

# Crookwell 3 Wind Farm Addendum Environmental Impact Statement

On behalf of  
Crookwell Development Pty Ltd

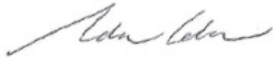
September 2016



## Project Director

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Signed\*



29 September 2016

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

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# Statement preparation

## Applicant details

**Name:** Crookwell Development Pty Ltd

## Site and proposal details

**Site Location:** The site is located in Crookwell, NSW. Crookwell is located in regional southwest NSW in the Upper Lachlan Local Government Area, 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.

**Legal Description:** Lot 1 DP 1074987; Lot 2 DP 1074987; Lot 1 DP 924832; Lot 2 DP 1139846; Lot 13 DP 784346; Lot 14 DP 784346; Lot 191 DP 750054; Lot 290 DP 750052; Lot 326 DP 750052; Lot 7011 DP 96802; Lot 3 DP 588100; Lot 8 DP 252214; Lot 1 DP 965855; Lot 2 DP 1087717; Lot 2 DP 1091383; Lot 7300 DP 1139548; Lot 257 DP 257478; Lot 9 252214; Lot 256 DP 257478; Lot 12 DP 252214; Lot 7009 DP 96794; Lot 1 DP 604536; Lot 2 DP 604536.

**Proposed Development:** Amendments to the Crookwell 3 Wind Farm State significant development application SSD 6695, MP 10\_0034, currently under assessment, including a reduction in the number of turbines and variations to turbine size.

## Prepared by

**Name:** Adam Coburn

**Qualifications:** Bachelor of Environmental Planning, Master of Planning

**Address:** Mecone Pty Ltd, Suite 1204B, 179 Elizabeth Street, Sydney NSW 2000

## Certification

I certify that I have reviewed the content of this Addendum Environmental Impact Statement (Addendum) and to the best of my knowledge:

- it is in accordance with Part 4 of the *Environmental Planning and Assessment Act 1979* (the Act) and Schedule 2 of the *Environmental Planning and Assessment Regulation 2000* (the Regulation);
- the Addendum contains all available information that is relevant to the environmental assessment of the development to which the statement relates; and
- the information contained in the Addendum is neither false nor misleading.

**Signature:**



**Name:** Adam Coburn

**Date:** 29 September 2016

# Executive Summary

## Introduction

This Addendum Environmental Impact Statement (Addendum Report) has been prepared on behalf of Crookwell Development Pty Ltd as an addendum to the Crookwell 3 Wind Farm development application, being State significant development application SSD 6695, MP 10\_0034.

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

Since that time, a number of changes have been proposed to the project to further reduce its environmental impact and reflect the significant advances which have been made in turbine technology.

## Site Description

Crookwell is located in regional NSW in the Upper Lachlan Local Government Area. The Crookwell 3 Wind Farm is one of three approved/proposed wind farms in the Crookwell area, the other farms being the operational Crookwell 1 Wind Farm and the approved Crookwell 2 Wind Farm.

The project site is split into two separate parcels to the east and south of the approved Crookwell 2 Wind Farm, known as Crookwell 3 East and Crookwell 3 South.

## Planning Context

The proposal was originally declared to be a major project under Part 3A of the *Environmental Planning and Assessment Act 1979* (EP&A Act) 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. The project was also declared to be a Critical Infrastructure Project under Part 3A of the EP&A Act as it is a renewable energy project with a peak generating capacity of more than 30 megawatts (MW).

An application was originally lodged seeking project approval under Part 3A of the EP&A Act for the Crookwell 3 Wind Farm in 2010.

While Part 3A of the EP&A Act was repealed in 2011, it continues to apply to certain transitional Part 3A projects unless and until they are transitioned to State significant development (SSD) under Part 4 of the EP&A Act.

An Environmental Assessment Report (EA Report) for the project was exhibited in November 2012 to February 2013.

In March 2014 a Preferred Project Report and Response to Submissions Report (Submissions Report) was lodged for the project.

The then Minister for Planning and Infrastructure formally transitioned the project from Part 3A to SSD via an order made under clause 6 of Schedule 6A of the EP&A Act on 21 March 2014. As such, the previous actions taken under the Part 3A process, including the exhibition of the EA Report and the lodgment of the Submissions Report, 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 (DPE) and a Secretary's Environmental Assessment Report was prepared under section 89E of the EP&A Act in February 2015 (Secretary's

Assessment Report). The Secretary's Assessment Report recommended that the project be approved subject to conditions and concluded that:

*The Department's assessment concludes that the proposal will meet relevant environmental and amenity criteria and would result in acceptable visual outcomes. Further, the Applicant has proposed adequate construction and operational environmental management measures and has reduced the development footprint so as to reduce the impact on native vegetation.*

...

*The Department therefore considers that the proposed Crookwell 3 Wind Farm is in the public interest. The development will also reduce the production of greenhouse gas emissions that would otherwise be produced if the equivalent proposed power supply was provided by fossil fuel combustion.*

## **6.2 Recommendation**

*The Department therefore recommends that the Planning and Assessment Commission consider the findings and recommendations of this report and determine to approve the development subject to the recommended conditions.*

## Changes to the Project

Since the Secretary's Assessment Report was prepared, a number of changes have been made to the project to further reduce its environmental impact and reflect the significant developments which have been made in turbine technology.

The modifications to the project include:

- Removal of 6 turbines, reducing the total number of turbines proposed from 29 to 23 (and resulting in a total of 17 turbines in Crookwell 3 East and 6 turbines in Crookwell 3 South).
- Increasing the maximum turbine envelope so as to accommodate the newer more efficient turbine models now available. The changes proposed to the turbine envelope will:
  - decrease in the hub height from 105 metres to up to 95 metres;
  - increase in the rotor diameter from 104 metres to up to 130 metres; and
  - 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 turbine height providing access to stronger wind resources, the increase in the swept path area due to the longer blade length, and an increase in generator capacity in the nacelle (up to approximately 3.6 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 4629 turbines initially proposed.



The reduction in overall turbine numbers will reduce the Project's overall environmental impacts.

This Addendum Report updates the assessment of the project contained in the EA Report and Submissions Report to reflect the changes now proposed to the project.

## Proposed Crookwell 2 Wind Farm Modification

Modifications are being sought to the approved Crookwell 2 Wind Farm project, including a reduction in the number of turbines from 46 to 33 and increase in the maximum turbine envelope. The noise and visual assessments in this Addendum Report have assessed the cumulative impacts resulting from the changes to the project and the proposed modifications to the approved Crookwell 2 Wind Farm.

## Planning Instruments

This Addendum Report considers the changes which have been made to the environmental planning instruments which apply to the site since the EA Report was prepared.

In particular, the *Upper Lachlan Local Environmental Plan 2010* (Upper Lachlan LEP), which was in draft form when the EA Report was prepared, has now commenced. Owing to the operation of the relevant savings and transitional provisions, the Upper Lachlan LEP does not apply to the project. However, in the interests of completeness, this Addendum Report updates the consideration of the key environmental planning instruments which apply to the site, including the Upper Lachlan LEP.

## Consultation

As part of the preparation of this Addendum Report, the community and all relevant government agencies were contacted advising them of the proposed modifications to the project and requesting written confirmation of any comments or issues with regard to those proposed modifications.

Those consulted include:

- Commonwealth Agencies:
  - Civil Aviation Safety Authority (CASA);
  - Airservices Australia;
  - Department of Defence;
  - Department of Environment;
  - Bureau of Meteorology (BoM);
- NSW Government Agencies:
  - NSW Department of Planning and Environment;
  - NSW Office of Environment and Heritage;
  - NSW Environmental Protection Authority;
  - NSW Department of Industry;
  - NSW Department of Industry, Crown Roads;
  - NSW Land and Property Information (NSW LPI);
  - NSW Roads and Maritime Services;
  - NSW Office of Water;
  - NSW Rural Fire Service;
  - Ambulance Service of NSW;
  - John Holland Rail on behalf of Transport for NSW;
- Local Government
  - Upper Lachlan Shire Council;

- Goulburn Mulwaree Council;
- Other Agencies / Organisations
  - Aerial Agricultural Association of Australia;
  - Fred Fahey Aerial Services;
  - Geoscience Australia;
  - Mobile phone service providers (Optus, Telstra and Vodafone);
  - Radio Goulburn;
  - Royal Flying Doctor Service;
  - Vertical Telecoms;
  - Wireless Internet (NBN, Yless4U, ACE Internet Services);
  - Yass Aerial Service;
- Associated residents where modified turbines are located on their land;
- Non-associated neighbouring landowners / residents and local community;

Consultation activities to non-associated landowners / residents and local community included:

- Local newspaper advertisements;
- Door knocks and/or similar meetings with adjoining landowners / residents, and landowners / residents within 3km of the project site; and
- Direct mail-out to households of a project newsletter to within 3km of the project site;

## Environmental and Social Impact Assessment

### Visual

Green Bean Design was commissioned by Union Fenosa Wind Australia Pty Ltd on behalf of Crookwell Development Pty Ltd to prepare a visual impact assessment (VIA) to assess and determine the potential visual effect of the amended Crookwell 3 Wind Farm. See **Appendix 1** for the full report.

The VIA includes a detailed assessment in tabular form of the visual impacts from residential dwellings up to 5km from the Crookwell 3 Wind Farm (refer to 'Visual Effects Matrix' in VIA). The overall effects associated with the amended Crookwell 3 Wind Farm is summarised as '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.

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

An updated shadow flicker assessment for the proposed modification has been prepared by DNV GL (refer **Appendix 3**). Results indicate that five dwellings in the vicinity of the wind farm are predicted to experience some theoretical shadow flicker within 50m of the house location. One host landowner dwelling and one non-participating dwelling are predicted to be affected by theoretical shadow flicker durations within 50m of the house locations that are greater than the recommended limit of 30 hours per year.

A more realistic prediction of shadow flicker was also conducted in order to take into account cloud cover and turbine orientation. Results show that the same two dwellings that exceed the 30 hours limit for theoretical shadow flicker are predicted

to experience actual annual shadow flicker durations that are greater than the recommended guideline limit.

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.

It is noted that one of the recommended conditions of consent in the Secretary's Assessment Report is that shadow flicker from the project must not exceed 30 hours/annum at any non-associated residence. It is anticipated that, following the implementation of the mitigation measures named above, the project will be able to fulfill this condition.

### Noise

An updated noise impact assessment has been prepared by SLR Consulting (refer **Appendix 2**). This report considers the noise impacts of the modifications made to the project together with the modifications also proposed to the approved Crookwell 2 Wind Farm in order to provide an assessment of cumulative noise impacts.

Modelling using the standard ISO9613 methodology was completed for three alternative turbines models (i.e. Vestas V126, GE130, Senvion M122). Initial results indicate that the wind farm may exceed the relevant noise limits at some receptors.

A mitigation investigation was undertaken utilising sound management mode, and it was found that compliance at all receptors can be achieved using a mitigated layout where some turbines are operated in Noise Management Mode. It should be noted that when turbines are configured in Noise Management Mode they are always operating in the reduced noise mode, which is distinctly different from Sector Management. The final configuration of Noise Management Mode WTGs will be determined from the result of noise monitoring undertaken post-construction of the wind farm.

At the request of the DP&E, a more detailed predicted analysis was completed using a more realistic evaluation of the effect of the variation of meteorology on noise from the wind farm. Results show that for project-involved receptors, the ISO9613 modeling approach is potentially overly conservative by 1dBA to 2dBA. For non-involved receptors, it is expected that the ISO9613 modeling approach is potentially overly conservative by 2dBA to 3dBA.

Given that the proposed mitigated layout demonstrates compliance with noise guidelines, the draft conditions of approval recommended in the Secretary's Assessment Report are considered sufficient for ensuring adequate acoustic amenity.

