



Planning &  
Environment

***State Significant Development  
Assessment:***

***Crookwell 3 Wind Farm  
Upper Lachlan Shire  
SSD 6695 (MP 10\_0034)***



Secretary's Environmental Assessment Report  
Section 89E of the  
*Environmental Planning and Assessment Act 1979*

February 2015

Cover Photograph:

Photomontage of proposed view south from Crookwell Goulburn Road toward the proposed Crookwell 3 Wind Farm (source: Landscape & Visual Impact Assessment, Green Bean Design)

© Crown copyright 2015

Published February 2015

NSW Department of Planning & Environment

[www.planning.nsw.gov.au](http://www.planning.nsw.gov.au)

Disclaimer:

While every reasonable effort has been made to ensure that this document is correct at the time of publication, the State of New South Wales, its agents and employees, disclaim any and all liability to any person in respect of anything or the consequences of anything done or omitted to be done in reliance upon the whole or any part of this document.

## EXECUTIVE SUMMARY

---

### The Proposal

Crookwell Development Pty Ltd, a fully owned subsidiary of Union Fenosa Wind Australia Pty Ltd, proposes to construct and operate a 29 turbine wind farm and associated electrical and civil infrastructure referred to as the 'Crookwell 3 Wind Farm'. The site comprises two separate land parcels individually referred to as 'Crookwell 3 South' and 'Crookwell 3 East'. The site is located in the NSW southern highlands approximately 17km south-east of Crookwell, 25km north-west of Goulburn and 90km north-east of Canberra and is contained entirely within the Upper Lachlan Shire local government area.

The Capital Investment Value of the project is estimated between \$90 and \$110 million. The proposal is expected to create 40 full-time equivalent construction jobs and six full-time equivalent operational jobs.

### Assessment and Approvals Process

The proposal was declared a major project under Part 3A of the *Environmental Planning and Assessment Act 1979* on 18 February, 2010, as it is development for the purpose of electricity generation that has a Capital Investment Value of more than \$30 million. Part 3A of the *Environmental Planning and Assessment Act 1979* was repealed in 2011 and replaced by the State significant development assessment system. As the project had not substantially progressed at the time Part 3A was repealed, the then Minister for Planning and Infrastructure formally transitioned the project via an Order under clause 6 of Schedule 6A of the *Environmental Planning and Assessment Act 1979* to the current State significant development assessment system on 21 March 2014. The previous actions taken under the Part 3A process, including exhibition of the Environmental Assessment have been accredited under the State significant development process. The project has subsequently been assessed as a State significant development application.

### Exhibition and Submissions

The Environmental Assessment was publicly exhibited from 1 November 2012 to 6 February 2013. The Department of Planning and Environment received 11 submissions from public authorities and 195 submissions from the general public. Of the public submissions received, 188 objected to the proposal and 7 provided support. Of the 188 objections received, a petition containing 169 signatures was accepted by the Department as individual objections following a request by the community. At the time of exhibition, bushfires were occurring in the Crookwell region and many members of the local community were unable to make separate submissions within that period (as they had to either vacate the area or were out working as volunteer firefighters).

The petition objected on the grounds of impacts to aerial firefighting as a result of the development.

The applicant prepared a Response to Submissions report which was submitted in February 2014 and subsequently made available on the Department's website. The report described amendments made to the project following exhibition of the Environmental Assessment. Amendments made to the proposal aim to reduce the impact on existing native vegetation and included:

- the removal of turbine A19 to reduce further fragmentation of remnant native vegetation;
- realignment of the access track and crane hardstand platform for turbines A12 and A18 to minimise clearing of native vegetation and hollow bearing trees;
- relocation of turbine A24 and the associated access track and crane hardstand platform to an adjacent paddock to avoid impacting on derived native grasslands;
- realignment of the access track between turbines A13 and A16 to avoid impacting on areas of Box-Gum Woodland; and
- relocation of the access point to Crookwell 3 East to avoid extensive tree clearing.

### Key Assessment Issues

Key assessment issues considered as part of the Department's assessment include:

- ecological impacts;
- visual impacts;
- noise;
- bushfire and firefighting;
- traffic and transportation; and
- aviation safety.

Given Crookwell 1, Crookwell 2 and Gullen Range wind farms are all located within 10km of the proposal site, the Department's assessment has also taken into account key cumulative impacts associated with operational noise and visual amenity, as well as for traffic and transport. Crookwell 1, 2 and 3 and Gullen Range wind farms are relevant to cumulative visual impacts, while all three Crookwell wind farms are also relevant for cumulative operational noise impacts. As Crookwell 2 and 3 wind farms may be built together, the traffic assessment took account of the total construction traffic of both wind farms.

### Ecological Impacts

The Department is satisfied that the Applicant has undertaken an assessment consistent with the principles of avoid, minimise and offset. The Department's assessment concludes that the ecological impacts are acceptable subject to the recommendations in this report.

As part of its Response to Submissions, the Applicant undertook additional vegetation mapping and surveys and made refinements to the construction footprint to minimise the clearance of native vegetation. As a result of the refinements made, as well as the Department's recommended deletion of turbine A18, the proposed location of turbine A12 is the only turbine in a forested area within the footprint. The Applicant's additional studies however state that the installation of this turbine would avoid the removal of hollow bearing trees. With respect to operational impacts, the Department has recommended a condition requiring the Applicant to prepare and implement a comprehensive Bird and Bat Adaptive Management Program, which includes environmental monitoring and management mechanisms, so as to ensure operational impacts on birds and bats, where detected, are adequately accounted for, assessed and addressed as part of the ongoing program.

### Visual Impacts

The Department's assessment, which was supported by an independent peer review, concludes that the visual impacts associated with the proposal, as well as the associated cumulative impacts, are acceptable subject to the implementation of additional mitigation and management measures.

The assessment concluded that an acceptable visual outcome can be achieved using vegetation to screen views of the turbines at the majority of affected receptors. However, there are 8 properties where vegetation screening and other minimisation measures may not result in an acceptable visual outcome. Subsequently, for these properties the Department has recommended a condition in which a stepped approach for minimising and negotiating the visual impacts at those receivers is to be implemented. The condition enables the relevant receiver to request that the Applicant acquire their property if no agreement on visual mitigation is secured.

In general, the Department has also recommended a condition which the Applicant is required to, at the request of any owners of residential dwellings or businesses with views of a turbine(s) located within 6km of their dwellings, provide landscaping.

### Noise Impacts

The Department's assessment concludes that the proposal can be constructed and operated within applicable noise criteria subject to best practice noise management. The Environment Protection Authority has also advised that it can licence the operation of the proposal subject to recommended noise limits. These limits have been adopted in the recommended conditions. The limits would also ensure that the Crookwell 3 wind farm, when operating at the same time as the other two Crookwell wind farms, would not exceed the relevant criteria.

The Applicant proposes to apply sector management measures in the unlikely event that there are exceedances of the relevant noise criteria. These measures include restrictions on turbine operations. These measures have been reinforced in the recommended conditions.

### Bushfire and Firefighting

As the wind turbines will house equipment containing flammable oils, there is a risk the turbines can catch on fire and trigger a bushfire. Also, due to the height (152 metres), spacing and breadth of the wind farm, there is also a risk that the ability to fight bushfires via aerial water dropping would be limited. This was a key concern for the community.

The Department's assessment concludes that these risks are low and manageable. It is further noted that the Rural Fire Service has not raised any concern with this aspect of the proposal. The Department has however recommended a range of conditions to ensure the Applicant provides for asset protection, has appropriate firefighting equipment and water supplies on site, and prepares construction and operational bushfire management plans (including having the option of potentially switching turbines off). The Applicant is further required to regularly consult with the local Rural Fire Service throughout the life of the development and comply with any of its reasonable requests to reduce the risks and enable fast access in emergencies.

### Traffic and Transportation

The Department's assessment concludes that the proposal will not have an unacceptable impact on the level of service of the local or regional road network. It also concludes that there are sufficient feasible access options available to the Applicant

The construction traffic volumes do have the potential to cause damage to the local road network. Concern was raised by the RMS and Upper Lachlan and Goulburn Mulwaree councils in relation to potential road damage. The Department is satisfied that this can be managed through the imposition of standard recommended conditions including the preparation of road dilapidation reports and the requirement that the Applicant repair damage resulting from construction traffic. A condition requiring the Applicant to prepare a Traffic Management Protocol has also been recommended. This protocol is to address the management requirements of Upper Lachlan Shire Council, Goulburn Mulwaree Council, Roads and Maritime Services and Crown Lands, and any other relevant road authority. The protocol must also outline the management of traffic conflicts that may be generated during construction and operation of the development, including final details of traffic volumes and routes for heavy vehicles.

### Aviation Safety

The Department's assessment concludes that risks to aviation are limited and residual impacts can be managed through consultation with appropriate authorities and standard conditions of consent.

While neither Air Services Australia nor the Department of Defence raised significant concern with the proposal, the Applicant will need to consult with relevant authorities and aerodrome operators in relation to final placement of the turbines and obstacle marking and lighting. Appropriate conditions have been recommended to ensure that this occurs.

Agricultural aerial spreading or spraying operations may be affected by the placement of the turbines. The Applicant has committed to cover the reasonable cost increase associated with aerial agricultural activity for adjoining landowners, in the event they require such operations.

#### Conclusions and Recommendations

The Department's assessment concludes that the impacts of the proposal are acceptable subject to a range of recommended conditions of consent to address residual environmental and amenity impacts. The recommended conditions complement the range of construction and operational environmental management measures proposed as part of the application.

Through the assessment process, the Applicant has reduced the development footprint to further minimise the impact on existing native vegetation and has outlined a number of additional environmental commitments, including avoidance and minimisation measures to further reduce the impact of the proposal on the environment and sensitive receivers in general.

The Department also notes that the wind farm will contribute towards offsetting the emissions of carbon dioxide and other gases, particulate emissions and other pollutants that may otherwise be produced if the equivalent power supply was provided by fossil fuel combustion. The proposal will also result in the avoidance of water consumption that would otherwise have been used in coal or other fossil fuel generated power stations.

The proposal is consistent with Commonwealth and State policies promoting the production and uptake of renewable energy sources as a means of addressing climate change. The proposed development will also contribute to Australia's Renewable Energy Target of sourcing 20% of electricity from renewable sources by the year 2020.

The Department has assessed the development application, the Environmental Assessment, submissions received on the proposal, and the Applicant's responses to submissions in accordance with the requirements of the *Environmental Planning and Assessment Act 1979*. The Department considers the proposal to have merit and to be in the public interest. Subsequently, the Department recommends the development be approved, subject to the recommended conditions of consent.

