

GPG

global power generation



CROOKWELL DEVELOPMENT PTY LTD

RESPONSE TO SUBMISSIONS REPORT CROOKWELL 3 WF

LOCATION:
DATE:
REVIEW :
CODE

Crookwell (NEW SOUTH WALES (NSW))
February 2018
0
CR3-PER-0100-0

Crookwell 3 Wind Farm Addendum Environmental Impact Statement Response to Submissions

On behalf of
Crookwell Development Pty Ltd

14 February 2018



Project Manager

Georgia Sedgmen



14 February 2018

Contributors

Georgia Sedgmen

Alan Chen

* This document is for discussion purposes only unless signed and dated by the persons identified. This document has been reviewed by the Project Manager.

Contact

Mecone

Suite 12.04B, Level 12, 179 Elizabeth Street
Sydney, New South Wales 2000

info@mecone.com.au
mecone.com.au

© Mecone

All Rights Reserved. No part of this document may be reproduced, transmitted, stored in a retrieval system, or translated into any language in any form by any means without the written permission of Mecone.

All Rights Reserved. All methods, processes, commercial proposals and other contents described in this document are the confidential intellectual property of Mecone and may not be used or disclosed to any party without the written permission of Mecone.

Table of Contents

1	Introduction	1
1.1	Purpose of Report	1
1.2	Structure of Report.....	2
2	Site Description	3
3	Background	5
4	Proposed Changes to the Project.....	6
5	Consultation	10
5.1	Summary of submissions	11
6	Response to Government Authorities	13
6.1	NSW Department of Primary Industries	13
6.2	Department of Primary Industries—Division of Resources and Energy	14
6.3	NSW Environmental Protection Authority	14
6.4	NSW Office of Environment and Heritage.....	16
6.5	NSW Transport, Roads and Maritime Services.....	20
6.6	Water NSW	21
6.7	Upper Lachlan Shire Council	22
6.8	Goulburn Mulwaree Council	24
6.9	Civil Aviation Safety Authority.....	24
7	Response to Special Interest Groups	25
7.1	Parksbourne/Mummel Landscape Guardians Inc	25
7.2	Other groups	25
8	Response to Public Submissions	27
8.1	Summary of public submissions	27
8.2	Support Public Submissions	30
8.3	Assessment and approvals process.....	31
8.4	Land use zoning	33
8.5	Visual impacts	33
8.6	Operational noise	35
8.7	Micro-siting	37

8.8	Telecommunications	37
8.9	Aviation impacts	38
8.10	Traffic and transport	39
8.11	Economic and social issues	40
8.12	Renewable Energy	41
8.13	Biodiversity, flora and fauna	42
8.14	Health impacts	43
8.15	Property values	43
9	Summary of Responses of Specialists Reports	45
9.1	Visual Impacts	45
9.2	Operational Noise	45
9.3	Traffic Impacts	45
9.4	Shadow Flicker	46
9.5	Electromagnetic Interference (EMI)	46
9.6	Heritage and Biodiversity	46
10	Conclusion	48

Schedule of Figures and Tables

Figure 1 – Location Plan	3
Figure 2 – Previous infrastructure layout (from Preferred Project and Response to Submissions Report)	7
Figure 3 – Proposed Infrastructure Layout	8
Figure 4 – Wind Turbine Comparison	9
Figure 5 – Summary of submissions received	30
Table 1. Site Description	3
Table 2. NSW Department of Primary Industries	13
Table 3. NSW Environmental Protection Authority	14
Table 4. NSW Office of Environment and Heritage	16
Table 5. Response to Roads and Maritime Services	20
Table 6. WaterNSW	21
Table 7. Upper Lachlan Shire Council	22
Table 8. Upper Lachlan Shire Council	24
Table 9. CASA	24
Table 10. PMLG Issues	25

Table 11.	Approval and Assessment Process	31
Table 12.	Land Use Zoning Issues	33
Table 13.	Visual Impact Issues	33
Table 14.	Operational Noise Issues.....	35
Table 15.	PMLG Issues	37
Table 16.	Telecommunications Issues	37
Table 17.	Aviation Issues	38
Table 18.	Traffic and Transport Issues	39
Table 19.	Economic and Social Impact.....	40
Table 20.	Renewable Energy Issues	41
Table 21.	Biodiversity, flora and fauna Issues	42
Table 22.	Health Impacts	43
Table 23.	Property Values	43

Appendices

Appendix 1: Visual Impacts Response to Submission
Appendix 2: Noise Impacts Response to Submission
Appendix 3: Traffic Impacts Response to Submission
Appendix 4: Shadow Flicker Impacts Response to Submission
Appendix 5: EMI Impacts Response to Submission
Appendix 6: Response to OEH Heritage and Biodiversity Letter

1 Introduction

This Response to Submissions Report (Report) has been prepared in response to the submissions received during the public exhibition of the Addendum Environmental Impact Assessment (Addendum EIS) for the proposed Crookwell 3 Wind Farm project (the project).

The Crookwell 3 Wind Farm (project) was recommended for approval by the Department of Planning and Environment (DP&E) in February 2015 and was referred to the Planning and Assessment Commission for determination.

Changes have been proposed to the project since that time and in general, the proposed changes include:

- removal of 6 turbines, reducing the total number of turbines proposed from 29 to 23 (17 turbines in Crookwell 3 East and 6 turbines in Crookwell 3 South);
- increase in the maximum turbine envelope to accommodate the newer, more efficient turbine models now available, including:
 - decrease in the maximum hub height from 105 metres to up to 95 metres;
 - increase in the rotor diameter from 104 metres to up to 130 metres;
 - maintain the blade tip height at 157 metres;
- minor changes to the location of one turbine (A24) and alignment of access track between turbine A13 and A16.

The Addendum EIS was publicly exhibited from 11 October to 14 November 2016 in accordance with Section 89F of the *Environmental Planning and Assessment Act 1979* (EP&A). A total of 82 submissions were received, including 9 government agency/entity submissions, 7 submissions from community/interest groups and 66 individual submissions from members of the public.

This Report will be reviewed by DP&E in conjunction with the existing Crookwell 3 Response to Submission Report dated 24 March 2014.

1.1 Purpose of Report

The purpose of the report is to address the requirements of clause 85A of the Environmental Planning and Assessment Regulation 200. In general, this report:

- responds to the matters raised in the submissions; and
- sets out and assesses some additional clarifications to the project layout which have been made to address the issues raised in submissions and as a result of further detailed design of the project.

1.2 Structure of Report

This Report is structured as follows:

- Site description;
- Response to Government Agency, community group and individual submissions;
- Summary of specialist's reports prepared in response to submissions.

2 Site Description

Crookwell is located in regional NSW in the Upper Lachlan local government area. The proposed Crookwell 3 Wind Farm is approximately 17km southeast of the Crookwell township and 25km northwest of Goulburn.

The site comprises two separate parcels known as Crookwell 3 East and Crookwell 3 South. Figure 1 provides a site location plan, with Crookwell 3 East and Crookwell 3 South demarcated in green, and Table 2 provides a summary description of the site.

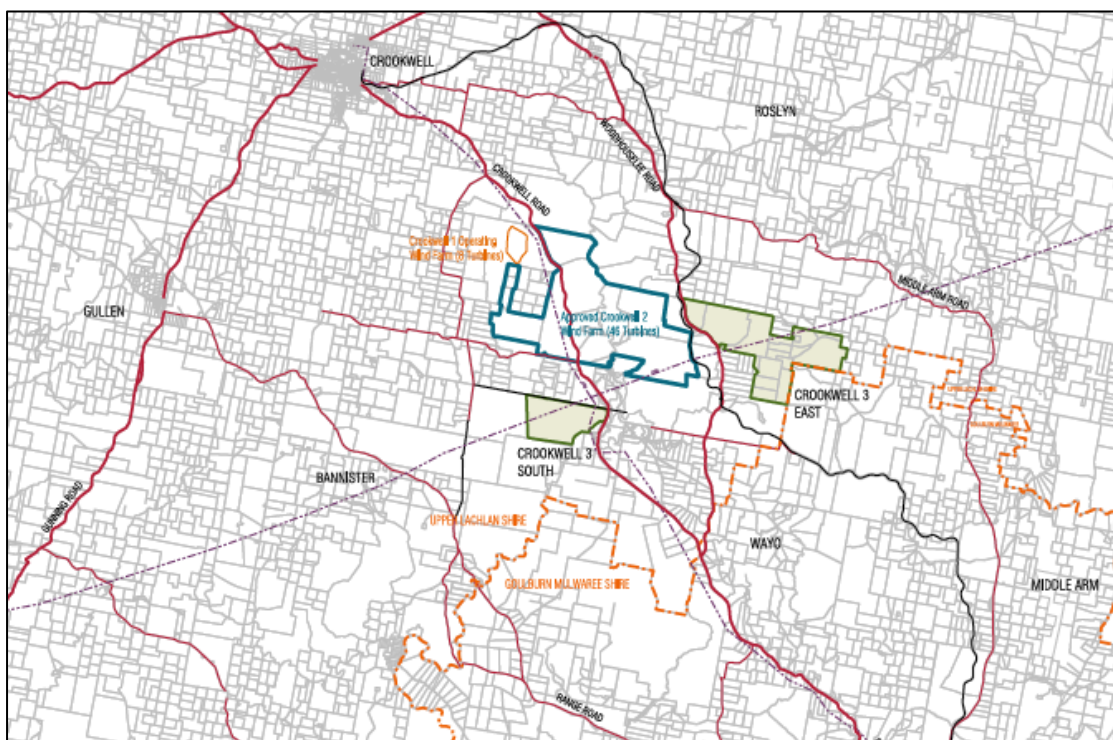


Figure 1 – Location Plan
Source: Crookwell Development Pty Ltd

Table 1. Site Description			
Item	Description		
Legal description	<u>Crookwell 3 East</u>	<u>Crookwell 3 South</u>	<u>Electricity Easement Options</u>
	Lot 1 DP 1074987	Lot 3 DP 588100	Lot 1 DP 965855
	Lot 2 DP 1074987	Lot 8 DP 252214	Lot 2 DP 1087717
	Lot 1 DP 924832		Lot 2 DP 1091383
	Lot 2 DP 1139846		Lot 7300 DP 1139548
	Lot 13 DP 784346		Lot 257 DP 257478
	Lot 14 DP 784346		Lot 9 DP 252214
	Lot 191 DP 750054		Lot 256 DP 257478
	Lot 290 DP 750052		Lot 12 DP 252214
	Lot 326 DP 750052		

Table 1. Site Description			
Item	Description		
	Lot 7011 DP 96802		Lot 7009 DP 96794 Lot 1 DP 604536 Lot 2 DP 604536
Total area	Approximately 1,500 hectares Crookwell 3 South = approximately 400ha Crookwell 3 East = approximately 1,100ha		
Access	Access to Crookwell 3 South is via Crookwell Road, and access to Crookwell 3 East is via Woodhouselee Road, and through an ungazetted Greywood Siding Road as one of the access options.		
Site description	The site is located on a system of ridges and low hills that are separated by the Wollondilly River and the Goulburn-Crookwell Road corridor.		
Surrounding context	The surrounding area is rural in character and features undulating hills with some steeper slopes around valleys.		

3 Background

The application for the Crookwell 3 Wind Farm was originally lodged in 2010 seeking approval under Part 3A of the EP&A Act. An Environmental Assessment Report (original EA) was exhibited from November 2012 to February 2013. A Preferred Project Report and Response to Submissions Report (PPRSR) was lodged in March 2014.

On 21 March 2014 the then Minister for Planning and Infrastructure formally transitioned the project from Part 3A to State Significant Development (SSD) via an order made under clause 6 of Schedule 6A of the EP&A Act. As such, the previous actions taken under the Part 3A process, including the exhibition of the original EA and the lodgment of the PPRS, are each taken to have been carried out under the corresponding provisions of the SSD process.

The project was subsequently assessed as SSD by the Department of Planning and Environment (DP&E), and a Secretary's Environmental Assessment Report (Secretary's Report) was prepared under section 89E of the EP&A Act in February 2015. The Secretary's Report recommended that the project be approved subject to conditions.

Following the Secretary's recommendation, a number of changes have been proposed for the project to further reduce its environmental impact and capitalise on significant developments in turbine technology. An Addendum EIS addressing these changes was lodged and publicly exhibited from 11 October to 14 November 2016. The responses received from the public exhibition are the subject of this Report.

4 Proposed Changes to the Project

The changes to the project include:

- removal of 6 turbines, reducing the total number of turbines proposed from 29 to 23 (17 turbines in Crookwell 3 East and 6 turbines in Crookwell 3 South);
- increase in the maximum turbine envelope to accommodate the newer, more efficient turbine models now available, including:
 - decrease in the maximum hub height from 105 metres to up to 95 metres;
 - increase in the rotor diameter from 104 metres to up to 130 metres;
 - maintain the blade tip height at 157 metres;
- minor changes to the location of one turbine (A24) and alignment of access track between turbine A13 and A16 in response to comments from the Office of Environment and Heritage.

The proposed new turbine models enable the Crookwell 3 Wind Farm to generate more energy per turbine and increase the overall energy yield of the project. This is due to the increase in the swept path area due to the longer blade length, and an increase in generator capacity in the nacelle (up to 4.2 Megawatts (MW)). These changes combine to increase the amount of the wind energy harnessed by each turbine.

Current estimates show that the amended project could generate up to 275 gigawatt hours per year (GWh/y) for the 23 larger turbines in comparison to only 208 GWh/y for the 29 turbines initially proposed.

The project otherwise remains as described in the original Environmental Assessment (EA), dated July 2012 and Response to Submissions Report, dated March 2014.

The revised Capital Investment Value of the project has been estimated at \$120 million.

Figure 2 below shows the Crookwell 3 Wind Farm infrastructure layout presented under the Preferred Project and Response to Submissions Report (PPRSR), while Figure 3 indicates the amended proposed infrastructure layout incorporating the changes described above.

The revised indicative locations reflect the current understanding of the best location for the turbines, given the current knowledge of wind characteristics and presence of vegetation.

Figure 4 provides a comparison between the proposed wind turbine envelope and the previous wind turbine envelope.

As outlined in the original EA and PPRS, if project approval is granted, the layout will be refined at the detailed design stage, once the final turbine has been selected, in order to achieve the best energy generation from the selected turbine model. It is estimated that this may result in individual turbines being moved approximately 25m to 100m from the currently nominated locations.

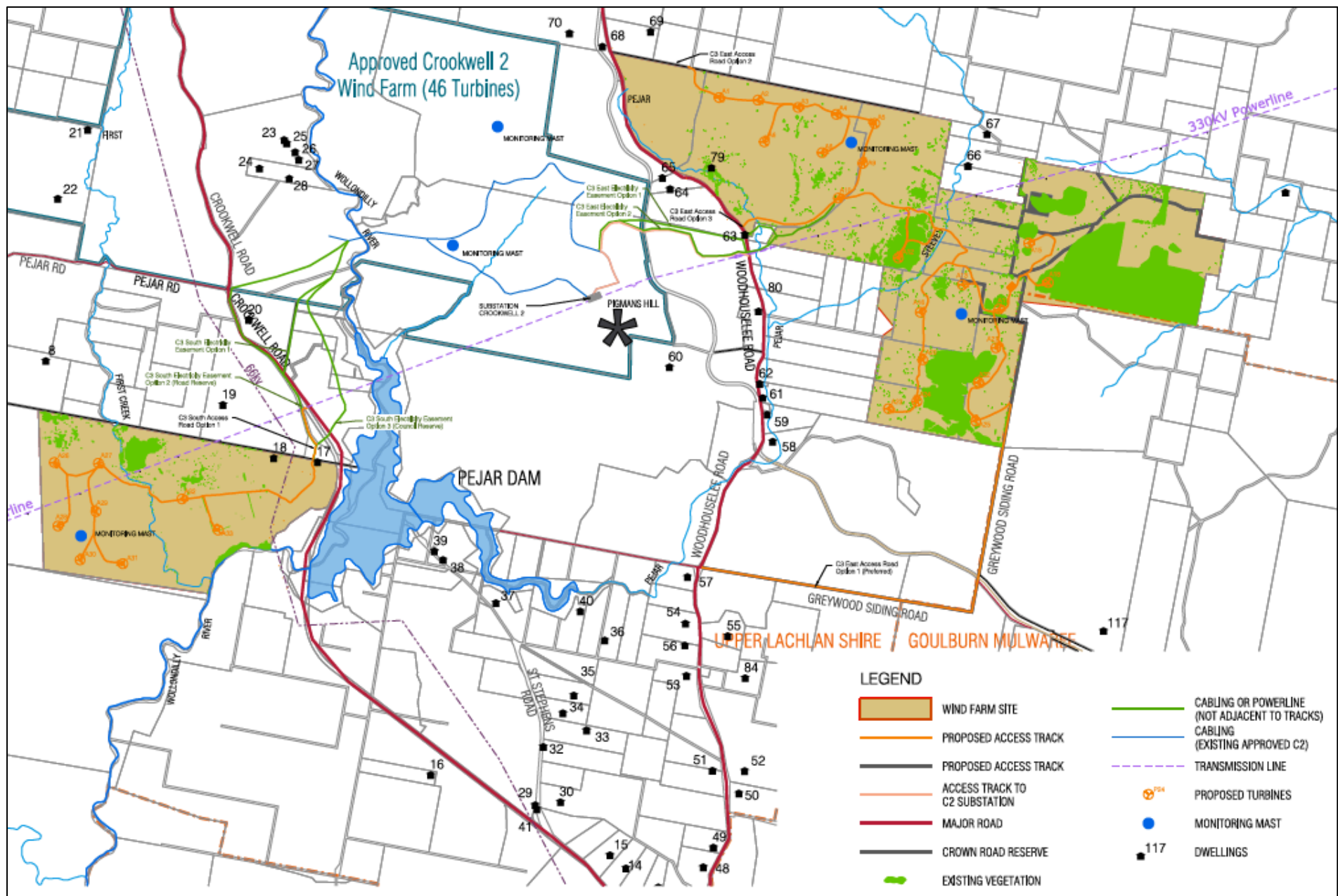


Figure 2 – Previous infrastructure layout (from Preferred Project and Response to Submissions Report)

Source: Crookwell Development Pty Ltd

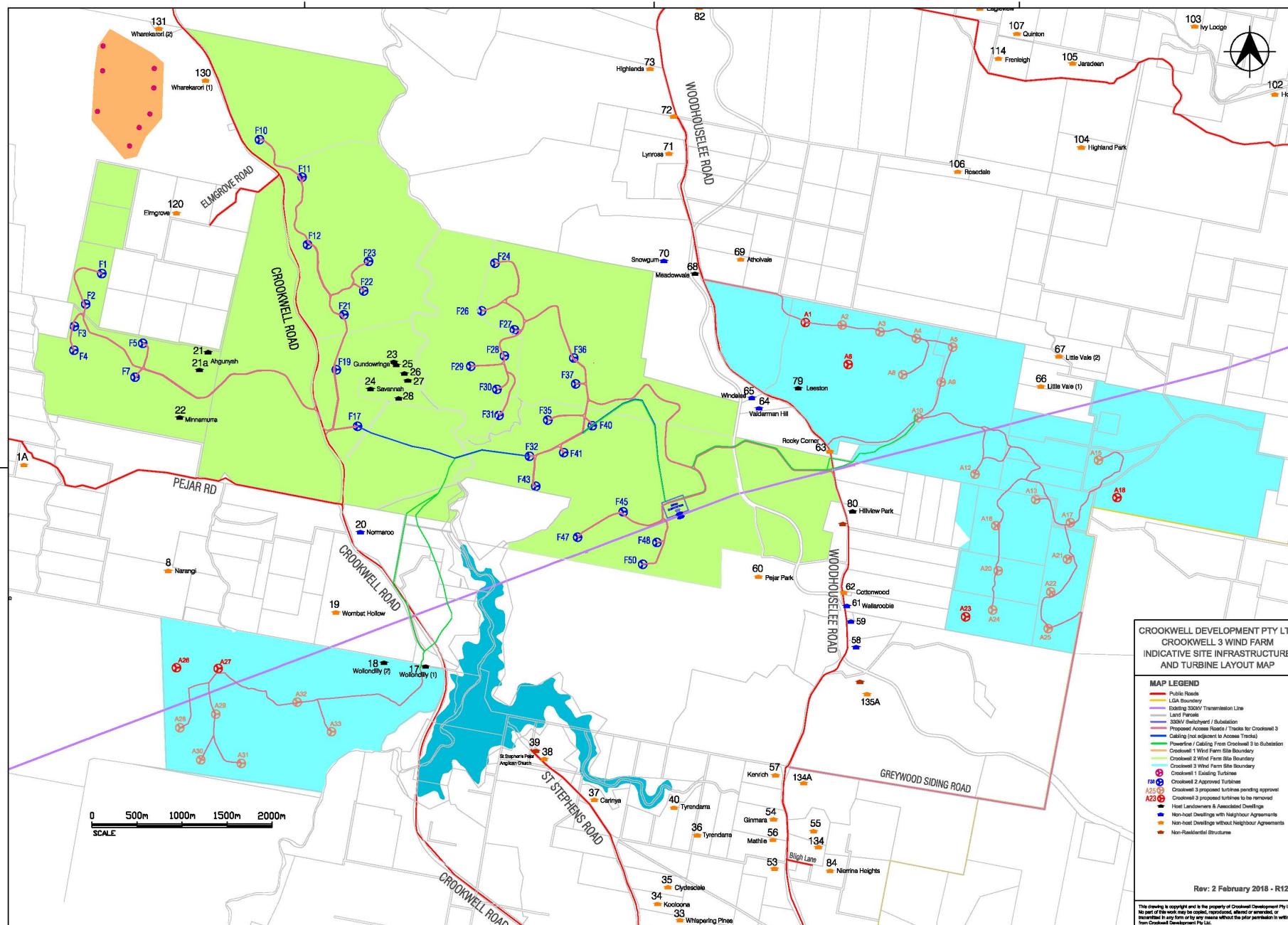


Figure 3 – Proposed Infrastructure Layout

Source: Crookwell Development Pty Ltd

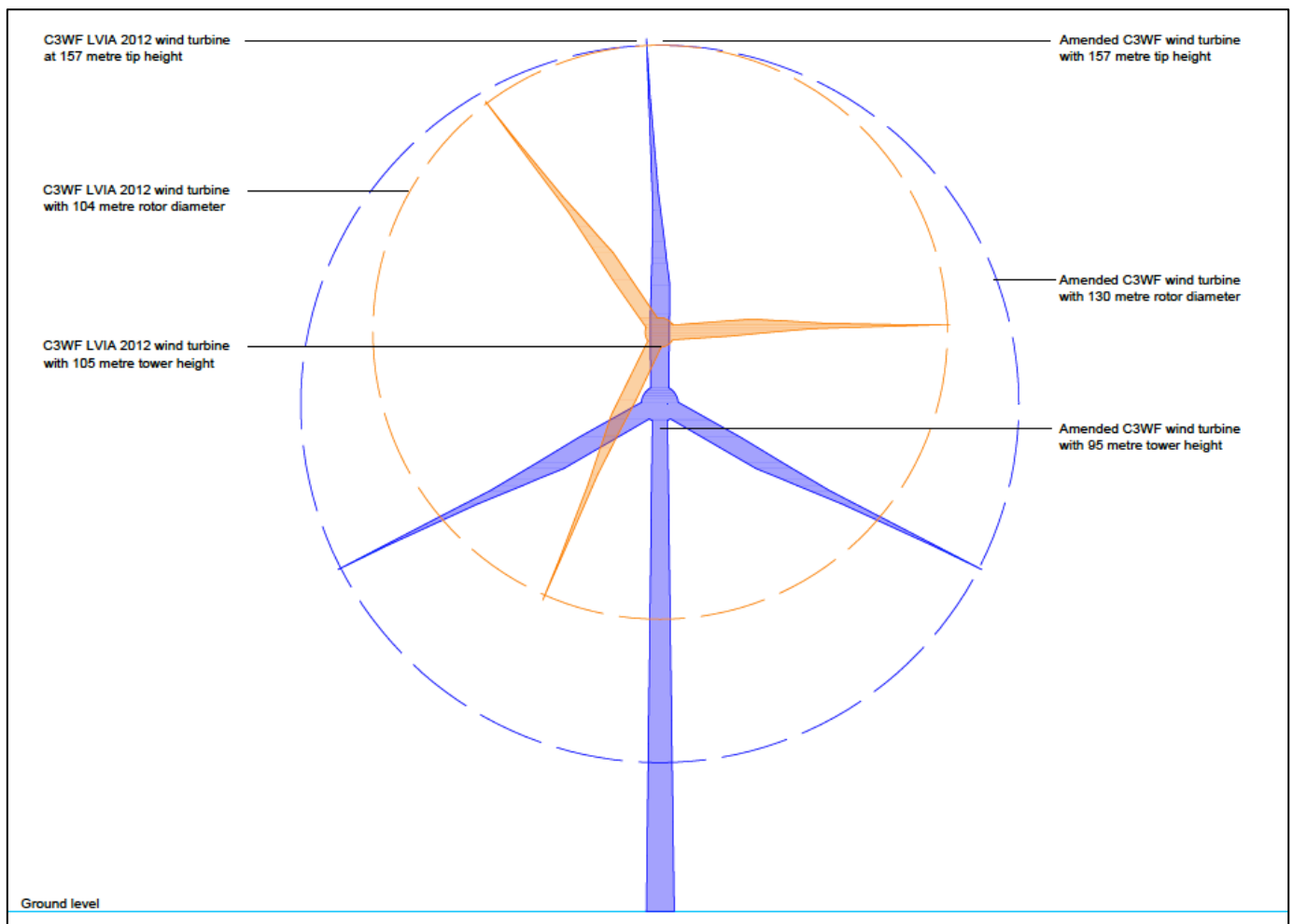


Figure 4 – Wind Turbine Comparison
Source: Green Bean Design

5 Consultation

The Addendum EIS was publically exhibited from 11 October to 14 November 2016 in accordance with Section 89F of the *Environmental Planning and Assessment Act 1979* (EP&A).

Notification of the exhibition was provided in local publications the Goulburn Post, Crookwell Gazette and Yass Tribune. Letters were sent to all adjoining and nearby landowners notifying of the exhibition and inviting a submission. The Addendum EIS was also made available on the Department's website, and at the following locations:

- Department of Planning and Environment, 23-33 Bridge Street, Sydney;
- Upper Lachlan Shire Council (Crookwell office), 44 Spring Street, Crookwell;
- Upper Lachlan Shire Council (Gunning Office), 123 Yass Street, Gunning;
- Goulburn Mulwaree Council (Civic Centre), 184-194 Bourke Street, Goulburn;
- Crookwell Library, Denison Street, Crookwell; and
- Nature Conservation Council, 2/5 Wilson Street, Newtown.

Additionally, community and stakeholder engagement was conducted with the following stakeholders:

- Commonwealth agencies:
 - Civil Aviation Safety Authority (CASA) (for aviation impact, telecommunication impact);
 - Airservices Australia (for aviation impact, telecommunication impact);
 - Department of Defence (for aviation impact, telecommunication impact);
 - Department of Environment—online Environmental Protection and Biodiversity Conservation Act 1999 Protected Matters Search Tool (for ecology impact); and
 - Bureau of Meteorology (BoM) (for telecommunication impact).
- NSW Government agencies:
 - NSW Department of Planning and Environment (for planning and assessment provisions, noise impact, visual impact, socio-economic benefits including Voluntary Planning Agreement and Neighbour Benefit Sharing Scheme);
 - NSW Office of Environment and Heritage, including Schedule 1 to the NSW Threatened Species Conservation Act 1995 (for ecology impact, heritage impact);
 - NSW Environmental Protection Authority (for noise impact);
 - NSW Department of Industry (for regional investment, socio-economic benefits including Voluntary Planning Agreement and Neighbour Benefit Sharing Scheme);
 - NSW Department of Industry, Crown Roads (for traffic impact, Crown Road crossing licensing);
 - NSW Land and Property Information (for Telecommunication impact);
 - NSW Roads and Maritime Services (for traffic impact);
 - NSW Office of Water, Sydney Catchment Authority/Southern Rivers Catchment Management Authority (for watercourse crossing licensing);

- NSW Rural Fire Service (for telecommunication impact, aviation impact);
- Ambulance Service of NSW (for telecommunication impact); and
- John Holland Rail on behalf of Transport for NSW (for traffic impact, unused rail corridor access licensing).
- Local government:
 - Upper Lachlan Shire Council (for planning provisions, aviation impact, traffic impact, telecommunication impact, socio-economic benefits (including Voluntary Planning Agreement and Neighbour Benefit Sharing Scheme); and
 - Goulburn Mulwaree Council (for traffic impact, aviation impact).
- Other agencies/organisations:
 - Aerial Agricultural Association of Australia (for aviation impact);
 - Fred Fahey Aerial Services (for aviation impact);
 - Geoscience Australia (for telecommunication impact);
 - mobile phone service providers (Optus, Telstra and Vodafone) (for telecommunication impact);
 - Radio Goulburn (for Telecommunication impact);
 - Royal Flying Doctor Service (for Aviation impact);
 - Vertical Telecoms (for Telecommunication impact);
 - Wireless Internet (NBN, Yless4U, ACE Internet Services) (for Telecommunication impact);
 - Yass Aerial Service (for Aviation impact);
- Associated residents where modified turbines are located on their land:
 - Host landowners (for proposed changes to the project, planning provisions and amendment process, socio-economic benefits including Voluntary Planning Agreement and Neighbour Benefit Sharing Scheme).
- Non-associated landowners/residents and the local community:
 - Neighbouring landowners, residents, local community groups and individuals (for proposed changes to the project, planning provisions and amendment process, socio-economic benefits including Voluntary Planning Agreement and Neighbour Benefit Sharing Scheme).

5.1 Summary of submissions

Eighty-two (82) submissions were received during exhibition:

- 9 submissions from government authorities:
 - Department of Primary Industries (DPI);
 - Department of Resources and Energy (DRE);
 - Environment Protection Authority (EPA);
 - Office of Environment and Heritage (OEH);
 - Roads and Maritime Service (RMS);
 - Water NSW;
 - Civil Aviation Safety Authority;
 - Upper Lachlan Shire Council (ULSC); and
 - Goulburn Mulwaree Council (GMC).
- 7 submissions from special interest groups (6 supporting and 1 objecting):
 - Industry Capability Network;

- Australian Wind Alliance;
 - Parkesbourne Mummel Landscape Guardians Inc.;
 - Greens NSW;
 - Ryde Gladesville Climate Change Action Group;
 - Community Energy for Goulburn; and
 - Ryde Hutners Hill Flora and Fauna Preservation Society.
- 66 submissions from individual members of the public (49 supporting and 17 objecting).

6 Response to Government Authorities

6.1 NSW Department of Primary Industries

The NSW Department of Primary Industries (DPI) provided a coordinated response from the relevant divisions of DPI including comments from the NSW Department of Industry – Lands, which now forms a distinct division of the broader Department of Industry and is no longer within DPI.

No particular issues were raised, but a number of recommendations were provided as outlined in the table below.

Table 2. NSW Department of Primary Industries	
Issue	Recommendation
Erosion & Sediment Control	Due to the increased disturbance area for footing construction the proponent should: - Consider additional erosion and sediment controls during the detailed design phase; and - Revise and detail water demands and confirm an adequate water source prior to approval of project.
	Response: An Erosion and Sediment Control Plan (ESCP) as part of the Construction Environmental Management Plan (CEMP) will be prepared by the proponent to manage the issues as raised by DPI.
Crown Public Roads	Should the Crown Roads be required for use in relation to the project the proponent should consult with the Department of Industry – Lands on legal requirements.
	Response: Noted, the proponent will consult with the Crown Lands division to identify appropriate mechanism for use of Crown Roads.
Conditions of Consent	The following conditions of consent should be included in any approval of the modification: - An Erosion and Sediment Control 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 <i>Guidelines for Controlled Activities on Waterfront Land (2012)</i>; - The proponent must obtain relevant licensing under the <i>Water Act 1912/Water Management Act 2000</i> before commencing any works which intercept or extract groundwater or surface water; and

Table 2. NSW Department of Primary Industries	
Issue	Recommendation
	If rock anchoring is selected for wind tower foundations, a groundwater assessment should be undertaken and endorsed prior to construction. The assessment should assess the risk of impact on existing licensed groundwater users and groundwater dependent ecosystems and provide suitable mitigation measures.
	Response: The above recommended conditions of consent have been reviewed by the proponent and are considered acceptable.

6.2 Department of Primary Industries—Division of Resources and Energy

The NSW Department of Primary Industries (DPI) Division of Resources and Energy provided a submission noting it has no resource sterilisation issues with the proposed changes to the project.

6.3 NSW Environmental Protection Authority

The NSW Environmental Protection Authority (EPA) advised that they previously reviewed and commented on the project in 2013. These comments and recommendations, other than those relating to noise and blasting issues, remain relevant.

SLR Consulting Australia Pty Ltd ('SLR') has prepared a response to submission letter to address the specific concerns as raised by EPA, which is attached and marked Appendix 2.

New recommendations related to noise and blasting issues are addressed in the following table.

Table 3. NSW Environmental Protection Authority	
Issue	Recommendation
	The Proponent check and confirm the exact location of each identified receiver and quantify any resulting change to modelled noise levels.
Noise levels	Response: The seven receiver locations which were identified by the EPA have been reviewed by SLR, and updated locations have been provided, within the letter provided at Appendix 2. The review by SLR has included the provision of a new receptor location in relation to Submission ID 219000. The new receptor is labeled as R135a. In relation to receptor R66/R67 (Little Vale), negotiations are

Table 3. NSW Environmental Protection Authority	
Issue	Recommendation
	still underway, attempting to reach a contractual noise agreement. In the event that a noise agreement is reached, then these receptors would be assessed similarly to others.
Viability of sector management	Department of Planning and Environment should confirm with the proponent that sector management, if needed, is a viable technical and financial option.
	Response: The proponent confirms that the selected turbine supplier has performed a noise optimisation analysis to achieve noise compliance at all non-participating dwellings around the project area.
	This noise optimisation analysis includes noise modes, sector and wind speed condition management, which is set and controlled by the manufacturer through various control algorithm.
	The manufacturer has provided a noise guarantee for the noise compliance in accordance with the noise optimisation process. The contractual noise guarantee demonstrates the technical and financial viability of the advanced noise mitigation measures that will be provided by the manufacturer's turbines.
Noise and blasting	A number of conditions have been recommended in regard to noise and blasting
	Response: The proponent has reviewed and agreed to the recommended conditions. However, additional comments and feedback is provided in relation to the following recommended conditions:
	<u>Condition L6.1 (b)</u>
	This condition should be reworded to be consistent with L6.2 to reference integer wind speed to be taken at hub height.
	<u>Condition L6.2</u>
	SLR acknowledges the numbers produced by EPA are consistent, with the exception of the final value in the table which should be read as 44dBA instead of 43dBA. SLR note that R124 has been identified as an agricultural shed and is therefore removed from the noise limit table.
	<u>Condition L6.4</u>
	Updated details for Table 6 are provided to satisfy this condition.
	<u>Condition L6.7</u>
	SLR notes that this condition requires the proponent to nominate a method for measuring and determining the wind

Table 3. NSW Environmental Protection Authority	
Issue	Recommendation
	speed for which the noise limits are based. However, SLR have provided that it is premature to provide the precise detail location and methodology. A precise methodology will be provided in the draft noise compliance monitoring plan which would be submitted prior to commissioning.

6.4 NSW Office of Environment and Heritage

The table below outlines the recommendations of the Office of Environment and Heritage (OEH) and offers a brief response. More detailed responses prepared by ERM are attached at Appendix 6.