### Heritage

The EA Report contained a comprehensive Indigenous and non-indigenous archeological heritage assessment. The revised turbine layout is generally within areas already approved for turbines, and therefore it is considered that no further assessment is required.

It is considered that the draft conditions of approval recommended in the Secretary's Assessment Report are considered sufficient for ensuring that the project does not cause adverse heritage impacts.

## Aviation

Aviation Projects has provided a summary of the net aviation impacts of the changes to the Crookwell 3 Wind Farm project (refer **Appendix 4**). The report has found that the increases in turbine envelope the updated turbine layout will not have increased aviation impacts when compared with the originally proposed turbine locations. Accordingly, it is considered that the draft conditions of approval recommended in the Secretary's Assessment Report are considered sufficient for ensuring that the project does not cause any adverse aviation impacts.

## Telecommunications

DNV GL has undertaken an electromagnetic interference (EMI) assessment (refer **Appendix 5**) with regards to fixed point-to-point links, radio communication assets belonging to emergency services, meteorological radars, trigonometrical stations, citizen band (CB) radio and mobile phones, wireless internet, broadcast radio, satellite television and internet, and broadcast television.

In summary it has been found that there may be some impacts associated with the changes made to the project, notably upon television broadcasting, but these can be effectively managed through various measures and would be implemented with additional consultation with stakeholders.

It is considered that the conditions of approval recommended in the Secretary's Assessment Report are sufficient for ensuring that any EMI impacts are properly mitigated.

## Traffic and Transport

A traffic and transport impact assessment has been prepared by GTA Consultants (refer **Appendix 6**).

The report concludes that the peak daily traffic generation for the construction and operation of the Wind Farm would be generally consistent with the original application.

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 64m 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.

The main issues addressed by the report in relation to the 64m blade swept paths include:

- Mitigating impacts on street furniture, signage, poles, traffic signal infrastructure;
- Ensuring safety; and
- Minimising impacts on road infrastructure including concrete medians, kerbs and road safety barriers.

It is considered that draft conditions of approval recommended in the Secretary's Assessment Report are sufficient for ensuring the project as amended results in no unreasonable adverse transport or traffic impacts.

## Biodiversity

An ecology report has been prepared by ERM (refer **Appendix 7**).

The removal of six turbines from the project is anticipated to reduce the overall impacts to birds and bats within the project area, and the change to the maximum

turbine envelope is not expected to result in any significant increase to the risk of bird and bat collision and barotrauma for the project.

In relation to flora, the reduced number of turbines has the benefit of removing from the project a number of access tracks and underground cabling routes. Furthermore, refinements to the access track layout have been made to avoid areas of higher ecological value have been undertaken. Both these modifications reduce the overall project footprint and hence result in a reduction to the total amount of vegetation clearing required for the project.

In addition, the reduction in turbine numbers and the realignment of the access tracks has the result that the project now totally avoids all EPBC Act listed Box Gum Woodland and areas of TSC Act listed Box Gum Woodland and Derived Native Grassland.

Given the reduced overall impacts on biodiversity, it is considered that the draft conditions of approval recommended in the Secretary's Assessment Report are sufficient for ensuring that any biodiversity impacts are properly mitigated.

#### Social and Economic

The changes made to the project are not anticipated have any adverse social or economic impacts. The detailed socio-economic analysis submitted with the EA Report is considered still relevant and authoritative. This analysis concluded that the project would provide positive benefits to the economy and local community, including capital investment, direct and flow-on employment benefits, maintenance of existing agricultural activities and contribution to national and international efforts to reduce potential impacts of climate change. All of these benefits would be maintained or improved by the changes made to the project, which features better, more efficient technology and fewer turbines.

## Cumulative Impacts

It has been found that the potential cumulative impacts from the changes made to the project and other development in the vicinity (namely the already constructed Crookwell 1 Wind Farm and the approved Crookwell 2 Wind Farm) are low and manageable.

Results of the updated cumulative impact assessment contained in the shadow flicker and blade glint assessment show that shadow flicker from the Crookwell 1 and Crookwell 2 Wind Farm turbines is not expected to affect the dwellings that receive shadow flicker from Crookwell 3 Wind Farm turbines.

The noise impact assessment prepared by SLR concludes that noise compliance at each of the Crookwell 1, 2 and 3 Wind Farms can be achieved using a mitigated layout at both Crookwell 2 and 3 Wind Farms (as referred to above), where a number of turbines are placed into noise management mode (if required).

The electromagnetic interference (EMI) assessment prepared by DNV GL considers possible cumulative impacts from Crookwell 2 and 3 Windfarms. It was found that there may be cumulative impacts on terrestrial television signals for some residences, particularly for dwellings that have a non-directional or low-gain antenna and may therefore receive a reflected signal from the surrounding turbines. In addition, the signal between the new Crookwell broadcast television repeater at Wades Hill and the Goulburn broadcast tower at Mount Gray passes through both the Crookwell 2 and Crookwell 3 Wind Farms, and therefore there is potential for cumulative impacts from the two projects. It is considered that the

draft conditions of consent contained in the Secretary's Assessment Report are sufficient for ensuring that any potential EMI impacts are properly mitigated.

## Environmental Management

Environmental management measures and strategies for the updated project would be managed with the aid of an Environmental Management Plan (EMP), including a standalone Construction Environmental Management Plan (CEMP) and Operational Environmental Management Plan (OEMP).

## Conclusion

Overall the changes proposed to the project will reduce the project's environmental impact and provide for more efficient generation of clean electrical power.

# 1 Introduction

This Addendum Environmental Impact Statement (Addendum Report) has been prepared on behalf of Crookwell Development Pty Ltd as an addendum to the Crookwell 3 Wind Farm development application, being State significant development application SSD 6695, MP 10\_0034.

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

Since that time, a number of changes have been made to the project to further reduce its environmental impact and reflect the significant advances which have been made in turbine technology. The increased energy per turbine will enable the reduction in the number of turbines, which will reduce the project's overall environmental impact and provide for the more efficient generation of clean electrical power.

This Addendum Report has been prepared on behalf Crookwell Development Pty Ltd to clarify and assess the changes now made to the project.

## 1.1 Purpose and Structure of Report

The purpose of this Addendum Report is to update the description of the project contained in the Environmental Assessment Report (EA Report) and the Preferred Project Report and Response to Submissions Report (Submissions Report) and to assess the impact of the changes made to the project.

The structure of this report is as follows:

- *Site Description*, which provides a brief description of the site and its location and context;
- *Changes to the Project*, which provides a detailed description of the changes to the project;
- *Planning Context*, which provides an update of the relevant planning legislation and policies and an assessment of the changes to the project against these;
- *Consultation*, which provides an overview of the consultation that has occurred with the community and other stakeholders regarding the changes to the project, and identifies the key issues raised during that consultation.
- *Environmental Impact Assessment*, which provides an overview of the environmental impacts of the changes to the project, including cumulative impacts, and identifies appropriate mitigation measures to safeguard the environment; and
- *Environmental Management*, which outlines the proponent's commitment to environmental management and ongoing monitoring.

## 1.2 Proponent and Project Team

The proponent and project team for the Addendum report are identified in the table below.

Table 1. Project Team	
Item	Description
Proponent	Crookwell Development Pty Ltd
Statutory Planning	Mecone Planning
Aeronautical and Night Obstacle Lighting	Aviation Projects
Ecology Consultant	Environmental Resources Management (ERM)
Shadow Flicker and Telecommunication	DNV GL - Energy
Landscape and Visual Consultant	Green Bean Design
Traffic and Transport Consultant	GTA Consultants
Noise Consultant	SLR Consulting Australia

The project team has also drawn upon, where appropriate, the environmental assessments undertaken as part of the original project application for the Crookwell 2 Wind Farm.

## 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.



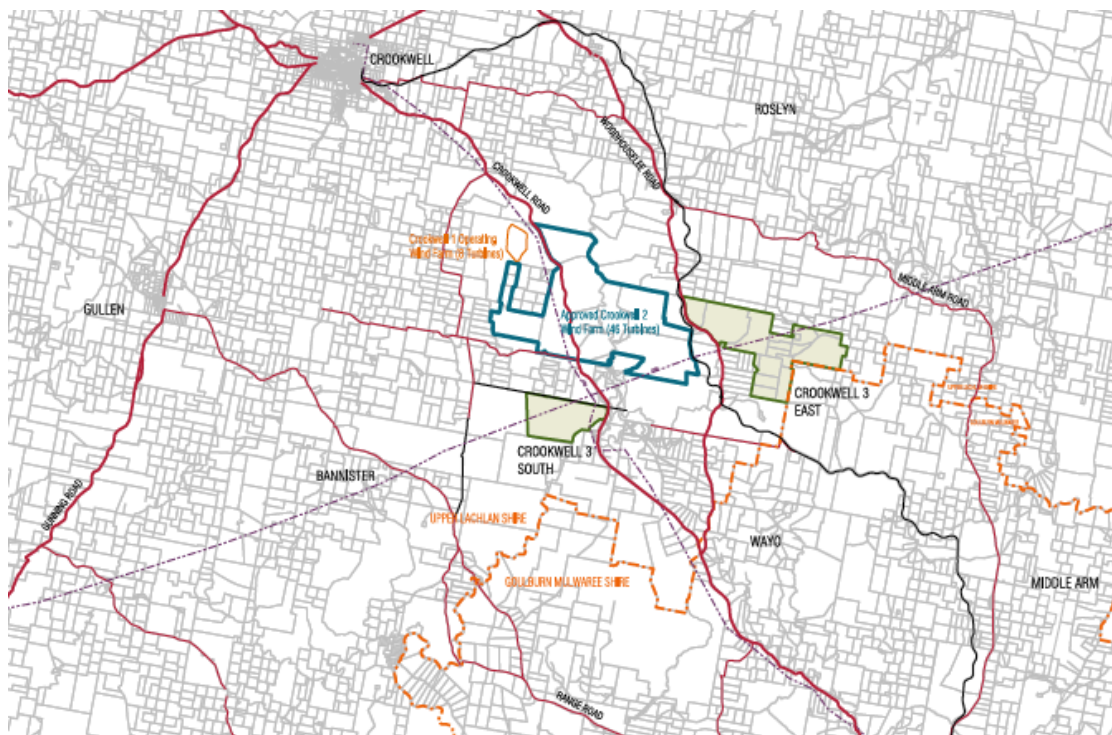


Figure 1 – Location Plan  
Source: Crookwell Development Pty Ltd

Table 2. 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 252214
	Lot 191 DP 750054		Lot 256 DP 257478
	Lot 290 DP 750052		Lot 12 DP 252214
	Lot 326 DP 750052		Lot 7009 DP 96794
Lot 7011 DP 96802		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		

Table 2. Site Description	
Item	Description
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 Changes to the Project

There have been significant advances in turbine technology since lodgment of the original project application for the Crookwell 3 Wind Farm, and changes have been made to the project in order to take advantage of these advances. New turbine models will enable the Crookwell 3 Wind Farm to generate more energy per turbine and to increase the overall energy yield of the project while reducing the overall impact of the project.

Since the Secretary's Assessment Report prepared, a number of changes have been made to the project to further reduce its environmental impact and reflect the significant developments which have been made in turbine technology.

The modifications to the project include:

- Removal of 6 turbines, reducing the total number of turbines proposed from 29 to 23 (and resulting in a total of 17 turbines in Crookwell 3 East and 6 turbines in Crookwell 3 South).
- Increasing the maximum turbine envelope so as to accommodate the newer more efficient turbine models now available (refer to Figure 4 below). The changes made to the turbine envelope will:
  - decrease in the hub height from 105 metres to up to 95 metres;
  - increase in the rotor diameter from 104 metres to up to 130 metres; and
  - maintain the blade tip height at 157 metres.
- Small changes to night lighting. The same number of turbines have lights; only the location of lighting has changed.
- 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 project otherwise remains as described in the EA Report and Submissions Report.

