence, any proposed dwellings would be further from the eastern turbines and remain at least 4 km from the western turbines. Any new dwellings would also have a view of the wind farm, but the level of impact would in no way prevent such developments from proceeding. Given the proximity of your additional lots to the actual [Redacted] residence, the photomontage from

that residence can be considered representative of the immediate area and we consider no additional photomontages to be necessary."

Responses have been provided for all communication from this resident.

4.6.7 "Wind Prospect Group (WP) and Continental Wind Partners (CWP) claim to have extensive experience in the development of wind farms.

Well so far this Group have carried on in a very unprofessional manner, they are more like a pack of con men and women.

Not good qualifications to build and manage a project like a Wind Farm!

Whereas Trustpower have been willing to go out of their way to ensure they made information available to everyone."

Response: The Proponent understands that this property is 8 km from the nearest proposed wind turbine location. Whilst it is regrettable to receive comments like this to our projects, the Proponent can reaffirm our local experience which comprises the successful delivery of the 113 MW Boco Rock Wind Farm, 107 Taralga Wind Farm (Asset Management), the 270 MW Sapphire Wind Farm (under construction), and the 135 MW Crudine Ridge Wind Farm (pending commencement of construction).

For Bango wind farm, a thorough and genuine consultation process has been undertaken, which is evidenced most notably in the Amended DA.

Consultation with neighbouring residents and the local community is outlined in Chapter Six of the EIS.

4.6.8 Satisfaction with developer consultation

"The EIS documents show that the developers have consulted with local agencies and local people regarding development issues."

Response: Noted.

4.6.9 Landowners at BAN 282 discontent with stakeholder communication.

"Considering that our newly constructed house is the closest to any turbines in the project (ascertained from maps provided to be approx. 800 metres) and that the turbines are going to be the biggest yet built in Australia, why has the company not done extensive consultation with us and why is there no neighbour agreement in place?"

"there has been no contact from the proponents since 21 December, 2015. "

Response: Consultation with the respondent has resulted in the removal of seven wind turbine locations in the south of the Mount Buffalo cluster. Moreover, dialogue is ongoing regarding a neighbour agreement in relation to the residual impacts of the project on their newly built residence.

4.6.10 "Wind turbines are placed further from non-associated landowners than associated landowners, in order to minimise impacts." This is not the case with our residence, which

is located approx. 800 metres from the nearest turbines. The proponents have made no suggestions about how they plan to minimise impacts at our residence."

Response: Refer to response 4.6.9.

4.6.11 Inadequacy of maps

"The majority of the maps in this document do not show the town of Boorowa and none of them show the village of Kangiara. "

"In considering the purchase of a property at Kangiara, I have concluded that the main residence will be approximately 2.8km from the closest turbines, although this is not certain as the mapping in the EIS is of poor quality and information."

"I have some serious concerns about this project and the lack of consultation. I live on the main sealed road between Boorowa and Rye Park. The consultation process has not found me and the maps I have located online tell me nothing about how close they will be to me or my property."

Response: The first map of the wind farm location, figure 2.1 on page 22 of the EIS, clearly shows both Boorowa and Kangiara, and their location in relation to the Bango wind farm.

All turbine locations have been included as Appendix 2 in the EIS. A search using the free software Google Earth or Six Maps can identify the turbine locations and measure their distances from any location. CWP Renewables would welcome contact from any landowner having difficulty with this process and we can help them identify the distance between themselves and the nearest turbine.

Distances from the Boorowa-Rye Park Rd to the nearest turbine range from 5.2 km to 13.0 km. Boorowa is about 13 km from the nearest turbine, Rye Park is about 5.6 km, and the dwellings labelled BAN151 and BAN111 are the closest dwellings along the road to the wind farm, at approximately 5.2 km each.

4.6.12 "Where is newsletter 3."

Response: There was Progress Update distributed in November 2015. In recognition of this publication, it was decided to assign the next Newsletter number 4.

4.6.13 "I believe that the community have not been given adequate information about this process as the Dept of Planning Information Meeting held in Boorowa in October was not advertised in the Yass Tribune."

Response: Noted on behalf of the DPE.

4.6.14 "I also question whether the independent Chair is actually an independent Chair. I note she has acted as the Independent Chair for all other wind farms from the Wind Farm company. I question the conduct and integrity of the process."

Response: The Independent Chairperson's appointment is verified by the DPE.

4.6.15	**"… many residents are simply scared to make their views known.'…'we strongly encourage the Department of Planning and Environment to commission an extensive and thorough "face to face"/ door knock survey of residents in the communities likely to be affected to get a true and fair understanding of the general consensus."**
	Response: Noted on behalf of the DPE.

Chapter 7: Assessment of Key Issues

No responses received.

Chapter 8: Landscape and Visual Impact Assessment

4.8.1	**Visual impact considered minimal.** **"The subject project is largely away from hobby farm activity and in my view the visual impact is minimal."** **"Ridges and valleys are a feature of the landscape in this region. Only parts of the wind farm will be visible to a viewer at any one time."** **"It is through my own family's experience that I can state that the positive outcomes for land holders in the location of the Windfarm far outweigh the visual imposition on the landscape."**
	Response: Noted.
4.8.2	**Visual impact considered high and negative, eg:** **"Primarily the visual impact they have on the rural landscape is significant. The existing windfarms outside of Crookwell and toward Gunning scar the landscape, and due to the fact they are typically located on ridge tops, the concept of blending them into the foreground and background is not a reality - the proposed towers are now 200m high - nothing will hide them, and it will ruin the historic and picturesque landscape."** **"The visual impact, from my homestead, will be devastating - the familiar rolling hills will be littered with turbines that are almost 200m high!"** **"They are a blight on the landscape."** **"There will be no escape from the sight or the sound of them thus they will destroy the joy of living and working on our property."** **"…the photo montages give a chilling account of what these people want to turn our landscape into. "** **"I believe the industrialisation of our rural landscapes with turbines dominating the surrounding countryside for tens of kilometres, and creeping into rural communities, is an issue that cannot be ignored. "**

Response: Current grazing and cropping activities can continue uninterrupted, and sufficient power for approximately 150,000 homes can be produced for relatively small impact on the landscape and the environment.

4.8.3 Positive visual impact

"On a personal note, the sight of wind turbines spinning and generating electricity with such little disturbance to the environment fills me with great contentment."

"I personally don't mind looking at wind turbines and don't believe once there in the landscape they will worry me at all. Within the Office of Environment and Heritage report on `community attitudes to renewable energy' it seems even within 2km most people (59%) support wind farm development. Even if I did find wind turbines ugly, I don't think it would give me or anyone the right to veto the project, as I don't own the view."

"The Bango wind farm is only 7ks from where I live, I and will have a full view of the northern end of the wind farm as I live in an elevated location looking down over Rye Park and on to the proposed hills where it is to be built. Other wind farms can all be seen from the hill on my place and I hope to be able to see these in the near future."

Response: Noted.

4.8.4 "We will be surrounded on three sides by turbines. There is nowhere on our property that we will not see them. The only rooms in our house where we will not see them are the bathroom and the toilet. Surely this saturation can't be allowed to happen.

Having said that, according to the EIS Part 3 Visual Significance Ratings, our visual significance is LowNil/Low and our cumulative LVIA Rating is Moderate-Low."

Response: This submission is from a landowner situated between the Bango and Rye Park wind farms. The Proponent for the Bango wind farm has recognised the visual impact on the village area of the five wind turbines closest to Rye Park, and has removed them from the layout (refer to the Amended DA).

Wind turbines in the Rye Park wind farm are a matter for Tilt Renewables and the DPE.

4.8.5 "The LVIA should be rejected"

Submission 174867 includes a 15-page attachment with multiple criticisms of the EIS LVIA.

Response: In addition to the LVIA produced for the Bango EIS, the DPE has also conducted an independent LVIA and provided advice to the Proponent. This has been considered in the development of the Amended DA.

4.8.6 "Note that Residence 282 has been omitted from Fig 8.5a"

Response: Noted.

4.8.7 Concern for shadow flicker and blade glint

"What simulations have been carried out to estimate the occurrence of flicker or reflection on our property? What are these potential impacts?"

"Shadow Flicker for traffic on the Lachlan Valley Way. Where is the assessment for this?"

Response: In the Bango EIS, Volume 3, A08 Landscape and Visual Impact Assessment, Section 9 discusses shadow flicker and blade glint in relation to the Bango wind farm, local residences and passing motorists.

4.8.8 "Why did CWP not disclose the western impact of their turbines to us earlier instead of only disclosing the nearer, eastern impact?"

Response: This is an issue the Proponent has discussed with this landowner individually. There is no view of the western wind turbines from the residence. The view of these turbines is from Tangmangaroo Rd, by the front gate.

Notably, two of these turbines have been removed – as have the 5 closest turbines to the southeast – through the Amended DA.

4.8.9 "We have been classified by Green Bean Consulting as "no impact" and we are perplexed to how they came to this conclusion given the close proximity, gigantic scale and number of towers that will be visible."

Response: The Visual Significance rating for this residence was given was 'low' (Bango EIS, Volume 3, A08 Landscape and Visual Impact Assessment, Section 8, Table 18, page 66) due to 'very low' sensitivity of visual receptor and 'medium' change of view due to project. Wind turbines at distances of 2.5 km and greater will be visible (note that due to the Amended DA this viewing angle has been reduced by approximately 60 degrees). Surrounding trees partially screen the view of the remaining visible turbines.

4.8.10 "In our case, we have not even received any photomontages nor any information regarding turbines to the West of our property – only the ones flanking our East boundary. Both areas will be clearly visible from our house and future building lots.

Furthermore, the proponent has not considered the visual impact from one of our larger, higher altitude lots which makes up part of our property where we intend to establish another residential dwelling. We wrote to CWP Renewables on Nov 1st 2013 requesting such an evaluation – to date we have had no reply. The impact here would be extreme."

Response: This resident has been provided with a photomontage of their view to the east and a wireframe image of the view to the west, as provided in this submission, 174934. Wireframe images only take topography and the wind turbine structures into account, so the result is conservative. To create a photomontage, access to the property is required to take photographs from the viewing location. The Proponent has been denied access to this property, so the wireframes provide the next-best image.

Please see response 4.4.12 regarding Dwelling Entitlements.

4.8.11 "The Bango proposal should only be assessed following the development of the national standard for visual and landscape impacts as per recommendation #6 of the 2015 Senate Select Committee on Wind Turbines."

Response: Noted on behalf of the DPE.

4.8.12 Suggested increased distance of turbines from dwellings to 10km for 200m tip height turbines.

Response: Noted on behalf of the DPE.

4.8.13 Visual impact of turbine night lighting.

Response: On receipt of Development Approval for the Project, and with particular regard to the Aeronautical Impact Assessment and Obstacle Lighting Review, the Proponent will consult with CASA and DIT on the issue of obstacle lighting.

If lighting is required, the Proponent will commit to shielding provisions allowed under existing CASA guidelines. Shielding restricts the downward component of light to 5 % of nominal intensity emitted below 5° below horizontal and zero light emission below 10° below horizontal.

4.8.14 "The photomontages (PM 22 and 23) from our residence, produced for the proposed development, are inadequate and misleading. Turbines have been placed behind trees and shrubs to minimize their effect. The turbines in the photomontages are grey and dull with a cloudy background. This makes them blend more easily into the background than they would on a bright sunny day. "

Response: The photomontages are conservative and represent the worst case, highest level visual impact with the largest proposed wind turbine (200 m blade tip height) on the closest spaced layout (Layout 1). Specialist wind farm software (ReSoft WindFarm) was used to superimpose the wind turbines on the panoramas, taking into account the topography of the land. Additional checks were performed to ensure that the wind turbine scale is correct for each photomontage.

The viewpoint panoramic views were not created from single, planar, wide angle photos. The panoramas are a composition of stitched images captured with a standard prime lens to preserve the horizontal scale across the panorama and represent the most natural perspective.

Turbines have not been 'placed' behind trees. Where local foliage obstructs the view of turbines from a particular viewpoint, the turbine will not be seen.

4.8.15 Appendix 8, Landscape and Visual Impact Assessment, Figure 20- BAN 238 is displayed as an uninvolved residential dwelling within 2 km and 5 km of wind turbine.

Response: In this report, figure 20 shows BAN238 as 'Uninvolved residential dwelling within 2 km of wind turbine subject to neighbour agreement', which is an accurate description of BAN238. The dwelling IDs are not included on this figure, which may be the cause of confusion here. It appears there is an error in this figure, as BAN060 has been categorised as the same as BAN238, however it is more than 2 km from the nearest turbine.

4.8.16 Appendix 8, Landscape and Visual Impact Assessment, Figure B7- Cumulative landscaping and visual assessment residential dwellings. We (BAN238) are not represented on this map

Response: BAN238 is not represented on this map as it falls outside the cumulative study area. An earlier figure, B5, shows that BAN238 will only have views of Bango wind turbines so a cumulative visual impact is not applicable at this residence.

4.8.17 "Appendix 8, Landscape and Visual Impact Assessment, Figure 77 Photomontage PM22- state the nearest turbine is 851 meters"

Response: This is an error. The closest turbine to BAN238 was 1.0 km – with the Amended DA, the nearest turbine to this residence is now 1.8 km away.

4.8.18 "The Landscape and Visual Impact section does not mention the turbine height."

Response: At the beginning of the chapter on page 143 under the heading 8. Landscape and Visual Impact Assessment, it says "For the purposes of the LVIA and CLVIA a blade tip height of 192 m was used. This height is 8 m (or 4 %) lower in height than the proposed maximum of 200 m."

4.8.19 "Other areas of concern about the information day were the lack of photomontages from the township of Boorowa, even though there is one in the EIS, and no photo montages from the Rye Park Road between Boorowa and Rye Park."

Response: The photomontage that is in the EIS, PM9, is considered to represent the highest visual impact of the wind farm to the township of Boorowa. It should be noted that due to the removal of the Lang's Creek cluster through the Amended DA, these turbines will no longer be visible from Boorowa.

PM5 and PM6 show visual impacts from each end of the Boorowa-Rye Park road, and PM10, although much closer to the turbines, gives an indication of the view from further back on the Rye Park Road. It should be noted that due to the removal of Lang's Creek turbines (closest to Boorowa), two turbines from the north of the Kangiara cluster and five turbines in the north of the Mt Buffalo cluster, all of the above-mentioned photomontages significantly overstate the visual impact.

4.8.20 Concern that the Landscape and Visual Impact Assessment is misleading.

'The document is consequently wholly unsuitable for the Department to evaluate actual visual impact from the Bango wind farm and needs to be rejected."

"The LVIA contains misleading and deceptive statements and components, especially photomontages. "

"All published photomontages are grossly misleading, both in the size representation of turbines, their clarity and contrast."

Response: Please see responses to 4.8.5 and 4.8.14.

4.8.21 "**From the preface explaining the differences over the extended timeframe for LVIA development:**

"and a review of all technical assessments has deemed that the removal of the four turbines has resulted in a reduced."

A reduced what?"

Response: This is a typographical error and should read "…a review of all technical assessments has deemed that the removal of the four turbines has resulted in a reduced *visual impact*."

4.8.22 Scepticism about the definition of Visual Significance.

Response: The definition of Visual Significance is clearly outlined in the source as cited in the LVIA (Guidelines for Landscape and Visual Impact Assessment 2nd Ed. 2002). The definition of Visual Significance has been correctly adapted from this source.

4.8.23 Submission 174867 asks how the Magnitude Matrix Factors used by Green Bean Design were derived.

"Can Mr Homewood share the peer reviewed literature that support those figures for 200 metre turbines?"

Response: The criteria set out in the LVIA Table 16 Sensitivity and magnitude assessment criteria are based on a professional analysis of factors considered applicable to the Bango Wind Farm project. The criteria are recognised as common factors which are combined to assess the significance of Visual Effect and included in the Guidelines for Landscape and Visual Impact Assessment 2nd Ed. 2002.

4.8.24 "No photomontages are offered for any of these residences [2-5km away] even though required by the SEARs of record."

Response: Photomontages have been prepared from residences within 2 km of the wind turbines in accordance with the SEAR's.

4.8.25 "The very first photomontage I looked at was 185 Klondyke (PM11, un-numbered page). Why did I pick that one? I wanted to see whether this view from the roadside through the roadside trees was representative of the view from the residence and its curtilage. Mr Homewood gives vastly different GPS coordinates for two identical photographs on successive pages."

Response: This is correct, the coordinates from PM10 Harrys Creek Road have been unintentionally replicated on the PM11 Sheet 1 Figure. The correct coordinates are included on PM11 Sheet 2.

4.8.26 "Another commonly used visual subterfuge in the past was to include in the photomontage some tall foreground structures to lessen the impact of the turbines in the distance."

Response: Photomontage locations and view directions were chosen to best-represent the predicted impact of the turbines on dwellings close to them. Where there were tall structures such as tree or buildings, these were included, but not intentionally placed in front of turbines. The fact that vegetation and structures can be accounted for is reason that Photomontages provide a better representation of the actual view than wireframes.

4.8.27 "The photographs, illustrated in Figure 25, demonstrate the degree to which the apparent visible height of a wind turbine decreases with increasing distance (in a negative exponential relationship)'

'Negative exponential relationship?"

Response: A negative effect occurs where an increase in distance between observer and wind turbine results in an observable decrease in wind turbine height. The relationship is exponential where the observable height increases at a rapid rate with distance as clearly illustrated in Figure 25.

4.8.28 "There are other issues which may also affect the degree of visibility. Table 13 outlines the relative effect of distance on visibility and has been based on empirical research conducted by the University of Newcastle (2002) as well as direct observations made during wind farm site inspections."

Ask Mr Homewood, where in the cited report is his table 13 supported."

Response: As stated in the LVIA Table 13 is based on the empirical research and is not drawn directly from the research.

4.8.29 Concern for the visual impact of the substation

Response: An assessment of the potential visual effect of electrical infrastructure, including substation, has been included in the LVIA (Section 13 Electrical works). The assessment determined that residences within 2km of the substation would be subject to Low or Nil visual effects with the greater extent of views screened by landform and/or vegetation. The location of potential substation locations and residences is illustrated in the LVIA Figure 83.

4.8.30 "The wind monitoring masts would be unlikely to create a significant visual impact, and are similar in scale, or smaller than a number of surrounding communication masts visible in the landscape surrounding the wind farm project area."

Is the last sentence true?

Response: Yes, the wind monitoring masts would be unlikely to create a significant visual impact.

4.8.31 "Page 8 of the Bango EIS Main Report:

"The CLVIA determined that two residences would experience a Moderate to Low cumulative visual impact, both of which are not involved with the project",

… but how did he come up with that conclusion?"

Response: The methodology and results of the Cumulative Landscape and Visual Impact Assessment are set out in the LVIA Appendix B, Supplementary Cumulative Landscape and Visual Impact Assessment.

4.8.32 Concern for the choice of study area for the Cumulative Landscape & Visual Impact Assessment.

"Why 10 kms? Ever since the Department defined a minimum ZVI of 10kms, all developers and their consultants have misinterpreted minimum as maximum."

This submission references Scottish Natural Heritage Guidance "Assessing the Cumulative Impact of Onshore Wind Energy Developments" March 2012.

Response: The Cumulative Landscape and Visual Impact Assessment has been prepared in consultation with the Department of Planning and Environment and has included a cumulative assessment of wind turbines within a 10 km view shed of wind turbines within the Bango and Rye Park projects as illustrated in the LVIA Figure B1. The 10 km view shed is considered to capture residences where cumulative visual impacts are considered to have a greater potential for significance. As stated in the Scottish Natural Heritage Guidelines (and cited in the LVIA) the emphasis of the cumulative assessment should 'be on likely significant effects rather than on comprehensive cataloguing of every conceivable effect that might occur'.

4.8.33 Concern about the accuracy of the Cumulative Landscape & Visual Impact Assessment.

"Is Mr Homewood asking you to believe that the visual impact on a single residence from two wind farms is LESS than the visual impact on the same residence from one of them?"

Response: The methodology and results of the Cumulative Landscape and Visual Impact Assessment are set out in the LVIA Appendix B, Supplementary Cumulative Landscape and Visual Impact Assessment.

Chapter 9: Noise Assessment

4.9.1 Health impacts of noise

"There are also numerous unanswered concerns with regards to noise and impact on health."

"Similarly there is a move with European windfarms to locate them off the coast, rather than on-shore or at least 10km from dwellings due to infrasound impacts."

http://waubrafoundation.org.au/resources/podcast-zoomer-radio-am740goldhawk-interviews-kevin-dooley/ Article: http://waubrafoundation.org.au/2016/poor-sleep-health-may-contributeinflammatory-disease-neuroscience-news-july-6-2016/ The need to apply this research from qualified specialist's in sound and acoustics' to the health effects with reference to understanding that whilst studies have been undertaken, in this proposal, they are weak in their analysis.

"The recent research [by the World Health Organisation] has indicated that anyone within a 10 kms radii of a wind farm is likely to suffer health related problems due to the noise and visual impact of the turbines."

"The adverse impacts to health are also identified and endorsed in the Department of Planning's report "Wind Turbines and Proximity to Homes: The Impact of Wind Turbine Noise on Health"."

"Sonus do not see the need to assess infrasound even when there is clear evidence from experts such as Dr Steve Cooper that prove otherwise."

Response: The Project has been assessed against the requirements of the SEARs. A thorough Noise Impact Assessment was undertaken by Sonus in consideration of those requirements. Aspects relating to potential health impacts are considered at a higher level than an individual project, to which end the Proponent accepts the advice provided by NSW Health.

4.9.2 Objection to the introduction of noise

"I object to the noise that we will subjected to when we chose to live in a place that had no noise."

"It is adding noise to a very quiet environment where one can hear almost anything."

Response: The DGRs require operational noise to be assessed against the South Australian Environmental Noise Wind Farm Guidelines 2003 (the SA Guidelines). The criteria of the SA Guidelines are established to ensure any audible wind farm noise is low enough in level such that it does not adversely impact on the health or amenity of the community. The SA Guidelines are considered to provide some of the most onerous criteria for wind farms in the world.

Notwithstanding this, the assessment goes beyond the requirements of the SA Guidelines and conducts a specific and more onerous analysis for both the daytime and night-time periods in accordance with the Draft Guidelines.

The SA Guidelines establish a base noise level of 35 dB(A). The base noise level generally applies during low wind speed and background noise conditions. The base noise level is significantly more onerous than the criterion established by the World Health Organisation (WHO) Guidelines for Community Noise (the WHO Guidelines) of 45 dB(A) to protect against the potential onset of sleep disturbance. The WHO Guidelines criterion is based on bedroom windows being open.

Noise predictions were conducted using the propagation model ISO 9613-2:1996 "Acoustics – Attenuation of sound during propagation outdoors" (ISO 9613) in the SoundPlan noise modelling software. This noise propagation model accounts for the influence of topography and is widely accepted as an appropriate model for the assessment of wind farms when appropriate inputs are used.

Results from the background noise measurements that were conducted for the Project EIS are available in the Noise Assessment (Project EIS, Appendix 10) and results from subsequent background noise measurements are available in Appendix 3 of this report.

4.9.3 Request that noise impact study be carried out on individual properties.

"Appendix B of the draft Planning Guideline provides for an independent review of the potential noise impacts on neighbouring properties prior to wind farm development approval. We hereby request that such a review be carried out on our property. "

"As the closest residence to a turbine, we expect that the proponents would have conducted a noise assessment on our property. This has not occurred."

"CWP Renewables have made no attempt to carry out sound spectrum measurements at our location."

Response: The Noise Assessment in Appendix 10 of the EIS is an independent review of the noise impacts on neighbouring properties. It reports the predicted noise impacts on all residences within 5 km of the wind farm for wind speeds from 3 m/s to 15 m/s.

An update of that assessment, using wind data from the more recently installed 100 m tall monitoring mast and the revised layout, has been included with this Response to Submissions.

4.9.4 Concerns were raised about the cumulative noise impact predictions from adjacent wind farms.

"…the sound expert at the last open day held by CWP in Boorowa, he didn't seem to know what impact the sound of two adjacent wind farms would have on the people in between."

Response: Please see response to 4.9.9.

4.9.5 "Developers will offer reassurance that levels will be monitored, but what practical action can be taken when levels are found to be too high?"

Response: As described on page 176 and in Chapter 20 of the EIS, if, during operation, wind turbine noise impacts are identified as having the potential to exceed the applicable limit due to temperature inversion, atmospheric stability or other reasons, then an 'adaptive management' approach can be implemented as a contingency strategy to mitigate or remove the impact. This process could include:

- Investigating the nature of the reported impact;
- Identifying exactly what conditions or times lead to undue impacts;
- Consideration of operating wind turbines in a reduced 'noise optimised' mode during offending wind directions and at night-time (sector management);
- Providing acoustic upgrades (glazing, façade, masking noise etc) to affected residences; and
- Operating in a noise reduced mode those wind turbines that are identified as causing the undue impact.

4.9.6 "The EIS identifies that "minor exceedances were predicted in the initial layout", and this should be further evaluated at night where the allowable background noise is often below 20 dBA."

Response: The biggest factor in determining background noise levels is the wind speed. Regardless of the time of day, as the wind speed increases there will be increased background

noise from surrounding foliage, buildings, etc. The Bango wind farm noise assessment was undertaken in accordance with the SA Guidelines, and the proposed Bango Wind Farm was found to achieve the SEARS.

There is one residence location, BAN100, at which noise levels exceed the guidelines under certain conditions. This residence is involved with the project and as such, to achieve the WHO Guidelines at BAN0100, acoustic treatment will be investigated and implemented in consultation with the landowner as required.

4.9.7 "In the preliminary EA, page 14/21 proponents state that a "consultant will be appointed to assess the acoustic environment within the vicinity of the site and potential impacts on nearby residences. A management plan to address potential impacts will be developed and implemented." From our point of view, as the closest residence to any turbine, there is no evidence of a management plan.'

'Could the proponent provide us with an acoustic assessment at our residence and details about how potential impacts will be addressed?"

Response: Please see response 4.9.3.

The management plan will form part of the documentation to be completed prior to construction. All management plans for the wind farm will be publicly available.

4.9.8 Concern was raised regarding vibration from wind turbine operation.

Response: Modern wind farms produce very low levels of ground vibration. Sonus engineers have performed testing at an existing South Australian wind farm and found that the measured level of vibration below a wind turbine and at different distances from the turbine are below the recommendation of Australian Standard AS2670.2 for "critical areas" such as operating theatres. At residential distances, the ground vibration from wind turbines would be undetectable.

4.9.9 "Noise modelling is inaccurate and cannot be relied upon"

Response: Because the wind farm has not yet been built, and every wind farm is different, the noise assessment is necessarily based on a prediction of the sound power output of the wind farm. Because it is important not to exceed acceptable noise levels, conservative inputs are used throughout the model, and it is therefore likely that the modelling will over-predict the sound output.

4.9.10 "Whereas Wind Turbines in operation do make similar sounds to the main rotor blades of turbine powered helicopter as it passes over the tail boom on shut down.

Aircraft maintenance engineers can suffer hearing problems from being in the vicinity of the sound of Rotor Blades and turbines, which is why we wear Ear-muffs and body protection when working around aircraft."

Response: The Proponent is not in a position to comment on the sound of helicopter rotor blades. The SA Guidelines have been used to evaluate wind farm noise impacts in accordance with the SEARS.

4.9.11	**"Surprisingly the maps showing Bango 1 and 2 layout not one location exceeds 30 decibels. My residence is given the same Db as others that are up to 5 times the distance away. "**
	Response: Noted. An updated Noise Impact Assessment for the Project has been undertaken with consideration of the modified layout. Please refer to the Amended DA.
4.9.12	**Implementation of adaptive management plan if noise levels exceed the applicable limit.** **"an 'adaptive management plan' must be implemented if noise conditions are breached. At a minimum, this must include investigation and identification of the cause and at least one solution."**
	Response: Noted.
4.9.13	**"The project complies with the guidelines for noise and other environmental concerns arising from its construction and operation."**
	Response: Noted.
4.9.14	**Submission 174976 raises a number of concerns, both in the introduction and the attached document. The introduction says:** **"Multiple authoritative sources, including the NHMRC, researchers and well respected acousticians, have provided overwhelming evidence and arguments why wind farm noise levels and character are unpredictable and why wind farm noise modelling is inherently unreliable.** **Consequently no reliability can be placed on the noise modelling submitted in this case and therefore the project should not be approved unless:** **• there is permanent 24/7, full spectrum sound monitoring;** **• at sufficient locations around the wind farm to provide a comprehensive history of noise impact at all residences within at least 10 kms; and,** **• with the complete data permanently available to the Department AND to all residents who believe they may be noise affected, and to their advisors.** **Further, given NHMRC advice and actions indicates the possibility of adverse health effects (including recurrent sleep deprivation) it is essential that any consent conditions:** **• draw explicit attention to the developer's obligations under the NSW Work Health and Safety Act 2011 No 10 (WH&S Act);** **• explicitly impose health protection obligations and conditions (including for sleep) such that Investor State Dispute Resolution (ISDS) provisions under any Australian trade agreement cannot be used to block or penalise the NSW Government for any subsequent actions it may take in relation to the wind farm to protect the health of NSW citizens or their animals."**
	Response: 1. Noise Prediction Model

The assessment has used the CONCAWE noise propagation model with specific worst-case inputs for wind farms.

Predicted noise levels based on the CONCAWE noise propagation model and the associated worst-case inputs have been compared with actual noise measurements from wind farms.

The CONCAWE model has been found to be reliable and is specifically referenced in the SA Wind Farm Noise Guidelines used in NSW.

2.Cumulative Modelling

A comprehensive assessment has been conducted of the cumulative noise from both Rye Park and Bango Wind Farms (Sonus report "S4889C2", dated April 2016). The assessment was based on the conservative scenario that both wind farms emit the highest noise levels, whilst the wind blows from all turbines to the dwellings.

The assessment reliably indicated that the cumulative noise from Rye Park and Bango Wind Farms achieves the relevant criteria at all dwellings surrounding both wind farms.

3.Continuous Noise Monitoring

Noise from the wind farm will often be less than noise from wind in trees. Therefore, noise monitoring cannot separate wind farm component of noise at any moment in time. Rather, six weeks of monitoring should be collected and correlated with relevant wind data, for comparison with noise measured pre-construction to determine the component of noise from the wind farm. Therefore, continuous noise monitoring will not be useful.

Chapter 10: Ecological Assessment

4.10.1 Understanding of flora and fauna issues

"The planning for this project has required additional flora and fauna surveys to be completed, adding to understanding of the natural value of the area."

"I fear that the proponents have not investigated the full environmental impacts of this major industrial construction will have on this region. But maybe that was their intention. "

Response: Noted.

4.10.2 Comments that biodiversity risk for the Project is 'not significant'.

Response: Noted.

4.10.3 Concern for the Superb Parrot

"Effects on protected species from the 122 x 200 meter high, 70 meter wide wing spanned wind turbines, species such as the critically endangered superb parrot."

"The fact that it is a known flight path for the endangered Superb Parrot in their breeding season should be enough for the Department of Planning and the Department of Environment and Heritage to say no this is not acceptable in any form."

Response: Due to concern for the Superb Parrot, further studies were undertaken by the environmental consultant, ERM, to evaluate potential impacts on the species, as seen in Appendix 2, Annex C. As a consequence of these studies, the Langs Creek cluster has been removed from the Project.

4.10.4 Concern about barotrauma

"Other species, such as, protected bats which we understand heads explode when approaching these wind turbines."

Response: A specific Bird and Bat Adaptive Monitoring Plan (BBAMP) to be developed with the objective of minimising the impacts of the operational wind farm on threatened bird species. The BBAMP will include:

- The required monitoring measures;
- Key thresholds for determining permissible impacts and corrective actions that are required in order to achieve the objectives of the plan; and
- The roles and responsibilities for the proponent, operator and agencies in implementing, assessing and enforcing the plan.

The frequency of reporting strike data will be determined during the preparation of a monitoring program. Adaptive management measures that could be implemented should strike thresholds be reached will be negotiated with OEH and DoE if significant strike rates are detected. Bird and bat strike monitoring will be undertaken with consideration of relevant monitoring guidelines.

The above constitutes the main text for Statement of Commitment 019, as found in the Amended DA.

4.10.5 Concern for bird and bat strike

"How can booby trapping such a significant area containing both open and bushy country zones (including forestry reserves) by construction of 2 large wind farms in such close proximity be justified as ecologically sound?"

"It is also adding huge turbines which will undoubtedly harm a significant number of bats and larger birds."

Response: The risk of bird and bat strike has been discussed in Chapter 10 of the EIS. This risk has been reduced with the reduction of turbine numbers in the revised layout.

4.10.6 Concern regarding the spread of noxious weeds

"Will the proponent be obliged to control/contain weed infestations?

If so, will this be during construction only or for the working life and removal phase of the project?"

Response: The spread of weeds is always a concern where there is movement of vehicles between localities. In the case of large construction projects such as the Bango wind farm, the risk is low because of mitigation measures adopted for compliance with the *NSW Noxious Weeds Act 1993*. Also see Statement of Commitments 12 in the Amended DA.

4.10.7 How do wind turbines support biodiversity?

"Do our threatened native bird species nest in turbine towers, can goannas and other lizards scale them to escape predation, do small birds and animals use hardstands as laneways while seeking water or fresh feeding/breeding grounds or do insects feed on the towers to become low level food chain participants supporting higher order animals?

Which of the thousands of important biodiversity aspects do wind turbines support?"

Response: Detailed, scientifically supported information on Climate Change can be found on the Australian Government's website for Climate Change in Australia (www.climatechangeinaustralia.gov.au). Electricity generation is the largest contributor climate change in Australia. This increase in global temperature is threatening biodiversity across the globe, and the Bango wind farm is expected to displace 736,000 tonnes of CO_2 per annum equivalent, contributing to climate change mitigation in Australia and globally.

4.10.8 Concern for the removal of habitat for wildlife.

"The vulnerable ecology of the remnant woodlands and road verges which support thousands of species of flora and fauna will be decimated for ever. The destruction of the natural environment to make way for something that is meant to save it should not be approved."

"Old growth trees along Wargeila Road and Tangmangaroo Road predate white settlement. The existing roads vary from 5 to 7metres wide. Proposals to bring large and heavy equipment along these roads would result in the trees on the verges being cut down to allow roads to be widened. This would destroy the habitat of many birds and animals"

"After viewing the proposal for local roads in the area ie. Wargeila and Boorowa and Rye Park Roads as well as others, it is impossible for large oversize trucks to access these. Many trees would have to be cleared effecting bird habitat and many corners into private property would have to be altered."

Response: Where possible, the Proponent aims to use land that has already been cleared for cropping and grazing, and to minimise the removal of habitat for wildlife. The following measures have been taken to achieve this.

All oversize vehicles will enter the site via the RMS highway, and not via local council roads. Some road upgrades will be required but this will have very minimal impact to roadside vegetation.

The wind farm development footprint has a 100 m micro siting allowance. This is to allow for the adjustment of infrastructure location within 100 m of the planned development footprint and can be used to avoid the removal of important habitat.

The removal of the Lang's Creek Cluster was driven by the need to reduce the impact on the Superb Parrot habitat. See Annex C from the ERM EA update, Appendix 2.

The removal of Lang's Creek and five other turbines has removed the need to use two access routes, which will reduce the impact on habitat for wildlife.

In addition, submission 174950 includes a photo of a tree-covered hilltop in Mt Buffalo, claiming the hilltop will be cleared for the installation of wind turbines. There are no forested hilltops that will be cleared to build the Bango wind farm.

4.10.9 "Tree preservation laws outline what are the limits that are allowed to be removed by a landholder. How can the clearance and removal of such vegetation in such a massive scale and still be under such guidelines."

Response: The land holder is required to adhere to tree preservation laws under the *Native Vegetation Act, 2003*. The relevant legislature for developments of State Significance is the *Threatened Species Conservation Act, 1995*.

4.10.10 Removal of one or more turbines from the northern end of the Kangiara cluster would have benefits for the Golden Sun Moth and the Wedge Tailed Eagle.

Response: Noted. 2 of these turbines have been removed.

4.10.11 Suggestion to use western-most substation option with regard to minimising impact to the Golden Sun Moth and Apple Box – Yellow Box Grassy Woodland.

Response: Noted.

4.10.12 "Page 203 stated no serrated tussock was found. As serrated tussock can be found throughout the area how hard did they look?"

Response: The Proponent has included many reference to tussock grass found within the Project development area throughout Chapter 10 of the EIS, and cannot find the reference referred to here. It is not on either page 203 or the 203rd page of the document.

4.10.13 "10.3.2 Says exotic species of plant life only covers 22% of the development area. Does that mean they will be disturbing 78% of native flora?"

Response: The actual impact area for the project is a small proportion of the development area. The expected impacts, temporary and permanent, for different vegetation types are quantified in Appendix 2.

4.10.14 "Page 212, figures 10.11, 10.12, and 10.13 Threatened species tables. These are dated 3/5/2013. If this is the date of surveys they would not have found many Superb Parrots around at this time of the year and needs clarifying. And again surely studies more recent than 2013 could have been found to more accurately indicate the current story."

Response: The date indicates when the figure was created, not the dates of the study. These are detailed in Appendix 2 (Annex C).

Chapter 11: Cultural Heritage Assessment

4.11.1 Concern for the area's environmental heritage.

"How can we talk about environmental heritage protection when there is a prospect of turning rolling hills and farming vistas into an industrial power station."

Response: Noted.

4.11.2 European heritage not considered.

"There is a great deal of European heritage considerations not captured in the report. e.g. the hills where the proposed wind farms are going was the main route from Yass to Goulburn and was frequented by bushrangers."

Response: The Cultural Heritage assessment includes a section on European Heritage in Appendix 3. Three potential European heritage items have been recorded during the study, none of which satisfy heritage listing criteria. All are located outside proposed impact areas and would not be affected by the development.

4.11.3 The Cultural Heritage assessment on page 11 mentions the aboriginals were Wiradjuri and Ngunawal but only gives credence to the Ngunawal in the Yass area. Although Boorowa is recognised as being Wiradjuri it seems the Wiradjuri People have not been consulted as they are not listed as being contacted on pages 68 & 69 of this assessment.

Response: As indicated on page 11 of the report, it is understood that the region was occupied by Aboriginal speakers of at least two languages, Wiradjuri and Ngunawal. G.A. Robinson noted that the people of Yass were called Onerwal [Ngunawal] (White and Cane 1986). According to Jackson-Nakano (2002), the Aboriginal group who occupied the Yass and Boorowa districts in the early years of European settlement were the Wallabalooa tribe.

Aboriginal consultation was conducted strictly in accordance with the relevant guidelines for consultation. In this process, neither Ngunawal nor Wiradjuri were targeted or favoured. The groups notified are those as listed under the relevant guidelines:

- NSW OEH Queanbeyan office
- Onerwal Local Aboriginal Land Council
- the Registrar, Aboriginal Land Rights Act 1983
- the National Native Title Tribunal, requesting a list of registered native title claimants, native title holders and registered Indigenous Land Use Agreements
- Native Title Services Corporation Limited (NTSCORP Limited)
- Yass Valley Shire Council
- Upper Lachlan Shire Council
- Boorowa Shire Council
- the Lachlan Catchment Management Authority, requesting contact details for any established Aboriginal reference group

In addition, an advertisement was placed in the Yass Tribune newspaper and the Boorowa News.

Following advice received from NSW OEH and the National Native Title Tribunal, further correspondence was sent to:

- Yukkumbruk

- Peter Falk Consultancy
- Pejar Local Aboriginal Land Council
- Gundungurra Aboriginal Heritage Association Inc
- Yass Valley Indigenous Consultative Committee Community Development
- Ngunawal Heritage Aboriginal Corporation
- Arnold Williams - Ngunnawal Elders Corporation
- Yurwang Gundana Consultancy Cultural Heritage Services
- Buru Ngunawal Aboriginal Corporation
- Carl and Tina Brown
- Gunjeewong Cultural Heritage Aboriginal Corporation
- Gundungurra Tribal Council Aboriginal Corporation

No other names of parties were provided to us for consultation.

During the process, consultation was clearly extensive, providing ample opportunity for any Aboriginal person to register and interest in the process of consultation for the project.

Chapter 12: Traffic and Transport Assessment

4.12.1	**Improvement to Council roads** **"The developer is required to make good on any road damage incurred through the construction period. Experience from other wind farms in Australia confirms that local council roads are significantly improved by the presence of a wind farm."**
	Response: Noted.
4.12.2	**General concern for the management of increased traffic during construction.** **"Significant additional traffic will only occur during the construction period with operation and maintenance adding little additional traffic to local roads. These traffic movements will be overseen by a comprehensive traffic management plan that is developed in conjunction with local councils and the NSW Government."** **"The excess traffic and type of traffic to which our local roads and residents will be subject from the Bango Wind Farm, is in no way acceptable"** **"Movement of sheep and cattle on roads is essential, and will be disrupted due to vehicles/trucks on roads."** **"Increased traffic on these roads will greatly effect local residents who use these roads for work or supplies from local towns."** **"I object to the Bango Wind Farm for the increased vehicle numbers that will be on the local roads during the construction phase."** **"The increased traffic on the Lachlan Valley Way will increase the 'black spot' reputation it already has, and I fear there will be even more of our young people killed on that road**

	due to the inadequacy of the road to take what it does now, let alone what it will need to take in the future. "
	Response: Noted. Please refer to the responses provided to RMS, Hilltops and Yass Valley Councils in the Agency submissions section of this report.
4.12.3	**Lack of detail in EIS regarding traffic on Hillview lane.** **"Hillview Lane, (an access road) which runs adjacent to our property, is not mentioned in Wind Farm Site Access Locations and has no significant mention anywhere in the EIS. Yet on Figure 3.2 it is clearly shown as an oversize vehicle transport route and the only access to the north east cluster of 5 turbines and a batching plant. See Appendix 14 Traffic and Transport Assessment. "**
	Response: With the revised layout, of Hillview Lane is no longer an access route for this project.
4.12.4	**Concern about Traffic and Transport management plan consultation.** **"Who has been consulted in your management plan?"**
	Response: Road safety during construction will be specifically managed through a CEMP sub-plan developed pre-construction. This sub-plan will deal with all specific traffic conditions and impacts on road users, including impacts on livestock movement and emergency services. Emergency vehicle access would be addressed in consultation with RMS and emergency services. The RMS permit system also incorporates incident management. Livestock movements along roads will be addressed in an EMP sub-plan and will include measures such as making drivers aware of the potential to encounter livestock and adherence to safe driving practices at all times.
4.12.5	**Concern is raised regarding dust generation along unsealed roads during the construction phase of the Project.** **"Additionally my son suffers from chronic asthma - I am worried about dust from construction."**
	Response: Dust generation during Project construction will be dealt with in relevant CEMP sub-plans, developed pre-construction. In particular, establishment of procedures to manage dust generation is addressed in Statement of Commitment 022. Mitigation measures proposed for dust suppression include use of water carts, covering loads where practicable and consideration of local weather conditions.
4.12.6	**Concern is raised regarding traffic noise generation during the construction phase of the Project.**
	Response: Traffic noise generation during Project construction will be dealt with in relevant CEMP sub-plans, developed pre-construction. In particular, establishment of procedures to manage traffic noise generation is addressed in Statement of Commitment 022.

4.12.7	**Concern about potential traffic delays during construction.**
	Response: Project traffic, and the associated impacts on local traffic, will be managed through the preparation of a project specific Transport Management Plan, which will be developed in consultation with local Councils.
4.12.8	**Concern about traffic management in the case that two wind farms will be under construction concurrently.**
	Response: Project traffic, and the associated impacts on local traffic, will be managed through the preparation of a project specific Transport Management Plan, which will be developed in consultation with local Councils. Local Council involvement in this process with go to serve the concern relating to concurrent construction activities. Note however, through the Amended DA, the Proponent of Bango wind farm has committed to avoid the transportation of wind turbine and substation components through the town of Boorowa and the village of Rye Park.
4.12.9	**Concern about road degradation caused by construction vehicles.**
	Response: Noted. Please refer to the responses provided to RMS, Hilltops and Yass Valley Councils in the Agency submissions section of this report.
4.12.10	**Concern about the ability of existing bridges and culverts to carry heavy loads.** **"Two of the access proposals, Lachlan Valley Way and Wargeila Road, both cross the Melbourne -Sydney rail-line. The bridges over this line are old and are not designed for heavy vehicles.. … On the Lachlan Valley way there are more than 20 culverts and a bridge over the Boorowa River all of which have load limits."**
	Response: Noted. Please refer to the responses provided to RMS, Hilltops and Yass Valley Councils in the Agency submissions section of this report and the Amended DA.
4.12.11	**Concern for habitat removal for road widening** **"How is the remnant BGW going to be protected when road upgrading, especially widening, is done for Tangmangaroo Road to accommodate oversize vehicles (Chapter 12)?"**
	Response: The Amended DA details proposed changes to the transportation and delivery of certain wind farm components which will limit the need for local Council road widening.

Chapter 13: Aviation Assessment

4.13.1	**Night lighting of turbines**

"…we understand will light up the surrounding night skies 24/7, to remain alight for aviation safety??? Surely height restrictions and cluster size is well above any realistic safe height?? Where is the consultation? Who with?"

Response: CASA, AsA, Dept Defence and local aerodrome operators were consulted with regard to potential impacts to aviation. CASA currently require tall structures above 152 m that have the potential to impact aviation to require night lighting. As a result, a lighting plan will be developed in consultation with CASA which will seek to address the agency's need for lighting, whilst also aiming to address the concerns of the local community.

4.13.2 Concerns were raised regarding Project impacts on aerial weed control.

Response: Chapter 13 of the Project EIS discussed the impact of the Project on all forms of aviation activities that were identified during planning and design through consultation with relevant aviation bodies and the local community. The chapter discusses aviation activity in the Project locality, potential impacts from the Project and appropriate mitigation actions.

As stated in this chapter, aerial pest management is unlikely to be affected by the Project. Aerial application aircraft routinely fly close (within 5 m) to obstacles such as trees, power lines, radio towers and any other obstacles found in a rural environment, it is reasonable to expect that a pilot would be able to safely manoeuvre about these obstacles.

Agricultural operations that involve low level flying can only occur in good conditions (high visibility) in accordance with the aviation regulations, where wind turbines would be highly visible. Aerial operators engaged in low level flying and agricultural operations are required to undertake a risk assessment for each flight. This would identify specific hazards such as trees and power lines. Wind turbines would be treated no differently. Therefore the operation of low flying aircraft in the vicinity of wind turbines does not represent an unacceptable risk if normal operational procedures are followed.