Table 4. NSW Office of Environment and Heritage	
Issue	Recommendation
Aboriginal cultural heritage matters	
Further investigation	We require clarification on section 5.4 of the September 2016 addendum EIS which advises that further investigation of Aboriginal Cultural Heritage is not required.
	Response: ERM confirms that no further heritage assessment was considered necessary to support the Amended EIS. However, further archeological investigation, including additional surveys and test excavation is confirmed to be required prior to construction. The statement in Section 5.4 of the Amended EIS refers that the requirement for additional archaeological investigation can be ensured in the draft conditions of consent (refer to E25 of Condition of Consent
ERM recommendations	OEH continues to support the incorporation of the recommendations provided by ERM (2014) in the <i>Supplementary Aboriginal and Historical Cultural Heritage Assessment</i>.
	Response: The proponent has reviewed and agreed to ERM's recommendations.
Management measures	OEH reiterates its recommendation that a firm commitment be given to considering all available management measures if any areas of significant Aboriginal objects or archaeological deposits are located during archaeological excavations/salvage activities.
	Response: The proponent confirm that all available

Table 4. NSW Office of Environment and Heritage	
Issue	Recommendation
	management measures will be considered in the event that significant Aboriginal objects or archaeological deposits are found along the access tracks and cabling alignments.
Site cards	Aboriginal site cards must be submitted to the Aboriginal Heritage Information Management System (AHIMS) for sites WF1 to WF16 or WF1PAD, WF2PAD or WF3PAD as soon as possible and OEH notified of their submission.
	Response: The relevant 19 site cards were submitted to the Aboriginal Heritage Information Management System on 21 September 2017.
Biodiversity matters	
	OEH reiterates its comment from 5 December 2014 that if the Booroolong Frog is known to occur in First Creek, or is found to occur during further surveys of the site, a buffer should be implemented around the local population and no impacts should occur in this area. This is regardless of whether they are breeding.
C8 – Biodiversity	Response: No Booroolong Frogs were identified during the surveys undertaken. Nevertheless, a Construction Flora and Fauna Management Plan will include protocols to implement measures in the event of any previously unrecorded threatened species, including Booroolong Frog, are confirmed within the site.
	This will trigger the requirement for additional consultation with OEH and where appropriate, the implementation of buffers.
	The Flora and Fauna Management Plan required by condition C9 should be prepared in consultation with OEH and should consider the Natural England Technical Information Note TIN051 to demonstrate appropriate buffers, including but not limited to identifying distances from Turbine A12 to the closest hollow bearing trees. OEH would still prefer that turbine A12 be removed.
C9 – Biodiversity	Response: E25 of Condition of Consent requires the Construction Flora and Fauna Management Plan to be prepared in consultation with OEH.
	As identified in the Response to Submissions Report (24/03/2014), woodland surrounding turbine A12 is unlikely to provide important habitat for threatened fauna. In addition, the proposed works would not result in the removal of any hollow bearing trees. As such, the turbine is not intended for removal as part of this proposal.

Table 4. NSW Office of Environment and Heritage	
Issue	Recommendation
Condition C10 – Detailed Design and Micro-siting	OEH considers that the Applicant should develop a Micro-siting plan to complement this condition and that it should reference TIN051 to determine buffer distances.
	Response: In reference to the Secretary's Assessment Report and Condition B8, only a written agreement of the Secretary permits micro-siting of development components. The proponent will prepare a micro-siting plan as a component of a Construction Environmental Management Plan as required to satisfy Condition C11.
Condition C13 – Biodiversity Offset Package	OEH understands that the Applicant will be using the NSW Biodiversity Offsets Policy for Major Projects underpinned by the Framework for Biodiversity to meet this condition. OEH do not consider that any transitional arrangements apply.
	Response: The Biodiversity Conservation Act 2016 commenced on 25 August 2017. However, it should be noted that there are transitional provisions for major project development applications so they can be considered under the previous legislation where substantial environmental assessment was undertaken before 25 August 2017, as determined in writing by the Secretary.
Bird and Bat Monitoring and Management Program (BBAMP)	OEH reiterates request to change the condition to ensure the proponent engages OEH early in the development of BBAMP, allowing a minimum of two months for consultation period.
	Response: Condition C14 requires the preparation and submission of a BBAMP for approval by the Secretary. The proponent commits to having ongoing consultation with OEH throughout the preparation of the program, which will be undertaken over a full 12 month period. Further, the proponent has already undertaken a Bird and Bat utilisation survey in February/March 2017 that is currently in progress to provide comprehensive mapping of the area.
	OEH requests clarification that "Operation" means that the applicant commences monitoring from the time that the turbines start turning, regardless of whether they are producing electricity
	Response: ERM considers the commencement of monitoring from the time that the turbines "start turning, regardless of whether they are producing electricity" as not practical and unsafe. The early commencement of

Table 4. NSW Office of Environment and Heritage	
Issue	Recommendation
	monitoring program outside of normal operational levels will provide “spurious results and outcomes”. During the commissioning phase, there will still be construction activities occurring across the site which will raise safety issues.
E25(d) – Construction Fauna and Flora Management Plan	OEH notes that turbine A27 has been removed, however this condition still should still apply to turbine A32. Response: Noted by proponent.
F20 – Operational Environment Management Plan	OEH would like to see the following statement, “<i>all areas that have been mapped as native vegetation must be rehabilitated with all native species that are suitable to the location – in particular areas that have been mapped as over 50% native grass must be rehabilitated with native grass species</i>”, to be included in the CEMP and OEMP. Response: The Applicant commits to undertake the revegetation works in accordance with Condition F6, and notes that all areas mapped as native vegetation will be rehabilitated with native species that are suitable to the location – in particular, areas that have been mapped as over 50% native grass will be rehabilitated with native grass species.
Access track realignments	Figures should be updated to show the minor changes to the alignment of access track between turbine A13 and A16 to avoid the box gum woodland. Response: Refer to Figure 1 in Appendix 6 showing the proposed footprint and vegetation mapping.
Turbine A24 realignment	Figures should be updated to show the changes of location for turbine 24. Response: Refer to Figure 1 in Appendix 6 showing the proposed footprint and vegetation mapping.
Turbine A26 and A27 removal and track realignment	OEH supports the removal of turbine A26 and A27 and the realignment of the access track. However, OEH indicates figures should be updated to show the realignment to the access track. Response: Refer to Figure 1 in Appendix 6 showing the proposed footprint and vegetation mapping.

6.5 NSW Transport, Roads and Maritime Services

The Roads and Maritime Services (RMS) has no objection to the proposed project in principle, subject to the following recommendations.

Table 5. Response to Roads and Maritime Services	
Issue	Recommendation
Prior to issuing of construction certificate	Prior to the issuing of the construction certificate, the developer shall enter into a Works Authorisation Deed (WAD) with the RMS for all works on Crookwell Road.
Prior to traffic operating under the consent	Prior to transporting any oversized or over mass loads, the applicant shall obtain a permit for an oversized and over mass load from the RMS Special Permits Unit in Glen Innes.
	The Traffic Management Plan (TMP) shall be developed in consultation with RMS Southern Traffic Operations Unit, Upper Lachlan and Goulburn Mulwaree Councils' Local Traffic Committees (LTCs). The TMP (and associated Traffic Control Plans) shall be submitted to the Upper Lachlan Council LTC for final acceptance
	A copy of the accepted TMP shall be forwarded prior to any transportation occurring or works commencing on site for this development.
	Concept plans for all roadworks on classified roads identified as part of the accepted TMP shall be submitted to RMS for approval.
	Should the TMP identify further construction works required on any State classified roads, RMS approval will be required and may require the developer to enter in a Work Authorisation Deed (WAD) with RMS. If physical construction works on any State classified roads are identified, the details shall be forwarded to RMS for consideration.
	All roadworks, traffic control facilities and other works associated with this development including any modifications required to meet RMS standards, will be at no cost to RMS. All works shall be completed prior to occupation.
	All roadworks on classified roads shall be designed in accordance with Austroads Guide to Road Design – Part 4a: Unsignalised and Signalised Intersections and Austroads Guide to Road Design – Part 4: Intersections and crossing General and RMS supplements.
	All roadworks and traffic control facilities on classified roads must be undertaken by a pre-qualified contractor.

Table 5. Response to Roads and Maritime Services	
Issue	Recommendation
	RMS will be exercising its powers under Section 64 of the Roads Act, 1993 to become the roads authority for works on Crookwell Road. Given this, Section 138 consent under the Roads Act, 1993 shall be obtained from the RMS prior to construction.
	The developer shall apply for, and obtain a Road Occupancy Licence (ROL) from the RMS Traffic Operations Unit (TOU) prior to commencing roadworks on a State Road or any other works that impact a travel lane of a State Road or impact the operation of traffic signals on any road. The application will require a Traffic Management Plan (TMP) to be prepared by a person who is certified to prepare Traffic Control Plans.
	Response: GTA indicates that development conditions would require the preparation of a Construction Traffic Management Plan (CTMP) for the proposal. As such, a CTMP will be prepared, similar to the one that was developed and approved for Crookwell 2 Wind Farm on 12 May 2009, and in consultation with relevant road authorities. Details of axle loadings is dependent on specific vehicles and configurations that would be used to transport turbine components. This would be further addressed in the CTMP and RAV permit applications. Overall, the proponent acknowledges the conditions contained in RMS's correspondence.

6.6 Water NSW

Water NSW has no objection to the proposed project in principle, subject to the following recommendations.

Table 6. WaterNSW	
Issue	Recommendation
Schedule E, condition E25(g) and throughout conditions	Replace 'the Sydney Catchment Authority (SCA)' with WaterNSW. Response: Noted.
Schedule E, condition E25(g)	Construction Soil and Water Quality Management Plan be prepared in accordance with the following documents: - Managing Urban Stormwater: Soils and Construction Vol 1 4th edition (Landcom, 2004 the 'Blue Book Vol.1'); and - Managing Urban Stormwater: Soils and Construction Vol. 2A of Services and Vol.2C Unsealed Roads (DECC, 2007)

Table 6. WaterNSW	
Issue	Recommendation
	the 'Blue Book Vol. 2).
	Response: Noted, the proponent will prepare a Soil and Water Quality Management Plan.
Schedule F, condition F20	- Require Water NSW be consulted in the preparation of the plan; - Include the protection of existing erosion control works on the land.
	Response: Noted, the proponent will consult with Water NSW in the preparation of a Soil and Water Quality Management plan.

6.7 Upper Lachlan Shire Council

The following table summarises the issues raised by the Upper Lachlan Shire Council in its submission.

Table 7. Upper Lachlan Shire Council	
Issue	Summary and response
	Lack of information regarding heavy vehicles and what routes they will use.
	Response: It is anticipated heavy vehicles will transport material to the site from designated roads south of the project site. Crookwell 3 East site will be serviced by Woodhouselee Road section, from the intersection with Crookwell Road to access entrance, and Crookwell 3 South site will be serviced by Crookwell Road section.
Insufficient information concerning heavy vehicle transport routes	Council emphasises that the road network in the area is particularly vulnerable to use by heavy vehicles and that the roads would need to be upgraded before any work could commence.
	Response: GTA note the recent upgrades and certain sections of Woodhouselee Road provides suitable condition to accommodate development traffic for Crookwell 3 Wind Farm. Notwithstanding, GTA recommend the proponent to carry out regular inspections of the road used by the proposal to ensure any damage caused by heavy vehicles can be remediated as soon as possible. Any major reconstruction works of relevant sections of

Table 7. Upper Lachlan Shire Council	
Issue	Summary and response
	Woodhouselee Road, if required, will be undertaken once construction of Crookwell 2 and 3 Wind Farms are completed.
	Proposed road network improvement and mitigation works to accommodate Restricted Access Vehicles are also detailed in Table 5.1 in 'Crookwell 2 Wind Farm Blade Modification Transport Impact Assessment'.
	Only one sound access point is required to Crookwell 3 East off Woodhouselee Rd, while three accesses are shown on the drawings.
	Response: Three potential access points to the east from Woodhouselee Road were shown on the drawings. This is to provide flexibility for the proponent as commercial negotiations are ongoing between the application and the various landowners. The overall intent is to provide one vehicle access, however, it is yet to be confirmed.
Interconnecting cabling	Only one interconnecting electrical cable is required across Crookwell Rd (connecting Crookwell 3 south to the substation), while two are shown on the drawings.
	Response: The proponent is keeping two options for the interconnecting cabling corridors to provide flexibility for the commercial negotiations purposes, however only one of the corridors will be utilised.
Interference with telecommunications	Council raises concerns about the potential for the project to interfere with Crookwell's television reception.
	Response: DNV GL advises the proponent to consider the engagement of a dedicated radiocommunications engineer to assess the potential impact of the proposal onto the Crookwell repeater. If assessment concludes the proposal is likely to impact on the Crookwell repeater, then remedial action is recommended to ensure the continual operation of the repeater. Therefore, DNV GL advises the proponent to prepare remediation plan if the assessed level of impact is deemed significant, and implement the remediation plan where practicable (see Appendix 5 for further details).

6.8 Goulburn Mulwaree Council

Table 8. Upper Lachlan Shire Council	
Issue	Response
Insufficient information concerning heavy vehicle transport routes	GMC brings to attention the insufficient details around how impacts of the construction traffic on the local road network will be addressed. Council recommends that the road upgrade works should be undertaken prior to construction commencing and again once the construction phase is completed.
	Response: Development traffic will go through state roads in Goulburn (i.e. Sydney Road, Lagoon Street, Goldsmith Street, Fitzroy Street and Crookwell Road). The proponent will also adopt Council's preferred route for over dimensional vehicles, as nominated in Crookwell 3 Wind Farm public exhibition in 2013, and also currently approved for Crookwell 2 Wind Farm.
	GTA recommends regular inspection and monitoring of Council roads used (if any) and undertake minor remediation works in response to damage caused by heavy vehicle traffic relating to the development.

6.9 Civil Aviation Safety Authority

Table 9. CASA	
Issue	Response
Lighting at night	CASA recommends that the wind farm is lit with steady red medium intensity lighting at night as per Section 9.4 of the CASA Manual of Standards Part 139.
	CASA recommends that the proponent makes the notifications described in the NASF Guideline D.
	Response: Noted

7 Response to Special Interest Groups

A total of seven submissions from special interest groups were received during the public exhibition period, seven of which were in support of the proposed project.

7.1 Parksbourne/Mummel Landscape Guardians Inc

The Parksbourne/Mummel Landscape Guardians Inc (PMLG) was the sole objecting special interest group. The concerns raised by PMLG are addressed in the table below.

Table 10. PMLG Issues	
Issue	Response
Visual impact	The issues raised by PMLG in relation to visual impacts are similar in nature to those raised in public submissions. Refer to section 8 of this report for a response.
Noise impact	The issue raised by PMLG in relation to noise impacts are similar in nature to those raised in public submissions. Refer to section 8 of this report for a response.
Micro-siting	The spacing between turbines should be revised as the rotor diameters are being increased. PMLG highlights that turbines less than 1,040m apart should be removed due to excessive noise and visual impact on neighbours. Response: The proposed layout design has been prepared in accordance to the relevant guidelines as contained in the SEARs. Notwithstanding, Conditions F7-F21 are considered efficient to ensure adequate acoustic amenity is provided by the proposal. Amended noise impact assessment also found that noise compliance can be achieved using a mitigated layout in which a number of turbines were placed into noise management mode. Further refinement of the proposed layout will be undertaken during detailed design stage, which a revised Noise Assessment will be prepared in consultation with EPA and submitted to the Secretary, prior to construction.

7.2 Other groups

The following six groups expressed support for the project:

- Industry Capability Network;
- Australian Wind Alliance;
- Greens NSW;
- Ryde Gladesville Climate Change Action Group;

- Community Energy for Goulburn; and
- Ryde Hunters Hill Flora and Fauna Preservation Society.

The reasons for support include.

- Opportunities for local businesses, contractors, and suppliers
- Positive local economic and social impacts
- Clean, renewable energy project
- Carbon emission reduction in NSW
- Effective and suitable location for the proposed use
- Timely upgrade to turbine models making use of technological advances

8 Response to Public Submissions

8.1 Summary of public submissions

A total of 66 submissions were received during the public exhibition period, 49 of which were in support of the project. A summary of topics raised in the submissions is provided at Figure 5.

We note that some submissions were lodged multiple times and provided more than one submission number. Where multiple submissions have been received from an individual, we have counted the multiple submissions as a single submission.

Submission No.	Application and Assessment	Aerial agriculture	Biodiversity, flora and fauna	Economic and social	Firefighting	Health impacts	Land Value	Micro-siting	Operational noise	Renewable energy	Telecommunications	Traffic Impacts	Visual	Zoning
172180						✓								
172044				✓						✓				
171429				✓						✓				
171228	X			X	X								X	
171230														
172148	X												X	
171638				✓						✓				
171234				✓						✓				
171821				✓						✓				
171835				✓						✓				
171543				✓						✓				
172172	X								X					
N/A				✓						✓				
171422				✓						✓				

Submission No.	Application and Assessment	Aerial agriculture	Biodiversity, flora and fauna	Economic and social	Firefighting	Health impacts	Land Value	Micro-siting	Operational noise	Renewable energy	Telecommunications	Traffic Impacts	Visual	Zoning
172190				✓						✓				
171433				✓						✓				
172162				✓						✓				
N/A										✓				
N/A										✓				
172048				✓						✓				
171823				✓						✓				
N/A		X			X		X		X		X		X	
171232				✓										
171749									X					
169791				X									X	
171801				✓										
172016				✓										
171424										✓				
171444				✓										
172016				✓						✓				
170498					X	X		X	X		X		X	
52708, 171791													X	X
171815										✓				
172160				✓						✓				
171817									X					

Submission No.	Application and Assessment	Aerial agriculture	Biodiversity, flora and fauna	Economic and social	Firefighting	Health impacts	Land Value	Micro-siting	Operational noise	Renewable energy	Telecommunications	Traffic Impacts	Visual	Zoning
173061				✓						✓				
171829													X	
171588										✓				
171837			X		X		X		X		X	X	X	X
173076	X		X	X									X	X
171833	X													
171797				✓						✓				
172178				✓						✓				
171431				✓						✓				
171962				✓						✓				
172154				✓						✓				
171753				✓						✓				
171779				✓						✓				
173084		X	X	X	X			X					X	
172156 172158										✓				
171757				✓						✓				
172106				✓						✓				
171661 171665 171659 171736	X			X		X			X	X			X	
172130				✓						✓				
172100				✓						✓				

Submission No.	Application and Assessment	Aerial agriculture	Biodiversity, flora and fauna	Economic and social	Firefighting	Health impacts	Land Value	Micro-siting	Operational noise	Renewable energy	Telecommunications	Traffic Impacts	Visual	Zoning
172036	X			X		X							X	X
171885				✓						✓				
171789				✓						✓				
171795				✓						✓				
171738				✓						✓				
171414										✓				
173078				✓						✓				
171930				✓						✓				
171427				✓										
172176				✓						✓				
219000					X		X		X				X	

Figure 5 – Summary of submissions received

Source: Mecone

8.2 Support Public Submissions

The 49 supporting public submissions largely emphasised the positive economic and renewable energy impacts of the Crookwell 3 Wind Farm project. Key points from the submissions are summarised as follows:

- Wind is preferable to coal as an energy source from a climate change and environmental impact perspective;
- The proposed amendments take advantage of the latest technology, which will reduce the environmental footprint of the project and improve efficiency; and
- The wind farm will provide economic benefit to community in the form energy infrastructure investment, income to host properties, contribution to the Upper Lachlan Shire's Community Enhancement Fund, contribution to the Neighbour Benefit Sharing Scheme, and jobs associated with construction and ongoing use.

8.3 Assessment and approvals process

The planning context including status, legislation and framework was addressed in section 4 of the Addendum EIS.

The table below provides a response to the key assessment and approval process issues raised by submissions 171228, 171230, 172148, 172172, 173076, 171833, 171659 and 172036.

Table 11. Approval and Assessment Process	
Issue	Response
Development application	The DP&E accepted the application and accompanying documentation. The application will be assessed in accordance with the requirements of the <i>Environmental Planning and Assessment Act 1979</i>.
State significance status	The proposal was declared a major project under Part 3A of the Environmental Planning and Assessment Act 1979 on 18 February 2010, as it is development for the purpose of electricity generation that has a Capital Investment Value of more than \$30 million. Part 3A of the Environmental Planning and Assessment Act 1979 was repealed in 2011 and replaced by the State significant development assessment system. As the project had not yet been determined at the time Part 3A was repealed, the then Minister for Planning and Infrastructure formally transitioned the project via an Order under clause 6 of Schedule 6A of the <i>Environmental Planning and Assessment Act 1979</i> to the current State significant development assessment system on 21 March 2014. The previous actions taken under the Part 3A process were accredited under the State significant development process. The proposal has been assessed as a State significant development application.
Approval under Roads Act	Section 138 of the Roads Act prohibits a number of activities, such as conducting work in, on or over a public road, unless consent has been obtained from the appropriate roads authority. The project would require upgrade works to various public roads as outlined in the EA/ EIS to enable access to wind farm access roads for construction vehicles. Approvals will be required under section 138 of the Roads Act from the appropriate roads authorities for the proposed upgrade works on public roads, including Crown roads.
Inadequate assessment	The EIS has been prepared in accordance with the current standards and guidelines applicable to wind farms.

Table 11. Approval and Assessment Process

Issue	Response
Error in Amended EIS	The proponent acknowledges the error made on page 3 of the Amended EIS referring to the number of turbines initially proposed. This will be amended accordingly.
Inadequate Justification for modification	This proposal is prepared as an amendment to the original application. The proposed changes are to allow the original proposal to adopt the latest advances in turbine technology to increase the overall energy yield of the wind farm, while, also reducing its environmental impacts.
Community Consultative Committee (CCC)	The CCC was established as part of the requirement of the Draft NSW Planning Guidelines Wind farms (Dec 2011), the combined Crookwell 2 and 3 Wind farm CCC has been operating since 2012 and the committee meets regularly in Crookwell.

8.4 Land use zoning

Planning policy and local controls has been addressed in section 4 of the Addendum to the EA.

The table below provides a response to the key land use zoning issues raised by submissions 52708, 171791, 171837, 173076 and 172036.

Table 12. Land Use Zoning Issues	
Issue	Response
Consistency with land use zone	At the time of lodgement, the site was subject to the provisions of Crookwell LEP 1994 and Mulwaree LEP 1995. The site was previously zoned RU2 Rural Landscape and identified within a prescribed rural zone, which continued to apply under the saving provisions set out in clause 1.8A of the Upper Lachlan LEP 2010. The proposal is classified as a 'energy generating facility', under clause 34(1) of the <i>State Environmental Planning Policy (Infrastructure) 2007</i>, electricity generating works may be carried out with consent on any land in prescribed rural, industrial or special use zone. Accordingly, the proposal was permitted with consent under the ISEPP.

8.5 Visual impacts

The visual impact matters were addressed in section 5 of the Addendum EIS and supported by a specialist report, which was attached and marked Landscape and Visual Impact Assessment. The assessment concluded that, "the visual effects associated with the proposed modifications is summarised as low to negligible".

The table below provides a response to the key visual impact issues raised by submissions 171228, 171230, 171829, 171837, 173076, 173084, 171661, 172036, 169791, 170498, 52708, 171791 and 1 confidential email with no submission ID.

Table 13. Visual Impact Issues	
Issue	Response
Inadequate assessment	The Visual Impact Assessment has been prepared in accordance with the current best practice and guidelines applicable to wind farms.
Photomontage	The photomontages have been prepared in accordance with industry standards using accurate scale and view representation. The photomontage viewpoint locations used to support the application were identical to those used in the EAR and PPR for the project, to ensure consistency and comparability.

Table 13. Visual Impact Issues

Issue	Response
	It is acknowledged that these types of images are never 100% accurate as they are flat images, which do not allow for the viewer to perceive depth or distance.
Visual impact	The Visual Impact Assessment has been prepared in accordance with the current best practice and guidelines applicable to wind farms. The Visual Impact Assessment included a detailed assessment in tabular form of the visual impacts from residential dwellings up to 5km from the Crookwell 3 Wind Farm (refer to Appendix 1 of Addendum EIS). The photomontages have been prepared with regard to general guidelines set out in the Scottish Natural Heritage (2006) Visual representation of wind farms and the British Landscape Institute Advice Note 01/11 (March 2011) Photography and photomontage in landscape and visual impact assessment. The assessment concluded that the overall effects associated with the amended Crookwell 3 Wind Farm were assessed to be 'Negligible to Low'. The scale of change in the wind turbines structures, whilst noticeable from proximate residential view locations, would not result in a degree of change significantly above the visibility of the original turbines. In addition, the Department's assessment, which was supported by an independent peer review, concluded that the visual impacts associated with the proposal, as well as the associated cumulative impacts, are acceptable subject to the implementation of additional mitigation and management measures. Therefore, the draft conditions of approval recommended in the Secretary's Assessment Report are considered sufficient for ensuring that any visual impacts are properly mitigated.
Shadow flicker	The proponent acknowledges that it is predicated two dwellings (a host landowner and non-participating dwelling) will experience theoretical shadow flicker within 50m of the dwellings location. The effects of shadow flicker can be reduced through a number of mitigation measures, such as: • Installation of screening structures or planting of trees to block shadows cast by the turbines; or • Use of turbine control strategies, which shut down turbines when shadow flicker is likely to occur. Furthermore, an independent review of the expected annual shadow flicker duration and cumulative impact from nearby wind farms found that shadow flicker from the Crookwell 1

Table 13. Visual Impact Issues	
Issue	Response
	and Crookwell 2 wind turbines is not expected to affect the dwellings that receive shadow flicker from the Crookwell 3 wind turbines. It is considered that the draft conditions of approval recommended in the Secretary's Assessment Report are sufficient for ensuring that shadow flicker impacts are properly mitigated.
Cumulative impact	A detailed assessment of cumulative visual effects has been undertaken for the proposed project, refer to Visual Impact Assessment Supplementary Report, provided at Appendix 1. This assessment concluded that there is unlikely to be an increase in the level of cumulative visual effect.
Assessment of House 104 – 'Highland Park'	The objector indicates the distance used in the Visual Impact Assessment (VIA) is incorrect. It should be noted that the assessment refers to the approximate distance of the residence from the indicative location of the proposed wind turbine and provides the best estimate, which is expressed by rounding to the nearest decimal place. The Amended VIA reviews the visual impacts that could potentially result from the proposed increase to the rotor diameter to a maximum 130m length. The Amended VIA highlights that the proposed changes and elements are not out of character than what was originally proposed. It is further considered that this proposal would not result in any changes to the visual impact rating of 'House 104' as considered in the original VIA. The draft conditions of approval as recommended in the Secretary's Assessment (February 2015) are also considered sufficient to ensure any visual impacts are properly mitigated.
Distraction for motorists	Views to the wind turbines located to the west of Pejar Dam would be adequately screened through landform and tree planting (see Appendix 1 for further details).

8.6 Operational noise

Operational noise issues were addressed in section 5 of the Addendum EIS and supported by a specialist report, which was attached and titled Noise Assessment.

The table below provides a response to the key operational noise issues raised by submissions 172172, 171749, 170498, 171817, 171837, 171665 and one confidential email with no submission ID.

Table 14. Operational Noise Issues	
Issue	Response

Table 14. Operational Noise Issues

Issue	Response
Inaccurate noise modeling	The SLR Noise Impact Assessment, submitted with the Addendum EIS, dated 16 September 2016, provided that the noise criteria adopted were based on the South Australian EPA Noise Guidelines for Wind Farms, 2003, which are still the current assessment guideline adopted in NSW. Noise modeling undertaken for the assessment utilised the ISO9613 modelling approach. In general, noise modeling is based on industry standard and has been validated by post-construction noise measurements on operating wind farms, both internationally and in Australia.
Increase in turbine height impact on noise	There are a number of factors, which play a part in noise impacts, such as distance from the turbine, topography, vegetation, wind conditions and height. While there is noise associated with the operation of turbines, the mitigated layout demonstrates compliance under the conservative and detailed predicative analyses. The proposal has the ability through the mitigated layout to comply with relevant guidelines. Additionally, the turbines will be placed into Noise Management Mode. The draft conditions of approval in the Secretary's Assessment Report are considered sufficient for ensuring adequate acoustic amenity.
Sleep disturbances	In February 2015, the National Health and Medical Research Council (NHMRC) released a statement in relation to evidence on wind farm noise to cause sleep disturbance and found: <i>"There is less consistent, poor quality direct evidence of an association between sleep disturbance and wind farm noise. However, sleep disturbance was not objectively measured in the studies and a range of other factors are possible explanations for the association observed. While chronic sleep disturbance is known to affect health, the parallel evidence suggests that wind farm noise is unlikely to disturb sleep at distances of more than 1,500 m from wind farms. There is no direct evidence that considered the possible effects on health of infrasound or low frequency noise from wind farms.</i> <i>Exposure to infrasound and low-frequency noise in a laboratory setting has few, if any, effects on body functions. However, this exposure did not replicate all of the characteristics of wind farm noise as it has generally been at much higher levels and of short duration.</i> <i>Although individuals may perceive aspects of wind farm noise at greater distances, it is unlikely that it will be disturbing at distances of more than 1,500 m. Noise from</i>

Table 14. Operational Noise Issues

Issue	Response
	<i>wind farms, including its content of low-frequency noise and infrasound, is similar to noise from many other natural and human-made sources."</i> We note that the objector raising concerns about the proposed noise impacts relates to a dwelling located 1.7km from the nearest proposed turbine.

8.7 Micro-siting

The table below provides a response to the key micro-siting issues raised by submissions 170498 and 173084.

Table 15. PMLG Issues

Issue	Response
Micro-siting Spacing of turbines	The final turbine locations are to be determined at the detailed design stage (post consent). In reference to the Secretary's Assessment Report and Condition B8, only a written agreement of the Secretary permits micro-siting of development components. The proponent will prepare a micro-siting plan as a component of a Construction Environmental Management Plan as required to satisfy Condition C11. Micro-siting is required to demonstrate how those locations will not give rise to increased landscape, ecological, cultural heritage, visual amenity, shadow flicker, noise, fire risk or aviation impacts.

8.8 Telecommunications

Telecommunications impacts were addressed in section 5 of the Addendum EIS and supported by a specialist report, which was attached and titled Telecommunications Report. The results of the assessment concluded that, should there be interference mitigation methods can be employed.

The table below provides a response to the key telecommunication issues raised by submissions 171837, 170498 and one confidential email with no submission ID.

Table 16. Telecommunications Issues

Issue	Response
TV reception	The proponent agrees that there may be some impacts associated with the changes made to the project, notably

Table 16. Telecommunications Issues	
Issue	Response
	upon television broadcasting. These impacts can be effectively managed through various measures and would be implemented with additional consultation with stakeholders. It is considered that the draft conditions of approval recommended in the Secretary's Assessment Report are sufficient for ensuring that any electromagnetic interference impacts are properly mitigated.
Radio reception	The proponent agrees that there may be some impacts associated with the change made to the project, notably upon FM signals. These impacts can be effectively managed through various measures and would be implemented with additional consultation with stakeholders. It is considered that the draft conditions of approval recommended in the Secretary's Assessment Report are sufficient for ensuring that any electromagnetic interference impacts are properly mitigated.
Mobile reception	A review of the mobile coverage for the area has found that there is generally fair to good network coverage in most areas around the project, and mobile signals are unlikely to be affected. If interference is encountered, it is considered that the draft conditions of approval recommended in the Secretary's Assessment Report are sufficient for ensuring that any electromagnetic interference impacts are properly mitigated.

8.9 Aviation impacts

Aviation impacts were addressed in section 5 of the Addendum to the EA and supported by a specialist report Appendix 4 – Aviation Report. The results of the changes to the proposal found that the increase in rotor diameter, tip height and the revised turbine layout will not give rise to any increased aviation impacts compared to the project layout assessed in the original report.

The table below provides a response to the key aviation issues raised by submissions 171837, 171228, 171230, 173084, 170498 and one confidential email with no submission ID.

Table 17. Aviation Issues	
Issue	Response
Impact on aerial agricultural	It is considered that the conditions of approval recommended in the Secretary's Assessment Report are sufficient for ensuring that any impacts on aerial agricultural

Table 17. Aviation Issues	
Issue	Response
practices	practices are mitigated.
Impact on fire fighting	It is considered that the conditions of approval recommended in the Secretary's Assessment Report are sufficient for ensuring that any impacts to bush fire fighting are avoided.

8.10 Traffic and transport

Traffic and transport issues were addressed in section 5 of the Addendum to the EA and supported by a traffic specialist response to submission letter (refer to Appendix 3).

The table below provides a response to the key traffic and transport issues raised by submissions 170498 and 171837.

Table 18. Traffic and Transport Issues	
Issue	Response
Traffic Impacts	The technical and commercial provisions for the access road options to the site will be negotiated with the relevant stakeholders associated with each option and one option selected to be the access entrance to the Crookwell 3 East site. The updated Traffic Impact Assessment concludes, that the traffic impacts for the proposed project remain consistent with the impacts assessed in the earlier EA Report. However, given the reduced number of turbines, the construction period and overall traffic generation is expected to be lower. Based on an inspection of the nominated restricted access vehicle transport route and vehicle swept path assessment, GTA has determined that the transportation of the 64 metre blades from Port Kembla to the Crookwell 3 Wind Farm via the nominated transport route is manageable with the temporary removal or relocation of various roadside elements at key intersections. A number of temporary road network improvements are proposed to be undertaken prior to transport of the blades to the site, at cost to the proponent. Once the final specifications for the restricted access vehicles to be used to transport the blades are known, a detailed traffic management plan will be prepared in consultation with Roads and Maritime Services and affected Councils. The plan will also be submitted to the Department of Planning and Environment for approval prior to delivery of the turbine equipment to site. Overall, the amendments to the proposed project involve no

Table 18. Traffic and Transport Issues

Issue	Response
	additional impacts that cannot be properly mitigated under the draft conditions of approval recommended in the Secretary's Assessment Report.

8.11 Economic and social issues

The original EA Report provided a detailed analysis of the social and economic impacts of the wind farm development (section 8). The changes to the project do not alter the findings of the original analysis.

The table below provides a response to the key economic and social issues raised by submissions 171228, 171230, 169791, 173076, 173084, 171736 and 172036.

Table 19. Economic and Social Impact

Issue	Response
Socio-economic impact	The proposed modifications are not anticipated to have any adverse social or economic impacts. The project will have a positive net present value, as such, would provide a positive contribution to the economy and local community. Additionally, the project will contribute in the following ways: • Provide capital investment, direct and flow-on economic benefits through permanent and temporary employment; • Help maintain the existing agricultural activities; and • Support national and international efforts to reduce the potential impacts of global warming and climate change. All of these benefits would be maintained or improved upon through the proposed modifications, which features better, more efficient technology and fewer turbines.
Generation of long term jobs for the community	The proposed project has the potential to directly create new local employment opportunities including 40 full time jobs during construction and 6 permanent jobs during the operational phase. These full time jobs include management staff during normal working hours and on-call services out-of-hours. In addition, up to 10 additional contractors could be working on the site once every 10 to 15 years as part of scheduled major site overhauls. These jobs can potentially be resourced locally if the skills exist within the community.
Real cost to the	It is anticipated that the total capital investment for proposed project is approximately \$110 – \$120 million. This investment

Table 19. Economic and Social Impact

Issue	Response
community	would be injected into the local region through construction and operational wages, as well as the purchase of local materials and services were available. Additionally, the wind farm would also fund community enhancement projects. Crookwell Development Pty Ltd will provide an annual contribution to the Upper Lachlan Shire Council's Community Enhancement Fund of approximately \$2,500 per operating turbine to be spent directly on local projects.
Significant increase in electricity bills	On 20 September 2017, Rod Sims, ACCC Chairman, noted at the National Press Club that the main driver of electricity price increases is related to network prices (41%) with green scheme costs being the lowest contributor (16%). Wind energy was considered to be the most commercially ready and cost-effective technology in increasing new renewable energy generation. It is identified in the <i>NSW Renewable Energy Action Plan (2013)</i> that deployment of low-cost renewable energy options can assist in mitigating future increases in electricity bills. Notwithstanding, this assessment is not to assess Government's initiatives and policies. It should be noted that this assessment is to ensure that the proposal is consistent with current planning policies and identify the environmental impacts of the proposed changes.

8.12 Renewable Energy

The table below provides a response to the key renewable energy issues raised by submission 171736, 169791,

Table 20. Renewable Energy Issues

Issue	Response
Wind energy is not effective	In accordance to 'The wind energy fact sheet', as developed by the former NSW Department of Environment, Climate Change and Water, identifies that wind turbines are more efficient at generating electricity as opposed to NSW coal plants. The <i>NSW Renewable Energy Action Plan (2013)</i> also regards wind energy to be the most economical form of large-scale renewable energy and is identified to represent the bulk of NSW renewable energy generation up to 2020.
Energy security and blackouts	There is no clear evidence to suggest that wind energy poses a direct threat to the electricity network or increases the

Table 20. Renewable Energy Issues

Issue	Response
	likelihood of future blackouts. NSW is transitioning from conventional carbon intensive technology to clean renewable energy, which is facilitating changes to its energy generation mix. It is identified that the “reduction in the synchronous generation that is supplied by coal will have a significant impact on the security and reliability of the power system....” (Initial report from the Energy Security Taskforce – May 2017, pp.28). As coal generation continues to withdraw, renewable energy and other energy sources are taking its place. Further investments into renewable energy would be needed to address the base capacity of non-renewable energy that will be withdrawn in the future. Overall, the adoption of renewable energy is acknowledged as a primary method to address energy security, given the growing demand for energy coinciding with depleting supply of non-renewable energy. Therefore, it is considered highly unlikely that this proposal will negatively impact the electricity network. Rather, this proposal diversifies and further contributes to energy supply which assists in improving energy security in NSW.

8.13 Biodiversity, flora and fauna

The table below provides a response to the key biodiversity, flora and fauna issues raised by submissions 171837,173076 and 173084.