## TABLE OF CONTENTS

---

<b>1.</b>	<b>INTRODUCTION</b>	<b>8</b>
<b>2.</b>	<b>ABOUT THE PROPOSAL</b>	<b>11</b>
	2.1. Description of the proposal	11
	2.2. Rationale for the proposal	13
<b>3.</b>	<b>STATUTORY PLANNING REQUIREMENTS</b>	<b>17</b>
	3.1. State Significance Status	17
	3.2. Minister's Delegation	17
	3.3. Environmental Planning Instruments	17
	3.4. Objects of the EP&A Act	18
	3.5. Ecologically Sustainable Development	18
<b>4.</b>	<b>CONSULTATION AND SUBMISSIONS</b>	<b>19</b>
	4.1. Exhibition	19
	4.2. Public Authority Submissions	19
	4.3. Public Submissions	22
	4.4. Response to Submissions	23
<b>5.</b>	<b>ASSESSMENT OF KEY &amp; OTHER ISSUES</b>	<b>24</b>
	5.1. Ecological Impacts – Construction and Operation	24
	5.2. Visual Impacts	35
	5.3. Noise Impacts	46
	5.4. Bushfire and Firefighting	49
	5.5. Traffic and Transport	51
	5.6. Aviation Safety	55
	5.7. Assessment of Other Issues	57
	5.7.1. Construction Noise and Vibration	57
	5.7.2. Aboriginal Heritage Impacts	58
	5.7.3. Historical Heritage	60
	5.7.4. Blade Throw	60
	5.7.5. Property Devaluation	61
	5.7.6. Community benefits and contributions	61
<b>6.</b>	<b>CONCLUSIONS AND RECOMMENDATION</b>	<b>62</b>
<b>APPENDIX A</b>	<b>ENVIRONMENTAL ASSESSMENT</b>	<b>63</b>
<b>APPENDIX B</b>	<b>CONSIDERATION OF ENVIRONMENTAL PLANNING INSTRUMENTS</b>	<b>64</b>
<b>APPENDIX C</b>	<b>SUBMISSIONS</b>	<b>68</b>
<b>APPENDIX D</b>	<b>LANDSCAPE AND VISUAL IMPACT ASSESSMENT PEER REVIEW</b>	<b>69</b>
<b>APPENDIX E</b>	<b>APPLICANT'S PREFERRED PROJECT &amp; RESPONSE TO SUBMISSIONS</b>	<b>70</b>
<b>APPENDIX F</b>	<b>PREDICTED CUMULATIVE NOISE EXCEEDANCES (CROOKWELL 1, 2 AND 3 WIND FARMS) – WITHOUT MITIGATION</b>	<b>71</b>
<b>APPENDIX G</b>	<b>RECOMMENDED CONDITIONS OF CONSENT</b>	<b>73</b>

## 1. INTRODUCTION

---

This chapter outlines the purpose and structure of this report and introduces the proposed development, and provides a brief outline of its location and environmental setting.

### 1.1 Purpose and structure of this report

This is an environmental assessment report to the Minister for the purposes of her consideration of the approval of State Significant Development. This report has been prepared in accordance with Section 89E of the *Environmental Planning and Assessment Act (1979)*. The assessment has been informed by the Applicant's Environmental Assessment, submissions (including advice from public authorities), the Applicant's Response to Submissions Report and other relevant matters.

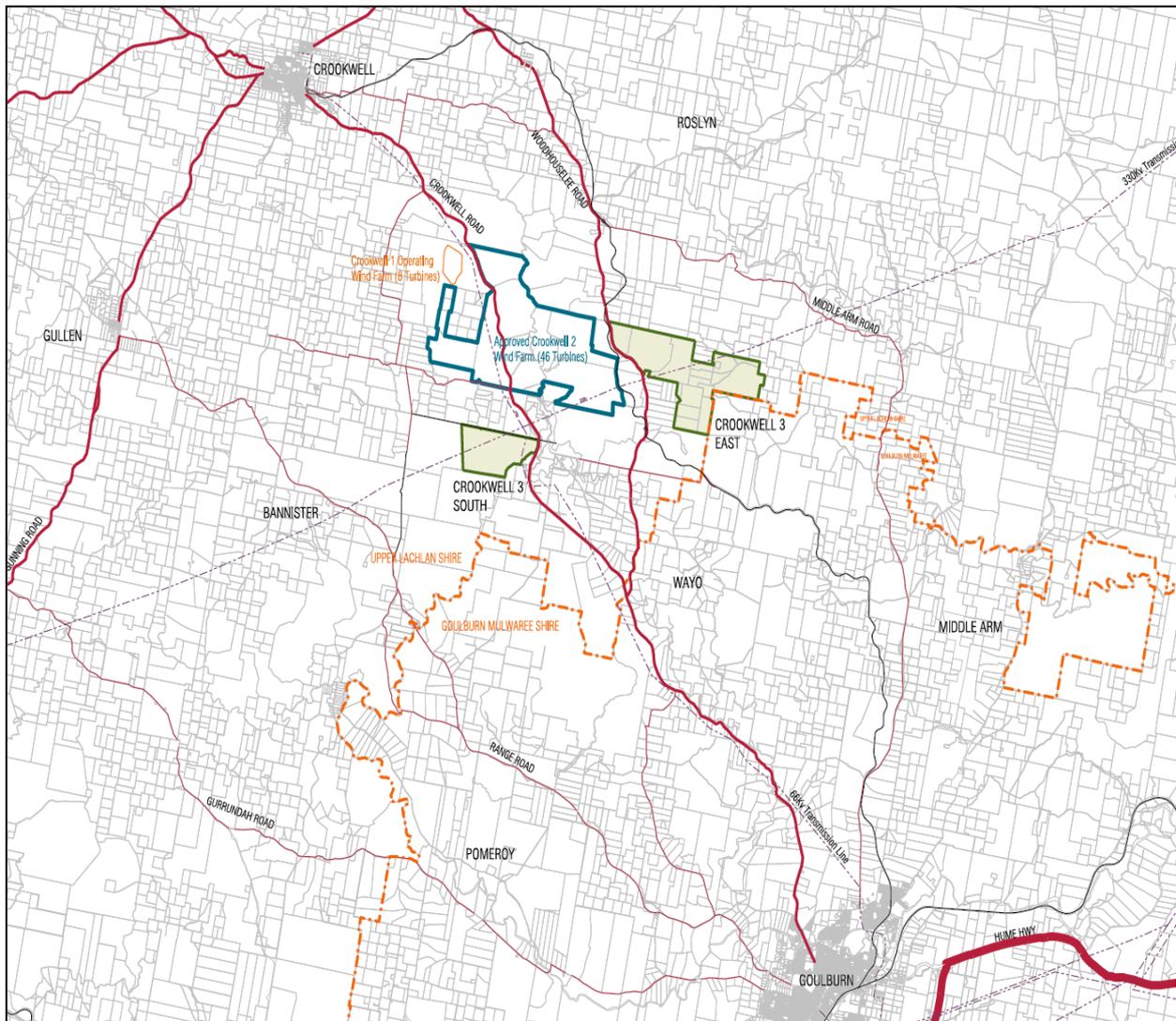
Chapter 2 of this report provides details of the proposal. Chapter 3 outlines both the assessment process and statutory approvals required for the proposed development. Chapter 4 summarises the public and government agency consultation process. The core part of the environmental assessment is provided in Chapter 5. Conclusions and recommendations are provided in Chapter 6.

### 1.2 Nature and location of the proposal

Crookwell Development Pty Ltd (the Applicant) seeks approval for the construction and operation of a wind energy generation facility referred to as the Crookwell 3 Wind Farm.

The site covers a total area of approximately 1,500ha and comprises two separate land parcels approximately 7km apart. The land parcels are individually referred to as 'Crookwell 3 South' and 'Crookwell 3 East' and collectively referred to in this report as 'the site'.

The site is located in the NSW southern highlands approximately 17km south-east of Crookwell township, 25km north-west of Goulburn and 90km north-east of Canberra. The site is contained entirely within the Upper Lachlan Shire local government area. Both Crookwell 3 South (400ha) and Crookwell 3 East (1,100ha) are rural land parcels comprising approximately 15 individual titles with three separate land owners. **Figure 1** shows the site location in context to the surrounding region. Also **Figure 11** in Section 5.5 of this report provides a broad location map for the proposal.



**Figure 1:** Site Location – Proposed Crookwell 3 Wind Farm

There are two constructed wind farms and one approved wind farm in close proximity to the site. These include:

- the constructed Crookwell 1 wind farm consisting of 8 turbines located immediately north of Crookwell 3 South which was approved by Upper Lachlan Shire Council and commenced operation in 1998;
- the constructed Gullen Range wind farm consisting of 73 turbines located approximately 12km west of Pejar Dam which was approved by the NSW Land and Environment Court on 4 August 2010; and
- the Crookwell 2 wind farm located directly north of Crookwell 3 South and immediately west of Crookwell 3 East, which was granted approval for 46 wind turbines on 10 June 2005 by the then Minister for Infrastructure and Planning. No turbines have yet been constructed on the site, although some preliminary site works have been undertaken.

Crookwell Road and Woodhouselee Road are the two major roads servicing the site. Crookwell Road is a classified State Road under the jurisdiction of Roads and Maritime Services (RMS) and provides access to Crookwell 3 South. Woodhouselee Road is a local road under the jurisdiction of Upper Lachlan Shire Council and provides access to Crookwell 3 East.

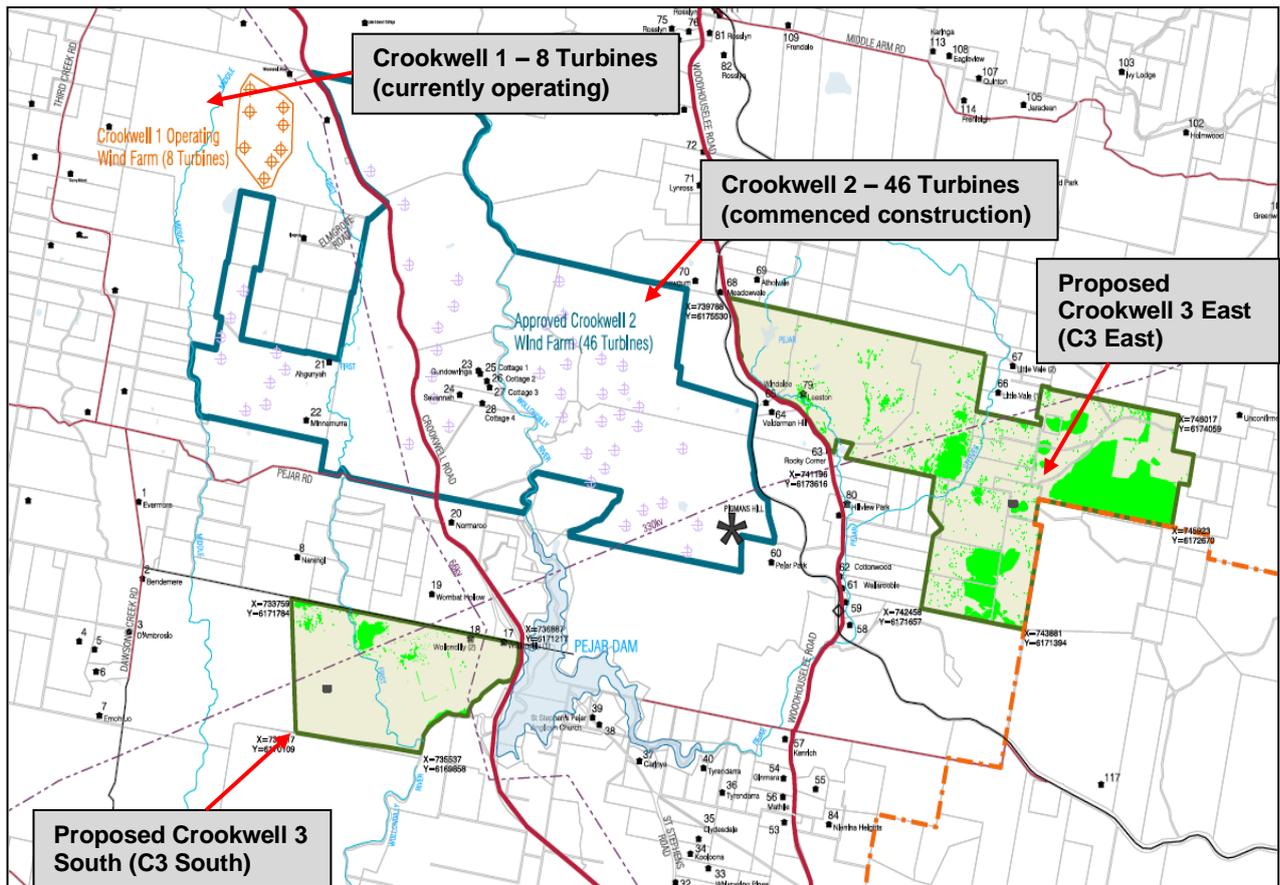
There is an existing 330kV electricity transmission line running in an east-west direction (extending from Yass to Bannaby) which traverses through both Crookwell 3 South and Crookwell 3 East, as shown on **Figures 1** and **2**. There are patches of remnant vegetation located across the site; however these areas are highly disturbed due to prior clearing activities for livestock grazing.