4.13.3 "The Aviation assessment does not mention to overall height of turbines. "

Response: The original Aviation Assessment was based on a maximum turbine tip height of 192 m above ground level (AGL). This was increased to 'up to 200 m AGL' prior to exhibition, and a cover letter is included at the beginning of the Aviation Assessment to outline the effects of this.

It is also mentioned in Chapter 13 of the EIS, at the beginning of the 2nd paragraph under the heading 13. Aviation Assessment on page 243. It says, "For the purposes of the Aviation Assessment, a blade tip height of 192 m was used. This height is 8 m (or 4 %) lower in height than the proposed maximum of 200 m".

4.13.4 "Volume 2, Figure 13_1 Known landing grounds within the Project locality

This map should have shown all landing grounds within a 10 km radius of the project, if they had referred to maps produced by NSW ."

Response: Noted.

4.13.5 "The Wind Turbine and feeder cable structures could have an "adverse physical or electromagnetic interference effect upon navigable airspace or air navigation."

Response: The Project has been developed and, if approved, will be constructed in accordance with current aviation regulations.

Chapter 14: Communications Assessment

4.14.1 The guidelines omit references to protection of the wind farm control and monitoring systems against cyber-attack, software fault or malware. Since the output of the wind farm is presumably to be used to supply energy safely to the grid, perhaps for this project additional guidelines could be added to the tender.

Response: Noted.

4.14.2 Effect of the wind farm on television reception.

"We are aware that CWP Renewable's Taralga Wind Farm has had ongoing problems with residents' television reception, even though the EIS for Taralga stated that problems were not likely to occur."

Response: Taralga wind farm was not a CWP Renewables development. CWP Renewables' asset management team were sought out to manage Taralga mid-way through construction to remedy the issues in hand. This was achieved successfully, and included resolving television reception issues caused by the original design of the project.

4.14.3 Effect of the wind farm on UHF radio communications.

"We have non-existent/extremely poor, mobile phone service When our telephones go out, or there is a fire, or storm, our contact is all by UHF radio"

"… not only do the wind turbines restrict the ability to extinguish flames in the local range by air craft, reduce the communications from our local fire brigade through our UHF radios…"

Response: UHF radio is used extensively throughout construction and operation by wind farm contractors. It is not envisaged that the concern raised will eventuate. Should a demonstrable issue arise as a consequence of the wind farm, then the project will seek to rectify the issue using appropriate and available means.

4.14.4 Effect of the wind farm on mobile phone communications.

Response: Refer to section 14.3.3 of the EIS.

4.14.5 Effect of the wind farm on internet.

Response: Domestic internet connection is usually transmitted to dwellings via cable, and there will be no interference to this service from the wind farm. Mobile internet in the region is provided by mobile phone carriers, so please see the response to 4.14.4.

Chapter 15: Electromagnetic Fields

4.15.1 "The Wind Turbine and feeder cable structures could have an "adverse physical or electromagnetic interference effect upon navigable airspace or air navigation."

Response: Refer to section 15.2.1 of the EIS.

Chapter 16: Fire and Bushfire Assessment

4.16.1 The wind farm will improve conditions for firefighting.

"Improved access to difficult areas will assist fire fighting capacity."

Response: Noted.

4.16.2 "Bushfire impacts? What about fires in this area, where is the consultative analysis of this? And any effects of these Wind turbines? There is no proper consultative analysis. Who responds to emergencies what maintenance is carried out?"

Response: As is typical for other wind farm developments in NSW, including those under construction and operation by CWP Renewables, appropriate Fire and Bushfire Management Plans are developed and enforced. Moreover, these include protocols and processes for liaising with the local RFS team.

4.16.3 Concerns were raised regarding the possible impact of the Project on aerial fire-fighting, in particular that the Project would prevent or limit aerial fire-fighting in the area.

"As we are nestled in between Kangiara and Mt Buffalo clusters and closest turbines being within 3km, low flying aircraft will not be possible to approach especially if prevailing wind conditions are not favourable. Are CWP going to be responsible for increased insurance premiums and/or compensate for damage as a result?"

Response: Improved access via wind farm access roads will reduce the need for aerial firefighting, which can still occur in and around the wind farm where necessary.

4.16.4 General concerns were raised regarding the possible impact of the Project on on-ground firefighting.

"How is the Government going to ensure that the fires which will almost certainly occur can be fought with full efficacy and safety for firefighters in the highly combustible surrounds of the Project? "

"Many issues abound with volunteer fire fighters most reluctant to work in turbine locations, realistically, these areas may not be attended by fire fighters."

Response: Please refer to 4.16.2.

4.16.5 How will fire risks introduced by the wind farm be managed?

"How is the Project/Government going to ensure that fire risks are held to the current low levels?"

"What assurances are given and what requirements are placed on the proponent as far as maintenance and bushfire mitigation… "

"We are also in a bushfire prone area which will be worsened by the turbines."

Response: Please refer to 4.16.2.

4.16.6 Concern for the effect of the wind farm on volunteer fire fighters.

"Is it going to fall back on the local volunteers to fight full on industrial fires which they are not trained or equipped for and not experienced in? "

Response: Please see response to 4.16.2.

4.16.7 Inaccurate assessment/description of bushfire risk.

"Why do the proponents minimize and generalize the bushfire risk when there is evidence against this?"

Response: The Proponent aims to address the impact of the Bango wind farm on the bushfire risk of the area. The overall impact of the wind farm is likely to lessen the occurrence of bushfires due to lightning strike due to the ability of the wind turbines to attract and ground lightning. The wind farm access tracks and road network provide significantly improved access to the area to facilitate on ground firefighting. Aerial firefighting, where necessary, can still occur in and around the wind farm.

4.16.8 "We could suffer increased insurance costs, or become uninsurable, if turbines are within 1 km of homes or boundaries as fire fighters will not offer aerial water bombing support in the case of fire.

Response: Please see the response to 4.16.7. Also note that this dwelling is no longer within 1 km of any wind turbine.

4.16.9 Trees for screening could increase the bushfire risk to these homes.

Response: The use of trees to provide screening is undertaken only where requested by the affected landowner.

Chapter 17: Water Assessment

4.17.1 Comparison with coal power plants' use of water during operation.

"Unlike coal-burning power plants, wind farms use no water in their operation, leaving local rivers and creeks untouched. On-site water usage during construction will be mitigated by minimising vegetation clearance, retaining all contaminated stormwater and process wastewater on-site and locating stockpiles away from drainage lines and in areas least susceptible to wind erosion."

Response: Noted.

4.17.2 Concerns were raised regarding use of groundwater during the construction phase of the Project.

"What will happen to our local springs and existing bores which already need to be husbanded carefully?'

'Will there be compensation for adverse effects?'

'Will the bores be dismantled when construction finishes or will they remain as an added bonus for the host properties?'

'How is the Government going to ensure that non-host neighbours are not disadvantaged in terms of their existing natural water resources which once added a premium to their land values?"

"As most rural property owners are aware, water is a scarce and valuable commodity in rural areas. There should be absolutely no water made available for a major industrial installation such as this. The proponents must source their water from outside the project area."

Response: Through its consultation with Council, the Proponent is aware of water scarcity issues in Boorowa. All water usage will be from sources that are deemed as suitable in consultation with the relevant Council authority. See response to a similar concern from Hilltops Council 3.17.1.

4.17.3 Concerns were raised regarding potential impacts of Project construction on surface water during the construction phase.

Response: Silt runoff and erosion impacts will be managed and mitigated in two broad manners. In the first instance, areas of vegetation have been avoided and / or minimised where possible. Retaining vegetation where possible on site will assist in reducing the possibility of soil and silt runoff. Where earthworks do take place, a number of erosion and sediment control measures will be implemented. Erosion and sedimentation control devices will be monitored to ensure that they are functioning appropriately, particularly after periods of heavy rain.

Further mitigation measures identified in the Ecological Assessment and Statement of Commitments address the possibility of weed spread; sedimentation, erosion and runoff; vegetation clearing; impacts to flora and fauna; impacts to soils; the incidence of fire; bank instability at creek crossings; and other general impacts.

Water quality monitoring is addressed in Statement of Commitment 060. As detailed, this monitoring, along with the mitigation measures discussed will be implemented in

consultation with NOW and in accordance with Landcom 2004. In order for an appropriate monitoring regime to be developed, details will be finalised when the final wind turbine model and micro-sited locations have been procured and finalised respectively.

4.17.4 "Has dust suppression on unsealed roads been considered in water requirements?"

Response: Yes, the water requirements for dust suppression of both internal access roads and unsealed sections of the existing road network have been included in water requirement calculations. This is outlined in Section 17.5 of the Project EIS.

4.17.5 "The water requirements detailed in the EA are well below what is going to be utilised and is an inaccurate amount." (Submission 56725)

Response: It is difficult to interpret from the relevant submission how the figures provided were arrived at. However, the water requirement for the Project was based on worst case scenarios at each stage of calculation. By way of example, submission 56725 estimates 150 litres of water are used per cubic metre of concrete, while calculations undertaken to prepare the Project EIS use a conservative estimate of 165 litres per cubic metre of concrete.

Statement of Commitment 062 notes that Project water requirements will be re-calculated once the final development footprint has been determined.

4.17.6 "The Proponent fails to determine whether an adequate water supply is available."

Response: The Proponent provided a very specific outline of the process that will be undertaken in order to secure the required water supply for Project construction in the Project EIS (Section 17.5.1). The EIS goes on to state that "identification of appropriate water sources will be determined post-consent, during the pre-construction phase of the Project. Should this approach not prove feasible, then water will be sourced from commercial suppliers within the vicinity of the Project at the expense of the Proponent.

Statements of Commitment 063 further addresses water supply for the construction phase of the Project.

Chapter 18: General Environmental Assessment

4.18.1 Source of raw materials for construction

"Will the materials other than concrete, water, gravel and other base materials even be sourced in Australia?"

Response: Procurement of raw materials is more than likely to occur locally to the project to minimise cost of transportation.

4.18.2 Concern about the long-term impacts on the terrain.

	"How can such extensive works be justified in an area of such demonstrated natural fragility?"
	Response: The project will be designed and built in a manner consistent with major civil and electrical engineered projects across Australia, where guidelines exist to ensure erosion controls and run-off measures are properly and effectively installed and maintained.
4.18.3	**Air quality during- and post-construction – dust** **"What protection will there be for non-host properties in the form of Construction Period and Post Construction dust suppression and dust compensation (including domestic, production and health effects)?'** **'When the fine wool sheep of the area have their fleeces coated with dust fallout increasing the cost of shearing and decreasing the price obtainable for the wool clip who will pay – the woolgrower or the Bango Project?'** **'For the entire life of the project will the proponent commit to dust suppression on the large expanses of lay down and support areas and the kilometres of access tracks they will need to retain?"**
	Response: Please see the response to 4.12.5.
4.18.4	**Concern about decommissioning of the project – will it happen, who will pay and what happens if the proponent goes bankrupt?**
	Response: The Proponent's approach to decommissioning is outlined in Chapter 18 of the EIS.
4.18.5	**Concern about soil erosion** **"Large amount of bushland cleared resulting in big amounts of erosion in the area and surrounds"** **"I believe the construction of the Bango Wind Farm will have significant cumulative impact on the ecology of the area and increase the erosion of fragile soils, for which the EIS gives scant response."**
	Response: The project will be designed and built in a manner consistent with major civil and electrical engineered projects across Australia, where guidelines exist to ensure erosion controls and run-off measures are properly and effectively installed and maintained.
4.18.6	**"At points east 675140 north 6174010 (Wargeila road) and east 673120 north 6175670 (Hillview lane) a major gas pipe for outer NSW is crossed. This is in the northern section of the MT buffalo cluster. Proposed turbine installation and heavy work is to be conducted on and near this gas line. This could have catastrophic and fatal results if gas exploded or pipelines under pressure were disturbed."**

	Response: Noted. The Amended DA removes infrastructure from the north of the Mount Buffalo cluster, and in doing so, addresses this concern.
4.18.7	**"CWP Renewables have not fully carried out significant wind monitoring over the BWF and adjacent sites to confirm an expected long term wind regime, the few wind measuring points are not fully representative of the whole site. "**
	Response: A thorough wind monitoring program has been undertaken.
4.18.8	**Increased income to landowners will allow them to allow them to rehabilitate damaged or neglected areas on their properties.**
	Response: Noted.
4.18.9	**Concern for the effect of cement, roads, powerlines and cables on soil fertility.**
	Response: Noted.

Chapter 19: Socio-Economic Assessment

4.19.1	**Increasing host and neighbouring landowners' resilience to uncontrollable variables such as climate and commodity prices.** **"As a farmer, we are directly affected by our unpredictable climate, and having alternate streams of income not related to rainfall is essential to make our business resilient. The construction of the wind farm will allow graziers to continue to use their land alongside the new enterprise of harnessing the renewable resource of 'wind'.'** **'It also has landholders who are supporting the construction of turbines on their properties."** **"… it will provide a much-needed supplementary income for a number of farmers that have struggled through years of drought and hard times."** **"The wind farm can help secure farmers business' by adding an alternative income stream."** **"Local farmers will receive millions of dollars in total every year for the next 25 years, either in lease payments or through neighbour agreements. This will dramatically increase the financial resilience of the local farming economy and help farmers manage periods of drought and fickle commodity prices."**
	Response: Noted. Audible noise is discussed further in Chapter 9 of the EA.
4.19.2	**Benefits of the Community Enhancement Fund** **"The Bango windfarm project has an operator who is committed to the long term prosperity of the community by injecting funds towards community enhancement projects the order of $300,000 every year."**

	"There will be a direct injection of about $4 million per year to the local community through payments to landholders, permanent staff, local councils, and the community. This project will create new jobs to boost the local economy, whilst allowing the current agricultural activities to continue." **"The Bango wind farm will inject new life into the Rye Park/Boorowa community through a community enhancement fund, long term employment for locals and economic stimulation."** **"Also about $300,000 will be given to community organisations through a Community Enhancement Fund."**
	Response: Noted.
4.19.3	**Local job creation - Positive** **"This project will create new jobs to boost the local economy, whilst allowing the current agricultural activities to continue "** **"This project will have huge benefit to the Yass district simulating many businesses not only during the construction phase but also on going with the completed project requiring maintenance teams etc."** **"The benefits to the local community of increased income for farmers and local businesses"** **"This project will stimulate the local economy by creating both long term and shorter term (during construction) jobs and by providing work for local contractors."** **"I am excited about the opportunity for new job creation provided by clean energy infrastructure."** **"The district will benefit during the construction period and from subsequent, quality, long term jobs."** **"The wind farm will assist local employment, especially during the construction phase. 300 jobs will be generated during this phase. There will be a significant number of long-term permanent jobs on the completion of construction. These jobs will be in maintenance of the turbines and the associated infrastructure."**
	Response: Noted.
4.19.4	**Local job creation - negative** **"Any local earning potential is virtually worthless as funds generated will transfer to the parent holding company (based in Thailand), and there will only be a very small amount of local labour employed in the initial assembly (noting they are all imported products). After which the turbines will be monitored remotely, controlled remotely and serviced by 'fly-in, fly-out' technicians."** **"In reality there will be some limited employment during the construction phase for jobs not filled by experienced but transient workers who move from project to project**

	and some subcontracted but minimized site maintenance work for the life of the project." **"There are NO local resources with the requisite skills or competence that could be employed on such high risk works under the Health & Safety Act."** **"Page 326 states "Once the Project is operational there would be a small number of permanent jobs available", therefore the perception that the project will create jobs is false."**
	Response: Benefits to the local work force will result across a range of sectors including skilled civil and electrical trades and technicians, however more broadly across the hospitality and service sectors which will support the increased workforce present in the locality. The number of permanent roles will reduce as the project reaches operation, however those roles require long-term commitments to the project and often result in skilled locals being employed or the permanent relocation of new employees to a region.
4.19.5	**"I see no benefit for the adjacent communities."**
	Response: Benefits to local communities will arise through a range of channels, perhaps most notably through the project Community Fund, and local retail, hospitality and trade industry growth.
4.19.6	**Concern about health effects of wind farms.** **"There are also numerous unanswered concerns with regards to noise and impact on health."** **"The health implications include a continuous disturbance of sleep due to the effects of infrasound, which can increase inflammatory diseases core of most serious disease."** **"The magnitude of possible health effects is not known as there are no conclusive research studies into the cumulative effects of being exposed to multi-directional industrial turbines and certainly not to the high number of turbines proposed in this area (231 total)."** **"Should this project proceed, we expect to be negatively affected financially, emotionally and suffer health effects. "**
	Response: The Proponent defers to the position of NSW Health regarding concerns in this field.
4.19.7	**Property values** **"The impact of this development will continue to affect my family even after I'm gone, as without any doubt the land value of my property will be greatly decreased."** **"A concern of visual impacts to the property and value/implications. Lack of any detail of how this will cause impact, due to "vague" mapping...?"**

	"CWP continued to move the Bango project forward and we watched our property value crash" **"It is evident that land values will drop significantly in the district as a result of the development."**
	Response: An assessment on the impacts to property values in included in Chapter 19 of the EIS.
4.19.8	**Health and Safety** **"In practical terms this money will be used to carry out conservation works, works which do not have an immediate payback and may not be undertaken otherwise. It will provide stability to the enterprise and the renewal of infrastructure, including OH&S improvements that may not otherwise be made."**
	Response: Noted.
4.19.9	**Increase on demand for local businesses, stimulation of local economy** **"Local businesses will supply goods and services including accommodation, engineering, earthworks services, fencing and landscaping."** **"This is a great opportunity for this area to benefit from infrastructure that will bring in money to the area."** **"It has the capacity to inject millions of dollars into the local economy for decades."**
	Response: Noted.
4.19.10	**Positive effect on the local schools** **"This project will employ locals from the community, improve the future for local schools and most importantly mitigate the effects of climate change by producing clean energy."** **"We need employment in the local area to attract families to live locally, which in turn provides kids for local schools."** **"More people working in the community improves the future of local schools and sporting teams and means more money being spent in the community - which stimulates business and creates jobs."** **"More people working in the community and relocating families to the area will improve the future of our local school."**
	Response: Noted.
4.19.11	**Concern for proximity to schools – health** **"I object to the fact that they are so close to a school."** **"Dr Nina Piermont (2010) states that 'the presence of noise in the environment degraded how these children's brains processed language sounds, which in turn degraded their**

	ability to learn to read. It wasn't that the noise just kept them from hearing things they needed to learn; the noise actually harmed their brain's ability to process language'"
	Response: The Proponent defers to the position of NSW Health regarding concerns in this field.
4.19.12	**Responsibility for health effects** **"Finally and importantly I request a statement in writing as to who will be taking responsibility for and effects from these well-known health effects when they occur, as a result of this project, as proven in current respected and qualified research"**
	Response: The Proponent defers to the position of NSW Health regarding concerns in this field.
4.19.13	**Unable to build additional dwellings due to the wind farm.** **"Our daughter was forced to buy a home, away from the property, in Boorowa when she returned from interstate needing family assistance with her children, one already chronically ill and subsequently another with chronic problems. Our son cannot build the home he had dreamt of on the farm either."**
	Response: Please see response 4.4.12.
4.19.14	**"What is the real prospect for employment growth in the local area – not the total number of jobs on the project but the number of permanent, local jobs?"**
	Response: Benefits to the local work force will result across a range of sectors including skilled civil and electrical trades and technicians, however more broadly across the hospitality and service sectors which will support the increased workforce present in the locality. The number of permanent roles will reduce as the project reaches operation, however those roles require long-term commitments to the project and often result in skilled locals being employed or the permanent relocation of new employees to a region.
4.19.15	**Community division due to differing opinions** **"How is the split in the community caused by this highly divisive project going to be healed?'** **'What form of community support is the Government going to put in place to repair the community harm being done?"** **"The tension within the community can be cut with a knife. "** **"The proposal has already caused division in our close-knit community and this division will be very hard to mend."**
	Response: The Proponent has taken all efforts to minimise the type of concern and division that can result from large scale developments. Notably, the project footprint has seen two

significant amendments made in response to local concern, the later resulting in the Amended DA.

4.19.16	**NSW Government spending priorities** **"Similarly, electricity demand has been trending downwards for a number of years and investments in NSW should be more focused on improving:** **- Infrastructure** **- Health** **- Education** **- Transport** **- Elderly & disabled"**

Response: Noted.

4.19.17	**Concern that wind farms will reduce tourism to the area.** **"How many times will a tourist return to visit Boorowa or Rye Park to see wind turbines. Where is the proof that Bungendore, Crookwell and Taralga have increased tourism, and the proof that people are returning over and over again to see them? People do return to Boorowa and Rye Park over and over again to enjoy the landscape, eat the food and experience the rural community."**

Response: Although a small proportion of private land will contain wind turbines, the wind farm will not reduce the ability of people to enjoy the landscape, the food and the rural community in the region. There is, however, a possibility that tourism will be increased because of the wind turbines, as there is much support for renewable energy in the greater community. The nature of tourists in general is not to return to the same attraction over and over, but to go out of their way to see something they haven't seen before.

4.19.18	**Concern that the Community Enhancement Fund will benefit towns within the LGAs but not Boorowa or Rye Park.**

Response: The terms of the Community Fund will be negotiated with the local Councils, within which the respective elected representatives should provide balance as to the Council's spending objectives. Moreover, the Proponent will work closely with each Council to share experiences of other, operational community funds, and influence the terms of reference to enable a sharing of benefits commensurate with the impact on the immediate community.

4.19.19	**"We had plans to host farm stays on our farm to supplement our income - this will now be impossible and significantly impacts our future livelihood. "**

Response: The proposed Bango wind farm does not prevent this enterprise from being pursued. Moreover, it may well cater for a different sector of the available market.

Chapter 20: Residence Assessment Summary

4.20.1	**Dwelling incorrectly identified in EIS.**
	Response: Noted. Please refer to updated Residence Assessment summary in the Amended DA.
4.20.2	**"Residence 282 is listed as an approved DA site but construction of a house here began in early 2016 and is near completion. "**
	Response: Noted.
4.20.3	**"The description of the following residence as "weekender" implies it has less status than a residence. However, for the owner, it may be an opportunity to leave the city and enjoy the beauty and tranquillity of the rural landscape. "**
	Response: Noted.

Chapter 21: Statement of Commitments

4.21.1	**"It needs to be ensured that mitigations are carried out as per the commitments detailed in Chapter 21. "**
	Response: Noted.

Refer to Section **Error! Reference source not found.** in the Amended Development Application for r evised Statement of Commitments.

Chapter 22: Conclusion

No responses received.

This page is intentionally left blank.

5. SUBMISSION RECONCILIATION

Table 4: Comments by Submission

SSN	Name	Suburb	Comments	Stance
167007	Rowling, J	Thornleigh	4.14.1	Support
170853	Lo Conte, A	Theresa Park	4.4.1, 4.4.2, 4.4.6	Support
171755	Cavanagh, L	Galong	4.4.1, 4.4.3, 4.19.1, 4.19.2, ,4.19.10	Support
171781	Cavanagh, M	Galong	4.4.1, 4.19.2, 4.19.3	Support
171783	Cavanagh, P	Galong	4.4.1, 4.19.1, 4.19.2	Support
172144	Purves, R	Sydney	4.4.1, 4.4.4, 4.8.1, 4.19.1, 4.19.3	Support
173219	Name withheld	Frogmore	4.3.2, 4.19.5	Object
173281	Name withheld	Marulan	4.4.5, 4.8.2, 4.9.1, 4.19.4	Object
173655	Name withheld	Lane Cove	4.4.4, 4.8.3, 4.19.3	Support
173732	Southwell, C	Rye Park	4.4.6, 4.8.3, 4.19.1, 4.19.2, 4.19.3, 4.19.10	Support
173792	Witt, Rahsn	Redfern	4.19.3	Support
173796	Lumsdaine, J	Redfern	4.4.1	Support
173810	Name withheld	Laverstock	4.6.1, 4.8.2, 4.9.1, 4.19.6, 4.19.7	Object
173853	Gibson, R	Rye Park	4.4.5, 4.4.6, 4.8.3, 4.19.1, 4.19.2, 4.19.3	Support
174262	Archer, Wal	Kangiara	4.4.1, 4.16.1, 4.18.8, 4.19.3, 4.19.8	Support
174290	Rainger, H	Goulburn	4.6.2	Support
174461	Pomfret, R	Mollymook	4.4.1, 4.4.3, 4.4.5, 4.4.9, 4.8.1, 4.10.1, 4.12.1, 4.12.2, 4.17.1, 4.19.1, 4.19.2, 4.19.3, 4.19.9, 4.19.10	Support
174471	Name withheld	Bungedore	4.4.1	Support
174473	Scott, M	Heathcote	4.4.4, 4.4.10, 4.10.2, 4.19.1	Support
174489	Kelly, W	Rugby	4.4.10	Support
174491	Kelly, A	Rugby	4.4.1, 4.19.1	Support
174493	Kelly, P	Rugby	4.4.10, 4.19.9	Support
174674	Reeves, P	Gladesville	4.4.1, 4.4.10, 4.8.1, 4.17.1, 4.19.1, 4.19.3, 4.19.9	Support
174692	Gibson, R	Rye Park	4.4.1, 4.8.3, 4.19.2, 4.19.3, 4.19.9, 4.19.10	Support
174756	Wesley, M	Coolah	4.4.1	Support
174783	Stone, Judy	Murrumbateman	4.4.1	Support
174802	Donoghoe, M	Woodhousele	4.4.1, 4.4.4, 4.8.1, 4.19.9	Support
174843	Vanderlaan, D	Rye Park	4.8.4, 4.9.2, 4.12.3, 4.12.5, 4.19.11	Object
174867	Gardner, A	Braidwood	4.8.5, 4.8.20, 4.8.21, 4.8.22, 4.8.23, 4.8.24, 4.8.25, 4.8.26, 4.8.27, 4.8.28, 4.8.29, 4.8.30, 4.8.31, 4.8.32, 4.8.33	Object
174869	Hartnett, S	Goulburn	4.4.1, 4.4.2, 4.19.9	Support
174877	Name withheld	Yass	4.4.8, 4.5.1, 4.5.2, 4.6.1, 4.6.3, 4.9.1, 4.10.3, 4.10.4, 4.12.4, 4.13.1, 4.16.2, 4.19.6, 4.19.7, 4.19.12	Object
174900	Sellwood, T	Downer	4.3.3, 4.3.4, 4.4.7, 4.4.12, 4.5.2, 4.6.5, 4.8.2, 4.8.7, 4.8.8, 4.9.3, 4.10.5, 4.10.6, 4.10.7, 4.12.5, 4.12.7, 4.16.4, 4.16.5, 4.16.6, 4.17.2, 4.18.1, 4.18.2, 4.18.3, 4.18.4, 4.19.4, 4.19.7, 4.19.13, 4.19.14, 4.19.15, 4.19.16	Object
174902	Name withheld	Downer	4.3.3, 4.3.4, 4.6.5, 4.8.2, 4.9.2, 4.16.5, 4.19.7	Object
174904	Stapleton, R	Rye Park	4.5.2, 4.5.7, 4.8.2, 4.9.2, 4.9.4, 4.12.2, 4.12.3, 4.12.8, 4.12.9, 4.14.2, 4.14.3, 4.16.5, 4.18.3	Object
174920	Sainsbury, E	Rye Park	4.19.11	Object
174924	Sainsbury, D	Rye Park	4.19.6	Object

SSN	Name	Suburb	Comments	Stance
174926	Sainsbury, E	Rye Park	4.8.2	Object
174928	Sainsbury, E	Rye Park	4.3.1	Object
174934	Name withheld	Yass	4.4.5, 4.4.9, 4.4.11, 4.4.13, 4.4.14, 4.4.18, 4.6.1, 4.6.6, 4.8.9, 4.8.10, 4.8.11, 4.8.12, 4.9.1, 4.9.5, 4.9.6, 4.10.3, 4.11.1, 4.16.3, 4.19.4, 4.19.7, 4.19.16	Object
174936	Veness, S	Rye Park	4.5.2, 4.10.8, 4.12.2, 4.12.6, 4.16.3, 4.16.4, 4.18.5, 4.19.6	Object
174942	McGrath, T	Boorowa	4.4.1, 4.19.1, 4.19.2, 4.19.3, 4.19.10	Support
174950	Barberis, V	Rye Park	4.10.8, 4.12.10, 4.18.6	Object
174952	Sainsbury, D	Rye Park	4.12.8, 4.12.9, 4.12.10	Object
174956	Name withheld	Rye Park	4.8.2, 4.10.4, 4.10.8, 4.19.6	Object
174958	Veness, R & L	Rye Park	4.5.2, 4.8.7, 4.9.4, 4.10.8, 4.12.2, 4.16.3, 4.19.7	Object
174960	Washbrooke, J	Rye Park	4.3.2, 4.4.11, 4.6.1, 4.6.4, 4.6.7, 4.8.2, 4.8.7, 4.9.2, 4.9.3, .4.9.10, 4.12.9, 4.13.2, 4.13.4, 4.13.5, 4.14.2, 4.14.3, 4.15.1, 4.16.3, 4.16.5, 4.18.7, 4.19.6, 4.19.7	Object
174962	Name withheld	Kangiara	4.4.1, 4.4.4, 4.4.6, 4.6.8, 4.8.3, 4.12.1, 4.16.1, .4.19.2, 4.19.3, 4.19.9	Support
174966	Papadopoulos, G	Yass	4.9.2, 4.10.5	Object
174970	Crawford, M	Boro	4.5.3	Object
174972	Veness, R	Rye Park	4.5.4, 4.6.1, 4.10.1, 4.10.8, 4.12.2, 4.12.7, 4.12.9, 4.14.2, 4.14.3, 4.14.4, 4.14.5, 4.16.3, 4.16.6, 4.19.6, 4.19.7, 4.19.15	Object
174974	Crawford, M	Boro	4.4.16	Object
174976	Crawford, M	Boro	4.9.9, 4.19.6	Object
174978	Veness, G	Rye Park	4.5.4, 4.8.2, 4.9.2, 4.10.9, 4.12.2, 4.12.9, 4.16.3, 4.16.6, 4.18.5, 4.19.6, 4.19.7	Object
174980	Name withheld	Rye Park	4.5.4, 4.8.2, 4.19.7, 4.19.15	Object
174982	Name withheld	Rye Park	4.5.4, 4.16.3, 4.18.5, 4.19.7	Object
174984	McGrath, Tim	Boorowa	4.4.1, 4.12.1, 4.19.1, 4.19.2, 4.19.3, 4.19.10	Support
174986	Gorham, P	Rye Park	4.5.4, 4.6.1, 4.10.8, 4.12.2, 4.12.7, 4.19.6, 4.19.7, 4.19.15	Object
174990	Name withheld	Macarthur	4.4.5, 4.4.9, 4.4.13, 4.6.1, 4.6.9, 4.6.10, 4.8.2, 4.8.7, 4.8.13, 4.8.14, 4.9.2, 4.9.3, 4.9.5, 4.9.7, 4.10.8, 4.16.3, 4.16.7, 4.16.8, 4.17.2, 4.19.6, 4.19.7, 4.20.1	Object
174992	Hedges, R	Canberra	4.4.13, 4.4.17, 4.5.1, 4.5.5, 4.6.1, 4.6.9, 4.8.2, 4.8.15, 4.9.11, 4.20.1	Object
174994	Hemsley, S	Earlwood	4.4.1, 4.5.5, 4.8.2, 4.8.6, 4.9.2, 4.9.12, 4.10.8, 4.10.10, 4.10.11, 4.12.11, 4.19.7, 4.20.2, 4.21.1	Object
175097	Barrass, A	Blakney Creek	Repeat of submission 175126	Object
175121	J Apps	Rye Park	4.3.5, 4.3.6, 4.5.2, 4.5.4, 4.6.1, 4.6.5, 4.6.11, 4.6.12, 4.8.7, 4.8.13, 4.8.18, 4.8.19, 4.10.3, 4.10.12, 4.10.13, 4.10.14, 4.13.3, 4.16.9, 4.17.2, 4.17.3, 4.19.4, 4.19.6, 4.19.7, 4.19.8, 4.19.15, 4.19.17	Object
175124	Name withheld	Blakney Creek	4.4.18, 4.4.19, 4.5.4, 4.6.11, 4.6.13, 4.8.2, 4.9.2, 4.10.3, 4.10.5, 4.10.8, 4.12.2, 4.17.2, 4.19.6, 4.20.3	Object
175126	Barrass, A	Blakney Creek	4.4.18, 4.5.4, 4.8.2, 4.9.2, 4.10.3, 4.10.8	Object
175128	Name withheld	Blakney Creek	4.4.18, 4.5.4, 4.8.2, 4.10.8, 4.18.5	Object

SSN	Name	Suburb	Comments	Stance
175130	Burgess, M	Boorowa	4.4.3, 4.4.6, 4.12.1, 4.16.1, 4.18.8, 4.19.1, 4.19.2, 4.19.3	Support
175136	Cockerill, B	Ainslie	4.4.1, 4.19.9	Support
175157	Name withheld	Goulburn	4.4.1, 4.4.6	Support
175173	Renwood, K	Kangiara	4.6.1, 4.6.14, 4.8.2, 4.11.2, 4.12.5, 4.19.6, 4.19.7, 4.19.19	Object
175178	Edwin Kelly	Rye Park	4.4.5, 4.4.18, 4.5.6, 4.8.2, 4.9.2, 4.10.3, 4.10.5, 4.16.3, 4.19.7, 4.19.15	Object
175186	Braid, C	Frogmore	Submission for Rye Park	Object
175191	Sainsbury, D	Rye Park	4.10.8, 4.12.11, 4.18.5	Object
175197	Field, J	Dalton	4.4.5, 4.8.2	Object
175209	Field, A	Yass	4.4.19, 4.10.8, 4.12.2, 4.19.7	Object
175233	Name withheld	Boorowa	4.6.11	Object
175247	Arnott, J	Boorowa	4.6.11, 4.10.8	Object
175251	Crawford, M	Boro	4.8.20	Object
175253	Arnott, A	Boorowa	4.6.1, 4.6.11, 4.8.2, 4.10.8	Object
175260	Arnott, M	Boorowa	4.8.2, 4.8.7, 4.9.1, 4.9.2, 4.10.5, 4.11.3, 4.16.3, 4.16.5, 4.16.6, 4.17.3, 4.18.9, 4.19.7, 4.19.15	Object
175264	Arnott, M	Boorowa	4.6.1, 4.8.2, 4.9.1, 4.12.2, 4.19.6, 4.19.15	Object
175298	Farthing, M	Rye Park	4.4.5, 4.8.2, 4.19.7	Object
175308	Name withheld	Boorowa	4.4.20, 4.8.2, 4.9.1, 4.10.5, 4.12.7, 4.12.9, 4.16.3, 4.19.7	Object
175316	Name withheld	Yass	4.8.2, 4.9.2, 4.10.8	Object
175320	Thompson, P	Boorowa	4.10.3	Object
175324	Johnston, L	Balmain	4.4.1, 4.9.13	Support
175329	Name withheld	Laverstock	4.6.15	Object
175337	Name withheld	Ourimbah	4.8.2	Object
175341	Name withheld	Halekulani	4.4.5	Object
175345	Barbaris, A	Rye Park	Repeat of submission 174956	Object
175347	Gunthorpe, T	Kangiara	4.4.4, 4.4.6, 4.19.1, 4.19.9	Support
176506	Bickford, T	Rye Park	4.5.2, 4.5.7, 4.8.2, 4.8.13, 4.10.3, 4.10.5, 4.10.8, 4.12.5, 4.12.11, 4.16.4, 4.19.6, 4.19.15	Object
178083	Winterflood, R	Kangiara	4.8.2, 4.19.6, 4.19.7	Object

This page is intentionally left blank.

6. REVISED LAYOUT OPTIONS

The following figures show the layout response to submissions. More detail is provided in the Bango Wind Farm Amended Development Application.

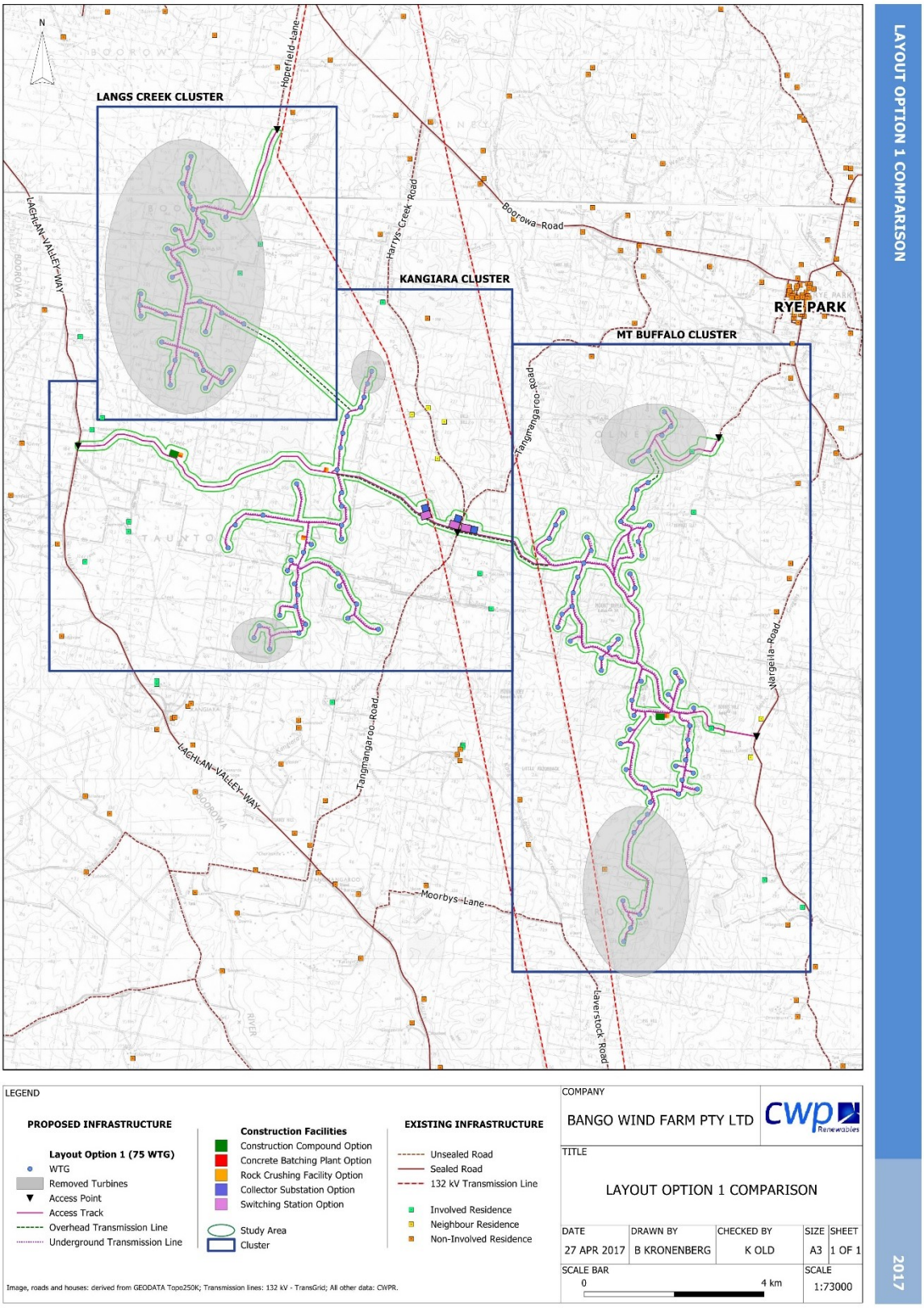


Figure 3: Areas Targeted for Turbine removal

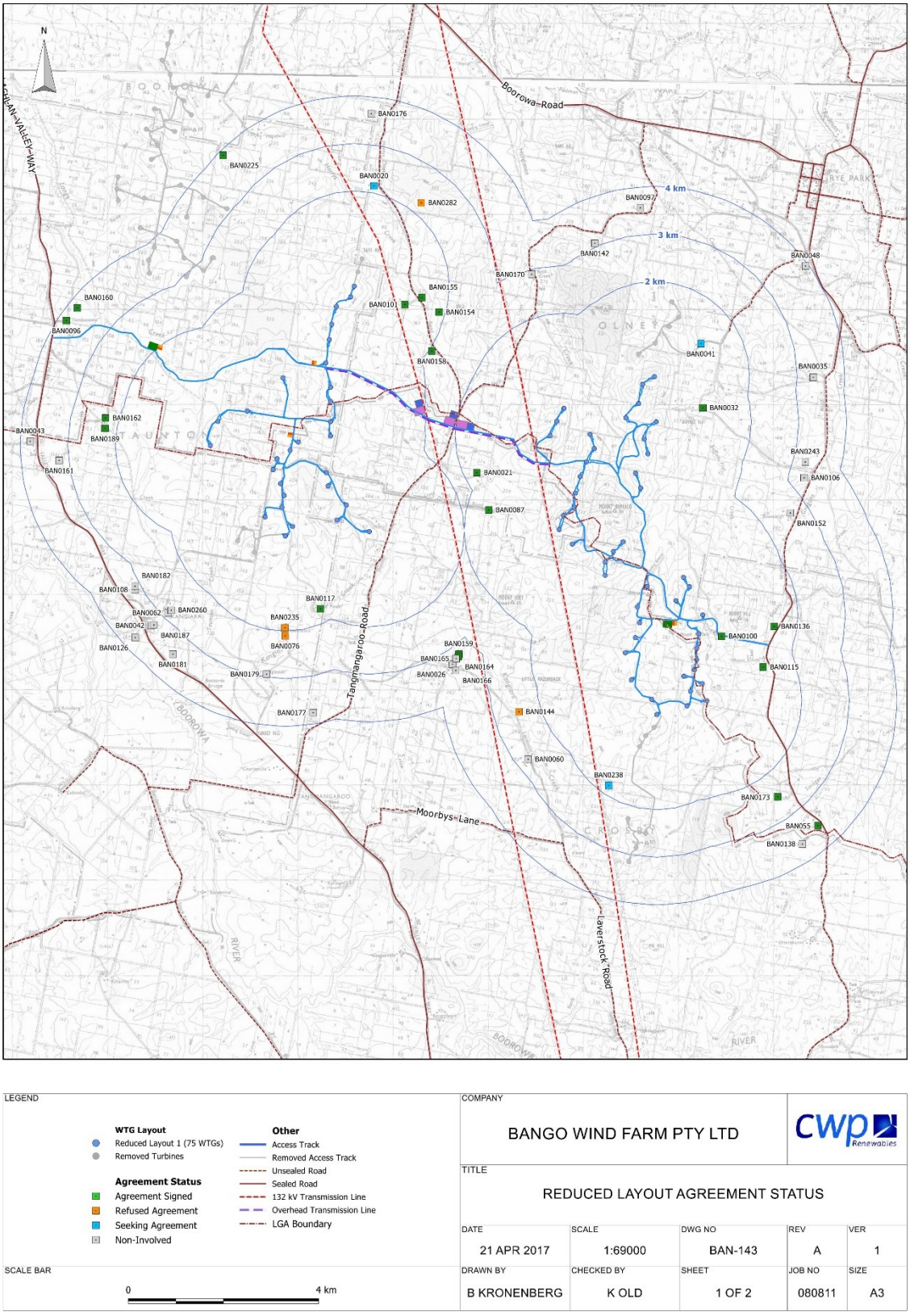


Figure 4: Bango Revised Layout Option 1

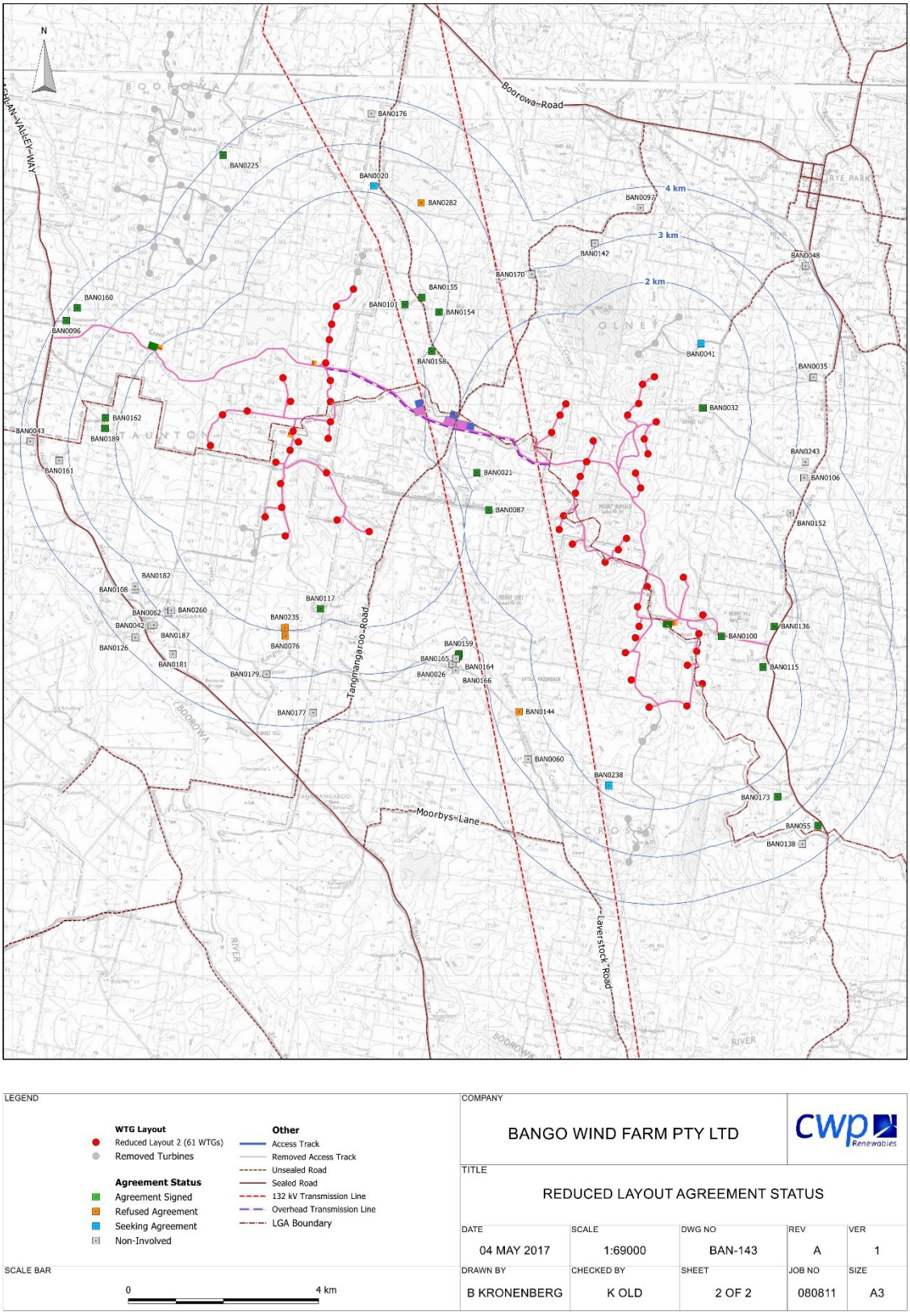


Figure 5: Bango Revised Layout Option 2

This page is intentionally left blank.