Table 21. Biodiversity, flora and fauna Issues

Issue	Response
Increased bird kill	The Ecological Assessment supporting the EA, prepared by Anderson Environmental Consultants Pty Ltd, regards the potential for bird and bat losses related to wind turbine impact as low. In addition, the assessment found that there are no bird or bat migratory species on site and concludes that “<i>the potential impacts would not interfere with any potential migratory corridors or areas</i>”. Further to note, the addendum Ecology Assessment concludes that the proposed changes to turbine envelope is not expected to result in any significant increase to the risk of bird and bat collision nor have a significant impact on any bird or bat species listed under the EPBC Act. The proposed reduction of the overall number of turbines is also considered to reduce the risk of bird and bat collision in the area.

8.14 Health impacts

The original EA Report provided a detailed analysis of current literature and scientific data relating to the health impacts associated with the operation of wind turbines (section 11). As a result of this review, it is considered that the proposed project will not have an adverse health impact on the local community and neighbouring residents.

The table below provides a response to the key biodiversity, flora and fauna issues raised by submissions 170498, 171665 and 172036.

Table 22. Health Impacts	
Issue	Response
Human health impacts	In February 2015, the National Health and Medical Research Council (NHMRC) released a statement in relation to evidence on wind farms and human health. NHMRC concluded, <i>'that after careful consideration and deliberation of the body of evidence, ... that there is currently no consistent evidence that wind farms cause adverse health effects in humans'</i>.

8.15 Property values

The table below provides a response to the key property values issues raised by submissions 171837 and one confidential email without submission ID.

Table 23. Property Values	
Issue	Response
Property value impacts	A 'Review of the Impact of Wind Farms on Property Values (2016)', commissioned by NSW Department of Environment and Heritage, concluded that the impact of wind farms on property values has no direct impact on the loss of productivity of the land, as a result the operation of a nearby wind farm is unlikely to negatively impact on surrounding property values. The review also compared the varying circumstance of wind farms in NSW to those in other countries, identifying the following: • appropriately located wind farms within rural areas, removed from higher density residential areas, are unlikely to have a measurable negative impact on surrounding land values; and that • there is limited available sales data to make a conclusive finding relating to value impacts on residential or lifestyle properties located close to wind farm turbines, noting that wind farms in NSW have been

Table 23. Property Values

Issue	Response
	constructed in predominantly rural areas.

9 Summary of Responses of Specialists Reports

9.1 Visual Impacts

Green Bean Design has prepared a comprehensive response to submissions letter to address the issues raised by objectors (refer to Appendix 1). These issues have also been discussed in Table 12 above.

In summary, a majority of the objector's concerns related to the issues as listed below:

- unacceptable visual impacts of proposed increases to rotor sizes;
- inadequate visual impact assessment and methodology;
- Visual distraction to drivers passing Pejar Dam on Crookwell Goulburn Road;

The letter includes updates to Figure 1 of the Visual Impact Assessment subsequent to a site inspection with NSW DP&E's Independent Expert to better reflect the existing surroundings and amended proposal.

9.2 Operational Noise

SLR has reviewed the acoustic-related comments provided by the Environmental Protection Authority and has provided a response letter (refer to Appendix 2). This is also discussed in Table 3 and Table 13 above. The letter has provided attachments to outline minor model updates to the sensitive receptors and CW2 WTG noted by the Environmental Protection Authority as being inconsistent or overlooked previously.

Key points discussed in the letter include:

- Evidence to check and confirm details;
- Sensitive receptor update;
- Re-positioning of CW2 WTG's;
- Noise model scenarios; and
- Viability of sector management

The letter includes recommended subsequent condition rewording and updates to detail. Refer to Appendix 2 for further details.

9.3 Traffic Impacts

GTA Consultants has reviewed the traffic-related comments from Upper Lachlan Shire Council, Goulburn Mulwaree Council and RMS have prepared a response to submissions letter (refer to Appendix 3).

Key concerns raised by Upper Lachlan Shire Council and Goulburn Mulwaree Council, and RMS are listed below:

- Interference with telecommunications;
- Insufficient information concerning heavy vehicle transport routes;
- Insufficient information concerning site access;
- Requirements prior to traffic operating under the consent; and
- Requirements prior to issuing of a construction certificate

An initial response to these concerns has been provided in Table 7, Table 8 and Table 17 above. Refer to Appendix 3 for further details on the responses by GTA.

9.4 Shadow Flicker

DNV GL was commissioned by the proponent to assess the potential of the proposal to cause shadow flicker impacts at a new dwelling that is currently under construction. A response to submission letter has also been prepared by DNV GL to specifically respond to the concerns raised in Submission No.219000, regarding the potential shadow flicker impacts on the objector's dwelling ('dwelling 135a') from the development and operation of both Crookwell 3 Wind Farm and the adjacent Crookwell 2 Wind Farm.

In the letter, it is understood that the impact of shadow flicker is usually significant at the distance of around 10 rotor diameters from a turbine. Given the rotor diameter of 130m of proposed turbines in Crookwell 3 Wind Farm, the maximum distance at which shadow flicker is likely to cause annoyance is assumed to be 1,300m.

In the assessment, 'dwelling 135a' is located 1.7km from the nearest turbine of the proposed Wind Farm and it is considered that the potential to cause annoyance to this dwelling would not constitute as a problem (see Figure 1 of Appendix 4). Refer to Table 12 above for further discussion.

9.5 Electromagnetic Interference (EMI)

A response to submission letter has been prepared by DNV GL (refer to Appendix 5) to address concerns made by the Upper Lachlan Shire Council regarding the potential impacts of the wind farm on television reception in the Crookwell area. In particular, the concerns relate to the recently installed television signal repeater for commercial network broadcasts at Wades Hill in Crookwell. This is addressed in Table 15 above.

DNV GL advises the Crookwell Development Pty Ltd to consider the engagement of a dedicated radio communications engineer to assess the potential impact of the proposal onto the Crookwell repeater. If assessment concludes the proposal is highly likely to impact on the Crookwell repeater, then remedial action is recommended to ensure the continual operation of the repeater. DNV GL outlines that if interference to television reception is experienced after the wind farm is commissioned, a range of mitigation options are available including realigning, retuning, or relocating the television antenna at the affected residence, installation of a more directional and higher gain antenna, and so on.

Therefore, DNV GL advises the proponent to prepare remediation plan if the assessed level of impact is deemed significant and implement the remediation plan where practicable.

9.6 Heritage and Biodiversity

A response to submissions letter has been prepared by ERM (refer to Appendix 6) to provide a direct response to the ecology-related comments and requests for information from the Office of Environment and Heritage (OEH). This is discussed in Table 4 and Table 20 above.

In summary, the letter provides comprehensive responses to OEH's comments and requests and identifies no need for additional information or any amendments to the project or consent conditions.

Heritage

The key heritage issues raised by OEH are listed below:

- Clarification on further archaeological investigation prior to construction;
- Ensuring commitment be given to considering all management measures if significant Aboriginal objects or archaeological deposits are located during excavation/salvage activities;
- Confirmation on the submission of Aboriginal site cards.

Biodiversity

The key biodiversity issues raised by OEH are listed below:

- Implementation of buffer around Booroolong Frog;
- Flora and Fauna Management is required to be prepared in consultation with OEH;
- Biodiversity Offset Package;
- Removal of Turbine A12;
- Detailed design and Micro-siting;
- Biodiversity Offset Package – Transitional arrangements does not apply;
- Bird and Bat Monitoring and Management Program (BBAMP);
- Clarification of monitoring during 'Operation'; and
- Access track realignments and mapping

10 Conclusion

This Report has been prepared in response to the submissions received following the public exhibition of the Addendum EIS for the proposed changes to the application for Crookwell 3 Wind Farm project. The Addendum EIS was publicly exhibited from 11 October to 14 November 2016.

A total of 82 submissions were received, including 66 submissions from individuals (49 of which, over 74%, supported the proposal), 7 submissions from groups/organisations, and 9 submissions from government agencies. This Report provides a direct response to the issues raised in the submissions and is supported by a range of specialist reports as outlined above.

Proposed changes to the Crookwell 3 Wind Farm will, if approved, further reduce the environmental impact of the project (including by reducing the number of approved wind turbines from 29 to a maximum of 23) and provide for the more efficient generation of clean renewable energy by enabling the project to use one of the newest and most efficient wind turbine technologies available in the market.

The project will bring an array of environmental and economic benefits at the local, regional, state and federal level including:

- The removal of 6 approved turbines and associated access tracks and crane hardstand platforms, along with optimisation of the substation configuration and realignment of access tracks and cabling would reduce overall development and environmental impact footprint.
- Generating around 40 direct jobs during construction, and around 6 ongoing operational jobs. In addition, up to 10 additional contractors would be employed on the site once every 10 to 15 years as part of scheduled overhaul works.
- The investment of \$110-\$120 million into the economy, which includes a large portion involved in the earthworks, electrical works, grid connection, transport and installation of wind turbines and associated equipment.
- Increase of electricity production from the amended project to generate up to 275 gigawatt hours per year (GWh/y) across 23 turbines in comparison to only 208GWh/y for the 29 turbines initially proposed.
- Reduction of greenhouse gas emissions and assistance in contributing to renewable energy targets under the Renewable Energy (Electricity) Act 2000.
- Contributing \$2,500 per operating turbine per year (adjusted annually to changes in the CPI) to the Upper Lachlan Shire Council's Community Enhancement Fund, to be spent on local projects benefiting the local community.
- Contributing to the Neighbour Benefit Sharing Scheme in place with associated and non-associated landowners who have entered into Neighbour Deeds with the project.

Appendix 1: Visual Impacts Response to Submission

Crookwell 3 Wind Farm – Amended DA/EIS

Visual Impact Assessment, Response to Submissions 12 December 2017

The following response to submissions has been prepared subsequent to the preparation and public exhibition of the Crookwell 3 Wind Farm Amended Visual Impact Assessment report (June 2016). This response to submissions has been prepared in addition to responses provided in the Preferred Project and Response to Submissions Report for the Crookwell 3 Wind Farm (March 2014), and the Crookwell 3 Wind Farm Landscape and Visual Impact Assessment Supplementary Report (January 2014).

Amended DA/EIS Website Submissions – Govt, Agency & Org

Submission ID 174437

Comment:

The increase in the size of the rotor will exacerbate the negative character of the visual impact, given the fact that turbine blades move. Turbines that are 157m in height, with a rotor of diameter of 130m, are bound to dominate their landscape. This will have an unacceptable visual impact.

Green Bean Design response:

A detailed assessment of potential visual impacts was undertaken and presented in the Crookwell 3 Wind Farm Amended Visual Impact Assessment Report, June 2016 (C3WF Amended VIA).

The C3WF Amended VIA concluded that the proposed increase in wind turbine dimension would be discernible from some surrounding and proximate view locations; however, the amended wind turbines are not considered to be of a magnitude that would significantly increase visual effects including those associated with the movement of the blades.

Amended DA/EIS Website Submissions – Public Feedback

Submission ID 170498

Comment:

Figure 9a, montage 2, page 45, places the camera where the tree in the foreground minimises the impact of the skyline. Had the camera shot been taken from the dining room or living room windows or on the deck area the panorama changes markedly.

Green Bean Design response:

The panorama photograph presented in Figure 9a was taken from the deck area following a discussion with the property owner prior to undertaking the site inspection. As no one was at the property on the day of the site inspection internal access to the dwelling was not possible. The tree located in the foreground would be present in the panorama photo from more or less any position on the deck.

Comment:

While the photomontage may have been compiled in accordance with standard practice it is incomprehensible that when the tree line in front of the turbines is about 15 metres high that a 150-metre turbine only appears to be 3 times as high as the trees.

Green Bean Design response:

The photomontages have been prepared with regard to general guidelines set out in the Scottish Natural Heritage (2006) Visual representation of wind farms and the British Landscape Institute Advice Note 01/11 (March 2011) Photography and photomontage in landscape and visual impact assessment.

It should be noted that the wind turbines are located at different ground heights to the trees and are at varying distances from the camera location. Attempting to establish relative height comparisons between the trees and wind turbines is not practical.

Comment:

In Clause 10, page 59-Conclusion the last paragraph states "the majority of people at residential dwellings surrounding the amended C3WF would experience NO SIGNIFICANT CHANGE in visual effect between C3WF LVIA and the amended turbine arrangement. In other words, NARANGI homestead was then and still is now in a HIGH visual category regardless of the 2 less turbines.

Green Bean Design response:

The C3WF Amended VIA determined the Narangi would still experience a high visual impact following the proposed removal of two wind turbines from the C3WF south turbine cluster.

Submission ID 171661 and 171829 (Duplicates)

Comment:

The ZVI (called a ZTV) of 5 km used in the assessment is ridiculously small.

Green Bean Design response:

A 5 km distance offset from the amended C3WF wind turbines has been adopted as views toward the original and amended C3WF wind turbines (which would have the same tip height) would not result in any significant level of change in visual effect beyond this distance.

Comment:

Failure to Acknowledge and Allow for Extent to which Photomontages Underestimate VI

Green Bean Design response:

The photomontages have been prepared with regard to general guidelines set out in the Scottish Natural Heritage (2006) Visual representation of wind farms and the British Landscape Institute Advice Note 01/11 (March 2011) Photography and photomontage in landscape and visual impact assessment.

Comment:

On page 15 of the VI Assessment it is stated "However, when compared to the approved C2WF Mod-1 wind turbines, the increase in wind turbine visibility would be restricted to the upper sections (hubs and rotors) of wind turbine structures, rather than whole wind turbines".

This suggests to the reader that the impact can be discounted because only part of the turbine is visible.

Green Bean Design response:

The C3WF Amended VIA makes no suggestion or statement that views toward portions of wind turbine structures has discounted the potential level of visual effect.

Comment:

The VI Assessment uses an arbitrary 4 point scale, structured so 3 points on the scale allow the VI in particular instances to be readily dismissed. Scale construction is biased and inadequate.

Green Bean Design response:

The C3WF Amended VIA methodology is set out in industry and best practice guidelines including the Guidelines for Landscape and Visual Impact Assessment, Third Edition, Landscape Institute and Institute of Environmental Management & Assessment, 2013 – Chapter 6 Assessment of visual effects.

Comment:

The Evaluation of Methodologies for Visual Impact Assessments review draws on peer reviewed research which demonstrates that professional ratings of VI have low validity in predicting the VI actually experienced by people who live near a development.

Green Bean Design response:

The C3WF Amended VIA methodology is set out in industry and best practice guidelines including the Guidelines for Landscape and Visual Impact Assessment, Third Edition, Landscape Institute and Institute of Environmental Management & Assessment, 2013 – Chapter 6 Assessment of visual effects.

Comment:

Inappropriate VI Assessment as though this is a Modification Proposal

Green Bean Design response:

The C3WF Amended VIA has been prepared as an amendment to the original C3WF application and not as a modification.

Comment:

Inadequate Cumulative Impact Assessment

Green Bean Design response:

GBD prepared detailed assessments of potential cumulative visual impact in the C3WF Landscape and Visual Impact Assessment (July 2012) and the C3WF Landscape and Visual Impact Assessment Supplementary Report (January 2014).

Submission ID 172148

Comment:

The methodology used in the Crookwell 3 amended application is inconsistent with empirical research findings in relation to the visual impact of wind farms. Visual impact is based on the visual values of the employed consultants. Research has shown that visual values of employed professionals on such tasks is profoundly different from those of members of the public who will be affected.

The application appears to claim a benefit that a lesser number of turbines will have a lesser impact. However, 23 turbines at a height of 157 metres, added to the cumulative impact of the already established Crookwell wind farm, and Crookwell 2, creates a significant visual impact for those people who will see and hear the 23 turbines for many years.

Green Bean Design response:

The C3WF Amended VIA methodology is set out in industry and best practice guidelines including the Guidelines for Landscape and Visual Impact Assessment, Third Edition, Landscape Institute and Institute of Environmental Management & Assessment, 2013 – Chapter 6 Assessment of visual effects.

The C3WF Amended VIA makes no claim that a lesser number of wind turbines will have a lesser impact. The Amended VIA concludes that:

*'This Amended VIA has illustrated the C3WF LVIA 2012 against the Amended C3WF wind turbine design and concludes that the removal of up to seven C3WF LVIA 2012 wind turbines, including wind turbines within proximity to residential dwellings adjoining the Woodhouselee Road corridor, **would not result** in any significant reduction in overall wind turbine visibility for key non-associated residential dwellings surrounding the C3WF development and for motorists travelling along local roads.*

Whilst the removal of up to the seven wind turbines would reduce the proximity of wind turbines to residential dwellings, and in some areas, has removed the wind turbine that dominated part of the view, the remaining wind turbines would tend to dominate views from a small number of residential dwelling locations'.

Submission ID 171837

Comment:

The pictures that have been produced by the proponent in the Photomontage show the towers blend in to the landscape. A drive around our district to view other windfarm sites tell a completely different story, they are prominent and stand out from every direction and can be seen for miles.

Green Bean Design response:

The photomontages have been prepared with regard to general guidelines set out in the Scottish Natural Heritage (2006) Visual representation of wind farms and the British Landscape Institute Advice Note 01/11 (March 2011) Photography and photomontage in landscape and visual impact assessment.

Submission ID 172036

Comment:

Visual Impact (Highland Park): It can be demonstrated that the visual impact assessment is flawed and that the impacts on affected residences has not been accurately assessed under the NSW Governments own guidelines. Therefore, what is the process or feasibility of requesting the relocation of one or more turbines that will greatly effect neighbouring residences? It can be demonstrated quite clearly.

Green Bean Design response:

The NSW Government Guidelines referred to in the submission were released as a draft for consultation in August 2016 and as a final in December 2016. The C3WF Amended VIA was finalised in June 2016. As such the Guidelines are not applicable to the C3WF Amended VIA.

Submission ID 171791 and 173084 (Duplicates)

Comment:

The six turbines comprising CIII South are to be located just west of the scenic Pejar Dam water body. Apart from the sheer absurdity of placing a huge and noisy industrial complex next to a beautiful and tranquil lake, these turbines will be a major distraction to motorists on the busy Goulburn Crookwell

Road. As one descends towards the dam a driver's attention is already drawn to look at aspects of the impressive water body, but the giant rotating turbines will also draw the drivers' attention to a different view on the other side.

Green Bean Design response:

The six wind turbines comprising the C3WF South precinct would be located to the west of Pejar Dam. The closest wind turbine (F30) would be approximately 1 km from the water body. The C3WF South wind turbines would be visible from vehicles travelling north west along the Crookwell Goulburn Road; however, views toward the dam are obscured by landform until the roads turns north and descends toward the dam causeway. At the posted speed limit (100 kilometres per hour) both wind turbines and the dam would be visible (in opposing views) for around 20 seconds over approximately 650 metres of road.

For drivers and passengers not wishing to look at the wind turbines, it would be possible to gain views across the dam water body without viewing the wind turbines at the same time. The wind turbines would have some partial screening through landform adjoining the road corridor south of the dam, as well as some filtering of views from a small extent of tree planting either side of the dam spillway.

Submission ID 178564

Comment:

Visual impact on property.

Green Bean Design response:

The original C3WF LVIA (July 2012) and C3WF Amended VIA determined a Moderate to High visual impact for the dwelling. Wind turbines within the C3WF East precinct would be visible with some filtering of views provided by tree and shrub planting within the building curtilage.

Submission ID 219000

Comment:

Our picturesque trees and rural environment will change. The scale of the turbines is overwhelming. The height, width, number and movement of the turbines is equivalent to putting up several constantly moving skyscrapers over 30 stories high right next door. In our circumstance, the proposed turbines cannot be hidden at all.

Green Bean Design response:

An assessment of potential visual effects has been prepared for the dwelling which has been constructed following the preparation and exhibition of the original C3WF Landscape and Visual Impact Assessment.

Further information subsequent to a site inspection with the NSW Department of Planning and Environment and the Departments Independent Expert Mr Terry O'Hanlon.

Update to C3WF Amendment Figure 1

The C3WF Amended VIA Figure 1 has been updated to:

- Illustrate the approved Crookwell 2 Wind Farm (C2WF) wind turbines.
- Remove wind turbine F9. The approved C2WF Mod 1 F9 wind turbine has been removed by the Proponent.
- Relocate wind C2WF turbines F48 and F50 as micro-sited and approved by NSW Department of Planning and Environment.
- Remove dwelling R124. Dwelling R124 has been verified by GBD and the NSW Department of Planning and Environment as an agricultural shed.
- Add dwelling R1a which has been confirmed as a DA approved shed conversion and residential dwelling.
- Add dwelling R134 recent construction.
- Add dwelling R134A recent Development Approval (not constructed).
- Add dwelling R135A recent construction.

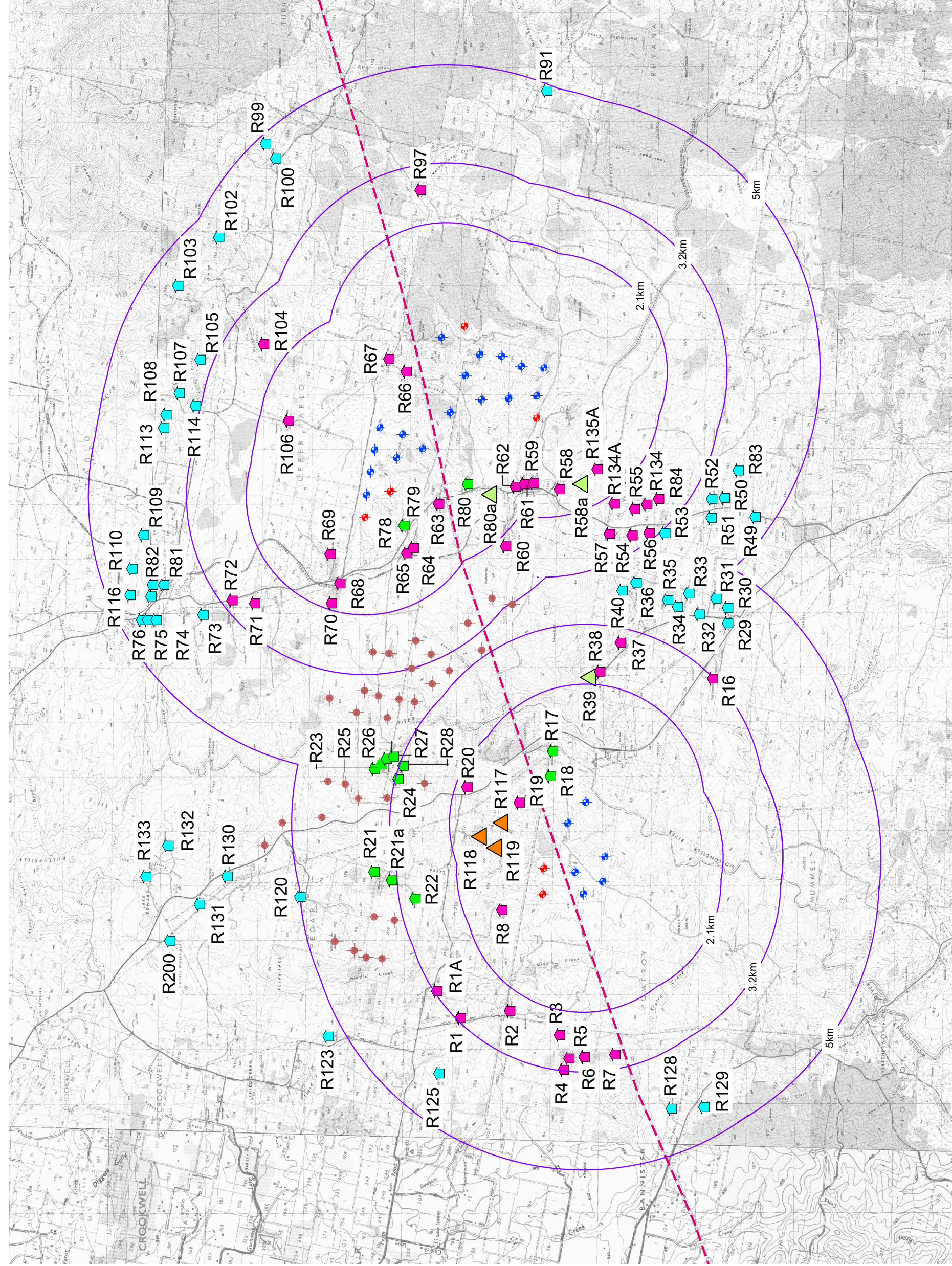
The updated C3WF Amended VIA Figure 1 is included in Appendix A – Figures as C3WF PS01.

Assessment of dwellings 1A, 134, 134A and 135A – C3WF Amendment

Residential dwellings 1A, 134, 134A and 135A include a shed conversion, other dwellings with recent DA approvals and recently constructed dwellings. These have been assessed in accordance with the C3WF Visual Impact Assessment.

Receiver location	Category of receiver location	Approximate distance to C3WF wind turbine	Description of visual effect	Proposed C3WF Amended Visual Effect
R1A	Non-associated residential dwelling	3.3 km	Views would extend south east toward wind turbines within the C3WF South precinct with some screening provided by sloping and ridgeline areas to the east. Short and mid distance views will extend toward the approved C2WF wind turbines to the north east and east of the dwelling. There is potential to mitigate views toward the C3WF wind turbines through planting to the south and south east of the dwelling.	Moderate low
R134	Non-associated residential dwelling	3.4 km	Views would extend north to north east toward all 16 wind turbines within the C3WF East precinct, as well as approved C2WF wind turbines above and beyond Pigmans Hill. Long distance views (around 5.6km) toward wind turbines within the C3WF South precinct will be screened by tree cover to the west of the dwelling.	High

Receiver location	Category of receiver location	Approximate distance to C3WF wind turbine	Description of visual effect	Proposed C3WF Amended Visual Effect
R134A	Non -associated residential dwelling	3 km	Views would extend north to north east toward all 16 wind turbines within the C3WF East precinct, as well as approved C2WF wind turbines above and beyond Pigmans Hill. Long distance views (around 6.2km) toward wind turbines within the C3WF South precinct will be screened by tree cover to the west of the dwelling.	High
R135A	Non -associated residential dwelling	1.7 km	Views would extend north to north east toward all 16 wind turbines within the C3WF East precinct, as well as around 4 approved C2WF wind turbines above and beyond Pigmans Hill. Wind turbines within the C3WF South precinct will be screened by landform to the west of the dwelling.	High



Legend

- C3WF LVIA 2012 wind turbine subject to amendment (indicative location)
- C3WF LVIA 2012 wind turbine to be removed (indicative location)
- Approved C2WF wind turbine (indicative location)
- Associated C3WF and C2WF residential dwelling
- Non associated residential dwelling within 3.2km of Amended C3WF wind turbine
- Non associated residential dwelling beyond 3.2km of Amended C3WF wind turbine
- Potential future dwelling location without DA lodged
- Non residential structure
- Existing 330kV transmission line

Note: All residential dwelling locations are indicative only

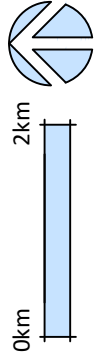


Figure POS 1 C3WF Amendment and approved C2WF

Crookwell 3 Wind Farm - Amendment

Visual Impact Assessment

CROOKWELL
DEVELOPMENT PTY LTD



GREEN BEAN DESIGN
landscape architects

Appendix 2: Noise Impacts Response to Submission

5 December 2017

640.11047-L02-v1.2.docx

Crookwell Development Pty Ltd
Suite 4, Level 3, 24 Marcus Clarke Street
Canberra ACT 2600

Attention: Shaq Mohajerani

Dear Shaq

Crookwell 3 Wind Farm response to submissions & update post CW2 approval

I have reviewed the response to submissions and have updated the noise model to reflect some of the minor changes resulting from the Crookwell 2 Modification 2 (CW2 Mod2) approval.

1 Attachment A - Sensitive receptor update

During the EPA review of the Noise Impact Assessment (NIA) for CW2 Mod2 and Crookwell 3 (CW3) (ref: DOC16/504288-02; EF16/30 Attachment A, dated 17 November 2016) a number of inconsistencies in relation to sensitive receptors were raised, which were previously addressed by SLR on a case by case basis (ref: 640.11047-L01-v1.1). The receptors in question have been checked by aerial photography (SIX Maps) and the correct coordinates verified in the noise model.

Additionally, a potential new receptor location has been identified in the submissions to Department of Planning and Environment (DPE) (submission ID 219000). The property address is 616 Woodhouselee Road, Woodhouselee, which is adjacent to the southern boundary of Crookwell 3 East site. The new house location is approximately (741594-E, 6170929-N) which makes it about 1.7 km from the nearest turbine (A24). The new receptor has been labelled as R135a.

We understand that negotiations with receptor R66 / R67 (Little Vale) are well advanced with regards to reaching a contractual noise agreement. In the event that such a noise agreement is reached then these receptors would be assessed in the same way as other project involved receptors.

2 Re-positioning of CW2 WTGs

We understand that as part of the discussions with DPE for the approval of CW2 Mod2 two WTGs had to be moved further away from R60 (Pejar Park). Turbines F48 and F50 in have been updated in the noise model with the following co-ordinates.

Table 1 Re-positioned WTGs

Turbine	Easting	Northing
F48	739262	6172625
F50	739104	6172383

3 Noise model scenarios

The noise model has been re-run with the following scenarios:

Table 2 Noise model scenarios

	Crookwell 2 Wind Farm	Crookwell 3 Wind Farm	R66 & R67 status
Scenario 1	GE 130 3.4MW	Vestas V126 3.45MW	not involved
Scenario 2	GE 130 3.4MW	GE 130 3.4MW	not involved
Scenario 3	GE 130 3.4MW	GE 130 3.4MW	project involved

3.1 Scenario 1 : CW2 = GE 130 3.4MW, CW3 = Vestas V126 3.45MW

The noise model results are presented in **Appendix A**, in both graphical and in tabulated form.

Table 3 shows a list of the WTGs and noise mitigated modes for the scenario.

Table 3 Scenario 1 Noise Mitigation Turbines

CW2 Turbine Name	Type	CW3 Turbine Name	Type
F1	GE 130 3.4 MW NRO100	A5	Vestas V126 3.45MW Mode 4
F2	GE 130 3.4 MW NRO100	A9	Vestas V126 3.45MW Mode 4
F3	GE 130 3.4 MW NRO100	A10	Vestas V126 3.45MW Mode 4
F4	GE 130 3.4 MW NRO104	A12	Vestas V126 3.45MW Mode 4
F5	GE 130 3.4 MW NRO100	A13	Vestas V126 3.45MW Mode 4
F11	GE 130 3.4 MW NRO100	A15	Vestas V126 3.45MW Mode 4
F12	GE 130 3.4 MW NRO102	A16	Vestas V126 3.45MW Mode 4
F17	GE 130 3.4 MW NRO100		
F19	GE 130 3.4 MW NRO100		
F26	GE 130 3.4 MW NRO102		
F27	GE 130 3.4 MW NRO100		
F28	GE 130 3.4 MW NRO100		
F29	GE 130 3.4 MW NRO100		
F30	GE 130 3.4 MW NRO100		
F31	GE 130 3.4 MW NRO100		
F32	GE 130 3.4 MW NRO100		
F35	GE 130 3.4 MW NRO100		
F36	GE 130 3.4 MW NRO100		
F40	GE 130 3.4 MW NRO100		
F41	GE 130 3.4 MW NRO100		
F43	GE 130 3.4 MW NRO100		
F45	GE 130 3.4 MW NRO102		
F47	GE 130 3.4 MW NRO100		
F50	GE 130 3.4 MW NRO100		

3.2 Scenario 2: CW2 = GE 130 3.4MW, CW3 = GE 130 3.4MW

The noise model results are presented in **Appendix B**, in both graphical and in tabulated form.

Table 4 shows a list of the WTGs and noise mitigated modes for the scenario.

Table 4 Scenario 2 Noise Mitigation Turbines

CW2 Turbine Name	Type	CW3 Turbine Name	Type
F1	GE 130 3.4 MW NRO100	A2	GE 130 3.4 MW NRO100
F2	GE 130 3.4 MW NRO100	A3	GE 130 3.4 MW NRO100
F3	GE 130 3.4 MW NRO100	A4	GE 130 3.4 MW NRO100
F4	GE 130 3.4 MW NRO100	A5	GE 130 3.4 MW NRO100
F5	GE 130 3.4 MW NRO100	A8	GE 130 3.4 MW NRO100
F12	GE 130 3.4 MW NRO100	A9	OFF
F17	GE 130 3.4 MW NRO100	A10	GE 130 3.4 MW NRO100
F19	GE 130 3.4 MW NRO100	A12	GE 130 3.4 MW NRO100
F26	GE 130 3.4 MW NRO100	A13	GE 130 3.4 MW NRO100
F27	GE 130 3.4 MW NRO100	A15	OFF
F28	GE 130 3.4 MW NRO100	A16	GE 130 3.4 MW NRO100
F29	GE 130 3.4 MW NRO100	A17	GE 130 3.4 MW NRO100
F30	GE 130 3.4 MW NRO100	A20	GE 130 3.4 MW NRO100
F31	GE 130 3.4 MW NRO100	A21	GE 130 3.4 MW NRO100
F32	GE 130 3.4 MW NRO100	A24	GE 130 3.4 MW NRO100
F35	GE 130 3.4 MW NRO100	A25	GE 130 3.4 MW NRO100
F36	GE 130 3.4 MW NRO100	A28	GE 130 3.4 MW NRO100
F40	GE 130 3.4 MW NRO100	A29	GE 130 3.4 MW NRO100
F41	GE 130 3.4 MW NRO100	A31	GE 130 3.4 MW NRO102
F43	GE 130 3.4 MW NRO100	A32	GE 130 3.4 MW NRO100
F45	GE 130 3.4 MW NRO102	A33	GE 130 3.4 MW NRO100
F47	GE 130 3.4 MW NRO100		
F50	GE 130 3.4 MW NRO100		

3.3 Scenario 3: CW2 = GE 130 3.4MW, CW3 = GE 130 3.4MW & Little Vale project involved

The noise model results are presented in **Appendix C**, in both graphical and in tabulated form.

Table 5 shows a list of the WTGs and noise mitigated modes for the scenario.

Table 5 Scenario 3 Noise Mitigation Turbines

CW2 Turbine Name	Type	CW3 Turbine Name	Type
F1	GE 130 3.4 MW NRO100	A2	GE 130 3.4 MW NRO100
F2	GE 130 3.4 MW NRO100	A3	GE 130 3.4 MW NRO100
F3	GE 130 3.4 MW NRO100	A4	GE 130 3.4 MW NRO100
F4	GE 130 3.4 MW NRO100	A8	GE 130 3.4 MW NRO100
F5	GE 130 3.4 MW NRO100	A10	GE 130 3.4 MW NRO100
F12	GE 130 3.4 MW NRO100	A12	GE 130 3.4 MW NRO100
F17	GE 130 3.4 MW NRO100	A16	GE 130 3.4 MW NRO100
F19	GE 130 3.4 MW NRO100	A28	GE 130 3.4 MW NRO100
F22	GE 130 3.4 MW NRO100	A29	GE 130 3.4 MW NRO100
F23	GE 130 3.4 MW NRO100	A32	GE 130 3.4 MW NRO100
F24	GE 130 3.4 MW NRO100	A33	GE 130 3.4 MW NRO100
F26	GE 130 3.4 MW NRO100		
F27	GE 130 3.4 MW NRO100		
F28	GE 130 3.4 MW NRO100		
F29	GE 130 3.4 MW NRO100		
F30	GE 130 3.4 MW NRO100		
F31	GE 130 3.4 MW NRO100		
F32	GE 130 3.4 MW NRO100		
F35	GE 130 3.4 MW NRO100		
F36	GE 130 3.4 MW NRO100		
F37	GE 130 3.4 MW NRO100		
F40	GE 130 3.4 MW NRO100		
F41	GE 130 3.4 MW NRO100		
F43	GE 130 3.4 MW NRO100		
F45	GE 130 3.4 MW NRO100		
F47	GE 130 3.4 MW NRO100		
F48	GE 130 3.4 MW NRO100		
F50	GE 130 3.4 MW NRO100		

4 Attachment A – viability of sector management

Crookwell Development Pty Ltd have notified SLR Consulting that *‘the selected turbine supplier has performed a noise optimisation analysis to achieve noise compliance at all non-participating dwellings around the project area. This noise optimisation analysis includes noise modes, sector and condition management, which is set and controlled by the manufacturer through various control algorithm. The manufacturer will provide a noise guarantee to Crookwell Development Pty Ltd for the noise compliance in accordance with the noise optimisation process. The contractual noise guarantee demonstrates the technical and financial viability of the advanced noise mitigation measures that will be provided by manufacturer’s turbines’.*

5 Attachment B - Recommended Conditions

The recommended conditions have been reviewed and in general they are acceptable. Additional comment / feedback is provided for specific conditions below:

- Condition L6.1 part (b) lists the noise limit as being the existing background noise level plus 5 dBA for each integer wind speed at 10 metres above ground level. We note that condition L6.2 lists explicit numerical limits at receptors, however, the reference integer wind speed is taken at hub height. Condition L6.1 (b) should be re-worded to be consistent with L6.2. e.g. hub height wind speeds.
- Condition L6.2 lists the explicit noise limits at critical receptors. The EPA has derived these limits from a simple linear interpolation of the limit values presented in the Noise Impact Assessment (which were non-integer wind speed values at hub height). As a check the process has been replicated and confirms that the numbers produced by the EPA are consistent, with the exception of the final value in the table, which should read 44 instead of 43 dBA. It should read.