### 1.3 Environmental setting / context

The surrounding locality comprises undulating terrain with the site located on a system of ridges and low hills that are separated by the Wollondilly River and Goulburn-Crookwell Road corridor. Pejar Dam is located immediately east of the Crookwell 3 South and has a surface area of approximately 155ha.

The surrounding land uses are predominately rural agricultural industries including wool, lamb, cattle grazing and seed potatoes, as well as wind generation. Smaller plot vineyards and other boutique rural uses such as flower farms have been established more recently throughout the region. The township of Crookwell is the nearest significant populated centre with approximately 2,500 people.

**Figure 2** shows the location of the proposed Crookwell 3 wind farm in context to the nearby Crookwell 1 and Crookwell 2 wind farms.



**2:** Proposed Crookwell 3 Wind Farm in context to the nearby Crookwell 1 and Crookwell 2 Wind Farms

## 2. ABOUT THE PROPOSAL

---

This chapter describes the proposal including any changes / amendments since the exhibition of the Environmental Assessment. It also explains the rationale (need and justification for the proposal).

### 2.1. Description of the proposal

The proposal involves the construction and operation of a wind farm comprising up to 29 wind turbines and associated infrastructure. Key components of the proposal are described in **Table 1**.

**Table 1: Project Components – Crookwell 3 Wind Farm**

Aspect	Description
<b>Wind Turbines and Monitoring Masts</b>	<p>A maximum of 29 wind turbines are proposed, with turbine capacity between 1.8 MW and 3.3 MW each. The Applicant has considered 8 potential wind turbine generator models with approval sought for the maximum turbine 'envelope.' The components of each turbine will comprise:</p> <ul style="list-style-type: none"> <li>• a 20m x 20m concrete foundation between 2m and 3m in depth;</li> <li>• a tubular steel tower approximately 4.5m in diameter at the base, tapering to approximately 3m in diameter at the top, with a maximum tower height of up to 100m;</li> <li>• a nacelle at the top of the tower housing a gearbox and electrical generator;</li> <li>• a rotor comprising a hub (attached to the nacelle) with three blades and a shaft that connects to the generator via the gearbox or direct drive mechanism; and</li> <li>• 3 blades of up to 51m long made of lightweight material (the maximum height of the turbine would be 151m from the base of the structure to the top of the blade tip).</li> </ul> <p>8 turbines are proposed to be constructed at Crookwell 3 South and 21 at Crookwell 3 East. Individual kiosks are proposed at the foot of each tower housing 33kV transformers and 33kV switchgears and control systems (some turbine models have this integrated within the tower or nacelle).</p> <p>3 wind monitoring masts are proposed, to be fitted with anemometers, weather vanes, temperature gauges and other electrical equipment. The masts will consist of a tall, thin tubular or lattice structure approximately 80m to 100m in height. 2 wind monitoring masts are proposed at Crookwell 3 East and one at Crookwell 3 South.</p>
<b>Wind Turbine Layout</b>	<p>The proposed turbine layout has been designed considering the site topography, native flora and fauna, proximity to existing dwellings, wind speed data collected on and off the site, visual amenity impacts, and distances to adjacent turbines. The layout is designed to ensure turbines take maximum advantage of winds from the west and south-west.</p> <p>The final turbine locations are to be determined at the detailed design stage (post consent). As amended by the Department's recommended conditions, micro-siting of the development components is only permitted with the written agreement of the Secretary. Where micro-siting is proposed, the Applicant is required to demonstrate how those locations will not give rise to increased landscape, ecological, cultural heritage, visual amenity, shadow flicker, noise, fire risk or aviation impacts when compared with the proposed (and as approved if consent is granted) locations.</p> <p>The indicative turbine layout is illustrated at <b>Figure 3</b>. It is noted that turbine A19 shown on <b>Figure 3</b> has since been removed from the proposal.</p>

<b>Aspect</b>	<b>Description</b>
<b>Site Access</b>	<p>3 potential access routes to Crookwell 3 East and one for Crookwell 3 South are proposed.</p> <p><u>Crookwell 3 East</u> Option 1 (preferred access) – via Greywood Siding Road (extending east off Woodhouselee Road) and along the existing corridor, turning left and heading in a northerly direction along the unused rail corridor towards the south-eastern corner of the site (near proposed turbine A25).</p> <p>Option 2 (alternative access) – via the Boltons Lane existing privately used road. This option involves realignment of the entrance, possibly through the site and onto Boltons Lane. This realignment would provide the required turning area for vehicles with Over Dimensional loads, and also provide a setback to dwellings in proximity of the intersection to reduce construction traffic noise.</p> <p>Option 3 (alternative access) – via a new access road through Leeston and Hillview Park properties.</p> <p><u>Crookwell 3 South</u> Via Crookwell Road approximately 400m to 500m north of where Crookwell Road crosses Wollondilly Creek.</p> <p><u>Delivery of Construction Materials</u> Overseas manufactured turbine components will likely be delivered from Port Kembla after arriving via sea freight. Given the size of the turbine components (particularly tower sections, blades and nacelles) many of the transport loads will be Over-Dimensional and require a permit from RMS. Road network upgrades for construction vehicles were required as part of the approval of the adjoining Crookwell 2 Wind Farm.</p>
<b>Internal Access Tracks</b>	<p>A network of internal access tracks will provide a safe passage of access for vehicles to each individual turbine. Existing farm tracks will be used where possible and these are proposed to be widened (8m to 10m in width) during construction, and reduced to approximately 6m in width once operational.</p>
<b>Electrical Works and Grid Connection</b>	<p>The turbines will be connected via 33kV electrical cables to be installed underground at a depth of 1m (where terrain permits) following the access track alignment. Control and communication cables linking the turbines to the control room will be installed underground adjacent to the 33kV cabling.</p> <p>Overhead power lines may be used to overcome access and terrain constraints in limited circumstances. In some instances cables may diverge from the track alignment to reduce electrical losses and to overcome ground constraints.</p> <p>Crookwell 3 Wind Farm is proposed to share the substation approved as part of the Crookwell 2 Wind Farm. This will involve road crossings from both Crookwell 3 East (Woodhouselee Road) and Crookwell 3 South (Crookwell Road). Provisions for easement access with the Crookwell 2 site landowner are in place.</p> <p>For connection to the substation from Crookwell 3 South, 3 options are under consideration including a combination of easements through neighbouring properties and which incorporates an overland connection along Crookwell Road. There are 2 options under consideration for Crookwell 3 East.</p>
<b>Construction Facilities</b>	<p>A temporary construction area is required at both Crookwell 3 East and Crookwell 3 South to accommodate portable toilets, vehicle parking, construction equipment, and vehicle wash down facilities. A concrete</p>

Aspect	Description
	<p>batching plant is proposed at Crookwell 3 East only.</p> <p>The proposed concrete batching plant is approximately 50m x 80m in size. This area will incorporate loading bays, hoppers, silos, hardstand areas, water tanks and stockpile areas for aggregates, sand and other raw materials for the production of between 250m<sup>3</sup> and 500m<sup>3</sup> of concrete daily.</p> <p>Temporary hardstand areas of 50m x 50m are required to provide a stable platform for construction equipment (including a crane) to enable the construction of each turbine. The hardstand area will be reduced in size following construction and rehabilitated to its agricultural state following completion of the development.</p>
<b>Operation</b>	<p>Landowners have agreed to provide the Applicant a 30 year lease with the option to extend for another 30 years. During operation, all infrastructure associated with the proposal will remain the property and responsibility of the Applicant.</p> <p>The wind farm will be controlled by a computerised system linking each turbine by communications (fibre-optic) cables. The computerised system will log all operating parameters and initiate efficiency of the turbines according to prevailing atmospheric conditions. Turbines will be disconnected at the grid during very low or very high wind speeds.</p>
<b>Decommissioning</b>	<p>Once the project reaches the end of its economic life, decommissioning will occur essentially involving the reverse process to construction. All materials will be removed from the site and recycled appropriately including the removal of turbines, overhead power lines and electrical works, turbine foundations and crane pads. Where beneficial to the ongoing use of the land, access tracks will remain in place. Where access tracks are considered surplus to the landowner's requirements, these will be rehabilitated and revegetated.</p>
<b>Jobs</b>	<p>40 full-time equivalent construction jobs and six full-time equivalent operational jobs will be generated by the proposal.</p>
<b>Capital Investment Value</b>	<p>The Capital Investment Value is estimated between \$90 to \$110 million.</p>

**Figure 3** below shows the indicative turbine layout and surrounding features, including the location of Crookwell 2 wind farm. **Figures 4 and 5** show the proposed access and infrastructure plan for Crookwell 3 South and Crookwell 3 East respectively.

## 2.2 Rationale for the proposal

The wind farm will contribute towards offsetting the emissions of carbon dioxide and other gases, particulate emissions and other pollutants that may otherwise be produced if the equivalent power supply was provided by fossil fuel combustion. The proposal will also result in the avoidance of water consumption that would otherwise have been used in coal or other fossil fuel generated power stations.

The proposal is consistent with Commonwealth and State policies promoting the production and uptake of renewable energy sources as a means of addressing climate change. The proposed development will also contribute to Australia's Renewable Energy Target of sourcing 20% of electricity from renewable sources by the year 2020.