Appendix 1

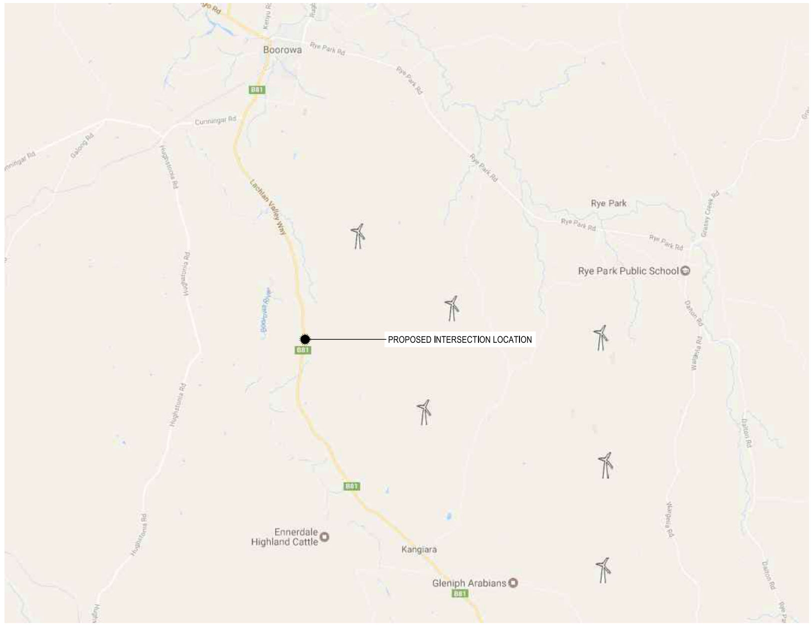
Main Entrance Design

BANGO WIND FARM

EXTERNAL INTERSECTION - OPTION 1

FOR

CWP RENEWABLES PTY LTD



PROPOSED INTERSECTION LOCALITY PLAN

NTS

DETAILED INTERSECTION LOCALITY PLAN

SCALE 1:2000

REV	DETAIL	DRN	CHK	APP	DATE
PRELIMINARY	FOR APPROVAL	M.J.L.	N.C.	N.C.	28.04.17

REVISIONS AND APPROVALS

i3 consulting pty ltd
engineering consultants
innovation, ingenuity, inspiration
L2 39 Sherwood Rd Toowong, Qld 4066
PO Box 878 Toowong, Qld 4066
www.icubed.com.au
mail@icubed.com.au
ABN 89 106 675 156
ACN 106 675 156
p 07 3870 8888

PROJECT: BANGO WIND FARM

TITLE: EXTERNAL INTERSECTION SITE ENTRY 1 - LOCALITY PLAN OPTION 1

DRAWING STATUS: PRELIMINARY

PROJECT No.: 16-097

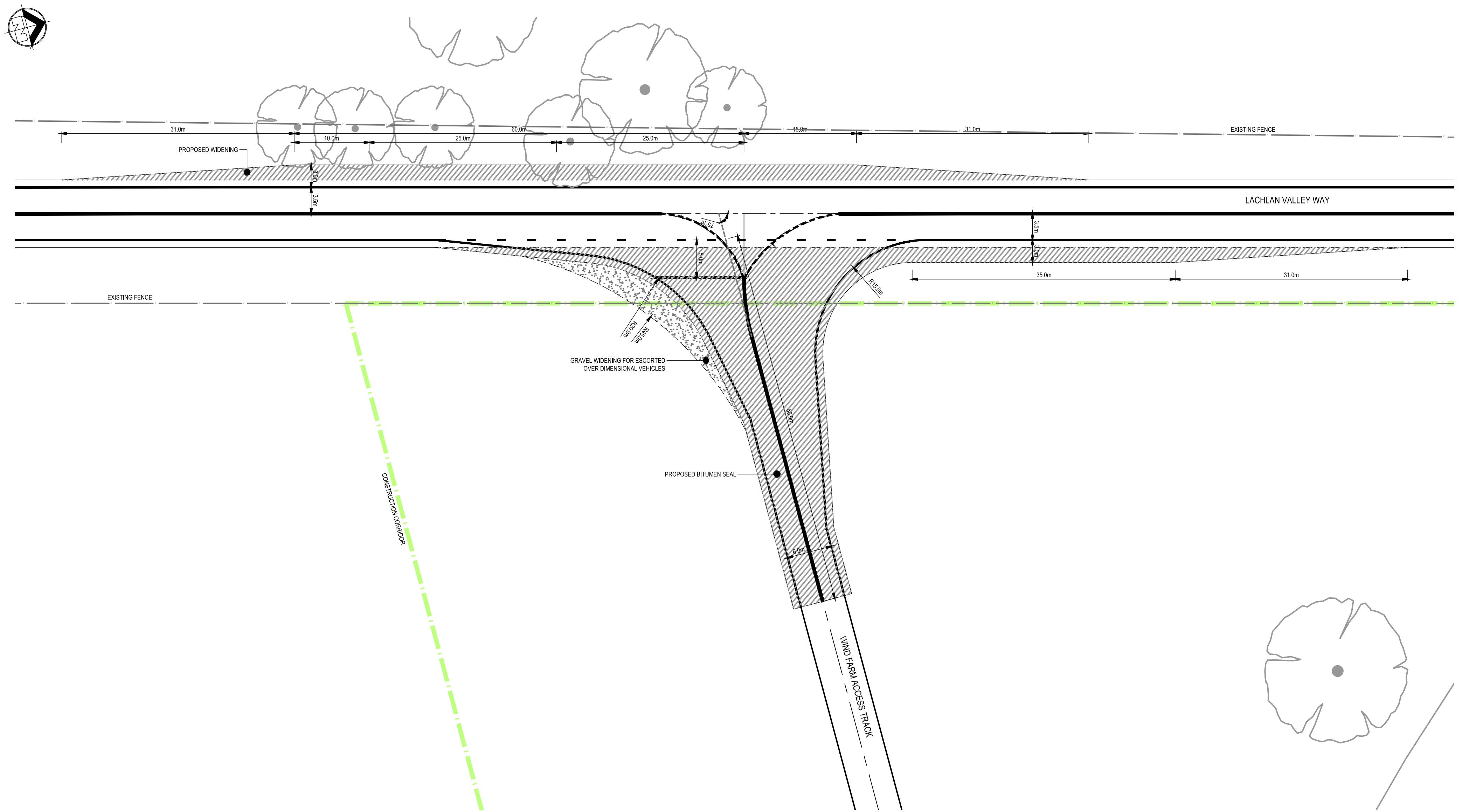
DO NOT AMEND MANUALLY

SCALE:

SIZE: A1

DRAWING No.: 16-097-BWF-C0100

REV.: A



PROPOSED SITE ENTRY 1 INTERSECTION LAYOUT PLAN

SCALE 1:250

2D LAYOUT ONLY!!
LEVELS, DRAINAGE AND SISD
STUDY TO BE ASSESSED
UPON RECEIPT OF SURVEY

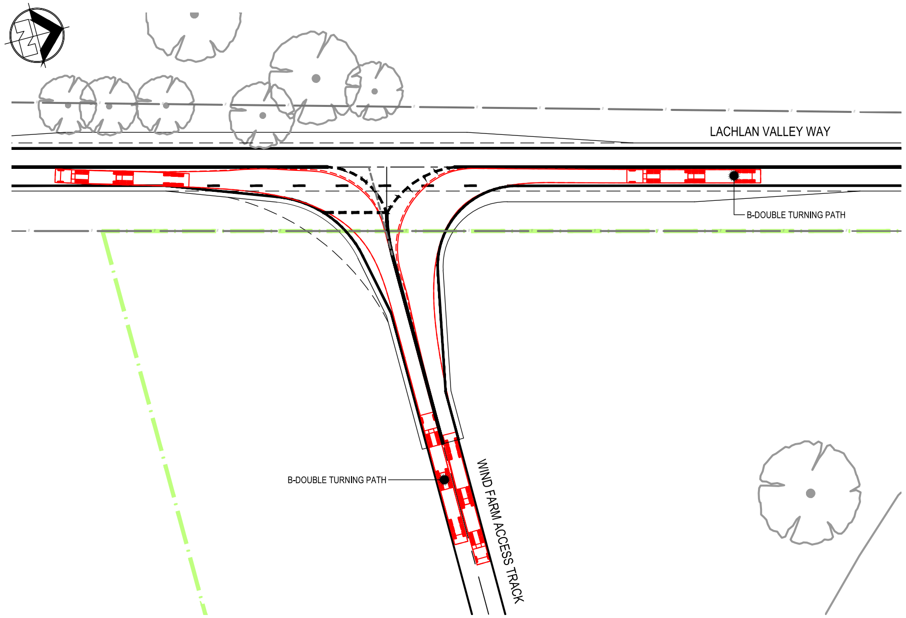
REV	DETAIL	DRN	CHK	APP	DATE
A	PRELIMINARY	M.J.L.	N.C.	N.C.	28.04.17

REVISIONS AND APPROVALS

i3 consulting pty ltd
engineering consultants
innovation, ingenuity, inspiration
L2 39 Sherwood Rd, Toowong, Qld 4066
PO Box 878, Toowong, Qld 4066
www.icubed.com.au
mail@icubed.com.au
ABN 89 106 675 156
ACN 106 675 156
p 07 3870 8888

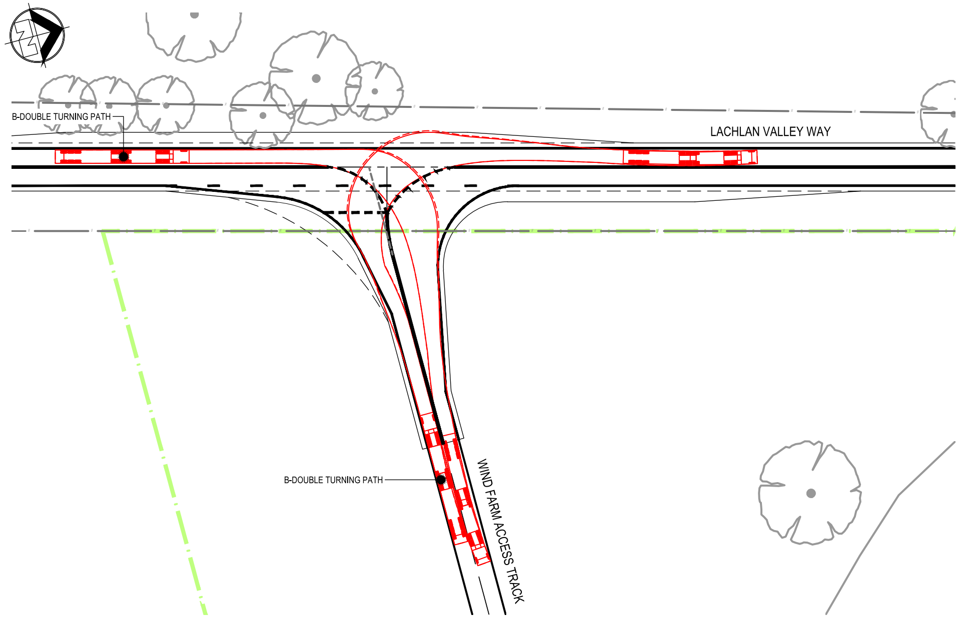
PROJECT	BANGO WIND FARM
TITLE	EXTERNAL INTERSECTION SITE ENTRY 1 - LAYOUT PLAN OPTION 1
DRAWING STATUS	PRELIMINARY
PROJECT No.	16-097
SCALE	
SIZE	A1
DRAWING No.	16-097-BWF-C0101
REV.	A

cad DO NOT AMEND MANUALLY



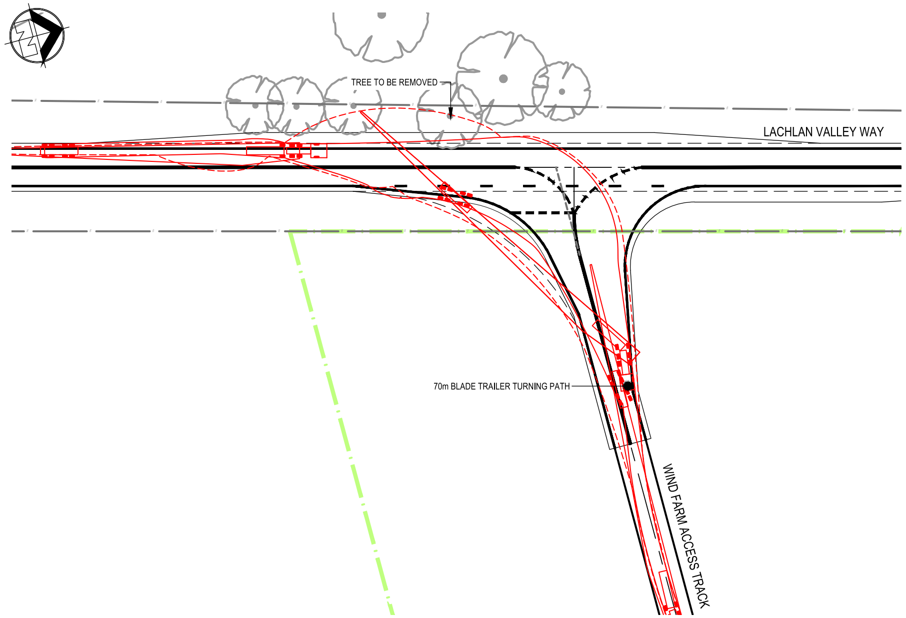
TURNING PATH PLAN - B-DOUBLE

SCALE 1:500



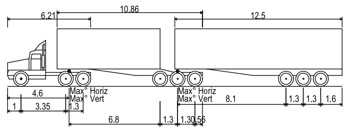
TURNING PATH PLAN - B-DOUBLE

SCALE 1:500



TURNING PATH PLAN - BLADE TRAILER

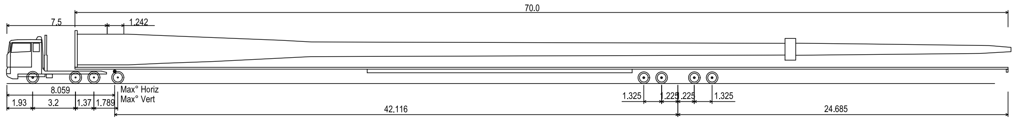
SCALE 1:500



B-Double (25.0m)	
Overall Length	25.000m
Overall Width	2.500m
Overall Body Height	4.300m
Min Body Ground Clearance	0.540m
Track Width	2.500m
Lock-to-lock time	6.00s
Curb to Curb Turning Radius	15.000m

B-DOUBLE PROFILE

NTS



70 m Blade Truck andTrailer (With Dolly)	
Overall Length	74.860m
Overall Width	2.591m
Overall Body Height	3.628m
Min Body Ground Clearance	0.348m
Max Track Width	2.591m
Lock-to-lock time	6.00s
Max Steering Angle (Virtual)	30.00°

70m BLADE TRAILER PROFILE

NTS

REV	DETAIL	DRN	CHK	APP	DATE
A	PRELIMINARY	M.J.L.	N.C.	N.C.	28.04.17

REVISIONS AND APPROVALS

i3 consulting pty ltd
engineering consultants
innovation, ingenuity, inspiration
L2 39 Sherwood Rd Toowong, Qld 4066
PO Box 878 Toowong, Qld 4066
www.icubed.com.au
mail@icubed.com.au
ABN 89 106 675 156
ACN 106 675 156
p 07 3870 8888

PROJECT: BANGO WIND FARM
TITLE: EXTERNAL INTERSECTION
SITE ENTRY 1 - TURNING PATH PLAN
OPTION 1
DRAWING STATUS: PRELIMINARY
PROJECT No.: 16-097
CAD DO NOT AMEND MANUALLY
SCALE:
SIZE: A1
DRAWING No.: 16-097-BWF-C0102
REV.: A

PROPOSED SITE ENTRY 1 INTERSECTION SISD PLAN

SCALE 1:1000

INTERSECTION SIGHT DISTANCES

AUSTROADS - GUIDE TO ROAD DESIGN PARTS 3 & 4a

SISD - SAFE INTERSECTION SIGHT DISTANCE

LACHLAN VALLEY WAY

1.1m	DRIVERS EYE HEIGHT
1.25m	OBJECT HEIGHT
3.0s	OBSERVATION TIME
2.0s	REACTION TIME
d=0.46	DECELERATION VALUE
V=110km/h	OPERATING (85th PERCENTILE) SPEED

CALCULATED SIGHT DISTANCES
(INCLUDING CORRECTION FOR GRADES)

ROAD	SISD (m)
LACHLAN VALLEY WAY NORTH	250
LACHLAN VALLEY WAY SOUTH	269

SIGHT DISTANCE NORTH

SIGHT DISTANCE SOUTH

2D LAYOUT ONLY!!
LEVELS, DRAINAGE AND SISD
STUDY TO BE ASSESSED
UPON RECEIPT OF SURVEY

REV	DETAIL	DRN	CHK	APP	DATE
A	PRELIMINARY	M.J.L	N.C.	N.C.	28.04.17

REVISIONS AND APPROVALS

i³ consulting pty ltd
engineering consultants
innovation, ingenuity, inspiration
L2 39 Sherwood Rd Toowong QLD 4066 PO Box 979 Toowong QLD 4066
www.i3consult.com.au mail@i3consult.com.au
ABN 99 106 670 765 ACN 106 670 765
p: 07 3870 0866

PROJECT
BANGO WIND FARM

TITLE
EXTERNAL INTERSECTION
SITE ENTRY 1 - SISD PLAN
OPTION 1

DRAWING STATUS
PRELIMINARY

PROJECT No.	SCALE	DATE
16-097		A1

DRAWING No.
16-097-BWF-C0103

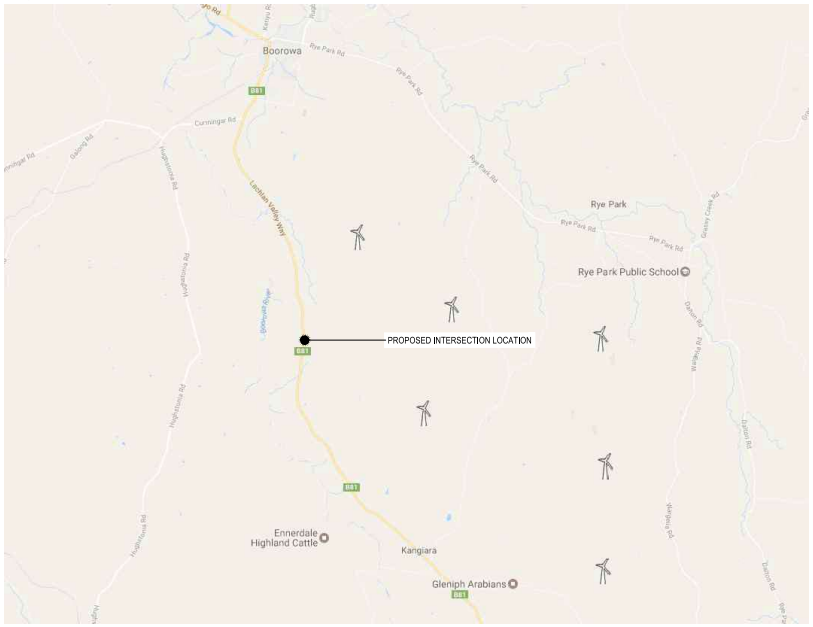
REV.
A

BANGO WIND FARM

EXTERNAL INTERSECTION - OPTION 2

FOR

CWP RENEWABLES PTY LTD



PROPOSED INTERSECTION LOCALITY PLAN

NTS

DETAILED INTERSECTION LOCALITY PLAN

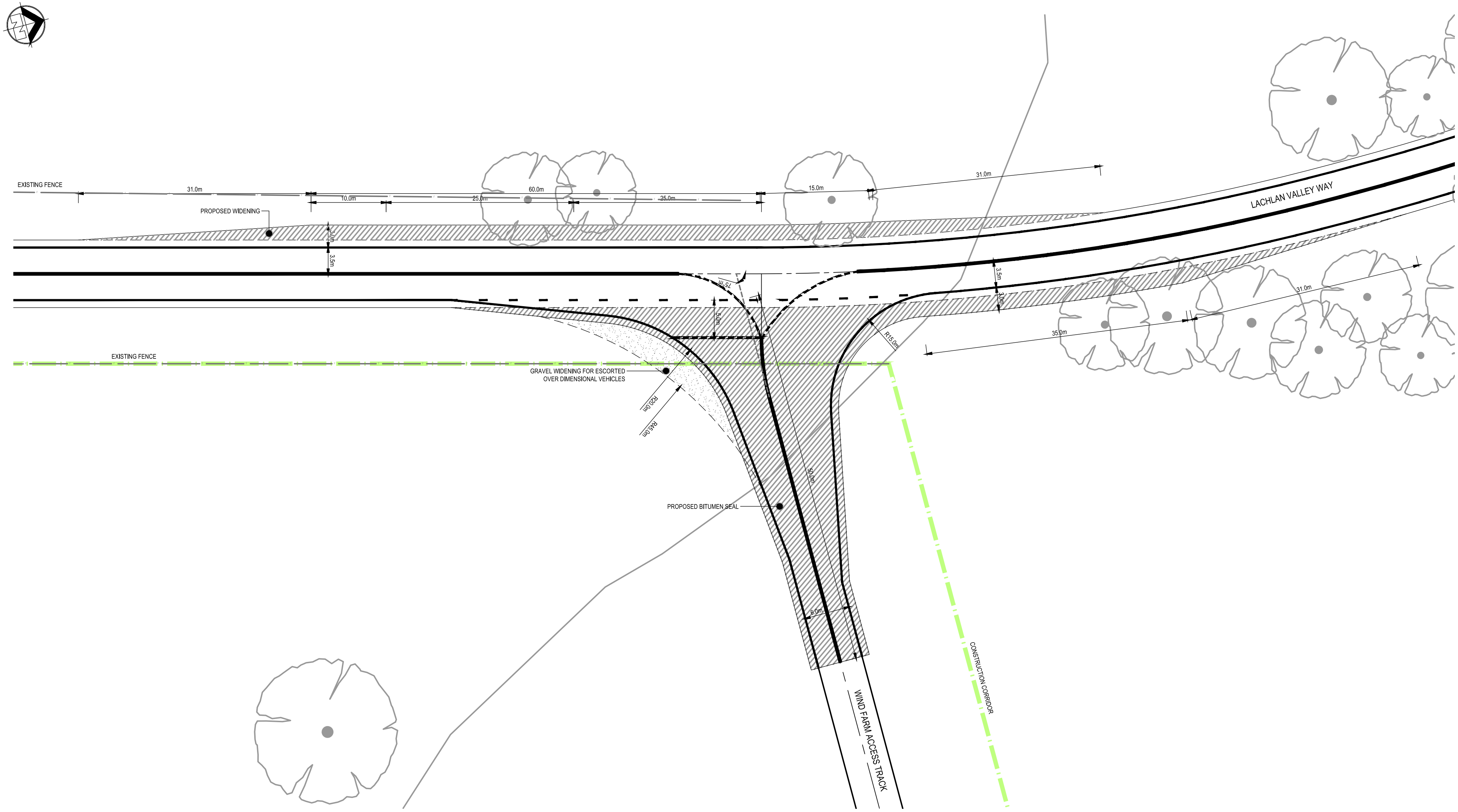
SCALE 1:2000

REV	DETAIL	DRN	CHK	APP	DATE
A	PRELIMINARY	M.J.L	N.C.	N.C.	28.04.17

REVISIONS AND APPROVALS

i³ consulting pty ltd
engineering consultants
innovation. ingenuity. inspiration

PROJECT	BANGO WIND FARM
TITLE	EXTERNAL INTERSECTION SITE ENTRY 1 - LOCALITY PLAN OPTION 2
DRAWING STATUS	PRELIMINARY
PROJECT No.	16-097
SCALE	
SIZE	A1
DRAWING No.	16-097-BWF-C0110
REV.	A



PROPOSED SITE ENTRY 1 INTERSECTION LAYOUT PLAN

SCALE 1:250

2D LAYOUT ONLY!!
LEVELS, DRAINAGE AND SISD
STUDY TO BE ASSESSED
UPON RECEIPT OF SURVEY

REV	DETAIL	DRN	CHK	APP	DATE
A	PRELIMINARY	M.J.L.	N.C.	N.C.	28.04.17

REVISIONS AND APPROVALS

i3 consulting pty ltd
engineering consultants
innovation, ingenuity, inspiration
L2 39 Sherwood Rd, Toowong, Qld 4066
PO Box 878, Toowong, Qld 4066
www.icubed.com.au
mail@icubed.com.au
ABN 89 106 675 156
ACN 106 675 156
p 07 3870 8888

PROJECT: BANGO WIND FARM

DRAWING STATUS: PRELIMINARY

TITLE: EXTERNAL INTERSECTION
SITE ENTRY 1 - LAYOUT PLAN
OPTION 2

PROJECT No. 16-097

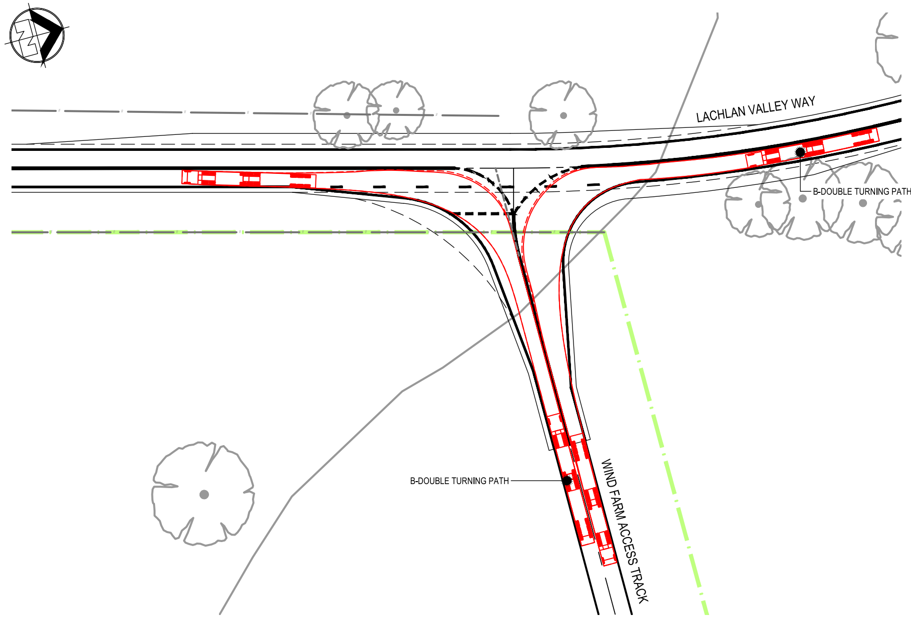
cad DO NOT AMEND MANUALLY

SCALE

SIZE A1

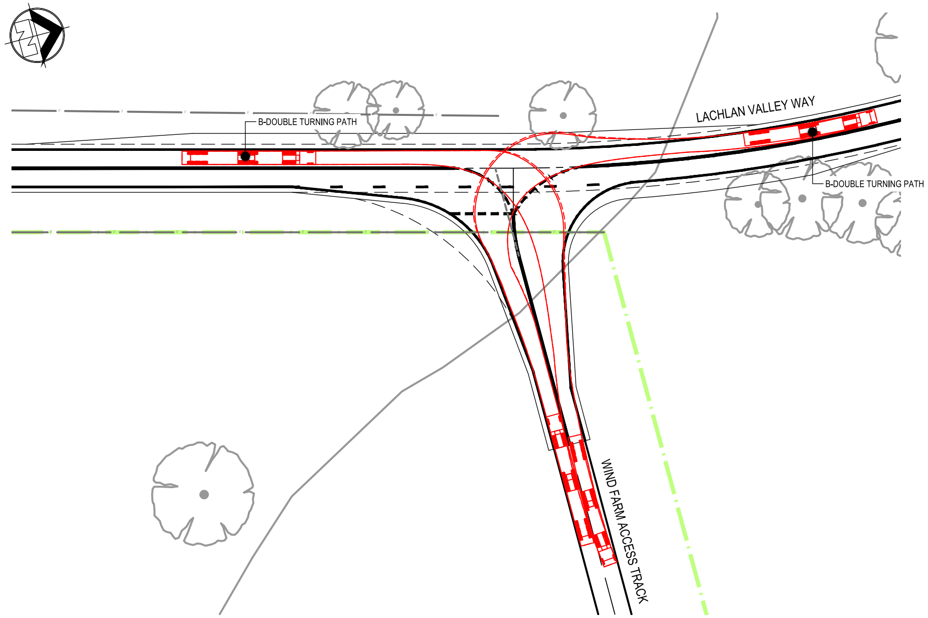
DRAWING No. 16-097-BWF-C0111

REV. A



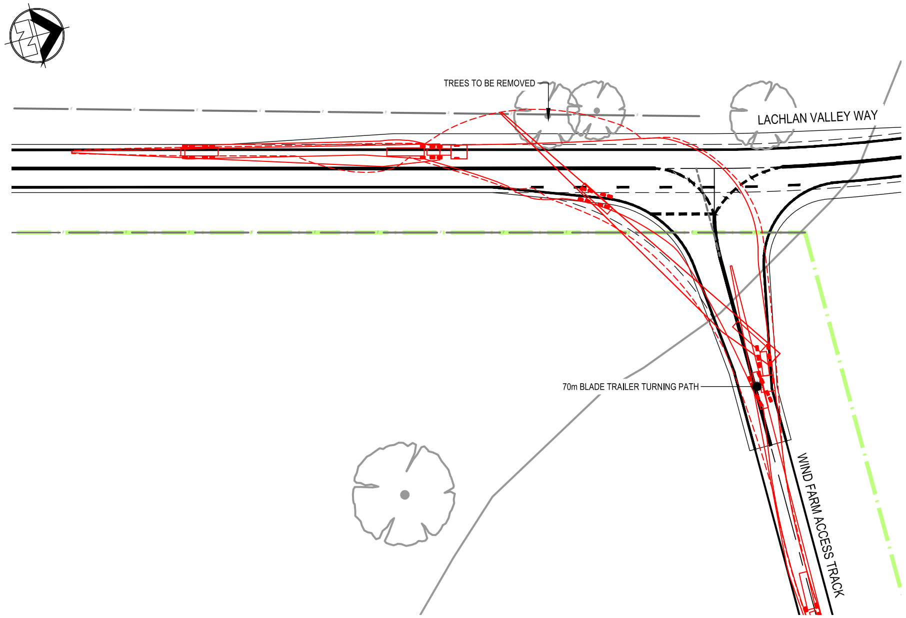
TURNING PATH PLAN - B-DOUBLE

SCALE 1:500



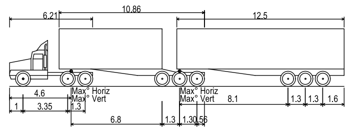
TURNING PATH PLAN - B-DOUBLE

SCALE 1:500



TURNING PATH PLAN - BLADE TRAILER

SCALE 1:500

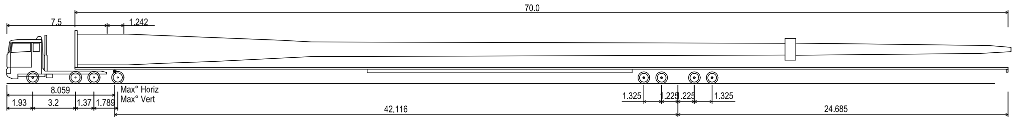


B-Double (25.0m)

Overall Length	25.000m
Overall Width	2.500m
Overall Body Height	4.300m
Min Body Ground Clearance	0.540m
Track Width	2.500m
Lock-to-lock time	6.00s
Curb to Curb Turning Radius	15.000m

B-DOUBLE PROFILE

NTS



70 m Blade Truck andTrailer (With Dolly)

Overall Length	74.860m
Overall Width	2.591m
Overall Body Height	3.628m
Min Body Ground Clearance	0.348m
Max Track Width	2.591m
Lock-to-lock time	6.00s
Max Steering Angle (Virtual)	30.00°

70m BLADE TRAILER PROFILE

NTS

REV	DETAIL	DRN	CHK	APP	DATE
A	PRELIMINARY	M.J.L.	N.C.	N.C.	28.04.17

REVIEWS AND APPROVALS

i3 consulting pty ltd
engineering consultants
innovation, ingenuity, inspiration
L2 39 Sherwood Rd, Toowong, Qld 4066
PO Box 878, Toowong, Qld 4066
www.icubed.com.au
mail@icubed.com.au
ABN 89 106 675 156
ACN 106 675 156
p 07 3870 8888

PROJECT: BANGO WIND FARM

TITLE: EXTERNAL INTERSECTION
SITE ENTRY 1 - TURNING PATH PLAN
OPTION 2

DRAWING STATUS: PRELIMINARY

PROJECT No. 16-097 | cad DO NOT AMEND MANUALLY | SCALE | SIZE A1

DRAWING No. 16-097-BWF-C0112 | REV. A

Appendix 2

Biodiversity Response to Submissions

ERM

Environmental Resources Management Australia Pty Ltd

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.

Environmental Resources
Management Australia Pty Ltd
A.C.N. 002 773 248
A.B.N. 12 002 773 248

Offices worldwide

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 oversize 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)

			Totals in Area (ha) or Number (HBTs)*												
Species	**Impact**	**Habitat Type or Vegetation Zone**	**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 micrositing. The results of this analysis would be considered to explore all opportunities to minimise impacts by ensuring micrositing 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

	PL1		PL2	
Wedge-tailed Eagle Nest Identifier	**WTG Identification Number**	**Separation Distance**	**WTG Identification Number**	**Separation Distance**
1	-	-	-	-
2	76	323	22	341
	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-> Species	Nov			Dec			Jan			Feb		
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-> Species	Nov			Dec			Jan			Feb		
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

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

Annex A

Endangered Ecological Communities

1 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 Blakley'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)

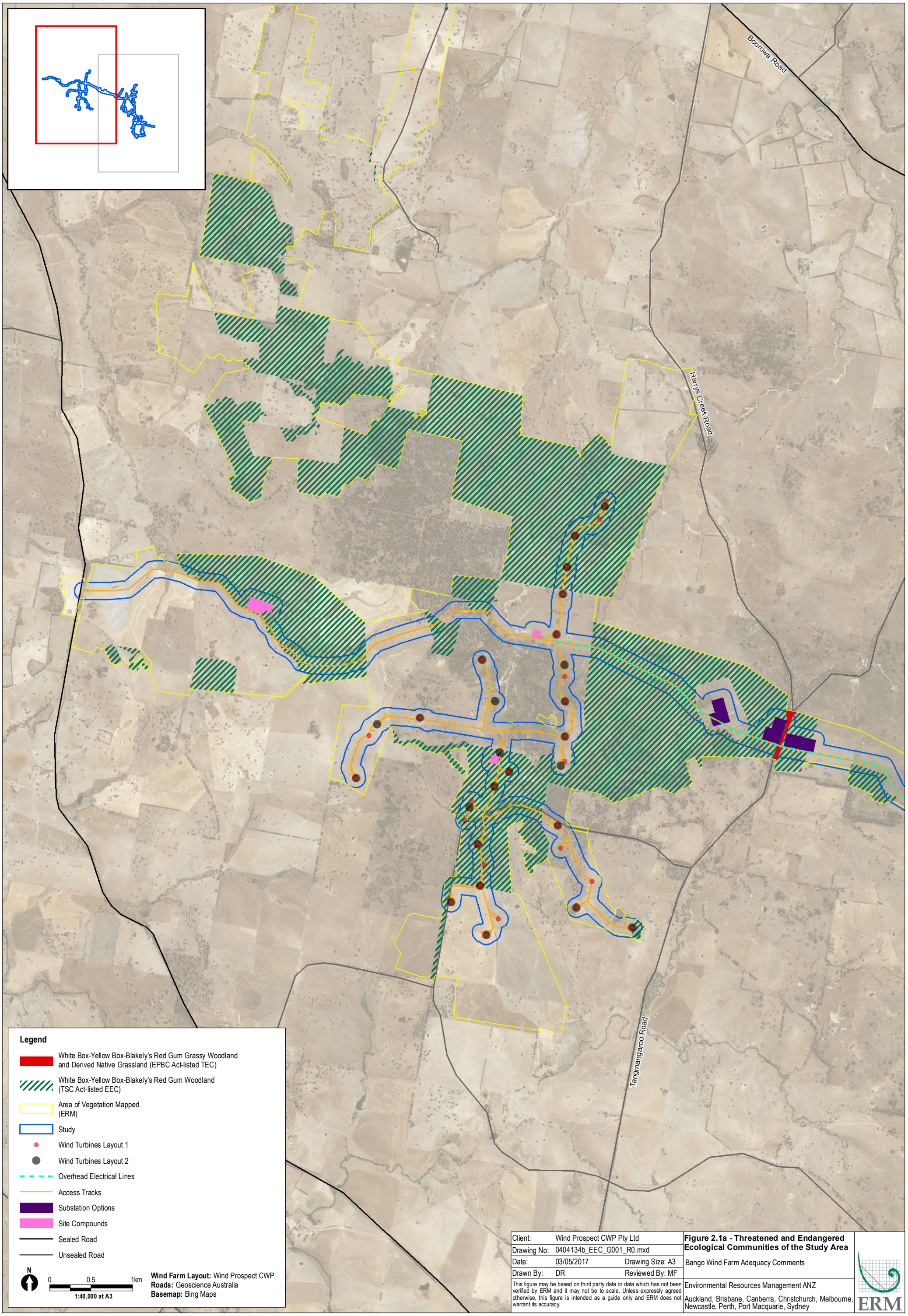
Vegetation zone Apple Box - Yellow Box Dry Grassy Woodland of the South Eastern Highlands - Mod_Good – Medium (LA103_MG_S) constitutes the TSC Act-listed EEC, as it is grassy woodland dominated by Yellow Box. However, it does not meet the identification guidelines for the EPBC listed TEC as it does not 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.



Client:	Wind Prospect CWP Pty Ltd		
Drawing No:	0404134b_EEC_G001_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.

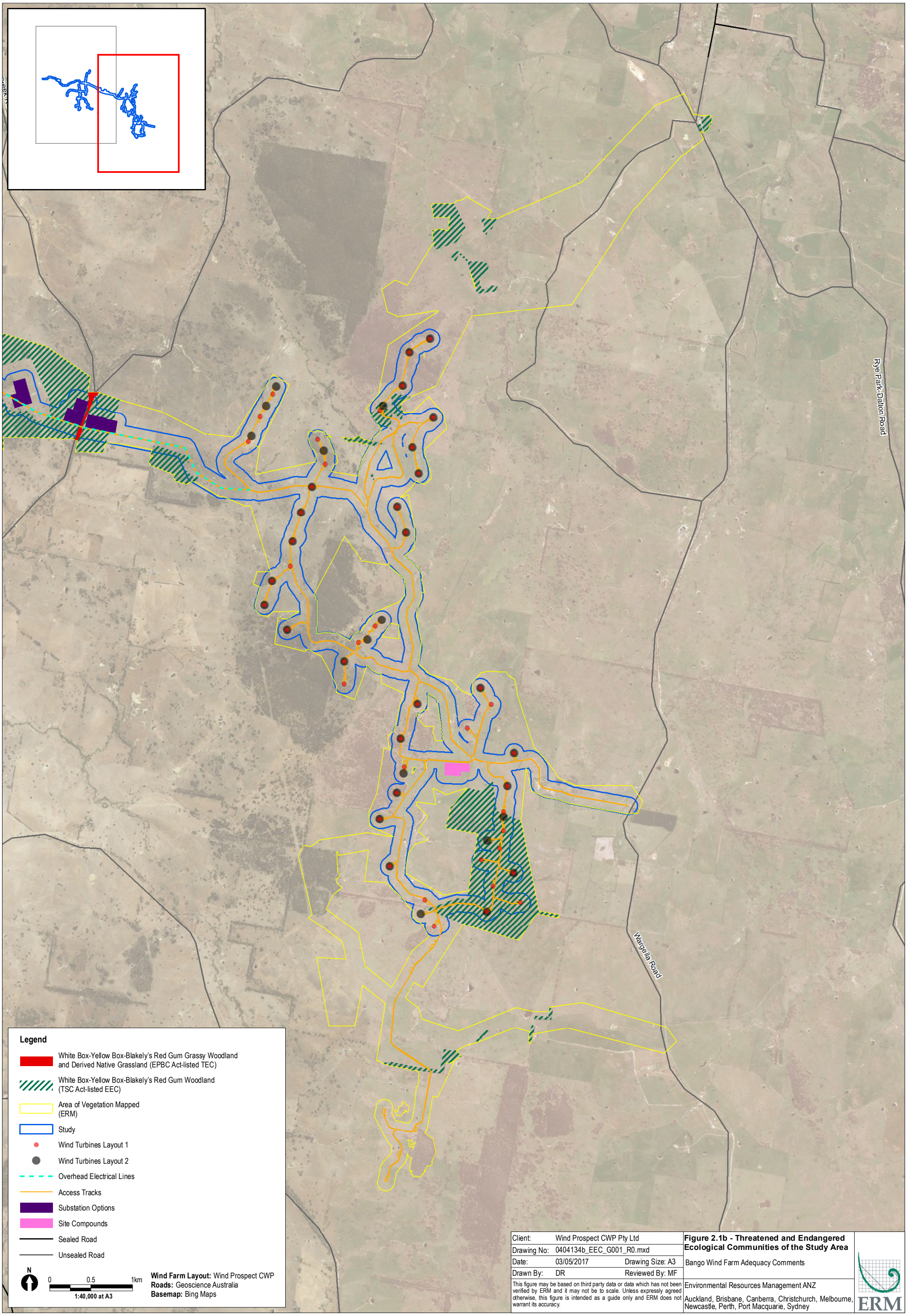
Figure 2.1a - Threatened and Endangered Ecological Communities of the Study Area

Bango Wind Farm Adequacy Comments

Environmental Resources Management ANZ

Auckland, Brisbane, Canberra, Christchurch, Melbourne, Newcastle, Perth, Port Macquarie, Sydney

ERM



Client:	Wind Prospect CWP Pty Ltd		
Drawing No:	0404134b_EEC_G001_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 2.1b - Threatened and Endangered Ecological Communities of the Study Area

Bango Wind Farm Adequacy Comments

Environmental Resources Management ANZ

Auckland, Brisbane, Canberra, Christchurch, Melbourne, Newcastle, Perth, Port Macquarie, Sydney

ERM

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.

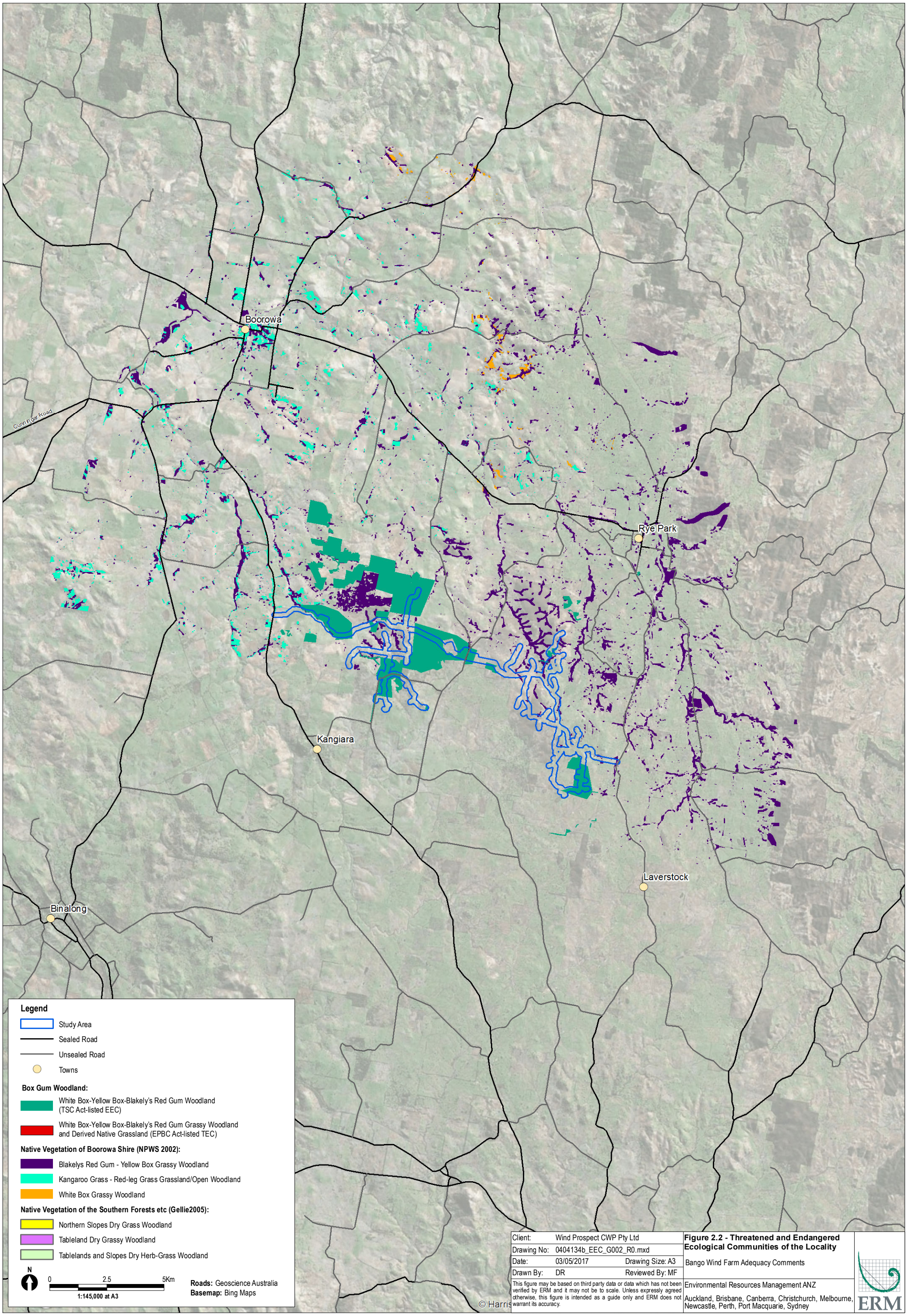
The following vegetation mapping was used:

- *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*.