The revised Capital Investment Value of the project has been estimated at up to \$120 Million

Refer to Figure 2 below for the Crookwell 3 Wind Farm infrastructure layout under the Preferred Project and Response to Submissions Report, and to Figure 3 for the proposed infrastructure layout incorporating the above changes.

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 (considered under the Landscape and Visual Impact Assessment 2012).

As outlined in the EA Report and Submissions Report, if project approval is granted, this proposed layout will be refined at the detailed design stage and once the final turbine has been selected so as to achieve the best energy generation from the selected turbine model. It is estimated that this may result in individual turbines being moved approximately 25-100 metres from the currently nominated locations in accordance with the detailed criteria set out in the Submissions Report.

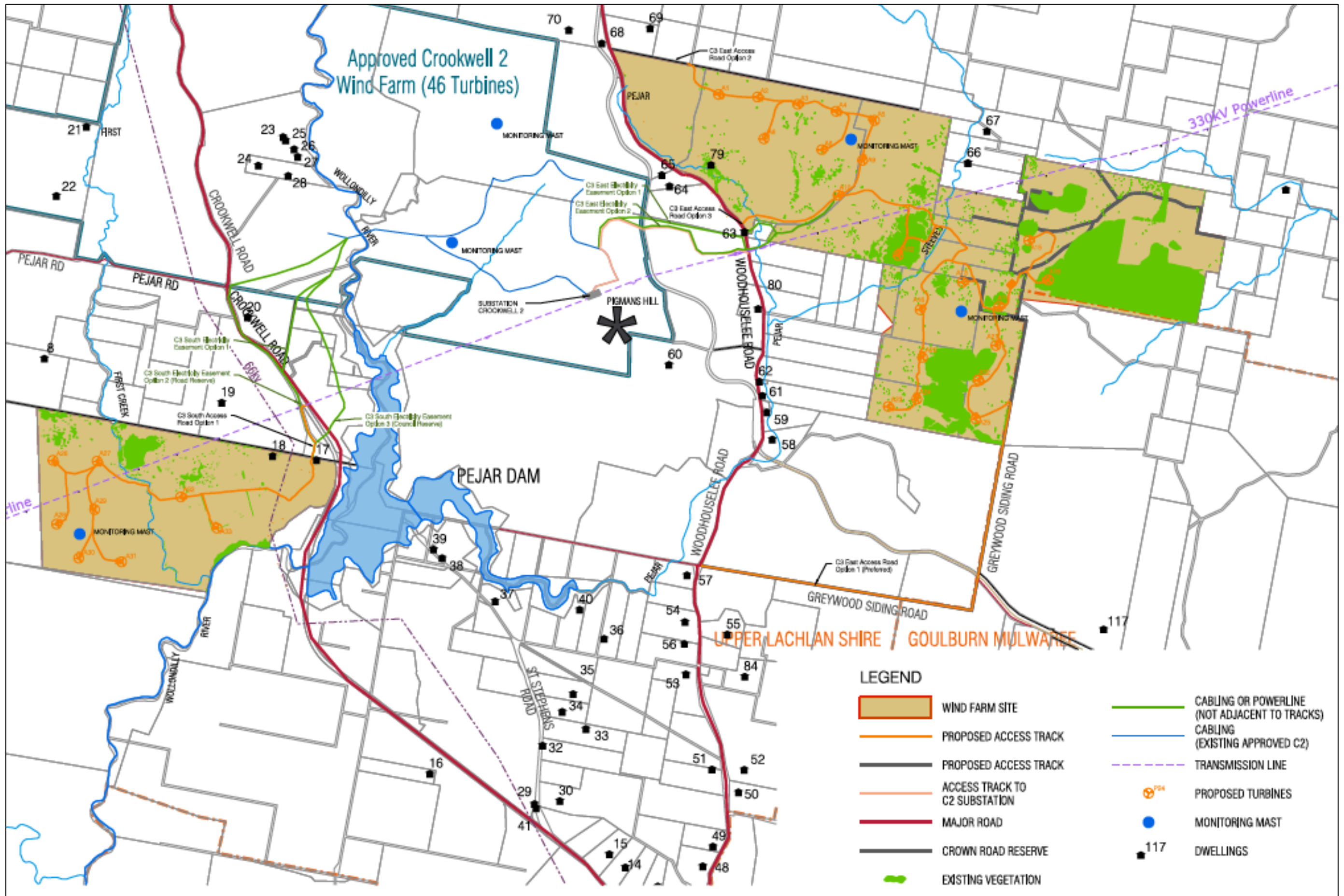


Figure 2 – Previous infrastructure layout (from Preferred Project and Response to Submissions Report)  
 Source: Crookwell Development Pty Ltd

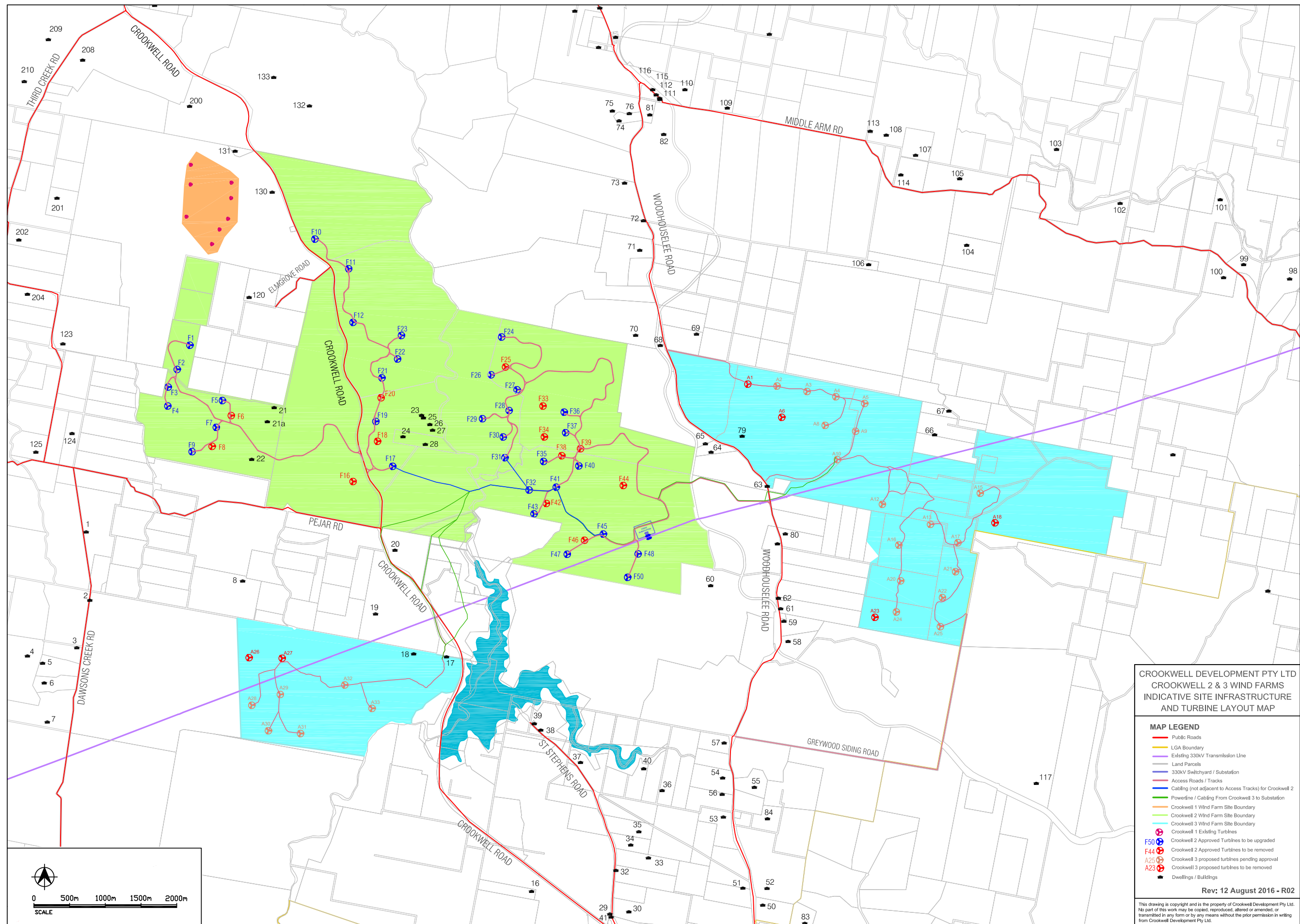


Figure 3 – Proposed Infrastructure Layout  
Source: Crookwell Development Pty Ltd

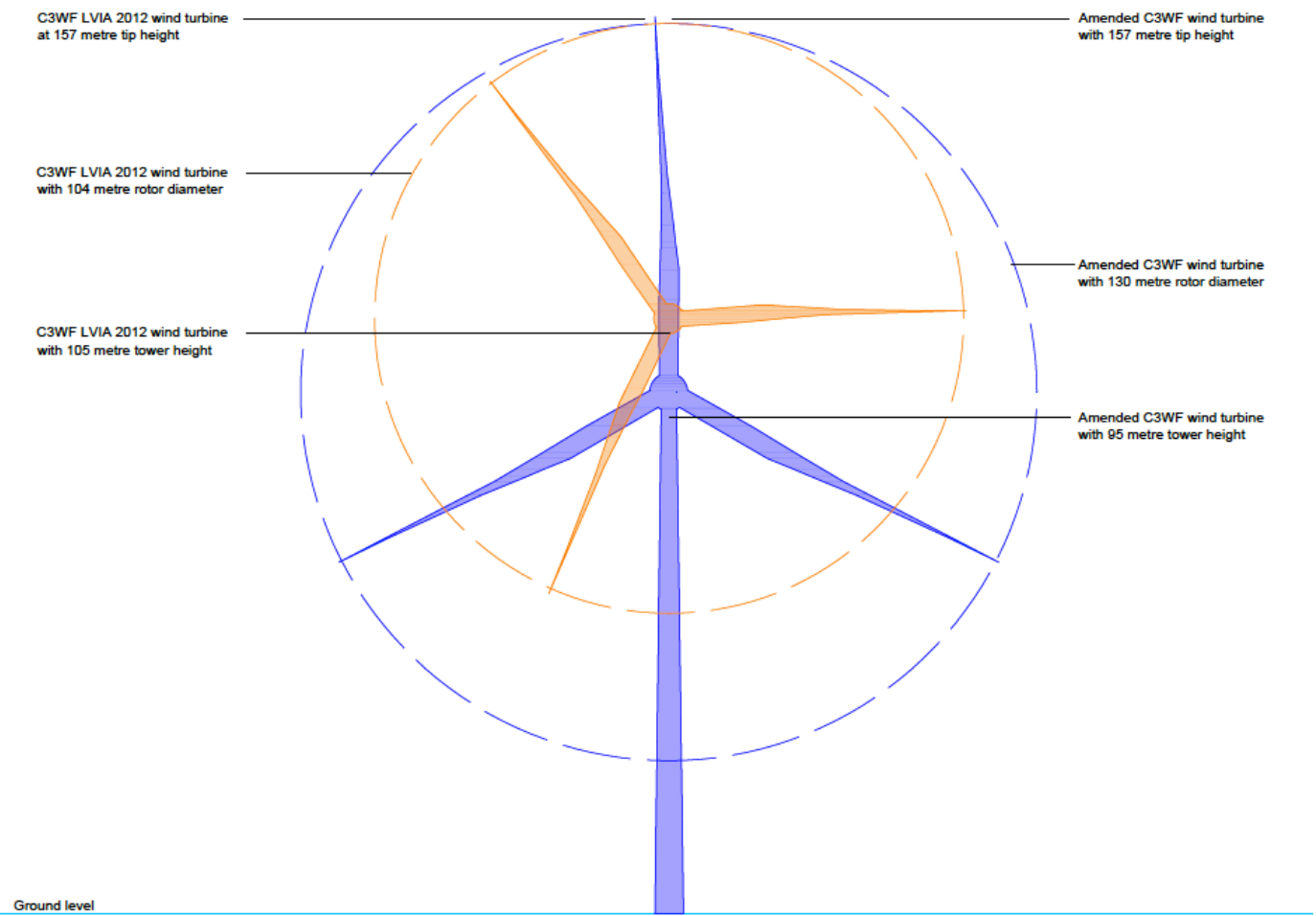


Figure 4 – Wind Turbine Comparison  
 Source: Green Bean Design

## 4 Planning Context

This chapter provides an updated assessment of the project against the relevant environmental planning instruments and planning controls.