R120, R123, R130, R131	35	35	35	36	37	38	39	41	42	44
------------------------	----	----	----	----	----	----	----	----	----	----

It should be noted that R124 has been identified as an Agricultural Shed and therefore is removed from the noise limit table.

- Condition L6.4 lists the locations for which the limits in Condition L6.2 apply. A number of them are marked with references to check and confirm details. Below are the updated details.

Table 6 updated details for L6.4

Location	Name	Easting (m)	Northing (m)
R1	Evermore	731644	6172961
R1a		732235	6173471
R64	Valdarnam Hill	740395	6174100
R65	Windalee	740244	6174226
R120	Elmgrove	733947	6176284
R130	Wharekorari	734290	6177739

- Condition L6.7 requires the proponent to nominate a method for measuring and determining the wind speed for which the noise limits are based. It is currently premature to provide the precise location and methodology. The precise methodology will be provided in the draft noise compliance monitoring plan to be submitted prior to commissioning, although considerations to include:

- The existing wind met mast may not be retained owing to its proximity to future WTGs. For example the position of the mast would interfere with the placement of a WTG, or alternatively, the WTG would adversely impact on the wind speed readings of the met mast (wake affected).
- The existing wind met mast may not be retained owing to its proximity and conflicts with other infrastructure associated with the project such as access roads and underground cabling.
- An alternative substitute mast may be used. It is common to complete a period of simultaneous wind monitoring at the original and the future reference wind mast. Statistical analysis of both data sets is used to provide a calibration between new and old.
- WTGs have their own on board wind speed monitoring capability. The suitability and accuracy of using the data obtained from select nearest WTGs to be evaluated.

In general terms the monitoring location(s) and method would be tailored such to give the best approximation of the hub height wind speed in the region nearest to the receptors in question.

6 Conclusion

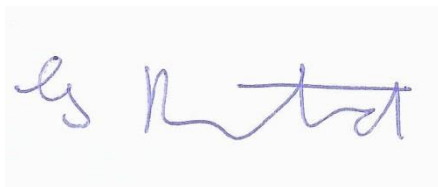
The modelling indicates that a mitigated layout using a combination of noise management modes of both WTG models is able to show that theoretical compliance can be achieved at all non-project receptors.

As previously investigated and discussed in the Noise Impact Assessment reports for both projects the noise modelling methodology is intrinsically conservative, assuming a worst case that all WTGs are upwind of all receptors simultaneously. The degree to which the predictive modelling is conservative will be dependent upon each specific receptor and meteorological condition; however, in some cases it will be significant and likely leads to the large number of WTGs (e.g. **Table 3, Table 4, Table 5**) that are required to be operated in reduced noise mode in order to meet theoretical compliance.

It is acknowledged that GE has provided a detailed noise optimisation mechanism to Crookwell Development Pty Ltd, whereby all the turbines can be configured to implement the noise optimisation using a combination of sector management, wind speed condition, and reduced noise mode operations to achieve compliance, as such a noise guarantee has been provided to the project to that effect.

If you have any questions regarding the above, please feel free to contact me.

Yours sincerely,



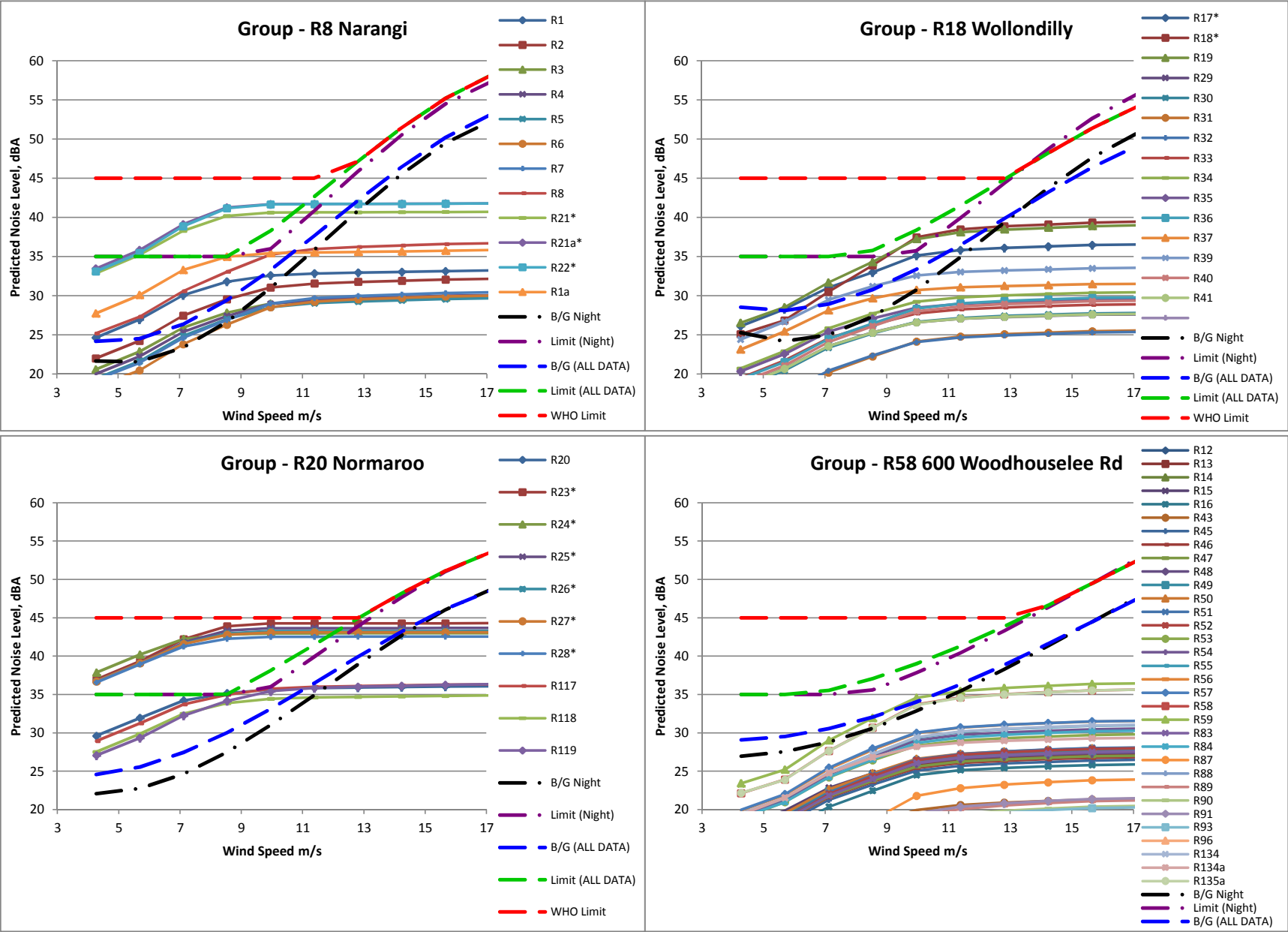
Gustaf Reutersward B.E. Mech. (Hons.) M.A.A.S.
SLR Consulting Melbourne Office Manager

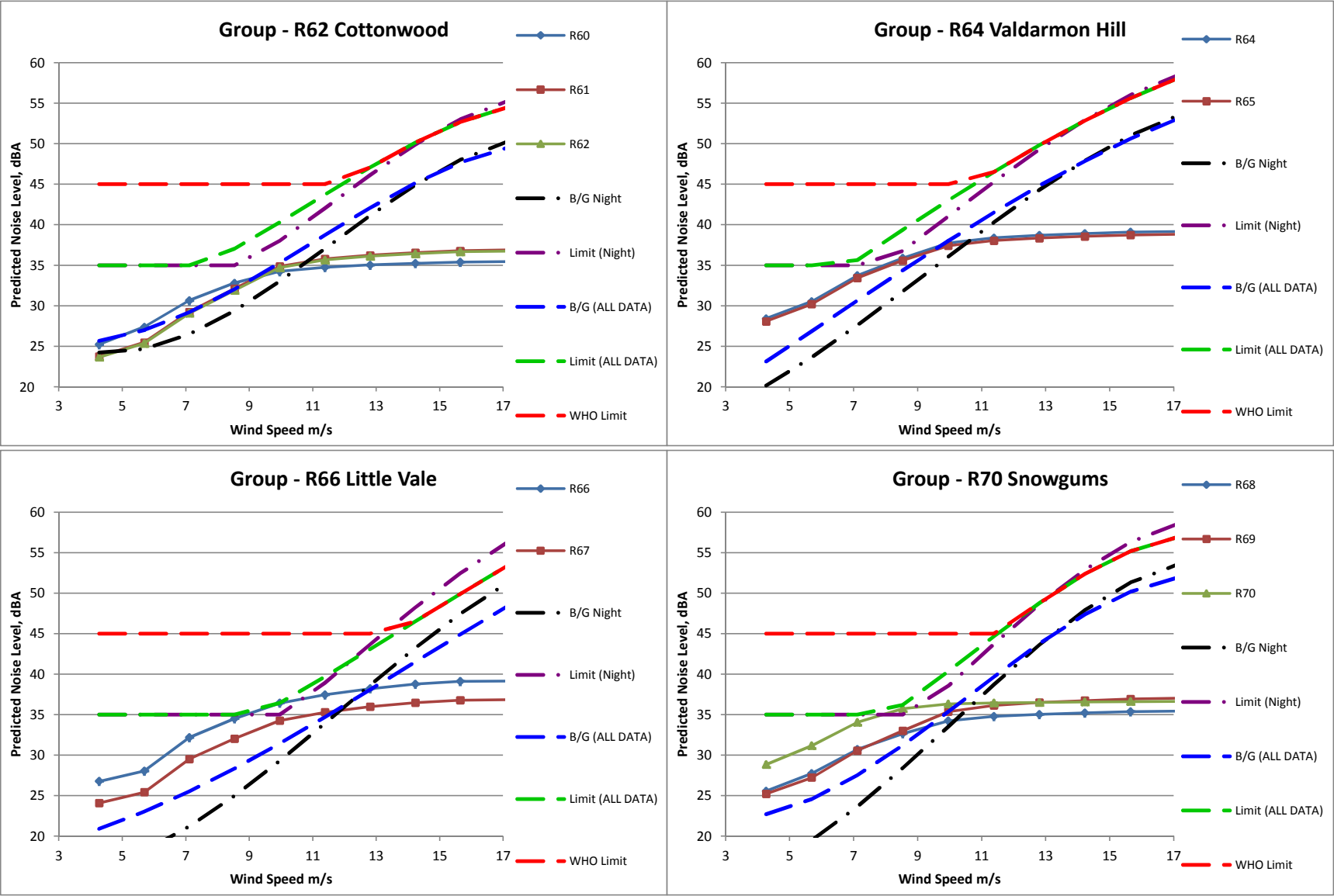
Checked/
Authorised by: JA

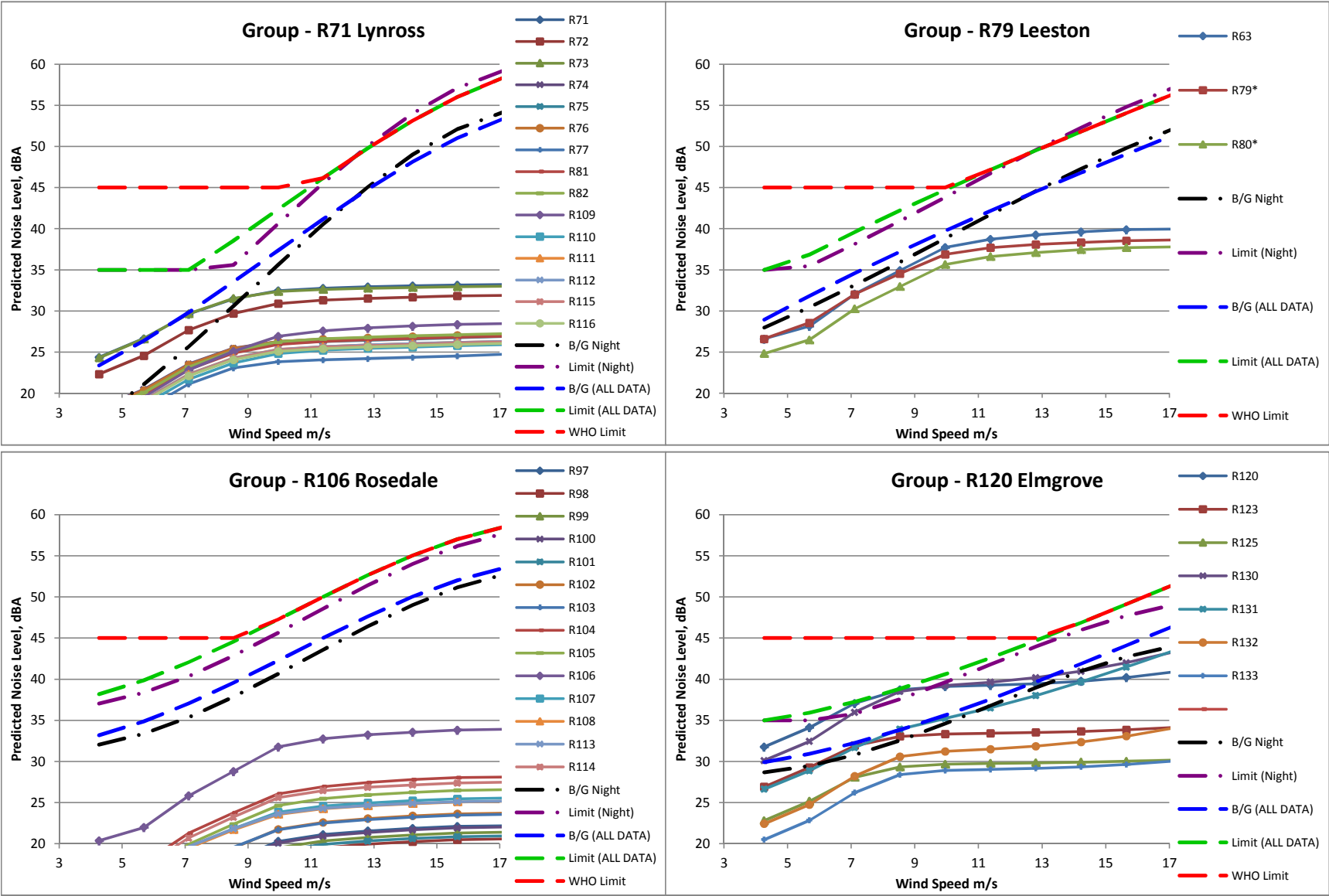
Appendix A – Scenario 1

Mitigated Layout : Crookwell 2 WF = GE 130 3.4 Crookwell 3 WF = Vestas V126 3.45 MW

CW2 Turbine Name	WTG model / setting	CW3 Turbine Name	WTG model / setting
F1	GE 130 3.4 MW NRO100	A2	Vestas V126 3.45 MW Mode 0
F2	GE 130 3.4 MW NRO100	A3	Vestas V126 3.45 MW Mode 0
F3	GE 130 3.4 MW NRO100	A4	Vestas V126 3.45 MW Mode 0
F4	GE 130 3.4 MW NRO104	A5	Vestas V126 3.45 MW Mode 4
F5	GE 130 3.4 MW NRO100	A8	Vestas V126 3.45 MW Mode 0
F7	GE 130 3.4 MW	A9	Vestas V126 3.45 MW Mode 4
F10	GE 130 3.4 MW	A10	Vestas V126 3.45 MW Mode 4
F11	GE 130 3.4 MW NRO100	A12	Vestas V126 3.45 MW Mode 4
F12	GE 130 3.4 MW NRO102	A13	Vestas V126 3.45 MW Mode 4
F17	GE 130 3.4 MW NRO100	A15	Vestas V126 3.45 MW Mode 4
F19	GE 130 3.4 MW NRO100	A16	Vestas V126 3.45 MW Mode 4
F21	GE 130 3.4 MW	A17	Vestas V126 3.45 MW Mode 0
F22	GE 130 3.4 MW	A20	Vestas V126 3.45 MW Mode 0
F23	GE 130 3.4 MW	A21	Vestas V126 3.45 MW Mode 0
F24	GE 130 3.4 MW	A22	Vestas V126 3.45 MW Mode 0
F26	GE 130 3.4 MW NRO102	A25	Vestas V126 3.45 MW Mode 0
F27	GE 130 3.4 MW NRO100	A28	Vestas V126 3.45 MW Mode 0
F28	GE 130 3.4 MW NRO100	A29	Vestas V126 3.45 MW Mode 0
F29	GE 130 3.4 MW NRO100	A30	Vestas V126 3.45 MW Mode 0
F30	GE 130 3.4 MW NRO100	A31	Vestas V126 3.45 MW Mode 0
F31	GE 130 3.4 MW NRO100	A32	Vestas V126 3.45 MW Mode 0
F32	GE 130 3.4 MW NRO100	A33	Vestas V126 3.45 MW Mode 0
F35	GE 130 3.4 MW NRO100	A24	Vestas V126 3.45 MW Mode 0
F36	GE 130 3.4 MW NRO100		
F37	GE 130 3.4 MW		
F40	GE 130 3.4 MW NRO100		
F41	GE 130 3.4 MW NRO100		
F43	GE 130 3.4 MW NRO100		
F45	GE 130 3.4 MW NRO102		
F47	GE 130 3.4 MW NRO100		
F48	GE 130 3.4 MW		
F50	GE 130 3.4 MW		







Windspeed at 10m AGL		3.0	4.0	5.0	6.0	7.0	8.0	9.0	10.0	11.0	12.0
Windspeed at Hub Height		4.3	5.7	7.1	8.5	10.0	11.4	12.8	14.2	15.7	17.1
Background Location: R8 Narangi											
B/G Regression Line	$-0.0201x^3 + 0.7209x^2 - 5.4402x + 35.805$	24.2	24.5	26.4	29.4	33.3	37.6	42.1	46.4	50.2	53.0
SA EPA Criteria		35.0	35.0	35.0	35.0	38.3	42.6	47.1	51.4	55.2	58.0
NIGHT BG Regression Line	$-0.0257x^3 + 0.9097x^2 - 7.1972x + 37.793$	21.6	21.6	23.4	26.7	31.0	35.8	40.8	45.5	49.5	52.2
EPA Night Criteria		35.0	35.0	35.0	35.0	36.0	40.8	45.8	50.5	54.5	57.2
WHO Criteria		45.0	45.0	45.0	45.0	45.0	45.0	47.1	51.4	55.2	58.0
R1		24.6	26.9	30.0	31.8	32.6	32.8	32.9	33.0	33.1	33.2
R2		22.0	24.2	27.4	29.5	31.0	31.5	31.7	31.9	32.0	32.1
R3		20.6	22.9	25.9	27.8	29.0	29.4	29.5	29.6	29.8	29.9
R4		20.0	22.2	25.4	27.4	28.9	29.5	29.7	29.8	30.0	30.1
R5		19.4	21.6	24.8	27.0	28.5	29.0	29.3	29.4	29.6	29.6
R6		18.3	20.4	23.8	26.3	28.5	29.2	29.5	29.7	29.9	30.0
R7		19.2	21.4	24.6	26.9	29.0	29.7	30.0	30.1	30.3	30.4
R8		25.2	27.3	30.6	33.0	35.2	35.9	36.2	36.4	36.6	36.7
R21*		32.8	35.2	38.3	40.2	40.6	40.6	40.6	40.7	40.7	40.7
R21a*		33.4	35.8	39.1	41.2	41.7	41.7	41.7	41.7	41.7	41.8
R22*		33.1	35.4	38.9	41.2	41.6	41.7	41.7	41.7	41.7	41.8
R1a		27.7	30.1	33.3	35.0	35.4	35.5	35.6	35.6	35.7	35.8
Background Location: R18 Wollondilly											
B/G Regression Line	$-0.0143x^3 + 0.5536x^2 - 4.7402x + 39.782$	28.5	28.1	28.9	30.8	33.4	36.5	39.8	43.2	46.4	49.1
SA EPA Criteria		35.0	35.0	35.0	35.8	38.4	41.5	44.8	48.2	51.4	54.1
NIGHT BG Regression Line	$-0.0229x^3 + 0.8605x^2 - 7.6186x + 43.885$	25.3	24.2	25.0	27.3	30.7	34.9	39.3	43.7	47.6	50.7
EPA Night Criteria		35.0	35.0	35.0	35.0	35.7	39.9	44.3	48.7	52.6	55.7
WHO Criteria		45.0	45.0	45.0	45.0	45.0	45.0	45.0	48.2	51.4	54.1
R17*		26.1	28.3	31.0	33.0	35.1	35.8	36.1	36.3	36.5	36.5
R18*		25.1	26.8	30.5	33.9	37.4	38.5	38.8	39.1	39.3	39.4
R19		26.5	28.5	31.7	34.3	37.2	38.1	38.4	38.7	38.9	39.0
R29		18.4	20.7	23.6	25.3	26.6	27.0	27.3	27.4	27.6	27.6
R30		18.2	20.5	23.4	25.2	26.6	27.1	27.4	27.6	27.7	27.8
R31		15.0	17.2	20.2	22.2	24.1	24.8	25.1	25.3	25.4	25.5
R32		15.3	17.5	20.4	22.4	24.1	24.7	24.9	25.1	25.3	25.4
R33		19.5	21.7	24.6	26.3	27.7	28.2	28.5	28.7	28.8	28.9
R34		20.7	22.9	25.8	27.7	29.2	29.8	30.0	30.2	30.3	30.4
R35		20.3	22.5	25.4	27.1	28.4	28.9	29.2	29.3	29.5	29.6
R36		19.4	21.5	24.5	26.4	28.3	29.0	29.3	29.5	29.7	29.8
R37		23.1	25.4	28.1	29.6	30.7	31.1	31.2	31.3	31.4	31.5
R39		24.4	26.7	29.5	31.2	32.6	33.0	33.2	33.3	33.5	33.5
R40		18.9	21.1	24.1	26.1	28.0	28.6	28.9	29.1	29.3	29.3
R41		18.4	20.7	23.5	25.3	26.6	27.1	27.3	27.5	27.6	27.7
Background Location: R20 Normaroo											
B/G Regression Line	$-0.0124x^3 + 0.4392x^2 - 2.7661x + 29.349$	24.6	25.5	27.4	30.0	33.1	36.5	39.9	43.2	46.1	48.4
SA EPA Criteria		35.0	35.0	35.0	35.0	38.1	41.5	44.9	48.2	51.1	53.4
NIGHT BG Regression Line	$-0.0166x^3 + 0.5896x^2 - 4.1646x + 30.403$	22.1	22.7	24.6	27.5	31.0	34.9	38.9	42.7	46.0	48.6
EPA Night Criteria		35.0	35.0	35.0	35.0	36.0	39.9	43.9	47.7	51.0	53.6
WHO Criteria		45.0	45.0	45.0	45.0	45.0	45.0	45.0	48.2	51.1	53.4
R20		29.6	31.9	34.2	35.1	35.7	35.8	35.9	36.0	36.0	36.1
R23*		36.9	39.3	42.2	43.9	44.3	44.3	44.3	44.3	44.3	44.3
R24*		37.8	40.2	42.2	42.8	43.0	43.0	43.0	43.0	43.0	43.0
R25*		36.7	39.1	41.8	43.3	43.6	43.6	43.7	43.7	43.7	43.7
R26*		36.7	39.0	41.6	43.0	43.3	43.3	43.3	43.3	43.3	43.3
R27*		36.7	39.1	41.6	42.8	43.1	43.1	43.1	43.1	43.1	43.1
R28*		36.6	38.9	41.3	42.3	42.5	42.5	42.5	42.5	42.5	42.6
R117		28.9	31.2	33.7	35.0	35.7	36.0	36.1	36.2	36.3	36.3
R118		27.5	29.9	32.5	33.9	34.4	34.6	34.7	34.7	34.8	34.9
R119		27.0	29.3	32.3	34.1	35.4	35.8	36.0	36.1	36.3	36.3
Background Location: R58 600 Woodhouselee Rd											
B/G Regression Line	$-0.0045x^3 + 0.2194x^2 - 1.5322x + 31.956$	29.1	29.5	30.5	32.1	34.0	36.3	38.9	41.6	44.5	47.4
SA EPA Criteria		35.0	35.0	35.5	37.1	39.0	41.3	43.9	46.6	49.5	52.4
NIGHT BG Regression Line	$-0.0053x^3 + 0.2472x^2 - 1.6363x + 29.838$	26.9	27.6	28.8	30.6	32.8	35.4	38.3	41.3	44.5	47.6
EPA Night Criteria		35.0	35.0	35.0	35.6	37.8	40.4	43.3	46.3	49.5	52.6
WHO Criteria		45.0	45.0	45.0	45.0	45.0	45.0	45.0	46.6	49.5	52.4
R12		16.9	19.1	22.1	24.1	25.9	26.5	26.8	27.0	27.1	27.2
R13		16.9	19.1	22.1	24.1	25.8	26.4	26.7	26.9	27.1	27.2
R14		17.4	19.6	22.5	24.5	26.2	26.8	27.1	27.3	27.4	27.5
R15		17.6	19.8	22.8	24.7	26.4	27.0	27.2	27.4	27.6	27.7
R16		15.2	17.3	20.3	22.4	24.5	25.1	25.4	25.6	25.8	25.9
R43		10.8	12.9	16.0	18.1	19.9	20.6	20.9	21.1	21.3	21.4
R45		16.0	18.2	21.2	23.3	25.1	25.7	26.0	26.2	26.4	26.5
R46		16.4	18.6	21.6	23.6	25.4	26.1	26.4	26.6	26.7	26.8
R47		16.5	18.7	21.7	23.8	25.6	26.2	26.6	26.8	26.9	27.0
R48		17.0	19.1	22.2	24.2	26.0	26.7	27.0	27.2	27.3	27.4
R49		17.2	19.4	22.4	24.5	26.3	26.9	27.3	27.5	27.6	27.7
R50		17.4	19.5	22.6	24.7	26.6	27.3	27.6	27.8	28.0	28.0
R51		16.8	18.8	22.2	24.5	26.5	27.2	27.6	27.8	28.0	28.1
R52		16.6	18.7	22.0	24.3	26.4	27.1	27.5	27.7	27.9	28.0
R53		18.9	21.0	24.2	26.4	28.3	29.0	29.3	29.5	29.7	29.8
R54		19.2	21.3	24.6	27.0	29.0	29.7	30.1	30.3	30.5	30.5
R55		19.4	21.5	24.8	27.2	29.4	30.1	30.5	30.7	30.9	31.0
R56		19.9	21.9	25.3	27.8	29.9	30.7	31.0	31.3	31.5	31.5
R57		20.0	22.0	25.5	28.0	30.0	30.7	31.0	31.3	31.5	31.5
R58		22.1	23.9	27.6	30.7	33.7	34.6	35.0	35.3	35.5	35.6
R59		23.4	25.2	29.0	31.9	34.6	35.4	35.9	36.1	36.4	36.5
R83		16.6	18.7	21.8	24.0	26.0	26.8	27.1	27.3	27.5	27.6

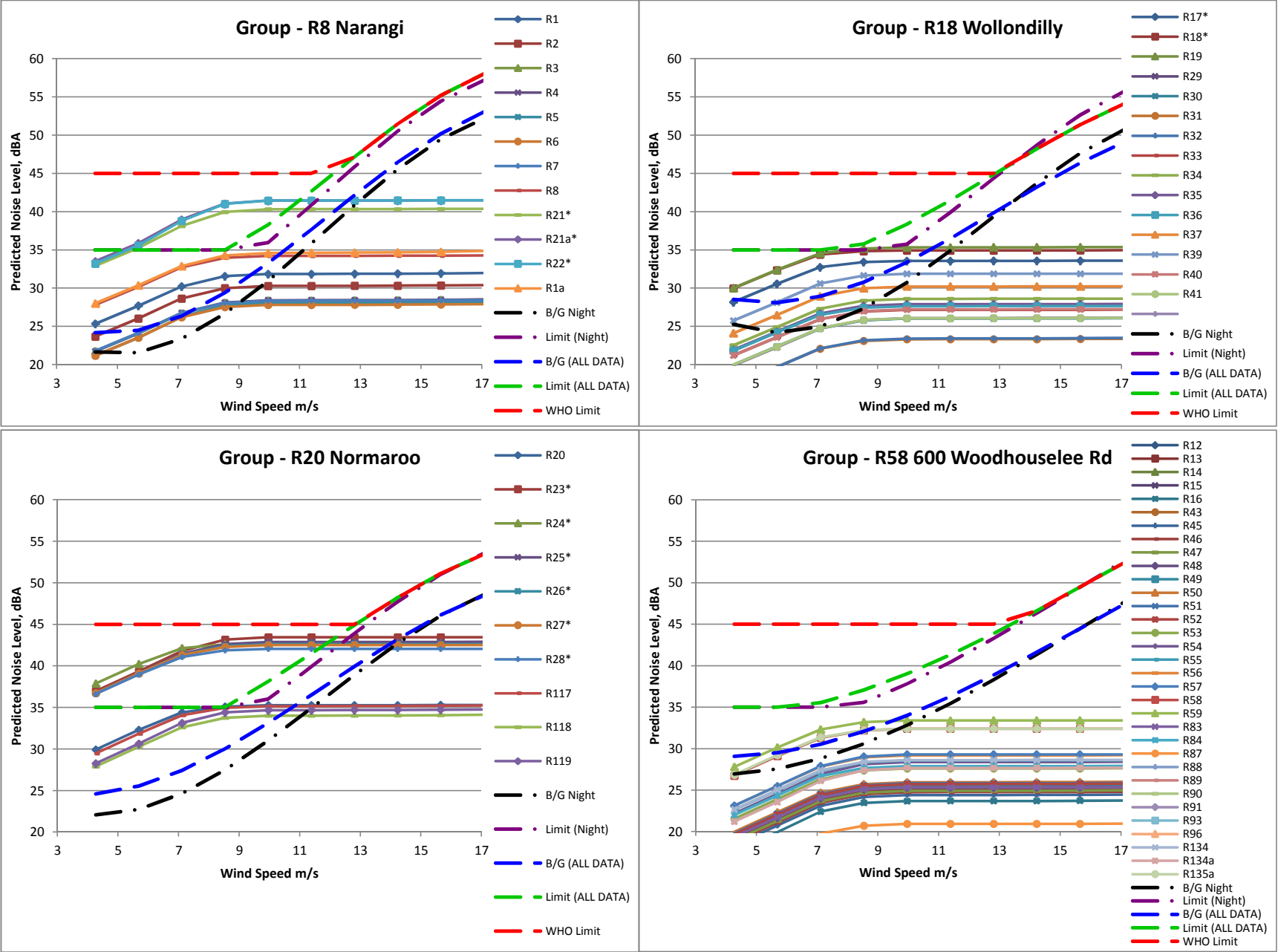
	Windspeed at 10m AGL	3.0	4.0	5.0	6.0	7.0	8.0	9.0	10.0	11.0	12.0
	Windspeed at Hub Height	4.3	5.7	7.1	8.5	10.0	11.4	12.8	14.2	15.7	17.1
R84		18.9	21.0	24.2	26.5	28.7	29.4	29.7	30.0	30.2	30.3
R87		10.1	11.7	15.6	18.7	21.8	22.8	23.2	23.6	23.8	23.9
R88		7.3	9.1	12.7	15.3	17.8	18.7	19.2	19.5	19.7	19.8
R89		8.5	10.2	13.9	16.5	19.1	20.1	20.5	20.8	21.1	21.2
R90		7.8	9.6	13.1	15.8	18.5	19.4	19.8	20.1	20.4	20.5
R91		8.8	10.6	14.2	16.8	19.5	20.4	20.8	21.1	21.4	21.5
R93		7.3	9.1	12.7	15.5	18.3	19.2	19.6	19.9	20.2	20.3
R96		6.4	8.3	11.7	14.2	16.7	17.5	17.9	18.2	18.5	18.6
R134		19.5	21.5	24.9	27.2	29.4	30.2	30.5	30.8	31.0	31.0
R134a		19.3	21.5	24.7	26.8	28.2	28.7	28.9	29.1	29.3	29.3
R135a		22.2	23.9	27.7	30.6	33.6	34.6	35.0	35.3	35.5	35.6
Background Location: R62 Cottonwood											
B/G Regression Line	$-0.0135x^3 + 0.4454x^2 - 2.4834x + 29.187$	25.7	27.0	29.2	32.0	35.3	38.7	42.1	45.1	47.7	49.4
SA EPA Criteria		35.0	35.0	35.0	37.0	40.3	43.7	47.1	50.1	52.7	54.4
NIGHT BG Regression Line	$-0.0198x^3 + 0.6869x^2 - 5.0582x + 34.828$	24.2	24.6	26.5	29.4	33.0	37.1	41.1	44.9	48.0	50.2
EPA Night Criteria		35.0	35.0	35.0	35.0	38.0	42.1	46.1	49.9	53.0	55.2
WHO Criteria		45.0	45.0	45.0	45.0	45.0	45.0	47.1	50.1	52.7	54.4
R60		25.2	27.4	30.7	32.8	34.2	34.8	35.0	35.2	35.4	35.4
R61		23.7	25.5	29.2	32.1	34.9	35.8	36.2	36.6	36.8	36.9
R62		23.6	25.4	29.1	31.9	34.7	35.6	36.1	36.4	36.7	36.7
Background Location: R64 Valdarmon Hill											
B/G Regression Line	$-0.0032x^3 + 0.0596x^2 + 2.2844x + 12.521$	23.1	26.9	30.6	34.4	38.0	41.5	44.8	47.9	50.6	53.0
SA EPA Criteria		35.0	35.0	35.6	39.4	43.0	46.5	49.8	52.9	55.6	58.0
NIGHT BG Regression Line	$-0.0093x^3 + 0.2628x^2 + 0.5447x + 13.759$	20.1	23.7	27.6	31.8	36.1	40.3	44.3	47.9	51.0	53.4
EPA Night Criteria		35.0	35.0	35.0	36.8	41.1	45.3	49.3	52.9	56.0	58.4
WHO Criteria		45.0	45.0	45.0	45.0	45.0	46.5	49.8	52.9	55.6	58.0
R64		28.4	30.5	33.7	35.9	37.7	38.4	38.7	38.9	39.1	39.2
R65		28.1	30.2	33.4	35.6	37.4	38.0	38.4	38.6	38.7	38.8
Background Location: R66 Little Vale											
B/G Regression Line	$-0.0038x^3 + 0.1588x^2 + 0.201x + 17.442$	20.9	23.0	25.5	28.4	31.4	34.7	38.1	41.5	44.9	48.3
SA EPA Criteria		35.0	35.0	35.0	35.0	36.4	39.7	43.1	46.5	49.9	53.3
NIGHT BG Regression Line	$-0.0126x^3 + 0.4524x^2 - 2.0963x + 17.752$	16.1	18.2	21.2	25.0	29.3	33.9	38.6	43.2	47.5	51.1
EPA Night Criteria		35.0	35.0	35.0	35.0	35.0	38.9	43.6	48.2	52.5	56.1
WHO Criteria		45.0	45.0	45.0	45.0	45.0	45.0	45.0	46.5	49.9	53.3
R66		26.8	28.1	32.2	34.5	36.4	37.4	38.2	38.8	39.1	39.1
R67		24.1	25.4	29.5	32.0	34.3	35.3	36.0	36.5	36.8	36.8
Background Location: R70 Snowgums											
B/G Regression Line	$-0.0182x^3 + 0.5772x^2 - 3.0782x + 26.75$	22.7	24.6	27.5	31.2	35.4	39.7	43.8	47.4	50.2	51.9
SA EPA Criteria		35.0	35.0	35.0	36.2	40.4	44.7	48.8	52.4	55.2	56.9
NIGHT BG Regression Line	$-0.0183x^3 + 0.5563x^2 - 1.9759x + 16.123$	16.4	19.5	23.6	28.4	33.5	38.7	43.6	47.9	51.3	53.5
EPA Night Criteria		35.0	35.0	35.0	35.0	38.5	43.7	48.6	52.9	56.3	58.5
WHO Criteria		45.0	45.0	45.0	45.0	45.0	45.0	48.8	52.4	55.2	56.9
R68		25.5	27.8	30.7	32.7	34.2	34.8	35.0	35.2	35.4	35.4
R69		25.2	27.2	30.6	33.0	35.4	36.1	36.5	36.7	36.9	37.0
R70		28.8	31.2	34.0	35.7	36.3	36.4	36.5	36.6	36.6	36.6
Background Location: R71 Lynross											
B/G Regression Line	$-0.0083x^3 + 0.243x^2 + 0.3267x + 18.194$	23.4	26.4	29.8	33.5	37.4	41.2	44.8	48.1	51.0	53.3
SA EPA Criteria		35.0	35.0	35.0	38.5	42.4	46.2	49.8	53.1	56.0	58.3
NIGHT BG Regression Line	$-0.0136x^3 + 0.3747x^2 + 0.0985x + 10.908$	17.1	21.1	25.7	30.6	35.6	40.5	45.1	49.0	52.1	54.1
EPA Night Criteria		35.0	35.0	35.0	35.6	40.6	45.5	50.1	54.0	57.1	59.1
WHO Criteria		45.0	45.0	45.0	45.0	45.0	46.2	49.8	53.1	56.0	58.3
R71		24.4	26.6	29.6	31.5	32.5	32.8	32.9	33.1	33.2	33.2
R72		22.3	24.6	27.7	29.7	30.9	31.3	31.5	31.7	31.8	31.9
R73		24.3	26.6	29.7	31.5	32.4	32.6	32.8	32.9	33.0	33.0
R74		18.2	20.5	23.6	25.5	26.3	26.5	26.7	26.8	27.0	27.1
R75		18.0	20.3	23.4	25.3	26.1	26.3	26.5	26.6	26.7	26.9
R76		18.1	20.4	23.5	25.4	26.3	26.6	26.8	26.9	27.0	27.2
R77		15.7	18.0	21.1	23.1	23.8	24.1	24.2	24.4	24.5	24.7
R81		17.5	19.8	22.9	24.9	25.9	26.3	26.5	26.7	26.8	26.9
R82		17.8	20.1	23.2	25.2	26.3	26.6	26.8	27.0	27.1	27.2
R109		17.4	19.5	22.8	25.1	26.9	27.6	27.9	28.2	28.4	28.5
R110		16.3	18.6	21.7	23.7	24.8	25.2	25.4	25.6	25.8	25.9
R111		16.9	19.2	22.3	24.3	25.3	25.7	25.9	26.0	26.2	26.3
R112		16.9	19.2	22.3	24.3	25.3	25.7	25.9	26.0	26.2	26.3
R115		16.8	19.1	22.2	24.2	25.2	25.6	25.8	25.9	26.1	26.2
R116		16.7	19.0	22.1	24.1	25.1	25.4	25.6	25.8	25.9	26.1
Background Location: R79 Leeston											
B/G Regression Line	$0.001x^3 - 0.053x^2 + 2.4941x + 19.177$	28.9	31.8	34.6	37.2	39.7	42.2	44.5	46.8	49.1	51.3
SA EPA Criteria		35.0	36.8	39.6	42.2	44.7	47.2	49.5	51.8	54.1	56.3
NIGHT BG Regression Line	$-0.0038x^3 + 0.1151x^2 + 0.878x + 22.436$	28.0	30.5	33.1	36.0	38.8	41.7	44.6	47.3	49.8	52.1
EPA Night Criteria		35.0	35.5	38.1	41.0	43.8	46.7	49.6	52.3	54.8	57.1
WHO Criteria		45.0	45.0	45.0	45.0	45.0	47.2	49.5	51.8	54.1	56.3
R63		26.6	28.2	32.1	34.9	37.7	38.7	39.3	39.6	39.9	40.0
R79*		26.6	28.6	32.0	34.5	36.9	37.7	38.1	38.3	38.6	38.6
R80*		24.8	26.5	30.3	33.0	35.7	36.6	37.1	37.4	37.7	37.8