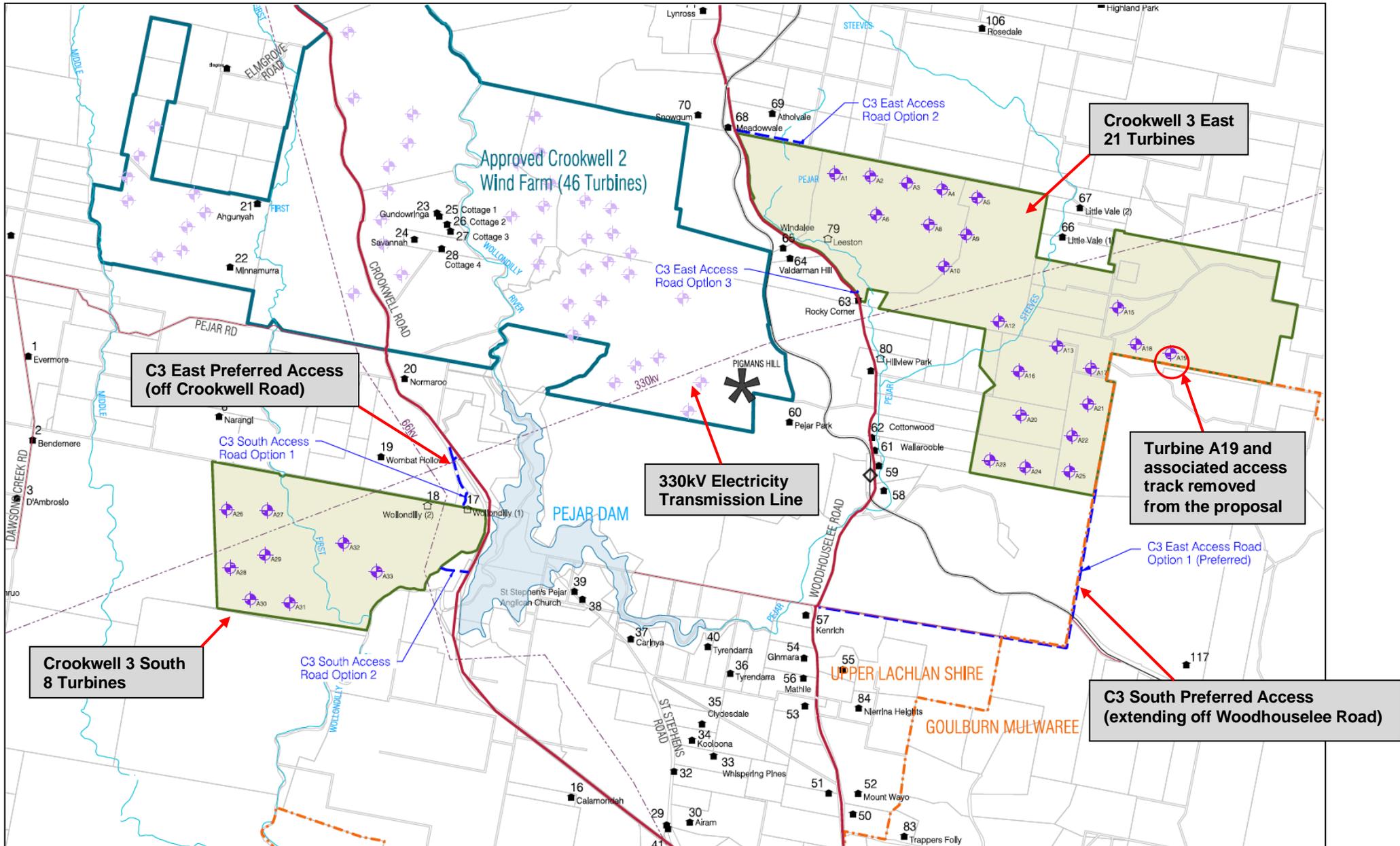


Figure 3: Proposed Site Layout – Crookwell 3 Wind Farm

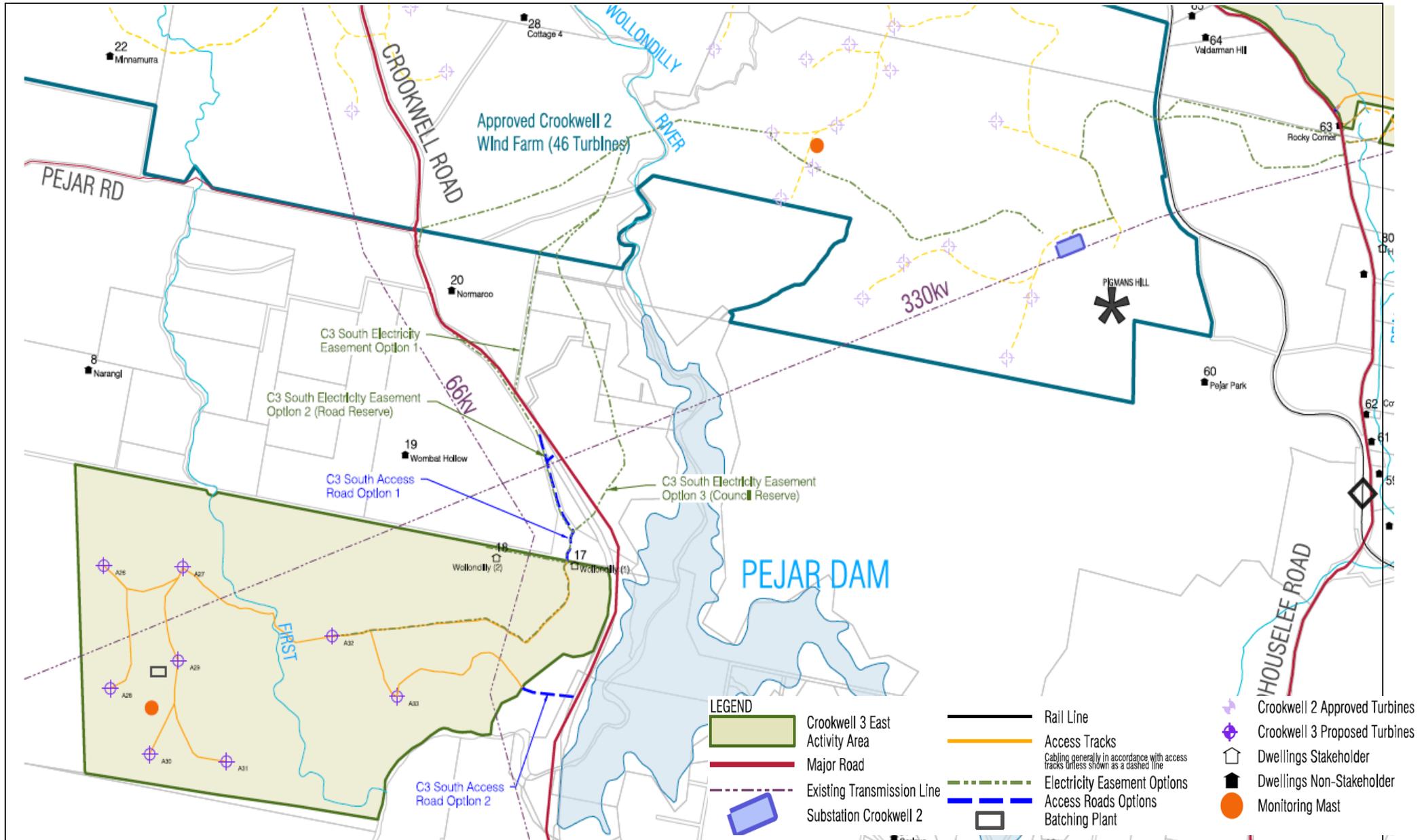
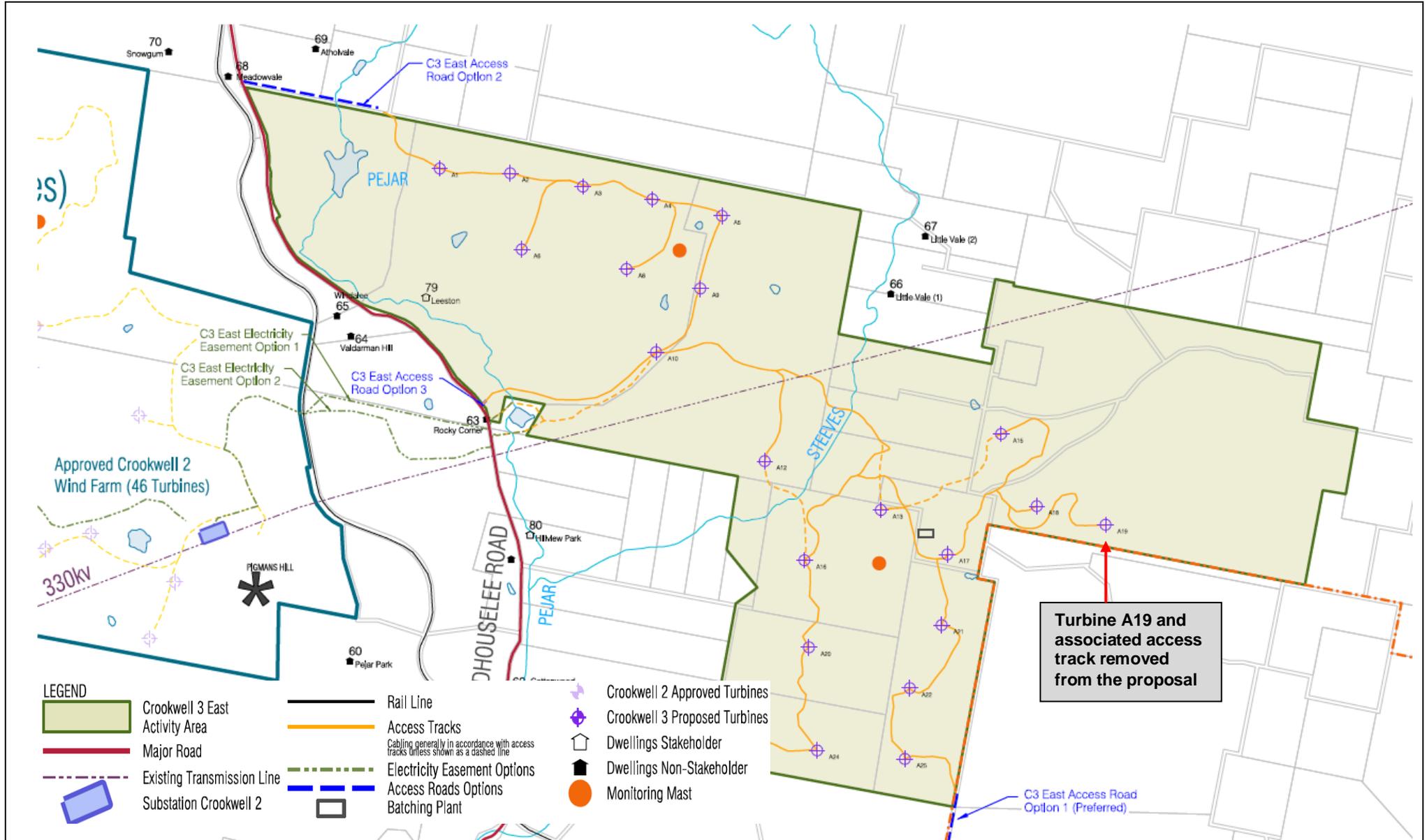


Figure 4: Proposed Access and Infrastructure Plan – Crookwell 3 South



**Figure 5:** Proposed Access and Infrastructure Plan – Crookwell 3 East

### 3. STATUTORY PLANNING REQUIREMENTS

---

This chapter describes the planning approval pathway together with the application of relevant state and local planning requirements.