Boorowa
Cunningar Road
Rye Park
Kangiara
Laverstock
Binalong
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):
Blakelys 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
N
0
2.5
5Km
1:145,000 at A3
Roads: Geoscience Australia
Basemap: Bing Maps
© Harris
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
ERM

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.

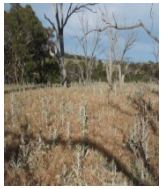
2.3 SURVEY SITE DETAILS

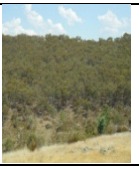
Table 2.4 describes the woodland bird survey locations by stratification sub units within the native woodland areas. Where sites had a similar vegetation community they were separated by levels of disturbance, structure and features.

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^{o}c
34	21/11/2012	Bird Census	15:35	16:14	Taffs Hill	34.51265 S	148.7546 E	Calm, 22^{o}c
36	22/11/2012	Bird Census	9:05	9:42	Pines	34.57336 S	148.7953 E	Light wind, 12^{0}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^{0}C
31	22/11/2012	Bird Census	17:30	17:58	Taree	34.55528 S	148.8679 E	Light wind, 24^{0}C
34	23/11/2012	Bird Census	7:21	8:07	Taffs Hill	34.51125 S	148.7536 E	Light wind, 10^{0}C
-	5/12/2012	Bird Census	7:35	8:20	Hillview	34.55223 S	148.865 E	Moderate wind, 10^{0}C
-	5/12/2012	Bird Census	16:25	17:10	Willow Hill	34.58071 S	148.8487 E	Moderate wind, 22^{0}C
-	6/12/2012	Bird Census	16:20	17:05	Hillview	34.55223 S	148.865 E	Calm, 25^{0}C
56	13/12/2012	Bird Census	12:07	13:00	Lloyd Davis	34.64377 S	148.8712 E	Calm, 20^{0}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 *Acacia* 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	Dominate 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	Dominate species Nodding Blue-lily and mixture of native and exotic grasses	Some fallen timber and stags scattered through this area	Moderate	
WP022	Yambacoona	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	Yambacoona	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	

2.4 *RESULTS*

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).

3 *REFERENCES*

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

1 INTRODUCTION

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

1.1 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).

2 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 RESULTS

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 *Table3.2)* 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 and *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	5/12/2012	15:10	1	0-40	20	W	Very Windy
19	Lavestock Rd. Montalta Gate	6/12/2012	13:25	5	0-40	30	S	
19	Lavestock Rd. Montalta Gate	6/12/2012	13:25	2	0-40	20	N	
19	Lavestock Rd. Montalta Gate	6/12/2012	13:25	3	0-40	10	N	

Figure 3.1 *Morning Flight Path Summary*

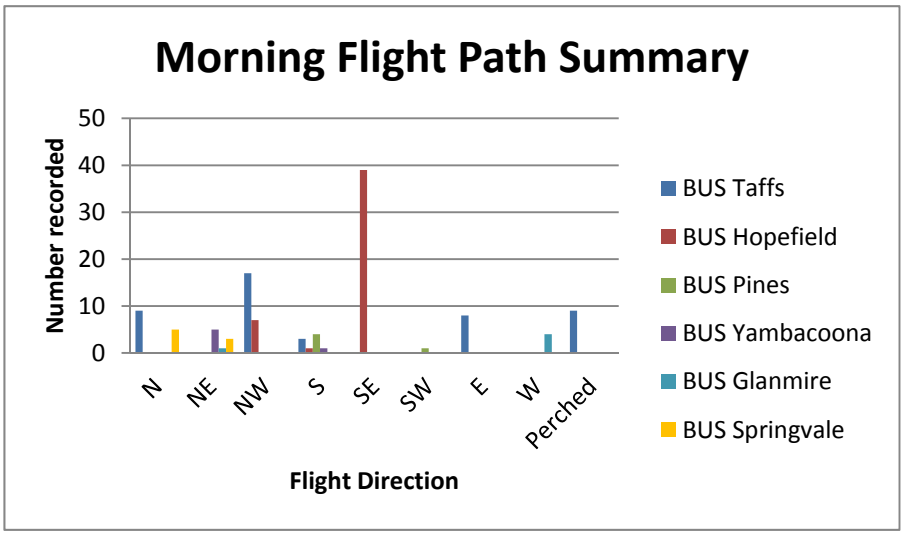
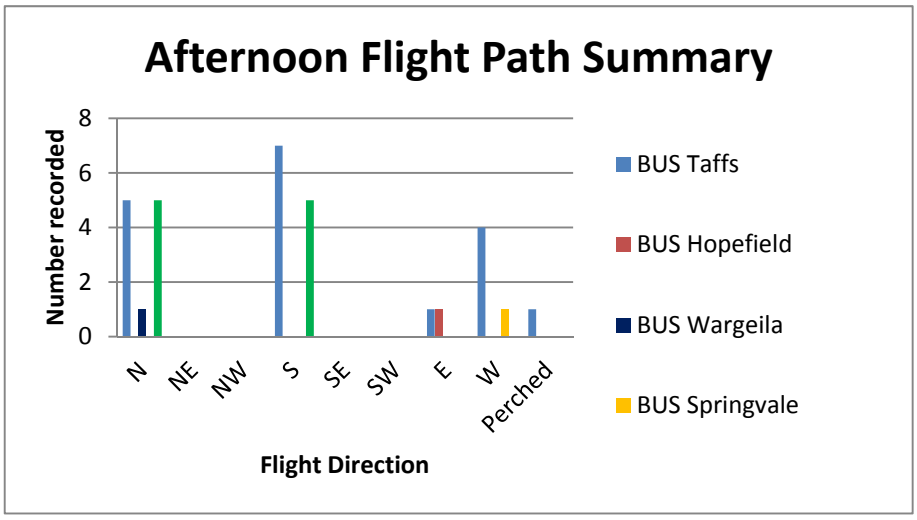


Figure 3.2 *Afternoon Flight Path Summary*



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.

5 *REFERENCES*

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.

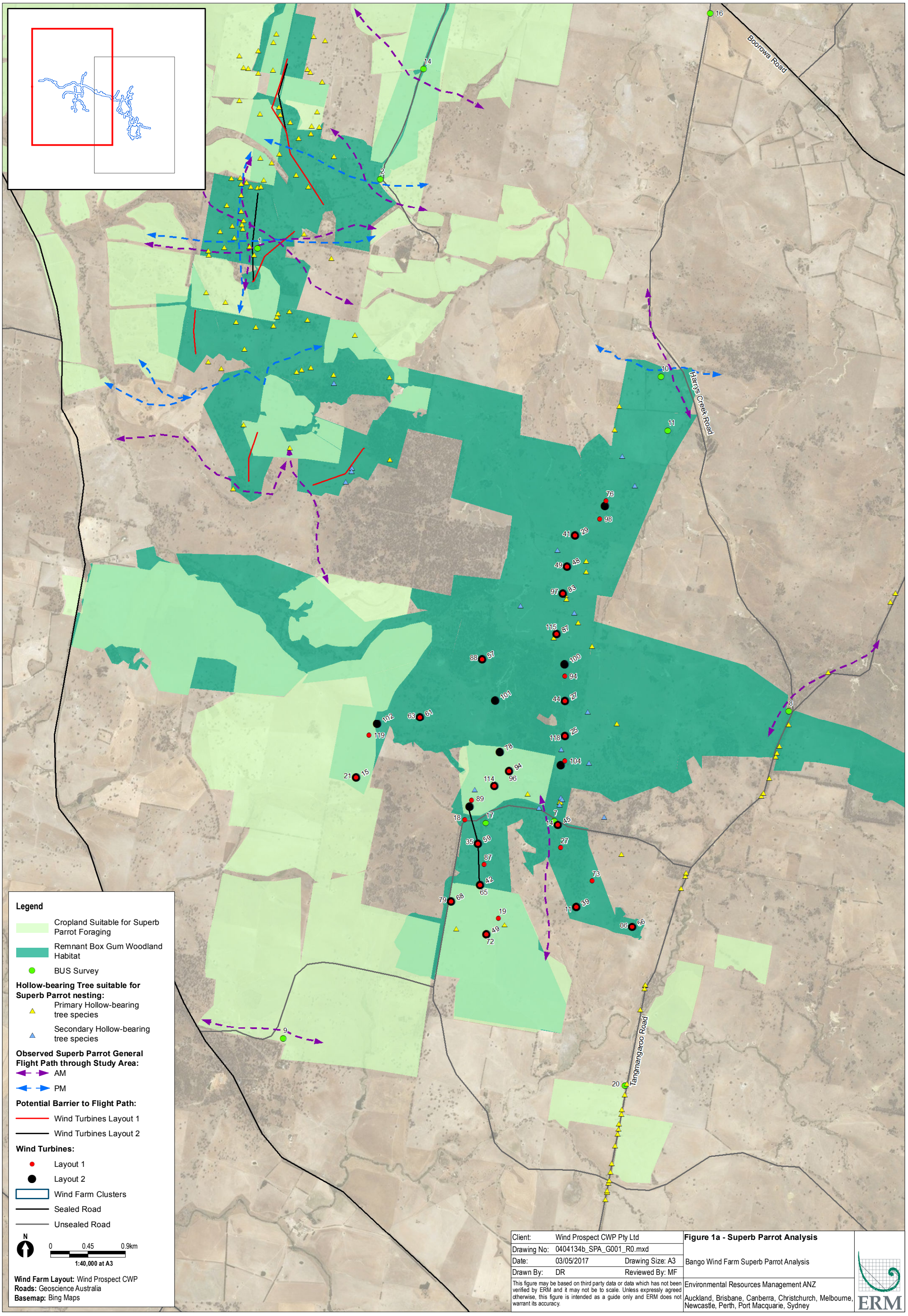
Gibbons. P (2002). **Tree Hollows and Wildlife Conservation in Australia**. CSIRO.

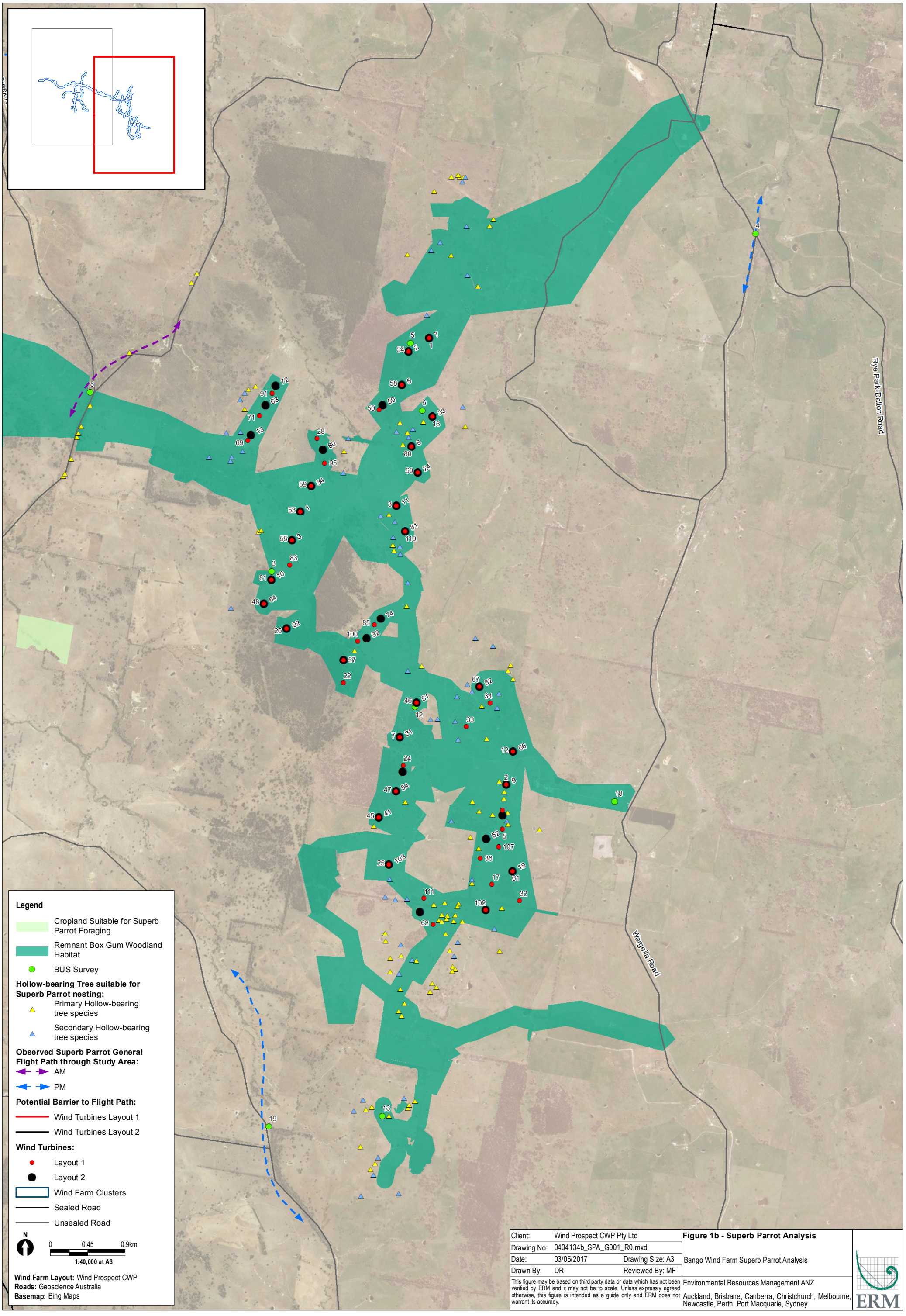
Manning. et al. (2012) **Hollow futures? Tree decline, lag effects and hollow-dependent species**. Fenner School of Environment and Society, The Australian National University, Canberra, ACT, Australia. Animal Conservation.

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


Boorowa Road
Harrys Creek Road
Tangmangaroo Road
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
N
0
0.45
0.9km
1:40,000 at A3
Wind Farm Layout: Wind Prospect CWP
Roads: Geoscience Australia
Basemap: Bing Maps
Client: Wind Prospect CWP Pty Ltd
Drawing No: 0404134b_SPA_G001_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 1a - Superb Parrot Analysis
Bango Wind Farm Superb Parrot Analysis
Environmental Resources Management ANZ
Auckland, Brisbane, Canberra, Christchurch, Melbourne, Newcastle, Perth, Port Macquarie, Sydney
ERM



Client:	Wind Prospect CWP Pty Ltd		
Drawing No:	0404134b_SPA_G001_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 1b - Superb Parrot Analysis

Bango Wind Farm Superb Parrot Analysis

Environmental Resources Management ANZ

Auckland, Brisbane, Canberra, Christchurch, Melbourne, Newcastle, Perth, Port Macquarie, Sydney

ERM

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
	271	491.39
	276	495.69
3	292	139.13
	291	195.27
	293	223.03
	289	382.37
	290	383.83
	288	482.13
	287	497.75
5	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
	267	482.57
	300	489.32
	275	493.67
7	279	412.93
	280	431.70
12	262	310.91
	225	351.35
	261	392.47
	263	394.02
	222	454.97
	240	491.46
	264	498.09
13	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
14	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	49.72
	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
	342	496.94
27	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
	326	464.84
33	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	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
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
	235	478.68
83	163	41.74
	162	81.58
	164	274.47
	160	389.17
	165	403.39
	159	483.88
	170	486.32
87	168	52.69
	167	76.01
	165	298.09
	164	339.49
	162	442.14
	166	457.87
	163	484.72
93	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

1 INTRODUCTION

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.

1.1 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 Yambacoona	-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 ridgline	574m
12	BUS Mt Buffalo	-34.5949	148.8696	No	On ridgline good visibility	735m
13	BUS Lloyd Davis	-34.6397	148.8663	Yes	On ridgline 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 (^{0}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	Harry's Ck Rd/Boorowa Rd	5/12/2012	14:40	20	9kmh NW
16	Harry's Ck Rd/Boorowa Rd	18/01/2013	11:38	27	Calm
16	Harry's Ck Rd/Boorowa Rd	23/01/2013	17:55	30	13kmh WNW
16	Harry's Ck Rd/Boorowa Rd	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 (^{0}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
Climacteris picumnus	Brown Treecreeper	V	
Merops ornatus	Rainbow Bee-eater		Mi
Polytelis swainsonii	Superb Parrot	V	V
Stagonopleura guttata	Diamond Firetail	V	
Circus assimilis	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.