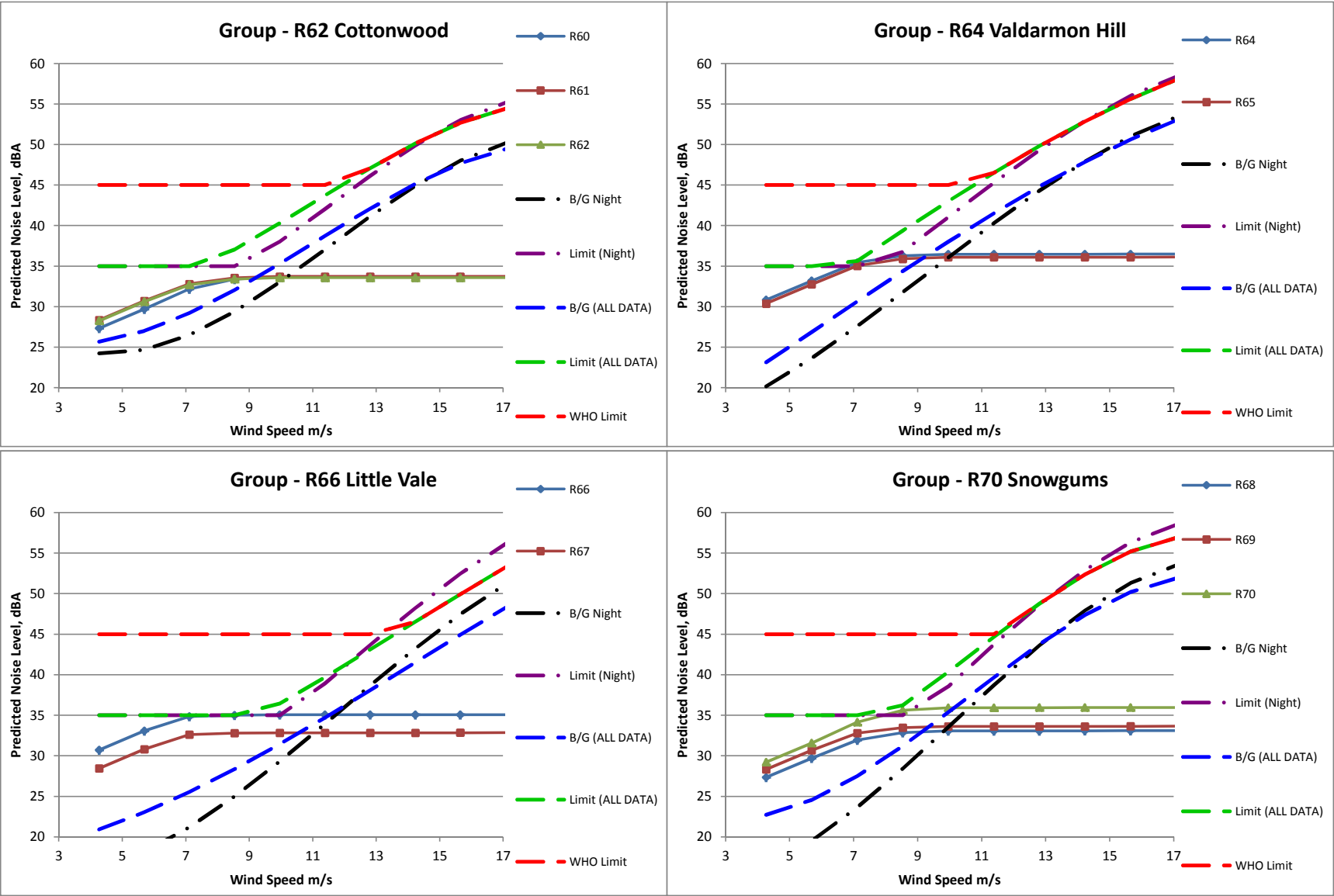
Windspeed at 10m AGL		3.0	4.0	5.0	6.0	7.0	8.0	9.0	10.0	11.0	12.0
Windspeed at Hub Height		4.3	5.7	7.1	8.5	10.0	11.4	12.8	14.2	15.7	17.1
Background Location: R106 Rosedale											
B/G Regression Line	$-0.0085x^3 + 0.2644x^2 - 0.8076x + 32.476$	33.2	34.9	37.1	39.6	42.3	45.0	47.6	50.0	52.0	53.5
SA EPA Criteria		38.2	39.9	42.1	44.6	47.3	50.0	52.6	55.0	57.0	58.5
NIGHT BG Regression Line	$-0.0109x^3 + 0.3551x^2 - 1.7974x + 34.095$	32.0	33.4	35.4	37.8	40.7	43.6	46.4	49.0	51.2	52.7
EPA Night Criteria		37.0	38.4	40.4	42.8	45.7	48.6	51.4	54.0	56.2	57.7
WHO Criteria		45.0	45.0	45.0	45.0	47.3	50.0	52.6	55.0	57.0	58.5
R97		10.2	12.1	15.6	18.0	20.3	21.1	21.6	21.9	22.1	22.2
R98		8.6	10.5	14.0	16.4	18.7	19.5	19.9	20.2	20.5	20.6
R99		9.4	11.3	14.8	17.2	19.5	20.3	20.8	21.1	21.3	21.4
R100		10.0	11.8	15.3	17.8	20.1	20.9	21.4	21.7	21.9	22.0
R101		9.2	11.1	14.6	16.9	19.1	19.9	20.3	20.6	20.9	21.0
R102		11.7	13.5	17.0	19.5	21.8	22.6	23.1	23.4	23.6	23.7
R103		11.8	13.8	17.2	19.6	21.7	22.5	22.9	23.2	23.5	23.6
R104		15.9	17.7	21.3	23.8	26.1	26.9	27.4	27.8	28.0	28.1
R105		14.5	16.4	19.9	22.4	24.6	25.5	25.9	26.3	26.5	26.6
R106		20.4	22.0	25.8	28.8	31.8	32.8	33.2	33.6	33.8	33.9
R107		14.2	16.2	19.5	21.8	23.8	24.6	25.0	25.2	25.5	25.5
R108		14.2	16.2	19.5	21.7	23.6	24.3	24.6	24.9	25.1	25.2
R113		14.3	16.4	19.6	21.8	23.6	24.3	24.7	24.9	25.1	25.2
R114		15.3	17.3	20.7	23.2	25.6	26.5	26.9	27.1	27.4	27.5
Background Location: R120 Elmgrove											
B/G Regression Line	$-0.0023x^3 + 0.1114x^2 - 0.2106x + 28.947$	29.9	30.9	32.3	33.8	35.6	37.6	39.7	41.9	44.1	46.4
SA EPA Criteria		35.0	35.9	37.3	38.8	40.6	42.6	44.7	46.9	49.1	51.4
NIGHT BG Regression Line	$-0.0083x^3 + 0.2813x^2 - 1.6306x + 31.151$	28.7	29.5	30.8	32.6	34.6	36.8	39.0	41.0	42.7	44.0
EPA Night Criteria		35.0	35.0	35.8	37.6	39.6	41.8	44.0	46.0	47.7	49.0
WHO Criteria		45.0	45.0	45.0	45.0	45.0	45.0	45.0	46.9	49.1	51.4
R120		31.8	34.1	37.1	38.7	39.1	39.3	39.5	39.8	40.2	40.9
R123		26.9	29.3	31.9	33.0	33.3	33.4	33.5	33.7	33.8	34.1
R125		22.8	25.2	28.1	29.3	29.7	29.8	29.8	29.9	30.0	30.2
R130		30.1	32.4	36.0	38.5	39.2	39.6	40.2	41.0	42.0	43.3
R131		26.6	28.9	31.7	33.9	35.2	36.5	38.0	39.7	41.5	43.4
R132		22.4	24.8	28.2	30.6	31.2	31.5	31.9	32.4	33.1	34.0
R133		20.5	22.9	26.2	28.4	28.9	29.0	29.2	29.3	29.6	30.0

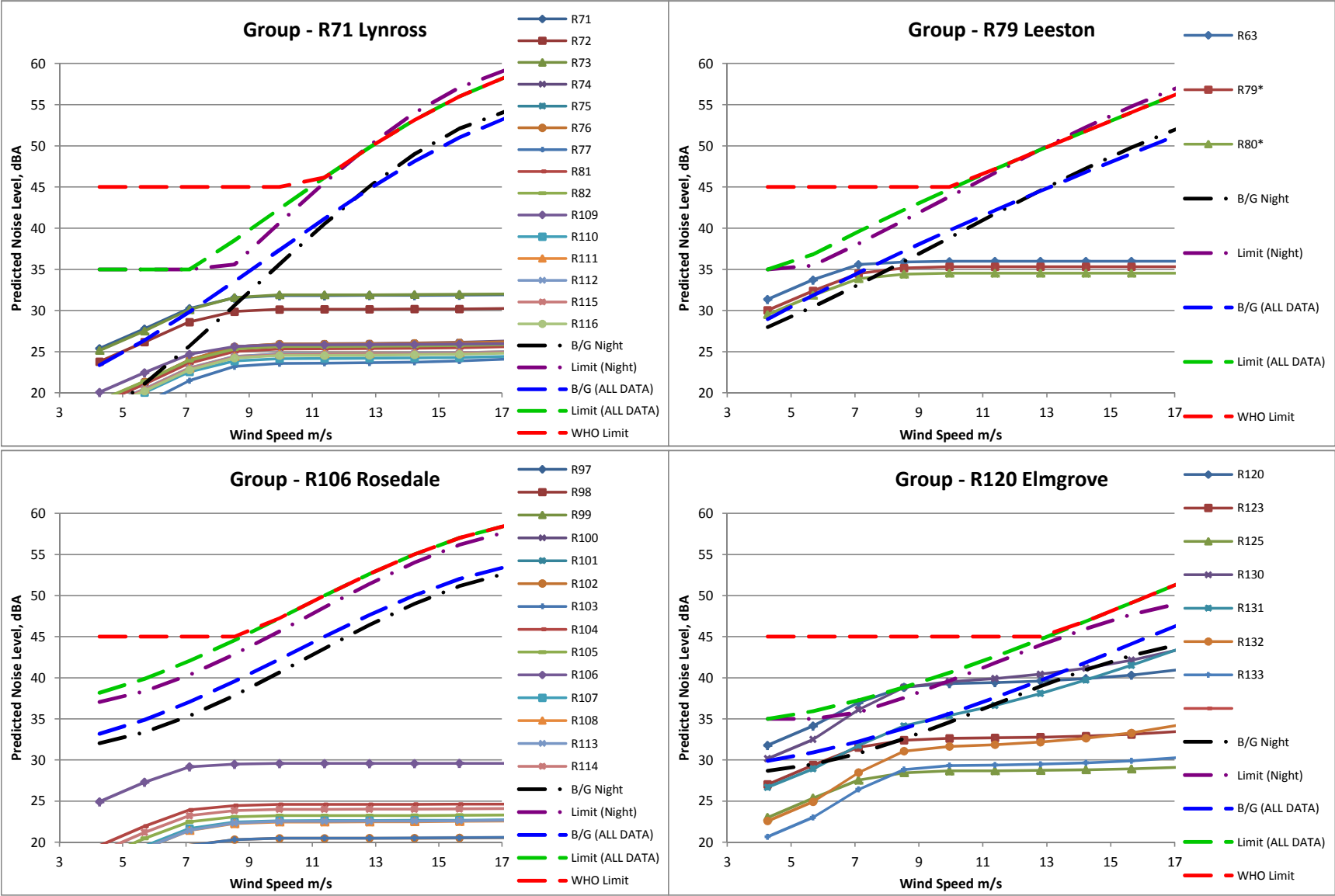
Appendix B – Scenario 2

Mitigated Layout : Crookwell 2 WF = GE 130 3.4 & Crookwell 3 WF = GE 130 3.4 MW

CW2 Turbine Name	WTG model / setting	CW3 Turbine Name	WTG model / setting
F1	GE 130 3.4 MW NRO100	A2	GE 130 3.4 MW NRO100
F2	GE 130 3.4 MW NRO100	A3	GE 130 3.4 MW NRO100
F3	GE 130 3.4 MW NRO100	A4	GE 130 3.4 MW NRO100
F4	GE 130 3.4 MW NRO100	A5	GE 130 3.4 MW NRO100
F5	GE 130 3.4 MW NRO100	A8	GE 130 3.4 MW NRO100
F7	GE 130 3.4 MW	A9	OFF
F10	GE 130 3.4 MW	A10	GE 130 3.4 MW NRO100
F11	GE 130 3.4 MW	A12	GE 130 3.4 MW NRO100
F12	GE 130 3.4 MW NRO100	A13	GE 130 3.4 MW NRO100
F17	GE 130 3.4 MW NRO100	A15	OFF
F19	GE 130 3.4 MW NRO100	A16	GE 130 3.4 MW NRO100
F21	GE 130 3.4 MW	A17	GE 130 3.4 MW NRO100
F22	GE 130 3.4 MW NRO100	A20	GE 130 3.4 MW NRO100
F23	GE 130 3.4 MW	A21	GE 130 3.4 MW NRO100
F24	GE 130 3.4 MW	A22	GE 130 3.4 MW
F26	GE 130 3.4 MW NRO100	A24	GE 130 3.4 MW NRO100
F27	GE 130 3.4 MW NRO100	A25	GE 130 3.4 MW NRO100
F28	GE 130 3.4 MW NRO100	A28	GE 130 3.4 MW NRO100
F29	GE 130 3.4 MW NRO100	A29	GE 130 3.4 MW NRO100
F30	GE 130 3.4 MW NRO100	A30	GE 130 3.4 MW
F31	GE 130 3.4 MW NRO100	A31	GE 130 3.4 MW NRO102
F32	GE 130 3.4 MW NRO100	A32	GE 130 3.4 MW NRO100
F35	GE 130 3.4 MW NRO100	A33	GE 130 3.4 MW NRO100
F36	GE 130 3.4 MW NRO100		
F37	GE 130 3.4 MW		
F40	GE 130 3.4 MW NRO100		
F41	GE 130 3.4 MW NRO100		
F43	GE 130 3.4 MW NRO100		
F45	GE 130 3.4 MW NRO102		
F47	GE 130 3.4 MW NRO100		
F48	GE 130 3.4 MW		
F50	GE 130 3.4 MW NRO100		







	Windspeed at 10m AGL	3.0	4.0	5.0	6.0	7.0	8.0	9.0	10.0	11.0	12.0
	Windspeed at Hub Height	4.3	5.7	7.1	8.5	10.0	11.4	12.8	14.2	15.7	17.1
Background Location:	R8 Narangi										
B/G Regression Line	$-0.0201x^3 + 0.7209x^2 - 5.4402x + 35.805$	24.2	24.5	26.4	29.4	33.3	37.6	42.1	46.4	50.2	53.0
SA EPA Criteria		35.0	35.0	35.0	35.0	38.3	42.6	47.1	51.4	55.2	58.0
NIGHT BG Regression Line	$-0.0257x^3 + 0.9097x^2 - 7.1972x + 37.793$	21.6	21.6	23.4	26.7	31.0	35.8	40.8	45.5	49.5	52.2
EPA Night Criteria		35.0	35.0	35.0	35.0	36.0	40.8	45.8	50.5	54.5	57.2
WHO Criteria		45.0	45.0	45.0	45.0	45.0	45.0	47.1	51.4	55.2	58.0
R1		25.3	27.7	30.2	31.6	31.8	31.8	31.9	31.9	31.9	32.0
R2		23.7	26.0	28.6	30.0	30.3	30.3	30.3	30.3	30.4	30.4
R3		21.7	24.1	26.7	28.1	28.4	28.4	28.4	28.4	28.4	28.5
R4		21.7	24.1	26.7	28.1	28.4	28.4	28.4	28.4	28.5	28.5
R5		21.2	23.5	26.2	27.7	28.1	28.1	28.1	28.1	28.1	28.2
R6		21.2	23.5	26.2	27.5	27.8	27.8	27.8	27.8	27.9	27.9
R7		21.8	24.1	26.8	28.1	28.3	28.4	28.4	28.4	28.4	28.4
R8		27.8	30.2	32.7	33.9	34.2	34.2	34.2	34.2	34.2	34.3
R21*		32.9	35.3	38.1	40.0	40.3	40.3	40.3	40.3	40.4	40.4
R21a*		33.5	35.9	39.0	41.0	41.5	41.5	41.5	41.5	41.5	41.5
R22*		33.2	35.6	38.8	41.0	41.4	41.4	41.5	41.5	41.5	41.5
R1a		28.0	30.3	32.9	34.3	34.6	34.6	34.6	34.7	34.7	34.9
Background Location:	R18 Wollondilly										
B/G Regression Line	$-0.0143x^3 + 0.5536x^2 - 4.7402x + 39.782$	28.5	28.1	28.9	30.8	33.4	36.5	39.8	43.2	46.4	49.1
SA EPA Criteria		35.0	35.0	35.0	35.8	38.4	41.5	44.8	48.2	51.4	54.1
NIGHT BG Regression Line	$-0.0229x^3 + 0.8605x^2 - 7.6186x + 43.885$	25.3	24.2	25.0	27.3	30.7	34.9	39.3	43.7	47.6	50.7
EPA Night Criteria		35.0	35.0	35.0	35.0	35.7	39.9	44.3	48.7	52.6	55.7
WHO Criteria		45.0	45.0	45.0	45.0	45.0	45.0	45.0	48.2	51.4	54.1
R17*		28.2	30.6	32.7	33.4	33.6	33.6	33.6	33.6	33.6	33.6
R18*		30.0	32.3	34.4	34.8	34.9	34.9	34.9	34.9	34.9	34.9
R19		30.0	32.4	34.5	35.2	35.3	35.3	35.3	35.3	35.3	35.4
R29		19.9	22.3	24.7	25.8	26.1	26.1	26.1	26.1	26.1	26.1
R30		20.0	22.4	24.7	25.8	26.0	26.0	26.0	26.0	26.0	26.1
R31		17.3	19.7	22.1	23.1	23.3	23.3	23.3	23.3	23.3	23.4
R32		17.3	19.7	22.1	23.2	23.4	23.4	23.4	23.4	23.5	23.5
R33		21.2	23.6	25.9	26.9	27.1	27.1	27.1	27.2	27.2	27.2
R34		22.5	24.9	27.3	28.4	28.6	28.6	28.6	28.6	28.6	28.6
R35		21.9	24.3	26.7	27.7	27.9	27.9	27.9	27.9	27.9	27.9
R36		21.8	24.2	26.5	27.4	27.6	27.6	27.6	27.6	27.7	27.7
R37		24.1	26.5	28.9	30.0	30.2	30.2	30.2	30.2	30.2	30.2
R39		25.8	28.1	30.6	31.6	31.9	31.9	31.9	31.9	31.9	31.9
R40		21.2	23.6	26.0	27.0	27.2	27.2	27.2	27.2	27.2	27.3
R41		20.0	22.3	24.7	25.8	26.1	26.1	26.1	26.1	26.1	26.1
Background Location:	R20 Normaroo										
B/G Regression Line	$-0.0124x^3 + 0.4392x^2 - 2.7661x + 29.349$	24.6	25.5	27.4	30.0	33.1	36.5	39.9	43.2	46.1	48.4
SA EPA Criteria		35.0	35.0	35.0	35.0	38.1	41.5	44.9	48.2	51.1	53.4
NIGHT BG Regression Line	$-0.0166x^3 + 0.5896x^2 - 4.1646x + 30.403$	22.1	22.7	24.6	27.5	31.0	34.9	38.9	42.7	46.0	48.6
EPA Night Criteria		35.0	35.0	35.0	35.0	36.0	39.9	43.9	47.7	51.0	53.6
WHO Criteria		45.0	45.0	45.0	45.0	45.0	45.0	45.0	48.2	51.1	53.4
R20		29.9	32.3	34.4	35.1	35.3	35.3	35.3	35.3	35.3	35.3
R23*		37.0	39.3	41.8	43.1	43.4	43.4	43.4	43.4	43.4	43.4
R24*		37.9	40.2	42.1	42.6	42.7	42.7	42.7	42.7	42.7	42.7
R25*		36.7	39.1	41.4	42.6	42.9	42.9	42.9	42.9	42.9	42.9
R26*		36.7	39.1	41.3	42.4	42.6	42.6	42.6	42.6	42.6	42.6
R27*		36.7	39.1	41.3	42.3	42.5	42.5	42.5	42.5	42.5	42.5
R28*		36.6	39.0	41.1	41.9	42.0	42.0	42.0	42.0	42.0	42.1
R117		29.5	31.8	34.1	35.0	35.2	35.2	35.2	35.2	35.2	35.2
R118		27.9	30.2	32.6	33.7	34.0	34.0	34.0	34.0	34.1	34.1
R119		28.3	30.6	33.1	34.4	34.7	34.7	34.7	34.7	34.7	34.8
Background Location:	R58 600 Woodhouselee Rd										
B/G Regression Line	$-0.0045x^3 + 0.2194x^2 - 1.5322x + 31.956$	29.1	29.5	30.5	32.1	34.0	36.3	38.9	41.6	44.5	47.4
SA EPA Criteria		35.0	35.0	35.5	37.1	39.0	41.3	43.9	46.6	49.5	52.4
NIGHT BG Regression Line	$-0.0053x^3 + 0.2472x^2 - 1.6363x + 29.838$	26.9	27.6	28.8	30.6	32.8	35.4	38.3	41.3	44.5	47.6
EPA Night Criteria		35.0	35.0	35.0	35.6	37.8	40.4	43.3	46.3	49.5	52.6
WHO Criteria		45.0	45.0	45.0	45.0	45.0	45.0	45.0	46.6	49.5	52.4
R12		19.2	21.5	23.9	25.0	25.2	25.2	25.2	25.2	25.2	25.2
R13		19.1	21.5	23.9	25.0	25.2	25.2	25.2	25.2	25.2	25.2
R14		19.5	21.9	24.3	25.3	25.6	25.6	25.6	25.6	25.6	25.6
R15		19.7	22.1	24.5	25.5	25.8	25.8	25.8	25.8	25.8	25.8
R16		17.6	19.9	22.4	23.4	23.7	23.7	23.7	23.7	23.7	23.7
R43		13.2	15.6	18.0	19.0	19.2	19.2	19.2	19.2	19.3	19.3
R45		18.4	20.7	23.1	24.2	24.4	24.4	24.4	24.4	24.4	24.5
R46		18.7	21.1	23.5	24.5	24.8	24.8	24.8	24.8	24.8	24.8
R47		18.9	21.3	23.6	24.7	24.9	24.9	24.9	24.9	24.9	25.0
R48		19.4	21.7	24.1	25.1	25.4	25.4	25.4	25.4	25.4	25.4
R49		19.7	22.0	24.4	25.4	25.7	25.7	25.7	25.7	25.7	25.7
R50		20.0	22.3	24.7	25.7	26.0	26.0	26.0	26.0	26.0	26.0
R51		19.8	22.1	24.5	25.6	25.8	25.8	25.8	25.8	25.8	25.9
R52		19.6	22.0	24.4	25.5	25.7	25.7	25.7	25.7	25.7	25.8
R53		21.5	23.9	26.3	27.4	27.6	27.6	27.6	27.6	27.6	27.6
R54		22.2	24.5	27.0	28.1	28.4	28.4	28.4	28.4	28.4	28.4
R55		22.6	25.0	27.3	28.3	28.6	28.6	28.6	28.6	28.6	28.6
R56		23.1	25.5	27.9	28.9	29.2	29.2	29.2	29.2	29.2	29.2
R57		23.1	25.5	27.9	29.0	29.3	29.3	29.3	29.3	29.3	29.3
R58		26.7	29.1	31.3	32.2	32.4	32.4	32.4	32.4	32.4	32.4
R59		27.8	30.1	32.3	33.2	33.4	33.4	33.4	33.4	33.4	33.4
R83		19.3	21.7	24.0	25.1	25.3	25.3	25.3	25.3	25.3	25.3

	Windspeed at 10m AGL	3.0	4.0	5.0	6.0	7.0	8.0	9.0	10.0	11.0	12.0
	Windspeed at Hub Height	4.3	5.7	7.1	8.5	10.0	11.4	12.8	14.2	15.7	17.1
R84		22.0	24.4	26.7	27.7	27.9	27.9	27.9	27.9	27.9	27.9
R87		15.2	17.5	19.7	20.7	20.9	20.9	20.9	20.9	20.9	20.9
R88		11.0	13.4	15.6	16.5	16.7	16.7	16.7	16.7	16.7	16.7
R89		12.5	14.9	17.1	17.9	18.1	18.1	18.1	18.1	18.1	18.1
R90		11.7	14.1	16.3	17.1	17.3	17.3	17.3	17.3	17.3	17.4
R91		12.8	15.2	17.4	18.3	18.5	18.5	18.5	18.5	18.5	18.5
R93		11.3	13.7	15.9	16.9	17.1	17.1	17.1	17.1	17.1	17.2
R96		9.9	12.3	14.5	15.4	15.6	15.6	15.6	15.6	15.7	15.7
R134		22.7	25.0	27.4	28.4	28.6	28.6	28.6	28.6	28.6	28.6
R134a		21.2	23.6	26.1	27.4	27.7	27.7	27.7	27.7	27.7	27.7
R135a		26.8	29.2	31.4	32.2	32.4	32.4	32.4	32.4	32.4	32.4
Background Location: R62 Cottonwood											
B/G Regression Line	$-0.0135x^3 + 0.4454x^2 - 2.4834x + 29.187$	25.7	27.0	29.2	32.0	35.3	38.7	42.1	45.1	47.7	49.4
SA EPA Criteria		35.0	35.0	35.0	37.0	40.3	43.7	47.1	50.1	52.7	54.4
NIGHT BG Regression Line	$-0.0198x^3 + 0.6869x^2 - 5.0582x + 34.828$	24.2	24.6	26.5	29.4	33.0	37.1	41.1	44.9	48.0	50.2
EPA Night Criteria		35.0	35.0	35.0	35.0	38.0	42.1	46.1	49.9	53.0	55.2
WHO Criteria		45.0	45.0	45.0	45.0	45.0	45.0	47.1	50.1	52.7	54.4
R60		27.3	29.7	32.2	33.4	33.6	33.6	33.6	33.7	33.7	33.7
R61		28.3	30.7	32.8	33.6	33.7	33.7	33.7	33.7	33.7	33.7
R62		28.2	30.6	32.7	33.4	33.6	33.6	33.6	33.6	33.6	33.6
Background Location: R64 Valdarmon Hill											
B/G Regression Line	$-0.0032x^3 + 0.0596x^2 + 2.2844x + 12.521$	23.1	26.9	30.6	34.4	38.0	41.5	44.8	47.9	50.6	53.0
SA EPA Criteria		35.0	35.0	35.6	39.4	43.0	46.5	49.8	52.9	55.6	58.0
NIGHT BG Regression Line	$-0.0093x^3 + 0.2628x^2 + 0.5447x + 13.759$	20.1	23.7	27.6	31.8	36.1	40.3	44.3	47.9	51.0	53.4
EPA Night Criteria		35.0	35.0	35.0	36.8	41.1	45.3	49.3	52.9	56.0	58.4
WHO Criteria		45.0	45.0	45.0	45.0	45.0	46.5	49.8	52.9	55.6	58.0
R64		30.8	33.2	35.4	36.3	36.5	36.5	36.5	36.5	36.5	36.5
R65		30.4	32.8	35.0	35.9	36.1	36.1	36.1	36.1	36.1	36.1
Background Location: R66 Little Vale											
B/G Regression Line	$-0.0038x^3 + 0.1588x^2 + 0.201x + 17.442$	20.9	23.0	25.5	28.4	31.4	34.7	38.1	41.5	44.9	48.3
SA EPA Criteria		35.0	35.0	35.0	35.0	36.4	39.7	43.1	46.5	49.9	53.3
NIGHT BG Regression Line	$-0.0126x^3 + 0.4524x^2 - 2.0963x + 17.752$	16.1	18.2	21.2	25.0	29.3	33.9	38.6	43.2	47.5	51.1
EPA Night Criteria		35.0	35.0	35.0	35.0	35.0	38.9	43.6	48.2	52.5	56.1
WHO Criteria		45.0	45.0	45.0	45.0	45.0	45.0	45.0	46.5	49.9	53.3
R66		30.7	33.1	34.9	35.0	35.1	35.1	35.1	35.1	35.1	35.1
R67		28.4	30.8	32.6	32.8	32.8	32.8	32.8	32.8	32.8	32.8
Background Location: R70 Snowgums											
B/G Regression Line	$-0.0182x^3 + 0.5772x^2 - 3.0782x + 26.75$	22.7	24.6	27.5	31.2	35.4	39.7	43.8	47.4	50.2	51.9
SA EPA Criteria		35.0	35.0	35.0	36.2	40.4	44.7	48.8	52.4	55.2	56.9
NIGHT BG Regression Line	$-0.0183x^3 + 0.5563x^2 - 1.9759x + 16.123$	16.4	19.5	23.6	28.4	33.5	38.7	43.6	47.9	51.3	53.5
EPA Night Criteria		35.0	35.0	35.0	35.0	38.5	43.7	48.6	52.9	56.3	58.5
WHO Criteria		45.0	45.0	45.0	45.0	45.0	45.0	48.8	52.4	55.2	56.9
R68		27.3	29.7	31.9	32.9	33.1	33.1	33.1	33.1	33.1	33.1
R69		28.3	30.7	32.8	33.5	33.6	33.6	33.6	33.6	33.6	33.6
R70		29.2	31.6	34.2	35.6	35.9	35.9	35.9	35.9	35.9	36.0
Background Location: R71 Lynross											
B/G Regression Line	$-0.0083x^3 + 0.2433x^2 + 0.3267x + 18.194$	23.4	26.4	29.8	33.5	37.4	41.2	44.8	48.1	51.0	53.3
SA EPA Criteria		35.0	35.0	35.0	38.5	42.4	46.2	49.8	53.1	56.0	58.3
NIGHT BG Regression Line	$-0.0136x^3 + 0.3747x^2 + 0.0985x + 10.908$	17.1	21.1	25.7	30.6	35.6	40.5	45.1	49.0	52.1	54.1
EPA Night Criteria		35.0	35.0	35.0	35.6	40.6	45.5	50.1	54.0	57.1	59.1
WHO Criteria		45.0	45.0	45.0	45.0	45.0	46.2	49.8	53.1	56.0	58.3
R71		25.4	27.8	30.3	31.6	31.8	31.8	31.8	31.8	31.9	31.9
R72		23.8	26.2	28.6	29.9	30.1	30.2	30.2	30.2	30.2	30.2
R73		25.2	27.5	30.1	31.6	31.9	31.9	31.9	31.9	32.0	32.0
R74		19.0	21.3	24.0	25.6	25.9	26.0	26.0	26.1	26.1	26.3
R75		18.7	21.1	23.8	25.4	25.7	25.8	25.8	25.9	26.0	26.1
R76		19.0	21.4	24.0	25.6	25.9	25.9	26.0	26.0	26.1	26.2
R77		16.4	18.7	21.5	23.2	23.6	23.6	23.7	23.7	23.9	24.1
R81		18.7	21.1	23.6	25.0	25.3	25.4	25.4	25.4	25.5	25.6
R82		19.0	21.4	23.9	25.3	25.6	25.6	25.7	25.7	25.7	25.8
R109		20.1	22.5	24.7	25.6	25.8	25.9	25.9	25.9	25.9	26.0
R110		17.7	20.1	22.5	23.9	24.2	24.2	24.2	24.2	24.3	24.4
R111		18.1	20.5	23.0	24.4	24.7	24.8	24.8	24.8	24.9	25.0
R112		18.1	20.5	23.0	24.4	24.7	24.7	24.8	24.8	24.9	25.0
R115		18.0	20.4	22.9	24.3	24.6	24.7	24.7	24.7	24.8	24.9
R116		17.9	20.2	22.8	24.2	24.5	24.6	24.6	24.6	24.7	24.8
Background Location: R79 Leeston											
B/G Regression Line	$0.001x^3 - 0.053x^2 + 2.4941x + 19.177$	28.9	31.8	34.6	37.2	39.7	42.2	44.5	46.8	49.1	51.3
SA EPA Criteria		35.0	36.8	39.6	42.2	44.7	47.2	49.5	51.8	54.1	56.3
NIGHT BG Regression Line	$-0.0038x^3 + 0.1151x^2 + 0.878x + 22.436$	28.0	30.5	33.1	36.0	38.8	41.7	44.6	47.3	49.8	52.1
EPA Night Criteria		35.0	35.5	38.1	41.0	43.8	46.7	49.6	52.3	54.8	57.1
WHO Criteria		45.0	45.0	45.0	45.0	45.0	47.2	49.5	51.8	54.1	56.3
R63		31.4	33.7	35.6	35.9	36.0	36.0	36.0	36.0	36.0	36.0
R79*		30.0	32.4	34.5	35.2	35.3	35.3	35.3	35.3	35.3	35.3
R80*		29.5	31.9	33.9	34.4	34.5	34.5	34.5	34.5	34.5	34.5