The EA Report assessed the project's compliance against the relevant planning instruments and found that the project was generally consistent with these instruments. The conclusions drawn in the EA Report continue to apply as the changes to the project are relatively minor. Accordingly, this section of the report considers the changes which have been made to the relevant environmental planning instruments which apply to the site since the EA Report was prepared.

### 4.1 State Significant Status

On 18 February 2010, the proposal was declared a major project under Part 3A of the *Environmental Planning and Assessment Act 1979* (the EP&A Act) as it is development for the purpose of electricity generation that has a Capital Investment Value of more than \$30 million (clause 24 of Schedule 1 of *State Environmental Planning Policy (Major Development) 2005*).

On 1 October 2011, Part 3A of the EP&A Act was repealed and replaced by the State Significant Development assessment system.

The project was also declared to be a Critical Infrastructure Project under Part 3A of the EP&A Act as it is a renewable energy project with a peak generating capacity of more than 30 megawatts (MW).

An application was originally lodged seeking project approval under Part 3A of the EP&A Act for the Crookwell 3 Wind Farm in 2010.

While, Part 3A of the EP&A Act was repealed in 2011, it continues to apply to certain transitional Part 3A projects unless and until they are transitioned to State significant development (SSD) under Part 4 of the EP&A Act.

The EA Report for the project was exhibited in November 2012 to February 2013.

In March 2014 the Submissions Report was lodged for the project.

The then Minister for Planning and Infrastructure subsequently formally transitioned the project to from Part 3A to SSD via an order made under clause 6 of Schedule 6A of the EP&A Act on 21 March 2014. As such, the previous actions taken under the Part 3A process, including the exhibition of the EA Report and the lodgment of the Submissions Report, 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 (DPE) and a Secretary's Environmental Assessment Report was prepared under section 89E of the EP&A Act in February 2015 (Secretary's Assessment Report). The Secretary's Assessment Report recommended that the project be approved subject to conditions and concluded that:

*The Department's assessment concludes that the proposal will meet relevant environmental and amenity criteria and would result in acceptable visual outcomes. Further, the Applicant has proposed adequate construction and operational environmental management measures and has reduced the development footprint so as to reduce the impact on native vegetation.*

...

The Department therefore considers that the proposed Crookwell 3 Wind Farm is in the public interest. The development will also reduce the production of greenhouse gas emissions that would otherwise be produced if the equivalent proposed power supply was provided by fossil fuel combustion.

## **6.2 Recommendation**

The Department therefore recommends that the Planning and Assessment Commission consider the findings and recommendations of this report and determine to approve the development subject to the recommended conditions.

## 4.2 Commonwealth Legislation

### 4.2.1 Environment Protection and Biodiversity Conservation Act 1999

The *Environment Protection and Biodiversity Conservation Act 1999 (Cth)* (EPBC Act) aims to protect the environment with regard to matters of national environmental significance. The EPBC Act promotes ecologically sustainable development and conserves biodiversity and heritage.

Any action which that has, will have, or is likely to have a on a matters of National Environmental Significance (MNES) requires referral to the Commonwealth Department of the Environment. If the Minister decides that significant impacts on a MNES are likely, an approval under the EPBC Act is required.

As detailed in the EA Report, the proposed Crookwell 3 Wind Farm does not require referral to the Commonwealth Minister for the Sustainability, Environment, Water, Population and Communities under the EPBC Act. The addendum ecological report provided in **Appendix 7** of this report has reassessed the risks of the changes to the project on relevant MNES, including listed threatened species and ecological communities or migratory species. The addendum ecological report and has confirmed that the changes to the project are not likely to result in a significant impact on any endangered ecological community or flora species listed under the EPBC Act and so do not give rise to any requirement for the project to be referred under the EPBC Act.

### 4.2.2 Renewable Energy (Electricity) Act 2000

The *Renewable Energy (Electricity) Act 2000 (Cth)* (REE Act) aims to:

- Encourage the additional generation of electricity from renewable sources;
- Reduce emissions of greenhouse gases in the electricity sector; and
- Ensure that renewable energy sources are ecologically sustainable.

The RE Act creates demand for electricity generated from renewable sources and provides renewable energy targets.

The project supports the REE Act by supplying 100% renewable energy and contributing to the Act's renewable energy targets.

### 4.2.3 Civil Aviation Safety Regulations 1998

The Civil Aviation Safety Authority regulates aviation activities in Australia. Applicable requirements include the *Civil Aviation Regulations 1988 (Cth)* (CAR), *Civil Aviation Safety Regulations 1998 (CASR)* and associated Manuals of Standards (MOS) and other guidance material.



As the height of the turbines exceeds 110m above ground level, it will be necessary to notify CASA in accordance with Advisory Circular AC 139-08(0) "Reporting of Tall Structures".

Section 5.5 of this Addendum Report provides an updated aviation assessment of the project changes.

## 4.3 NSW Planning Framework

### 4.3.1 Environmental Planning and Assessment Act 1979

Under the *Environmental Planning and Assessment Act 1979* (EP&A Act) development must have regard to the objects of the Act, as set out in Section 5 of the Act. The relevant objects are:

- (a) *to encourage:*
- (i) *the proper management, development and conservation of natural and artificial resources, including agricultural land, natural areas, forests, minerals, water, cities, towns and villages for the purpose of promoting the social and economic welfare of the community and a better environment,*
  - (ii) *the promotion and co-ordination of the orderly and economic use and development of land,*
  - (iii) *the protection, provision and co-ordination of communication and utility services,*
  - (iv) *the provision of land for public purposes, and*
  - (v) *the provision and co-ordination of community services and facilities, and*
  - (vi) *the protection of the environment, including the protection and conservation of native animals and plants, including threatened species, populations and ecological communities, and their habitats, and*
  - (vii) *ecologically sustainable development, and*
- (b) *to promote the sharing of the responsibility for environmental planning between the different levels of government in the State, and*
- (c) *to provide increased opportunity for public involvement and participation in environmental planning and assessment.*

The project, as amended, is consistent with the relevant objects in that it:

- Will promote the proper management, development and conservation of natural and artificial resources as the project will develop the natural wind resource and conserve other resources such as fossil fuels and air quality. It will lead to a better environment by displacing greenhouse emissions and reducing the impacts of climate change and global warming;
- Provides for the orderly and economic use and development of land by adding a new use to the site that can coexist with the current agricultural uses;
- Contributes to the provision of electricity utility services and provides for the protection of communication services;
- Contributes to Community Enhancement Funds to fund local projects;

- Has consistent or reduced environmental impacts compared to the original project; and
- Provides for ecologically sustainable development.

Furthermore, the further agency and community consultation undertaken addresses objects 5(b) and (c) of the EP&A Act.

#### 4.3.2 Protection of the Environment Operations Act 1997

The *Protection of the Environment Operations Act 1997* (POEO Act) aims to:

- Protect, restore and enhance the quality of the environment having regard to the need to maintain ecologically sustainable development.
- Encourage public participation in environmental protection;
- Provide information to the public about pollution.
- Reduce risks to human health and prevent the degradation of the environment; and
- Improve the regulatory framework for environmental protection.

Under the POEO Act operators of wind farms must hold environment protection licenses (EPL) for both construction and operation.

Subject to the grant of development consent for the project, an EPL will be sought in accordance with the provisions of the POEO Act.

#### 4.3.3 National Parks and Wildlife Act 1974

The objects of the *National Parks and Wildlife Act 1974* (NPW Act) are set out in section 2A of that Act and are to:

- Conserve nature, including habitat, ecosystems and ecosystem processes, biological diversity at the community, species and genetic levels, and landforms of significance, including geological features and processes, and landscapes and natural features of significance including wilderness and wild rivers;
- Conserve objects, places or features (including biological diversity) of cultural value within the landscape; and
- Foster public appreciation, understanding and enjoyment of nature and cultural heritage and their conservation.
- The objects of the Act are to be achieved by applying the principles of ecologically sustainable development.

The impacts of the project on Aboriginal heritage were considered in the original EA and were found to be minimal and manageable. Due to the reduction in the number of turbines, the changes made to the project is anticipated to result in less heritage impact than the original project.

If SSD development consent is granted for the project, separate Aboriginal heritage impact permits under the NPW Act will not be required for the project.

#### 4.3.4 Threatened Species Conservation Act 1995

The *Threatened Species Conservation Act 1995* (TSC Act) aims to:

- Conserve biological diversity and promote ecologically sustainable development,

- Prevent the extinction and promote the recovery of threatened species, populations and ecological communities,
- Protect the critical habitat of those threatened species, populations and ecological communities that are endangered,
- Eliminate or manage certain processes that threaten the survival or evolutionary development of threatened species, populations and ecological communities,
- Ensure that the impact of any action affecting threatened species, populations and ecological communities is properly assessed, and
- Encourage the conservation of threatened species, populations and ecological communities by the adoption of measures involving co-operative management.

An addendum ecological report has been prepared to assess the changes to the project (refer **Appendix 7**). The report analyses the impact of the modified project on threatened species and communities listed under the TSC Act and concludes that the changes made to the project is unlikely to result in any significant impacts on any of listed threatened species or communities. Furthermore, it was found that the reduction in turbines and realignment of the access tracks will result in total avoidance of areas of the TSC Act listed Box Gum Woodland and Derived Native Grassland.

#### 4.3.5 Water Management Act 2000 and Water Act 1912

Water in NSW is regulated by the *Water Management Act 2000 (NSW)* (WM Act) and *Water Act 1912 (NSW)* (Water Act). The WM Act applies to all water sources for which a water sharing plan has been gazetted and the Water Act applies to remaining water sources.

A controlled activity approval under the WMA is required for certain types of developments and activities that are carried out in or near a river, lake or estuary. However, controlled activity approvals are not required for projects which have received SSD development consent under the EP&A Act.

The project will require water licences under the WM Act or Water Act if water from any onsite bore, dam or river (e.g. concrete batching plant, etc) is required during construction or operation.

#### 4.3.6 Native Vegetation Act 2003

The *Native Vegetation Act 2003* aims to:

- Provide for, encourage and promote the management of native vegetation on a regional basis in the social, economic and environmental interests of the State,
- Prevent broad scale clearing unless it improves or maintains environmental outcomes,
- Protect native vegetation of high conservation value having regard to its contribution to such matters as water quality, biodiversity, or the prevention of salinity or land degradation,
- Improve the condition of existing native vegetation, particularly where it has high conservation value, and
- Encourage the revegetation of land, and the rehabilitation of land, with appropriate native vegetation.

Projects which have received SSD development consent under the EP&A Act do not require separate approval under the NV Act for the clearing of native vegetation.

As described in the ecological report in **Appendix 7**, the changes made to the project will reduce the project's impacts on the native vegetation. Specifically, the reduction in the number of turbines has the benefit of removing from the project a number of access tracks and underground cabling routes. Furthermore, access track layout has been refined in order to avoid areas of higher ecological value native vegetation.