2 *REFERENCES*

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
Acanthiza reguloides	Buff-rumped Thornbill	2	0-40	0-20	Below RSA	4	S	1	BUS Taffs	22/11/2012	15:00	
Anthochaera carunculata	Red Wattlebird	1	0-40	0-20	Below RSA	100	-	1	BUS Taffs	21/11/2012	13:38	Perched
Artamus cyanopterus	Dusky Woodswallow	1	0-40	0-20	Below RSA	30	SW	1	BUS Taffs	23/11/2012	7:28	
Cacatua galerita	Sulphur-crested Cockatoo	10	0-40	20-40	At RSA	150	S	1	BUS Taffs	6/12/2012	7:05	
Cacatua galerita	Sulphur-crested Cockatoo	1	0-40	0-20	Below RSA	50	E	1	Bus Taffs	15/11/2012	12:58	
Cacatua galerita	Sulphur-crested Cockatoo	1	0-40	0-20	Below RSA	100	N	1	Bus Taffs	15/11/2012	12:58	
Cacatua galerita	Sulphur-crested Cockatoo	2	0-40	0-20	Below RSA	30	SE	1	BUS Taffs	22/11/2012	15:00	
Cacatua galerita	Sulphur-crested Cockatoo	1	0-40	0-20	Below RSA	50	W	1	BUS Taffs	22/11/2012	15:00	
Cacatua galerita	Sulphur-crested Cockatoo	1	0-40	0-20	Below RSA	81-120	NE	1	BUS Taffs	22/11/2012	15:00	
Cacatua galerita	Sulphur-crested Cockatoo	1	0-40	0-20	Below RSA	20	N	1	BUS Taffs	22/11/2012	15:00	
Cacatua galerita	Sulphur-crested Cockatoo	1	0-40	0-20	Below RSA	60	S	1	BUS Taffs	22/11/2012	15:00	
Cacatua galerita	Sulphur-crested Cockatoo	1	0-40	0-20	Below RSA	100	N	1	BUS Taffs	23/11/2012	7:28	
Cacatua galerita	Sulphur-crested Cockatoo	1	0-40	0-20	Below RSA	50	N	1	BUS Taffs	23/11/2012	7:28	
Cacatua galerita	Sulphur-crested Cockatoo	1	0-40	0-20	Below RSA	20	NW	1	BUS Taffs	23/11/2012	7:28	
Cacatua galerita	Sulphur-crested Cockatoo	3	0-40	0-20	Below RSA	90	-	1	BUS Taffs	29/11/2012	7:38	
Cacatua galerita	Sulphur-crested Cockatoo	2	0-40	0-20	Below RSA	100	NE	1	BUS Taffs	3/12/2012	16:00	Observed/Heard call
Coracina novaehollandiae	Black-faced Cuckoo-shrike	5	0-40	20-40	At RSA	70	NE	1	BUS Taffs	23/11/2012	7:28	
Cincloramphus mathewsi	Rufous Songlark	4	0-40	0-20	Below RSA	30	-	1	Bus Taffs	15/11/2012	12:58	Flying from ground to trees
Cincloramphus mathewsi	Rufous Songlark	2	0-40	0-20	Below RSA	30	-	1	BUS Taffs	21/11/2012	13:38	Perched
Cincloramphus mathewsi	Rufous Songlark	1	0-40	0-20	Below RSA	30	S	1	BUS Taffs	21/11/2012	13:38	
Cincloramphus mathewsi	Rufous Songlark	1	0-40	0-20	Below RSA	40	-	1	BUS Taffs	22/11/2012	15:00	Perched
Cincloramphus mathewsi	Rufous Songlark	1	0-40	0-20	Below RSA	50	-	1	BUS Taffs	23/11/2012	7:28	Perched
Cincloramphus mathewsi	Rufous Songlark	2	0-40	0-20	Below RSA	30	-	1	BUS Taffs	29/11/2012	7:38	
Cincloramphus mathewsi	Rufous Songlark	1	-	0-20	Below RSA	40	-	1	BUS Taffs	6/12/2012	7:05	Perched
Colluricincla harmonica	Grey Shrike-thrush	1	-	0-20	Below RSA	80	-	1	BUS Taffs	6/12/2012	7:05	Calling in woodland
Coracina novaehollandiae	Black-faced Cuckoo-shrike	2	0-40	0-20	Below RSA	60	W	1	BUS Taffs	21/11/2012	13:38	
Coracina novaehollandiae	Black-faced Cuckoo-shrike	1	0-40	0-20	Below RSA	20	W	1	BUS Taffs	3/12/2012	16:00	Observed
Coracina novaehollandiae	Black-faced Cuckoo-shrike	1	0-40	0-20	Below RSA	10	S	1	BUS Taffs	5/12/2012	12:10	
Coracina novaehollandiae	Black-faced Cuckoo-shrike	1	0-40	0-20	Below RSA	40	N	1	BUS Taffs	6/12/2012	7:05	
Coracina novaehollandiae	Black-faced Cuckoo-shrike	1	0-40	0-20	Below RSA	80	S	1	BUS Taffs	6/12/2012	7:05	
Corvus coronoides	Australasian Raven	2	0-40	0-20	Below RSA	100	W	1	BUS Taffs	23/11/2012	7:28	
Corvus coronoides	Australasian Raven	2	0-40	0-20	Below RSA	40	-	1	BUS Taffs	29/11/2012	7:38	
Corvus coronoides	Australasian Raven	1	0-40	0-20	Below RSA	120	S	1	BUS Taffs	5/12/2012	12:10	
Corvus coronoides	Australasian Raven	2	-	0-20	Below RSA	120	-	1	BUS Taffs	6/12/2012	7:05	Perched
Cracticus tibicen	Australian Magpie	1	0-40	20-40	At RSA	100	N	1	Bus Taffs	15/11/2012	12:58	
Cracticus tibicen	Australian Magpie	3	0-40	20-40	At RSA	100	S	1	Bus Taffs	15/11/2012	12:58	
Cracticus tibicen	Australian Magpie	1	0-40	20-40	At RSA	50	NW	1	BUS Taffs	23/11/2012	7:28	
Cracticus tibicen	Australian Magpie	1	0-40	0-20	Below RSA	5	N	1	BUS Taffs	22/11/2012	15:00	
Cracticus tibicen	Australian Magpie	2	0-40	0-20	Below RSA	70	-	1	BUS Taffs	29/11/2012	7:38	
Cracticus tibicen	Australian Magpie	1	0-40	0-20	Below RSA	80	W	1	BUS Taffs	5/12/2012	12:10	
Cracticus tibicen	Australian Magpie	2	0-40	0-20	Below RSA	100	E	1	BUS Taffs	5/12/2012	12:10	
Cracticus tibicen	Australian Magpie	1	-	0-20	Below RSA	40	-	1	BUS Taffs	5/12/2012	12:10	Perched
Cracticus tibicen	Australian Magpie	4	-	0-20	Below RSA	80	-	1	BUS Taffs	6/12/2012	7:05	Perched
Dacelo novaeguineae	Laughing Kookaburra	1	0-40	0-20	Below RSA	50	-	1	BUS Taffs	22/11/2012	15:00	
Dacelo novaeguineae	Laughing Kookaburra	1	0-40	0-20	Below RSA	50	W	1	BUS Taffs	22/11/2012	15:00	
Eolophus roseicapilla	Galah	1	0-40	20-40	At RSA	80	S	1	BUS Taffs	21/11/2012	13:38	
Eolophus roseicapilla	Galah	1	0-40	0-20	Below RSA	140	N	1	BUS Taffs	21/11/2012	13:38	
Eolophus roseicapilla	Galah	1	0-40	0-20	Below RSA	30	N	1	BUS Taffs	22/11/2012	15:00	
Eolophus roseicapilla	Galah	2	0-40	0-20	Below RSA	50	E	1	BUS Taffs	22/11/2012	15:00	
Eolophus roseicapilla	Galah	3	0-40	0-20	Below RSA	70	S	1	BUS Taffs	23/11/2012	7:28	
Eolophus roseicapilla	Galah	2	0-40	0-20	Below RSA	20	-	1	BUS Taffs	29/11/2012	7:38	
Eolophus roseicapilla	Galah	1	0-40	0-20	Below RSA	60	E	1	BUS Taffs	6/12/2012	7:05	
Falco berigora	Brown Falcon	1	0-40	0-20	Below RSA	80	N	1	BUS Taffs	5/12/2012	12:10	
Falco cenchroides	Nankeen Kestrel	1	0-40	20-40	At RSA	70	N	1	BUS Taffs	15/11/2012	12:58	
Falco peregrinus	Peregrine Falcon	1	40-150	40-150	At RSA	50	W	1	Bus Taffs	15/11/2012	12:58	
Falcunculus frontatus	Crested Shrike-tit	2	0-40	0-20	Below RSA	30	-	1	BUS Taffs	23/11/2012	7:28	Perched
Hirundo neoxena	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
Malurus cyaneus	Superb Fairywren	1	0-40	0-20	Below RSA	40	-	1	BUS Taffs	21/11/2012	13:38	Calling in dense grass
Pardalotus striatus	Striated Pardalote	1	0-40	0-20	Below RSA	15	N	1	BUS Taffs	22/11/2012	15:00	Perched in tree
Pardalotus striatus	Striated Pardalote	1	-	0-20	Below RSA	70	-	1	BUS Taffs	5/12/2012	12:10	Calling in woodland
Pardalotus striatus	Striated Pardalote	1	-	0-20	Below RSA	70	-	1	BUS Taffs	6/12/2012	7:05	Calling in woodland
Phaps chalcoptera	Common Bronzewing	1	0-40	0-20	Below RSA	80	S	1	BUS Taffs	6/12/2012	7:05	
Philemon citreogularis	Little Friarbird	1	0-40	0-20	Below RSA	60	-	1	Bus Taffs	15/11/2012	12:58	Perched in tree
Philemon citreogularis	Little Friarbird	1	0-40	0-20	Below RSA	40	-	1	BUS Taffs	21/11/2012	13:38	Calling in trees
Philemon corniculatus	Noisy Friarbird	1	0-40	0-20	Below RSA	50	SE	1	BUS Taffs	3/12/2012	16:00	Heard call
Platycercus elegans	Crimson Rosella	3	0-40	0-20	Below RSA	70	-	1	BUS Taffs	21/11/2012	13:38	Calling in trees
Platycercus elegans	Crimson Rosella	3	0-40	0-20	Below RSA	50	SW	1	BUS Taffs	23/11/2012	7:28	
Platycercus elegans	Crimson Rosella	2	-	0-20	Below RSA	50	-	1	BUS Taffs	5/12/2012	12:10	Perched in tree
Platycercus eximius	Eastern Rosella	1	0-40	0-20	Below RSA	40	SE	1	BUS Taffs	5/12/2012	12:10	
Platycercus eximius	Eastern Rosella	1	0-40	0-20	Below RSA	100	N	1	BUS Taffs	6/12/2012	7:05	
Platycercus eximius	Eastern Rosella	3	0-40	0-20	Below RSA	60	W	1	BUS Taffs	6/12/2012	7:05	
Polytelis swainsonii	Superb Parrot	2	0-40	0-20	Below RSA	50	N	1	Bus Taffs	15/11/2012	12:58	
Polytelis swainsonii	Superb Parrot	1	0-40	0-20	Below RSA	110	W	1	BUS Taffs	21/11/2012	13:38	
Polytelis swainsonii	Superb Parrot	3	0-40	0-20	Below RSA	140	N	1	BUS Taffs	21/11/2012	13:38	
Polytelis swainsonii	Superb Parrot	3	0-40	0-20	Below RSA	40	S	1	BUS Taffs	22/11/2012	15:00	
Polytelis swainsonii	Superb Parrot	8	0-40	0-20	Below RSA	60	NW	1	BUS Taffs	23/11/2012	7:28	
Polytelis swainsonii	Superb Parrot	5	0-40	0-20	Below RSA	70	NW	1	BUS Taffs	23/11/2012	7:28	
Polytelis swainsonii	Superb Parrot	4	0-40	0-20	Below RSA	80	NW	1	BUS Taffs	23/11/2012	7:28	
Polytelis swainsonii	Superb Parrot	6	0-40	0-20	Below RSA	70	-	1	BUS Taffs	29/11/2012	7:38	Perched
Polytelis swainsonii	Superb Parrot	3	0-40	0-20	Below RSA	0	W	1	BUS Taffs	3/12/2012	16:00	Observed/Heard call
Polytelis swainsonii	Superb Parrot	1	0-40	0-20	Below RSA	100	E	1	BUS Taffs	3/12/2012	16:00	Observed/Heard call
Polytelis swainsonii	Superb Parrot	4	0-40	0-20	Below RSA	0	S	1	BUS Taffs	5/12/2012	12:10	
Polytelis swainsonii	Superb Parrot	1	-	0-20	Below RSA	100	-	1	BUS Taffs	5/12/2012	12:10	Perched in stag
Polytelis swainsonii	Superb Parrot	3	-	0-20	Below RSA	40	-	1	BUS Taffs	6/12/2012	7:05	Perched
Polytelis swainsonii	Superb Parrot	2	0-40	0-20	Below RSA	50	N	1	BUS Taffs	6/12/2012	7:05	
Polytelis swainsonii	Superb Parrot	8	0-40	0-20	Below RSA	100	E	1	BUS Taffs	6/12/2012	7:05	
Polytelis swainsonii	Superb Parrot	1	0-40	0-20	Below RSA	20	N	1	BUS Taffs	6/12/2012	7:05	
Polytelis swainsonii	Superb Parrot	3	0-40	0-20	Below RSA	50	N	1	BUS Taffs	6/12/2012	7:05	
Polytelis swainsonii	Superb Parrot	3	0-40	0-20	Below RSA	90	N	1	BUS Taffs	6/12/2012	7:05	
Polytelis swainsonii	Superb Parrot	1	0-40	0-20	Below RSA	40	S	1	BUS Taffs	6/12/2012	7:05	
Polytelis swainsonii	Superb Parrot	2	0-40	0-20	Below RSA	50	S	1	BUS Taffs	6/12/2012	7:05	
Psephotus haematonotus	Red-rumped Parrot	5	0-40	0-20	Below RSA	80	E	1	BUS Taffs	6/12/2012	7:05	
Rhipidura leucophrys	Willie Wagtail	1	0-40	0-20	Below RSA	50	-	1	BUS Taffs	21/11/2012	13:38	Perched in tree
Rhipidura leucophrys	Willie Wagtail	1	0-40	0-20	Below RSA	10	S	1	BUS Taffs	21/11/2012	13:38	
Rhipidura leucophrys	Willie Wagtail	1	0-40	0-20	Below RSA	20	S	1	BUS Taffs	22/11/2012	15:00	
Rhipidura leucophrys	Willie Wagtail	2	0-40	0-20	Below RSA	50	SW	1	BUS Taffs	3/12/2012	16:00	Heard call
Rhipidura leucophrys	Willie Wagtail	2	-	0-20	Below RSA	5	-	1	BUS Taffs	6/12/2012	7:05	Perched
Sturnus vulgaris	Common Starling	10	0-40	0-20	Below RSA	60	-	1	BUS Taffs	29/11/2012	7:38	
Sturnus vulgaris	Common Starling	50	0-40	0-20	Below RSA	100	SW	1	BUS Taffs	3/12/2012	16:00	Observed
Cacatua galerita	Sulphur-crested Cockatoo	20	0-40	0-20	Below RSA	30	N	2	BUS Hopefield	3/12/2012	16:30	Observed
Cacatua galerita	Sulphur-crested Cockatoo	5	-	0-20	Below RSA	50	-	2	BUS Hopefield	5/12/2012	13:25	Perched
Cacatua galerita	Sulphur-crested Cockatoo	3	0-40	0-20	Below RSA	50	W	2	BUS Hopefield	5/12/2012	13:25	Perched
Coracina novaehollandiae	Black-faced Cuckoo-shrike	1	0-40	0-20	Below RSA	40	S	2	BUS Hopefield	3/12/2012	16:30	Observed
Cracticus tibicen	Australian Magpie	2	0-40	0-20	Below RSA	80	SE	2	BUS Hopefield	14/11/2012	7:55	
Cracticus tibicen	Australian Magpie	3	0-40	0-20	Below RSA	15	W	2	BUS Hopefield	14/11/2012	7:55	
Cracticus tibicen	Australian Magpie	2	0-40	0-20	Below RSA	20	N	2	BUS Hopefield	3/12/2012	16:30	Observed/Heard call
Cracticus tibicen	Australian Magpie	1	-	0-20	Below RSA	15	-	2	BUS Hopefield	5/12/2012	13:25	Perched on fence
Cracticus tibicen	Australian Magpie	1	-	0-20	Below RSA	50	-	2	BUS Hopefield	5/12/2012	13:25	Perched
Egretta novaehollandiae	White-faced Heron	2	0-40	0-20	Below RSA	10	E	2	BUS Hopefield	3/12/2012	16:30	Observed
Eolophus roseicapilla	Galah	2	0-40	0-20	Below RSA	20	S	2	BUS Hopefield	14/11/2012	7:55	
Eolophus roseicapilla	Galah	20	0-40	0-20	Below RSA	30	NE	2	BUS Hopefield	3/12/2012	16:30	Observed
Eolophus roseicapilla	Galah	6	-	0-20	Below RSA	10	-	2	BUS Hopefield	5/12/2012	13:25	On ground
Eolophus roseicapilla	Galah	2	-	0-20	Below RSA	50	-	2	BUS Hopefield	5/12/2012	13:25	Perched
Eolophus roseicapilla	Galah	6	-	0-20	Below RSA	50	-	2	BUS Hopefield	5/12/2012	13:25	Perched
Eolophus roseicapilla	Galah	20	0-40	0-20	Below RSA	80	S	2	BUS Hopefield	5/12/2012	13:25	
Malurus cyaneus	Superb Fairywren	1	0-40	0-20	Below RSA	5	S	2	BUS Hopefield	3/12/2012	16:30	Observed
Pardalotus striatus	Striated Pardalote	2	0-40	0-20	Below RSA	20	NW	2	BUS Hopefield	14/11/2012	7:55	
Pardalotus striatus	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
Pardalotus striatus	Striated Pardalote	1	0-40	0-20	Below RSA	20	E	2	BUS Hopefield	14/11/2012	7:55	
Platycercus elegans	Crimson Rosella	2	0-40	0-20	Below RSA	100	NE	2	BUS Hopefield	3/12/2012	16:30	Observed
Platycercus eximius	Eastern Rosella	1	0-40	0-20	Below RSA	30	SE	2	BUS Hopefield	14/11/2012	7:55	
Platycercus eximius	Eastern Rosella	2	0-40	0-20	Below RSA	20	N	2	BUS Hopefield	3/12/2012	16:30	Observed
Polytelis swainsonii	Superb Parrot	30	0-40	0-20	Below RSA	10	SE	2	BUS Hopefield	14/11/2012	7:55	Forgaing in pasture and hanging in trees
Polytelis swainsonii	Superb Parrot	2	0-40	0-20	Below RSA	5	SE	2	BUS Hopefield	14/11/2012	7:55	
Polytelis swainsonii	Superb Parrot	7	0-40	0-20	Below RSA	5	NW	2	BUS Hopefield	14/11/2012	7:55	
Polytelis swainsonii	Superb Parrot	3	0-40	0-20	Below RSA	10	SE	2	BUS Hopefield	14/11/2012	7:55	
Polytelis swainsonii	Superb Parrot	4	0-40	0-20	Below RSA	30	SE	2	BUS Hopefield	14/11/2012	7:55	
Polytelis swainsonii	Superb Parrot	1	0-40	0-20	Below RSA	40	S	2	BUS Hopefield	14/11/2012	7:55	
Polytelis swainsonii	Superb Parrot	1	0-40	0-20	Below RSA	60	E	2	BUS Hopefield	3/12/2012	16:30	Observed
Rhipidura leucophrys	Willie Wagtail	1	0-40	0-20	Below RSA	5	W	2	BUS Hopefield	3/12/2012	16:30	Observed/Heard call
Rhipidura leucophrys	Willie Wagtail	1	-	0-20	Below RSA	40	-	2	BUS Hopefield	5/12/2012	13:25	Perched
Rhipidura leucophrys	Willie Wagtail	2	-	0-20	Below RSA	10	-	2	BUS Hopefield	5/12/2012	13:25	Perched
Sturnus vulgaris	Common Starling	10	0-40	0-20	Below RSA	100	N	2	BUS Hopefield	5/12/2012	13:25	
Acanthiza chrysorrhoa	Yellow-rumped Thornbill	5	0-40	0-20	Below RSA	20	-	3	BUS Willow	4/12/2012	9:05	Perched in tree
Cincloramphus mathewsi	Rufous Songlark	2	0-40	0-20	Below RSA	100	NW	3	BUS Willow	25/01/2013	10:00	perched
Climacteris picumnus	Brown Treecreeper	2	0-40	0-20	Below RSA	60	E	3	BUS Willow	25/01/2013	10:00	calling from tree
Coracina novaehollandiae	Black-faced Cuckoo-shrike	2	0-40	0-20	Below RSA	200	NW	3	BUS Willow	13/12/2012	17:57	
Corvus coronoides	Australasian Raven	3	0-40	0-20	Below RSA	70	N	3	BUS Willow	25/01/2013	10:00	Perched
Cracticus tibicen	Australian Magpie	1	0-40	0-20	Below RSA	20	W	3	BUS Willow	4/12/2012	9:05	
Cracticus tibicen	Australian Magpie	2	0-40	0-20	Below RSA	120	S	3	BUS Willow	4/12/2012	9:05	
Cracticus tibicen	Australian Magpie	2	0-40	0-20	Below RSA	40	W	3	BUS Willow	5/12/2012	16:40	Very Windy
Cracticus tibicen	Australian Magpie	1	0-40	0-20	Below RSA	200	N	3	BUS Willow	13/12/2012	17:57	
Cracticus tibicen	Australian Magpie	2	0-40	0-20	Below RSA	50	NE	3	BUS Willow	25/01/2013	10:00	
Dacelo novaeguineae	Laughing Kookaburra	1	0-40	0-20	Below RSA	60	NW	3	BUS Willow	25/01/2013	10:00	perched
Falco cenchroides	Nankeen Kestrel	3	0-40	0-20	Below RSA	40	-	3	BUS Willow	5/12/2012	16:40	Hovering in wind
Falco cenchroides	Nankeen Kestrel	2	0-40	20-40	At RSA	80	NE	3	BUS Willow	25/01/2013	10:00	foraging
Malurus cyaneus	Superb Fairywren	2	0-40	0-20	Below RSA	20	-	3	BUS Willow	4/12/2012	9:05	Calling in trees
Pardalotus striatus	Striated Pardalote	1	0-40	0-20	Below RSA	30	S	3	BUS Willow	13/12/2012	17:57	
Platycercus elegans	Crimson Rosella	1	0-40	0-20	Below RSA	20	W	3	BUS Willow	5/12/2012	16:40	Very Windy
Platycercus elegans	Crimson Rosella	3	0-40	0-20	Below RSA	40	NW	3	BUS Willow	25/01/2013	10:00	
Rhipidura leucophrys	Willie Wagtail	2	0-40	0-20	Below RSA	70	W	3	BUS Willow	25/01/2013	10:00	perched
Anthochaera carunculata	Red Wattlebird	4	0-40	0-20	Below RSA	50	W	4	BUS Wargeila	18/01/2013	8:42	
Artamus superciliosus	White-browed Woodswallow	7	0-40	0-20	Below RSA	20	-	4	BUS Wargeila	4/12/2012	15:35	Circling
Cacatua galerita	Sulphur-crested Cockatoo	2	0-40	0-20	Below RSA	50	NE	4	BUS Wargeila	4/12/2012	15:35	
Cacatua galerita	Sulphur-crested Cockatoo	2	0-40	0-20	Below RSA	100	W	4	BUS Wargeila	4/12/2012	15:35	
Cacatua galerita	Sulphur-crested Cockatoo	5	0-40	0-20	Below RSA	80	NE	4	BUS Wargeila	18/01/2013	8:42	
Cacatua galerita	Sulphur-crested Cockatoo	2	0-40	0-20	Below RSA	60	E	4	BUS Wargeila	18/01/2013	8:42	
Cacatua galerita	Sulphur-crested Cockatoo	1	0-40	0-20	Below RSA	30	W	4	BUS Wargeila	18/01/2013	8:42	
Cacatua galerita	Sulphur-crested Cockatoo	3	0-40	0-20	Below RSA	150	NE	4	BUS Wargeila	25/02/2013	7:23	Perched
Cacatua galerita	Sulphur-crested Cockatoo	5	0-40	0-20	Below RSA	70	N	4	BUS Wargeila	27/02/2013	9:50	Perched
Coracina novaehollandiae	Black-faced Cuckoo-shrike	1	0-40	0-20	Below RSA	40	W	4	BUS Wargeila	4/12/2012	15:35	
Coracina novaehollandiae	Black-faced Cuckoo-shrike	1	0-40	0-20	Below RSA	30	W	4	BUS Wargeila	18/01/2013	8:42	
Cormobates leucophaea	White-throated Treecreeper	1	-	0-20	Below RSA	40	-	4	BUS Wargeila	4/12/2012	15:35	Calling in woodland
Cracticus tibicen	Australian Magpie	3	0-40	0-20	Below RSA	25	E	4	BUS Wargeila	18/01/2013	8:42	On ground
Cracticus tibicen	Australian Magpie	8	0-40	0-20	Below RSA	100		4	BUS Wargeila	25/02/2013	7:23	Perched
Cracticus tibicen	Australian Magpie	1	0-40	0-20	Below RSA	150	NE	4	BUS Wargeila	25/02/2013	7:23	Flying
Cracticus tibicen	Australian Magpie	2	0-40	0-20	Below RSA	150	NW	4	BUS Wargeila	25/02/2013	7:23	Flying
Cracticus tibicen	Australian Magpie	4	0-40	0-20	Below RSA	70	N	4	BUS Wargeila	27/02/2013	9:50	Perched
Dacelo novaeguineae	Laughing Kookaburra	1	0-40	0-20	Below RSA	50	N	4	BUS Wargeila	18/01/2013	8:42	
Dacelo novaeguineae	Laughing Kookaburra	1	0-40	0-20	Below RSA	150	E	4	BUS Wargeila	25/02/2013	7:23	Perched
Eolophus roseicapilla	Galah	2	0-40	0-20	Below RSA	10	N	4	BUS Wargeila	4/12/2012	15:35	
Eolophus roseicapilla	Galah	2	0-40	0-20	Below RSA	20	N	4	BUS Wargeila	4/12/2012	15:35	
Eolophus roseicapilla	Galah	2	0-40	0-20	Below RSA	200	SE	4	BUS Wargeila	25/02/2013	7:23	Flying
Eolophus roseicapilla	Galah	2	0-40	0-20	Below RSA	150	N	4	BUS Wargeila	25/02/2013	7:23	Flying
Eurystomus orientalis	Dollarbird	1	0-40	0-20	Below RSA	30	N	4	BUS Wargeila	18/01/2013	8:42	
Grallina cyanoleuca	Magpie Lark	1	0-40	0-20	Below RSA	100		4	BUS Wargeila	25/02/2013	7:23	Perched
Malurus cyaneus	Superb Fairywren	4	0-40	0-20	Below RSA	100	S	4	BUS Wargeila	25/02/2013	7:23	Perched
Malurus cyaneus	Superb Fairywren	4	0-40	0-20	Below RSA	30	E	4	BUS Wargeila	27/02/2013	9:50	Perched
Pardalotus striatus	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
Phalacrocorax varius	Pied Cormorant	2	0-40	0-20	Below RSA		S	4	BUS Wargeila	25/02/2013	7:23	Flying
Philemon corniculatus	Noisy Friarbird	1	0-40	0-20	Below RSA	50	W	4	BUS Wargeila	27/02/2013	9:50	
Platycercus elegans	Crimson Rosella	1	0-40	0-20	Below RSA	50	NE	4	BUS Wargeila	4/12/2012	15:35	
Platycercus elegans	Crimson Rosella	1	0-40	0-20	Below RSA	50	E	4	BUS Wargeila	18/01/2013	8:42	
Platycercus elegans	Crimson Rosella	1	0-40	0-20	Below RSA	50	N	4	BUS Wargeila	18/01/2013	8:42	
Platycercus elegans	Crimson Rosella	2	0-40	0-20	Below RSA	45	NW	4	BUS Wargeila	18/01/2013	8:42	
Platycercus eximius	Eastern Rosella	2	0-40	0-20	Below RSA	150	NW	4	BUS Wargeila	25/02/2013	7:23	Perched
Polytelis swainsonii	Superb Parrot	1	0-40	0-20	Below RSA	50	N	4	BUS Wargeila	4/12/2012	15:35	
Rhipidura leucophrys	Willie Wagtail	1	0-40	0-20	Below RSA	30	N	4	BUS Wargeila	18/01/2013	8:42	on ground
Rhipidura leucophrys	Willie Wagtail	1	0-40	0-20	Below RSA	20		4	BUS Wargeila	25/02/2013	7:23	Perched
Acanthiza reguloides	Buff-rumped Thornbill	2	0-40	0-20	Below RSA	-	N	5	BUS Taree	28/11/2012	7:18	
Aquila audax	Wedge-tailed Eagle	1	40-150	40-150	At RSA	300	N	5	BUS Taree	16/11/2012	11:15	Thermaling North
Cacatua galerita	Sulphur-crested Cockatoo	2	0-40	0-20	Below RSA	40	SW	5	BUS Taree	28/11/2012	7:18	
Coracina novaehollandiae	Black-faced Cuckoo-shrike	1	0-40	0-20	Below RSA	100	W	5	BUS Taree	16/11/2012	11:15	
Coracina novaehollandiae	Black-faced Cuckoo-shrike	1	0-40	0-20	Below RSA	30	SE	5	BUS Taree	16/11/2012	11:15	
Coracina novaehollandiae	Black-faced Cuckoo-shrike	1	0-40	0-20	Below RSA	40	-	5	BUS Taree	21/11/2012	8:15	Calling in woodland
Coracina novaehollandiae	Black-faced Cuckoo-shrike	1	0-40	0-20	Below RSA	-	SW	5	BUS Taree	28/11/2012	7:18	
Cormobates leucophaea	White-throated Treecreeper	2	0-40	0-20	Below RSA	80	-	5	BUS Taree	16/11/2012	11:15	Calling in trees
Cormobates leucophaea	White-throated Treecreeper	1	0-40	0-20	Below RSA	100	-	5	BUS Taree	21/11/2012	8:15	Calling, perched in tree
Corvus coronoides	Australasian Raven	2	0-40	0-20	Below RSA	100	S	5	BUS Taree	21/11/2012	8:15	
Corvus mellori	Little Raven	2	0-40	0-20	Below RSA	-	S	5	BUS Taree	28/11/2012	7:18	
Cracticus nigrogularis	Pied Butcherbird	1	0-40	0-20	Below RSA	60	N	5	BUS Taree	21/11/2012	8:15	
Cracticus tibicen	Australian Magpie	2	0-40	20-40	At RSA	70	E	5	BUS Taree	16/11/2012	11:15	
Cracticus tibicen	Australian Magpie	3	0-40	0-20	Below RSA	100	-	5	BUS Taree	16/11/2012	11:15	Perched in tree
Cracticus tibicen	Australian Magpie	1	0-40	0-20	Below RSA	60	-	5	BUS Taree	16/11/2012	11:15	Perched in tree
Cracticus tibicen	Australian Magpie	1	0-40	0-20	Below RSA	80	-	5	BUS Taree	16/11/2012	11:15	Perched in tree
Cracticus tibicen	Australian Magpie	1	0-40	0-20	Below RSA	90	-	5	BUS Taree	21/11/2012	8:15	Perched in tree
Cracticus tibicen	Australian Magpie	2	0-40	0-20	Below RSA	-	S	5	BUS Taree	28/11/2012	7:18	
Cracticus tibicen	Australian Magpie	2	0-40	0-20	Below RSA	100	NE	5	BUS Taree	4/12/2012	13:25	Very Windy
Cracticus tibicen	Australian Magpie	4	0-40	0-20	Below RSA	40	S	5	BUS Taree	5/12/2012	8:25	Very Windy
Eopsaltria australis	Eastern Yellow Robin	1	0-40	0-20	Below RSA	-	NW	5	BUS Taree	28/11/2012	7:18	
Falco berigora	Brown Falcon	1	0-40	0-20	Below RSA	20	W	5	BUS Taree	4/12/2012	13:25	Very Windy
Falco cenchroides	Nankeen Kestrel	1	0-40	0-20	Below RSA	110	S	5	BUS Taree	16/11/2012	11:15	
Falco cenchroides	Nankeen Kestrel	2	0-40	0-20	Below RSA	80	NE	5	BUS Taree	21/11/2012	8:15	
Gerygone albogularis	White-throated Gerygone	1	0-40	0-20	Below RSA	80	-	5	BUS Taree	16/11/2012	11:15	Calling in trees
Gerygone albogularis	White-throated Gerygone	1	0-40	0-20	Below RSA	80	-	5	BUS Taree	21/11/2012	8:15	Calling in woodland
Pardalotus striatus	Striated Pardalote	1	0-40	0-20	Below RSA	40	-	5	BUS Taree	21/11/2012	8:15	Perched in tree
Pardalotus striatus	Striated Pardalote	?	0-40	0-20	Below RSA	-	SW	5	BUS Taree	28/11/2012	7:18	
Pardalotus striatus	Striated Pardalote	1	-	0-20	Below RSA	40	-	5	BUS Taree	4/12/2012	13:25	Calling in woodland, Very Windy
Pardalotus striatus	Striated Pardalote	1	0-40	0-20	Below RSA	20	-	5	BUS Taree	5/12/2012	8:25	Very Windy
Philemon citreogularis	Little Friarbird	1	0-40	0-20	Below RSA	80	-	5	BUS Taree	16/11/2012	11:15	Calling in trees
Philemon corniculatus	Noisy Friarbird	4	0-40	0-20	Below RSA	80	-	5	BUS Taree	21/11/2012	8:15	Calling in woodland
Philemon corniculatus	Noisy Friarbird	1	0-40	0-20	Below RSA	-	W	5	BUS Taree	28/11/2012	7:18	
Platycercus elegans	Crimson Rosella	2	0-40	0-20	Below RSA	40	E	5	BUS Taree	16/11/2012	11:15	
Platycercus elegans	Crimson Rosella	1	0-40	0-20	Below RSA	100	S	5	BUS Taree	21/11/2012	8:15	
Platycercus elegans	Crimson Rosella	2	0-40	0-20	Below RSA	20	NE	5	BUS Taree	21/11/2012	8:15	
Platycercus elegans	Crimson Rosella	2	0-40	0-20	Below RSA	-	W	5	BUS Taree	28/11/2012	7:18	
Platycercus elegans	Crimson Rosella	2	0-40	0-20	Below RSA	30	NW	5	BUS Taree	28/11/2012	7:18	
Platycercus elegans	Crimson Rosella	1	0-40	0-20	Below RSA	10	E	5	BUS Taree	5/12/2012	8:25	Very Windy
Acanthiza reguloides	Buff-rumped Thornbill	3	0-40	0-20	Below RSA	20	NW	6	BUS Taree 2	22/11/2012	17:30	Foraging
Coracina novaehollandiae	Black-faced Cuckoo-shrike	1	0-40	0-20	Below RSA	80	W	6	BUS Taree 2	5/12/2012	8:55	Very Windy
Cormobates leucophaea	White-throated Treecreeper	1	0-40	0-20	Below RSA	30	NW	6	BUS Taree 2	22/11/2012	17:30	
Cormobates leucophaea	White-throated Treecreeper	1	-	0-20	Below RSA	50	-	6	BUS Taree 2	6/12/2012	11:15	Calling in woodland
Cracticus tibicen	Australian Magpie	6	0-40	0-20	Below RSA	20	W	6	BUS Taree 2	22/11/2012	17:30	Perched
Cracticus tibicen	Australian Magpie	2	0-40	0-20	Below RSA	60	NE	6	BUS Taree 2	22/11/2012	17:30	Foraging on ground
Cracticus tibicen	Australian Magpie	3	0-40	0-20	Below RSA	100	W	6	BUS Taree 2	5/12/2012	8:55	Very Windy
Cracticus tibicen	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
Dacelo novaeguineae	Laughing Kookaburra	1	-	0-20	Below RSA	100	-	6	BUS Taree 2	6/12/2012	11:15	Perched
Falco berigora	Brown Falcon	1	0-40	0-20	Below RSA	200	S	6	BUS Taree 2	6/12/2012	11:15	
Gerygone albogularis	White-throated Gerygone	1	0-40	0-20	Below RSA	-	E	6	BUS Taree 2	22/11/2012	17:30	Perched
Gerygone albogularis	White-throated Gerygone	2	-	0-20	Below RSA	70	-	6	BUS Taree 2	6/12/2012	11:15	Calling in woodland
Grallina cyanoleuca	Magpie Lark	1	-	0-20	Below RSA	100	-	6	BUS Taree 2	6/12/2012	11:15	Calling in woodland
Pardalotus striatus	Striated Pardalote	2	0-40	0-20	Below RSA	-	N	6	BUS Taree 2	22/11/2012	17:30	Heard
Pardalotus striatus	Striated Pardalote	1	-	0-20	Below RSA	50	-	6	BUS Taree 2	6/12/2012	11:15	Calling in woodland
Philemon corniculatus	Noisy Friarbird	1	0-40	0-20	Below RSA	5	N	6	BUS Taree 2	22/11/2012	17:30	
Philemon corniculatus	Noisy Friarbird	1	-	0-20	Below RSA	60	-	6	BUS Taree 2	6/12/2012	11:15	Calling in woodland
Platycercus elegans	Crimson Rosella	1	0-40	0-20	Below RSA	-	SE	6	BUS Taree 2	22/11/2012	17:30	Perched
Platycercus elegans	Crimson Rosella	2	0-40	0-20	Below RSA	10	N	6	BUS Taree 2	22/11/2012	17:30	
Platycercus elegans	Crimson Rosella	2	0-40	0-20	Below RSA	30	W	6	BUS Taree 2	6/12/2012	11:15	
Strepera graculina	Pied Currawong	1	0-40	0-20	Below RSA	-	E	6	BUS Taree 2	22/11/2012	17:30	Heard
Strepera graculina	Pied Currawong	1	0-40	0-20	Below RSA	-	E	6	BUS Taree 2	22/11/2012	17:30	Heard
Anthochaera carunculata	Red Wattlebird	1	0-40	0-20	Below RSA	40	-	7	BUS Pines	21/11/2012	11:30	Perched in woodland
Anthochaera carunculata	Red Wattlebird	2	0-40	0-20	Below RSA	50	NW	7	BUS Pines	22/11/2012	8:45	
Anthochaera carunculata	Red Wattlebird	1	0-40	0-20	Below RSA	50	-	7	BUS Pines	6/12/2012	8:45	Perched
Aquila morphnoides	Little Eagle	1	40-150	40-150	At RSA	0	NE	7	BUS Pines	15/11/2012	17:23	
Cacatua galerita	Sulphur-crested Cockatoo	1	0-40	0-20	Below RSA	100	NW	7	BUS Pines	15/11/2012	17:23	
Cacatua galerita	Sulphur-crested Cockatoo	1	0-40	0-20	Below RSA	100	E	7	BUS Pines	15/11/2012	17:23	
Cacatua galerita	Sulphur-crested Cockatoo	2	0-40	0-20	Below RSA	50	-	7	BUS Pines	22/11/2012	8:45	Calling in woodland
Cacatua galerita	Sulphur-crested Cockatoo	1	0-40	0-20	Below RSA	50	W	7	BUS Pines	5/12/2012	10:35	Very Windy
Cacatua galerita	Sulphur-crested Cockatoo	-	-	0-20	Below RSA	40	S	7	BUS Pines	11/12/2012	11:40	
Colluricincla harmonica	Grey Shrike-thrush	1	0-40	0-20	Below RSA	50	-	7	BUS Pines	6/12/2012	8:45	Perched in paddock tree
Coracina novaehollandiae	Black-faced Cuckoo-shrike	2	0-40	0-20	Below RSA	20	SW	7	BUS Pines	15/11/2012	17:23	
Coracina novaehollandiae	Black-faced Cuckoo-shrike	2	0-40	0-20	Below RSA	20	NW	7	BUS Pines	22/11/2012	8:45	
Corvus coronoides	Australasian Raven	2	0-40	20-40	At RSA	80	E	7	BUS Pines	15/11/2012	17:23	
Coracina novaehollandiae	Black-faced Cuckoo-shrike	1	0-40	0-20	Below RSA	50	E	7	BUS Pines	6/12/2012	8:45	
Coracina novaehollandiae	Black-faced Cuckoo-shrike	-	-	0-20	Below RSA	50	N	7	BUS Pines	11/12/2012	11:40	
Cormobates leucophaea	White-throated Treecreeper	1	0-40	0-20	Below RSA	50	-	7	BUS Pines	15/11/2012	17:23	Calling in woodland
Cormobates leucophaea	White-throated Treecreeper	1	0-40	0-20	Below RSA	60	-	7	BUS Pines	21/11/2012	11:30	Calling in woodland
Cormobates leucophaea	White-throated Treecreeper	1	0-40	0-20	Below RSA	70	-	7	BUS Pines	22/11/2012	8:45	Calling in trees
Cormobates leucophaea	White-throated Treecreeper	1	0-40	0-20	Below RSA	50	-	7	BUS Pines	6/12/2012	8:45	Calling in woodland
Cormobates leucophaea	White-throated Treecreeper	-	-	0-20	Below RSA	50	E	7	BUS Pines	11/12/2012	11:40	
Corvus coronoides	Australasian Raven	1	0-40	0-20	Below RSA	20	S	7	BUS Pines	15/11/2012	17:23	
Corvus coronoides	Australasian Raven	2	0-40	0-20	Below RSA	60	SW	7	BUS Pines	15/11/2012	17:23	
Corvus coronoides	Australasian Raven	1	0-40	0-20	Below RSA	50	S	7	BUS Pines	15/11/2012	17:23	
Corvus coronoides	Australasian Raven	2	0-40	0-20	Below RSA	50	W	7	BUS Pines	21/11/2012	11:30	
Cracticus tibicen	Australian Magpie	1	0-40	0-20	Below RSA	70	-	7	BUS Pines	6/12/2012	8:45	Perched
Cracticus tibicen	Australian Magpie	-	-	0-20	Below RSA	40	N	7	BUS Pines	11/12/2012	11:40	
Cracticus torquatus	Grey Butcherbird	-	-	0-20	Below RSA	50	NW	7	BUS Pines	11/12/2012	11:40	
Eolophus roseicapilla	Galah	2	0-40	0-20	Below RSA	50	W	7	BUS Pines	5/12/2012	10:35	Very Windy
Falco berigora	Brown Falcon	1	0-40	0-20	Below RSA	50	E	7	BUS Pines	6/12/2012	8:45	
Gerygone albogularis	White-throated Gerygone	1	0-40	0-20	Below RSA	60	-	7	BUS Pines	21/11/2012	11:30	Calling in woodland
Gerygone albogularis	White-throated Gerygone	1	0-40	0-20	Below RSA	80	-	7	BUS Pines	22/11/2012	8:45	Calling in woodland
Gerygone albogularis	White-throated Gerygone	-	-	0-20	Below RSA	100	E	7	BUS Pines	11/12/2012	11:40	
Gerygone albogularis	White-throated Gerygone	-	-	0-20	Below RSA	70	NW	7	BUS Pines	11/12/2012	11:40	
Gerygone albogularis	White-throated Gerygone	-	-	0-20	Below RSA	70	SE	7	BUS Pines	11/12/2012	11:40	
Grallina cyanoleuca	Magpie Lark	-	-	0-20	Below RSA	50	W	7	BUS Pines	11/12/2012	11:40	
Pardalotus striatus	Striated Pardalote	1	0-40	0-20	Below RSA	70	-	7	BUS Pines	21/11/2012	11:30	Calling in woodland
Pardalotus striatus	Striated Pardalote	1	0-40	0-20	Below RSA	40	-	7	BUS Pines	22/11/2012	8:45	Calling in trees
Pardalotus striatus	Striated Pardalote	1	0-40	0-20	Below RSA	50	-	7	BUS Pines	6/12/2012	8:45	Perched
Pardalotus striatus	Striated Pardalote	-	-	0-20	Below RSA	30	SE	7	BUS Pines	11/12/2012	11:40	
Philemon citreogularis	Little Friarbird	1	0-40	0-20	Below RSA	20	-	7	BUS Pines	6/12/2012	8:45	Perched
Philemon corniculatus	Noisy Friarbird	1	0-40	0-20	Below RSA	30	-	7	BUS Pines	22/11/2012	8:45	Perched
Philemon corniculatus	Noisy Friarbird	-	-	0-20	Below RSA	60	NE	7	BUS Pines	11/12/2012	11:40	
Platycercus elegans	Crimson Rosella	2	0-40	0-20	Below RSA	30	-	7	BUS Pines	21/11/2012	11:30	Feeding in woodland
Platycercus elegans	Crimson Rosella	1	0-40	0-20	Below RSA	40	-	7	BUS Pines	22/11/2012	8:45	Perched
Platycercus elegans	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
Platycercus elegans	Crimson Rosella	-	-	0-20	Below RSA	30	N	7	BUS Pines	11/12/2012	11:40	
Platycercus eximius	Eastern Rosella	2	0-40	0-20	Below RSA	40	-	7	BUS Pines	15/11/2012	17:23	Perched in tree
Platycercus eximius	Eastern Rosella	1	0-40	0-20	Below RSA	30	W	7	BUS Pines	21/11/2012	11:30	
Polytelis swainsonii	Superb Parrot	1	0-40	0-20	Below RSA	80	SW	7	BUS Pines	5/12/2012	10:35	Very Windy
Polytelis swainsonii	Superb Parrot	1	0-40	0-20	Below RSA	10	S	7	BUS Pines	6/12/2012	8:45	
Polytelis swainsonii	Superb Parrot	3	0-40	0-20	Below RSA	5	S	7	BUS Pines	6/12/2012	8:45	
Rhipidura albiscapa	Grey Fantail	1	0-40	0-20	Below RSA	60	-	7	BUS Pines	21/11/2012	11:30	Calling in woodland
Todiramphus sanctus	Sacred Kingfisher	1	0-40	0-20	Below RSA	70	-	7	BUS Pines	22/11/2012	8:45	Calling in woodland
Todiramphus sanctus	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
Acanthiza lineata	Striated Thornbill	10	0-40	0-20	Below RSA	50	-	8	BUS Yambacoona	14/11/2012	9:50	Foraging in trees
Anthochaera carunculata	Red Wattlebird	1	0-40	0-20	Below RSA	100	-	8	BUS Yambacoona	14/11/2012	9:50	Calling in trees
Cormobates leucophaea	White-throated Treecreeper	2	0-40	0-20	Below RSA	50	-	8	BUS Yambacoona	14/11/2012	9:50	Foraging in trees
Corvus coronoides	Australasian Raven	1	0-40	0-20	Below RSA	100	SE	8	BUS Yambacoona	14/11/2012	9:50	
Cracticus tibicen	Australian Magpie	1	0-40	0-20	Below RSA	70	S	8	BUS Yambacoona	14/11/2012	9:50	
Eolophus roseicapilla	Galah	1	0-40	0-20	Below RSA	20	N	8	BUS Yambacoona	4/12/2012	16:50	Observed/Heard call
Gerygone albogularis	White-throated Gerygone	1	0-40	0-20	Below RSA	5	W	8	BUS Yambacoona	28/11/2012	12:30	
Malurus cyaneus	Superb Fairywren	5	0-40	0-20	Below RSA	30	-	8	BUS Yambacoona	14/11/2012	9:50	Foraging in grass
Malurus cyaneus	Superb Fairywren	3	0-40	0-20	Below RSA	3	W	8	BUS Yambacoona	28/11/2012	12:30	
Malurus cyaneus	Superb Fairywren	2	0-40	0-20	Below RSA	20	N	8	BUS Yambacoona	4/12/2012	16:50	Observed
Pachycephala rufiventris	Rufous Whistler	1	0-40	0-20	Below RSA	35	E	8	BUS Yambacoona	28/11/2012	12:30	
Pachycephala rufiventris	Rufous Whistler	1	0-40	0-20	Below RSA	10	W	8	BUS Yambacoona	4/12/2012	16:50	Observed/Heard call
Petroica rosea	Rose Robin	2	0-40	0-20	Below RSA	10	-	8	BUS Yambacoona	22/11/2012	10:36	Perched
Petroica rosea	Rose Robin	2	0-40	0-20	Below RSA	10	S	8	BUS Yambacoona	4/12/2012	16:50	Observed
Philemon corniculatus	Noisy Friarbird	2	0-40	0-20	Below RSA	70	-	8	BUS Yambacoona	14/11/2012	9:50	Perched
Philemon corniculatus	Noisy Friarbird	1	0-40	0-20	Below RSA	20	SE	8	BUS Yambacoona	22/11/2012	10:36	
Philemon corniculatus	Noisy Friarbird	1	0-40	0-20	Below RSA	30	S	8	BUS Yambacoona	28/11/2012	12:30	
Platycercus elegans	Crimson Rosella	1	0-40	0-20	Below RSA	50	E	8	BUS Yambacoona	14/11/2012	9:50	
Platycercus elegans	Crimson Rosella	1	0-40	0-20	Below RSA	30	S	8	BUS Yambacoona	14/11/2012	9:50	
Platycercus elegans	Crimson Rosella	3	0-40	0-20	Below RSA	20	S	8	BUS Yambacoona	22/11/2012	10:36	
Platycercus elegans	Crimson Rosella	2	0-40	0-20	Below RSA	30	S	8	BUS Yambacoona	22/11/2012	10:36	
Platycercus elegans	Crimson Rosella	1	0-40	0-20	Below RSA	5	S	8	BUS Yambacoona	22/11/2012	10:36	
Platycercus elegans	Crimson Rosella	1	0-40	0-20	Below RSA	5	N	8	BUS Yambacoona	22/11/2012	10:36	
Platycercus elegans	Crimson Rosella	2	0-40	0-20	Below RSA	20	SW	8	BUS Yambacoona	28/11/2012	12:30	
Platycercus elegans	Crimson Rosella	1	0-40	0-20	Below RSA	30	NW	8	BUS Yambacoona	28/11/2012	12:30	
Platycercus elegans	Crimson Rosella	2	0-40	0-20	Below RSA	40	N	8	BUS Yambacoona	4/12/2012	16:50	Observed
Platycercus eximius	Eastern Rosella	1	0-40	0-20	Below RSA	50	S	8	BUS Yambacoona	14/11/2012	9:50	
Platycercus eximius	Eastern Rosella	1	0-40	0-20	Below RSA	30	S	8	BUS Yambacoona	28/11/2012	12:30	
Platycercus eximius	Eastern Rosella	1	0-40	0-20	Below RSA	10	S	8	BUS Yambacoona	4/12/2012	16:50	Observed
Polytelis swainsonii	Superb Parrot	5	0-40	0-20	Below RSA	40	NE	8	BUS Yambacoona	22/11/2012	10:36	Travelling along rd
Polytelis swainsonii	Superb Parrot	1	0-40	0-20	Below RSA	10	S	8	BUS Yambacoona	22/11/2012	10:36	
Rhipidura albiscapa	Grey Fantail	1	0-40	0-20	Below RSA	30	-	8	BUS Yambacoona	14/11/2012	9:50	Perched in tree
Rhipidura albiscapa	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	
Cacatua galerita	Sulphur-crested Cockatoo	2	0-40	20-40	At RSA	80	E	9	BUS Glanmire	16/11/2012	8:55	
Cacatua galerita	Sulphur-crested Cockatoo	1	0-40	20-40	At RSA	70	E	9	BUS Glanmire	16/11/2012	8:55	
Cracticus tibicen	Australian Magpie	2	0-40	0-20	Below RSA	100	NE	9	BUS Glanmire	16/11/2012	8:55	
Cracticus tibicen	Australian Magpie	2	0-40	0-20	Below RSA	100	NE	9	BUS Glanmire	16/11/2012	8:55	
Eolophus roseicapilla	Galah	2	40-150	20-40	At RSA	30	NW	9	BUS Glanmire	16/11/2012	8:55	
Eolophus roseicapilla	Galah	2	0-40	40-150	At RSA	80	N	9	BUS Glanmire	16/11/2012	8:55	
Falco cenchroides	Nankeen Kestrel	1	0-40	20-40	At RSA	10	N	9	BUS Glanmire	16/11/2012	8:55	
Polytelis swainsonii	Superb Parrot	1	0-40	20-40	At RSA	10	NE	9	BUS Glanmire	16/11/2012	8:55	
Platycercus eximius	Eastern Rosella	1	0-40	0-20	Below RSA	70	NE	9	BUS Glanmire	16/11/2012	8:55	
Polytelis swainsonii	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	
Anas superciliosa	Pacific Black Duck	1	0-40	0-20	Below RSA	20	W	10	BUS Springvale	14/11/2012	7:37	Flying along creek
Cacatua galerita	Sulphur-crested Cockatoo	1	0-40	0-20	Below RSA	100	NE	10	BUS Springvale	14/11/2012	7:37	
Cacatua galerita	Sulphur-crested Cockatoo	1	0-40	0-20	Below RSA	100	W	10	BUS Springvale	5/12/2012	15:10	Very Windy
Cacatua galerita	Sulphur-crested Cockatoo	4	0-40	0-20	Below RSA	200	E	10	BUS Springvale	27/02/2013	9:00	Perched
Chenonetta jubata	Australian Wood Duck	2	0-40	0-20	Below RSA	70	S	10	BUS Springvale	27/02/2013	9:00	
Colluricincla harmonica	Grey Shrike-thrush	3	0-40	0-20	Below RSA	20	W	10	BUS Springvale	14/11/2012	7:37	Flying along creek
Corvus mellori	Little Raven	2	0-40	20-40	At RSA	40	S	10	BUS Springvale	27/02/2013	9:00	
Cracticus tibicen	Australian Magpie	1	0-40	0-20	Below RSA	30	SE	10	BUS Springvale	14/11/2012	7:37	
Cracticus tibicen	Australian Magpie	2	0-40	0-20	Below RSA	70	W	10	BUS Springvale	5/12/2012	15:10	Very Windy
Cracticus tibicen	Australian Magpie	1	0-40	0-20	Below RSA	20	W	10	BUS Springvale	6/12/2012	14:57	
Cracticus tibicen	Australian Magpie	2	0-40	0-20	Below RSA	100	E	10	BUS Springvale	27/02/2013	9:00	Perched
Cracticus tibicen	Australian Magpie	4	0-40	0-20	Below RSA	200	E	10	BUS Springvale	27/02/2013	9:00	Perched
Egretta novaehollandiae	White-faced Heron	1	0-40	0-20	Below RSA	10	SE	10	BUS Springvale	14/11/2012	7:37	
Egretta novaehollandiae	White-faced Heron	1	0-40	0-20	Below RSA	50	W	10	BUS Springvale	5/12/2012	15:10	Very Windy
Eolophus roseicapilla	Galah	2	0-40	0-20	Below RSA	50	S	10	BUS Springvale	5/12/2012	15:10	Very Windy
Eolophus roseicapilla	Galah	2	0-40	0-20	Below RSA	10	-	10	BUS Springvale	6/12/2012	14:57	Perched
Eolophus roseicapilla	Galah	2	0-40	0-20	Below RSA	50	N	10	BUS Springvale	6/12/2012	14:57	
Eolophus roseicapilla	Galah	2	0-40	0-20	Below RSA	50	W	10	BUS Springvale	6/12/2012	14:57	
Eolophus roseicapillus	Galah	2	0-40	0-20	Below RSA	50	N	10	BUS Springvale	14/11/2012	7:37	
Lichenostomus pencillatus	White-plumed Honeyeater	2	0-40	0-20	Below RSA	10	W	10	BUS Springvale	6/12/2012	14:57	
Malurus cyaneus	Superb Fairywren	5	0-40	0-20	Below RSA	15	W	10	BUS Springvale	14/11/2012	7:37	Flying along creek
Malurus cyaneus	Superb Fairywren	6	0-40	0-20	Below RSA	10	-	10	BUS Springvale	6/12/2012	14:57	Perched
Merops ornatus	Rainbow Bee-eater	2	0-40	0-20	Below RSA	40	-	10	BUS Springvale	14/11/2012	7:37	Perched
Merops ornatus	Rainbow Bee-eater	1	0-40	0-20	Below RSA	30	W	10	BUS Springvale	5/12/2012	15:10	Very Windy
Merops ornatus	Rainbow Bee-eater	2	0-40	0-20	Below RSA	5	-	10	BUS Springvale	6/12/2012	14:57	Perched
Pardalotus striatus	Striated Pardalote	1	0-40	0-20	Below RSA	10	-	10	BUS Springvale	6/12/2012	14:57	Perched
Petrochelidon ariel	Fairy Martin	7	0-40	0-20	Below RSA	70	E	10	BUS Springvale	14/11/2012	7:37	Flying across grassland
Phaps chalcoptera	Common Bronzewing	1	0-40	0-20	Below RSA	10	E	10	BUS Springvale	27/02/2013	9:00	
Platycercus elegans	Crimson Rosella	2	0-40	0-20	Below RSA	40	-	10	BUS Springvale	6/12/2012	14:57	Perched
Platycercus eximius	Eastern Rosella	2	0-40	0-20	Below RSA	30	W	10	BUS Springvale	5/12/2012	15:10	Very Windy
Platycercus eximius	Eastern Rosella	1	0-40	0-20	Below RSA	50	-	10	BUS Springvale	6/12/2012	14:57	Perched
Platycercus eximius	Eastern Rosella	2	0-40	0-20	Below RSA	30	W	10	BUS Springvale	6/12/2012	14:57	
Polytelis swainsonii	Superb Parrot	3	0-40	0-20	Below RSA	10	NE	10	BUS Springvale	14/11/2012	7:37	
Polytelis swainsonii	Superb Parrot	5	0-40	0-20	Below RSA	40	N	10	BUS Springvale	14/11/2012	7:37	
Polytelis swainsonii	Superb Parrot	1	0-40	0-20	Below RSA	20	W	10	BUS Springvale	5/12/2012	15:10	Very Windy
Stagonopleura guttata	Diamond Firetail	1	0-40	0-20	Below RSA	10	-	10	BUS Springvale	6/12/2012	14:57	Perched
Egretta novaehollandiae	White-faced Heron	1	0-40	20-40	At RSA	100	N	11	Springvale property	5/12/2012	15:35	
Cracticus tibicen	Australian Magpie	1	0-40	0-20	Below RSA	60	E	11	Springvale property	5/12/2012	15:35	
Cracticus tibicen	Australian Magpie	2	-	0-20	Below RSA	40	-	11	Springvale property	5/12/2012	15:35	On ground
Cracticus tibicen	Australian Magpie	1	0-40	0-20	Below RSA	50	E	11	Springvale property	6/12/2012	14:35	
Elanus axillaris	Black-shouldered Kite	1	0-40	0-20	Below RSA	150	-	11	Springvale property	5/12/2012	15:35	Hovering in wind
Eolophus roseicapilla	Galah	2	0-40	0-20	Below RSA	20	W	11	Springvale property	5/12/2012	15:35	
Malurus cyaneus	Superb Fairywren	4	0-40	0-20	Below RSA	20	-	11	Springvale property	6/12/2012	14:35	Along creek
Merops ornatus	Rainbow Bee-eater	2	0-40	0-20	Below RSA	30	E	11	Springvale property	6/12/2012	14:35	
Neochmia temporalis	Red-Browed Finch	1	-	0-20	Below RSA	20	-	11	Springvale property	5/12/2012	15:35	On ground
Platycercus elegans	Crimson Rosella	1	0-40	0-20	Below RSA	30	SW	11	Springvale property	5/12/2012	15:35	
Platycercus elegans	Crimson Rosella	2	0-40	0-20	Below RSA	20	S	11	Springvale property	5/12/2012	15:35	
Platycercus elegans	Crimson Rosella	2	0-40	0-20	Below RSA	80	N	11	Springvale property	5/12/2012	15:35	
Platycercus elegans	Crimson Rosella	4	-	0-20	Below RSA	40	N	11	Springvale property	5/12/2012	15:35	
Platycercus elegans	Crimson Rosella	2	0-40	0-20	Below RSA	40	N	11	Springvale property	6/12/2012	14:35	
Rhipidura leucophrys	Willie Wagtail	1	-	0-20	Below RSA	40	-	11	Springvale property	5/12/2012	15:35	Perched
Rhipidura leucophrys	Willie Wagtail	2	0-40	0-20	Below RSA	20	-	11	Springvale property	6/12/2012	14:35	Along creek
Sturnus vulgaris	Common Starling	4	0-40	0-20	Below RSA	30	W	11	Springvale property	5/12/2012	15:35	
Sturnus vulgaris	Common Starling	1	0-40	0-20	Below RSA	50	S	11	Springvale property	5/12/2012	15:35	
Sturnus vulgaris	Common Starling	1	0-40	0-20	Below RSA	30	E	11	Springvale property	6/12/2012	14:35	
Sturnus vulgaris	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
Sturnus vulgaris	Common Starling	1	0-40	0-20	Below RSA	50	W	11	Springvale property	6/12/2012	14:35	
Threskiornis spinicollis	Straw-necked Ibis	2	-	0-20	Below RSA	40	-	11	Springvale property	5/12/2012	15:35	On ground
Anthus novaeseelandiae	Australasian Pipit	1	0-40	0-20	Below RSA	30	E	12	BUS Mt Buffalo	4/12/2012	11:25	Very Windy
Cracticus tibicen	Australian Magpie	1	0-40	20-40	At RSA	80	NE	12	BUS Mt Buffalo	15/11/2012	12:20	
Cracticus tibicen	Australian Magpie	2	0-40	0-20	Below RSA	50	-	12	BUS Mt Buffalo	15/11/2012	12:20	Perched in tree
Cracticus tibicen	Australian Magpie	1	0-40	0-20	Below RSA	90	NW	12	BUS Mt Buffalo	15/11/2012	12:20	
Cracticus tibicen	Australian Magpie	1	0-40	0-20	Below RSA	90	NE	12	BUS Mt Buffalo	15/11/2012	12:20	
Cracticus tibicen	Australian Magpie	5	0-40	0-20	Below RSA	80	-	12	BUS Mt Buffalo	15/11/2012	12:20	Flying between trees
Cracticus tibicen	Australian Magpie	1	0-40	0-20	Below RSA	80	NE	12	BUS Mt Buffalo	15/11/2012	12:20	
Cracticus tibicen	Australian Magpie	1	0-40	0-20	Below RSA	90	SW	12	BUS Mt Buffalo	15/11/2012	12:20	
Cracticus tibicen	Australian Magpie	2	0-40	0-20	Below RSA	80	E	12	BUS Mt Buffalo	4/12/2012	11:25	Very Windy
Cracticus tibicen	Australian Magpie	1	0-40	0-20	Below RSA	100	S	12	BUS Mt Buffalo	4/12/2012	11:25	Very Windy
Aquila audax	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
Acanthiza chrysorrhoa	Yellow-rumped Thornbill	2	0-40	0-20	Below RSA	40	W	13	BUS Loyde Davis	13/12/2012	13:50	
Anthus novaeseelandiae	Australasian Pipit	1	0-40	0-20	Below RSA	20	W	13	BUS Loyde Davis	13/12/2012	13:50	
Coracina novaehollandiae	Black-faced Cuckoo-shrike	1	0-40	0-20	Below RSA	60	NE	13	BUS Loyde Davis	13/12/2012	13:50	
Coracina novaehollandiae	Black-faced Cuckoo-shrike	1	0-40	0-20	Below RSA	75	NE	13	BUS Loyde Davis	17/12/2012	13:10	
Falco cenchroides	Nankeen Kestrel	1	0-40	20-40	At RSA	80	W	13	BUS Loyde Davis	13/12/2012	13:50	
Falco cenchroides	Nankeen Kestrel	1	0-40	0-20	Below RSA	200	W	13	BUS Loyde Davis	13/12/2012	13:50	
Hirundo neoxena	Welcome Swallow	1	0-40	0-20	Below RSA	100	NE	13	BUS Loyde Davis	23/02/2013	15:25	Flying
Hirundo neoxena	Welcome Swallow	1	0-40	0-20	Below RSA	10	S	13	BUS Loyde Davis	23/02/2013	15:25	Flying
Hirundo neoxena	Welcome Swallow	5	0-40	0-20	Below RSA	30	S	13	BUS Loyde Davis	23/02/2013	15:25	Flying
Malurus cyaneus	Superb Fairywren	2	0-40	0-20	Below RSA	20	NE	13	BUS Loyde Davis	17/12/2012	13:10	
Rhipidura leucophrys	Willie Wagtail	1	0-40	0-20	Below RSA	30	NW	13	BUS Loyde Davis	23/02/2013	15:25	Foraging on ground
Acanthiza chrysorrhoa	Yellow-rumped Thornbill	10	0-40	0-20	Below RSA	70	E	14	Hopefield Lane	27/02/2013	8:00	
Acanthiza chrysorrhoa	Yellow-rumped Thornbill	1	0-40	0-20	Below RSA	25	E	14	Hopefield Lane	27/02/2013	8:00	
Anthus novaeseelandiae	Australasian Pipit	2	0-40	0-20	Below RSA	10	NW	14	Hopefield Lane	26/02/2013	17:37	Flying
Aquila audax	Wedge-tailed Eagle	2	40-150	40-150	At RSA	50	S	14	Hopefield Lane	3/12/2012	16:50	Observed
Cacatua galerita	Sulphur-crested Cockatoo	1	0-40	0-20	Below RSA	70	S	14	Hopefield Lane	27/02/2013	8:00	Perched
Circus assimilis	Spotted Harrier	1	40-150	40-150	At RSA	50	S	14	Hopefield Lane	3/12/2012	16:50	Observed
Coracina novaehollandiae	Black-faced Cuckoo-shrike	2	0-40	0-20	Below RSA	60	E	14	Hopefield Lane	26/02/2013	17:37	Perched
Coracina novaehollandiae	Black-faced Cuckoo-shrike	1	0-40	0-20	Below RSA	100	N	14	Hopefield Lane	27/02/2013	8:00	Perched
Coracina novaehollandiae	Black-faced Cuckoo-shrike	1	0-40	0-20	Below RSA	70	N	14	Hopefield Lane	27/02/2013	8:00	Flying between trees
Corvus coronoides	Australasian Raven	5	40-150	40-150	At RSA	50	S	14	Hopefield Lane	3/12/2012	16:50	Observed
Cracticus tibicen	Australian Magpie	2	0-40	0-20	Below RSA	60	W	14	Hopefield Lane	26/02/2013	17:37	Perched
Cracticus tibicen	Australian Magpie	3	0-40	0-20	Below RSA	80	NE	14	Hopefield Lane	27/02/2013	8:00	Perched
Cracticus tibicen	Australian Magpie	1	0-40	0-20	Below RSA	70	N	14	Hopefield Lane	27/02/2013	8:00	
Eolophus roseicapilla	Galah	2	0-40	0-20	Below RSA	40	E	14	Hopefield Lane	3/12/2012	16:50	Observed
Eolophus roseicapilla	Galah	3	0-40	0-20	Below RSA	50	E	14	Hopefield Lane	26/02/2013	17:37	On ground
Falco berigora	Brown Falcon	2	40-150	40-150	At RSA	50	S	14	Hopefield Lane	3/12/2012	16:50	Observed
Falco berigora	Brown Falcon	1	0-40	0-20	Below RSA	25	S	14	Hopefield Lane	27/02/2013	8:00	
Grallina cyanoleuca	Magpie Lark	1	0-40	0-20	Below RSA	70	W	14	Hopefield Lane	26/02/2013	17:37	Perched
Hirundo neoxena	Welcome Swallow	2	0-40	0-20	Below RSA	20	S	14	Hopefield Lane	5/12/2012	13:45	Very Windy
Malurus cyaneus	Superb Fairywren	1	-	0-20	Below RSA	10	-	14	Hopefield Lane	5/12/2012	13:45	Calling in trees
Platycercus elegans	Crimson Rosella	1	0-40	0-20	Below RSA	70	E	14	Hopefield Lane	26/02/2013	17:37	Perched
Platycercus eximius	Eastern Rosella	1	0-40	0-20	Below RSA	70	W	14	Hopefield Lane	26/02/2013	17:37	Perched
Platycercus eximius	Eastern Rosella	3	0-40	0-20	Below RSA	60	W	14	Hopefield Lane	27/02/2013	8:00	Perched
Platycercus eximius	Eastern Rosella	2	0-40	0-20	Below RSA	5	E	14	Hopefield Lane	27/02/2013	8:00	
Platycercus eximius	Eastern Rosella	6	0-40	0-20	Below RSA	25	E	14	Hopefield Lane	27/02/2013	8:00	
Psephotus haematonotus	Red-rumped Parrot	6	0-40	0-20	Below RSA	10	E	14	Hopefield Lane	27/02/2013	8:00	
Sturnus vulgaris	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
Anthus	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
novaeseelandiae									Lane/Boorowa Rd			
Corvus coronoides	Australasian Raven	2	0-40	0-20	Below RSA	120	SE	15	Hopefield Lane/Boorowa Rd	5/12/2012	14:10	Very Windy
Corvus coronoides	Australasian Raven	3	0-40	0-20	Below RSA	80	NW	15	Hopefield Lane/Boorowa Rd	18/01/2013	8:09	
Corvus coronoides	Australasian Raven	5	40-150	40-150	At RSA	100	NW	15	Hopefield Lane/Boorowa Rd	18/01/2013	8:09	
Corvus mellori	Little Raven	2	0-40	0-20	Below RSA	60	E	15	Hopefield Lane/Boorowa Rd	27/02/2013	7:40	
Cracticus tibicen	Australian Magpie	1	0-40	0-20	Below RSA	120	W	15	Hopefield Lane/Boorowa Rd	26/02/2013	17:07	Perched on fence
Cracticus tibicen	Australian Magpie	1	0-40	0-20	Below RSA	40	W	15	Hopefield Lane/Boorowa Rd	26/02/2013	17:07	Flying
Cracticus tibicen	Australian Magpie	1	0-40	0-20	Below RSA	60	E	15	Hopefield Lane/Boorowa Rd	27/02/2013	7:40	
Cracticus tibicen	Australian Magpie	4	0-40	0-20	Below RSA	100	W	15	Hopefield Lane/Boorowa Rd	27/02/2013	7:40	Flying
Elanus axillaris	Black-shouldered Kite	1	0-40	0-20	Below RSA	70	SW	15	Hopefield Lane/Boorowa Rd	18/01/2013	8:09	
Eolophus roseicapilla	Galah	2	0-40	0-20	Below RSA	60	N	15	Hopefield Lane/Boorowa Rd	5/12/2012	14:10	Very Windy
Eolophus roseicapilla	Galah	1	40-150	40-150	At RSA	70	W	15	Hopefield Lane/Boorowa Rd	18/01/2013	8:09	
Grallina cyanoleuca	Magpie Lark	2	0-40	0-20	Below RSA	100	W	15	Hopefield Lane/Boorowa Rd	27/02/2013	7:40	
Malurus cyaneus	Superb Fairywren	4	0-40	0-20	Below RSA	5	-	15	Hopefield Lane/Boorowa Rd	18/01/2013	8:09	
Malurus cyaneus	Superb Fairywren	2	0-40	0-20	Below RSA	3	E	15	Hopefield Lane/Boorowa Rd	26/02/2013	17:07	
Malurus cyaneus	Superb Fairywren	3	0-40	0-20	Below RSA	5	E	15	Hopefield Lane/Boorowa Rd	27/02/2013	7:40	Perched
Platycercus elegans	Crimson Rosella	4	0-40	0-20	Below RSA	4	W	15	Hopefield Lane/Boorowa Rd	26/02/2013	17:07	
Rhipidura leucophrys	Willie Wagtail	1	-	0-20	Below RSA	15	-	15	Hopefield Lane/Boorowa Rd	18/01/2013	8:09	
Rhipidura leucophrys	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
Ardea pacifica	White-necked Heron	1	40-150	40-150	At RSA	100	E	16	Harry's ck rd/Boorowa Rd	18/01/2013	11:38	
Chenonetta jubata	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
Coracina novaehollandiae	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	
Cracticus tibicen	Australian Magpie	3	-	0-20	Below RSA	50	-	16	Harry's ck rd/Boorowa Rd	5/12/2012	14:40	On ground
Cracticus tibicen	Australian Magpie	1	-	0-20	Below RSA	120	-	16	Harry's ck rd/Boorowa Rd	5/12/2012	14:40	Perched on powerline
Eolophus roseicapilla	Galah	10	0-40	0-20	Below RSA	250	W	16	Harry's ck rd/Boorowa Rd	23/01/2013	17:55	
Falco cenchroides	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
Hirundo neoxena	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
Ocyphaps lophotes	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
Cacatua galerita	Sulphur-crested Cockatoo	1	0-40	0-20	Below RSA	100	S	17	The Pines Property	6/12/2012	9:15	
Coracina novaehollandiae	Black-faced Cuckoo-shrike	1	0-40	0-20	Below RSA	5	S	17	The Pines Property	6/12/2012	9:15	
Corvus coronoides	Australasian Raven	1	0-40	0-20	Below RSA	80	-	17	The Pines Property	6/12/2012	9:15	Perched
Cracticus tibicen	Australian Magpie	3	0-40	0-20	Below RSA	30	SW	17	The Pines Property	6/12/2012	9:15	
Cracticus tibicen	Australian Magpie	1	0-40	0-20	Below RSA	70	SE	17	The Pines Property	23/01/2013	16:50	Perched
Cracticus tibicen	Australian Magpie	5	0-40	0-20	Below RSA	60	W	17	The Pines Property	25/01/2013	11:20	Perched
Grallina cyanoleuca	Magpie Lark	1	0-40	0-20	Below RSA	70	S	17	The Pines Property	23/01/2013	16:50	Perched
Microeca fascinans	Jacky Winter	2	-	0-20	Below RSA	30	-	17	The Pines Property	6/12/2012	9:15	Perched
Pachycephala rufiventris	Rufous Whistler	1	-	0-20	Below RSA	10	-	17	The Pines Property	6/12/2012	9:15	Perched
Pardalotus striatus	Striated Pardalote	1	-	0-20	Below RSA	50	-	17	The Pines Property	6/12/2012	9:15	Calling in trees
Platycercus elegans	Crimson Rosella	2	-	0-20	Below RSA	20	-	17	The Pines Property	6/12/2012	9:15	Perched
Platycercus elegans	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
Platycercus elegans	Crimson Rosella	4	0-40	0-20	Below RSA	40	N	17	The Pines Property	25/01/2013	11:20	Perched
Platycercus eximius	Eastern Rosella	5	0-40	0-20	Below RSA	20	W	17	The Pines Property	6/12/2012	9:15	
Platycercus eximius	Eastern Rosella	2	0-40	0-20	Below RSA	100	W	17	The Pines Property	23/01/2013	16:50	Perched
Anthus novaeseelandiae	Australasian Pipit	1	-	0-20	Below RSA	10		18	Mt Buffalo Access Gate	6/12/2012	11:55	Perched
Anthus novaeseelandiae	Australasian Pipit	2	0-40	0-20	Below RSA	25	S	18	Mt Buffalo Access Gate	18/01/2013	9:22	
Aquila audax	Wedge-tailed Eagle	1	40-150	40-150	At RSA	80	NE	18	Mt Buffalo Access Gate	18/01/2013	9:22	
Aquila audax	Wedge-tailed Eagle	1	40-150	40-150	At RSA	100	E	18	Mt Buffalo Access Gate	18/01/2013	9:22	
Cacatua galerita	Sulphur-crested Cockatoo	16	0-40	20-40	At RSA	100	E	18	Mt Buffalo Access Gate	18/01/2013	9:22	
Corvus coronoides	Australasian Raven	1	40-150	40-150	At RSA	100	E	18	Mt Buffalo Access Gate	18/01/2013	9:22	Chaseing WTE
Cracticus tibicen	Australian Magpie	3	0-40	0-20	Below RSA	70	N	18	Mt Buffalo Access Gate	18/01/2013	9:22	in tree
Cracticus tibicen	Australian Magpie	5	0-40	0-20	Below RSA	80	W	18	Mt Buffalo Access Gate	27/02/2013	10:20	Perched
Dacelo novaeguineae	Laughing Kookaburra	1	0-40	0-20	Below RSA	100	W	18	Mt Buffalo Access Gate	27/02/2013	10:20	Perched
Falco berigora	Brown Falcon	1	0-40	0-20	Below RSA	5	W	18	Mt Buffalo Access Gate	6/12/2012	11:55	
Grallina cyanoleuca	Magpie Lark	2	0-40	0-20	Below RSA	80	E	18	Mt Buffalo Access Gate	27/02/2013	10:20	Perched
Pardalotus striatus	Striated Pardalote	1	-	0-20	Below RSA	80		18	Mt Buffalo Access Gate	6/12/2012	11:55	Perched
Platycercus elegans	Crimson Rosella	1	0-40	0-20	Below RSA	70	N	18	Mt Buffalo Access Gate	18/01/2013	9:22	
Sturnus vulgaris	Common Starling	1	0-40	0-20	Below RSA	40	E	18	Mt Buffalo Access Gate	6/12/2012	11:55	
Anthochaera carunculata	Red Wattlebird	1	0-40	0-20	Below RSA	30	W	19	Lavestock rd. Montalta Gate	18/01/2013	10:16	
Cacatua galerita	Sulphur-crested Cockatoo	1	0-40	0-20	Below RSA	40	-	19	Lavestock rd. Montalta Gate	6/12/2012	13:25	Perched
Cacatua galerita	Sulphur-crested Cockatoo	1	0-40	0-20	Below RSA	100	N	19	Lavestock rd. Montalta Gate	6/12/2012	13:25	
Cacatua galerita	Sulphur-crested Cockatoo	2	0-40	0-20	Below RSA	120	NW	19	Lavestock rd. Montalta Gate	18/01/2013	10:16	perched
Cacatua galerita	Sulphur-crested Cockatoo	1	0-40	0-20	Below RSA	50	S	19	Lavestock rd. Montalta Gate	21/02/2013	17:26	Flying
Cacatua galerita	Sulphur-crested Cockatoo	1	0-40	0-20	Below RSA	70	E	19	Lavestock rd. Montalta Gate	23/02/2013		Flying
Colluricincla harmonica	Grey Shrike-thrush	1	0-40	0-20	Below RSA	20		19	Lavestock rd. Montalta Gate	23/02/2013		Perched
Corvus mellori	Little Raven	1	0-40	0-20	Below RSA	120	N	19	Lavestock rd. Montalta Gate	23/02/2013		Flying
Cracticus tibicen	Australian Magpie	2	0-40	0-20	Below RSA	30	-	19	Lavestock rd. Montalta Gate	6/12/2012	13:25	Perched
Cracticus tibicen	Australian Magpie	1	0-40	0-20	Below RSA	20	S	19	Lavestock rd. Montalta Gate	6/12/2012	13:25	
Cracticus tibicen	Australian Magpie	2	0-40	0-20	Below RSA	70	W	19	Lavestock rd. Montalta Gate	21/02/2013	17:26	Flying
Cracticus tibicen	Australian Magpie	4	0-40	0-20	Below RSA	100	W	19	Lavestock rd. Montalta Gate	23/02/2013		Flying
Falco cenchroides	Nankeen Kestrel	1	0-40	0-20	Below RSA	100	NW	19	Lavestock rd. Montalta Gate	18/01/2013	10:16	perched
Haliastur sphenurus	Whistling Kite	1	40-150	40-150	At RSA	60	E	19	Lavestock rd. Montalta Gate	18/01/2013	10:16	Took off from perch
Manorina melanocephala	Noisy Miner	1	0-40	0-20	Below RSA	20	N	19	Lavestock rd. Montalta Gate	6/12/2012	13:25	
Merops ornatus	Rainbow Bee-eater	1	0-40	0-20	Below RSA	30	SW	19	Lavestock rd. Montalta Gate	21/02/2013	17:26	Flying
Merops ornatus	Rainbow Bee-eater	3	0-40	0-20	Below RSA	0		19	Lavestock rd. Montalta Gate	21/02/2013	17:26	Perched
Merops ornatus	Rainbow Bee-eater			0-20	Below RSA			19	Lavestock rd. Montalta Gate	23/02/2013		Heard
Philemon corniculatus	Noisy Friarbird	1	0-40	0-20	Below RSA	30	N	19	Lavestock rd. Montalta Gate	6/12/2012	13:25	
Platycercus elegans	Crimson Rosella	2	0-40	0-20	Below RSA	30	-	19	Lavestock rd. Montalta Gate	6/12/2012	13:25	Perched
Platycercus elegans	Crimson Rosella	6	0-40	0-20	Below RSA	70	NW	19	Lavestock rd. Montalta Gate	21/02/2013	17:26	Perched in tree
Platycercus elegans	Crimson Rosella	1	0-40	0-20	Below RSA	20	NW	19	Lavestock rd. Montalta Gate	23/02/2013		Flying
Platycercus eximius	Eastern Rosella	4	0-40	0-20	Below RSA	20	S	19	Lavestock rd. Montalta Gate	6/12/2012	13:25	
Platycercus eximius	Eastern Rosella	4	0-40	0-20	Below RSA	20	N	19	Lavestock rd. Montalta Gate	6/12/2012	13:25	
Platycercus eximius	Eastern Rosella	4	0-40	0-20	Below RSA	100	S	19	Lavestock rd. Montalta Gate	23/02/2013		Flying
Platycercus eximius	Eastern Rosella	2	0-40	0-20	Below RSA	100	N	19	Lavestock rd. Montalta Gate	23/02/2013		Flying
Platycercus eximius	Eastern Rosella	7	0-40	0-20	Below RSA	100	W	19	Lavestock rd. Montalta Gate	23/02/2013		Flying
Platycercus eximius	Eastern Rosella	2	0-40	0-20	Below RSA	80	E	19	Lavestock rd. Montalta Gate	23/02/2013		Flying
Platycercus eximius	Eastern Rosella	6	0-40	0-20	Below RSA	15	N	19	Lavestock rd. Montalta Gate	23/02/2013		Flying
Polytelis swainsonii	Superb Parrot	2	0-40	0-20	Below RSA	20	N	19	Lavestock rd. Montalta Gate	6/12/2012	13:25	
Polytelis swainsonii	Superb Parrot	3	0-40	0-20	Below RSA	10	N	19	Lavestock rd. Montalta Gate	6/12/2012	13:25	
Polytelis swainsonii	Superb Parrot	5	0-40	0-20	Below RSA	30	S	19	Lavestock rd. Montalta Gate	6/12/2012	13:25	
Rhipidura albiscapa	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
Rhipidura albiscapa	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
Anthus novaeseelandiae	Australasian Pipit	1	0-40	0-20	Below RSA	20	E	20	The Pines Access	23/01/2013	17:20	
Ardea pacifica	White-necked Heron	1	0-40	0-20	Below RSA	100	W	20	The Pines Access	25/01/2013	11:50	foraging in paddock
Cacatua galerita	Sulphur-crested Cockatoo	8	-	0-20	Below RSA	50		20	The Pines Access	17/01/2013	7:53	Perched
Cacatua galerita	Sulphur-crested Cockatoo	1	0-40	0-20	Below RSA	200	W	20	The Pines Access	25/01/2013	11:50	
Cracticus tibicen	Australian Magpie	1	0-40	0-20	Below RSA	40	N	20	The Pines Access	6/12/2012	14:20	
Cracticus tibicen	Australian Magpie	2	-	0-20	Below RSA	50		20	The Pines Access	17/01/2013	7:53	On ground
Cracticus tibicen	Australian Magpie	3	0-40	0-20	Below RSA	90	NW	20	The Pines Access	18/01/2013	11:05	Perched
Egretta novaehollandiae	White-faced Heron	3	0-40	0-20	Below RSA	100	W	20	The Pines Access	25/01/2013	11:50	foraging in paddock
Eolophus roseicapilla	Galah	2	-	0-20	Below RSA	40		20	The Pines Access	17/01/2013	7:53	Perched in trees
Eolophus roseicapilla	Galah	10	0-40	0-20	Below RSA	60		20	The Pines Access	17/01/2013	7:53	
Eolophus roseicapilla	Galah	1	0-40	0-20	Below RSA	10		20	The Pines Access	17/01/2013	7:53	
Grallina cyanoleuca	Magpie Lark	1	0-40	0-20	Below RSA	50	SE	20	The Pines Access	23/01/2013	17:20	Perched
Malurus cyaneus	Superb Fairywren	3	-	0-20	Below RSA	20	-	20	The Pines Access	6/12/2012	14:20	Calling in road reserve
Malurus cyaneus	Superb Fairywren	3	-	0-20	Below RSA	30		20	The Pines Access	17/01/2013	7:53	Calling in road reserve
Malurus cyaneus	Superb Fairywren	2	0-40	0-20	Below RSA	25	E	20	The Pines Access	18/01/2013	11:05	In Acacia thicket
Malurus cyaneus	Superb Fairywren	2	0-40	0-20	Below RSA	50	SE	20	The Pines Access	23/01/2013	17:20	Perched
Malurus cyaneus	Superb Fairywren	3	0-40	0-20	Below RSA	10	E	20	The Pines Access	25/01/2013	11:50	Perched
Pachycephala rufiventris	Rufous Whistler	1	0-40	0-20	Below RSA	50	SE	20	The Pines Access	23/01/2013	17:20	Perched
Pardalotus striatus	Striated Pardalote	1	-	0-20	Below RSA	50	-	20	The Pines Access	6/12/2012	14:20	Perched
Platycercus elegans	Crimson Rosella	2	-	0-20	Below RSA	40		20	The Pines Access	17/01/2013	7:53	Perched
Platycercus elegans	Crimson Rosella	2	0-40	0-20	Below RSA	20		20	The Pines Access	17/01/2013	7:53	Along road reserve
Platycercus eximius	Eastern Rosella	1	0-40	0-20	Below RSA	30		20	The Pines Access	17/01/2013	7:53	
Rhipidura leucophrys	Willie Wagtail	1	-	0-20	Below RSA	20		20	The Pines Access	17/01/2013	7:53	Calling from trees
Rhipidura leucophrys	Willie Wagtail	1	0-40	0-20	Below RSA	20	NE	20	The Pines Access	18/01/2013	11:05	Perched
Rhipidura leucophrys	Willie Wagtail	1	0-40	0-20	Below RSA	50	SE	20	The Pines Access	23/01/2013	17:20	Perched
Rhipidura leucophrys	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	9:00 AM				3:00 PM			
		Temp	Cloud Cvr	Wind		Temp	Cloud Cvr	Wind	
	(mm)	(°C)	(8th)	Dir	Spd (km)	(°C)	8th	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	-	-	-	-	-	-	-	-