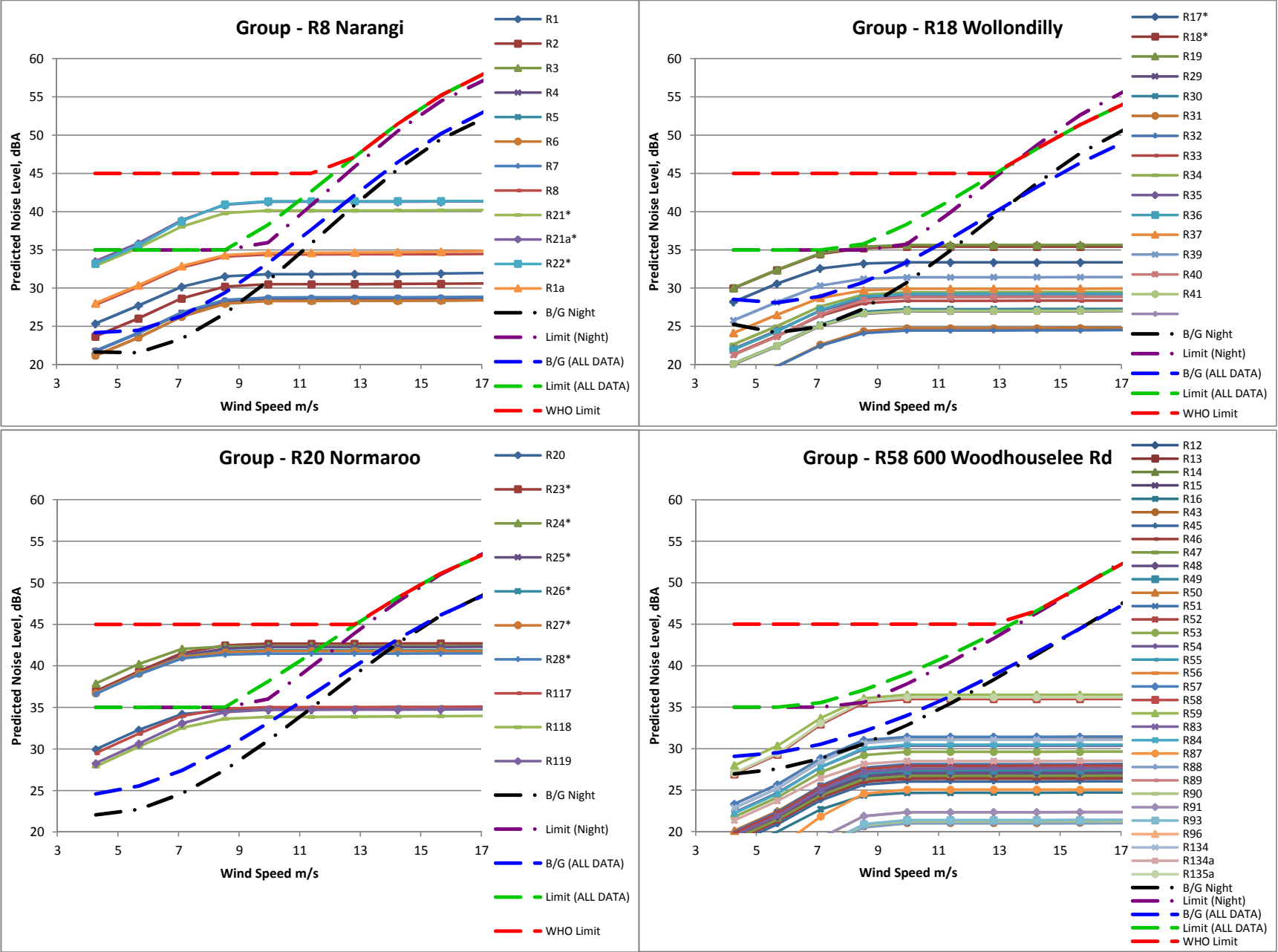
Windspeed at 10m AGL		3.0	4.0	5.0	6.0	7.0	8.0	9.0	10.0	11.0	12.0
Windspeed at Hub Height		4.3	5.7	7.1	8.5	10.0	11.4	12.8	14.2	15.7	17.1
Background Location: R106 Rosedale											
B/G Regression Line	$-0.0085x^3 + 0.2644x^2 - 0.8076x + 32.476$	33.2	34.9	37.1	39.6	42.3	45.0	47.6	50.0	52.0	53.5
SA EPA Criteria		38.2	39.9	42.1	44.6	47.3	50.0	52.6	55.0	57.0	58.5
NIGHT BG Regression Line	$-0.0109x^3 + 0.3551x^2 - 1.7974x + 34.095$	32.0	33.4	35.4	37.8	40.7	43.6	46.4	49.0	51.2	52.7
EPA Night Criteria		37.0	38.4	40.4	42.8	45.7	48.6	51.4	54.0	56.2	57.7
WHO Criteria		45.0	45.0	45.0	45.0	47.3	50.0	52.6	55.0	57.0	58.5
R97		13.7	16.1	18.2	19.0	19.2	19.2	19.2	19.2	19.2	19.2
R98		12.1	14.4	16.6	17.4	17.6	17.6	17.6	17.6	17.6	17.7
R99		12.9	15.3	17.4	18.2	18.4	18.4	18.4	18.4	18.4	18.5
R100		13.5	15.9	18.0	18.8	19.0	19.0	19.0	19.0	19.0	19.1
R101		12.5	14.9	17.0	17.8	18.0	18.0	18.0	18.0	18.1	18.1
R102		15.2	17.5	19.6	20.3	20.5	20.5	20.5	20.5	20.5	20.6
R103		15.1	17.5	19.6	20.3	20.5	20.5	20.5	20.5	20.5	20.6
R104		19.6	21.9	23.9	24.5	24.6	24.6	24.6	24.6	24.6	24.6
R105		18.1	20.5	22.5	23.1	23.2	23.2	23.2	23.3	23.3	23.3
R106		24.9	27.3	29.2	29.5	29.6	29.6	29.6	29.6	29.6	29.6
R107		17.2	19.5	21.7	22.4	22.6	22.6	22.6	22.7	22.7	22.7
R108		16.9	19.2	21.4	22.3	22.5	22.5	22.5	22.5	22.5	22.6
R113		16.9	19.3	21.5	22.3	22.5	22.5	22.6	22.6	22.6	22.7
R114		18.8	21.2	23.2	23.8	24.0	24.0	24.0	24.0	24.0	24.1
Background Location: R120 Elmgrove											
B/G Regression Line	$-0.0023x^3 + 0.1114x^2 - 0.2106x + 28.947$	29.9	30.9	32.3	33.8	35.6	37.6	39.7	41.9	44.1	46.4
SA EPA Criteria		35.0	35.9	37.3	38.8	40.6	42.6	44.7	46.9	49.1	51.4
NIGHT BG Regression Line	$-0.0083x^3 + 0.2813x^2 - 1.6306x + 31.151$	28.7	29.5	30.8	32.6	34.6	36.8	39.0	41.0	42.7	44.0
EPA Night Criteria		35.0	35.0	35.8	37.6	39.6	41.8	44.0	46.0	47.7	49.0
WHO Criteria		45.0	45.0	45.0	45.0	45.0	45.0	45.0	46.9	49.1	51.4
R120		31.8	34.2	37.0	38.9	39.3	39.4	39.6	39.9	40.3	41.0
R123		27.0	29.4	31.5	32.4	32.6	32.7	32.8	32.9	33.1	33.4
R125		23.0	25.4	27.6	28.5	28.7	28.7	28.7	28.8	28.9	29.1
R130		30.2	32.5	36.1	38.9	39.5	39.9	40.4	41.2	42.2	43.4
R131		26.7	28.9	31.8	34.1	35.4	36.6	38.1	39.7	41.5	43.4
R132		22.6	24.9	28.5	31.1	31.7	31.9	32.2	32.6	33.3	34.2
R133		20.7	23.0	26.4	28.8	29.3	29.4	29.5	29.7	29.9	30.3

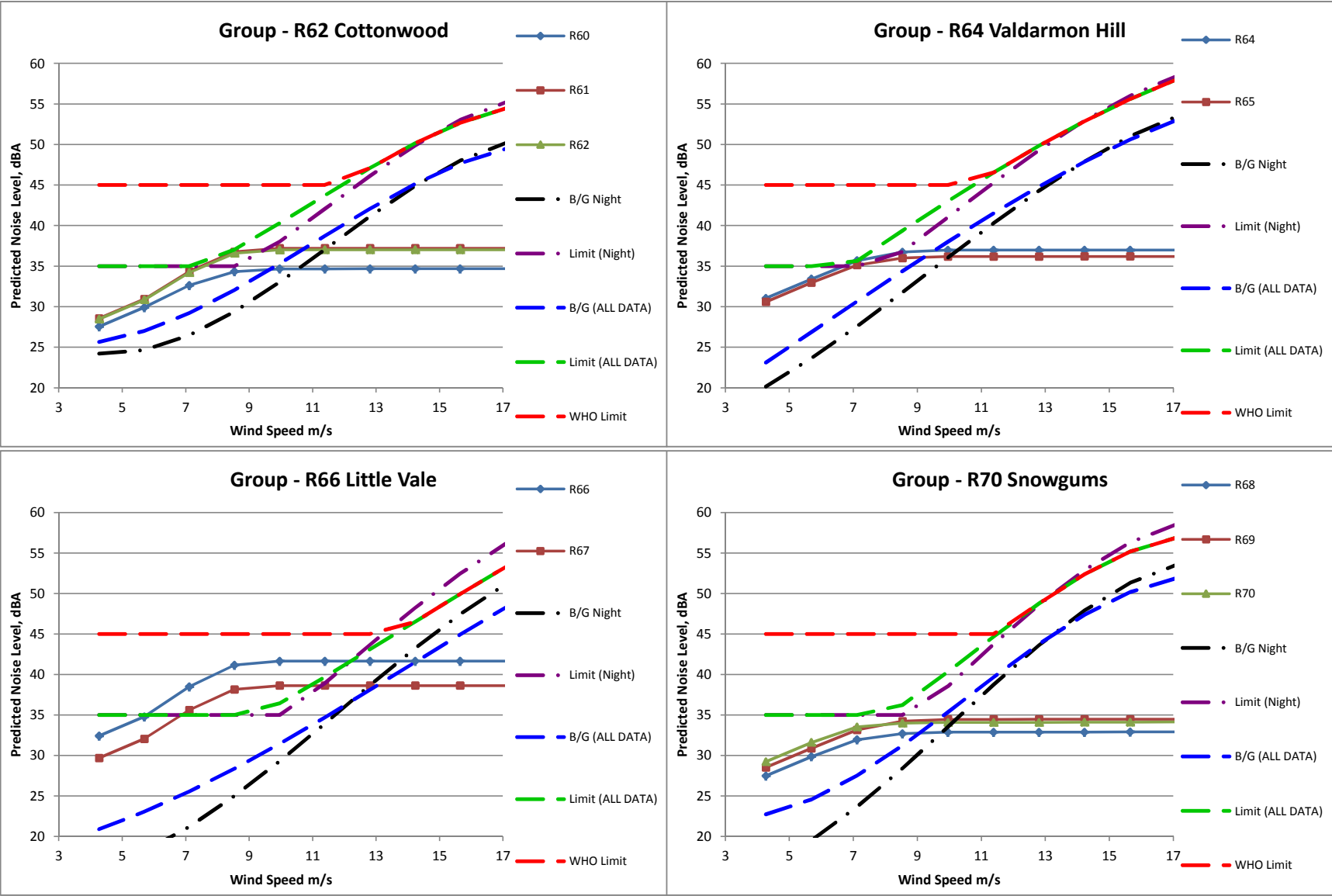
Appendix C – Scenario 3

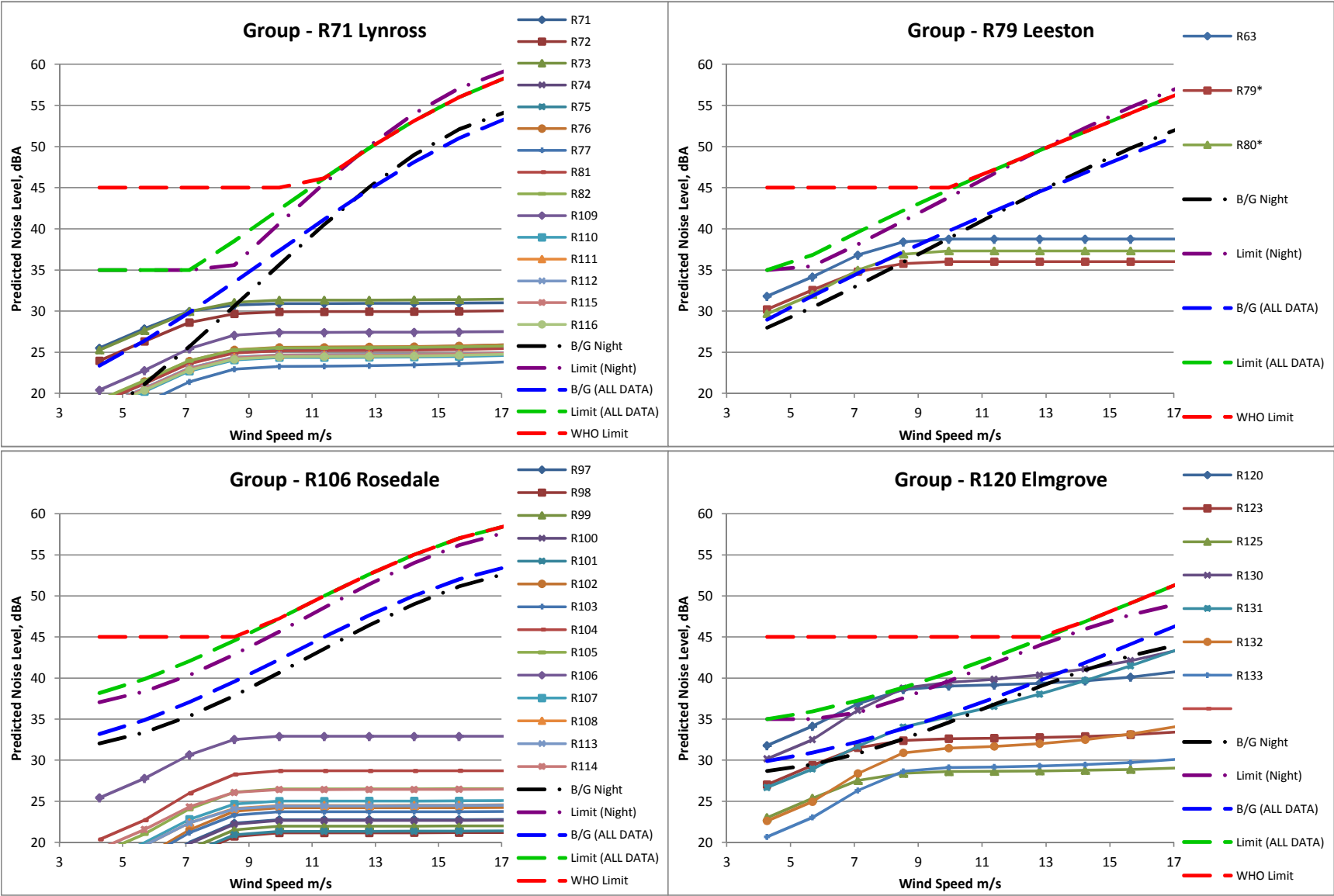
Mitigated Layout : Crookwell 2 WF = GE 130 3.4 MW & Crookwell 3 WF = GE 130 3.4 MW

Little Vale is Project involved

CW2 Turbine Name	WTG model / setting	CW3 Turbine Name	WTG model / setting
F1	GE 130 3.4 MW NRO100	A2	GE 130 3.4 MW NRO100
F2	GE 130 3.4 MW NRO100	A3	GE 130 3.4 MW NRO100
F3	GE 130 3.4 MW NRO100	A4	GE 130 3.4 MW NRO100
F4	GE 130 3.4 MW NRO100	A5	GE 130 3.4 MW
F5	GE 130 3.4 MW NRO100	A8	GE 130 3.4 MW NRO100
F7	GE 130 3.4 MW	A9	GE 130 3.4 MW
F10	GE 130 3.4 MW	A10	GE 130 3.4 MW NRO100
F11	GE 130 3.4 MW	A12	GE 130 3.4 MW NRO100
F12	GE 130 3.4 MW NRO100	A13	GE 130 3.4 MW
F17	GE 130 3.4 MW NRO100	A15	GE 130 3.4 MW
F19	GE 130 3.4 MW NRO100	A16	GE 130 3.4 MW NRO100
F21	GE 130 3.4 MW	A17	GE 130 3.4 MW
F22	GE 130 3.4 MW NRO100	A20	GE 130 3.4 MW
F23	GE 130 3.4 MW NRO100	A21	GE 130 3.4 MW
F24	GE 130 3.4 MW NRO100	A22	GE 130 3.4 MW
F26	GE 130 3.4 MW NRO100	A24	GE 130 3.4 MW
F27	GE 130 3.4 MW NRO100	A25	GE 130 3.4 MW
F28	GE 130 3.4 MW NRO100	A28	GE 130 3.4 MW NRO100
F29	GE 130 3.4 MW NRO100	A29	GE 130 3.4 MW NRO100
F30	GE 130 3.4 MW NRO100	A30	GE 130 3.4 MW
F31	GE 130 3.4 MW NRO100	A31	GE 130 3.4 MW
F32	GE 130 3.4 MW NRO100	A32	GE 130 3.4 MW NRO100
F35	GE 130 3.4 MW NRO100	A33	GE 130 3.4 MW NRO100
F36	GE 130 3.4 MW NRO100	A24	GE 130 3.4 MW
F37	GE 130 3.4 MW NRO100		
F40	GE 130 3.4 MW NRO100		
F41	GE 130 3.4 MW NRO100		
F43	GE 130 3.4 MW NRO100		
F45	GE 130 3.4 MW NRO100		
F47	GE 130 3.4 MW NRO100		
F48	GE 130 3.4 MW NRO100		
F50	GE 130 3.4 MW NRO100		







Windspeed at 10m AGL		3.0	4.0	5.0	6.0	7.0	8.0	9.0	10.0	11.0	12.0
Windspeed at Hub Height		4.3	5.7	7.1	8.5	10.0	11.4	12.8	14.2	15.7	17.1
Background Location:	R8 Narangi										
B/G Regression Line	$-0.0201x^3 + 0.7209x^2 - 5.4402x + 35.805$	24.2	24.5	26.4	29.4	33.3	37.6	42.1	46.4	50.2	53.0
SA EPA Criteria		35.0	35.0	35.0	35.0	38.3	42.6	47.1	51.4	55.2	58.0
NIGHT BG Regression Line	$-0.0257x^3 + 0.9097x^2 - 7.1972x + 37.793$	21.6	21.6	23.4	26.7	31.0	35.8	40.8	45.5	49.5	52.2
EPA Night Criteria		35.0	35.0	35.0	35.0	36.0	40.8	45.8	50.5	54.5	57.2
WHO Criteria		45.0	45.0	45.0	45.0	45.0	45.0	47.1	51.4	55.2	58.0
R1		25.3	27.7	30.2	31.5	31.8	31.8	31.8	31.9	31.9	32.0
R2		23.7	26.0	28.6	30.2	30.5	30.5	30.5	30.5	30.6	30.6
R3		21.7	24.1	26.7	28.1	28.4	28.5	28.5	28.5	28.5	28.6
R4		21.8	24.1	26.7	28.3	28.6	28.6	28.6	28.7	28.7	28.7
R5		21.2	23.5	26.3	28.0	28.3	28.3	28.3	28.4	28.4	28.4
R6		21.2	23.5	26.3	28.0	28.3	28.3	28.3	28.3	28.4	28.4
R7		21.8	24.1	26.8	28.5	28.8	28.8	28.8	28.8	28.8	28.9
R8		27.8	30.2	32.7	34.1	34.4	34.4	34.4	34.4	34.4	34.5
R21*		32.9	35.3	38.0	39.8	40.1	40.1	40.2	40.2	40.2	40.2
R21a*		33.5	35.9	38.9	40.9	41.3	41.3	41.3	41.3	41.3	41.3
R22*		33.2	35.6	38.7	40.9	41.4	41.4	41.4	41.4	41.4	41.4
R1a		28.0	30.3	32.9	34.3	34.6	34.6	34.6	34.7	34.8	34.9
Background Location:	R18 Wollondilly										
B/G Regression Line	$-0.0143x^3 + 0.5536x^2 - 4.7402x + 39.782$	28.5	28.1	28.9	30.8	33.4	36.5	39.8	43.2	46.4	49.1
SA EPA Criteria		35.0	35.0	35.0	35.8	38.4	41.5	44.8	48.2	51.4	54.1
NIGHT BG Regression Line	$-0.0229x^3 + 0.8605x^2 - 7.6186x + 43.885$	25.3	24.2	25.0	27.3	30.7	34.9	39.3	43.7	47.6	50.7
EPA Night Criteria		35.0	35.0	35.0	35.0	35.7	39.9	44.3	48.7	52.6	55.7
WHO Criteria		45.0	45.0	45.0	45.0	45.0	45.0	45.0	48.2	51.4	54.1
R17*		28.2	30.6	32.6	33.2	33.4	33.4	33.4	33.4	33.4	33.4
R18*		30.0	32.3	34.5	35.2	35.4	35.4	35.4	35.4	35.4	35.4
R19		30.0	32.4	34.5	35.4	35.6	35.6	35.6	35.6	35.6	35.7
R29		20.0	22.4	25.0	26.6	27.0	27.0	27.0	27.0	27.0	27.0
R30		20.1	22.5	25.2	26.9	27.3	27.3	27.3	27.3	27.3	27.3
R31		17.4	19.8	22.6	24.4	24.8	24.8	24.8	24.8	24.8	24.8
R32		17.4	19.8	22.5	24.1	24.4	24.5	24.5	24.5	24.5	24.5
R33		21.4	23.7	26.4	28.0	28.3	28.3	28.3	28.4	28.4	28.4
R34		22.6	25.0	27.6	29.1	29.5	29.5	29.5	29.5	29.5	29.5
R35		22.1	24.4	27.0	28.6	28.9	28.9	28.9	28.9	28.9	28.9
R36		22.0	24.3	27.1	28.9	29.3	29.3	29.3	29.3	29.3	29.3
R37		24.1	26.5	28.7	29.7	29.9	29.9	29.9	29.9	29.9	29.9
R39		25.8	28.1	30.3	31.2	31.4	31.4	31.4	31.4	31.4	31.4
R40		21.3	23.6	26.5	28.4	28.8	28.8	28.8	28.8	28.8	28.8
R41		20.1	22.5	25.1	26.7	27.0	27.0	27.0	27.0	27.0	27.1
Background Location:	R20 Normaroo										
B/G Regression Line	$-0.0124x^3 + 0.4392x^2 - 2.7661x + 29.349$	24.6	25.5	27.4	30.0	33.1	36.5	39.9	43.2	46.1	48.4
SA EPA Criteria		35.0	35.0	35.0	35.0	38.1	41.5	44.9	48.2	51.1	53.4
NIGHT BG Regression Line	$-0.0166x^3 + 0.5896x^2 - 4.1646x + 30.403$	22.1	22.7	24.6	27.5	31.0	34.9	38.9	42.7	46.0	48.6
EPA Night Criteria		35.0	35.0	35.0	35.0	36.0	39.9	43.9	47.7	51.0	53.6
WHO Criteria		45.0	45.0	45.0	45.0	45.0	45.0	45.0	48.2	51.1	53.4
R20		29.9	32.3	34.2	34.6	34.7	34.7	34.7	34.7	34.8	34.8
R23*		37.0	39.3	41.5	42.5	42.7	42.7	42.7	42.7	42.7	42.7
R24*		37.9	40.2	42.1	42.3	42.4	42.4	42.4	42.4	42.4	42.4
R25*		36.7	39.1	41.2	42.1	42.3	42.3	42.3	42.3	42.3	42.3
R26*		36.7	39.1	41.1	41.7	41.9	41.9	41.9	41.9	41.9	41.9
R27*		36.7	39.1	41.1	41.6	41.8	41.8	41.8	41.8	41.8	41.8
R28*		36.6	39.0	40.9	41.4	41.5	41.5	41.5	41.5	41.5	41.5
R117		29.5	31.8	34.0	34.8	35.0	35.0	35.0	35.1	35.1	35.1
R118		27.9	30.3	32.5	33.6	33.9	33.9	33.9	33.9	33.9	34.0
R119		28.3	30.6	33.1	34.4	34.7	34.7	34.7	34.8	34.8	34.8
Background Location:	R58 600 Woodhouselee Rd										
B/G Regression Line	$-0.0045x^3 + 0.2194x^2 - 1.5322x + 31.956$	29.1	29.5	30.5	32.1	34.0	36.3	38.9	41.6	44.5	47.4
SA EPA Criteria		35.0	35.0	35.5	37.1	39.0	41.3	43.9	46.6	49.5	52.4
NIGHT BG Regression Line	$-0.0053x^3 + 0.2472x^2 - 1.6363x + 29.838$	26.9	27.6	28.8	30.6	32.8	35.4	38.3	41.3	44.5	47.6
EPA Night Criteria		35.0	35.0	35.0	35.6	37.8	40.4	43.3	46.3	49.5	52.6
WHO Criteria		45.0	45.0	45.0	45.0	45.0	45.0	45.0	46.6	49.5	52.4
R12		19.3	21.7	24.5	26.3	26.7	26.7	26.7	26.7	26.7	26.7
R13		19.3	21.6	24.4	26.2	26.6	26.6	26.6	26.6	26.6	26.6
R14		19.7	22.0	24.8	26.6	26.9	26.9	27.0	27.0	27.0	27.0
R15		19.8	22.2	25.0	26.7	27.1	27.1	27.1	27.1	27.1	27.1
R16		17.6	20.0	22.7	24.3	24.7	24.7	24.7	24.7	24.7	24.7
R43		13.4	15.7	18.7	20.7	21.0	21.0	21.0	21.1	21.1	21.1
R45		18.5	20.9	23.8	25.7	26.0	26.0	26.0	26.0	26.0	26.1
R46		18.9	21.2	24.1	26.0	26.4	26.4	26.4	26.4	26.4	26.4
R47		19.1	21.4	24.4	26.3	26.7	26.7	26.7	26.7	26.7	26.7
R48		19.5	21.9	24.8	26.7	27.0	27.0	27.0	27.0	27.1	27.1
R49		19.8	22.1	25.1	27.0	27.4	27.4	27.4	27.4	27.4	27.4
R50		20.1	22.5	25.5	27.5	27.9	27.9	27.9	27.9	27.9	28.0
R51		20.0	22.3	25.5	27.7	28.1	28.1	28.1	28.1	28.1	28.1
R52		19.8	22.2	25.3	27.5	27.9	27.9	27.9	27.9	27.9	28.0
R53		21.8	24.1	27.2	29.2	29.6	29.6	29.6	29.6	29.6	29.6
R54		22.3	24.7	27.8	29.9	30.4	30.4	30.4	30.4	30.4	30.4
R55		22.8	25.2	28.4	30.7	31.1	31.1	31.1	31.1	31.1	31.1
R56		23.3	25.7	28.8	31.0	31.4	31.4	31.4	31.4	31.4	31.4
R57		23.3	25.7	28.8	31.0	31.4	31.4	31.4	31.4	31.4	31.4
R58		26.9	29.3	32.9	35.5	36.0	36.0	36.0	36.0	36.0	36.0
R59		28.0	30.3	33.7	36.1	36.5	36.5	36.5	36.5	36.5	36.5
R83		19.5	21.9	25.0	27.2	27.6	27.6	27.6	27.6	27.6	27.6

	Windspeed at 10m AGL	3.0	4.0	5.0	6.0	7.0	8.0	9.0	10.0	11.0	12.0
	Windspeed at Hub Height	4.3	5.7	7.1	8.5	10.0	11.4	12.8	14.2	15.7	17.1
R84		22.2	24.6	27.8	30.0	30.5	30.5	30.5	30.5	30.5	30.5
R87		15.6	18.0	21.8	24.6	25.1	25.1	25.1	25.1	25.1	25.1
R88		11.9	14.2	17.9	20.5	21.0	21.0	21.0	21.0	21.0	21.0
R89		13.2	15.5	19.2	21.8	22.3	22.3	22.3	22.3	22.3	22.3
R90		12.2	14.6	18.2	20.8	21.2	21.2	21.2	21.2	21.2	21.2
R91		13.3	15.7	19.3	21.9	22.3	22.3	22.3	22.3	22.3	22.4
R93		12.1	14.5	18.2	20.9	21.4	21.4	21.4	21.4	21.4	21.4
R96		10.4	12.8	16.3	18.7	19.2	19.2	19.2	19.2	19.2	19.2
R134		22.9	25.2	28.4	30.7	31.1	31.1	31.1	31.1	31.1	31.1
R134a		21.3	23.7	26.4	28.2	28.5	28.5	28.5	28.5	28.5	28.5
R135a		27.0	29.4	33.1	35.7	36.2	36.2	36.2	36.2	36.2	36.2
Background Location: R62 Cottonwood											
B/G Regression Line	$-0.0135x^3 + 0.4454x^2 - 2.4834x + 29.187$	25.7	27.0	29.2	32.0	35.3	38.7	42.1	45.1	47.7	49.4
SA EPA Criteria		35.0	35.0	35.0	37.0	40.3	43.7	47.1	50.1	52.7	54.4
NIGHT BG Regression Line	$-0.0198x^3 + 0.6869x^2 - 5.0582x + 34.828$	24.2	24.6	26.5	29.4	33.0	37.1	41.1	44.9	48.0	50.2
EPA Night Criteria		35.0	35.0	35.0	35.0	38.0	42.1	46.1	49.9	53.0	55.2
WHO Criteria		45.0	45.0	45.0	45.0	45.0	45.0	47.1	50.1	52.7	54.4
R60		27.5	29.9	32.6	34.3	34.7	34.7	34.7	34.7	34.7	34.7
R61		28.6	30.9	34.3	36.8	37.2	37.2	37.2	37.2	37.2	37.2
R62		28.5	30.8	34.2	36.6	37.0	37.0	37.0	37.0	37.0	37.0
Background Location: R64 Valdarmon Hill											
B/G Regression Line	$-0.0032x^3 + 0.0596x^2 + 2.2844x + 12.521$	23.1	26.9	30.6	34.4	38.0	41.5	44.8	47.9	50.6	53.0
SA EPA Criteria		35.0	35.0	35.6	39.4	43.0	46.5	49.8	52.9	55.6	58.0
NIGHT BG Regression Line	$-0.0093x^3 + 0.2628x^2 + 0.5447x + 13.759$	20.1	23.7	27.6	31.8	36.1	40.3	44.3	47.9	51.0	53.4
EPA Night Criteria		35.0	35.0	35.0	36.8	41.1	45.3	49.3	52.9	56.0	58.4
WHO Criteria		45.0	45.0	45.0	45.0	45.0	46.5	49.8	52.9	55.6	58.0
R64		31.0	33.4	35.7	36.7	37.0	37.0	37.0	37.0	37.0	37.0
R65		30.6	33.0	35.1	36.0	36.2	36.2	36.2	36.2	36.2	36.2
Background Location: R66 Little Vale											
B/G Regression Line	$-0.0038x^3 + 0.1588x^2 + 0.201x + 17.442$	20.9	23.0	25.5	28.4	31.4	34.7	38.1	41.5	44.9	48.3
SA EPA Criteria		35.0	35.0	35.0	35.0	36.4	39.7	43.1	46.5	49.9	53.3
NIGHT BG Regression Line	$-0.0126x^3 + 0.4524x^2 - 2.0963x + 17.752$	16.1	18.2	21.2	25.0	29.3	33.9	38.6	43.2	47.5	51.1
EPA Night Criteria		35.0	35.0	35.0	35.0	35.0	38.9	43.6	48.2	52.5	56.1
WHO Criteria		45.0	45.0	45.0	45.0	45.0	45.0	45.0	46.5	49.9	53.3
R66		32.4	34.8	38.5	41.2	41.6	41.6	41.6	41.6	41.6	41.6
R67		29.7	32.0	35.6	38.2	38.6	38.6	38.6	38.6	38.6	38.6
Background Location: R70 Snowgums											
B/G Regression Line	$-0.0182x^3 + 0.5772x^2 - 3.0782x + 26.75$	22.7	24.6	27.5	31.2	35.4	39.7	43.8	47.4	50.2	51.9
SA EPA Criteria		35.0	35.0	35.0	36.2	40.4	44.7	48.8	52.4	55.2	56.9
NIGHT BG Regression Line	$-0.0183x^3 + 0.5563x^2 - 1.9759x + 16.123$	16.4	19.5	23.6	28.4	33.5	38.7	43.6	47.9	51.3	53.5
EPA Night Criteria		35.0	35.0	35.0	35.0	38.5	43.7	48.6	52.9	56.3	58.5
WHO Criteria		45.0	45.0	45.0	45.0	45.0	45.0	48.8	52.4	55.2	56.9
R68		27.5	29.9	31.9	32.7	32.9	32.9	32.9	32.9	32.9	32.9
R69		28.5	30.9	33.2	34.2	34.5	34.5	34.5	34.5	34.5	34.5
R70		29.2	31.6	33.5	34.0	34.1	34.1	34.1	34.1	34.1	34.1
Background Location: R71 Lynross											
B/G Regression Line	$-0.0083x^3 + 0.243x^2 + 0.3267x + 18.194$	23.4	26.4	29.8	33.5	37.4	41.2	44.8	48.1	51.0	53.3
SA EPA Criteria		35.0	35.0	35.0	38.5	42.4	46.2	49.8	53.1	56.0	58.3
NIGHT BG Regression Line	$-0.0136x^3 + 0.3747x^2 + 0.0985x + 10.908$	17.1	21.1	25.7	30.6	35.6	40.5	45.1	49.0	52.1	54.1
EPA Night Criteria		35.0	35.0	35.0	35.6	40.6	45.5	50.1	54.0	57.1	59.1
WHO Criteria		45.0	45.0	45.0	45.0	45.0	46.2	49.8	53.1	56.0	58.3
R71		25.5	27.9	30.0	30.7	30.9	30.9	30.9	30.9	31.0	31.0
R72		24.0	26.3	28.6	29.7	29.9	29.9	29.9	30.0	30.0	30.0
R73		25.3	27.6	29.9	31.1	31.3	31.3	31.3	31.4	31.4	31.4
R74		19.1	21.4	23.9	25.2	25.5	25.5	25.6	25.6	25.7	25.9
R75		18.8	21.2	23.7	25.0	25.3	25.3	25.4	25.4	25.5	25.7
R76		19.1	21.5	23.9	25.3	25.6	25.6	25.6	25.7	25.8	25.9
R77		16.4	18.8	21.4	22.9	23.3	23.3	23.4	23.5	23.6	23.8
R81		18.8	21.2	23.6	24.9	25.2	25.2	25.2	25.3	25.3	25.4
R82		19.2	21.6	24.0	25.3	25.5	25.6	25.6	25.6	25.7	25.8
R109		20.4	22.8	25.4	27.1	27.4	27.4	27.4	27.4	27.5	27.5
R110		17.9	20.2	22.7	24.1	24.4	24.4	24.4	24.4	24.5	24.6
R111		18.3	20.6	23.1	24.4	24.7	24.7	24.7	24.8	24.8	24.9
R112		18.3	20.6	23.1	24.4	24.7	24.7	24.7	24.8	24.8	24.9
R115		18.2	20.5	23.0	24.3	24.6	24.6	24.6	24.7	24.8	24.9
R116		18.0	20.4	22.8	24.2	24.5	24.5	24.5	24.6	24.6	24.8
Background Location: R79 Leeston											
B/G Regression Line	$0.001x^3 - 0.053x^2 + 2.4941x + 19.177$	28.9	31.8	34.6	37.2	39.7	42.2	44.5	46.8	49.1	51.3
SA EPA Criteria		35.0	36.8	39.6	42.2	44.7	47.2	49.5	51.8	54.1	56.3
NIGHT BG Regression Line	$-0.0038x^3 + 0.1151x^2 + 0.878x + 22.436$	28.0	30.5	33.1	36.0	38.8	41.7	44.6	47.3	49.8	52.1
EPA Night Criteria		35.0	35.5	38.1	41.0	43.8	46.7	49.6	52.3	54.8	57.1
WHO Criteria		45.0	45.0	45.0	45.0	45.0	47.2	49.5	51.8	54.1	56.3
R63		31.8	34.2	36.8	38.4	38.8	38.8	38.8	38.8	38.8	38.8
R79*		30.2	32.6	34.8	35.8	36.0	36.0	36.0	36.0	36.0	36.0
R80*		29.7	32.0	35.0	36.9	37.3	37.3	37.3	37.3	37.3	37.3

Windspeed at 10m AGL		3.0	4.0	5.0	6.0	7.0	8.0	9.0	10.0	11.0	12.0
Windspeed at Hub Height		4.3	5.7	7.1	8.5	10.0	11.4	12.8	14.2	15.7	17.1
Background Location: R106 Rosedale											
B/G Regression Line	$-0.0085x^3 + 0.2644x^2 - 0.8076x + 32.476$	33.2	34.9	37.1	39.6	42.3	45.0	47.6	50.0	52.0	53.5
SA EPA Criteria		38.2	39.9	42.1	44.6	47.3	50.0	52.6	55.0	57.0	58.5
NIGHT BG Regression Line	$-0.0109x^3 + 0.3551x^2 - 1.7974x + 34.095$	32.0	33.4	35.4	37.8	40.7	43.6	46.4	49.0	51.2	52.7
EPA Night Criteria		37.0	38.4	40.4	42.8	45.7	48.6	51.4	54.0	56.2	57.7
WHO Criteria		45.0	45.0	45.0	45.0	47.3	50.0	52.6	55.0	57.0	58.5
R97		14.3	16.7	20.0	22.3	22.8	22.8	22.8	22.8	22.8	22.8
R98		12.6	15.0	18.4	20.7	21.1	21.1	21.2	21.2	21.2	21.2
R99		13.5	15.9	19.2	21.5	22.0	22.0	22.0	22.0	22.0	22.0
R100		14.1	16.5	19.8	22.2	22.7	22.7	22.7	22.7	22.7	22.7
R101		13.1	15.4	18.7	20.9	21.3	21.3	21.3	21.4	21.4	21.4
R102		15.9	18.3	21.5	23.8	24.2	24.2	24.2	24.2	24.2	24.2
R103		15.7	18.0	21.2	23.3	23.7	23.7	23.7	23.7	23.7	23.8
R104		20.3	22.7	26.0	28.3	28.7	28.7	28.7	28.7	28.7	28.7
R105		18.6	21.0	24.0	26.1	26.5	26.5	26.5	26.5	26.5	26.5
R106		25.4	27.8	30.7	32.5	32.9	32.9	32.9	32.9	32.9	32.9
R107		17.6	19.9	22.8	24.6	25.0	25.0	25.0	25.0	25.0	25.1
R108		17.2	19.6	22.4	24.1	24.5	24.5	24.5	24.5	24.5	24.6
R113		17.2	19.6	22.3	24.1	24.4	24.4	24.4	24.4	24.5	24.5
R114		19.2	21.6	24.3	26.1	26.4	26.4	26.4	26.4	26.5	26.5
Background Location: R120 Elmgrove											
B/G Regression Line	$-0.0023x^3 + 0.1114x^2 - 0.2106x + 28.947$	29.9	30.9	32.3	33.8	35.6	37.6	39.7	41.9	44.1	46.4
SA EPA Criteria		35.0	35.9	37.3	38.8	40.6	42.6	44.7	46.9	49.1	51.4
NIGHT BG Regression Line	$-0.0083x^3 + 0.2813x^2 - 1.6306x + 31.151$	28.7	29.5	30.8	32.6	34.6	36.8	39.0	41.0	42.7	44.0
EPA Night Criteria		35.0	35.0	35.8	37.6	39.6	41.8	44.0	46.0	47.7	49.0
WHO Criteria		45.0	45.0	45.0	45.0	45.0	45.0	45.0	46.9	49.1	51.4
R120		31.8	34.2	36.9	38.6	39.0	39.2	39.4	39.7	40.1	40.8
R123		27.0	29.4	31.5	32.4	32.6	32.7	32.8	32.9	33.1	33.4
R125		23.0	25.4	27.5	28.4	28.6	28.6	28.7	28.8	28.9	29.0
R130		30.2	32.5	36.1	38.8	39.5	39.8	40.4	41.1	42.1	43.4
R131		26.7	28.9	31.7	34.0	35.3	36.6	38.0	39.7	41.5	43.4
R132		22.6	25.0	28.4	30.9	31.5	31.7	32.0	32.5	33.2	34.1
R133		20.7	23.0	26.3	28.6	29.1	29.2	29.3	29.5	29.7	30.1

Appendix 3: Traffic Impacts Response to Submission

Reference: #15S1569100

23 November 2017

Crookwell Development Pty Ltd
c/- Global Power Generation Australia Pty Ltd
Suite 4 Level 3, 24 Marcus Clarke Street
CANBERRA ACT 2600

Attention: Mr. Shaq Mohajerani (Project Development Manager)

Dear Shaq

**RE: CROOKWELL 3 WIND FARM
RESPONSE TO SUBMISSIONS**

I refer to the Amended Application lodged with the NSW Department of Planning and Environment for the proposed Crookwell 3 Wind Farm, located approximately 25km northwest of Goulburn. Specifically, the below sets out a response to the following agency submissions:

- Upper Lachlan Shire Council letter 'Response to Crookwell 2 Wind Farm Modification and Crookwell 3 Wind Farm Amended Application' from Tina Dodson dated 14 November 2016
- Email from Louise Wakefield (Goulburn Mulwaree Council) to Elle Donnelly (NSW Department of Planning and Environment) 'Crookwell 2 MOD and Crookwell 3 Wind Farms' dated 28 November 2016
- Roads and Maritime Service letter from Chris Millet dated 7 November.