#### 4.3.7 Heritage Act 1977

The *Heritage Act 1997* (Heritage Act) aims to:

- Promote an understanding and encourage the conservation of the State's heritage,
- Provide for the identification and registration of items of State heritage significance,
- Provide for the interim protection of items of State heritage significance,
- Encourage the adaptive reuse of items of State heritage significance,
- Constitute the Heritage Council of New South Wales and confer on it functions relating to the State's heritage,
- Assist owners with the conservation of items of State heritage significance.

No items of local, regional and State heritage significance protected by the Heritage Act will be impacted by the project

#### 4.3.8 Roads Act 1993

The relevant aims of *Roads Act 1993* (Roads Act) are to:

- Set out the rights of members of the public to pass along and have access to public roads, and
- Regulate the carrying out of various activities on public roads.

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 Report and Submissions Report 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.

#### 4.3.9 Crown Lands Act 1989

Part 4 of the *Crown Lands Act 1989* provides for circumstances where Crown Land may be leased or sold and where licenses over Crown Land may be granted.

There is a network of Crown public roads in the area, and electrical cables may be installed under such roads to connect the turbines to the substation which forms part of the approved Crookwell 2 Wind Farm. A number of options have been shown in the Access and Infrastructure Plans in the original EA for electrical connections, some of which involve crown land public roads.

As outlined above, consents will be applied for under section 138 of the Roads Act to authorise the carrying out of any works within the road reserves. In the event that

the proponent determines to obtain or the Department of Lands requires that the proponent obtain a formal easement or similar interest in the land, this will be obtained under the Crown Lands Act 1989.

The revised project involves no change from the original application in this regard.

#### 4.3.10 State Environmental Planning Policies

##### State Environmental Planning Policy (Infrastructure) 2007

The *State Environmental Planning Policy (Infrastructure) 2007* (ISEPP) aims to facilitate the effective delivery of infrastructure across the State.

Wind farms are defined as 'electricity generating works' and referred to in Division 4 of Part 3 of the ISEPP. Wind farm development is permitted with consent under Clause 34 of the ISEPP in prescribed rural, industrial or special use zones. The site is located in a prescribed zone under the Crookwell LEP 1994 and Mulwaree LEP 1995 (which continue to apply to the project under the savings provisions set out in clause 1.8A of the Upper Lachlan LEP 2010) and, therefore, the project is permitted with consent under the ISEPP.

##### State Environmental Planning Policy (State and Regional Development) 2011

The aims of this SEPP are to identify State significant development and State significant infrastructure and to confer the necessary functions to joint regional planning panels to determine development application.

The project is classified as State significant development as it is development for the purpose of electricity generating works with a capital investment value (CIV) of more than \$30 million. As such, the Minister for Planning is the consent authority.

##### State Environmental Planning Policy (Rural Lands) 2008

The aims of the State Environmental Planning Policy (Rural Lands) 2008 (Rural Lands SEPP) are to:

- Facilitate the orderly and economic use and development of rural lands for rural and related purposes;
- Identify the Rural Planning Principles and the Rural Subdivision Principles so as to assist in the proper management, development and protection of rural lands for the purpose of promoting the social, economic and environmental welfare of the State;
- Implement measures designed to reduce land use conflicts;
- Identify State significant agricultural land for the purpose of ensuring the ongoing viability of agriculture on that land, having regard to social, economic and environmental considerations; and
- Amend provisions of other environmental planning instruments relating to concessional lots in rural subdivisions.

The alignment of the project with the aims of the Rural Lands SEPP was considered in the EA Report. The changes to the project further promote the continued use of the land for agricultural purposes as it reduces the total footprint of the project, thus opening up more land for agricultural purposes.

##### State Environmental Planning Policy No 44 - Koala Habitat Protection

The aim of the *State Environmental Planning Policy No 44 - Koala Habitat Protection* is to encourage the proper conservation and management of areas of natural

vegetation that provide habitat for koalas to ensure a permanent free-living population over their present range and reverse the current trend of koala population decline.

The proposal does not include core koala habitat, and the original ecological report which formed an addendum to the EA Report for the project detected no usage of the site by koalas. The original assessment also reported that there have been no koalas reported in the local area for over 30 years (likely to be due to the highly cleared local areas and the lack of interconnecting vegetation).

#### 4.3.11 Crookwell Local Environmental Plan 1994 and Mulwaree Local Environmental Plan 1995

While the *Upper Lachlan Local Environmental Plan 2010* (Upper Lachlan LEP) is currently in force and applies to the site, clause 1.8A (savings provision) of the Upper Lachlan LEP states that if a development application has been made before the commencement of the Upper Lachlan LEP and has not been determined before such commencement, the application is to be determined as if the Upper Lachlan LEP has not commenced.

As set out in the EA Report, the original major project application for the Crookwell 3 Wind Farm was lodged prior to the commencement of the Upper Lachlan LEP, and the local environmental plans which applied before the commencement of the Upper Lachlan LEP are the *Crookwell Local Environmental Plan 1994* (Crookwell LEP) and *Mulwaree Local Environmental Plan 1995* (Mulwaree LEP). The current SSD application for the project is therefore to be assessed by reference to the Crookwell LEP and the Mulwaree LEP. However, the Upper Lachlan LEP remains relevant as it was in draft form at the time of the application being made and is therefore relevant under section 79C of the EP&A Act.

When the original application was lodged the site was zoned 1(a) General Rural under both the Crookwell LEP and Mulwaree LEP. The application of the Crookwell LEP and the Mulwaree LEP to the project is set out in section 7.4 of the EA Report.

#### 4.3.12 Upper Lachlan Local Environmental Plan 2010

The Upper Lachlan LEP 2010 was in draft form at the time the original application and, according to Section 79C(1)(a)(ii) of the EP&A Act, must be taken into consideration by the consent authority. The application of the Upper Lachlan LEP 2010 to the project is set out in section 7.4 of the EA Report.

No relevant changes to the Upper Lachlan LEP 2010 have been made since the EA Report was prepared.

#### 4.3.13 Development Control Plans

Clause 11 of *State Environmental Planning Policy (State and Regional Development) 2011* provides that development control plans (DCPs) do not apply to SSD.

Nonetheless, in the interests of completeness, the application of the relevant DCP (Upper Lachlan DCP 2010) to the project is considered in section 7.4.5 of the EA Report.

No relevant changes have been made to the Upper Lachlan DCP 2010 since the EA Report was prepared.

## 4.4 Draft NSW Planning Guidelines: Wind farms

The *NSW Planning Guidelines: Wind Farms* (the Draft Guidelines) were prepared in December 2011 by the Department of Planning and Infrastructure. The purpose of the guidelines is to:

- Provide a clear and consistent regulatory framework for the assessment and determination of wind farm proposals across the state
- Outline clear processes for community consultation for wind farm developments
- Provide guidance on how to measure and assess potential environmental noise impacts from wind farms.

The Draft Guidelines were exhibited from 23 December 2011 to 14 March 2012 and public comments on the Draft Guidelines were sought. The Draft Guidelines remain in draft form and, as at the date of this report, have not been finalised or adopted by the DPE.

The DPE subsequently issued guidance to the proponent as to how the Draft Guidelines apply to the project in a letter dated 18 April 2012. The EA Report and Submissions Report addressed the application of the Draft Guidelines to the project and the Draft Guidelines have also been considered in the preparation of this Addendum Report.

## 5 Environmental and Social Impact Assessment

### 5.1 Visual

#### 5.1.1 Introduction

Green Bean Design (GBD) was commissioned by Union Fenosa Wind Australia Pty Ltd on behalf of Crookwell Development Pty Ltd to prepare a visual impact assessment to analyse the potential visual effect of the amended Crookwell 3 Wind Farm. See **Appendix 1** for the full report.

#### 5.1.2 Methodology

The methodology for the VIA included the following activities:

##### Desktop Study

A desktop study was carried out to review the original Crookwell 3 Wind Farm application and associated viewshed. This was carried out by reference to topographic maps as well as aerial photographs of the surrounding landscape.

A preliminary zone of theoretical visibility (ZTV) diagram for the amended Crookwell 3 Wind Farm wind turbine layout was produced prior to the commencement of fieldwork to inform the likely extent and nature of residual visual effects within a 5km viewshed of the approved wind turbines. Topographic maps and aerial photographs were also used to identify the locations and categories of potential view locations that could be verified during the fieldwork component of the assessment.

##### ZTV Diagrams

ZTV diagrams were prepared to illustrate and confirm the theoretical visibility contained in the original Crookwell 3 Wind Farm Landscape and Visual Impact Assessment (LVIA) 2012 wind turbines (tip height at 157 metres) and the amended Crookwell 3 Wind Farm wind turbines (tip height at 157 metres).

##### Fieldwork and Photography

GBD undertook fieldwork for the amended Crookwell 3 Wind Farm project. The fieldwork included:

- Site inspection to determine and confirm the extent of residual effects between the original Crookwell 3 Wind Farm and amended Crookwell 3 Wind Farm wind turbines and ancillary project structures.
- Photography for the Crookwell 3 Wind Farm photomontages from residential and public view locations.

##### Visual Effects

The visual effects on surrounding receiver locations would result from a combination of the amended Crookwell 3 Wind Farm wind turbine visibility and the characteristics of the landscape between, and surrounding, the receiver locations and the wind farm. The potential degree of visibility and resultant visual effect would be partly determined by a combination of factors such as:

- Category and type of situation from which people could view the wind farm (examples of view location categories include residents or motorists).
- Visual sensitivity of view locations surrounding the wind farm.



- Distance of visual effect (between view locations and the wind farm).
- Duration of time people could view the wind farm from any particular static or dynamic view location.

#### Photomontages

Eight photomontages have been prepared from residential dwellings and public road corridors. The photomontages illustrate and contrast the original Crookwell Wind Farm and the amended Crookwell 3 Wind Farm wind turbines, in addition to the approved Crookwell 2 Wind Farm and the proposed Crookwell 2 Modification 2 wind turbines.

### 5.1.3 Results

#### ZTV Diagrams

Within the recognised limitations of ZTV diagrams, the overall extent of the original Crookwell 3 Wind Farm and amended Crookwell 3 Wind Farm wind turbine visibility covers a very similar extent within and beyond 5km of the landscape surrounding the Crookwell 3 Wind Farm project.

The similarity in theoretical wind turbine visibility demonstrates the influence of local topographical features on views toward wind turbines within both Crookwell 3 Wind Farm layouts (original and amended). The ZTV diagrams also illustrate that the amended Crookwell 3 Wind Farm wind turbines would have very little difference in visual effects across the surrounding viewshed.

Given there is no change to the original Crookwell 3 Wind Farm wind turbine tip height there would be no increase in wind turbine visibility.

#### Ancillary Structures

The Crookwell 3 Wind Farm would utilise infrastructure associated with the Crookwell 2 Wind Farm. Electrical connections between the Crookwell 3 Wind Farm and the grid would extend underground to the Crookwell 2 Wind Farm substation facility. The amended Crookwell 3 Wind Farm would not result in any fundamental change to the original Crookwell 3 Wind Farm ancillary structures and would not result in additional visual impacts to those outlined in the original Crookwell 3 Wind Farm.

The proponent commissioned AECOM Australia Pty Ltd to prepare a visual impact assessment detailing the potential visual impact that would arise from the change in grid connection configuration (requirement of TransGrid) of the Crookwell 2 Wind Farm to the TransGrid network. The AECOM visual impact assessment determined that the overall visual impact rating for the new transmission line tower would be minor to negligible.

GBD have reviewed the AECOM visual impact assessment and, following the GBD site inspection, concur with the findings presented in the AECOM report, i.e., the overall visual rating of the new transmission line tower is minor to negligible on surrounding receiver locations.