#### 3.1. State Significance Status

On 18 February 2010, the proposal was declared a major project under Part 3A of the *Environmental Planning and Assessment Act 1979* 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*). Therefore, the Minister for Planning (the Minister) is the approval authority.

On 1 October 2011, Part 3A of the Act was repealed and replaced by the State Significant Development assessment system. On 21 March 2014, the then Minister for Planning and Infrastructure formally transitioned the project to the State Significant Development system via an Order under clause 6 of Schedule 6A of the Act.

The previous actions undertaken under the Part 3A process, including exhibition of the Environmental Assessment, have been accredited under the State Significant Development process and the project has subsequently been assessed as a State Significant Development application under section 89E of the Act.

#### 3.2. Minister's Delegation

The Minister has delegated the functions to determine State Significant Development applications to the Planning Assessment Commission including where an application has been made by persons other than or on behalf of a public authority, and including in cases where:

- the Council has made an objection; and/or
- there are 25 or more public submissions in objection to the proposal; and/or
- a political donations disclosure statement has been made in relation to the application.

The application is being referred to the Planning Assessment Commission for determination as more than 25 public submissions in objection to the proposal were received.

#### 3.3. Environmental Planning Instruments

The following environmental planning instruments apply to the site:

- *State Environmental Planning Policy (State and Regional Development) 2011*;
- *State Environmental Planning Policy (Infrastructure) 2007*;
- *State Environmental Planning Policy (Rural Lands) 2008*;
- *State Environmental Planning Policy 44 (Koala Habitat Protection)*;
- *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 covers the development site, Clause 1.8A of this LEP states that if a development application has been made before the commencement of the Upper Lachlan LEP and the application has not been determined before that commencement, the application is to be determined as if the Upper Lachlan LEP has not commenced. The application was lodged prior to the commencement of the Upper Lachlan LEP. 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 development site, including the electricity connection options linking the development with Crookwell 2 substation, is zoned 1(a) General Rural under the Crookwell and the Mulwaree LEPs. The development is permissible with development consent upon land zoned 1(a) General Rural.

Notwithstanding the LEP provisions, Division 4 of *State Environmental Planning Policy (Infrastructure) 2007* (Infrastructure SEPP) also applies to the development as it relates to electricity generating works, with Clause 34(1) stating that development for the purpose of electricity generating works may be carried out by any person with consent on land in a prescribed zone. As the proposal is for the purpose of generating electricity and is in a prescribed zone, it is permissible with consent.

Detailed assessments of the proposal against the relevant provisions of the above environmental planning instruments are provided at **Appendix B**. The development is generally consistent with the above environmental planning instruments.

### 3.4. Objects of the EP&A Act

Decisions made under the *Environmental Planning and Assessment Act (1979)* 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 most relevant objects are those under 5(a) (i), (ii), (iii), (iv), (v), (vi), (vii) as these form key areas of assessment and are of particular relevance to the determination of the application. With respect to ecologically sustainable development, the Act adopts the definition in the *Protection of the Environment Administration Act 1991*, including the precautionary principle which is discussed in **Section 3.5** of this report. Also, the agency and community consultation undertaken as part of the assessment process (refer **Section 4** of this report) address objects 5(b) and (c) of the Act.

### 3.5. Ecologically Sustainable Development

Section 6(2) of the *Environmental Planning and Assessment Act (1979)* states that Ecologically Sustainable Development (ESD) requires the effective integration of economic and environmental considerations in decision-making processes and that ESD can be achieved through the implementation of:

- (a) *the precautionary principle,*
- (b) *inter-generational equity,*
- (c) *conservation of biological diversity and ecological integrity,*
- (d) *improved valuation, pricing and incentive mechanisms.*

The Department's assessment of the ecological impacts of the project (refer to **Sections 5.4.1 to 5.4.4**) is based on a conservative and rigorous assessment of the likely ecological impacts and of the likely offset requirements. This assessment ensures that appropriate and adequate measures would be put in place to prevent the threats of serious or irreversible environmental damage and is consistent with the precautionary principle and the principle of conservation of biological diversity and ecological integrity.

The majority of the potential impacts are likely to be localised and would not diminish the options regarding land and resource uses and nature conservation available to future generations. The development has significant social and environmental benefits on a state and federal level and can be argued to have global environmental benefits on the basis that it would produce electricity without the production of greenhouse gases.

The Department has assessed the benefits of the development and assessed the potential impacts. The Department on balance considers that the development's potential key impacts on the environment can be adequately minimised and/or mitigated and the residual impacts can be managed to an acceptable level (refer **Section 5.4**). As such, it is considered that the development would be ecologically sustainable within the context of the above principles.

## 4. CONSULTATION AND SUBMISSIONS

---

### 4.1. Exhibition

The Environmental Assessment for the project was publicly exhibited in accordance with section 75H(3) (now repealed) of the *Environmental Planning and Assessment Act (1979)* from 1 November 2012 to 6 February 2013 (98 days in total).

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

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

The Department also wrote to the relevant State and local government authorities notifying of the exhibition.

A total of 206 submissions were received during the exhibition period which included 11 from public authorities and 195 from the general public and special interest groups. Of the 195 public submissions received, a petition containing 169 signatures objecting to the proposal has been regarded as individual objections. This is because a request was made to the Department to consider the petition as individual submissions as at the time of exhibition, bushfires were occurring in the Crookwell region and many members of the local community were unable to make separate submissions within that period (as they had to either vacate the area or were out working as volunteer firefighters).

A summary of the issues raised in the submissions is provided below.

### 4.2. Public Authority Submissions

**Upper Lachlan Shire Council** raised the following issues:

- It is unclear how the applicant intends to address visual impacts beyond roadside tree planting. Roadside tree plantings also provide ongoing maintenance issues.
- Should noise levels be found to exceed the stated levels, Council would require the deletion of relevant turbines or a written agreement provided for affected land owners outlining appropriate noise mitigation measures.
- All turbines within 2km of any dwelling not involved with the development should be deleted, or written consent provided from all existing land owners within residences within the 2km turbine radius.

- In the event of a complaint regarding television, radio or wireless transmission, the Applicant shall investigate the quality of transmission at the receptor. Where transmission problems can be reasonably attributed to the development, the Applicant must be responsible for all costs associated with mitigation measures.
- Additional information is required in relation to available sight distances from Crookwell Road in regards to the site access to Crookwell 3 South.
- Only one access should be provided to Crookwell 3 East from Woodhouselee Road.
- Greywood Siding Road is a NSW Crown owned public road and is required to be upgraded to accommodate vehicles required to service the site during both construction and operation. The design of the road will need to cater for stormwater impacts at low points, and provide an intersection with Woodhouselee Road that safely provides for the dimension loads anticipated to access the site.
- Should access option 1 for Crookwell 3 East not be used, council will require significant upgrading of Woodhouselee Road in the vicinity of Woodhouselee Village to strengthen the pavement to allow for the anticipated heavy vehicle traffic and minimise impacts on residents.
- All roads that are proposed to be crossed by high voltage electrical connections are to be under bored (not open trenched) with the cables to be encased in ducts to ensure the safety of Council staff when carrying out future maintenance work of the road.
- Further information is required regarding the delivery of heavy building materials to the site as roads to the north of the proposed development are incapable of servicing intense usage by construction traffic.
- A timeframe should be placed upon the Applicant to connect electricity reticulation to Crookwell 2.
- Should the decommissioning and rehabilitation plan be deemed inadequate, the Applicant should be required to provide a decommissioning bond.
- The Applicant is required to enter into a planning agreement with Council to provide contributions for a community enhancement fund.

**Goulburn Mulwaree Council** acknowledged that whilst the site is contained wholly within the Upper Lachlan Shire, the proposed transportation route for construction materials passes through the Goulburn Mulwaree local government area. It was requested that the proposed Goulburn Bypass section referred to in the Traffic Impact Assessment be clearly outlined as any right turns from Old Sydney Road into Union Street will pose problems for oversized vehicles.

**The Office of Environment & Heritage** raised the following issues:

- The flora and fauna surveys are lacking in detail. The nature and extent of potential impacts on threatened species is difficult to determine.
- The location of turbines within remnant woodland or forest is not supported. Of particular concern is the location of turbines A12, A18 and A19. Medium sized remnants in heavily cleared rural landscapes are likely to provide habitat for threatened fauna species.
- There is insufficient information relating to the proposed offsets, the vegetation types it contains, proposed management actions, and the legal instrument to secure the offset.
- The Archaeological Heritage report does not adequately consider the full nature and extent of impacts on Aboriginal cultural heritage values, and has not been prepared in accordance with the Draft Guidelines for Aboriginal Cultural Heritage Impact Assessment and Community Consultation.

**NSW Environment Protection Authority** provided the following comments:

- Insufficient detail has been provided on noise limits for specific sensitive receivers.
- Construction works to be limited to standard hours to minimise construction noise impacts. A Construction Noise Management Plan should also be developed and implemented.
- It is recommended that the Australian and New Zealand Environment Council (ANZEC) *Technical Basis for Guidelines to Minimise Annoyance Due to Blasting Overpressure and Ground Vibration* is implemented to ensure the impacts of blasting are reasonable.

**The Department of Primary Industries'** submission included comments from three separate divisions within the agency including the NSW Office of Water, Fisheries NSW and Trade & Investment (Crown Lands and Minerals sections).

**NSW Office of Water** recommended the following conditions of consent:

- A Construction Environmental Management Plan and Operation Water Management Plan to be prepared in consultation with Office of Water.
- The design of waterway crossings for access roads and cable installations, and any associated in-stream works is to be included within the CEMP and prepared in accordance with the Guideline for Controlled Activities on Waterfront Land (2012).
- If rock anchoring is selected for wind tower foundations, an assessment of groundwater is to be undertaken in consultation with NOW and endorsed by prior to construction.

**Fisheries NSW** recommended the following conditions of consent:

- The installation of electrical cabling crossing of waterways be done by trenching or underboring in a manner which does not block fish passage.
- The design and construction of any new or upgraded track crossings of Steeves Creek, Fish Creek, Pejar River and Wollondilly River be undertaken in accordance with the NSW Policy and Guidelines for Fish Friendly Waterway Crossings (2004) and Why Do Fish Need to Cross the Road? Fish Passage Requirements for Waterway Crossings (2004).