Each of the relevant transport items from the above submissions has been reproduced (in bold italics) below with a response provided thereafter. The below responses should be read in conjunction with the GTA Report 'Crookwell 3 Wind Farm Blade Modification Transport Impact Assessment' dated 9 March 2016.

Upper Lachlan Shire Council

"1. There is still no information regarding heavy haulage vehicles (vehicles over 4.5 tonnes and less than 42 tonnes) and what routes they will use. This is important as the road network in the area is particularly vulnerable to use by heavy vehicles. The roads would need to be upgraded before any work could commence. The roads are certainly not sound enough to start construction work (without reconstruction) and repair them at the end of the job. There is gravel quarries located to the north of the site – use of these will require a significant amount of reconstruction work. If the gravel is to be hauled from quarries south of the site (eg Goulburn), Woodhouselee [Road] will require upgrading from Crookwell Rd to the northern most access to the site."

It is anticipated that supply contracts for earthworks material will be with various quarry operators in proximity to the site. The heavy haulage vehicles will bring material to the site from designated roads south of the project site. The Woodhouselee Road section, from the intersection with Crookwell Road to the access entrance, will service the Crookwell 3 East site, and the Crookwell Road section will service the Crookwell 3 South site. Approximately 8.4km of

VIC | **NSW** | QLD
ACT | SA | WA

Level 6, 15 Help Street
CHATSWOOD NSW 2067
PO Box 5254
WEST CHATSWOOD NSW 1515
t// +612 8448 1800

www.gta.com.au

Woodhouselee Road has been rebuilt in the last few months by the contractor working for Crookwell Development Pty Ltd in accordance with specification provided by Upper Lachlan Shire Council and is currently being used for the construction of Crookwell 2 Wind Farm project. This stretch of Woodhouselee Road is in suitable condition to accommodate Crookwell 3 Wind Farm development traffic. The use of the Woodhouselee Road and any other Public Infrastructure is generally subject to the Applicant repairing, or paying the full costs associated with repairing, any public infrastructure that is damaged by the development. As such the Applicant would carry out regular inspections of the roads used by the development to ensure any damaged caused by the development is remediated as soon as possible.

It is understood that the section of Woodhouselee Road, north of Crookwell Road intersection, that is designated to be used by the projects (8.4km for Crookwell 2 Wind Farm and approximately 11km for the Crookwell 3 East site northernmost access option) is generally in good condition and of a standard capable of accommodating heavy haulage vehicles (it is understood that heavy haulage vehicles currently do use the Woodhouselee Road section although in much smaller volumes than required for the developments).

It is recommended that the Applicant should perform regular inspection and monitoring of the Woodhouselee Road section from Crookwell Road intersection to the Crookwell 3 East site access entrance, and undertake minor remediation works in response to damage caused by the development's use of the heavy haulage vehicles, noting that any major reconstruction works of relevant sections of Woodhouselee Road (if required) will only be undertaken once by the Applicant, at the completion of construction of Crookwell 2 and 3 Wind Farms, this would provide the greatest long-term benefit for current and future users of Woodhouselee Road.

It is noted that the road network improvement/mitigation works proposed to accommodate Restricted Access Vehicles (RAVs) are detailed in the Crookwell 3 Wind Farm Blade Modification Transport Impact Assessment (Table 5.1).

"2. The drawings show three accesses to Crookwell 3 East off Woodhouselee Rd. As the internal road network is completely interconnected, there should only be one sound access required."

The drawings show three potential access points from Woodhouselee Road to the eastern section of Crookwell 3 Wind Farm, as follows:

- Option 1 – South
- Option 2 – North
- Option 3 – West

The intent is that only one vehicle access point will be provided from Woodhouselee Road to the eastern section of Crookwell 3 Wind Farm. Three potential options have been shown to provide flexibility for the Applicant as commercial negotiations continue between the applicant and the various landowners.

The preferred access option will be determined based on several considerations, including (but not limited to):

- environmental constraints
- terrain restrictions
- cost effectiveness
- other items (land ownership, disused railway corridor, etc.).

Initially, it was considered that Option 1 (south) was the most likely vehicle access option. However, as construction planning has progressed, more recently Option 3 (west) has emerged as the most likely, followed by Option 2 (north). The preferred vehicle access option is still yet to be confirmed.

Goulburn Mulwaree Council

“The information provided about the heavy vehicle transport routes is insufficient, as is the detail around how the proponents intend to address the impacts of the construction traffic on the local road network. The current state of many of the roads identified in the application is not acceptable for the construction traffic generation related to the wind farm projects and it is Council’s view that road upgrade works should be undertaken prior to construction commencing to the satisfaction of the Goulburn Mulwaree Council (and Upper Lachlan Shire Council) and then further works required to reinstate roads to a suitable standard once the construction phase is completed.”

The Construction Environment Management Plan (CEMP) for Stage 1 was approved on 12 May 2009. This CEMP encompasses all construction activities other than the deliveries by the over-dimensional vehicles that require a CEMP Stage 2 approval by the Department of Planning and Environment. Based on this approval, the development traffic will go through the state roads in Goulburn (i.e. Sydney Road, Lagoon Street, Goldsmith Street, Fitzroy Street, Crookwell Road).

As part of the Crookwell 3 Wind Farm public exhibition process in 2013, Goulburn Mulwaree Council nominated the alternative route (i.e. Hume Street, Cowper Street, Clinton Street, Deccan Street, Fitzroy Street and Crookwell Road) for the development transport route associated with over-dimensional vehicles, as the alternate route was already augmented to accommodate other wind farm projects, and currently approved for the Crookwell 2 Wind Farm over-dimensional transport. In response to Council’s comments that many of the roads identified in the application are not acceptable for the construction traffic generated, the Applicant will revert to the heavy vehicle transport corridor via state roads through Goulburn as currently approved for the Crookwell 2 Wind Farm for its heavy haulage traffic, and will adopt Council’s preferred route for over-dimensional vehicles.

The existing supply contracts for the earthworks material is anticipated to be with various quarry operators in proximity to the site. It is understood that one of the main quarry locations designated to service the construction phase is located on Crookwell Road, south of Woodhouselee Road. As such, the heavy haulage vehicles for the development from this location will not be travelling through Goulburn, therefore significantly reducing the potential for impact to road pavement in Goulburn. Currently, other quarry site options are located south of Marulan and south-east of Goulburn. Given that several key routes in the area (excluding Woodhouselee Road that is specifically discussed above) have been used for access to other wind farm construction sites, it is not anticipated that any significant works, other than those outlined for RAV access, would be required for the development.

It is recommended that the Applicant conducts regular inspection and monitoring of Council roads used (if any), and undertake minor remediation works in response to damage caused by the development’s use of heavy haulage vehicles.

Roads and Maritime Services

The Roads and Maritime Services correspondence indicates that they do not object to the proposed development application in principle. In this respect, they do outline several conditions that it is assumed would be included in any Development Consent.

"Prior to the issuing of a construction certificate

- ***Prior to the issuing of the construction certificate, the developer shall enter into a Works Authorisation Deed (WAD) with the RMS for all works on Crookwell Road.***

Prior to traffic operating under the consent

- ***Prior to transporting any oversized or over mass loads, the applicant shall obtain a permit for an oversized and over mass load from the RMS Special Permits Unit in Glen Innes.***

The contact number is 1300 656 371.

It should be noted that the issue of a Special Permit may be subject to route and bridge assessment/s if deemed necessary by the RMS Special Permits Unit, as these issues have not been covered by the Traffic Impact Study (TIS). While the TIS has considered the length, width, height and turning radius requirements for over-dimensional loads/vehicles, no details have been given as to the expected weight of loads or axle loadings for the over-dimensional movements. The maximum weight of loads associated with the subject development to be moved should be specified in the TIS.

- ***The Traffic Management Plan (TMP) shall be developed in consultation with RMS Southern Traffic Operations Unit, Upper Lachlan and Goulburn Mulwaree Councils' Local Traffic Committees (LTCs). The TMP (and associated Traffic Control Plans) shall be submitted to the Upper Lachlan Council LTC for final acceptance.***
- ***A copy of the accepted TMP shall be forwarded to RMS (via development.southern@rms.nsw.gov.au) prior to any transportation occurring or works commencing on site for this development.***
- ***Concept plans for all roadworks on classified roads identified as part of the accepted TMP shall be submitted to RMS for acceptance of the treatment type (via development.southern@rms.nsw.gov.au).***
- ***Should the TMP identify further construction works required on any State classified roads, RMS approval will be required and may require the developer to enter into a Works Authorisation Deed (WAD) with RMS. The WAD would manage the design and construction of the works. If physical construction works on any State classified roads are identified, the details shall be forwarded to RMS for consideration in the first instance (via development.southern@rms.nsw.gov.au).***
- ***All roadworks, traffic control facilities and other works associated with this development, including any modifications required to meet RMS standards, will be at no cost to RMS.***
- ***All works shall be completed prior to occupation.***
- ***All roadworks on classified roads shall be designed in accordance with Austroads Guide to Road Design - Part 4a: Unsignalised and Signalised Intersections and***

Austroads Guide to Road Design - Part 4: Intersections and Crossings General and RMS supplements.

- ***All roadworks and traffic control facilities on classified roads must be undertaken by a pre-qualified contractor. A copy of pre-qualified contractors can be found on the RMS website at:***

<http://www.rta.nsw.gov.au/doingbusinesswithus/tenderscontracts/prequalifiedcontractors.html>
- ***RMS will be exercising its powers under Section 64 of the Roads Act, 1993 to become the roads authority for works on Crookwell Road. Given this, Section 138 consent under the Roads Act, 1993 shall be obtained from the RMS prior to construction.***
- ***The developer shall apply for, and obtain a Road Occupancy Licence (ROL) from the RMS Traffic Operations Unit (TOU) prior to commencing roadworks on a State Road or any other works that impact a travel lane of a State Road or impact the operation of traffic signals on any road. The application will require a Traffic Management Plan (TMP) to be prepared by a person who is certified to prepare Traffic Control Plans. Should the TMP require a reduction of the speed limit, a Speed Zone Authorisation will also be required from the TOU. The developer shall submit the ROL application 10 business days prior to commencing work. It should be noted that receiving an approval for the ROL within this 10 business day period is dependent upon RMS receiving an accurate and compliant TMP.***

Note: An approved ROL does not constitute an approval to commence works until an authorisation letter for the works has been issued by RMS Project Manager."

Primarily, the Development Consent conditions require the preparation of a Construction Traffic Management Plan and associated standard applications for the Crookwell 3 Wind Farm.

A Construction Environmental Management Plan (CEMP)¹ was previously prepared to address the pre-construction condition of the Crookwell 2 Wind Farm. The CEMP included a Construction Traffic Management Plan and Traffic Incident Management Plan. This CEMP was subsequently approved by the NSW Department of Planning on 12 May 2009.

In this respect, a Construction Traffic Management Plan similar to the one prepared for the Crookwell 2 Wind Farm will be prepared for the Crookwell 3 Wind Farm in consultation with relevant road authorities. It is noted that details of axle loadings is dependent on the specific vehicles/configurations being used to transport turbine components. This would be appropriately addressed in the Construction Traffic Management Plan and RAV permit applications.

The Applicant acknowledges the conditions contained in the Roads and Maritime Services correspondence.

¹ 'Construction Environmental Management Plan (CEMP) for Crookwell II Wind Farm', Revision D, 3 June 2009.

I trust the above appropriately responds to the submissions received. Naturally, should you have any questions or require any further information, please do not hesitate to contact me in our Sydney office on (02) 8448 1800.

Yours sincerely

GTA CONSULTANTS



Brett Maynard
Director

Appendix 4: Shadow Flicker Impacts Response to Submission

Crookwell Development Pty Ltd
Suite 4, Level 3, 24 Marcus Clarke Street
Canberra
ACT 2600

DNV GL - Energy
Renewables Advisory
Suite 25, Level 8
401 Docklands Drive
Docklands
Victoria 3008
Tel: 03 9600 1993
Fax: 03 9602 1714
ABN: 14 154 635 319

Date: 12 December 2017
Our reference: 170691-AUME-L-05-B
Your reference:

Re: Response to submissions regarding shadow flicker impacts from the proposed Crookwell 3 Wind Farm

Dear Shaq Mohajerani,

DNV GL (formerly Garrad Hassan Pacific Pty Ltd) has been commissioned by Crookwell Development Pty Ltd to provide an assessment of the potential for the proposed Crookwell 3 Wind Farm to cause shadow flicker impacts at a new dwelling 135a currently under construction at 741594 m east, 6170929 m north (MGA zone 55, GDA94 datum). This assessment has been undertaken in response to a submission made by Scott Macourt expressing concerns regarding the potential shadow flicker impacts of the wind farm on the Macourt property, where the dwelling is located [1].

DNV GL has previously assessed the potential shadow flicker impacts arising from the development and operation of the Crookwell 3 Wind Farm and the adjacent Crookwell 2 Wind Farm (as reported in documents 170691-AUME-L-01-D [2] and 170691-AUME-R-01-D [3] respectively). Further details of the assessment methodologies employed by DNV GL are described in [3].

It is noted that one turbine (turbine F9) has since been removed from the proposed layout for the Crookwell 2 Wind Farm, and two turbine locations have been changed as shown in Table 1. These changes have been considered in the current assessment.

Table 1 Changes to turbine locations for the Crookwell 2 Wind Farm

Turbine ID	Original location		Revised location	
	Easting ¹ [m]	Northing ¹ [m]	Easting ¹ [m]	Northing ¹ [m]
F48	739373	6172687	739262	6172625
F50	739227	6172360	739104	6172383

1. Coordinate system: MGA zone 55, GDA94 datum

The impact of shadow flicker is usually only significant up to a distance of around 10 rotor diameters from a turbine [4], or approximately 265 times the maximum blade chord length [5]. Beyond this distance limit, the shadow is typically diffused such that the variation in light levels is not likely to be sufficient to cause annoyance. For the turbines proposed for the Crookwell 3 Wind Farm, which have a rotor diameter of 130 m, the maximum distance at which shadow flicker is likely to cause annoyance has been assumed to be 1300 m.

The effects of shadow flicker are generally most noticeable for an observer indoors. This is because light levels indoors are lower and the shadow cast by a wind turbine blade has the potential to intercept the only light source in the room. When an observer is outside, they are exposed to ambient or diffuse light as well as direct sunlight. This means that if shadow flicker does occur, the variations in light level are typically lower in amplitude and are therefore less likely to cause annoyance. As noted in [3], there is no requirement under either the SEARs, Draft NSW Guidelines, or Draft National Guidelines to assess shadow flicker durations at locations other than in the vicinity of dwellings.

This assessment has considered the potential shadow flicker impacts on dwelling 135a, which is currently under construction on the Macourt property. Figure 1 shows the location of dwelling 135a in relation to the Crookwell 3 Wind Farm. The 1300 m distance limit for shadow flicker impacts from turbines at the Crookwell 3 Wind Farm is also illustrated in Figure 1. Since dwelling 135a is located 1.7 km from the nearest turbine, or approximately 400 m beyond the maximum distance at which shadow flicker is likely to cause annoyance, it is not expected that shadow flicker from the Crookwell 3 Wind Farm will be a problem at this dwelling.

Sincerely
for DNV GL Australia

Naomi Brammer
Engineer
naomi.brammer@dnvgl.com

Trenton Gilbert
Principal Engineer
trenton.gilbert@dnvgl.com

References

- [1] Submission by Scott Macourt of Woodhouselee NSW, viewed 23 November 2017, http://majorprojects.planning.nsw.gov.au/?action=view_submission&job_id=6695&submission_id=219010
- [2] Garrad Hassan Pacific Pty Ltd, "Shadow flicker assessment for proposed Crookwell 3 Wind Farm", document no. 170691-AUME-L-01-D, 24 February 2016.
- [3] Garrad Hassan Pacific Pty Ltd, "Crookwell 2 Wind Farm Shadow Flicker and Blade Glint Assessment", document no. 170691-AUME-R-01-D, 24 February 2016.
- [4] "Planning for Renewable Energy – A Companion Guide to PPS22", Office of the Deputy Prime Minister, UK, 2004.
- [5] Environment Protection and Heritage Council (EPHC), "National Wind Farm Development Guidelines – Draft", July 2010.

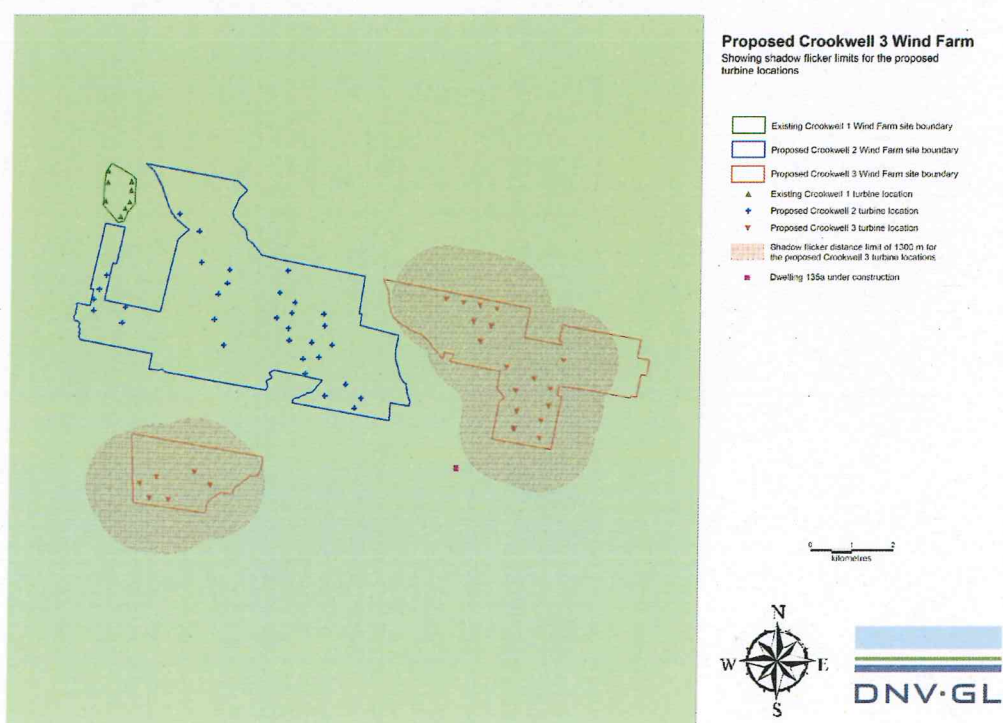


Figure 1 Location of dwelling 135a relative to the proposed Crookwell 3 Wind Farm and assumed shadow flicker distance limit

Appendix 5: EMI Impacts Response to Submission

Crookwell Development Pty Ltd
Suite 4, Level 3, 24 Marcus Clarke Street
Canberra
ACT 2600

DNV GL - Energy
Renewables Advisory
Suite 25, Level 8
401 Docklands Drive
Docklands
Victoria 3008
Tel: 03 9600 1993
Fax: 03 9602 1714
ABN: 14 154 635 319

Date: 12 December 2017
Our reference: 170691-AUME-L-04-C
Your reference:

Re: Response to submissions regarding potential television interference from the proposed Crookwell 3 Wind Farm

Dear Shaq Mohajerani,

DNV GL (formerly Garrad Hassan Pacific Pty Ltd) has been commissioned by Crookwell Development Pty Ltd to provide an assessment of the potential for the proposed Crookwell 3 Wind Farm to cause electromagnetic interference (EMI) to television reception in the vicinity of the wind farm. This assessment has been undertaken in response to a submission made by the Upper Lachlan Shire Council (ULSC) expressing concerns regarding the potential impacts of the wind farm on television reception in the Crookwell area.

DNV GL has previously assessed EMI-related issues, including potential impacts on television reception, arising from the development and operation of the Crookwell 3 Wind Farm and the adjacent Crookwell 2 Wind Farm (as reported in documents 170691-AUME-L-02-C [1] and 170691-AUME-R-02-C [2] respectively). Further details of the assessment methodologies employed by DNV GL are described in [2].

It is noted that one turbine (turbine F9) has since been removed from the proposed layout for the Crookwell 2 Wind Farm, and two turbine locations have been changed as shown in Table 1. Additionally, there have been several changes to the identified dwellings in the vicinity of the proposed wind farm, as outlined in Table 2. These changes have been considered in the current assessment.

Table 1 Changes to turbine locations for the Crookwell 2 Wind Farm

Turbine ID	Original location		Revised location	
	Easting ¹ [m]	Northing ¹ [m]	Easting ¹ [m]	Northing ¹ [m]
F48	739373	6172687	739262	6172625
F50	739227	6172360	739104	6172383

1. Coordinate system: MGA zone 55, GDA94 datum

Table 2 Changes to identified dwellings in the vicinity of the Crookwell 3 Wind Farm site

Dwelling ID	Easting ¹ [m]	Northing ¹ [m]	Previous status	Current status
1a	732235	6173471	Shed	Dwelling
R21a	734183	6174526	Not constructed	Stakeholder dwelling
R124	731448	6174361	Dwelling	Shed (omitted from assessment)
135a	741594	6170929	Not constructed	Dwelling

1. Coordinate system: MGA zone 55, GDA94 datum

The main television transmitters used by residents in the vicinity of the proposed Crookwell 3 Wind Farm are the Crookwell transmitter at Wades Hill, the Goulburn transmitter at Mt Gray, and the Canberra transmitter at Black Mountain. However, it is also possible that residents to the north of the site may receive television signals from the Illawarra and Central Tablelands transmitters.

Based on the methodology described in [2], dwellings that have an increased potential to experience EMI to television reception caused by turbines at the Crookwell 3 Wind Farm have been identified. The results of this analysis are shown in Figure 1 to Figure 5, and the number of dwellings identified in the potential interference zone for each television transmitter is summarised in Table 3 on the following page. Signal coverage maps for each of the transmitters obtained from the Australian Government mySwitch website [3], and reproduced in Figure 1 to Figure 5, suggest that the majority of the area surrounding the wind farm site receives 'variable' television coverage. It is noted that interference is most likely to be experienced in areas where television reception is marginal, and that if the signal received at a dwelling from the transmitter is sufficiently weak, or if an antenna with insufficient directional discrimination is installed, interference may still occur outside of the identified interference zones.

Table 3 Number of dwellings located within potential interference zones for television transmitters in the vicinity of the Crookwell 3 Wind Farm site

Digital television broadcast tower	Number of dwellings within potential interference zone
Crookwell (Wades Hill)	7 (no stakeholder dwellings)
Goulburn (Mt Gray)	30 (including 3 stakeholder dwellings)
Canberra (Black Mountain)	25 (including 8 stakeholder dwellings)
Illawarra (Knights Hill)	24 (including 8 stakeholder dwellings)
Central Tablelands (Mt Canobolas)	2 (including 1 stakeholder dwelling)

If interference to television reception is experienced after a wind farm is commissioned, a range of mitigation options are available as described in [2]. These mitigation options include realigning, retuning, or relocating the television antenna at the affected residence, installation of a more directional or higher gain antenna, installation of cable or satellite television at the affected residence, or the installation of a television signal repeater to service the area. Crookwell Development Pty Ltd have advised DNV GL that

they would be prepared to implement these measures in the event that television reception interference is encountered as a result of the operation of the Crookwell 3 Wind Farm.

DNV GL understands that the ULSC has recently installed and commenced operation of a television signal repeater for commercial network broadcasts at Wades Hill in Crookwell. Prior to the installation of the repeater, only public television broadcast signals were available from the Wades Hill site. The new Crookwell repeater receives commercial television broadcast signals from the transmitter at Mt Gray in Goulburn and retransmits those signals to residents in the Crookwell vicinity. Residents who rely on the signals from the Crookwell repeater previously received marginal commercial television reception from either the Goulburn or Canberra transmission towers, although DNV GL has been advised by the ULSC that the television reception experienced by these residents has been very good since the repeater commenced operating [4]. The locations of the Crookwell repeater and Goulburn transmitter in relation to the proposed Crookwell 3 Wind Farm are shown in Figure 6.

In communications with DNV GL, the ULSC has expressed concerns regarding the potential for the proposed Crookwell 3 Wind Farm to impact upon the performance of the Crookwell repeater [4]. The council has previously experienced cases where other wind farms have caused interference to existing television signals in the area and remediation efforts have taken considerable time to implement, during which time the affected residents had no or substandard television reception. The ULSC has therefore requested that Crookwell Development Pty Ltd act to mitigate any potential impacts to the Crookwell repeater before the proposed Crookwell 3 Wind Farm starts operation, to avoid a period during which residents have inadequate television reception due to interference caused by the wind farm.

In order to address these concerns, DNV GL recommends that Crookwell Development Pty Ltd considers engaging a dedicated radiocommunications engineer to assess the potential impact of the proposed Crookwell 3 Wind Farm on the Crookwell repeater. This assessment could involve evaluating in detail how the repeater functions, taking measurements of the existing strength of the signal from the Goulburn transmitter at the repeater location, and providing advice on whether the repeater signal is likely to be affected by the proposed wind farm. If the assessment concludes that the performance of the Crookwell repeater is likely to be affected by the Crookwell 3 Wind Farm, then remedial action could be carried out to ensure that the repeater continues to operate effectively. If the conclusion is that the repeater will not be affected, then this information may provide sufficient assurance to negate the need for remedial action.

Crookwell Development Pty Ltd has advised DNV GL that they will commit to engaging a radiocommunications engineer prior to commencing operation of the Crookwell 3 Wind Farm as recommended above [5]. If the assessment finds that significant impact is expected at a large number of residences, Crookwell Development Pty Ltd will consult with the ULSC to identify alternative solutions and devise a plan for resolving any interference experienced after the wind farm begins operation in a reasonable timeframe, with consideration given to installing a new television repeater to either replace or complement the existing infrastructure at Crookwell and Goulburn. The remediation plan, if required, will be established before the wind farm is commissioned so that it can be implemented by Crookwell Development Pty Ltd as soon as any impact arising from the wind farm is encountered, hence minimising disruption and inconvenience to residents.

Therefore, Crookwell Development Pty Ltd has advised that they are prepared to accept a pre-operation condition stating that the wind farm proponent will engage an experienced radiocommunications consultant to assess the expected level of impact caused by possible interference from turbines at the Crookwell 3 Wind Farm to the quality of television reception provided by the recently commissioned Crookwell repeater; and, if the expected level of impact is considered significant, the proponent will

prepare a remediation plan encompassing alternative solutions to resolve any issues, including the potential installation of a new television repeater, in consultation with the ULSC; and, if the impact experienced once the wind farm is fully operational is deemed significant, the proponent will implement the remediation plan as soon as is practicable.

Sincerely
for DNV GL Australia

Naomi Brammer
Engineer
naomi.brammer@dnvgl.com

Trenton Gilbert
Principal Engineer
trenton.gilbert@dnvgl.com

References

- [1] Garrad Hassan Pacific Pty Ltd, "EMI assessment for proposed Crookwell 3 Wind Farm", document no. 170691-AUME-L-02-C, 24 February 2016.
- [2] Garrad Hassan Pacific Pty Ltd, "Crookwell 2 Wind Farm EMI Assessment", document no. 170691-AUME-R-02-C, 24 February 2016.
- [3] Australian Government, "mySwitch", [Online]. Available: <http://myswitch.digitalready.gov.au/>. [Accessed 13 November 2015].
- [4] Telephone conversation between T. Gilbert (DNV GL) and P. Newham (ULSC), 25 January 2017.
- [5] Email from S. Mohajerani (UFWA) and T. Gilbert (DNV GL), 20 February 2017.