#### Visual Effects

The VIA includes a detailed assessment in tabular form of the visual impacts from residential dwellings up to 5km from the Crookwell 3 Wind Farm (refer to 'Visual Effects Matrix' in VIA). The overall effects associated with the amended Crookwell 3 Wind Farm are summarized as '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 Crookwell 3 Wind Farm wind turbine.

## Photomontages

The full set of photomontages are found in the VIA at **Appendix 1**, and a sample is shown in the figure below.



Figure 5 – Photomontage 6d Valdarman Hill dwelling  
Source: Green Bean Design

### 5.1.4 Mitigation Measures

Given that the additional visual impacts resulting from the amended project have been found to be negligible to low, no additional measures have been identified to mitigate visual impacts.

It is considered that the draft conditions of approval recommended in the Secretary's Assessment Report are sufficient for ensuring that any potential visual impacts are properly mitigated.

## 5.2 Shadow Flicker

### 5.2.1 Introduction

Garrad Hassan Pacific (now trading as DNV GL) has been commissioned by Union Fenosa Wind Australia Pty Ltd (UFWA) on behalf of Crookwell Development Pty Ltd to update the independent shadow flicker assessment to assess the changes now made to the project. Refer to **Appendix 3** for the full report.

### 5.2.2 Methodology

A shadow flicker assessment was carried out at all dwelling locations within 1.5km of the proposed Crookwell 3 Wind Farm. The assessment included two methods of calculating predicted shadow flicker durations—theoretical and actual. The former approach utilises using a purely geometric analysis that takes into account the relative position of the sun throughout the year, the wind turbines at the site, local topography and the viewer. The latter approach considers the possible reduction in shadow flicker duration due to turbine orientation and cloud cover.

### 5.2.3 Results

The results of the updated shadow flicker assessment indicate that five dwellings in the vicinity of the Crookwell 3 Wind Farm are predicted to experience some theoretical shadow flicker within 50m of the house location, based on the methodology recommended in the EPHC Draft National Wind Farm Development Guidelines (July 2010).

One host landowner dwelling (house 18) and one non-participating dwelling house (house 66) are predicted to be affected by theoretical shadow flicker durations within 50m of the house locations that are greater than the limit of 30 hours per year recommended in the Draft NSW Planning Guidelines: Wind Farms (December 2011).

A more realistic prediction of shadow flicker was also conducted in order to take into account cloud cover and turbine orientation. Results show that the two dwellings that exceed the 30 hours limit for theoretical shadow flicker are predicted to experience actual annual shadow flicker durations within 50m of the house location that are greater than the recommended guideline limit.

For comparison purposes, the report also contains the results of the shadow flicker analysis conducted for the original project layout (as reported in Appendix 6 of the EA Report). In the original layout, four dwellings in the vicinity of the wind farm were predicted to experience some shadow flicker within 50m of the house location. One host landowner dwelling (house 79) was predicted to be affected by theoretical shadow flicker durations within 50m of the house location that exceeded the recommended 30-hour limit. This dwelling was also predicted to experience actual shadow flicker durations within 50m of the house location that exceed the recommended 10-hour limit. Notably, this dwelling is not predicted to experience shadow flicker above the recommended limits within the proposed turbine layout and dimensions.

#### 5.2.4 Mitigation Measures

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.

It is noted that one of the recommended conditions of consent in the Secretary's Assessment Report is that shadow flicker from the project must not exceed 30 hours/annum at any non-associated residence. It is anticipated that, following the implementation of the mitigation measures named above, the project will be able to fulfill this condition.

### 5.3 Noise

#### 5.3.1 Introduction

SLR Consulting Australia Pty Ltd was commissioned by Crookwell Development Pty Ltd to update the independent noise assessment for the project to reflect the revised project layout presented in this Addendum Report together with the proposed modifications to the approved Crookwell 2 Wind Farm. See **Appendix 2** for the full report.

#### 5.3.2 Methodology

As some receptors are potentially affected by noise from both Crookwell 2 and Crookwell 3 Wind Farms, from the DPE has requested that the noise impacts resulting from the changes made to the Crookwell 3 Wind Farm be assessed cumulatively with the proposed modifications to the approved Crookwell 2 wind farm and the existing operational Crookwell 1 Wind Farm. SLR Consulting was accordingly commissioned to conduct a cumulative noise assessment. Crookwell 1, 2 and 3 Wind Farms. For the purpose of this assessment each of the Crookwell 1, 2 and 3 Wind

Farms were assumed to be operating simultaneously, and both Crookwell 2 and 3 Wind Farms were assumed to be operating with the same turbine model.

As part of this assessment, additional monitoring was undertaken at four locations in the vicinity of the Elmgrove property. The purpose of this monitoring was to confirm that the noise level produced by Crookwell 1 Wind Farm is accurately portrayed in the noise model as well as to provide an estimate as to the background noise level at the Elmgrove property (where no previous monitoring has been completed due to access constraints).

Modelling using the standard ISO9613 methodology was completed for three alternative potential turbines models (i.e. Vestas V126, GE130, Senvion M122). A potential limitation of the ISO9613 methodology is that it assumes downwind propagation from each source to each receptor, which is an unrealistic over-simplification of what will occur at some receptors as all receptors will not be downwind of each operating wind turbine.

A mitigation investigation was then undertaken for the Vestas V126 model utilising a mitigated layout where some turbines are operated in Noise Management Mode (NMM). Notably, information regarding NMM for the GE130 and Senvion M122 models was not available at the time of compiling this report because these models are relatively new and accordingly these were not included in the mitigation investigation.

To address the limitations of the ISO9613 methodology, and at the request of DP&E, a detailed predictive analysis was also completed using a more realistic evaluation of the effect of meteorological variation on noise from the wind farm. For this analysis the noise modeling algorithm changed from the ISO 9613 Standard to the CONCAWE calculation method. The CONCAWE algorithm allows for a more detailed analysis of the influence of wind speed, wind direction and atmospheric stability.

### 5.3.3 Results

Results of the standard modeling indicated that the revised wind farm layout may exceed the relevant noise limits at some receptors without the use of NMM. However, the mitigation investigation found that compliance at all receptors can be achieved using the mitigated layout where some turbines operate in NMM. It is anticipated that subsequent testing for the GE130 and Senvion M122 models should be able to show the possibility of operating in Noise Management Mode.

Results show that for project-involved receptors, the ISO9613 modeling approach is potentially overly conservative by 1dBA to 2dBA. For non-involved receptors, it is expected that the ISO9613 modeling approach is potentially overly conservative by 2dBA to 3dBA. That is, the highest predicated noise level is potentially 1dBA to 2dBA lower and 2dBA to 3dBA lower for project-involved and non-involved receptors, respectively.

In summary the proposed mitigated layout demonstrates compliance both under the conservative and detailed predicative analyses.

### 5.3.4 Mitigation Measures

Given the ability of the proposed mitigated layout to comply with relevant guidelines, the mitigation measures contained in the draft conditions of consent are considered sufficient for ensuring noise adequate amenity.

NMM has been proposed for mitigation purposes as DPE have expressed a preference to avoid the use of SM as a basis for establishing compliance during the planning and approval processes. NMM differs from SM in that using a wind turbine

generator in NMM is akin to selecting a model with a lower sound power level. NMM is a firmware-locked operation mode whereby the speed of the rotor is reduced to lessen the sound power generated by the blades. This is set by the turbine manufacturer and is fixed for each turbine. If post-construction measurements demonstrate that the wind farm already complies and that additional mitigation is not required then the firmware is not installed and the reduced noise mode is never used. Alternatively, if additional mitigation is required, the manufacture can change firmware settings within each turbine to activate reduced noise mode on additional turbines. The relevant turbines will then each operate according to the lower sound power curve settings.

## 5.4 Heritage

The EA Report contained a detailed Indigenous and non-Indigenous archaeological heritage assessment prepared by Anderson Environmental Consultants, followed by a detailed *Supplementary Aboriginal and Historical Cultural Heritage Assessment* by Environmental Resources Management Australia in February 2014 that formed part of the Preferred Project and Response to Submissions report dated March 2014.

No new heritage assessment has been included with this report for the changes to the project since the Submission Report due to limited changes to the project footprint that was already assessed. The heritage impact of the project is anticipated to be reduced due to the reduction in turbines and associated foundations, crane hardstand and access tracks.

The changes made to the project feature no new turbines, and the proposed turbines are to be located in areas already assessed for turbines. As such, it is considered that no further Indigenous cultural heritage assessment is required.

The mitigation measures contained in the draft conditions of consent are considered sufficient for ensuring protection of Indigenous cultural heritage.

## 5.5 Aviation

### 5.5.1 Introduction

Aviation Projects has provided a summary of the net aviation impacts of the changes to the Crookwell 3 Wind Farm. See **Appendix 4** for the full report.

The original report produced by Aviation Projects—Aeronautical Impact and Night Lighting Assessment (Appendix 9 of original EA Report—only considered a maximum blade tip height of 152m AGL. Therefore, an addendum report has been prepared to assess the aeronautical impacts of the reduced number of turbines and the increased maximum wind turbine rotor size and overall blade tip heights.

### 5.5.2 Methodology

The addendum report notes that there has been no change in methodology to the previous impact assessment. This methodology includes:

- A desktop review of supplied materials;
- Review of regulatory requirements and sources of information; and
- Assessment of the impact of the proposed wind farm on PANS-OPS and obstacle limitation surfaces of nearby aerodromes.

### 5.5.3 Results

Following a high level evaluation of aviation impacts as a result of the changes to the project, it was found that the increase in rotor diameter and tip height and the revised turbine layout will not give rise to any increased aviation impacts when compared with the project layout assessed in the EA Report.

### 5.5.4 Mitigation Measures

Based on the findings of the previous assessment, and considering the maximum wind turbine height has increased by 5m, the project will need obstacle lighting regardless of which turbine is selected. A revised obstacle lighting design has been prepared (refer to the report in **Appendix 4**).

In accordance with the previous assessment and mitigation process, it was identified that if the maximum proposed turbine envelope size for turbine A25 is used, then the proponent will request Airservices Australia (or other relevant agency) to amend the Lower Safe Altitude (LSALT) on air route W10. Aviation Projects conducted a comparison between instrument procedures identified as part of the original EA Report and existing instrument procedures. An additional procedure was identified (RNAV-Z (GNSS) RWY 22 (Airservices Australia)). Although it is unlikely that the amended project would impact on the PANS-OPS surfaces associated with the new instrument, Aviation Projects has recommended that the designer of the new instrument procedure (Airservices Australia) should be further consulted when the turbine model and tip height is finalised in order to appropriately address any hazards arising from the project. It is noted that this consultation would occur as per the requirements of the draft conditions of consent for the project.

Given the lack of additional impacts caused by amended project, it is considered that the draft conditions of approval recommended in the Secretary's Assessment Report are sufficient for ensuring aviation safety.

## 5.6 Telecommunications

### 5.6.1 Introduction

Garrad Hassan Pacific Pty Ltd (now trading as DNV GL has been commissioned to independently assess the potential electromagnetic interference issues associated with the development and operation of the amended project layout. See **Appendix 5** for the full report.

### 5.6.2 Methodology

DNV GL has previously assessed the electromagnetic interference (EMI) for the originally proposed turbine layout and dimensions. While the previous assessment considered only telecommunication sites with licence frequencies greater than 500MHz located within a 50km radius of the proposed wind farm site, the current assessment considers a 75km radius from the site boundaries and all licence frequencies. As a result, the total number of telecommunication sites identified in the current assessment is considerably greater than the number identified in the previous assessment.

### 5.6.3 Results

Telecommunication Towers

The current EMI assessment has identified 26 additional telecommunication towers within 20km of the proposed wind farm that were not identified in the previous assessment. Details of these additional sites are provided in the sections below.