**Trade & Investment – Crown Lands and Mineral Resources** advised that the following Crown land and roads are impacted by the proposal:

- An internal access track within Crookwell 3 South (traversing Lot 700 DP 1139548) is held under Permissive Occupancy 1517 for grazing. The access track will be required to be authorised via suitable easements with compensation and fees claimed.
- It is requested that turbine A13 be relocated so that there is no impediment on the adjoining Crown road. If the turbine is unable to be relocated, the affected section of road should be subject to a road closure and purchase application.
- The proposed concrete batching plant between turbines A13 and A17 encroaches on an existing Crown road and should be relocated.
- Internal access tracks traverse Crown roads in several locations at Crookwell 3 East. Given these access tracks will be 10m wide during construction, they cannot be constructed as minor works. The preferred position is for the affected roads to be closed and purchased by adjoining landowners. If closure is not possible, easements should be created for the road crossings and works with compensation fees claimed.
- The Mineral Resources section noted that the Applicant has attempted to consult with the holder of the only mineral exploration licence which overlaps the development area. Mineral Resources notes that while no response has been received from the licence holder, it is important that the Applicant continues to attempt to liaise with the licence holder with regards to the placement of turbines and related infrastructure and their potential impact upon mineral resources.

**Roads and Maritime Services** did not object to the proposal subject to a number of conditions being met. The recommended conditions primarily relate to the upgrading of surrounding local roads to cater for heavy vehicles and the delivery of construction materials. A complete list of RMS' recommended conditions of consent is included at **Appendix C**.

**Sydney Catchment Authority** raised concerns relating to the protection of erosion control works given the site location within the Wollondilly River catchment. It was requested that measures to protect the erosion control works be implemented, and that appropriate erosion and sediment control measures be employed during proposed works.

**The Department of Defence** advised that there are no concerns regarding the safety of military aircraft or potential interference to defence communications or surveillance radars. "As constructed" details of the turbines are to be provided to the RAAF Aeronautical Information Service.

**Air Services Australia** advised that the proposal will not affect any sector or circling altitude, nor any instrument approach or departure procedure at Goulburn Aerodrome. However, proposed turbines A19 and A25 may affect the Lowest Safe Altitude on air route W10.

A copy of all public authority submissions is included at **Appendix C**.

#### 4.3. Public Submissions

A total of 195 submissions were received from the public. This included submissions from the following special interest groups:

- Crookwell District Landscape Guardians;
- NSW Landscape Guardians;
- Parkesbourne/Mummel Landscape Guardians; and
- Clean Energy Council.

A petition of 169 signatures in objection to the proposal was also received. Of the 195 public submissions, 188 objected to the proposal and seven provided support. Key issues raised in public submissions are listed in **Table 2**.

**Table 2: Summary of Issues Raised in Public Submissions – Proposed Crookwell 3 Wind Farm**

Issue	Proportion of Submissions (%)
Noise (Infrasound) and Health – concerns about the effects of infrasound (low frequency) noise to emanate from the proposed wind turbines.	42%
Visual impact (shadow flicker, lifestyle and industrialisation of landscape) – concerns about impact to visual amenities, including cumulative impacts given other surrounding wind farms within the locality, and loss of scenic enjoyment.	42%
Property devaluation – concerns about the impacts on property values (including reduced land rates) as a result of being located near the wind farm development.	33%
Cumulative impacts – concerns raised that the development would contribute to the existing impacts in the locality due to the other wind farms, including causing significant cumulative operational noise and visual impacts.	25%
Bushfire and aerial firefighting* - concerns that the proposed wind turbines would catch on fire (as the structures would house flammable oils and hydraulic fluids) and that aerial firefighting would be impacted by the placement of the wind farm.	91%
2 km Setback (Council DCP) – concerns raised about the setback distances of the development and that the development does not comply with the 2km setback requirement in the Upper Lachlan Shire Council Development Control Plan.	21%
Telecommunication interference – concerns raised about impacts on television, radio and mobile phone reception during the operation of the development.	14%
Flora and fauna – concerns raised about the extent of impacts on flora and fauna, including habitat areas as a result of construction and bird-strike during operation.	11%
Other: Aviation (wake turbulence); Construction related impacts (traffic, noise, dust); Electro-magnetic radiation (EMF); Subsidies from government; Groundwater impacts (concrete footings); Blade throw; Inaccuracies in Environmental Assessment.	<7%

\* *Bushfire and aerial firefighting was raised in a submission containing a petition signed by 169 people.*

Submissions supporting the proposal cited the following reasons:

- the economic benefits of wind farms;
- wind energy is a cost-efficient renewable energy source available;
- reduction to greenhouse gas emissions;
- turbines provide an additional income to farmers; and
- construction of road infrastructure will benefit local communities, and enable the Rural Fire Service improved access to areas.

The Department has considered the above issues in its assessment detailed in **Section 5** of this report.

#### **4.4. Response to Submissions**

The Applicant has provided a response to the issues raised in the submissions through a Response to Submission Report. The Response to Submissions Report outlines a number of amendments to the proposal, including:

- the removal of turbine A19 to reduce the impact on remnant native vegetation;
- realignment of the access track and crane hardstand platform for turbines A12 and A18 to minimise clearing of native vegetation and hollow bearing trees;
- relocation of turbine A24 and its associated access track and crane hardstand platform to the adjacent paddock to avoid impacting on derived native grasslands;
- realignment of the access track between turbines A13 and A16 to avoid impacting on areas of Box-Gum Woodland; and
- relocation of the access point to Crookwell 3 East to avoid extensive tree clearing.

A copy of the Response to Submissions Report is provided at **Appendix E**.

## 5. ASSESSMENT OF KEY & OTHER ISSUES

---

Key issues considered in the Department's assessment of the proposal include the following:

- ecological impacts;
- visual impacts;
- noise impacts;
- bushfire and firefighting;
- traffic and transportation; and
- aviation safety.

The Department's assessment of key issues, as well as its assessment of other issues, is provided in this chapter.

Given Crookwell 1, Crookwell 2 and Gullen Range wind farms are all located within 10km of the proposal site, the Department's assessment has also taken into account key cumulative impacts as a result of these wind farms and the subject proposal. The key cumulative impacts addressed within this chapter include visual impacts (from Crookwell 1, 2 and 3 and Gullen Range wind farms) and operational noise impacts (from all three Crookwell wind farms).

### 5.1. Ecological Impacts – Construction and Operation

#### Issue

The proposed construction of the wind farm would result in the clearing of approximately 8.81ha of native vegetation to accommodate the turbines, establishing internal access tracks, crane hardstand platforms, and site access roads. The operation of the wind farm may cause collision strike to bird and bat species and the alienation of habitat as a result of the established wind turbine areas.

#### Submissions

OEH stated that the Applicant's ecological assessment contains limited information on the surveys undertaken and on the offsets proposed. OEH also stated that it does not support turbines being located within remnant woodland or forest and raised concerns that proposed turbines A12, A18 and A19 are within such areas. The Department of Primary Industries (Fisheries NSW division) recommended conditions for waterway crossings to ensure fish passages are not blocked and are designed in accordance with the relevant guidelines.

Some of the public submissions raised concerns about the extent of impacts on flora and fauna as a result of construction, as well as bird-strike during operation.

Anderson Environmental Consultants Pty Ltd undertook an Ecological Impact Assessment which formed part of the Environmental Assessment. Additional ecological field surveys and assessments were undertaken by ERM Australia Pty Ltd which prepared a Supplementary Ecology Report (April 2013) and a further addendum (October 2013), with both documents submitted as part of the Response to Submissions.

The Department's assessment has focused on the following key issues raised in the public authority and public submissions relating to potential ecological impacts:

- the clearing of native vegetation and impacts on threatened fauna species; and
- proposed onsite environmental offsetting.

#### Vegetation Mapping

OEH had stated that both the vegetation mapping and fauna surveying efforts undertaken as part of the Ecological Impact Assessment were incomplete with respect to detail. The additional vegetation mapping carried out by the Applicant in response to OEH's concerns, focused on the following key areas within the site, particularly those areas to be removed to accommodate the development:

- woodland remnants within the development footprint of proposed turbines A12 and A18;
- the Greywood Siding Road reserve (proposed to be used as the access road servicing the proposed Crookwell 3 East area);
- grassland areas within the development footprint; and
- woodland remnants not previously mapped in detail, including to the west of proposed turbine A13, north of proposed turbine A26, and along the proposed access road to the Wollondilly property at Crookwell 3 South.

Four prominent vegetation types were identified at these locations (refer to **Figure 7** below), including Silvertop Ash Open Forest; Red Stringybark Open Forest; Box-Gum Woodland; and Pasture land.

Despite the Ecological Impact Assessment field surveys detecting no Endangered Ecological Communities (EECs), the vegetation mapping carried out identified parts of the Box-Gum Woodland community comprising of *White Box Yellow Box Blakely's Red Gum Woodland* as being an EEC listed under the NSW *Threatened Species Conservation Act 1995*. Parts of this community also comprise the Critically Endangered Ecological Community *White box – Yellow Box – Blakely's Red Gum grassy woodlands and derived native grasslands* listed under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999*.



**Figure 7:** Distribution of Vegetation Communities – Proposed Crookwell 3 Wind Farm Site

OEH was satisfied that the Supplementary Ecology Report adequately addressed the issues raised. The Department concurs with OEH and considers the additional survey work undertaken has allowed for a comprehensive ecological assessment to be undertaken for the development. It is however noted that the proposed location of turbines A12 and A18 in areas of existing native forest vegetation is not supported by OEH.

## Fauna Surveying

OEH considered the Ecological Impact Assessment provided insufficient detail regarding the timing, location, and intensity of targeted fauna surveying. The Response to Submissions therefore provided more comprehensive details on this. The Applicant also undertook further fauna habitat assessments and opportunistic fauna sightings as part of the Supplementary Ecology Report.

While woodland habitats were identified and assessed in the vicinity of turbines A12 and A18, no contiguous woodland area with high species richness was recorded. The Supplementary Ecology Report subsequently determined that the existing woodland habitat does not provide optimal habitat for either the Regent Honeyeater or Swift Parrot species.

Nine Hollow bearing trees were recorded within a 100m radius of turbine A12 (with the Supplementary Ecology Report stating that none will be removed for turbine A12) and a further 27 were recorded within a 100m radius of turbine A18 (with up to eight of these trees in the vicinity of turbine A18 likely to be removed). The Applicant has subsequently committed to a tree felling protocol to mitigate any potential harm to individual species that may utilise the trees to be removed in the event removal is unavoidable.

Four creek crossings were investigated for potential Booroolong Frog habitat, a listed endangered species under the *Threatened Species Conservation Act 1995* and *Environment Protection and Biodiversity Conservation Act 1999*. Three of the crossings were considered to hold little value and one crossing at First Creek was found to provide suitable habitat for the species. The Supplementary Ecology Report recommends construction works in this area be avoided where possible. The Applicant has committed to the implementation of mitigation measures as outlined in the Flora and Fauna Management Plan.

To determine if any species of flocking waterbirds likely to occur in the area of Pejar Dam may be impacted by the proposal, four bird monitoring locations were established. The Supplementary Ecology Report determined that the ecological values of the dam are unlikely to be impacted on by the development due to the distance of construction activities from the dam (with the closest turbine being approximately 1.3km from the dam). Furthermore, it is noted that no migratory waterbird species listed under either the *Threatened Species Conservation Act 1995* and *Environment Protection and Biodiversity Conservation Act 1999* were recorded in the vicinity of the dam.