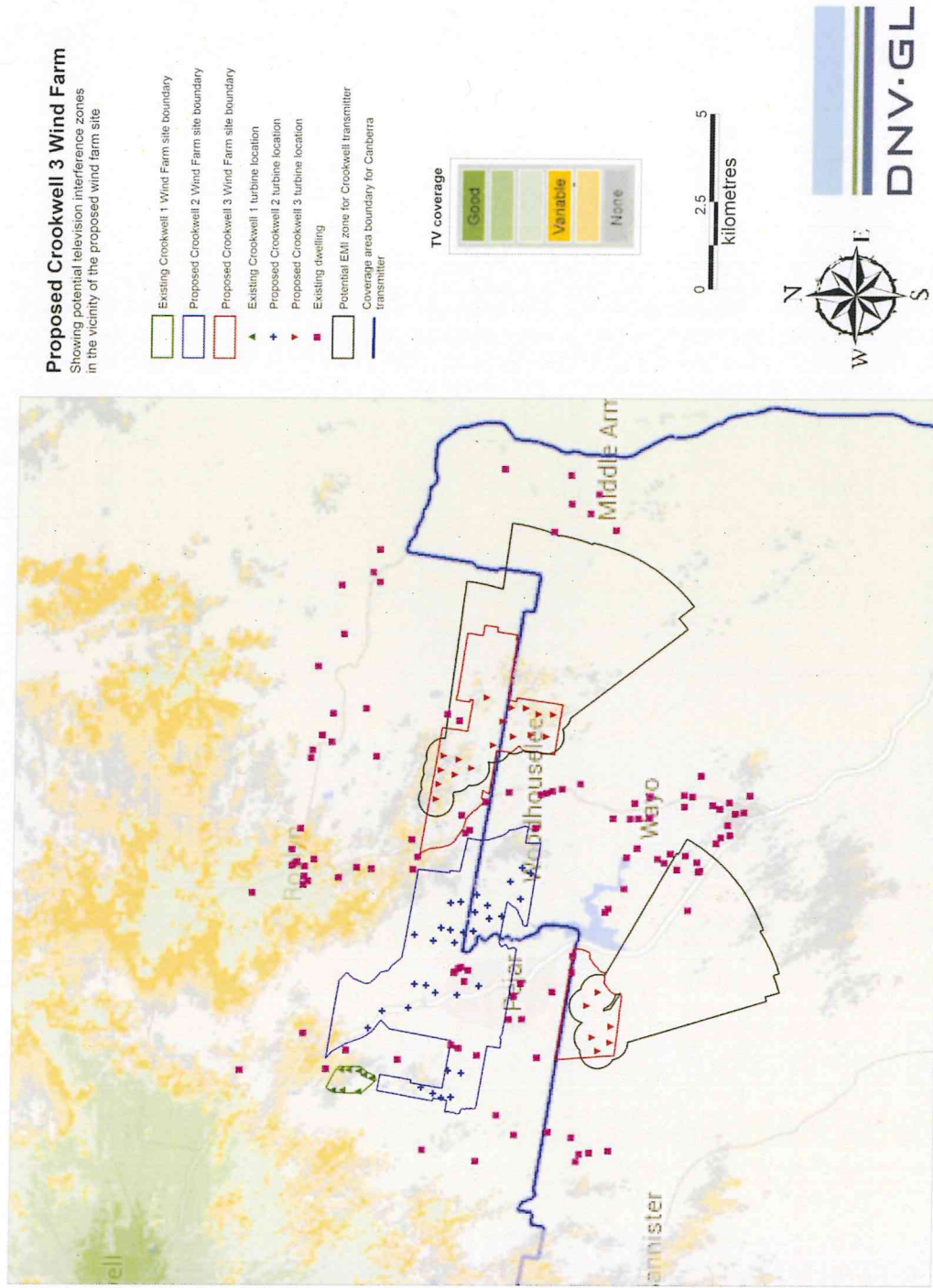


Figure 1 Potential television EMI zones for the signal from the Crookwell transmitter

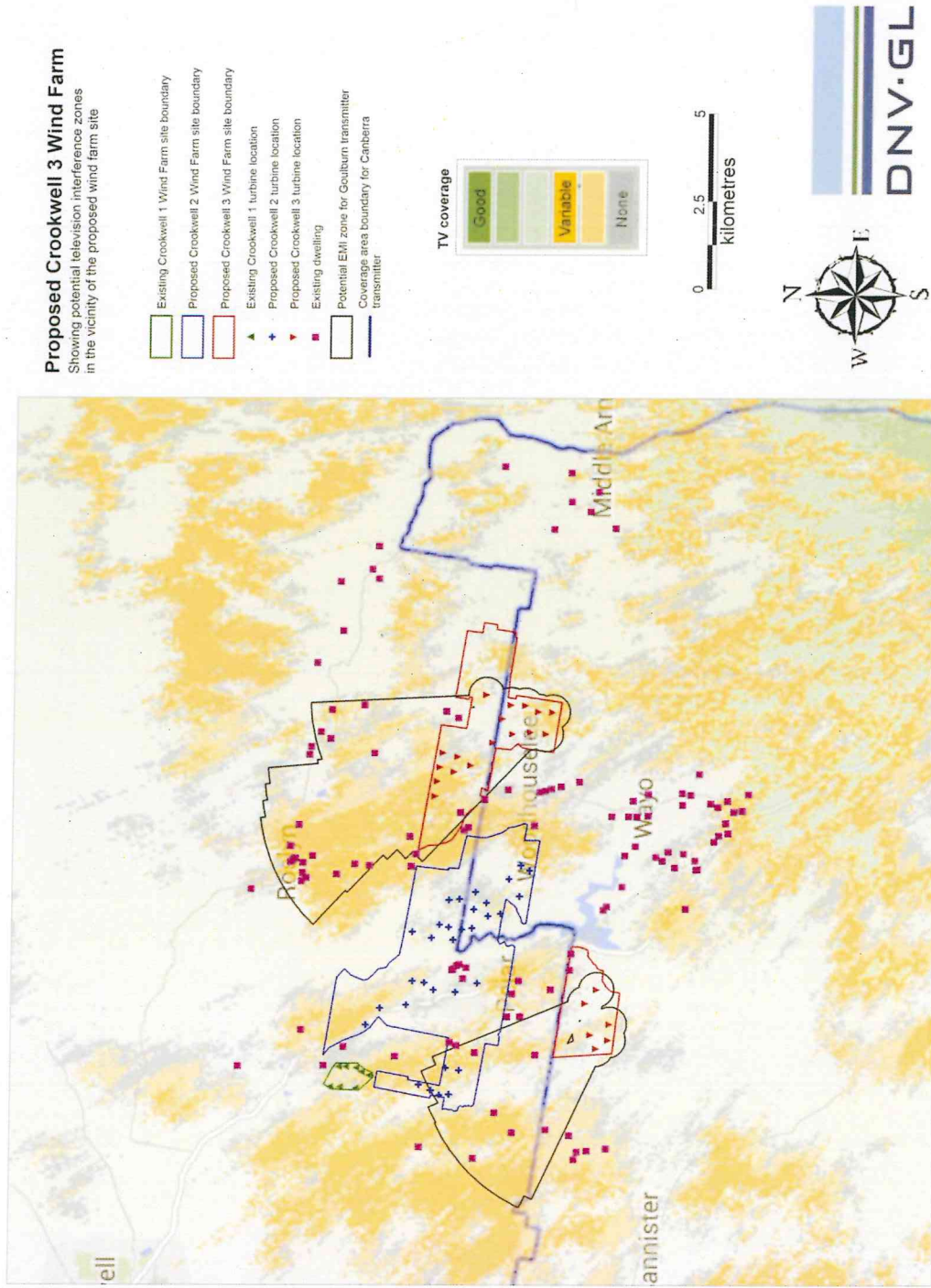


Figure 2 Potential television EMI zones for the signal from the Goulburn transmitter

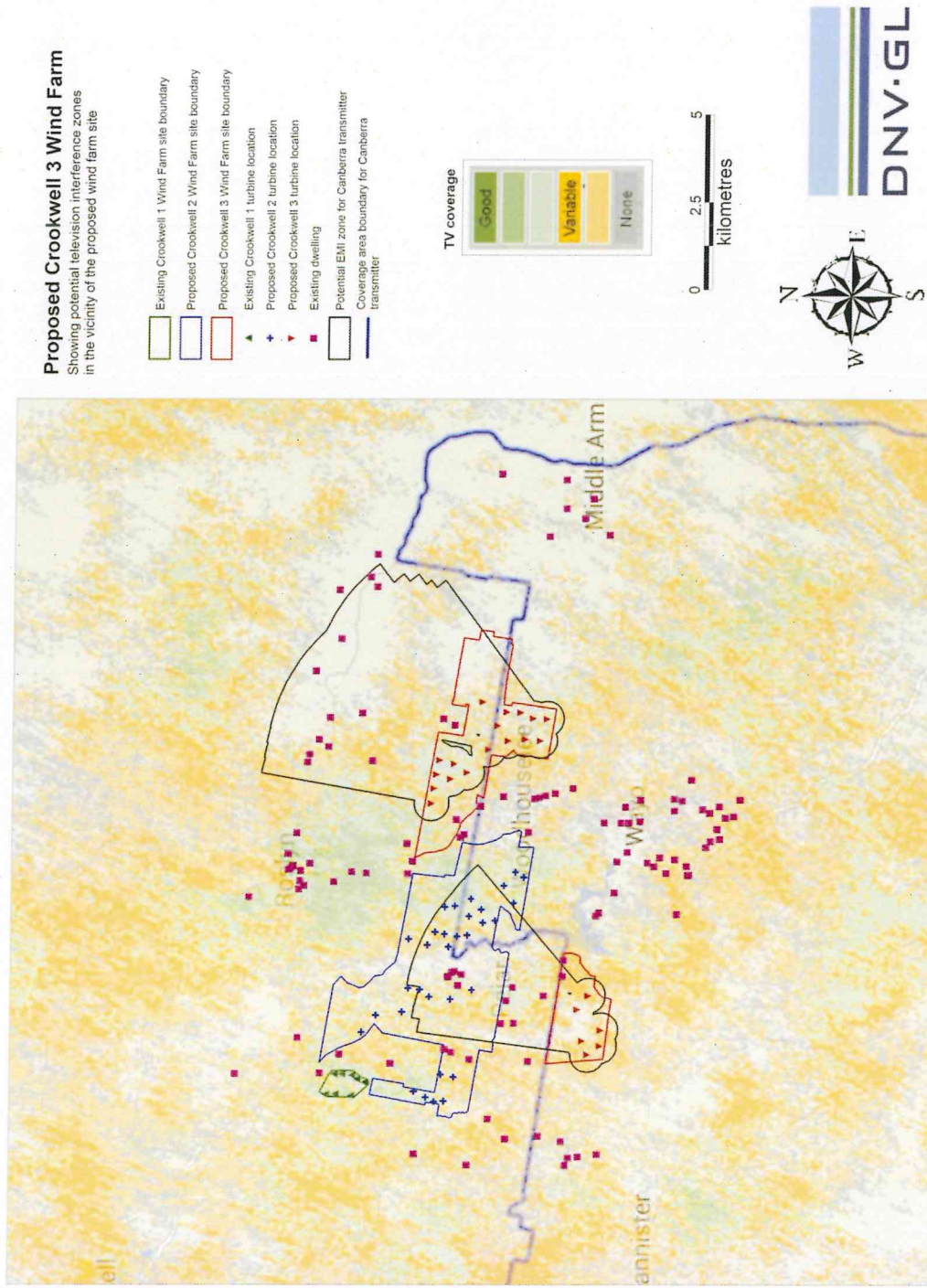


Figure 3 Potential television EMI zones for the signal from the Canberra transmitter

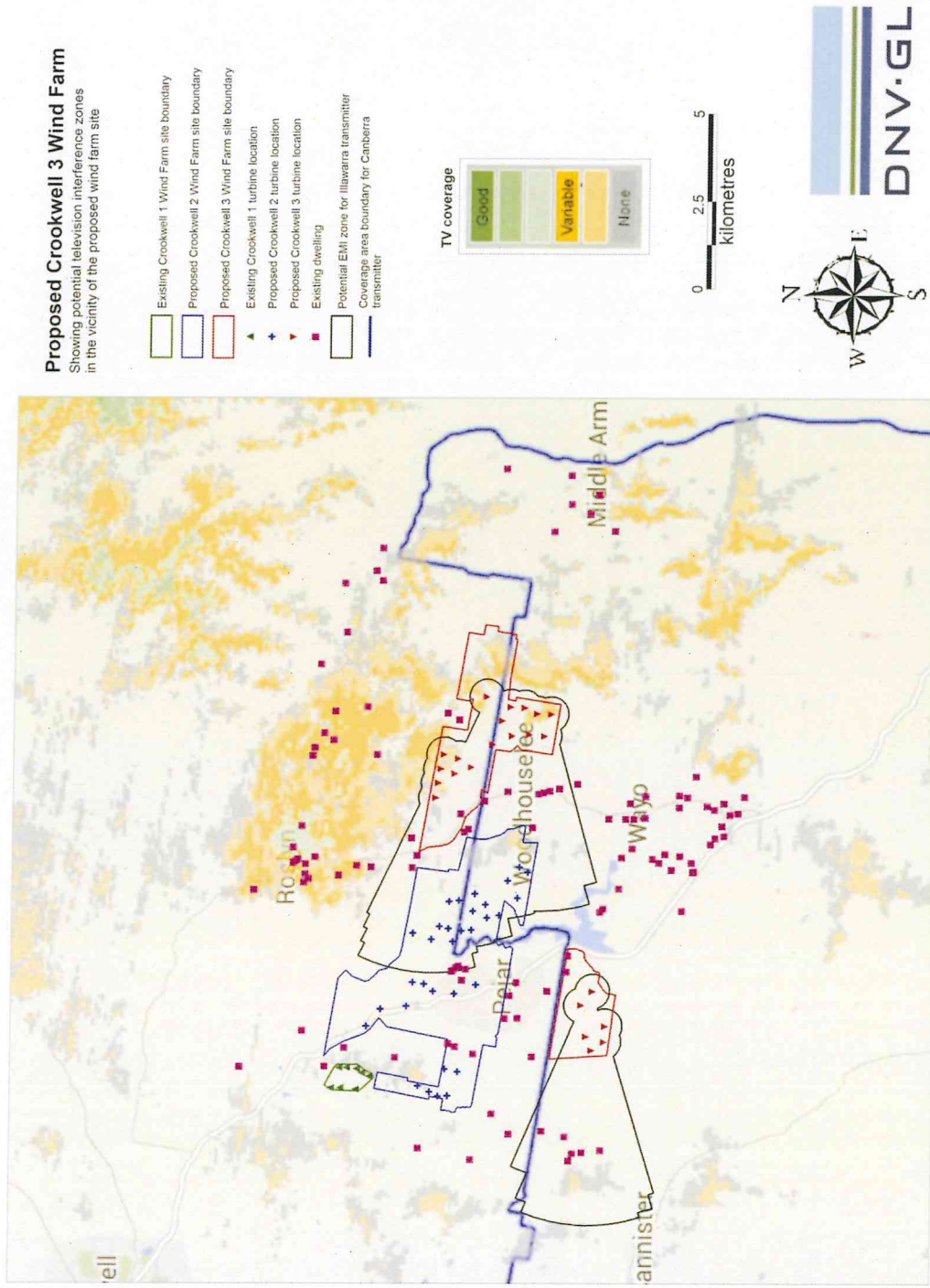


Figure 4 Potential television EMI zones for the signal from the Illawarra transmitter

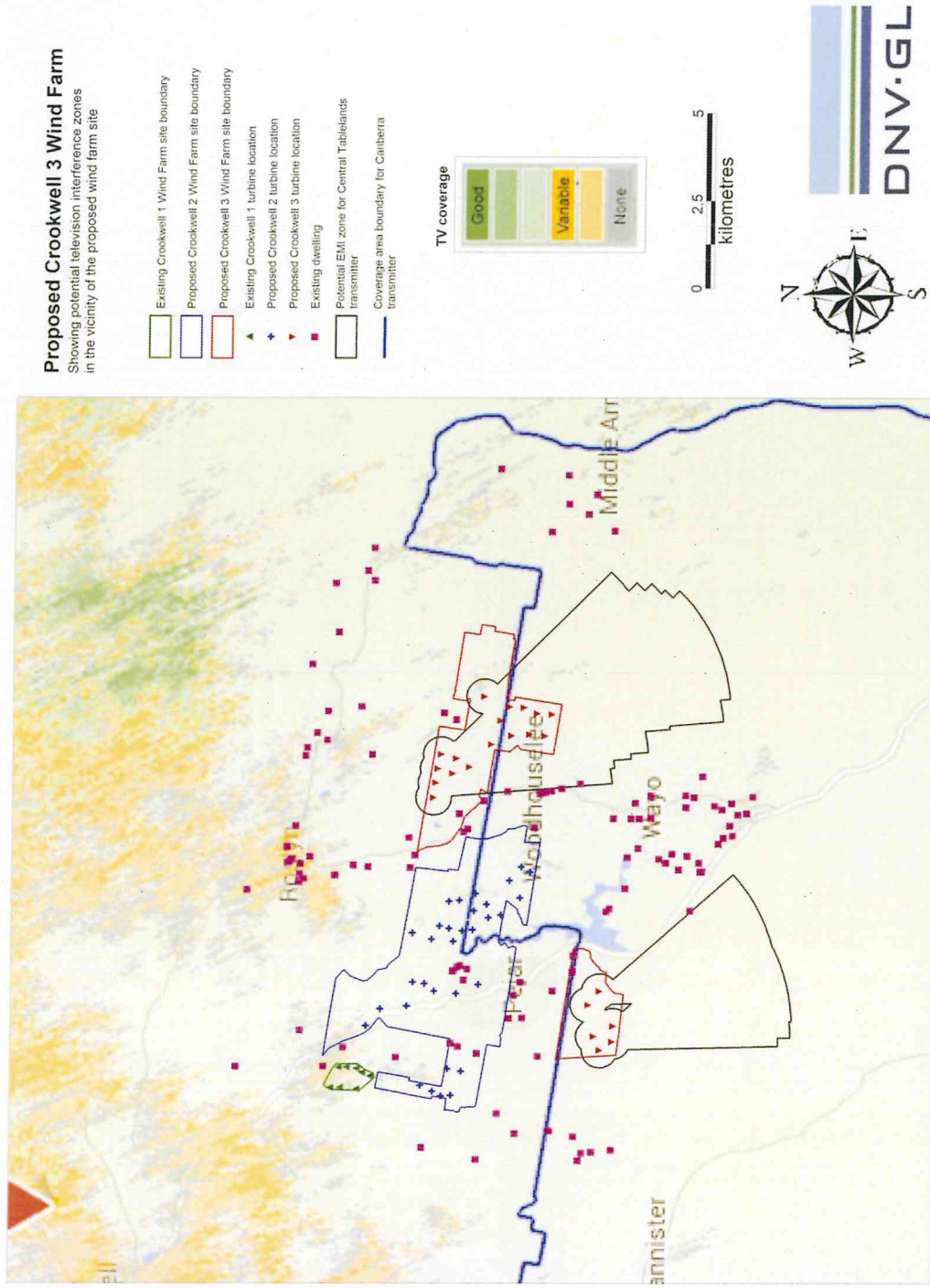


Figure 5 Potential television EMI zones for the signal from the Central Tablelands transmitter

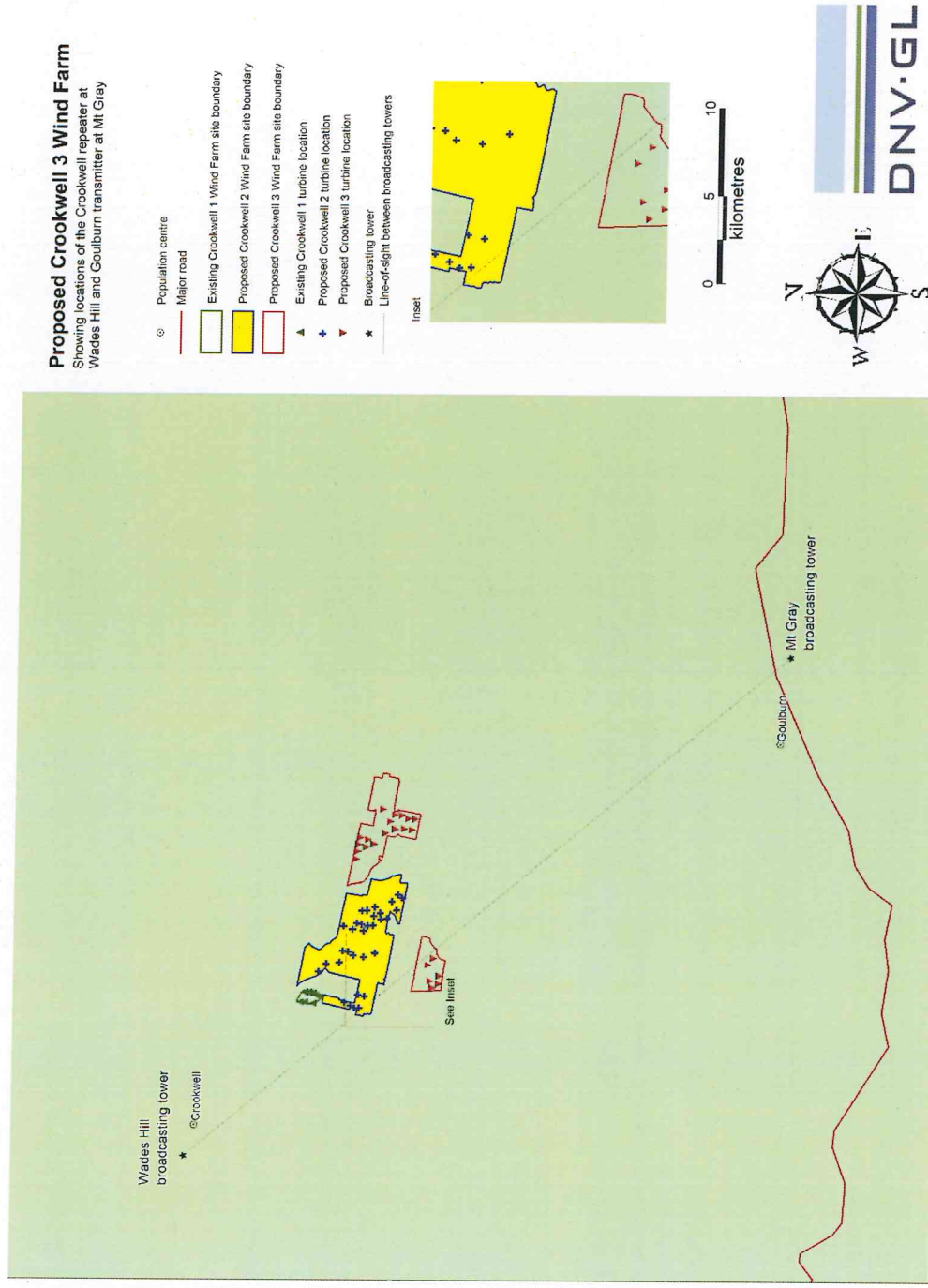


Figure 6 Locations of the Crookwell repeater at Wades Hill and Goulburn transmitter at Mt Gray relative to the proposed Crookwell 3 Wind Farm

Appendix 6: Response to OEH Heritage and Biodiversity Letter

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

1 December, 2017

Shaq Mohajerani
Crookwell Development Pty Ltd
Suite 4, Level 3, 24 Marcus Clarke Street
Canberra ACT 2600

Our Reference: 0326058L01 - RESPONSE TO OEH - 1 DECEMBER 2017.DOCX

Attention: Shaq Mohajerani

Dear Shaq,

**RE: CROOKWELL 3 WIND FARM (SSD 6695) - RESPONSE TO OEH ON
AMENDED DEVELOPMENT APPLICATION**



Environmental Resources Management Australia Pty Ltd (ERM) provides this letter to Crookwell Developments Pty Ltd (CDPL) in response to the NSW Office of Environment and Heritage's (OEH's) correspondence regarding the amended development application (letter OEH to NSW Department of Planning & Environment (DP&E): DOC 16/507690-9, dated 14 November 2016).

The comments herein relate to biodiversity and heritage issues which are separately addressed in tables in the attached annexes.

Yours sincerely,
for Environmental Resources Management Australia Pty Ltd

APPROVED UNSECURE VERSION

Nathan Lynch
Principal Consultant

APPROVED UNSECURE VERSION

Paul Douglass
Partner

Annex A

HERITAGE ISSUES

Table A.1 – Aboriginal Cultural Heritage Matters for Crookwell 3 Wind Farm

OEH Comment	ERM Response / Advice
<i>OEH require clarification on section 5.4 of the September 2016 addendum EIS which advises that further investigation of Aboriginal Cultural Heritage is not required... while no further heritage assessment may be considered necessary for the Addendum EIS – further archaeological investigation, including additional surveys and test excavations, must be undertaken for the project prior to construction.</i>	ERM confirm that no further heritage assessment was considered necessary to inform the Addendum EIS. ERM confirm that further archaeological investigation, including additional surveys and test excavations, are required for the project prior to construction. Section 5.4 of the Addendum EIS states that ‘mitigation measures contained in the draft conditions of consent are considered sufficient for ensuring protection of Indigenous cultural heritage’ this captures the requirement for addition archaeological investigation as follows: Condition E25 (e) of the Condition of Consent require a Construction Heritage Management Plan to be developed in consultation OEH and Pejar Local Aboriginal Land Council, any other registered Aboriginal parties. The Plan shall be informed by archaeological surveys and/or test excavations conducted for the access roads and electrical connections for the development. The Construction Heritage Management Plan must include details of further investigation and identification of Aboriginal cultural heritage sites within the development area (including a clearly labelled map showing those sites and which defines the boundaries of each site with a polygon).

OEH Comment	ERM Response / Advice
<i>We continue to support the incorporation of the recommendations provided by ERM (2014) in the Supplementary Aboriginal and Historical Cultural Heritage Assessment as part of the conditions of consent. Specifically:</i> <i>Subsurface testing of potential archaeological deposits (PADs) be undertaken prior to ground disturbance (ERM 2014:97). Figures 7.4 and 7.5 of the report indicate that PADs will be impacted by the currently proposed access roads and that archaeological testing is therefore required.</i> <i>Salvage collection of Aboriginal sites where impacts cannot be avoided.</i> <i>Preparation of an Aboriginal Cultural Heritage Management Plan (ACHMP) developed in conjunction with the Aboriginal knowledge holders and OEH to determine how best to manage and mitigate impacts to Aboriginal cultural heritage, and develop an unexpected finds procedure. These strategies must be developed prior to construction. The Plan must be informed by the results of previous archaeological surveys and test excavations.</i>	Recommendation supported by OEH - No response required.

OEH Comment	ERM Response / Advice
<i>We reiterate our recommendations that a firm commitment be given to considering all available management measures if any areas of significant Aboriginal objects or archaeological deposits are located during archaeological excavations/salvage activities. This could include consideration to changing the project layout so as to avoid any significant areas.</i>	CDPL will consider all available management measures if any areas of significant Aboriginal objects or archaeological deposits are found along the access tracks and cabling alignments.
<i>We can confirm that Aboriginal site cards have still not been submitted to the Aboriginal Heritage Information Management System (AHIMS) for sites WF1 to WF16 or WF1 PAD, WF2PAD or WF3PAD. This is a legal requirement with associated financial penalties. Site cards must be submitted to AHIMS as soon as possible and OEH notified of their submission.</i>	The nineteen site cards were submitted to AHIMS on Thursday, September 21, 2017 at or before approximately 1:50 PM.

Annex B

BIODIVERSITY ISSUES

Table B.1 – Biodiversity Matters for Crookwell 3 Wind Farm

Matter	OEH Comment	ERM Response/Advice
C8 Biodiversity	<i>OEH reiterates our comment from 5 December 2014 that if the Booroolong Frog is known to occur in First Creek, or is found to occur during further surveys of the site, a buffer should be implemented around the local population and no impacts should occur in this area". This is regardless of whether they are breeding.</i>	The general mitigation measures included in ERM (2013) for the creek crossings and referred to in C8, including conducting works outside of the breeding seasons and avoiding disturbance to the rock shelf and vegetated bank have been proposed to minimise the impact on habitat resources. These precautionary measures have been recommended based on the identification of potential habitat only – no Booroolong Frogs were identified during the surveys. The Construction Flora and Fauna Management Plan will include a detailed protocol in the event that any previously unrecorded threatened species, including the Booroolong Frog, are confirmed to occur within the site. This will trigger the requirement for additional consultation with OEH, a review of mitigation measures and where appropriate, the implementation of appropriate buffers.
C9 Biodiversity	<i>The Flora and Fauna Management Plan required by condition C9 should be prepared in consultation with OEH and should consider the Natural England Technical Information Note TIN051 to demonstrate appropriate buffers, including but not limited to identifying distances from Turbine A 12 to the closest hollow bearing trees. OEH would still prefer that turbine A 12 be removed.</i>	Project approval condition E25(d) requires that the Construction Flora and Fauna Management Plan be developed in consultation with OEH. As identified in the Response to Submissions Report (24/03/2014), the woodland surrounding A12 is unlikely to provide important habitat for threatened fauna and the proposed works would not result in the removal of any of the Hollow Bearing Trees (HBTs) in the vicinity of turbine A12. This turbine is not intended to be removed from the Project. Natural England Technical Information Note TIN051 recommends a 50 m buffer from the edge of the rotor-swept area to the nearest part of the

Matter	OEH Comment	ERM Response/Advice
		habitat feature (in this case reference is being made to HBTs) i.e. not from the turbine base to habitat feature at ground level. TIN051 may be used as a reference in the absence of any Australian guidelines at the time that the Management Plan is prepared and any setback analyses will be considered (in concert with all other factors affecting micro-siting).
Condition C10 Detailed Design and Micro-siting	<i>OEH considers that the Applicant should develop a Micro-siting plan to complement this condition and that it should reference TIN051 to determine buffer distances.</i>	As stated in the Secretary's Assessment Report and Condition B8, micro-siting of development components is only permitted with the written agreement of the Secretary. C11 requires that where micro-siting is proposed, the Applicant shall identify the final development components in the CEMP, and demonstrate how those locations will not give rise to increased landscape, ecological, cultural heritage, visual amenity, shadow flicker, noise, fire risk or aviation impacts when compared with the approved locations. In satisfying the above conditions, the Applicant will be preparing a micro-siting plan as a component of the CEMP which will include consideration of the many various factors affecting micro-siting. TIN051 may be used as a reference in the absence of any Australian guidelines at the time that the Management Plan is prepared.
C 13 Biodiversity Offset Package	<i>OEH understands that the Applicant will be using the NSW Biodiversity Offsets Policy for Major Projects underpinned by the Framework for Biodiversity to meet this condition. OEH do not consider that any transitional arrangements apply.</i>	As the project assessment period has been ongoing for a number of years, OEH and DP&E policies regarding biodiversity impact assessment and offsets have changed during this time. The NSW Biodiversity Offsets Policy for Major Projects (OEH 2014) has been introduced since the fieldwork and assessment was originally undertaken and CDPL request DP&E consider adherence to the principles upon negotiation, in particular, Principle 2

Matter	OEH Comment	ERM Response/Advice
		requires the implementation of the Framework for Biodiversity Assessment which requires the production of a Biodiversity Assessment Report (BAR) and a Biodiversity Offsets Strategy (BOS). Based on previous liaison, CDPL had not previously considered the use of BioBanking to calculate impacts and secure the offset required for the impacts (required in Principles 2 and 4 of the NSW Biodiversity Offsets Policy for Major Projects (OEH 2014)). Should the project receive approval, CDPL intend to progress to securing a BioBanking statement (for impacts) and agreement (for offset areas) and will continue to liaise with DP&E regarding progress. CDPL has however throughout time altered the design to maximise avoidance of native vegetation and currently the total area of native vegetation to be cleared totals 7.68 ha comprising: • Silvertop Ash Open Forest = 1.09 ha • Silvertop Ash Open Forest Derived Native Grassland = 0.52 ha • Red Stringybark Open Forest = 1.63 ha • Red Stringybark Open Forest Derived Native Grassland = 4.44 ha The Biodiversity Conservation Act 2016 commenced on 25 August 2017 however there are transitional provisions for major project development applications so as they can be considered under the previous legislation where substantial environmental assessment was undertaken before 25 August 2017, as determined in writing by the Secretary of the Department of Planning and Environment.

Matter	OEH Comment	ERM Response/Advice
C14 - Bird and Bat Monitoring and Management	<i>We reiterate our request from 5 December 2014 that OPE change the condition to ensure that the Applicant engage with OEH early in the development of the BBAMP and allow a minimum of two months for the consultation period.</i>	Condition C14 requires the preparation and submission for approval of the Secretary a Bird and Bat Adaptive Management Programme. The Applicant commits that consultation with OEH will be ongoing throughout the preparation of the program including the design and implementation of the baseline surveys which will be undertaken over a full 12 month period. It is understood that CDPL has already undertaken a combined Crookwell 2 and Crookwell 3 bird and bat utilisation survey earlier this year in February / March and further surveys are currently in progress to provide more comprehensive mapping of the area.
-	<i>We also reiterate our request that the OEH considers that "Operation" means that the Applicant must commence monitoring from the time that the turbines start turning, regardless of whether they are producing electricity.</i>	It is not practical or safe to commence monitoring from the time that the turbines "start turning, regardless of whether they are producing electricity". Generally a group of turbines (in the same electrical circuit) will be commissioned and commence operation, during this period some blade movement may be experienced but not at normal operational levels, as such, if the monitoring program starts too early recorded data will provide spurious results and outcomes. Regarding safety, during the commissioning phase there is construction activity at multiple locations across the site and safety could be an issue if consultants are walking around.

Matter	OEH Comment	ERM Response/Advice
-	<i>Surveys for Eastern Bentwing-bat and Eastern False Pipistrelle should be conducted using detectors placed at height (preferably on monitoring masts) during activity periods, especially migration, and that this survey should be undertaken in consultation with OEH, and should be part of the baseline surveys required by this condition.</i>	Condition C14 requires the preparation and submission for approval of the Secretary a Bird and Bat Adaptive Management Programme. This Program will be prepared in consultation with OEH. Condition C14(b) states that the monitoring program must be capable of detecting any changes to the population of birds and/ or bats that can reasonably be attributed to the operation of the development, as such, baseline data over a 12 month period prior to commencement of operation of the project are required to be collected. This survey period will therefore capture migration and other high activity periods. Methodology, including the appropriate placement of detectors based on the target species, will be designed based on the current best practise guidelines and in consultation with OEH.
E25(d) Construction Fauna and Flora Management Plan	<i>OEH notes that turbine A27 has been removed, however this condition still should still apply to turbine A32.</i>	Noted.
F20 - Operational Environment Management Plan	<i>We also reiterate that we would like to see the following statement included in the CEMP and OEMP that "all areas that have been mapped as native vegetation must be rehabilitated with all native species that are suitable to the location – in particular areas that have been mapped as over 50% native grass must be rehabilitated with native grass species."</i>	Condition F6 requires a revegetation and rehabilitation programme for all areas of the development footprint which are disturbed during the construction of the development, which are not required for the ongoing operation of the development. All revegetation measures are implemented progressively and in all cases within six months of the cessation of construction activities at the relevant area. The Applicant commits to undertake the revegetation works in accordance with Condition F6 above and that all areas that have been mapped as native

Matter	OEH Comment	ERM Response/Advice
		vegetation will be rehabilitated with native species that are suitable to the location – in particular, areas that have been mapped as over 50% native grass will be rehabilitated with native grass species.
Access track realignments	<i>There has been a minor change to the alignment of access track between turbine A 13 and A 16 to avoid the box gum woodland. However the layout in Figures 2 and 3 in the Addendum Environmental Impact Statement doesn't look any different. These figures should be updated to show these changes.</i>	Refer Figure 1(attached) showing the proposed footprint and vegetation mapping. .
Turbine A24 realignment	<i>The Ecology report states that there has been a slight change of location for turbine A24, however it doesn't look any different between Figure 2 and Figure 3 in the Addendum Environmental Impact Statement. These figures should be updated to show these changes.</i>	Refer Figure 1(attached) showing the proposed footprint and vegetation mapping.
Turbine A26 and A27 removal and track realignment	<i>OEH notes and supports the removal of turbine A26 and A27 from within the Box Gum derived native grassland path in the western part of the project area and the realignment of the access track to avoid this patch.</i> <i>However it doesn't appear that the realignment to the access track is reflected in Figure 3 - Proposed Infrastructure layout. This should be updated to reflect the changes.</i>	Refer Figure 1(attached) showing the proposed footprint and vegetation mapping.

Legend

Wind Farm Layout:

●

Wind Turbine Generator

●

Wind Turbine Generator (Removed)

—

Access Track

Vegetation Type

■

Box-Gum Woodland

■

Box-Gum Woodland - DNG

■

Pasture

■

Planted Native Vegetation

■

Planted Vegetation

■

Red Stringybark Open Forest

■

Red Stringybark Open Forest - DNG

■

Silvertop Ash Open Forest

■

Silvertop Ash Open Forest - DNG

■

Silvertop Ash Open Forest - Regrowth

▨

TSC Act listed BGW

▨

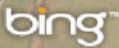
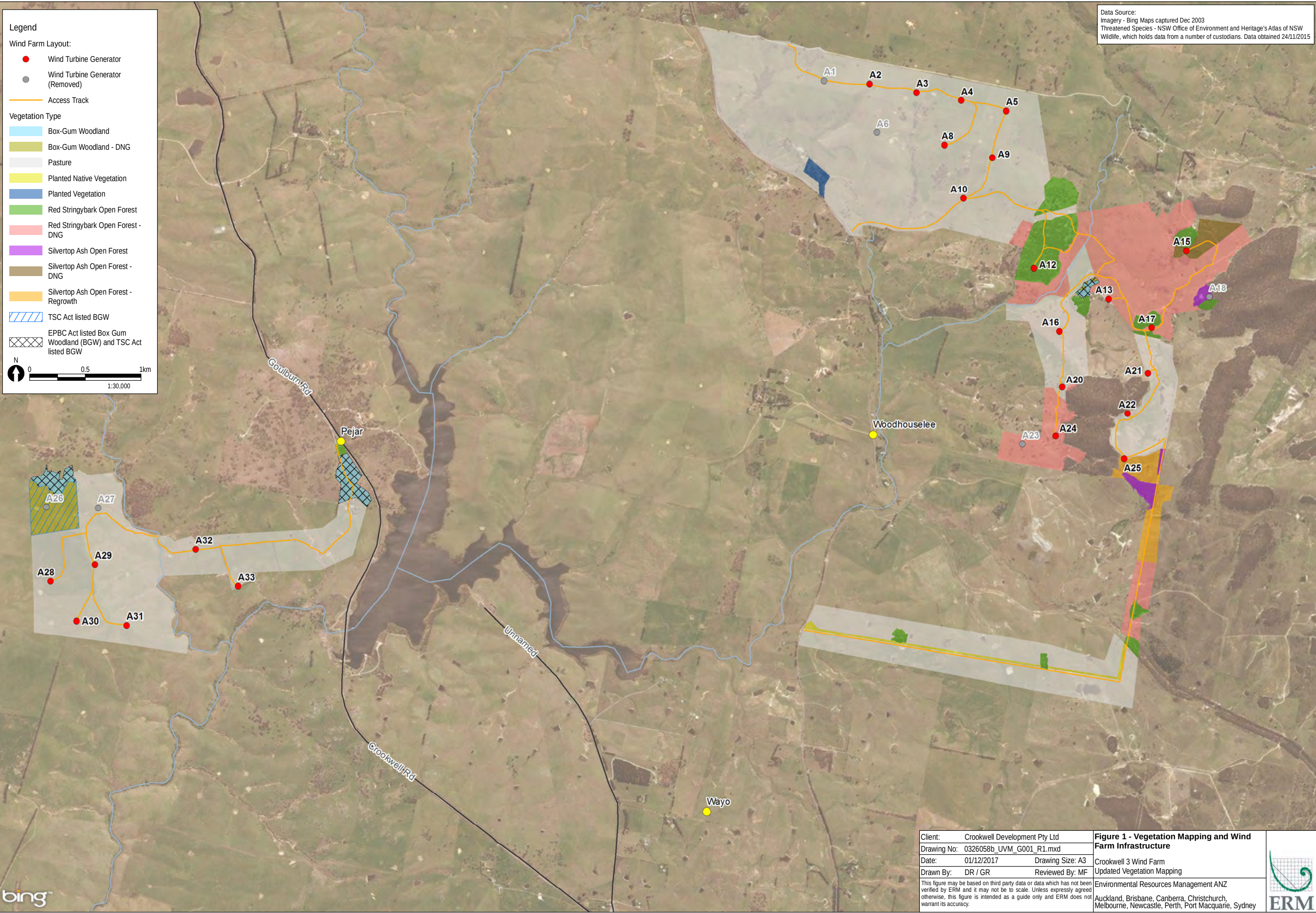
EPBC Act listed Box Gum Woodland (BGW) and TSC Act listed BGW

N

00.51km

1:30,000

Data Source:
Imagery - Bing Maps captured Dec 2003
Threatened Species - NSW Office of Environment and Heritage's Atlas of NSW
Wildlife, which holds data from a number of custodians. Data obtained 24/11/2015



Client:	Crookwell Development Pty Ltd
Drawing No:	0326058b_UVM_G001_R1.mxd
Date:	01/12/2017
Drawn By:	DR / GR

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 1 - Vegetation Mapping and Wind Farm Infrastructure
Crookwell 3 Wind Farm
Updated Vegetation Mapping

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



ERM has over 100 offices
across the following
countries worldwide

Australia	Netherlands
Argentina	New Zealand
Belgium	Peru
Brazil	Poland
China	Portugal
France	Puerto Rico
Germany	Singapore
Hong Kong	Spain
Hungary	Sri Lanka
India	Sweden
Indonesia	Taiwan
Ireland	Thailand
Italy	UK
Japan	USA
Korea	Venezuela
Malaysia	Vietnam
Mexico	

Environmental Resources Management

Level 15, 309 Kent Street
Sydney NSW 2000
Locked Bag 3012
Australia Square NSW 1215

T: 61 2 8584 8888
F: 61 2 8584 8800
www.erm.com





Suite 12048, Level 12, 179 Elizabeth Street
Sydney, New South Wales 2000

info@mecone.com.au
mecone.com.au