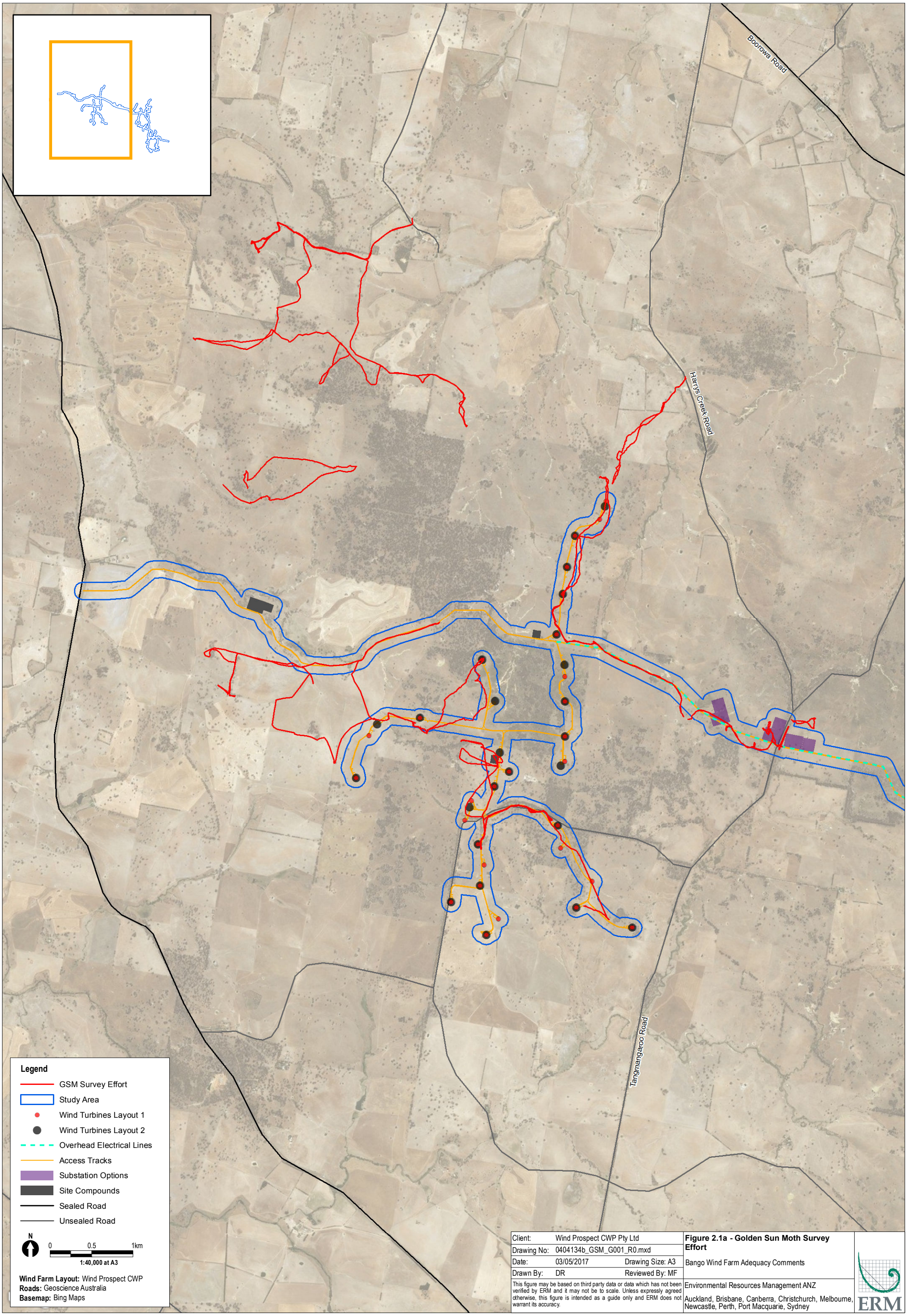
Source: Australian Government Bureau of Meteorology (Yass: Rural Fire Service)

*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.



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	Drawing Size: A3	
Drawn By:	DR	Reviewed By: MF	Environmental Resources Management ANZ

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.

Auckland, Brisbane, Canberra, Christchurch, Melbourne, Newcastle, Perth, Port Macquarie, Sydney

ERM

Rye Park-Dalton Road

Wargeila Road

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

N

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		
Drawing No:	0404134b_GSM_G001_R0.mxd		
Date:	03/05/2017	Drawing Size: A3	
Drawn By:	DR	Reviewed By: MF	

Figure 2.1b - Golden Sun Moth Survey Effort

Bango Wind Farm Adequacy Comments

Environmental Resources Management ANZ

Auckland, Brisbane, Canberra, Christchurch, Melbourne, Newcastle, Perth, Port Macquarie, Sydney

ERM

3 RESULTS

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**

Boorowa

Rye Park

Kangiara

Laverstock

Binalong

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	
Drawing No:	0404134b_GSM_G002_R0.mxd	
Date:	03/05/2017	Drawing Size: A3
Drawn By:	DR	Reviewed By: MF

Figure 3.1 - Golden Sun Moth Locations and Habitat

Bango Wind Farm Adequacy Comments

Environmental Resources Management ANZ

Auckland, Brisbane, Canberra, Christchurch, Melbourne, Newcastle, Perth, Port Macquarie, Sydney

ERM

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 micrositing 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

FindMyShadow

09 S

Bespoke Shadow Plotting

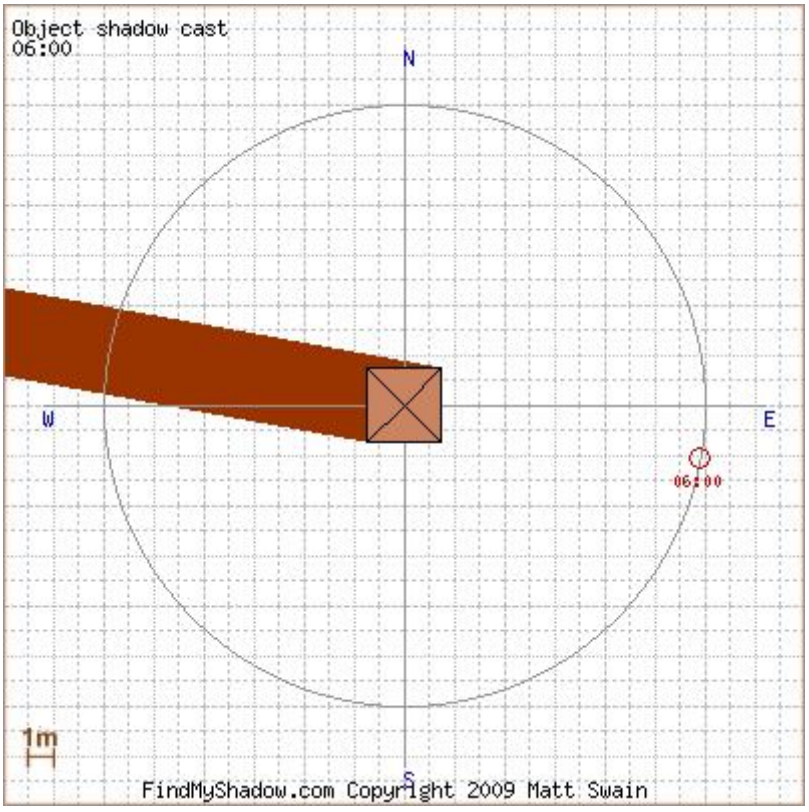
Select Location :: Select Date :: Draw your Scene :: **Calculate Shadows** :: Print Report

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



Animated view - hover over an hour in the table b

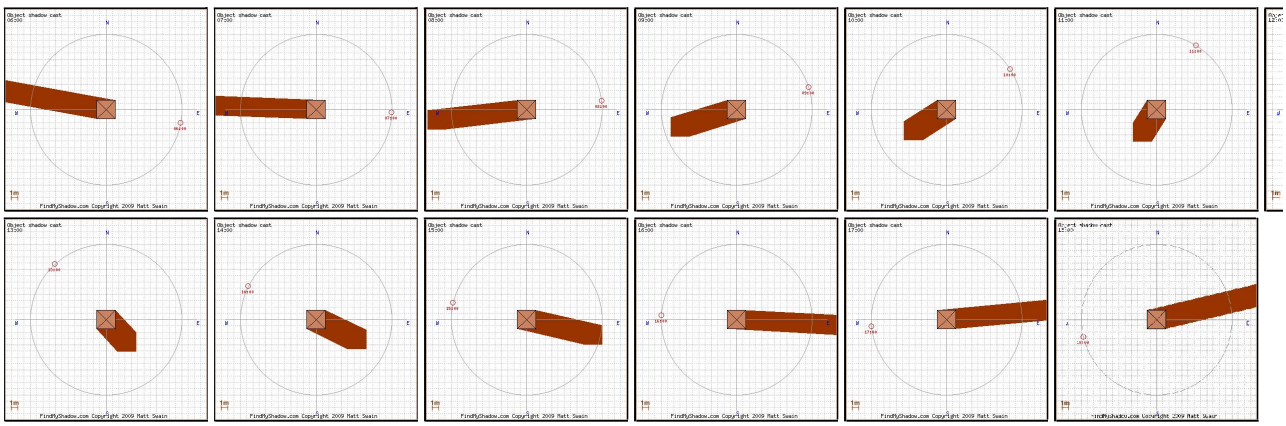
Sun-up hours:

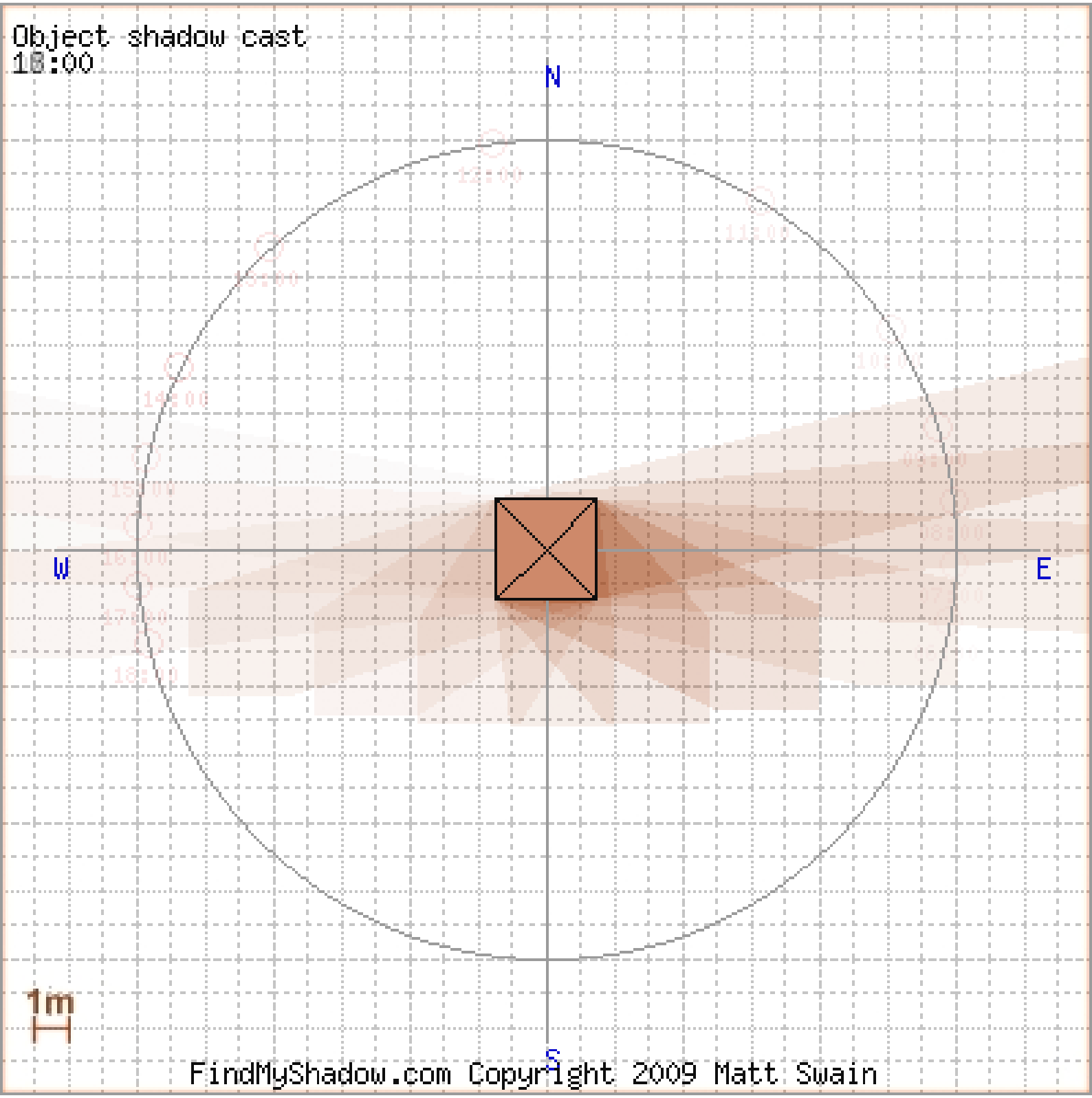
06
07
08
09
10
11
12
13
14
15
16
17
18

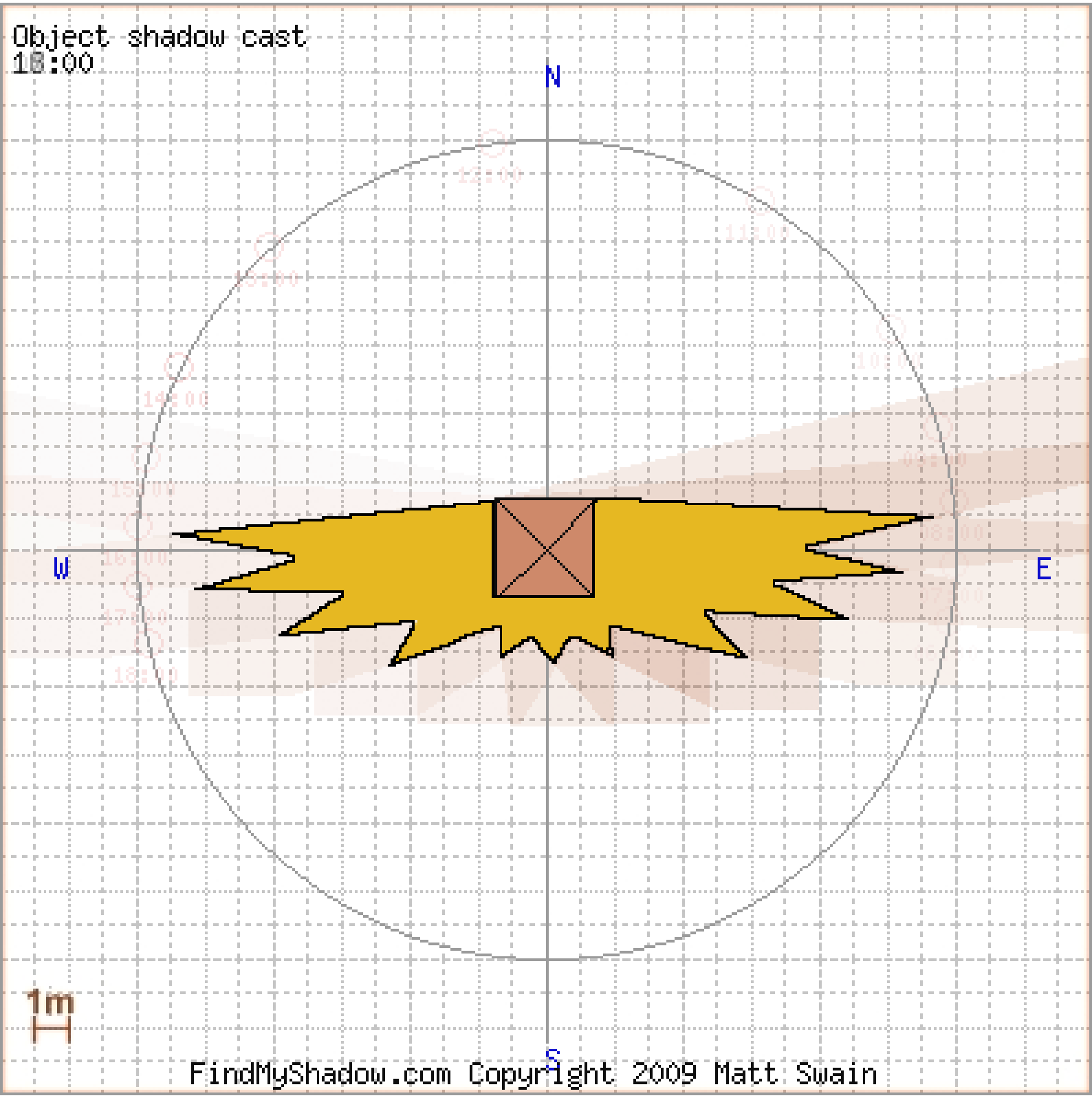
Notes:

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
W
E
S
1m
FindMyShadow.com Copyright 2009 Matt Swain


Object shadow cast
18:00
N
W
E
S
1m
FindMyShadow.com Copyright 2009 Matt Swain

Annex G

Biobanking

Environmental Resources Management Australia Pty Ltd

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
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

Environmental Resources Management Australia Pty Ltd
A.C.N. 002 773 248
A.B.N. 12 002 773 248

Offices worldwide

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
Hieraaetus morphnoides	Little Eagle	Vulnerable	6.58	89	15
Circus assimilis	Spotted Harrier	Vulnerable	6.58	89	15
Synemon plana	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

This page is intentionally left blank.

Appendix 3

Supplementary Noise Report

Sonus

Bango Wind Farm

Supplementary Environmental Noise Assessment

May 2017

sonus.

Sonus Pty Ltd
17 Ruthven Avenue
Adelaide 5000 SA
www.sonus.com.au
+61(8) 8231 2100

Document Title	:	Bango Wind Farm - Supplementary Environmental Noise Assessment
Document Reference	:	S3958C12
Date	:	May 2017
Author	:	Chris Turnbull, MAAS
Reviewer	:	Jason Turner, MAAS

TABLE OF CONTENTS

1 INTRODUCTION

An environmental noise assessment for the proposed Bango Wind Farm in New South Wales was conducted and detailed in the Sonus report S3958C9, dated June 2016 (the Principal Assessment).

Since the Principal Assessment, there has been:

- A revision to the wind speed data used for correlation with background noise. Specifically, the background noise data have now been correlated with data derived for the wind mast BAN02 in lieu of wind data farm wind mast BAN01. Mast BAN02 was installed after the background noise monitoring campaign, however incorporates anemometers at greater heights than mast BAN01. Given that future post-construction noise correlations will likely consider wind data from mast BAN02, it is appropriate that the pre-construction noise correlations also consider the same mast for direct comparisons; and,
- An update to the proposed wind turbine layout which includes the removal of a number of turbines. The updated wind turbine layout "LO1" incorporates a total of 75 wind turbines.
- Minor corrections to the coordinates of some dwellings.

Therefore this supplementary environmental noise assessment includes:

- A correlation analysis of wind speeds from the two wind masts, BAN01 and BAN02, to determine the relationship between the two wind masts. The result of the analysis was used to derive BAN02 hub height wind speeds based on BAN01 wind speeds;
- Re-correlations of the background noise levels with BAN02 hub height wind speeds;
- Predictions of the noise levels at the updated dwelling locations from the updated turbine layout. The predicted noise levels were compared against noise criteria established based on the background noise levels determined from the correlations above.

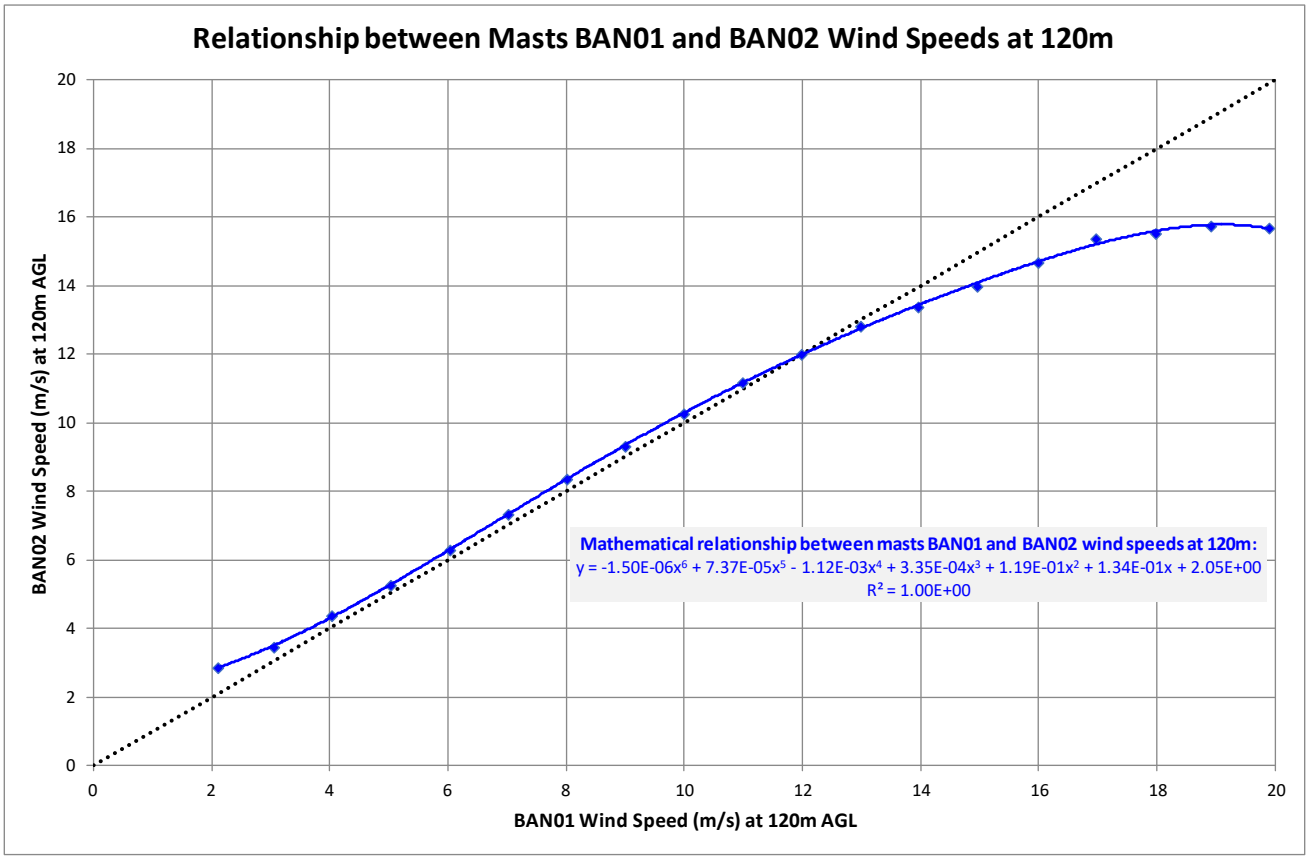
2 CORRELATION OF WIND DATA FROM MASTS BAN01 AND BAN02

Wind mast BAN01 was erected prior to the background noise monitoring campaign in 2012 and incorporates anemometers at heights between 30m and 61m. Wind mast BAN02 was erected in 2013 after the completion of the background noise monitoring and incorporates anemometers at heights between 80m and 98m.

There are no measured wind data available from mast BAN02 during the background noise monitoring campaign period, therefore the data had to be derived based on data from mast BAN01. In order to do so, the mathematical relationship between the two masts was determined.

Wind data collected over a period of approximately two years from the two masts have been analysed. Wind speed measurements at lower positions on the two wind masts were extrapolated to hub height (120m) and correlated. The correlation included in excess of 80,000 10 minute data points.

A bin analysis was performed on the correlation to determine BAN02 wind speed corresponding to BAN01 integer wind speed. Finally, a regression analysis of the resulting points was performed to obtain the mathematical relationship between BAN02 and BAN01 wind speeds, as shown on the plot below.



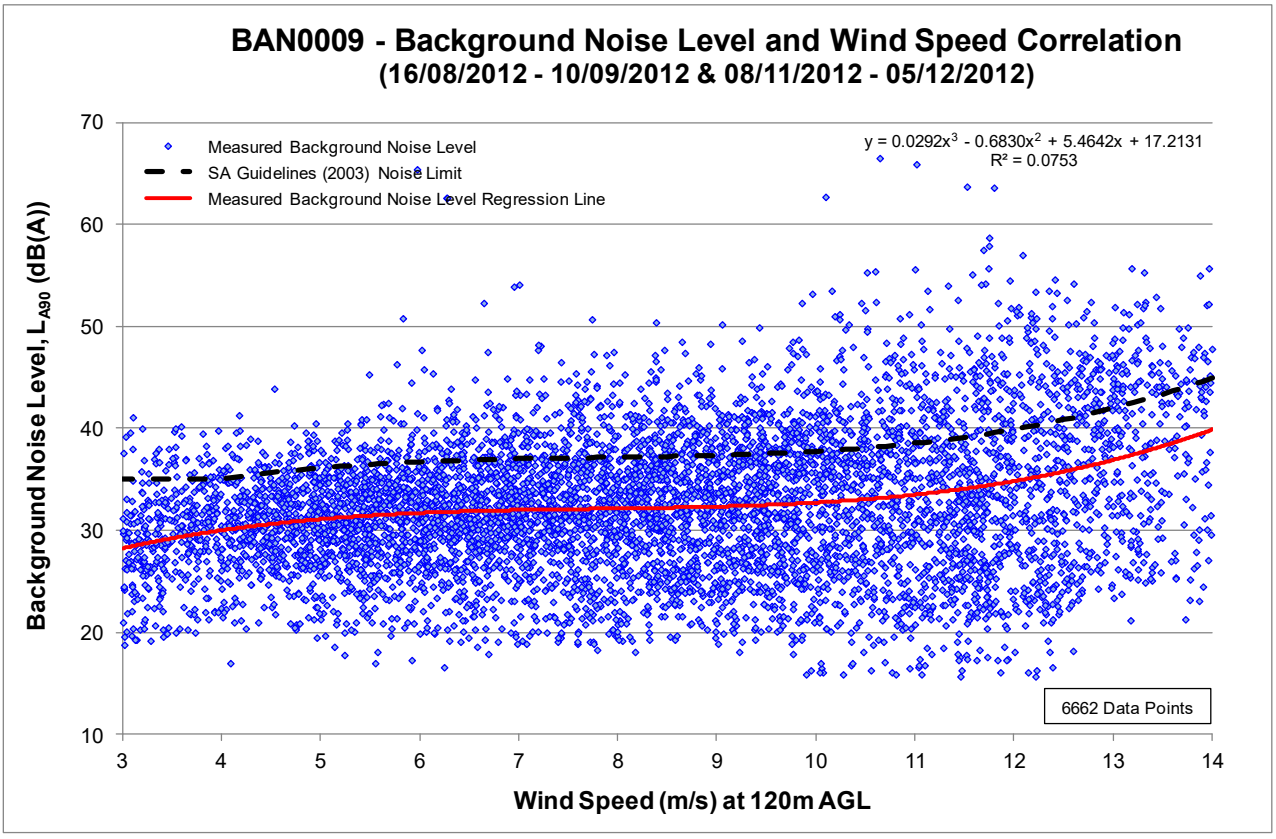
3 CORRELATION OF BACKGROUND NOISE DATA WITH DERIVED MAST BAN02 WIND DATA

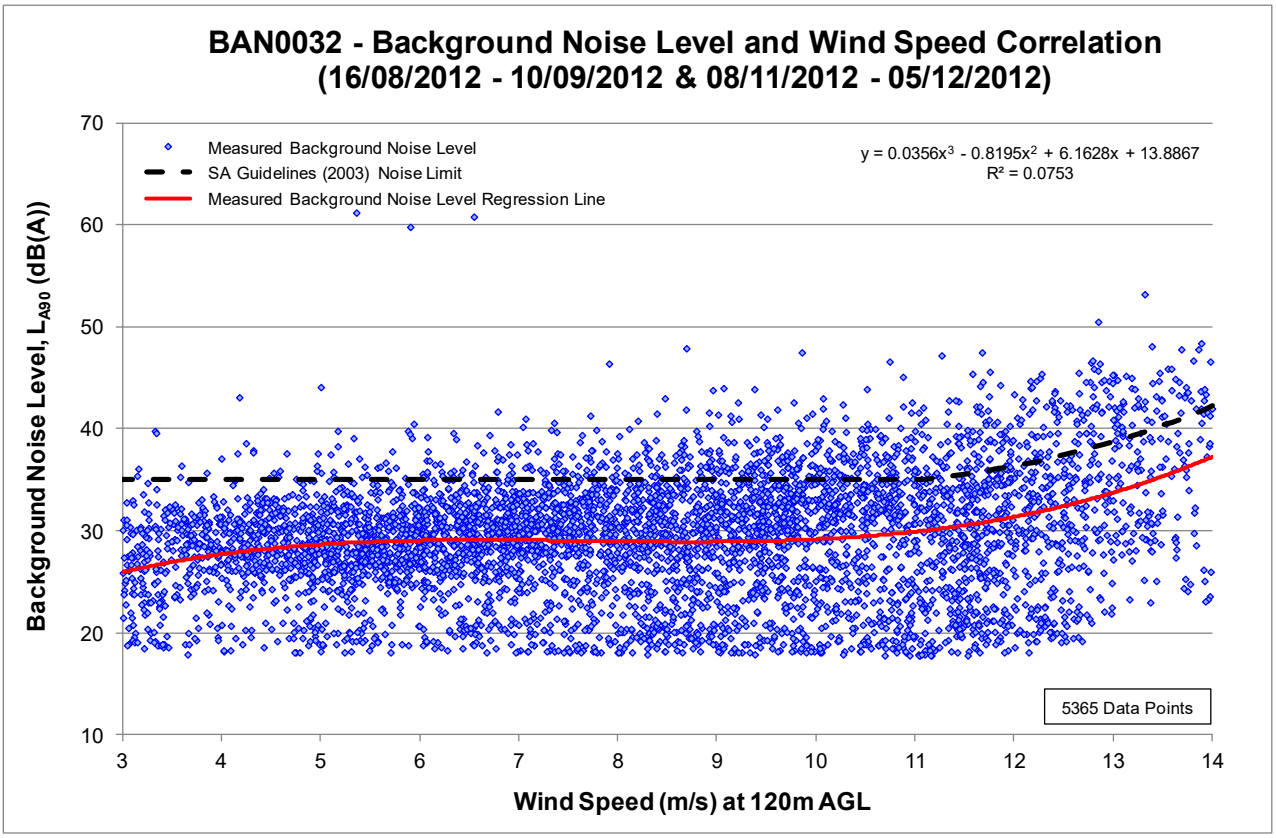
The mathematical relationship between hub height wind speeds from masts BAN02 and BAN01 (as provided in Section 2) has been used to derive BAN02 wind speeds corresponding to the period when background noise monitoring was conducted.

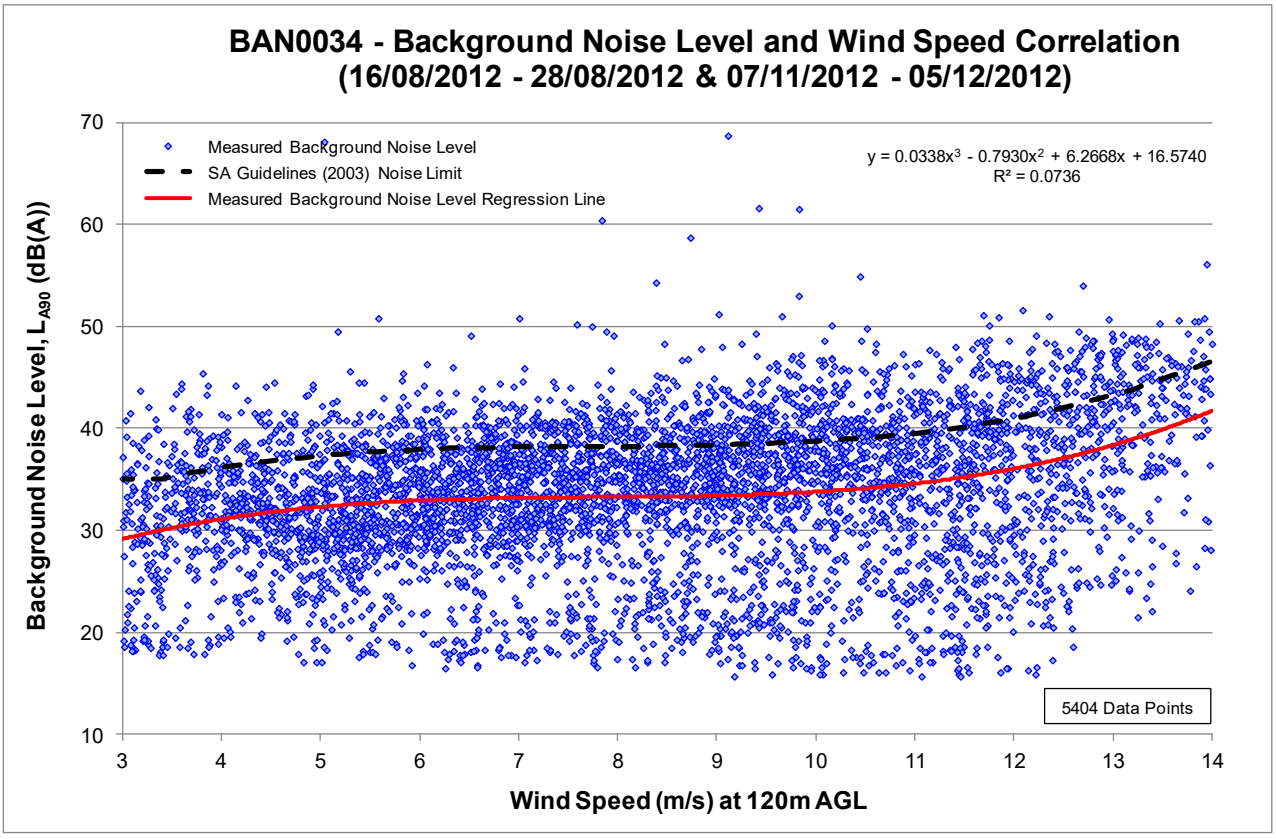
The resultant wind speeds were then correlated with the background noise data. The correlation plots and the derived background noise level at integer wind speeds, for each background noise monitored dwelling are provided below.

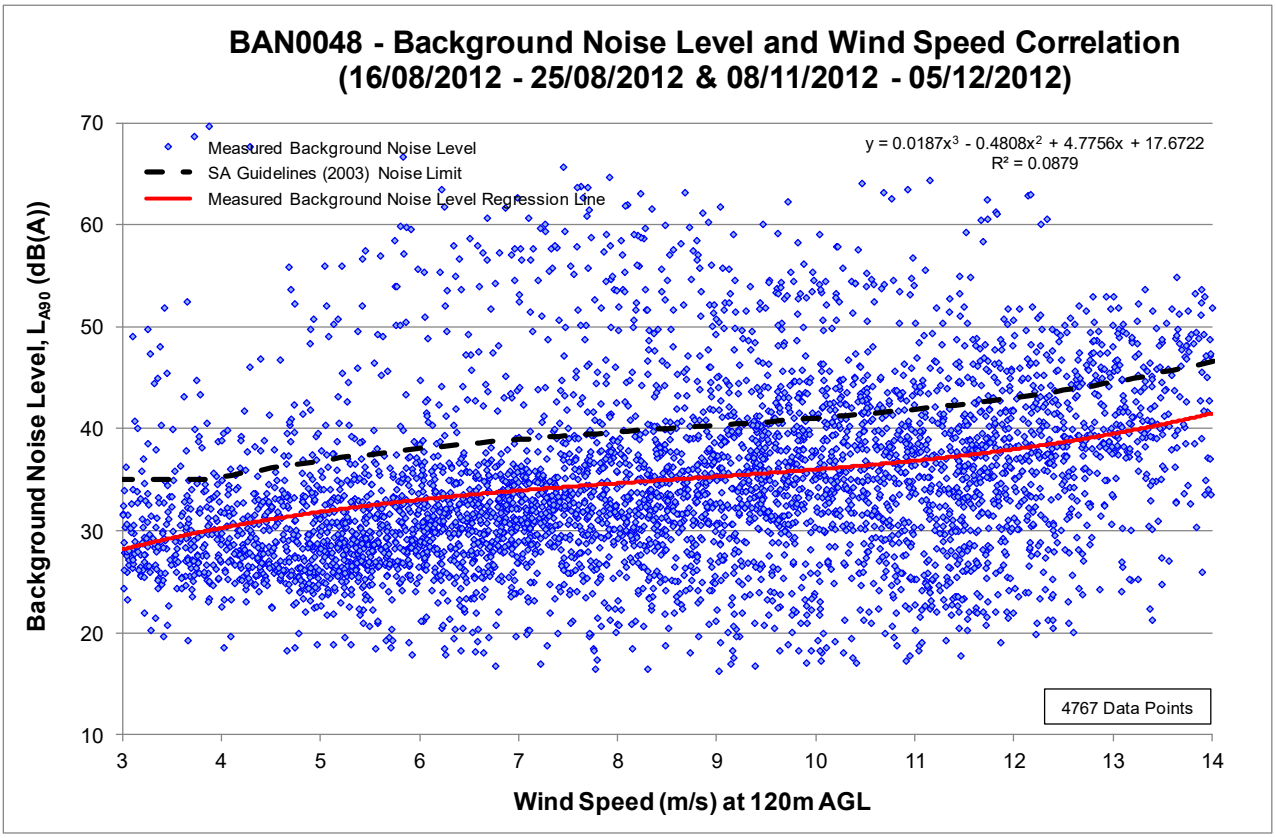
Table 1: Background noise levels by 120m integer wind speed derived for BAN02.