The Department is satisfied with the additional vegetation mapping and fauna surveying efforts carried out by the Applicant. The additional information submitted with the Response to Submissions has allowed a comprehensive assessment of potential impacts on EECs and threatened flora and fauna species to be conducted.

In addition to concerns relating to mapping and surveys, several turbines in remnant woodland or native forest vegetation were not supported by OEH. The proposed location of turbines A12, A18 and A19 were of particular concern due to their location in forested areas. OEH requested the ESD principle of 'avoidance' be applied through the removal of these turbines from the project.

In response the Applicant submitted a revised proposal in the Response to Submissions report which included:

- the removal of turbine A19 to minimise remnant vegetation clearing;
- realignment of the access track and crane hardstand platform for turbines A12 and A18 to make use of the existing cleared and regrowth areas;
- the relocation of turbine A24 and its associated access track and crane hardstand platform to the adjacent paddock to avoid impacting on existing native grasslands;
- realignment of the access track between turbines A13 and A16 to avoid impacting on areas of Box-Gum Woodland vegetation; and
- the relocation of the access road entrance to Crookwell 3 East from Greywood Siding Road to avoid the removal of trees at the entrance.

OEH acknowledged that the Applicant has demonstrated the key ESD principle of 'avoidance' through the removal of turbine A19 from the development and relocation of turbine A24 to prevent impacts on native grasslands. However, the proposed location of turbines A12 and A18 remain of concern to OEH, despite the realignment of access tracks and crane hardstand areas which was an improvement to the previous layout.

## Consideration

### Clearing of native vegetation

The development will result in the clearing of approximately 8.81ha of native vegetation, which includes the use of Greywood Siding Road as the proposed access road servicing the Crookwell 3 East development area. The proposed clearing comprises approximately:

- 0.56 ha of Silvertop Ash Open Forest Derived Native Grassland and 1.89 ha of Silvertop Ash Open Forest;
- 4.96 ha of Red Stringybark Open Forest Derived Native Grassland and 1.37 ha of Red Stringybark Open Forest; and
- 0.03 ha of Box Gum Woodland Derived Native Grassland (listed as Vulnerable under the *Threatened Species Conservation Act 1995* and the *Environment Protection and Biodiversity Conservation Act 1999*).

The Box Gum Woodland Derived Native Grassland is part of the vegetation that was originally present within the project area, being the listed endangered ecological community known as White Box Yellow Box Blakely's Red Gum Woodland (under the *Threatened Species Conservation Act 1995*) and as part of the Commonwealth listed White Box – Yellow Box – Blakely's Red Gum Grassy Woodland and Derived Native Grassland (under the *Environment Protection and Biodiversity Conservation Act 1999*).

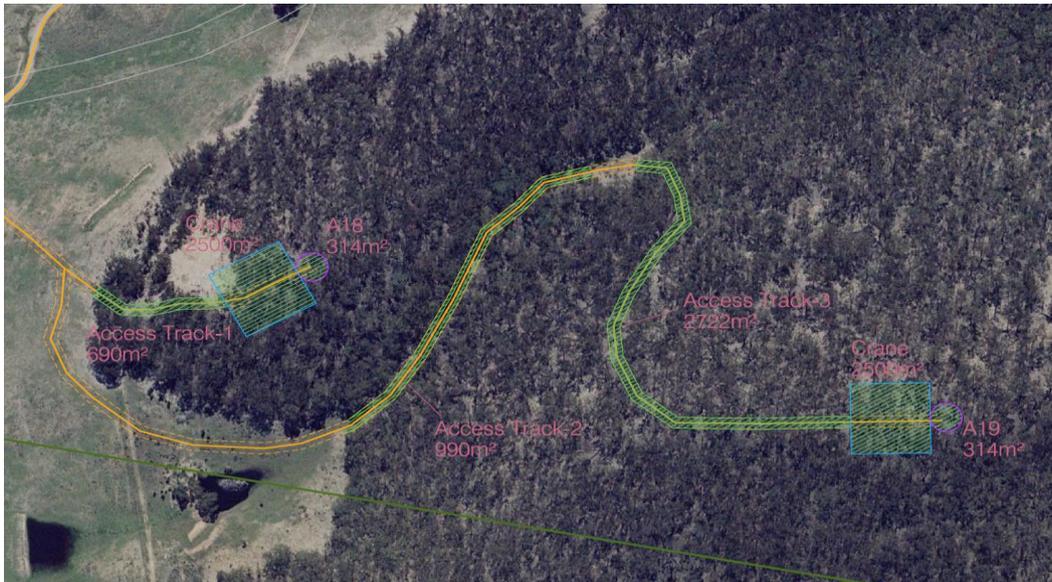
The Department notes the Applicant has committed to preparing a Vegetation/Ecological Restoration Plan to address post-construction works to be undertaken to rehabilitate the areas that are disturbed as a result of construction. The development of a Riparian Vegetation Management Plan has also been committed to with respect to proposed creek crossings where native vegetation will be disturbed.

**Figures 8 and 9** show the extent of vegetation removal required to position turbines A12, and A18 and the associated access tracks in the locations proposed. Placement of these turbines in the locations proposed will require a total clearing of approximately:

- 5,887m<sup>2</sup> of vegetation for turbine A12; and
- 3,504m<sup>2</sup> of vegetation for turbine A18 (note **Figure 9** also shows the area required for turbine A19 but that turbine has been removed from the scope of the development).



**Figure 8:** Proposed Turbine A12 and Associated Access Track within Remnant Vegetation



**Figure 9:** Proposed Turbines A18, A19 and Associated Access Tracks within Remnant Vegetation

### Flora Impacts

The Department notes that the vegetated area of Silvertop Ash Open Forest in which proposed turbine A18 is to be situated has been found to be in good condition, comprising intact native canopy, mid-storey and a ground layer. It is noted that 27 hollow bearing trees were identified within a 100 m radius of turbine A18 (with up to 8 of those to be removed for construction). The Applicant has committed to a tree felling protocol when removing the hollow bearing trees to mitigate any potential harm to fauna, however, the removal of up to 8 of those trees would mean less available trees in an already fragmented and disturbed regional locality, to shelter and/or provide breeding habitat for a variety of threatened species including the Scarlet Robin which was recorded in the vicinity of turbine A18. Recordings of the threatened Powerful Owl and Squirrel Glider were also made within the footprint of turbine A18 as part of the last round of survey work undertaken for the Supplementary Ecology Report. The Department concurs with OEH that the presence of these two fragmentation-sensitive threatened species indicates that this area of continuous forest (refer to **Figure 9**), containing a large number of hollow bearing trees, is an important remnant in this heavily cleared landscape.

The Department consequently recommends turbine A18 be removed from the proposal to prevent the clearing of native forest vegetation within the area of A18 and to avoid impacts on existing biodiversity. It is noted that this would also reduce the total vegetated area to be cleared for construction (by approximately 0.35 ha). The Department therefore recommends a condition to this effect.

Turbine A12 is proposed to be situated within remnants of Red Stringybark Open Forest, which occurs as derived native grassland in the development footprint area (including small stands of it occurring adjacent to the Greywood Siding Road Reserve). While it was found that the stands of this vegetation are in good condition, the mid-storey is sparse and comprises of low native shrubs such as Hoary Guinea-flower and Peach Heath, with scattered Speargrass occurring in the groundlayer. It was also found that this remnant area within which A12 is proposed is quite disturbed and while it would be further disturbed by the installation of proposed turbine A12, that disturbance would not create a significant impact. This is because the remnant woodland area is disconnected from large areas of forest and therefore its habitat value is reduced with a corresponding low diversity of fauna observed in the field surveys.

It is noted that the hollow bearing trees within the vicinity of A12 have the potential to provide nesting habitat for small to medium sized parrots, such as the Crimson Rosella (observed using the area of A12 but not in the hollow bearing trees) and roosting habitat for bats, including the recorded Eastern False Pipistrelle and Eastern Bentwing-bat (both listed as Vulnerable under the *Threatened Species Conservation Act 1995*). The hollows may also provide habitat for possums and gliders, although only one species (being the Common Brushtail Possum) was recorded during the field surveys.

The Department notes that while 9 hollow bearing trees were recorded within a 100m radius of turbine A12, the Supplementary Ecology Report states that the proposed works would not result in the removal of any of the hollow bearing trees in the vicinity of turbine A12. Noting that the area within and immediately surrounding turbine A12 is heavily cleared and does not contain a dense amount of vegetation when compared to the area for turbine A18 (refer to **Figures 8 and 9** for a comparison), and noting that no hollow bearing trees are proposed to be removed as part of the installation of turbine A12, the Department considers that the removal of turbine A12 from the scope of the development is not warranted.

The Department recommends a condition requiring the Applicant to avoid the removal of any hollow bearing trees within or immediately surrounding turbine A12. The Department has also recommended a condition which states that all feasible and reasonable measures should be made to locate the turbines at least 60 metres from adjacent hollow bearing trees which have the potential to provide roost or nesting habitat for bird and bat species identified to be at risk of rotor collision during the turbine operation.

A small portion of Box-Gum Woodland derived native grassland occurring within proposed turbine area A26 (0.03 ha) will be removed to accommodate that turbine and associated infrastructure. The seven part test however conducted for this removal concluded that there would not be significant impacts to this ecological community due to its degraded nature within the area (it occurs as part of a cleared paddock that has undergone ploughing in the past) and the avoidance of more intact occurrences elsewhere.

Apart from the wind turbine areas discussed above, the remaining turbines are proposed to be located on cleared grazing lands (the majority of the site comprises of cleared and improved pasture areas), as are the remaining access roads and other associated infrastructure. Subject to the recommended conditions, the Department considers that impacts on flora can be adequately minimised and managed to avoid significant impacts.

#### Fauna Impacts

Additional survey work undertaken as part of the Applicant's Supplementary Ecology Report detected a number of native fauna species within the footprint. These are outlined in **Table 6**.

**Table 6:** Fauna Recordings undertaken as part of the Supplementary Ecology Report

Fauna	Locality	Threatened Species Conservation Act 1995	
White-throated Treecreeper	Turbine A12	-	
Eastern Grey Kangaroo	Turbine A18	-	
Jacky Winter	Turbine A12	-	
Common Brushtail Possum	turbine A12	-	
Gould's Wattled Bat	Within development footprint area	-	
Chocolate Wattled Bat			
Gould's Long-eared Bat			
Large Forest Bat			
Southern Forest Bat			
Little Forest Bat			
Eastern False Pipistrelle	Turbines A12 and A18	Vulnerable	
Eastern Bentwing-bat	Turbines A12 and A18	Vulnerable	
Australian Owlet-nightjar	Turbine A18	-	
Southern Boobook		-	
Powerful Owl		Vulnerable	
Tawny Frogmouth		-	
Eastern Grey Kangaroo		-	
Sugar Glider		-	
Squirrel Glider		Vulnerable	
Common Ringtail Possum		-	
Common Wombat		-	
Swamp Wallaby		-	
Common Wallaroo		Turbine A12	-
Common Brushtail Possum		Turbines A12 and A18	-

Twenty-four (24) waterbird species were observed around the dam. The majority of these are open water species, including diving species such as Coots and Ducks. A full list of these can be seen under Table 3.5 of the Applicant's SER (October 2013). No threatened or migratory species were observed.