#### Fixed Point-to-Point Microwave Links

Three point-to-point links passing through the proposed wind farm site (operated by Airservices Australia, Vertical Telecoms and Optus Mobile), and three additional links passing near the site through the constructed Crookwell 1 Wind Farm and the approved Crookwell 2 Wind Farm (operated by the Ambulance Service of NSW, NSW Rural Fire Service and Radio Goulburn) have been identified in the current assessment.

#### Fixed Licences of Point-to-Multipoint Type

The current EMI assessment has identified nine fixed point-to-multipoint Assignment IDs associated with three base stations located within 20km of the wind farm boundary that were not identified in the previous assessment. However, it is not possible to determine if there are any potential impacts on these services without knowing the locations of each station in the multipoint network. Feedback received from the operators of point-to-multipoint services during the consultation process did not raise any concerns regarding potential impacts from the Crookwell 3 Wind Farm.

#### Other Licence Types

The current EMI assessment has identified 156 Assignment IDs allocated to other types of licences with station located within 20km of the wind farm boundary that were not identified in the previous assessment. Most of these licence types can be described as base to mobile station communication and are generally not affected by the presence of wind turbines any more than other effects. Should reception difficulty be encountered, the amelioration method for most services consists of the user simply moving to receive a clearer signal.

#### Emergency Services

The current EMI assessment has identified three emergency services with licenses for sites located within 20km of the wind farm boundary that were not identified in the previous assessment. However, no direct interference has been predicted. Feedback received during the consultation process has not raised any concerns regarding potential impacts from the project.

#### Meteorological Radar

The current EMI assessment has identified the "Wollongong" weather station as the closest Bureau of Meteorology (BoM) radar site. This is consistent with the previous assessment. Additionally, the current assessment has also identified three BoM radar sites that were not identified in the previous assessment. However, these new sites are all located more than 350km from the wind farm site boundary, so any interference is considered unlikely. Feedback received from BoM during the consultation process has not raised any concerns regarding potential impacts of the project.

#### Trigonometrical Stations

The current EMI assessment has identified two trigonometrical (trig) stations located within 20km of the wind farm site boundary that were not identified in the previous assessment. It is considered unlikely that trig stations located close to the wind farm host equipment that is susceptible to electromagnetic interference.

The closest Global Navigation Satellite Systems (GNSS) station identified in the current assessment is located approximately 95km southwest of the proposed wind

farm site, at Mt Stromlo near Canberra. Due to the significant distance of this station from the proposed wind farm, interference is considered unlikely.

#### Wireless Internet

The previous EMI assessment identified the potential for interference to wireless internet services provided by Cirrus Communications to dwellings in the vicinity of the wind farm. However, a recent review of the Cirrus Communications website suggests that the company is no longer providing services in this region. Furthermore, UFWA has advised DNV GL that the wireless internet tower previously located within the wind farm site has been decommissioned and will be dismantled. The potential for interference to wireless internet services is therefore no longer considered to be an issue and has not been considered further.

#### Satellite Television and Internet

The current EMI assessment has found that no turbines in the revised turbine layout intercept the line-of-sight from commonly used televisions and internet satellites to the house locations considered in this analysis.

#### Terrestrial Television Broadcasting

The current EMI assessment has identified four digital television broadcast towers in the vicinity of the proposed wind farm that were not identified in the previous assessment. The closest is the Crookwell tower, which is located approximately 16km northwest of the site.

For the current EMI assessment, a total of 25 houses were identified in the potential interference zone for the Canberra broadcast tower, including 8 dwellings belonging to participating landowners.

Additionally, the analysis identified 30, 7, 24 and 1 houses in the potential interference zones for the Goulburn, Crookwell, Illawarra and Central Tablelands towers, respectively. The results are generally similar to the previous assessment, with a notable reduction in the number of houses in the potential interference zone for the Central Tablelands tower.

DNV GL also understands that the Upper Lachlan Shire Council has recently installed a new free-to-air television repeater on the existing Crookwell broadcast tower at Wades Hill, which relies on a signal received from the transmitter on the Goulburn broadcast tower at Mt Gray.

### 5.6.4 Mitigation Measures

DNV GL's report notes that feedback received from the Upper Lachlan Shire Council during the consultation process carried out by DNV GL for the Crookwell 2 and 3 wind farms indicates that Council will be seeking conditions of consent that require Crookwell Development Pty Ltd to take all necessary actions to protect the signal between the Goulburn and Crookwell broadcast repeater towers. It is noted that the draft conditions of approval recommended in the Secretary's Assessment Report already include appropriate measures requiring this.

Overall it is considered that the draft conditions of approval recommended in the Secretary's Assessment Report are sufficient for ensuring that any potential EMI impacts are properly mitigated. That is, the amendments to the project involve no additional impacts that cannot be properly mitigated under the draft conditions.



## 5.7 Traffic and Transport

### 5.7.1 Introduction

GTA Consultants have prepared an updated traffic and transport impact assessment to assess the impacts resulting from the proposed amendments to the project. See **Appendix 6** for the full report.

### 5.7.2 Methodology

The following actions were undertaken as part of the assessment:

- Identification of appropriate construction vehicle routes to the site for general construction vehicle and oversize/overmass construction vehicles;
- Identification and assessment of the traffic generating characteristics of the proposed development during construction and operation phases;
- Assessment of the suitability of the proposed access arrangements for the site; and
- Assessment of the transport impact of the proposal on the surrounding road network.

### 5.7.3 Results

The updated transport impact assessment concludes that the peak daily traffic generation for the construction and operation of the Crookwell 3 Wind Farm would remain consistent with the impacts assessed in the 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.

The main issues that have been addressed by the report in relation to the 64m blade swept paths include:

- Mitigating impacts on street furniture, signage, poles, traffic signal infrastructure; and
- Ensuring Safety; and
- Minimising impacts on road infrastructure including concrete medians, kerbs and road safety barriers.

### 5.7.4 Mitigation

The updated transport impact assessment has identified a number of temporary road network improvements works that will need to be undertaken prior to transport of the blades to the site. A summary of these works is provided at **Appendix 6**.

Once the final specifications for the restricted access vehicles to be used to transport the blades are known, a detailed traffic management plan should be prepared in consultation with Roads and Maritime Services and affected Councils. The plan should be provided to the NSW Department of Planning and Environment for approval prior to delivery of the turbine equipment to site.

Overall it is considered that the draft conditions of approval recommended in the Secretary's Assessment Report are sufficient for ensuring that any potential transport and impacts are properly mitigated. That is, the amendments to the project involve no additional impacts that cannot be properly mitigated under the draft conditions.

## 5.8 Biodiversity

### 5.8.1 Introduction

Environmental Resources Management Australia (ERM) was commissioned to prepare an addendum ecology report for the amended Crookwell 3 Wind Farm project. See **Appendix 7** for the full report.

The report updates the ecological assessment and focuses on two main areas in revising the ecological impacts of the project:

- to assess the impacts resulting from the changes made to the turbine envelope and overall reduction in turbine numbers on bird and bat species, (including as a result of collision risk, alienation of habitat and barotrauma); and
- to re-calculate of the native vegetation clearance required for the project.

### 5.8.2 Methodology

The addendum ecology report builds on existing impact assessments prepared in relation to the project, including those found at Appendix 8 of the EA Report and Appendix 3 of the Response to Submissions Report. Updated database searches were conducted to obtain records of threatened birds and bats listed under the EPBC Act and the TSC Act. This allowed the existing impact assessments to be updated in the case of any recent additional records or highlight species which have changed listing status or have been recently listed. The following searches were conducted with a 10km buffer applied to the project area:

- NSW Office of Environment and Heritage (OEH) Atlas of NSW Wildlife database (Bionet 2014); and
- Commonwealth Department of the Environment's online Protected Matters Search Tool (PMST).

### 5.8.3 Results

#### Database Search

The results of the Atlas of NSW Wildlife Database search showed a total of five different species as being recorded within a 10km buffer of the project area, all of which were birds. The latest records were dated during 2009 and thus precede the previous impact assessments.

The PMST search results were also cross referenced against the species considered in the previous assessment, and one additional bird was identified—the Painted Honeyeater. This species has recently been listed as Vulnerable under the EPBC Act and is also listed as Vulnerable under the TSC Act. The addendum ecology assessment concludes that, as indicated by a lack of records and suboptimal habitat, this species is unlikely to occur at the site, and no further impact assessment is deemed necessary under either the TSC Act or the EPBC Act.

#### Turbine Removal

The addendum ecology assessment concludes that the removal of six turbines and their access tracks from the project will lower the risk of rotor impacts for birds and bats, including collision risk, barotrauma and habitat elimination.

Modification to Turbine Envelope

The addendum ecology assessment concludes that the change to the maximum turbine envelope is not expected to result in any significant increase to the risk of bird and bat collision and barotrauma for the project. Individual threatened species are considered in detail in the full report.

Recalculation of Vegetation Clearance

The most important revisions to the project layout affecting areas of higher ecological value are:

- Removal of turbine A18 from the woodland in Crookwell 3 East;
- Realignment of the access track north of turbine A16 around the areas of Box Gum Woodland; and
- Removal of turbine A26 from within the Box Gum Woodland Derived Native Grassland path in the western part of the project area and realignment of the access track to avoid this patch.

The revised vegetation clearance calculations are shown in the table below, extracted from the addendum ecology report.

Vegetation Type	Supplementary Ecology Report (ERM 2013a)	PP&RtS Report (CDPL 2014)	Revised Calculation (March 2016)	Change from Supplementary Ecology Report (ERM 2013a)	Change from PP&RtS Report (CDPL 2014)
<b>Native Vegetation Types</b>					
Box-Gum Woodland	0.64	0	0	-0.64	0
Box-Gum Woodland - Derived Native Grassland (DNG)	0.03	0.03	0	-0.03	-0.03
Planted Native Vegetation	0.3	0.3	0	-0.3	-0.3
Red Stringybark Open Forest	1.37	1.37	1.63	0.26	0.26
Red Stringybark Open Forest - DNG	4.96	4.96	4.44	-0.52	-0.52
Silvertop Ash Open Forest (includes area mapped as 'regrowth')	1.89	1.89	1.09	-0.8	-0.8
Silvertop Ash Open Forest - DNG	0.56	0.56	0.52	-0.04	-0.04
Sum Native Vegetation	9.75	9.11	7.68	-2.07	-1.43
<b>Non-native Vegetation Types</b>					
Pasture	22.25	22.25	21.54	-0.67	-0.67

1. Note: the access track to the Wollondilly Property (to turbines west of Crookwell Road) traverses a patch of Box Gum Woodland that meets the EPBC Act-listing status and a patch of Red Stringybark Open Forest. Impacts to these patches have not been included in the calculations as the existing access track through there will be used and no vegetation either side of the track will be affected.

2. Note: the impacts to the Red Stringybark Open Forest are slightly increased due to revisions to the track alignment.

Figure 6 – Recalculation of Vegetation Impacts  
Source: ERM

5.8.4 Mitigation Measures

Given the reduced overall impacts on biodiversity, it is considered that the draft conditions of approval recommended in the Secretary's Assessment Report are sufficient for ensuring that any potential biodiversity impacts are properly mitigated.

5.9 Social and Economic

The EA Report provided a detailed analysis of the social and economic impacts of the Crookwell 3 Wind Farm development. The changes to the project do not significantly alter this original analysis. A summary of the original analysis is provided below.

Economically, the wind farm would invest \$110-120 million into the economy and create 40 full time jobs in construction and 6 jobs during operation. 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.