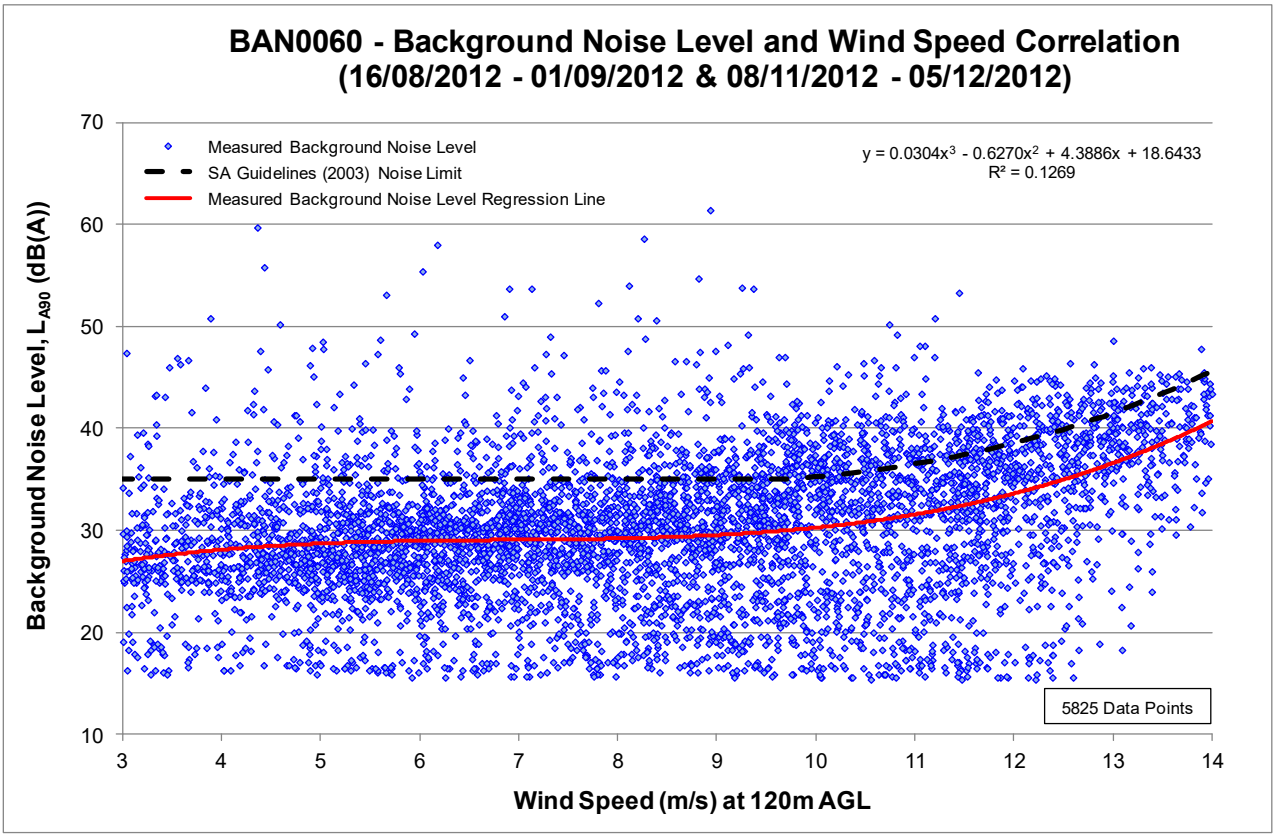
Monitored Dwelling	Coordinates (UTM WGS84 Z55)		Background Noise Level (dB(A)) by 120m AGL Wind Speed (m/s)											
	Easting	Northing	3	4	5	6	7	8	9	10	11	12	13	14
BAN0009	658993	6177998	28	30	31	32	32	32	32	33	34	35	37	40
BAN0032	672635	6174096	26	28	29	29	29	29	29	29	30	31	34	37
BAN0034	658197	6178590	29	31	32	33	33	33	33	34	35	36	38	42
BAN0048	674793	6177078	28	30	32	33	34	35	35	36	37	38	40	42
BAN0060	668962	6166711	27	28	29	29	29	29	30	30	32	34	37	41
BAN0076	663854	6169306	31	31	31	32	32	32	32	33	33	35	36	39
BAN0115	673902	6168649	31	31	31	31	32	32	33	34	35	37	38	40
BAN0136	674135	6169504	26	26	27	27	28	29	30	31	32	34	36	39
BAN0144	668769	6167707	25	26	27	27	28	29	30	31	32	35	37	40
BAN0152	674475	6171888	29	30	31	31	32	32	33	34	35	37	39	42
BAN0155	666694	6176430	23	23	24	24	25	26	27	28	30	32	35	38
BAN0158	666918	6175275	25	26	27	28	29	30	31	32	34	37	41	45
BAN0159	667506	6168917	24	25	27	28	29	30	31	33	34	37	40	43
BAN0170	669036	6176903	25	26	27	27	28	28	29	30	31	33	35	38

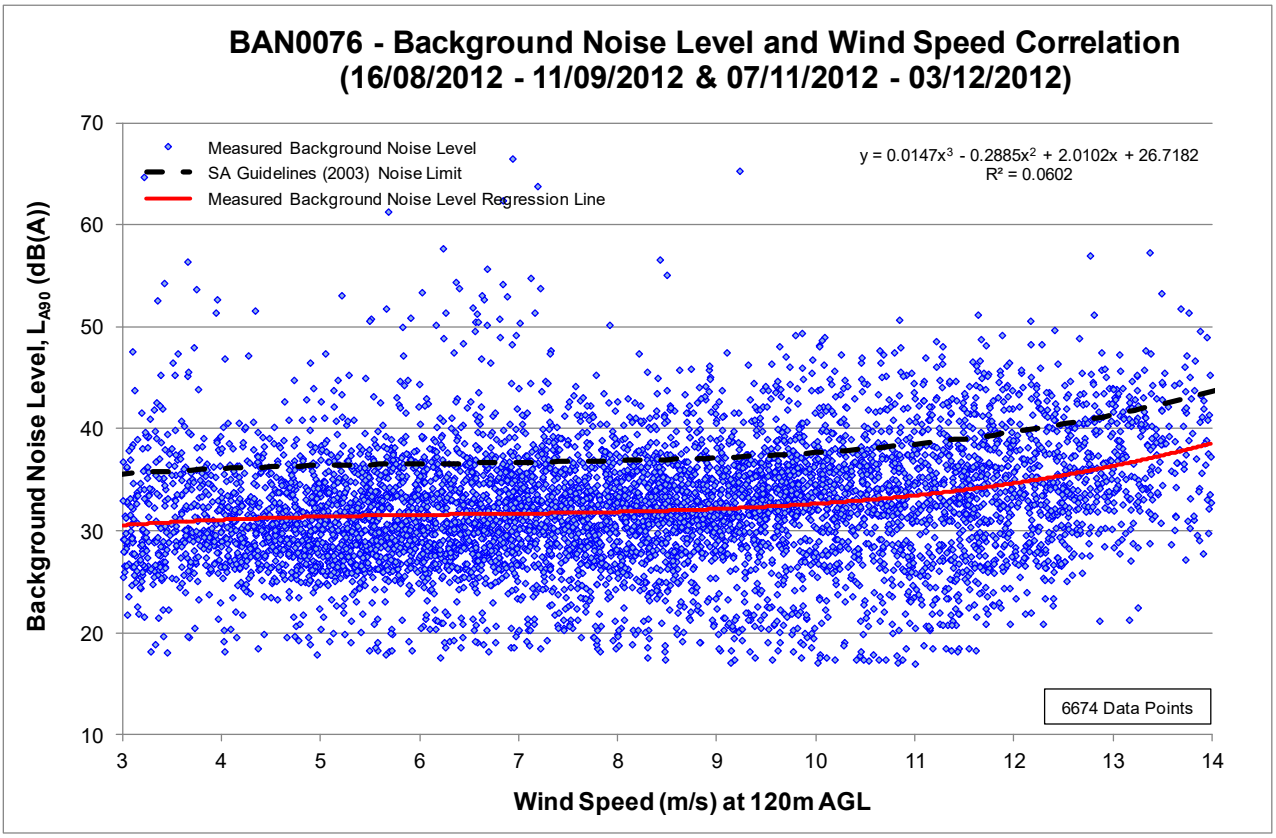

BAN0009 - Background Noise Level and Wind Speed Correlation
(16/08/2012 - 10/09/2012 & 08/11/2012 - 05/12/2012)
Measured Background Noise Level
SA Guidelines (2003) Noise Limit
Measured Background Noise Level Regression Line
y = 0.0292x³ - 0.6830x² + 5.4642x + 17.2131
R² = 0.0753
6662 Data Points
Background Noise Level, LA90 (dB(A))
Wind Speed (m/s) at 120m AGL

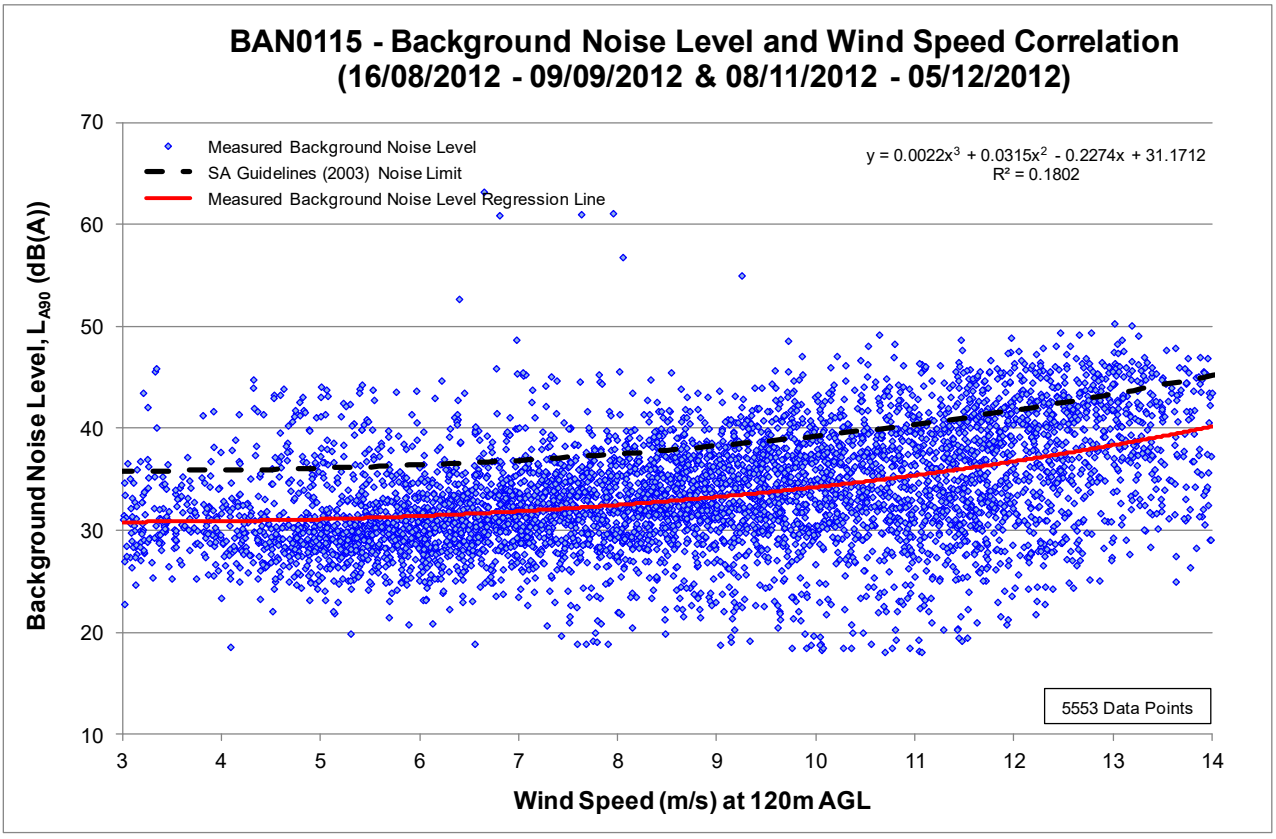

BAN0032 - Background Noise Level and Wind Speed Correlation
(16/08/2012 - 10/09/2012 & 08/11/2012 - 05/12/2012)
Measured Background Noise Level
SA Guidelines (2003) Noise Limit
Measured Background Noise Level Regression Line
y = 0.0356x³ - 0.8195x² + 6.1628x + 13.8867
R² = 0.0753
5365 Data Points
Background Noise Level, LA90 (dB(A))
Wind Speed (m/s) at 120m AGL

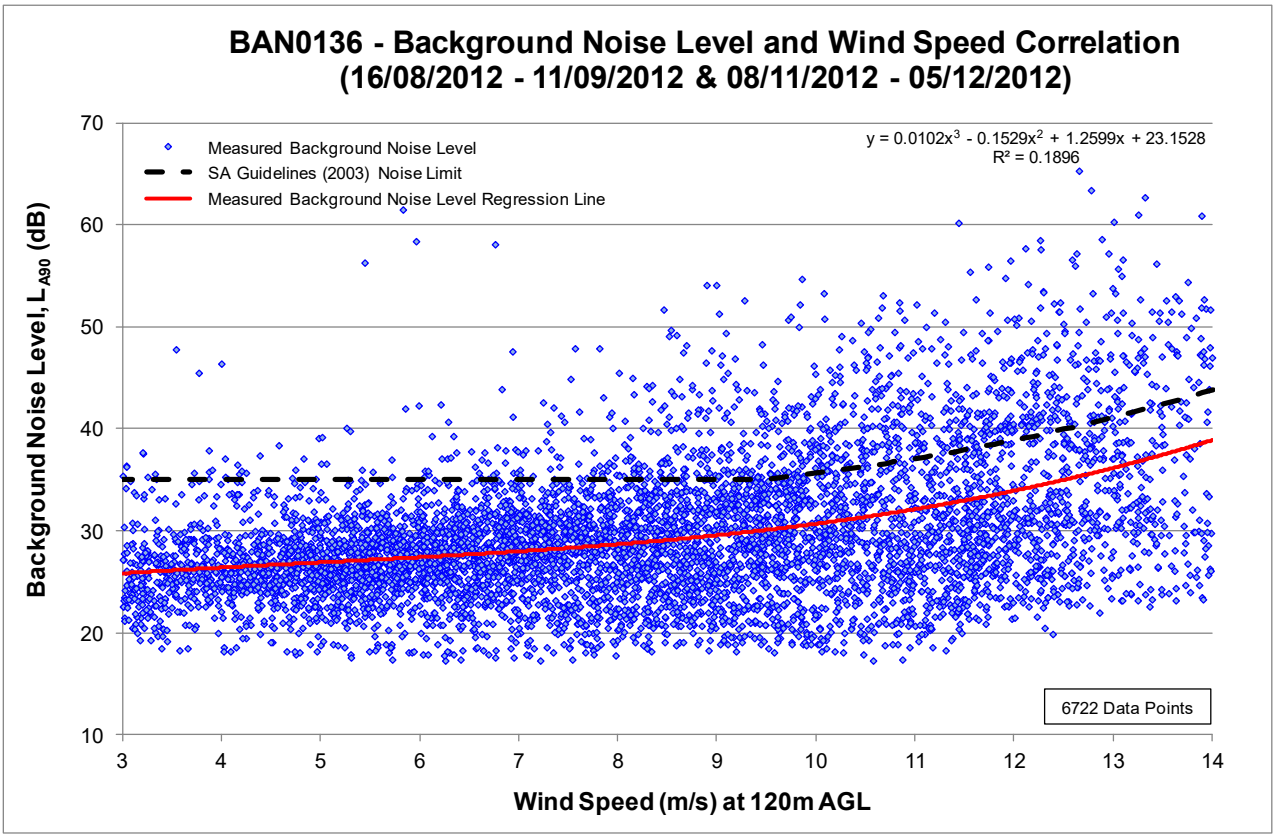

BAN0034 - Background Noise Level and Wind Speed Correlation
(16/08/2012 - 28/08/2012 & 07/11/2012 - 05/12/2012)
Measured Background Noise Level
SA Guidelines (2003) Noise Limit
Measured Background Noise Level Regression Line
y = 0.0338x³ - 0.7930x² + 6.2668x + 16.5740
R² = 0.0736
5404 Data Points
Background Noise Level, LA90 (dB(A))
Wind Speed (m/s) at 120m AGL

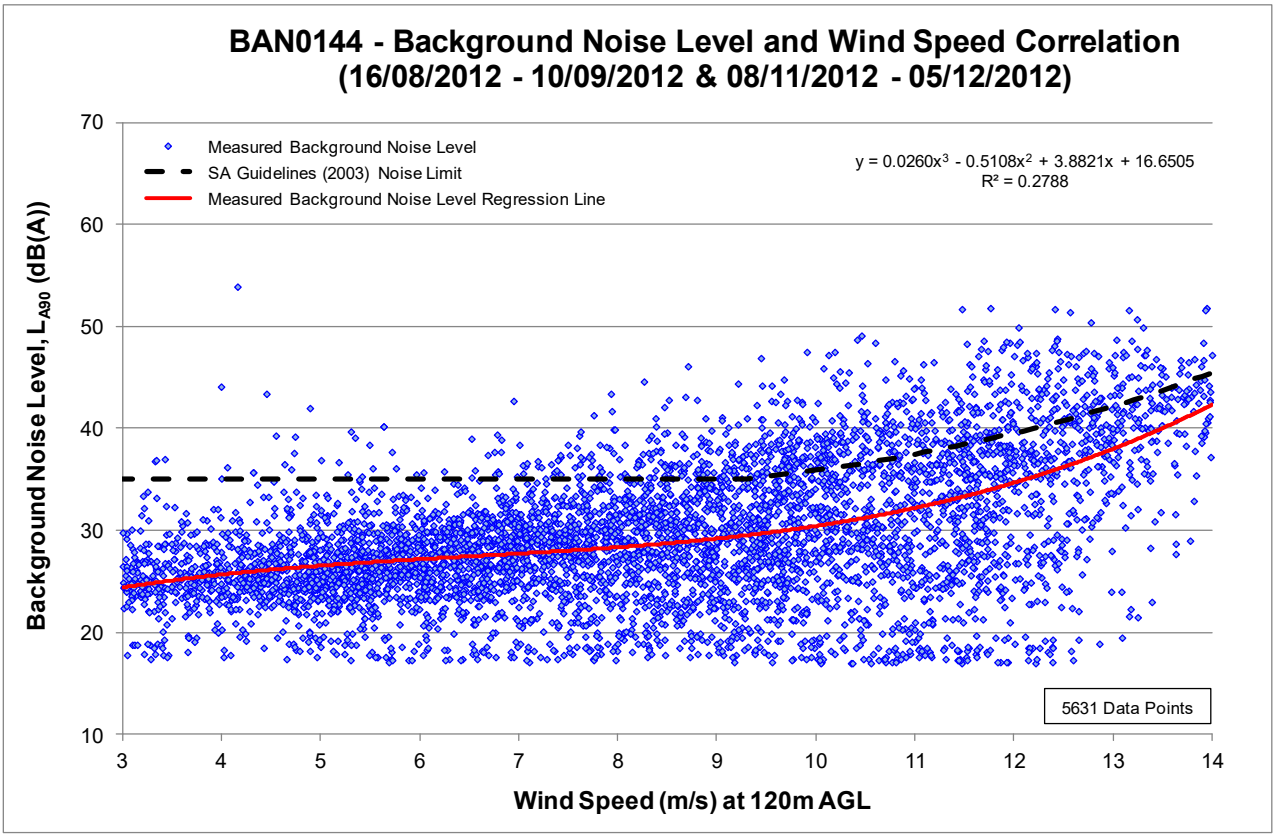

BAN0048 - Background Noise Level and Wind Speed Correlation
(16/08/2012 - 25/08/2012 & 08/11/2012 - 05/12/2012)
Measured Background Noise Level
SA Guidelines (2003) Noise Limit
Measured Background Noise Level Regression Line
y = 0.0187x³ - 0.4808x² + 4.7756x + 17.6722
R² = 0.0879
4767 Data Points
Background Noise Level, LA90 (dB(A))
Wind Speed (m/s) at 120m AGL

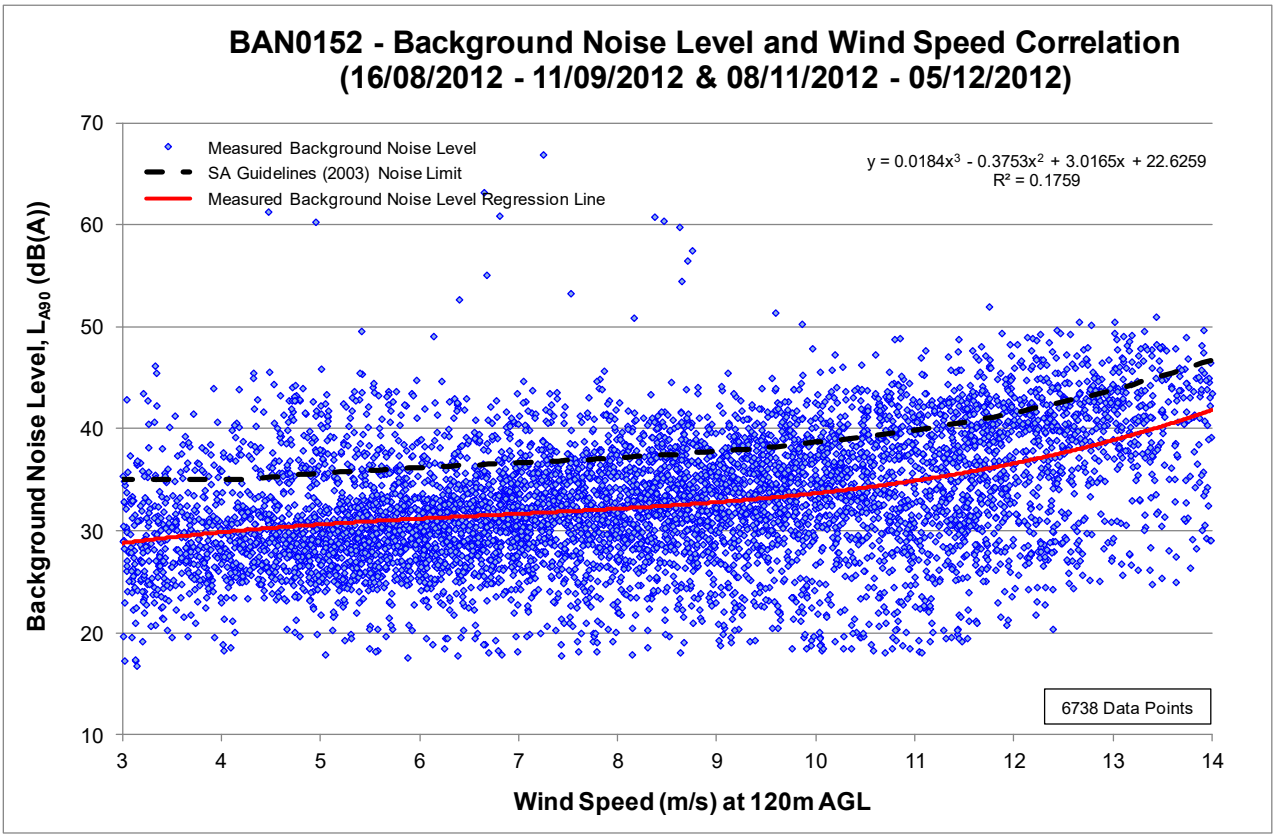

BAN0060 - Background Noise Level and Wind Speed Correlation
(16/08/2012 - 01/09/2012 & 08/11/2012 - 05/12/2012)
Measured Background Noise Level
SA Guidelines (2003) Noise Limit
Measured Background Noise Level Regression Line
y = 0.0304x³ - 0.6270x² + 4.3886x + 18.6433
R² = 0.1269
5825 Data Points
Background Noise Level, LA90 (dB(A))
Wind Speed (m/s) at 120m AGL

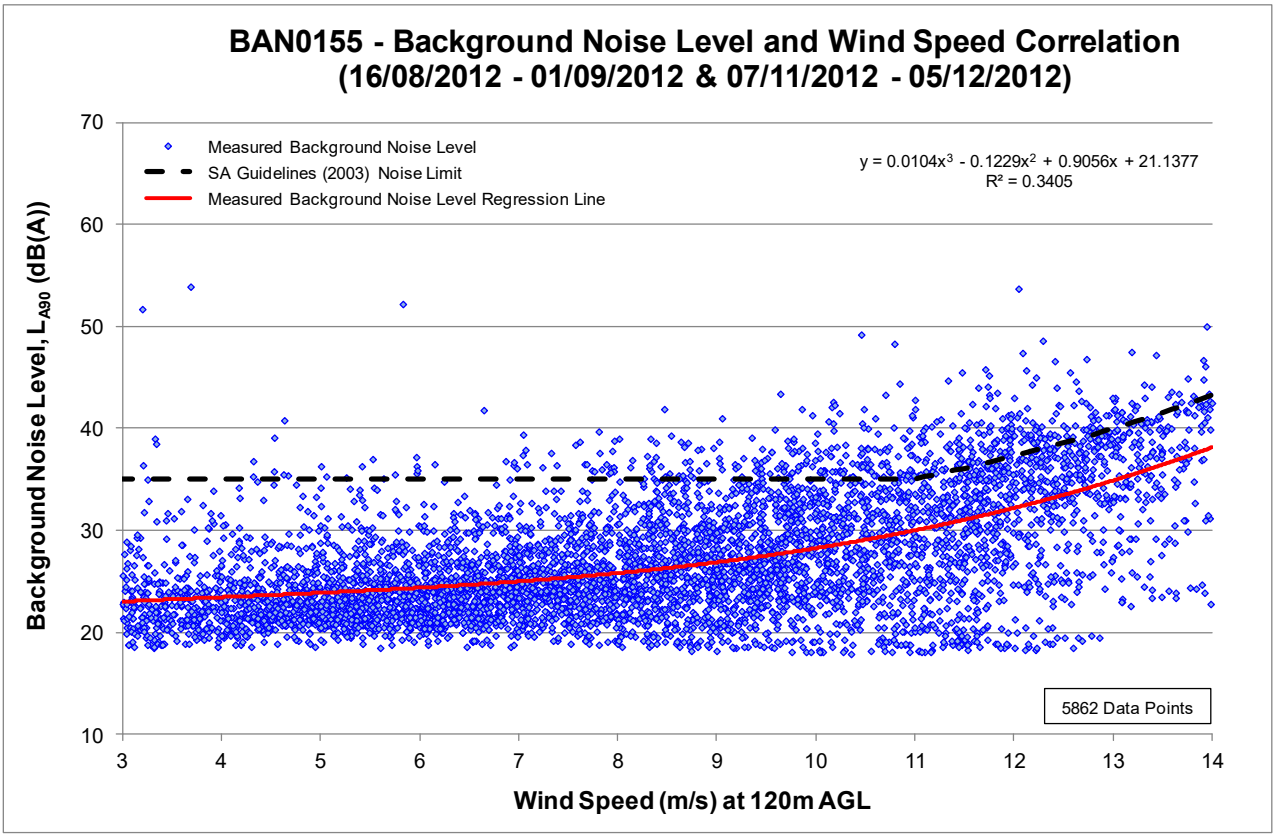

BAN0076 - Background Noise Level and Wind Speed Correlation
(16/08/2012 - 11/09/2012 & 07/11/2012 - 03/12/2012)
Measured Background Noise Level
SA Guidelines (2003) Noise Limit
Measured Background Noise Level Regression Line
y = 0.0147x³ - 0.2885x² + 2.0102x + 26.7182
R² = 0.0602
6674 Data Points
Background Noise Level, LA90 (dB(A))
Wind Speed (m/s) at 120m AGL

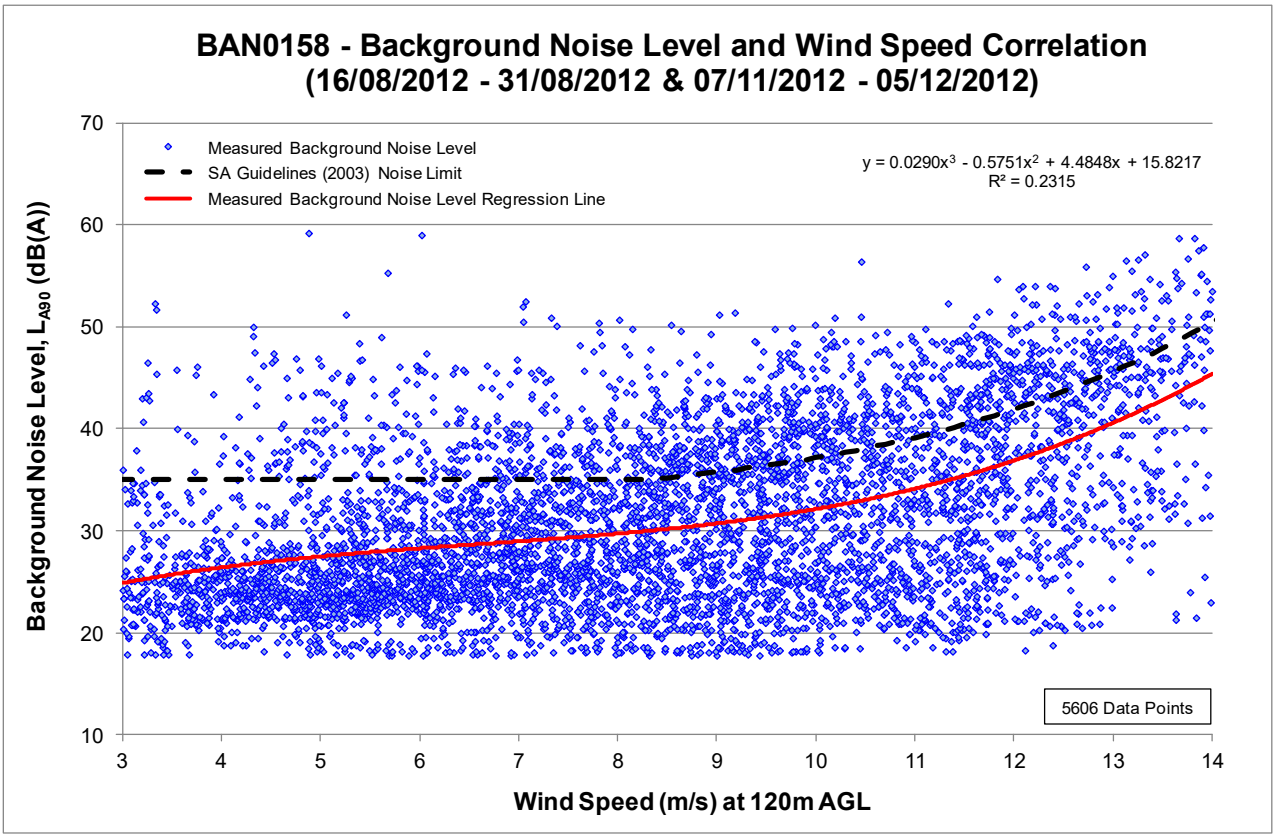

BAN0115 - Background Noise Level and Wind Speed Correlation
(16/08/2012 - 09/09/2012 & 08/11/2012 - 05/12/2012)
Measured Background Noise Level
SA Guidelines (2003) Noise Limit
Measured Background Noise Level Regression Line
y = 0.0022x3 + 0.0315x2 - 0.2274x + 31.1712
R² = 0.1802
5553 Data Points
Background Noise Level, LA90 (dB(A))
Wind Speed (m/s) at 120m AGL

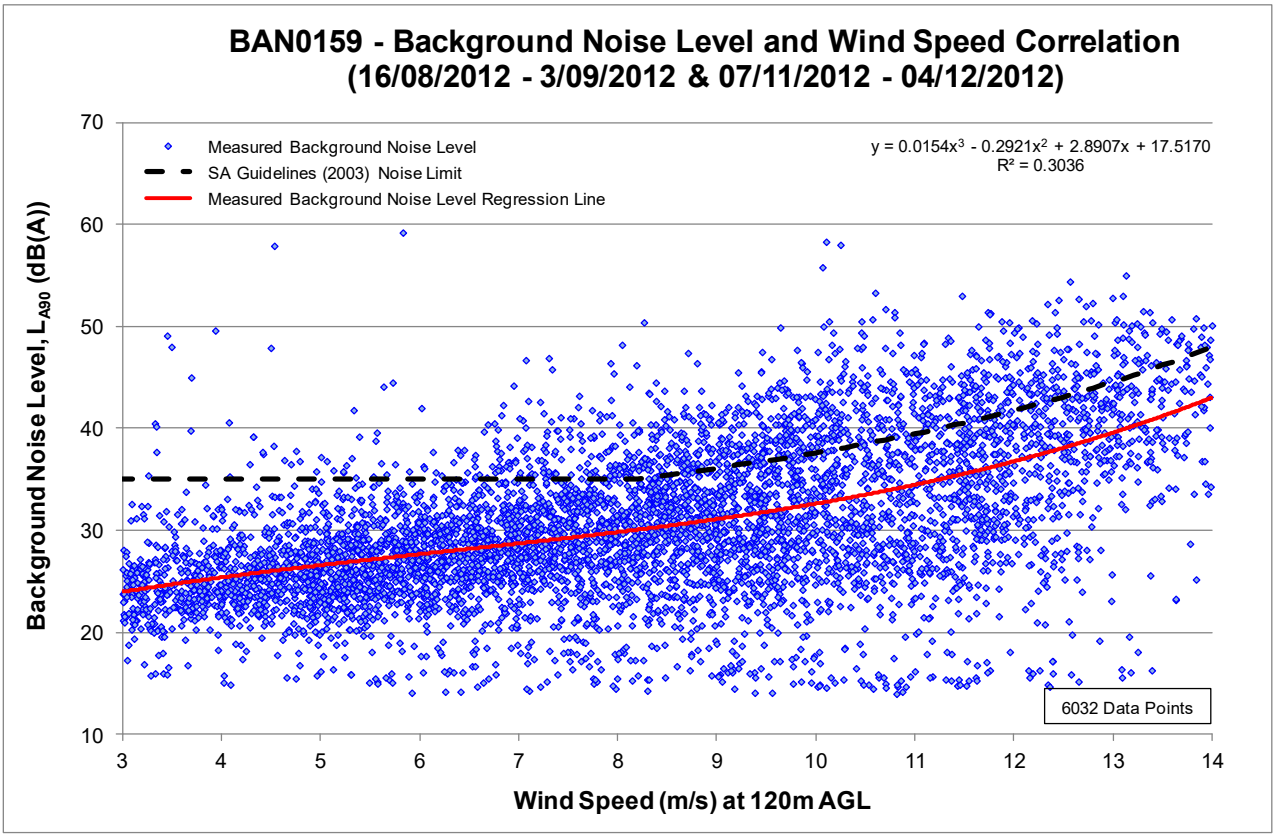

BAN0136 - Background Noise Level and Wind Speed Correlation
(16/08/2012 - 11/09/2012 & 08/11/2012 - 05/12/2012)
Measured Background Noise Level
SA Guidelines (2003) Noise Limit
Measured Background Noise Level Regression Line
y = 0.0102x3 - 0.1529x2 + 1.2599x + 23.1528
R² = 0.1896
6722 Data Points
Background Noise Level, LA90 (dB)
Wind Speed (m/s) at 120m AGL

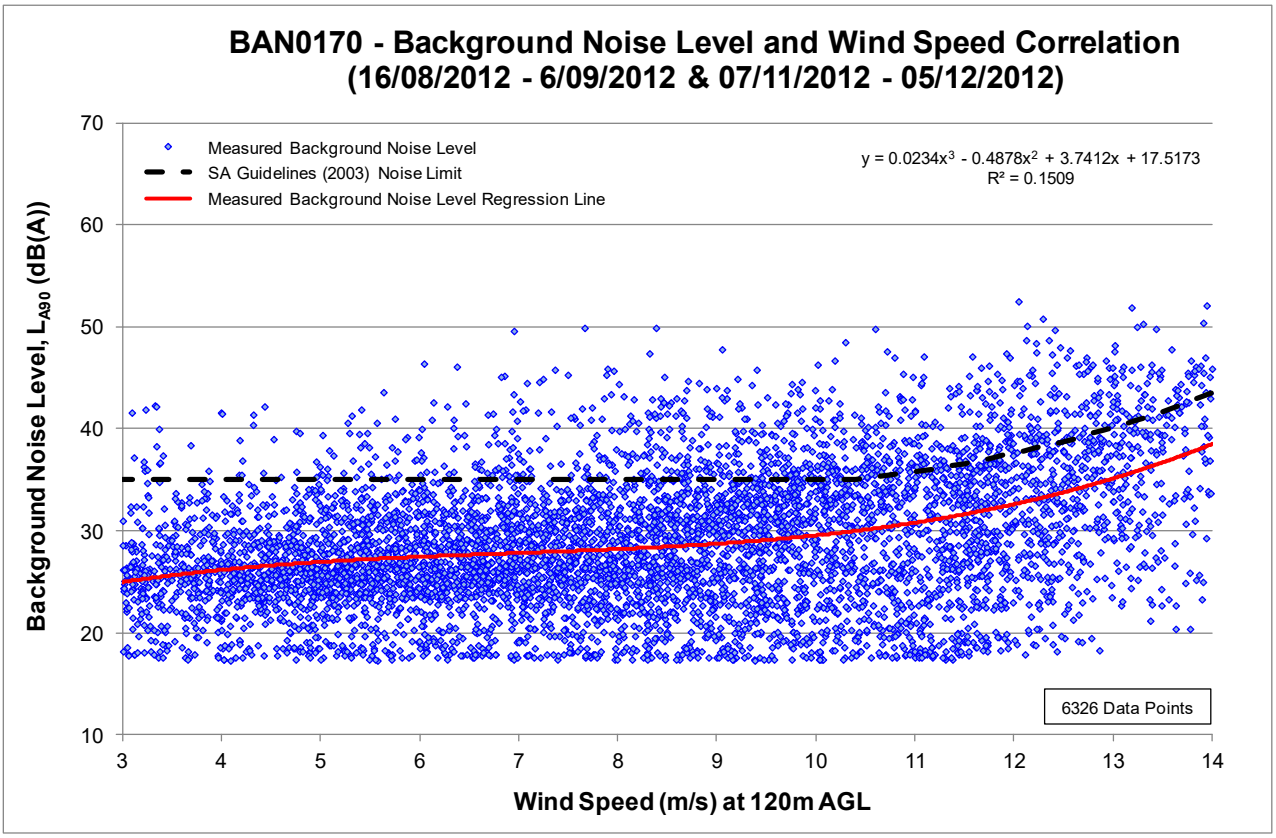

BAN0144 - Background Noise Level and Wind Speed Correlation
(16/08/2012 - 10/09/2012 & 08/11/2012 - 05/12/2012)
Measured Background Noise Level
SA Guidelines (2003) Noise Limit
Measured Background Noise Level Regression Line
y = 0.0260x3 - 0.5108x2 + 3.8821x + 16.6505
R² = 0.2788
5631 Data Points
Background Noise Level, LA90 (dB(A))
Wind Speed (m/s) at 120m AGL


BAN0152 - Background Noise Level and Wind Speed Correlation
(16/08/2012 - 11/09/2012 & 08/11/2012 - 05/12/2012)
Measured Background Noise Level
SA Guidelines (2003) Noise Limit
Measured Background Noise Level Regression Line
y = 0.0184x3 - 0.3753x2 + 3.0165x + 22.6259
R² = 0.1759
6738 Data Points
Background Noise Level, LA90 (dB(A))
Wind Speed (m/s) at 120m AGL


BAN0155 - Background Noise Level and Wind Speed Correlation
(16/08/2012 - 01/09/2012 & 07/11/2012 - 05/12/2012)
Measured Background Noise Level
SA Guidelines (2003) Noise Limit
Measured Background Noise Level Regression Line
y = 0.0104x³ - 0.1229x² + 0.9056x + 21.1377
R² = 0.3405
5862 Data Points
Background Noise Level, LA90 (dB(A))
Wind Speed (m/s) at 120m AGL


BAN0158 - Background Noise Level and Wind Speed Correlation
(16/08/2012 - 31/08/2012 & 07/11/2012 - 05/12/2012)
Measured Background Noise Level
SA Guidelines (2003) Noise Limit
Measured Background Noise Level Regression Line
y = 0.0290x³ - 0.5751x² + 4.4848x + 15.8217
R² = 0.2315
5606 Data Points
Background Noise Level, LA90 (dB(A))
Wind Speed (m/s) at 120m AGL


BAN0159 - Background Noise Level and Wind Speed Correlation
(16/08/2012 - 3/09/2012 & 07/11/2012 - 04/12/2012)
Measured Background Noise Level
SA Guidelines (2003) Noise Limit
Measured Background Noise Level Regression Line
y = 0.0154x3 - 0.2921x2 + 2.8907x + 17.5170
R² = 0.3036
6032 Data Points
Background Noise Level, LA90 (dB(A))
Wind Speed (m/s) at 120m AGL


BAN0170 - Background Noise Level and Wind Speed Correlation
(16/08/2012 - 6/09/2012 & 07/11/2012 - 05/12/2012)
Measured Background Noise Level
SA Guidelines (2003) Noise Limit
Measured Background Noise Level Regression Line
y = 0.0234x3 - 0.4878x2 + 3.7412x + 17.5173
R² = 0.1509
6326 Data Points
Background Noise Level, LA90 (dB(A))
Wind Speed (m/s) at 120m AGL

4 PREDICTED NOISE LEVEL FROM THE UPDATED TURBINE LAYOUT

The turbine layout has been updated and includes the removal of a number of wind turbines. The updated turbine layout "LO1" has a total of 75 wind turbines, at the coordinates provided in Table 1.

Table 2: Coordinates of turbines associated with turbine layout LO1.

Turbine ID	Coordinates (UTM WGS84 Z55)	
	Easting	Northing
1	671618	6174752
2	672551	6169350
3	671220	6172725
5	672506	6168805
7	671261	6169917
11	664944	6171739
12	672635	6169745
13	671656	6173805
14	664721	6172733
17	672377	6168142
18	663601	6172799
19	664006	6171605
21	662281	6173305
22	670581	6170580
24	671306	6169580
25	671131	6168379
26	669892	6171233
27	664756	6172455
28	670262	6173541
32	672716	6167943
33	672070	6170045
34	672357	6170336
35	663756	6172505
36	672238	6168456
41	664931	6176230

Turbine ID	Coordinates (UTM WGS84 Z55)	
	Easting	Northing
44	664806	6174230
45	671006	6168951
46	671465	6170340
47	671217	6169267
48	669615	6171540
49	664831	6175855
50	671015	6173890
53	670056	6172655
54	671370	6174593
55	669956	6172305
57	670581	6170855
58	671287	6174189
59	670190	6172964
60	671481	6173130
61	672625	6168300
62	671668	6167651
63	663056	6174030
65	663781	6172005
67	672228	6170535
69	669424	6173513
71	669565	6173814
72	663856	6171405
73	665140	6172054
76	665306	6176655
79	663431	6171805

Turbine ID	Coordinates (UTM WGS84 Z55)	
	Easting	Northing
80	671402	6173443
81	669706	6171830
83	669931	6172005
85	670956	6171280
86	665621	6171497
87	663831	6172255
88	663806	6174730
89	663681	6173030
91	669715	6174088
94	664806	6174530
95	670351	6173243
96	664131	6173380
97	664781	6175530
98	665231	6176430
100	670756	6171080
102	672301	6167831
104	664806	6173505
107	672458	6168591
110	671328	6172413
111	671558	6167971
114	663956	6173205
115	664704	6175039
118	664806	6173805
119	662440	6173814
122	672508	6169040

Dwellings that are located within 5km of the wind turbines are identified in Table 3.

Table 3: Dwellings within 5km of the wind turbines.