Socially, the wind farm would fund community enhancement projects. Crookwell Development Pty Ltd is in the process of negotiating a voluntary planning agreement with the Council which provides for an annual contribution to the Upper Lachlan Shire Council's Community Enhancement Fund. It is currently proposed that the voluntary planning agreement will include mechanisms for Crookwell Development Pty Ltd to make an annual monetary contribution to the local community of \$1,666 (adjusted annually to changes in the CPI) per operating turbine, as part of Upper Lachlan's Community Enhancement Fund. This equates to an annual contribution of up to \$38,320 to community projects, which will directly benefit the local area.

## 5.10 Cumulative Impacts

The previous sections of this report outline the results of the specialist reports undertaken to assess the changes made to the project from that assessed in the EA Report and Submissions Report. The key cumulative impacts identified as likely to arise from the interaction with the revised project with the operating Crookwell 1 Wind Farm and the approved Crookwell 2 Wind Farm (as proposed to be further modified by Modification 2) are summarised below. For additional detail, refer to the relevant specialist report.

### 5.10.1 Shadow Flicker

As part of its shadow flicker assessment for the proposed Crookwell 3 Wind Farm development, DNV GL has included the wind turbines at the adjacent Crookwell 1 and Crookwell 2 Wind Farm in order to assess any cumulative shadow flicker impact upon dwellings neighboring the Crookwell 3 Wind Farm. Results show that shadow flicker from the Crookwell 1 and Crookwell 2 Wind Farm turbines is not expected to affect the dwellings that also receive shadow flicker from the Crookwell 3 Wind Farm turbines.

### 5.10.2 Noise

The noise impact assessment prepared by SLR is a combined report that considers the proposed modifications to the Crookwell 3 and Crookwell 2 Wind Farms as well as cumulative noise from the constructed Crookwell 1 Wind Farm. Additional noise monitoring was also undertaken around the outside perimeter of the Elmgrove property in order to confirm the current noise emissions from Crookwell 1 Wind Farm. The report provides an analysis of compliance with noise standards in terms of the cumulative noise from all three wind farms. In conclusion the report has found that noise compliance can be achieved using a mitigated layout where a number of turbines were placed into noise management mode.

### 5.10.3 Telecommunications

As part of its electromagnetic interference (EMI) assessment, DNV GL has considered the possible cumulative EMI impacts from the Crookwell 3 Wind Farm and the adjacent Crookwell 2 Wind Farm.

Two of the point-to-point links that pass through the proposed Crookwell 3 Wind Farm (operated by Vertical Telecoms and Optus Mobile) also pass through the proposed Crookwell 2 Wind Farm. The link operated by Vertical Telecoms was not identified in the previous EMI assessment. However, cumulative impacts on these links are considered unlikely as no turbines from either farms are located within the potential exclusion zones. Feedback received from Vertical Telecoms during the consultation

process has not raised any issues regarding potential cumulative impacts from the wind farms, but no formal response has been received from Optus Mobile to date.

The assessment suggests that there may be cumulative impacts on terrestrial television signals for some residences surrounding the wind farm, particularly for dwellings which have a non-directional or low-gain antenna. The possible television interference zones for all three Crookwell wind farms are provided in the EMI assessment. These zones differ from those determined in the previous EMI assessment, due to the revised turbine layout for the Crookwell 3 Wind Farm and the inclusion of the Illawarra broadcast tower.

In addition, the signal between the new Crookwell broadcast television repeater at Wades Hill and the Goulburn broadcast tower at Mt Gray passes through both the Crookwell 2 and Crookwell 3 Wind Farms, and therefore there is potential for cumulative impacts from the two projects. Cumulative impacts for all other services are considered unlikely.

Any impacts that do arise can be mitigated effectively by implementing the measures contained in the recommended conditions of consent.

## 5.11 Ecologically Sustainable Development (ESD)

The key principles of ESD are addressed in the original EA for the project. The impact of the changes made to the project on compliance with those ESD principles is considered below.

The precautionary principle – If there are threats of serious or irreversible environmental damage, lack of full scientific certainty should not be used as a reason for postponing measures to prevent environmental degradation.

The changes made to the project are not expected to lead to serious or irreversible environmental damage. Effective mitigation measures have been identified for potential environmental impacts.

Inter-generational equity – The present generation should ensure that the health, diversity and productivity of the environment are maintained or enhanced for the benefit of future generations.

The changes made to the project provide for the utilisation of advanced wind energy technology and will help Australia meet renewable energy targets for the benefit of future generations.

Conservation of biological diversity and ecological integrity – Conservation of biological diversity and ecological integrity should be a fundamental consideration.

An addendum ecological report has been prepared for the changes made to the project and forms a fundamental consideration of the project. The report concludes that the amendments made to the project are unlikely to significantly increase bird and bat species collision risk, alienation of habitat and barotrauma or result in any significant impacts on birds and bat species listed under the TSC Act or EPBC Act. The report also concludes that the reduction in the number of turbines and realignment of the access tracks result in total avoidance of EPBC Act listed Box Gum Woodland and areas of TSC Act listed Box Gum Woodland and Derived Native Grassland.

Improved valuation, pricing and incentive mechanisms – Environmental factors should be included in the valuation of assets and services. One key aspect of this principle is that the users of goods and services should pay prices based on the full life cycle costs of providing goods and services. In accordance with this principle, the proponent is committed to funding the decommissioning of the project and rehabilitation of the project area as required by any conditions of consent.

## 5.12 Environmental Management

This chapter provides a summary of the general management and mitigation measures and strategies for monitoring the efficacy of those measures.

### 5.12.1 Environmental Management Plan

The environmental management plan (EMP) is a procedural document which outlines the environmental goals of the project, the safeguard measures to be implemented, the timing of the implementation in relation to the progress of the project, responsibilities for implementation and management, and a review process. The EMP would be prepared to address each stage of the proposed wind farm development, namely, site preparation, construction and operation phases.

The key objectives of the EMP would include:

- Ensuring that works are carried out in accordance with appropriate environmental statutory requirements and relevant non-statutory policy;
- Ensuring that works are carried out in accordance with the goals and requirements;
- Ensuring that works are carried out in such a way as to minimise the likelihood of environmental degradation occurring;
- Ensuring that works are carried out in such a way as to manage the impact of the works on neighbouring properties (e.g. noise, traffic);
- Ensuring that all employees engaged in the works comply with the terms and conditions of the EMP;
- Providing clear procedures for management of environmental impact including corrective actions; and
- Identifying management responsibilities and reporting requirements to demonstrate compliance with the EMP.

A standalone construction environmental management plan (CEMP) and operational environmental management plan (OEMP) would form an integral part of the EMP for the proposed development and would be consistent with the requirements of ISO 9001:2000 and ISO 14001.

Preparation of the CEMP would be a condition of a contractual agreement between Crookwell Development Pty Ltd and the nominated contractor, ensuring the plan is prepared prior to commencement of construction. Similarly the OEMP would be prepared prior to the commencement of operation.

The EMPs would be prepared following assessment and approval of the Project, and would serve as working documents to be used throughout the detailed design, construction and operation of the proposed wind farm.

The CEMP and OEMP would typically include:

- Establishment of environmental goals and objectives;
- Conditions of project approval;
- List of actions, timing and responsibilities;
- Supervision protocols fully identifying areas of responsibility for environmental management of the project;
- Statutory requirements;
- A structured reporting system detailing all relevant matters on a regular basis;

- Procedures and forms for documentation and reporting of issues;
- Standard specifications incorporating environmental safeguards;
- Training of personnel in environmental awareness and Best Practice Environmental Management Systems;
- Guidelines for emergencies, contact names and corrective actions for non-conformance and notifications to appropriate authorities and affected parties;
- Calibration and measuring of testing equipment;
- Process surveillance and auditing procedures;
- Review procedures and protocols for modification of the CEMP or OEMP;
- Complaint handling procedure;
- Site management and control procedures;
- Monitoring procedures; and
- Quality assurance procedures.

## 6 Consultation

### 6.1 Original Project Consultation

The EA Report contains details of the comprehensive, detailed and genuine community consultation and engagement program for the project. This program includes:

- identification of stakeholder groups;
- newsletters widely distributed in the region;
- a door-knock consultation and survey;
- consultation with the local community;
- a second independent round of consultation with concerned community members;
- consultation with particular focus on any neighbours that have houses within 2km of a wind turbine proposed as part of the project;
- consultation with Upper Lachlan Shire Council;
- hosting of a widely advertised Information Day for residents and other stakeholders during the public exhibition period;
- consultation with State Government agencies, specially the NSW Department of Planning and Infrastructure, Office of Environment and Heritage (OEH) [previously NSW Department of Environment, Climate Change and Water (DECCW)], NSW Department of Transport and Infrastructure (DTI), NSW Department of Industry and Investment, Department of Defence, and other Government bodies; and
- establishing a Community Consultative Committee (CCC).

The consultation activities commenced many years ago at the beginning of the project and are proposed to continue throughout the various phases of the project, including after construction. The consultation timeline will be dynamic and will be updated as required to suit the planning process and feedback from key stakeholders.

## 6.2 Additional Consultation

Additional community and stakeholder engagement was conducted for the changes to the project assessed in this Addendum Report. IN particular, additional consultation was conducted with:

- 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 (EPBC Act) Protected Matters Search Tool [for Ecology impact];
  - 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, Neighbour Benefit Sharing Scheme)];
  - NSW Office of Environment and Heritage, including Schedule 1 to the NSW Threatened Species Conservation (TSC) 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, Neighbour Benefit Sharing Scheme)];
  - NSW Department of Industry, Crown Roads [for Traffic impact, Crown Road Crossing Licencing];
  - NSW Land and Property Information (NSW LPI) [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 Licencing];
  - NSW Rural Fire Service [for Telecommunication impact, Aviation impact];
  - Ambulance Service of NSW [for Telecommunication impact];
  - John Holland Rail on behalf of Transport for NSW [for Traffic impact, Unused Rail Corridor Access Licencing];
- Local Government
  - Upper Lachlan Shire Council [for Planning provisions, Aviation impact, Traffic impact, Telecommunication impact, Socio-Economic benefits (including Voluntary Planning Agreement, Neighbour Benefit Sharing Scheme)];
  - 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, Neighbour Benefit Sharing Scheme)]; and
- 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, Neighbour Benefit Sharing Scheme)];

Consultation activities included:

- Correspondence with government agencies, other agencies and organisations by the proponent and its authorised consultants team commissioned for work on this project:
  - The relevant stakeholders were advised on the amendment application proposal and were requested feedback on any impact that may arise as a result of the amendment to the project proposal;
- Non-associated landowners / residents, and the local community:
  - Local newspaper advertisements in 2015 and 2016;
  - Door knocks and/or similar meetings with adjoining landowners / residents, and landowners / residents within 3km of the project site in December 2015. A copy of the newspaper advertisement for the household door-to-door knocks is provided at Appendix 8. This advertisement was featured in the Goulburn Post and Crookwell Gazette during 7-11 December 2015; and
  - Direct mail-out to households of a project newsletter to within 3km of the project site in August 2016, and project newsletters were also made available at the Upper Lachlan Shire Council offices in Crookwell;
- The proponent also carried out additional consultation in 2012 with adjoining landowners of both the approved Crookwell 2 Wind Farm and the proposed Crookwell 3 Wind Farm. This consultation identified those landowners interested in participating in a voluntary Neighbour Benefit Sharing Agreement (Neighbour Deed). Further consultation on the voluntary Neighbour Deed was carried out in late 2015 and in 2016.

## Appendix 1: Visual Report

## Appendix 2: Noise Report

## Appendix 3: Shadow Flicker Report

## Appendix 4: Aviation Report

## Appendix 5: Telecommunications Report

## Appendix 6: Traffic and Transport Report

## Appendix 7: Ecology Report



## Appendix 8: Consultation Advertisement

## Appendix 9: Newsletter with Turbine Layout





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