Receiver ID	Coordinates (UTM WGS84 Z55)		Type	Land Owner Status	Distance to Closest Turbine (m)
	Easting	Northing			
BAN0020	665655	6178818	House	Involved	2191
BAN0021	667892	6172720	House	Involved	1725
BAN0022	676792	6171940	House	Not Involved	4701
BAN0025	676000	6175941	House	Not Involved	4540
BAN0026	667373	6168710	House	Not Involved	3292
BAN0032	672635	6174096	House	Involved	1021
BAN0035	675013	6174765	House	Not Involved	3395
BAN0041	672598	6175449	House	Involved	1203
BAN0042	661105	6169530	House	Not Involved	3254
BAN0043	658490	6173393	House	Not Involved	3792
BAN0048	674793	6177078	House	Not Involved	3936
BAN0055	675055	6165317	House	Involved	3517
BAN0056	658577	6171343	House	Not Involved	4192
BAN0060	668962	6166711	House	Not Involved	2736
BAN0062	661390	6169789	House	Not Involved	2869
BAN0064	674960	6178313	School	Not Involved	4884
BAN0075	661597	6167901	House	Not Involved	4169
BAN0076	663854	6169306	House	Not Involved	2099
BAN0087	668133	6171952	House	Involved	1538
BAN0096	659218	6175919	House	Involved	3849
BAN0100	673030	6169297	House	Involved	482
BAN0101	666370	6176268	House	Neighbour Agreement	1132
BAN0105	675804	6175406	House	Not Involved	4237
BAN0106	674765	6172626	House	Not Involved	3288
BAN0108	660693	6170275	House	Involved	3136
BAN0111	672994	6179558	House	Not Involved	4999
BAN0115	673902	6168649	House	Neighbour Agreement	1324
BAN0117	664596	6169872	House	Involved	1702
BAN0119	663003	6180058	House	Involved	4109
BAN0126	660701	6169270	House	Not Involved	3725
BAN0128	676659	6168997	House	Not Involved	4081
BAN0129	677616	6169758	House	Not Involved	4981
BAN0135	675341	6163994	House	Not Involved	4742
BAN0136	674135	6169504	House	Neighbour Agreement	1519
BAN0138	674728	6164928	House	Not Involved	3625
BAN0139	674830	6177838	House	Not Involved	4454
BAN0140	674863	6178411	House	Not Involved	4891
BAN0141	671520	6179339	House	Not Involved	4588
BAN0142	670364	6177556	House	Not Involved	3072
BAN0144	668769	6167707	House	Not Involved	2456

Receiver ID	Coordinates (UTM WGS84 Z55)		Type	Land Owner Status	Distance to Closest Turbine (m)
	Easting	Northing			
BAN0152	674475	6171888	House	Not Involved	2623
BAN0154	667088	6176107	House	Neighbour Agreement	1864
BAN0155	666694	6176430	House	Neighbour Agreement	1406
BAN0158	666918	6175275	House	Neighbour Agreement	2045
BAN0159	667506	6168917	House	Involved	3195
BAN0160	659484	6176196	House	Involved	3796
BAN0161	659100	6172993	House	Involved	3196
BAN0162	660074	6173884	House	Involved	2282
BAN0164	667492	6168869	House	Involved	3226
BAN0165	667447	6168827	House	Not Involved	3235
BAN0166	667440	6168580	House	Not Involved	3438
BAN0170	669036	6176903	House	Not Involved	2896
BAN0172	670575	6166155	House	Neighbour Agreement	1853
BAN0173	674209	6165923	House	Involved	2512
BAN0175	675807	6176676	House	Not Involved	4610
BAN0176	665662	6180278	House	Not Involved	3640
BAN0177	664441	6167689	House	Not Involved	3762
BAN0179	663462	6168501	House	Not Involved	2931
BAN0181	661493	6168919	House	Not Involved	3430
BAN0182	660693	6170348	House	Involved	3102
BAN0186	663765	6166945	House	Not Involved	4461
BAN0187	661093	6169533	House	Not Involved	3260
BAN0189	660065	6173665	House	Involved	2245
BAN0212	674876	6178540	House	Not Involved	4996
BAN0215	674828	6178554	House	Not Involved	4976
BAN0217	674575	6178684	House	Not Involved	4920
BAN0225	662546	6179407	House	Involved	3898
BAN0235	663846	6169475	House	Not Involved	1930
BAN0238	670657	6166162	House	Not Involved	1800
BAN0243	674789	6172958	House	Not Involved	3245
BAN0260	661457	6169844	House	Not Involved	2782
BAN0274	674876	6178488	House	Not Involved	4957
BAN0276	668772	6167753	Cottage	Not Involved	2441
BAN0280	664102	6166698	New Cabin	Not Involved	4713
BAN0282	666714	6178407	New House	Not Involved	2248

The noise from the wind turbines has been predicted to the dwellings above based on the GE3.4-130 turbine, and the same sound propagation model and inputs as the Principal Assessment.

The predicted noise levels were compared with noise criteria established in accordance with the methodology in the Principal Assessment, which considered the SA Wind Farm Noise Guidelines and WHO Guidelines. The noise criteria have been based on the background noise levels in Table 1.

The predicted noise levels and the resultant noise criteria are summarised in Table 4. Predicted noise level contours corresponding to 10 m/s wind speed (results in the highest noise levels) are provided in Figure 1.

Table 4: Predicted noise levels and relevant criteria.

Receiver ID	Representative Logging Location	Noise Level (dB(A)) at Integer Wind Speed																							
		3m/s		4m/s		5m/s		6m/s		7m/s		8m/s		9m/s		10m/s		11m/s		12m/s		13m/s		14m/s	
		Criterion	Prediction	Criterion	Prediction	Criterion	Prediction	Criterion	Prediction	Criterion	Prediction	Criterion	Prediction	Criterion	Prediction	Criterion	Prediction	Criterion	Prediction	Criterion	Prediction	Criterion	Prediction	Criterion	Prediction
BAN0020	BAN0170	45	22	45	22	45	23	45	25	45	29	45	31	45	33	45	33	45	33	45	33	45	33	45	33
BAN0020	BAN0170	45	22	45	22	45	23	45	25	45	28	45	31	45	33	45	33	45	33	45	33	45	33	45	33
BAN0021	BAN0158	45	30	45	30	45	30	45	33	45	36	45	39	45	40	45	40	45	40	45	40	46	40	50	40
BAN0022	BAN0152	35	17	35	17	36	17	36	20	37	23	37	26	38	27	39	27	40	27	42	27	44	27	47	27
BAN0025	BAN0048	35	15	35	15	37	16	38	18	39	21	40	24	40	25	41	25	42	25	43	25	45	25	47	25
BAN0026	BAN0159	35	23	35	23	35	23	35	25	35	29	35	31	36	33	38	33	39	33	42	33	45	33	48	33
BAN0032	BAN0032	45	33	45	33	45	33	45	36	45	39	45	42	45	43	45	43	45	43	45	43	45	43	45	43
BAN0035	BAN0048	35	20	35	20	37	20	38	23	39	26	40	29	40	30	41	30	42	30	43	30	45	30	47	30
BAN0041	BAN0032	45	29	45	29	45	29	45	32	45	35	45	38	45	39	45	39	45	39	45	39	45	39	45	39
BAN0042	BAN0076	36	20	36	20	36	20	37	23	37	26	37	29	37	30	38	30	38	30	40	30	41	30	44	30
BAN0043	BAN0009	35	16	35	16	36	16	37	19	37	22	37	25	37	26	38	26	39	26	40	26	42	26	45	26
BAN0048	BAN0048	35	16	35	16	37	17	38	19	39	22	40	25	40	26	41	26	42	26	43	26	45	26	47	26
BAN0055	BAN0115	45	19	45	19	45	19	45	21	45	25	45	27	45	29	45	29	45	29	45	29	45	29	45	29
BAN0056	BAN0009	35	15	35	15	36	15	37	18	37	21	37	24	37	25	38	25	39	25	40	25	42	25	45	25
BAN0060	BAN0060	35	23	35	23	35	23	35	26	35	29	35	32	35	33	35	33	37	33	39	33	42	33	46	33
BAN0062	BAN0076	36	22	36	22	36	22	37	24	37	28	37	30	37	32	38	32	38	32	40	32	41	32	44	32
BAN0064	BAN0048	35	13	35	13	37	14	38	16	39	19	40	22	40	23	41	23	42	23	43	23	45	23	47	23
BAN0075	BAN0076	36	16	36	16	36	17	37	19	37	22	37	25	37	26	38	27	38	27	40	26	41	26	44	26
BAN0076	BAN0076	36	25	36	25	36	25	37	28	37	31	37	34	37	35	38	36	38	35	40	35	41	35	44	35
BAN0087	BAN0159	45	31	45	31	45	31	45	33	45	37	45	40	45	41	45	41	45	41	45	41	45	41	48	41
BAN0096	BAN0009	45	16	45	16	45	17	45	19	45	23	45	25	45	27	45	27	45	27	45	27	45	27	45	27
BAN0100	BAN0115	45	39	45	39	45	39	45	42	45	45	45	**48**	45	**49**	45	**50**	45	**50**	45	**50**	45	**50**	45	**50**
BAN0101	BAN0155	45	31	45	31	45	31	45	34	45	37	45	40	45	41	45	42	45	41	45	41	45	41	45	41
BAN0105	BAN0048	35	16	35	16	37	17	38	19	39	23	40	25	40	27	41	27	42	27	43	27	45	27	47	27
BAN0106	BAN0152	35	23	35	23	36	23	36	26	37	29	37	32	38	33	39	33	40	33	42	33	44	33	47	33
BAN0108	BAN0076	45	21	45	21	45	21	45	23	45	27	45	29	45	31	45	31	45	31	45	31	45	31	45	31
BAN0111	BAN0048	35	13	35	13	37	14	38	16	39	19	40	22	40	23	41	23	42	23	43	23	45	23	47	23

Receiver ID	Representative Logging Location	Noise Level (dB(A)) at Integer Wind Speed																							
		3m/s		4m/s		5m/s		6m/s		7m/s		8m/s		9m/s		10m/s		11m/s		12m/s		13m/s		14m/s	
		Criterion	Prediction	Criterion	Prediction	Criterion	Prediction	Criterion	Prediction	Criterion	Prediction	Criterion	Prediction	Criterion	Prediction	Criterion	Prediction	Criterion	Prediction	Criterion	Prediction	Criterion	Prediction	Criterion	Prediction
BAN0115	BAN0115	45	33	45	33	45	33	45	36	45	39	45	42	45	43	45	43	45	43	45	43	45	43	45	43
BAN0117	BAN0076	45	28	45	28	45	29	45	31	45	34	45	37	45	39	45	39	45	39	45	39	45	39	45	39
BAN0119	BAN0009	45	15	45	15	45	16	45	18	45	21	45	24	45	26	45	26	45	26	45	26	45	26	45	26
BAN0126	BAN0076	36	18	36	18	36	18	37	21	37	24	37	27	37	28	38	28	38	28	40	28	41	28	44	28
BAN0128	BAN0136	35	19	35	19	35	19	35	21	35	25	35	27	35	29	36	29	37	29	39	29	41	29	44	29
BAN0129	BAN0136	35	16	35	16	35	16	35	18	35	22	35	24	35	26	36	26	37	26	39	26	41	26	44	26
BAN0135	BAN0115	36	14	36	14	36	15	36	17	37	20	37	23	38	25	39	25	40	25	42	25	43	25	45	25
BAN0136	BAN0136	45	30	45	30	45	31	45	33	45	36	45	39	45	41	45	41	45	41	45	41	45	41	45	41
BAN0138	BAN0115	36	18	36	18	36	19	36	21	37	24	37	27	38	28	39	29	40	29	42	28	43	28	45	28
BAN0139	BAN0048	35	14	35	14	37	15	38	17	39	20	40	23	40	24	41	24	42	24	43	24	45	24	47	24
BAN0140	BAN0048	35	13	35	13	37	14	38	16	39	19	40	22	40	23	41	23	42	23	43	23	45	23	47	23
BAN0141	BAN0170	35	14	35	14	35	15	35	17	35	20	35	23	35	25	35	25	36	25	38	25	40	25	43	25
BAN0142	BAN0170	35	19	35	19	35	19	35	22	35	25	35	28	35	29	35	30	36	29	38	29	40	29	43	29
BAN0144	BAN0144	35	25	35	25	35	25	35	28	35	31	35	34	35	35	36	35	37	35	40	35	42	35	45	35
BAN0152	BAN0152	35	25	35	25	36	25	36	28	37	31	37	34	38	35	39	35	40	35	42	35	44	35	47	35
BAN0154	BAN0155	45	27	45	27	45	27	45	30	45	33	45	36	45	37	45	38	45	37	45	37	45	37	45	37
BAN0155	BAN0155	45	29	45	29	45	29	45	32	45	35	45	38	45	39	45	39	45	39	45	39	45	39	45	39
BAN0158	BAN0158	45	28	45	28	45	28	45	31	45	34	45	37	45	38	45	39	45	38	45	38	46	38	50	38
BAN0159	BAN0159	45	23	45	23	45	24	45	26	45	29	45	32	45	34	45	34	45	34	45	34	45	34	48	34
BAN0160	BAN0009	45	17	45	17	45	17	45	20	45	23	45	26	45	27	45	27	45	27	45	27	45	27	45	27
BAN0161	BAN0009	45	18	45	18	45	19	45	21	45	24	45	27	45	29	45	29	45	29	45	29	45	29	45	29
BAN0162	BAN0009	45	23	45	23	45	23	45	25	45	29	45	31	45	33	45	33	45	33	45	33	45	33	45	33
BAN0164	BAN0159	45	23	45	23	45	24	45	26	45	29	45	32	45	33	45	34	45	34	45	34	45	33	48	33
BAN0165	BAN0159	35	23	35	23	35	23	35	26	35	29	35	32	36	33	38	33	39	33	42	33	45	33	48	33
BAN0166	BAN0159	35	22	35	22	35	23	35	25	35	29	35	31	36	33	38	33	39	33	42	33	45	33	48	33
BAN0170	BAN0170	35	22	35	22	35	23	35	25	35	29	35	31	35	33	35	33	36	33	38	33	40	33	43	33
BAN0172	BAN0060	45	26	45	26	45	27	45	29	45	32	45	35	45	37	45	37	45	37	45	37	45	37	46	37
BAN0173	BAN0115	45	23	45	23	45	23	45	26	45	29	45	32	45	33	45	33	45	33	45	33	45	33	45	33
BAN0175	BAN0048	35	15	35	15	37	15	38	17	39	21	40	23	40	25	41	25	42	25	43	25	45	25	47	25
BAN0176	BAN0155	35	16	35	16	35	16	35	19	35	22	35	25	35	26	35	26	35	26	37	26	40	26	43	26
BAN0177	BAN0076	36	18	36	18	36	19	37	21	37	24	37	27	37	29	38	29	38	29	40	29	41	29	44	29
BAN0179	BAN0076	36	21	36	21	36	21	37	24	37	27	37	30	37	31	38	31	38	31	40	31	41	31	44	31
BAN0181	BAN0076	36	19	36	19	36	19	37	22	37	25	37	28	37	29	38	29	38	29	40	29	41	29	44	29
BAN0182	BAN0076	45	21	45	21	45	21	45	24	45	27	45	30	45	31	45	31	45	31	45	31	45	31	45	31
BAN0186	BAN0076	36	16	36	16	36	16	37	19	37	22	37	24	37	26	38	26	38	26	40	26	41	26	44	26

Receiver ID	Representative Logging Location	Noise Level (dB(A)) at Integer Wind Speed																					
		3m/s		4m/s		5m/s		6m/s		7m/s		8m/s		9m/s		10m/s		11m/s		12m/s		13m/s		14m/s	
		Criterion	Prediction	Criterion	Prediction	Criterion	Prediction	Criterion	Prediction	Criterion	Prediction	Criterion	Prediction	Criterion	Prediction	Criterion	Prediction	Criterion	Prediction	Criterion	Prediction	Criterion	Prediction	Criterion	Prediction
BAN0187	BAN0076	36	20	36	20	36	20	37	23	37	26	37	29	37	30	38	30	38	30	40	30	41	30	44	30
BAN0189	BAN0009	45	23	45	23	45	23	45	25	45	29	45	31	45	33	45	33	45	33	45	33	45	33	45	33
BAN0212	BAN0048	35	13	35	13	37	13	38	16	39	19	40	22	40	23	41	23	42	23	43	23	45	23	47	23
BAN0215	BAN0048	35	13	35	13	37	13	38	16	39	19	40	21	40	23	41	23	42	23	43	23	45	23	47	23
BAN0217	BAN0048	35	13	35	13	37	14	38	16	39	19	40	22	40	23	41	23	42	23	43	23	45	23	47	23
BAN0225	BAN0009	45	17	45	17	45	17	45	19	45	23	45	25	45	27	45	27	45	27	45	27	45	27	45	27
BAN0235	BAN0076	36	26	36	26	36	26	37	29	37	32	37	35	37	36	38	36	38	36	40	36	41	36	44	36
BAN0238	BAN0060	35	27	35	27	35	27	35	29	35	33	35	35	35	**37**	35	**37**	37	37	39	37	42	37	46	37
BAN0243	BAN0152	35	21	35	21	36	22	36	24	37	28	37	30	38	32	39	32	40	32	42	32	44	32	47	32
BAN0260	BAN0076	36	22	36	22	36	22	37	25	37	28	37	31	37	32	38	32	38	32	40	32	41	32	44	32
BAN0274	BAN0048	35	13	35	13	37	13	38	16	39	19	40	22	40	23	41	23	42	23	43	23	45	23	47	23
BAN0276	BAN0144	35	25	35	25	35	25	35	28	35	31	35	34	35	35	36	35	37	35	40	35	42	35	45	35
BAN0280	BAN0076	36	15	36	15	36	16	37	18	37	21	37	24	37	26	38	26	38	26	40	26	41	26	44	26
BAN0282	BAN0155	35	22	35	22	35	23	35	25	35	28	35	31	35	33	35	33	35	33	37	33	40	33	43	33

Based on the predictions, the noise from layout LO1 will comply with the criteria established in accordance with the SA Guidelines with a base level of 35 dB(A), at all non-involved dwellings except at BAN238. To achieve the requirements of the SA Guidelines at BAN238, an agreement with the landholder will need to be established (it is understood that this is currently being negotiated), otherwise the wind farm layout will need to be modified (removal of the two closest turbines, or relocation of the turbines) such that the predicted noise levels at all non-involved dwellings achieve the established criteria.

At involved dwellings, the external noise levels provided by the WHO Guidelines will be achieved with the exception of BAN0100. At this dwelling, the WHO Guidelines can be achieved by assessing the acoustic performance of the facade and considering potential acoustic treatment if required. This treatment might take the form of mechanical ventilation to allow windows to be closed and/or sealing any gaps around doors and windows.

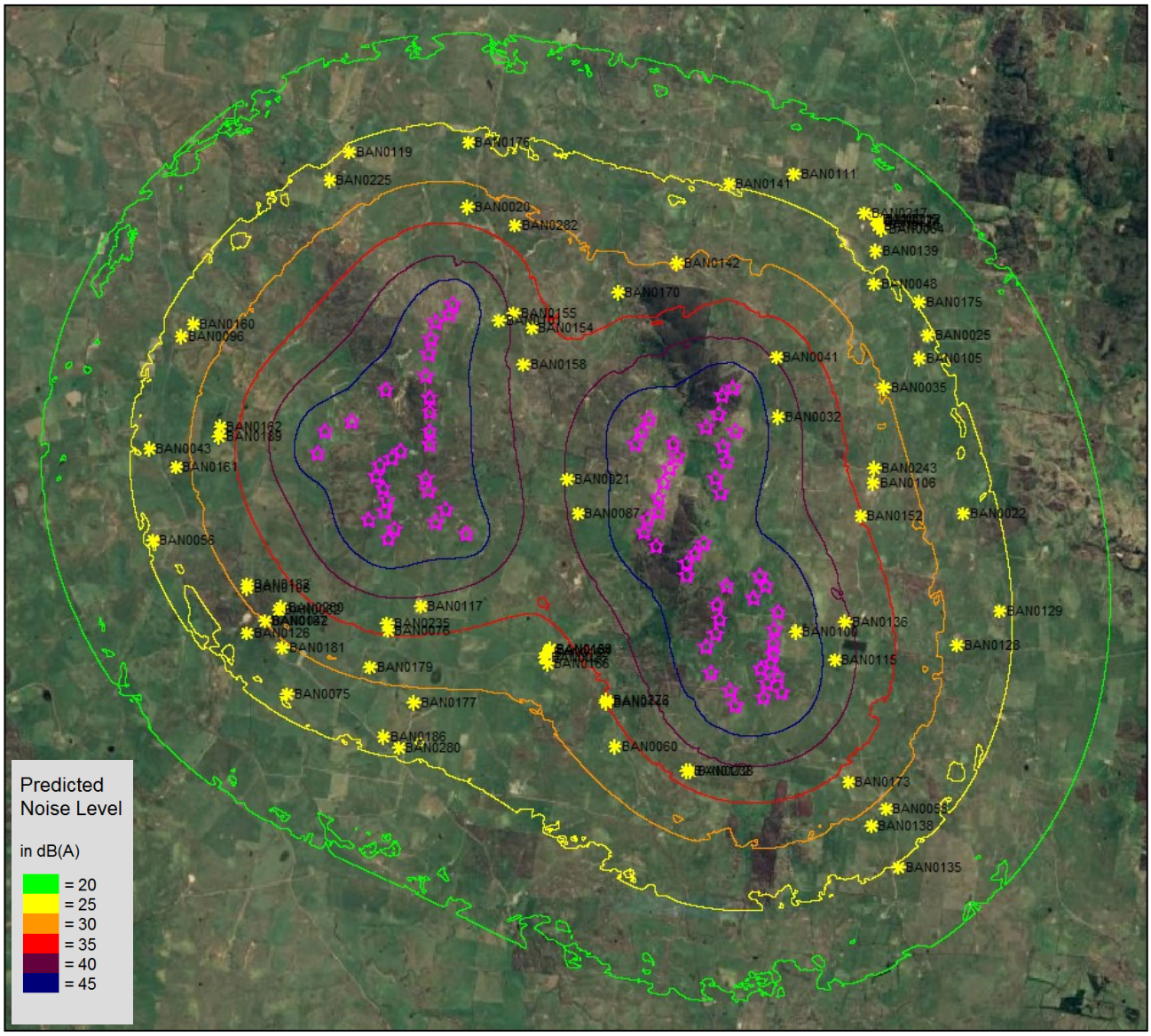


Figure 1: Predicted noise level contours at 10m/s wind speed.

Appendix 4

LVIA Update

Green Bean

GREEN BEAN DESIGN landscape architects

Kristy Old
CWP Renewables Pty Ltd
Level 6, Suite A, 41-45 Hunter Street,
Newcastle NSW 2300

By email

4 May 2017

Dear Kristy

Bango Wind Farm – supplementary visual assessment 4 May 2017

As requested we have undertaken a supplementary assessment of potential visual effects for associated and non-associated residential dwellings surrounding the Bango Wind Farm Project.

This supplementary assessment has been undertaken further to the removal of (forty-seven) wind turbines that were included and assessed in the Landscape and Visual Impact Assessment v5 May 2016 (LVIA).

Our supplementary assessment has included:

- a review of the original LVIA
- a review of CWP Renewables Figures BAN-143 Reduced Layout and BAN-144 Photomontage Locations
- a review of an additional (eleven) wireframe models
- a review of an additional (five) photomontage as amended.

This information has been used to consider and determine the potential change in visual effect for the residential dwellings included in the Excel Spreadsheet (170502_BWF_Residence Summary) as provided to Green Bean Design Pty Ltd by CWP Renewables.

The results of our supplementary assessment have been entered into the spreadsheet as requested.

Yours sincerely,

GREEN BEAN DESIGN
landscape architects

GREEN BEAN DESIGN PTY LTD
PO Box 3178 Austral NSW 2179
Principal: Andy Homewood BSc (Dual Hons), Dip.LM, Dip.Hort, Registered Landscape Architect, AILA
(ABN: 86603575702, ACN:603575702)

Residence ID	Landowner Status	Agreement Status	Distance to Nearest Wind Turbine (km)		EIS Visual		Amended DA Visual			Noise
			Amended DA	Increase from EIS	Visual Significance Rating	Cumulative Visual Impact Rating	Change in Situation	Visual Significance Rating	Cumulative Visual Impact Rating	Compliance Achieved
100	Host	Agreed	0.5	0	High	-	No Change	-	-	No
32	Host	Agreed	1	0	Low to Medium	-	No Change	-	-	Yes
101	Neighbour	Agreed	1.1	0	High	-	No Change	-	-	Yes
41	Ex-Host	Pending	1.2	0.5	Low to Medium	-	Five wind turbine sites removed from north of Mount Buffalo cluster	Low to Medium	-	Yes
115	Neighbour	Agreed	1.4	0	High	-	No Change	-	-	Yes
155	Neighbour	Agreed	1.4	0	High	-	No Change	-	-	Yes
87	Host	Agreed	1.5	0	Medium to High	-	No Change	-	-	Yes
136	Neighbour	Agreed	1.5	0	High	-	No Change	-	-	Yes
21	Host	Agreed	1.7	0	Medium	-	No Change	-	-	Yes
117	Host	Agreed	1.7	0	Medium to High	-	No Change	-	-	Yes
238	Neighbour	Consultation in progress	1.8	0.8	Medium	-	Three wind turbine sites removed (in addition to four previously removed) from south of Mount Buffalo cluster	Low	-	No
154	Neighbour	Agreed	1.9	0	High	-	No Change	-	-	Yes

235	Neighbour	Declined	1.9	0.2	High	-	Three wind turbine sites removed from south of Kangiara cluster and three wind turbine sites removed (in addition to four previously) from south of Mount Buffalo cluster	High	-	Yes
20	Ex-Host	Pending	2.1	0.5	Low to Medium	-	Two wind turbine sites removed from north of Kangiara cluster	Low to Medium	-	Yes
76	Neighbour	Declined	2.1	0.2	Medium	-	Three wind turbine sites removed from south of Kangiara cluster and three wind turbine sites removed (in addition to four previously) from south of Mount Buffalo cluster	Medium	-	Yes
158	Neighbour	Agreed	2.1	0	Medium	-	No Change	-	-	Yes
189	Host	Agreed	2.2	0	Low	-	Langs Creek cluster removed	Low	-	Yes
282	Neighbour	Declined	2.2	0.5	High	-	Two wind turbine sites removed from north of Kangiara cluster	Medium	-	Yes
162	Host	Agreed	2.3	0	Low	-	Langs Creek cluster removed	Low	-	Yes
144	Neighbour	Declined	2.5	0	Low	-	ved (in addition to four previously removed) from	Low	-	Yes
173	Host	Agreed	2.5	0	Low	-	No Change	-	-	Yes
152	Neighbour	Agreed	2.6	0	Low to Medium	-	No Change	-	-	Yes
60	Neighbour	Declined	2.7	0.3	Medium	-	Three wind turbine sites removed (in addition to four previously removed) from south of Mount Buffalo cluster	Medium	-	Yes
170	Neighbour	Consultation in progress	2.8	0	Nil/Low	-	No Change	-	-	Yes

260	Neighbour	Consultation in progress	2.8	0.8	Medium to High	-	Three wind turbine sites removed from south of Kangiara cluster	Medium to High	-	Yes
62	Neighbour	Consultation in progress	2.9	0.8	Medium to High	-	Three wind turbine sites removed from south of Kangiara cluster	Medium to High	-	Yes
179	Neighbour	Consultation in progress	2.9	0.3	Low	-	Three wind turbine sites removed from south of Kangiara cluster	Low	-	Yes
142	Neighbour	Consultation in progress	3.0	1	Low	-	Five wind turbine sites removed from north of Mount Buffalo cluster and two wind turbine sites removed from north of Kangiara cluster	Low (possibly Nil)	-	Yes
108	Ex-Host	Consultation in progress	3.1	0.7	Low to Medium	-	Three wind turbine sites removed from south of Kangiara cluster	Low to Medium	-	Yes
182	Ex-Host	Consultation in progress	3.1	0.7	Low to Medium	-	Three wind turbine sites removed from south of Kangiara cluster	Low to Medium	-	Yes
243	Neighbour	Consultation in progress	3.2	0	Low	-	No Change	-	-	Yes
26	Neighbour	None proposed	3.3	0	Low to Medium	-	Three wind turbine sites removed (in addition to four previously removed) from south of Mount Buffalo cluster	Low to Medium	-	Yes
35	Neighbour	None proposed	3.3	0.2	Low	Nil to low	Five wind turbine sites removed from north of Mount Buffalo cluster	Low	Nil to Low	Yes
42	Neighbour	None proposed	3.3	0.8	Nil/Low	-	Three wind turbine sites removed from south of Kangiara cluster	Nil/Low	-	Yes

106	Neighbour	None proposed	3.3	0	Low	-	No Change	-	-	Yes
187	Neighbour	None proposed	3.3	0.8	Nil/low	-	Three wind turbine sites removed from south of Kangiara cluster	Nil/Low	-	Yes
166	Neighbour	None proposed	3.4	0	Low to Medium	-	Three wind turbine sites removed (in addition to four previously removed) from south of Mount Buffalo cluster	Low to Medium	-	Yes
181	Neighbour	None proposed	3.4	0.8	Nil/Low	-	Three wind turbine sites removed from south of Kangiara cluster	Nil/Low	-	Yes
55	Host	Agreed	3.5	0	Low	-	No Change	-	-	Yes
138	Neighbour	None proposed	3.6	0.3	Low	-	No Change	Low	-	Yes
176	Neighbour	None proposed	3.6	0.6	Low	-	Two wind turbine sites removed from north of Kangiara cluster	Low	-	Yes
126	Neighbour	None proposed	3.7	0.7	Nil/Low	-	No Change	Nil/Low	-	Yes
177	Neighbour	None proposed	3.7	0.1	Low	-	Three wind turbine sites removed from south of Kangiara cluster	Low	-	Yes
43	Neighbour	None proposed	3.8	0	Nil/Low	-	No Change	-	-	Yes
160	Host	Agreed	3.8	2.1	Medium to High	-	Langs Creek cluster removed	Low (possibly Nil)	-	Yes
48	Neighbour	None proposed	3.9	1	Low	Low to Medium	Five wind turbine sites removed from north of Mount Buffalo cluster	Low	Low	Yes
96	Host	Agreed	3.9	2.1	Low	-	Langs Creek cluster removed	Low (possibly Nil)	-	Yes
225	Host	Agreed	3.9	2.9	High	-	Langs Creek cluster removed	Low (possibly Nil)	-	Yes

Appendix 5

Roads and Transport

Council Communications

Kristin Old

From: Terry Cooper <Terry.Cooper@yass.nsw.gov.au>
Sent: Thursday, 4 May 2017 5:01 PM
To: Kristin Old; Simon Cassidy (simon.cassidy@hilltops.nsw.gov.au)
Subject: RE: Bango - Site access roads

Hi
These changes generally address the concerns raised

Terry Cooper
Engineering Services Manager
Yass Valley Council
(02) 6226-9274

From: Kristin Old [mailto:Kristin.Old@cwpam.com.au]
Sent: Monday, 1 May 2017 3:00 PM
To: Terry Cooper; Simon Cassidy (simon.cassidy@hilltops.nsw.gov.au)
Subject: Bango - Site access roads

Good afternoon Terry and Simon,

Please find attached the amended table as discussed last week. If you could let me know if you are happy for us to include this table in our response to submissions, or provide feedback if you have any issues with it, it would be much appreciated.

If we could get this feedback by Wednesday COB it would be great, as we are trying to submit the response by the end of this week.

Regards,

Kristy Old

CWP Renewables Pty Ltd
t 02 4013 4640 f 02 4926 2154 m 0416 932 549
P.O. Box 1708 / Level 6, Suite A, 41-45 Hunter Street, Newcastle NSW 2300
kristin.old@cwprenewables.com.au www.cwprenewables.com.au

Kristin Old

From: Simon Cassidy <simon.cassidy@hilltops.nsw.gov.au>
Sent: Friday, 5 May 2017 8:01 AM
To: Kristin Old
Cc: Cooper Terry
Subject: Fwd: Site Access roads.docx
Attachments: Site Access roads.docx; ATT00001.htm

Kirsty

I added one comment under the construction timing section. Otherwise I am happy that it reflects our recent discussions.

Regards

Simon Cassidy

Begin forwarded message:

> **From:** Simon Cassidy <simon.cassidy@genium.com.au>
> **Date:** 5 May 2017 at 7:58:10 am AEST
> **To:** "simon.cassidy@hilltops.nsw.gov.au" <simon.cassidy@hilltops.nsw.gov.au>
> **Subject: Site Access roads.docx**

Site Access - Balance of Plant and Resources: The Proponent acknowledges the feedback provided by Hilltops and Yass Valley Councils through the public exhibition of the EIS. In particular, the commentary regarding the impacts to the local Council road network pavements and associated safety concerns with the use of heavy vehicles ("truck-and-dog" arrangements) hauling balance of plant and resources to the Project Site. In response to this, a range of proposed solutions have been discussed with both Councils (summarised in Table 1~~Table 1~~ below), to address the uncertainty and risks identified by each, while retaining flexibility in the Project.

Table 1: Proposed solutions to Council road concerns

Aspect	Response
The location and source (and the associated road routes) required for the delivery of resources (water, sand, gravel, cement, etc.) to the Project Site.	The Proponent requests that the location of these resource requirements is determined through a competitive tender process, however in doing so acknowledges Councils' concern that only appropriately licenced suppliers of resources will be used, unless materials are otherwise won within the Project site (for instance the use of material excavated from the wind turbine foundation sites). Nonetheless, it is proposed that the locations of known sources are identified and addressed in the Project Transport Management Plan (TMP), which is to be prepared to the satisfaction of the relevant Council, prior to the commencement of the relevant stage of works. It is also requested that additional TMPs be allowable to accommodate the introduction of new sources should they be identified during the construction period. All TMPs are to be prepared in consultation with the relevant Council. It is noted that the location of currently known and potential quarry sites were identified in the EIS Figure 3.9, however in accordance with the comments above, consideration of their licence status will be undertaken prior to use.
Maintenance of roads during construction	The Proponent acknowledges and accepts that maintenance of the local Council road network (to the extent that impacts are caused by Project vehicles) is a requirement of the Project during the construction period, and that the associated costs are to be borne by the Project. The Proponent also acknowledges the current low levels of local traffic users on the known Project roads (Wargeila, Tanmangaroo, and Harry's Creek roads), and that speed (or the perception of speed) for construction vehicles is a concern for residents. To address this matter, and in consideration of identifying the source of resource requirements as outlined above, the Proponent proposes to enter a Road Dilapidation Deed with each Council, prior to the commencement of the relevant stage of works. The Road Dilapidation Deed will clearly outline the responsibility of each party for the identification, prioritization, rectification of any defects, and the apportionment of costs of such works, and has been utilised by the Proponent on other projects - most recently at the Sapphire wind farm in

	northern NSW in consultation with Glen Innes Severn and Inverell Shire, Councils. The Road Dilapidation Deed will incorporate the requirements of pre- and post-dilapidation surveys, any necessary road upgrades and methods deemed appropriate for control of speed limits by construction vehicles.
Upgrades to roads	The Proponent acknowledges Council's responsibilities under the Roads Act 1993, and therefore the Proponent's own responsibilities in committing to appropriate upgrades and traffic management protocols to the local Council road network to ensure safe passage of vehicles during the construction period. In this regard, and as recommended above, the Proponent proposes to enter a Road Dilapidation Deed with each Council with respect to the required works.
Timing of road upgrades	The Proponent requests that consideration is given to construction works that can occur in parallel to road upgrades. This request goes beyond the typical allowance of activities within the definition of "Pre-construction works" within recent planning approvals. It should be an "Early works" construction package that could be commenced prior to the completion of all required road upgrades, and would include the following activities: - Commencement of construction of site access roads from the site entrances to the site facilities (site compound, substation, operations and maintenance facility, batching plant and crushing facility); - Activities required to bench, install hardstand and temporary office facilities and amenities for temporary and permanent facilities across the Project; and, - Onsite extraction and stockpiling of pavement materials in preparation for the commencement of construction. These works would typically require plant and equipment to be brought to site once, to be left within the Project Site to undertake works without consequential ongoing impacts to the local Council road network, other than those of light vehicles which are generally permitted under the recent standard definition of "Pre-construction works". The works would generally not require delivery of significant quantities of materials to or from the site using the public road network. It is proposed that final vehicle numbers and movements are to be determined through the finalisation of the TMP and Road Dilapidation Deeds, at which point the known construction partner will be on-board to advise on the construction program and preferred work fronts. Ultimately, this requested solution will drive efficacy in the construction program, which in turn will reduce construction program and impacts of

	the project to local residents and road users with little additional impacts to the local Council road network.
Impacts on local sources of water, in particular potable and agricultural waters supplies.	This concern is noted and the scope provided to tendering construction contractors will include a directive that liaison with each Council and/or Department of Primary Industries (DPI) is required in relation to sourcing water for the Project. It is acknowledged that this is a particular concern for the Hilltops Council in the Boorowa area.
Decommissioning	The Proponent's approach to provisioning funds for decommissioning is outlined in Chapter 18 of the EIS which will incorporate the costs associated with impacts to the local Council road network.

Appendix 6

Airservices Australia

From: Airport Developments [mailto:Airport.Developments@AirservicesAustralia.com]
Sent: Wednesday, 3 May 2017 4:20 PM
To: Kristin Old <Kristin.Old@cwpam.com.au>
Cc: 'diana.charteris@planning.nsw.gov.au' <diana.charteris@planning.nsw.gov.au>; 'Airspace.Protection@casa.gov.au' <Airspace.Protection@casa.gov.au>
Subject: AIRSERVICES RESPONSE (NSW-WF-043 P4) - Bango Wind Farm [SEC=UNCLASSIFIED]

Hi Kristin,

I refer to your request for an Airservices assessment of the Bango Wind Farm.

Airspace Procedures

With respect to procedures designed by Airservices in accordance with ICAO PANS-OPS and Document 9905, at a maximum tip height of 952m (3124ft) AHD, the wind farm will not affect any sector or circling altitude, nor any instrument approach or departure procedure at Young Airport. The wind farm will also not affect any air routes.

Note that procedures not designed by Airservices at Young Airport were not considered in this assessment.

Communications/Navigation/Surveillance (CNS) Facilities

Based on the supplied *170320_BAN_200m WTG tip heights.docx* (attached), the Bango Wind Farm to a maximum wind turbine tip height of 952m (3124ft) AHD will not adversely impact the performance of Airservices Precision/Non-Precision Nav Aids, HF/VHF Comms, A-SMGCS, Radar, PRM, ADS-B, WAM or Satellite/Links.

Regards,

Tony Aiezza

Senior Advisor Airport Development

Airservices Australia

Tower Road, Melbourne Airport

Tullamarine VIC 3043

t **03 9339 2272** I m **0409 143 120**

Turbine #	Easting	Northing	WTG Base Elevation (m/AMSL)	200m WTG Blade Tip Elevation (m/AMSL)
1	671618	6174752	701	901
2	672551	6169350	742	942
3	671220	6172725	682	882
5	672506	6168805	722	922
7	671261	6169917	722	922
11	664944	6171739	650	850
12	672635	6169745	710	910
13	671656	6173805	661	861
14	664721	6172733	661	861
17	672377	6168142	711	911
18	663601	6172799	661	861
19	664006	6171605	631	831
21	662281	6173305	627	827
22	670581	6170580	701	901
24	671306	6169580	698	898
25	671131	6168379	680	880
26	669892	6171233	713	913
27	664756	6172455	648	848
28	670262	6173541	631	831
32	672716	6167943	721	921
33	672070	6170045	712	912
34	672357	6170336	699	899
35	663756	6172505	650	850
36	672238	6168456	713	913
41	664931	6176230	650	850
44	664806	6174230	674	874
45	671006	6168951	699	899
46	671465	6170340	717	917
47	671217	6169267	710	910
48	669615	6171540	698	898
49	664831	6175855	642	842
50	671015	6173890	646	846
53	670056	6172655	722	922
54	671370	6174593	708	908
55	669956	6172305	729	929
57	670581	6170855	752	952
58	671287	6174189	682	882
59	670190	6172964	662	862
60	671481	6173130	654	854
61	672625	6168300	732	932
62	671668	6167651	722	922
63	663056	6174030	640	840
65	663781	6172005	642	842
67	672228	6170535	696	896

69	669424	6173513	692	892
71	669565	6173814	651	851
72	663856	6171405	631	831
73	665140	6172054	631	831
76	665306	6176655	651	851
79	663431	6171805	631	831
80	671402	6173443	671	871
81	669706	6171830	733	933
83	669931	6172005	698	898
85	670956	6171280	713	913
86	665621	6171497	632	832
87	663831	6172255	642	842
88	663806	6174730	651	851
89	663681	6173030	657	857
91	669715	6174088	628	828
94	664806	6174530	649	849
95	670351	6173243	641	841
96	664131	6173380	651	851
97	664781	6175530	629	829
98	665231	6176430	651	851
100	670756	6171080	731	931
102	672301	6167831	721	921
104	664806	6173505	666	866
107	672458	6168591	721	921
110	671328	6172413	663	863
111	671558	6167971	695	895
114	663956	6173205	649	849
115	664704	6175039	633	833
118	664806	6173805	677	877
119	662440	6173814	622	822
122	672508	6169040	732	932

Appendix 7

Cultural Heritage Update

New South Wales Archaeology Pty Limited ABN 53106044366

PO Box 2135
Central Tilba NSW 2546

Ph 02 44737947
www.nswarchaeology.com.au

1 May 2017

Ed Mounsey
CWP Renewables
45 Hunter Street
Newcastle NSW

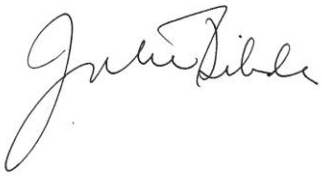
Dear Ed

Re Proposed Bango Wind Farm, via Boorowa

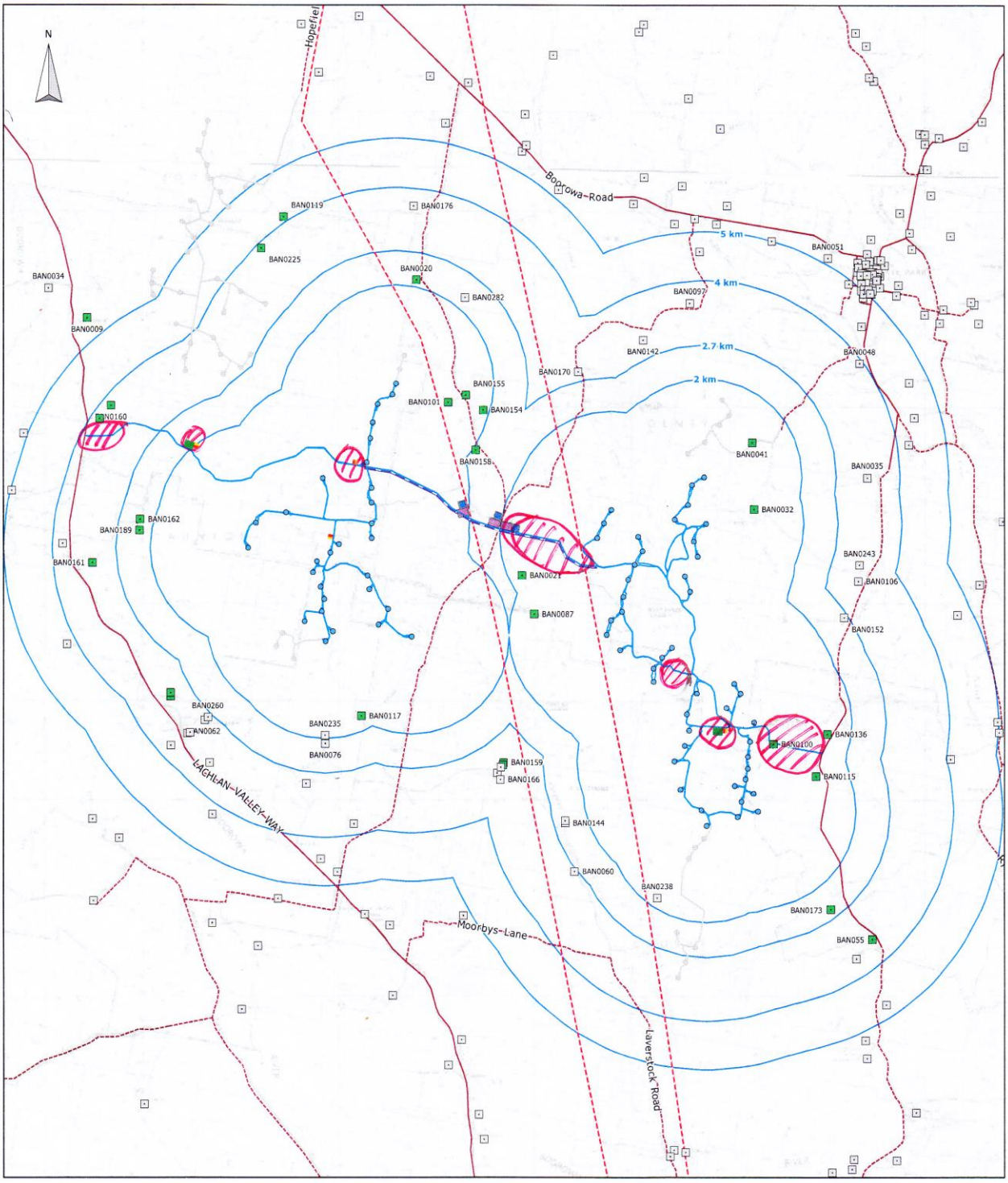
I have conducted a review of the current project layout in respect of the heritage assessment of the Bango Wind Farm conducted by NSW Archaeology in 2012/2013.

This letter is to confirm that the project layout put forward in the Amended DA is consistent with what was assessed previously. Accordingly, the conclusions previously reached in the Heritage Assessment remain valid, to the extent they apply to the reduced foot print.

Yours faithfully



Dr Julie Dibden
New South Wales Archaeology Pty Limited



LEGEND

WTG Layout
- Reduced Layout 1 (75 WTGs)
- Removed Turbines

Involvement Status
- Involved
- Not Involved

Other
- Access Track
- Removed Access Track
- Unsealed Road
- Sealed Road
- 132 kV Transmission Line
- Overhead Transmission Line

SCALE BAR

0 — 4 km

COMPANY	BANGO WIND FARM PTY LTD
TITLE	POST EXHIBITION REDUCED LAYOUT

DATE	SCALE	DWG NO	REV	VER
21 MAR 2017	1:74000	BAN-141	A	1

DRAWN BY	CHECKED BY	SHEET	JOB NO	SIZE
K OLD	E MOUNSEY	1 OF 1	080811	A3

BURU NGUNAWAL ABORIGINAL CORPORATION

ABN : 24 059 704 833

12 April 2013

NSW Archaeology Pty Ltd
PO Box 2135
Central Tilba NSW 2546

Attention: Julie Dibden

Dear Julie

Re: Draft Aboriginal Heritage Assessment for Bango Windfarm

Thank you for your email dated 27 March 2013, advising of the above Draft Aboriginal Heritage Assessment at Bango, and requesting input from Buru Ngunawal Aboriginal Corporation (BNAC) as the Traditional Owner group.

As the Traditional Owners, we agree with NSW Archaeology Pty Ltd's draft report for the project, but we are of the belief that decision-making is a collaborative process involving all concerned parties. Being inclusive develops a strong working relationship with respect for opinions and an understanding of values and may increase the understanding of the need to protect our cultural heritage.

If you have any queries, please do not hesitate to contact Walter on the number below, or by email, or myself on 0407 517844.

Thank you for the opportunity to provide comment. We look forward to working with you collaboratively on future projects.

Yours faithfully

Tyronne Bell
Director/Senior Sites Officer

PO Box 6900, CHARNWOOD ACT 2615 Ph: 02 62591672 Fax: 02 6258 1264 Email: walbell@bigpond.net.au