Note: the two threatened microbat species recorded (Eastern False Pipistrelle and Eastern Bentwing-bat) were identified as possible recordings only (via bat call). The song-meters that recorded these species were placed in woodland areas.

The Department notes that most recorded fauna were detected in the vicinity of proposed turbines A12 and A18. Given the Department has recommended the deletion of turbine A18 and noting the Applicant has realigned the proposed access track and crane hardstand platform for turbine A12, the potential impacts would be minimised, if not avoided completely.

The Department also notes that apart from the threatened Eastern Bentwing-bat, the observed bat species are known to roost in tree hollows (including the threatened Eastern False Pipistrelle). Given no hollow bearing trees surveyed as part of the application would now be removed as a result of the construction, impacts on these bats would be minimal, if not completely avoided. Also, while the Eastern Bentwing-bat was recorded within the vicinity of turbines A12 and A18, it roosts in caves and forms discrete populations centred on a maternity cave, with the nearest known maternity cave being 40km to the south-east of the development site.

The threatened Powerful Owl was heard in the vicinity of turbine A18 and the Supplementary Ecology Report finds that one hollow may have been suitable for large owls, such as the Powerful Owl however this could not be confirmed. With respect to the threatened Squirrel Glider, the Department notes that the woodland area to the east of turbine A18 (refer to **Figure 7**) is a large area of continuous forest and contains a large number of hollow bearing trees. The Supplementary Ecology Report found that the majority of that area would provide suitable habitat for gliders (as well as possums and parrots). Given turbine A18 has been recommended to be deleted from the scope of the development, no hollow bearing trees would require removal to accommodate that turbine. As such, potential construction impacts on the threatened

Powerful Owl and the Squirrel Glider would be mitigated as a result of the Department's recommended condition to delete turbine A18.

The Department's recommended Flora and Fauna Management Plan, which is to be developed in consultation with OEH must outline measures developed to protect any native fauna habitat within or immediately surrounding the development site.

It is also acknowledged that the Applicant's seven-part tests undertaken in accordance with the *Threatened Species Conservation Act 1995*, found that the construction of the development is unlikely to have significant impacts on those species, subject to the management measures committed to by the Applicant. These include the development of appropriate construction methods to minimise and manage impacts on habitat detected for the Endangered Booroolong Frog, at one of the proposed creek crossings.

The main ecological operational issue associated with the wind farm is the potential for bird and bat strike. Operational impacts on bird and bat species were considered as part of the Supplementary Ecology Report. Potential impacts include direct mortality associated with rotor collisions, and collisions with other associated infrastructure including turbine towers, electrical wires and transmission lines. Barotrauma can also be fatal to bats. Indirect impacts include habitat loss through the installation of turbines and associated infrastructure.

A large woodland area comprising of continuous forest is situated within and to the east of proposed turbine A18 and contains a large number of hollow bearing trees. These trees are also present in the area west of proposed turbine A12 (refer to **Figure 9**). A number of bat species were also detected as part of the Supplementary Ecology Report field surveys (refer to **Table 6**) and therefore potential for these bats to be fatally impacted exists.

It is noted that the Applicant has committed to prepare a Bird and Bat Adaptive Management Plan in consultation with OEH. A Bird Monitoring and Bat Strike Monitoring pre-commissioning survey will be undertaken at each turbine site. The Applicant has stated that this will provide baseline data for the bird and bat strike monitoring study which will be undertaken during the first year of the operation of the wind farm.

With respect to potential bird strikes, the Supplementary Ecology Report notes that birds likely to use hollow bearing trees in the vicinity of turbines A12 and A18 (potentially the Glossy Black Cockatoo, listed as Vulnerable under *Environment Protection and Biodiversity Conservation Act 1999* and Endangered under *Threatened Species Conservation Act 1995*, the Regent Honeyeater and the Swift Parrot, both Endangered under both Acts) generally fly below canopy height or just above. The canopy in this area is generally 10m-15m in height. As such, although these species may fly within the rotor swept area, they are more likely to fly below it, significantly reducing the risk of rotor strike.



**Figure 9:** Hollow Bearing Trees in the Vicinity of Turbines A12 and A18 (marked as blue circles)

Also, none of these bird species were detected during the field surveys undertaken by the Applicant. OEH has advised that while potential habitat for the Regent Honeyeater and Swift Parrot was also not present within or immediately surrounding the development site, the survey work only covered one season and this does not indicate a complete absence of potential habitat for these two bird species. The Department also notes these two species were identified in the Applicant's literature review as potentially occurring in the locality and OEH has stated that there have been previous records of the Regent Honeyeater within 10km of the proposed turbines. The Department therefore concurs with OEH that further winter surveys for the Regent Honeyeater and the Swift Parrot occur during the baseline surveys. The Department also notes and agrees with OEH that a full year of baseline "before" surveys be required pre-construction, and that detailed survey design be discussed with OEH prior to the surveys being undertaken, so as to ensure the baseline surveys meet OEH survey requirements. This will ensure that the potential occurrences of these species are taken into account during the monitoring and management phases throughout operation.

It is noted that the recommended deletion of turbine A18 reduces the chances of bird strike at that site. The bird monitoring would however ascertain the number and type of bird species that may fly across or around the proposed wind farm development, including within the vicinity of proposed turbine A12. It is also noted that an area in which a record of the White-fronted Chat (listed as Vulnerable under the *Threatened Species Conservation Act 1995*) was made has been ploughed. Given the species may forage in the grassland areas of the development site or pass through the area, it is recommended, as advised by OEH, that this species be included in the Bird and Bat Adaptive Management Plan.

Similarly, OEH notes new records of the Little Eagle (also listed as Vulnerable under the *Threatened Species Conservation Act 1995*), including nests, in the vicinity of turbines A27 and

A32 were made by the Applicant. OEH has therefore subsequently recommended buffers of 500m around the threatened and at-risk raptor nests. The Department notes that the nests are in the one tree, located about 310m from the nearest turbine A27. The Department concludes that given the identification of the nests, the Little Eagle species should be taken into account in the Bird and Bat Adaptive Management Plan.

Microchiropteran bats have the potential to be impacted by the operation of the turbines as they are high and fast flyers. The threatened Common-bent Wing Bat and the Yellow-bellied Sheath-tailed Bat are generally the two microchiropteran bat species that have high aspect wing ratios resulting in a fast flight. Microchiropteran bats can fly in crowded environments and use biological sonar (echolocation) to locate and identify objects. Therefore, they are likely to detect the movement of a wind turbine and avoid collision with the rotating blades. While the risk to the bats is low, the Department notes that there is still potential for bats to collide with the operating turbines if they fly through the site.

OEH has also advised the Department that surveying with ultrasonic bat detectors at ground level, as undertaken by the Applicant, does not provide an accurate record of bat activity at the rotor swept area. Also, the nearest maternity cave for the Eastern Bentwing-bat is about 40 km to the south-east of the site, rather than the Applicant's stated distance of 98km south-west. OEH considers that the threatened Eastern Bentwing-bat and Eastern False Pipistrelle may both occur within or immediately surrounding the development site and as such disagrees with the Applicant's position that these two bat species are unlikely to fly close to (or within) the development area.

With respect to barotrauma on bats, it was found that the most at risk species are microbats including the threatened Eastern Bentwing-bat and Eastern False Pipistrelle, both of which were identified during the additional field surveys undertaken as part of the Supplementary Ecology Report. This is because both of these species may forage above canopy height and as such may fly close enough to turbine blades to cause barotrauma.

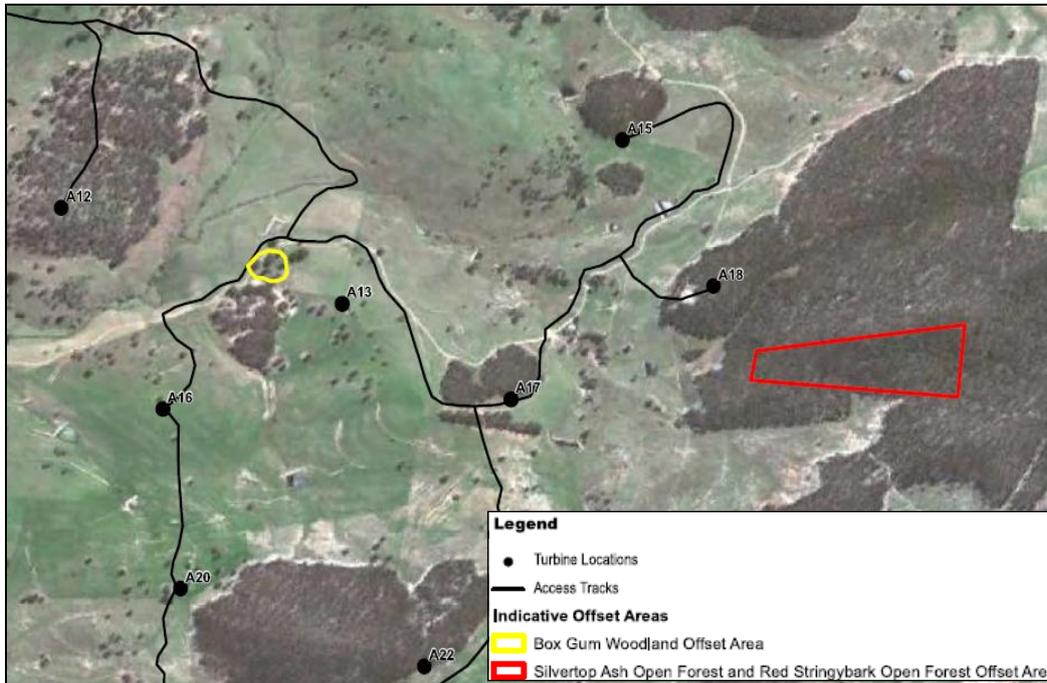
One of the two turbines (A12 and A18) located close to hollow bearing trees has however been recommended to be deleted (turbine A18) and there is limited foraging habitat available for these bats within the development site. The Department therefore notes that there are limited chances that these bat species would be flying close to the other turbines. The Department has however recommended a condition that requires the Applicant to identify, in the Construction Flora and Fauna Management Plan (which is to be developed in consultation with OEH), the distances from Turbine A12 to the closest hollow bearing trees to ascertain adequate setbacks to avoid potentially significant impacts on fauna utilising those trees during the development's operation.

### Environmental Offsets

An environmental offset is proposed as part of the project to compensate for the loss of native vegetation. The offset is to be provided by two formal Property Vegetation Plan agreements (PVPs) to be entered into with the Hawkesbury Nepean Catchment Management Authority (now referred to as the South East Local Land Services region). The proposed PVPs encompass approximately 60ha of existing remnant vegetation within the site comprising 15ha in perpetuity and 45ha for the life of the development. **Figure 10** below shows the general locations of the proposed offsetting areas.

OEH considers the size of the proposed offset as reasonable, relative to the potential size of the development footprint. However, OEH considered there to be insufficient information in respect to the location of proposed offsets, the vegetation types the offset area contains, proposed management actions, and the legal instrument to secure the offset.

The Supplementary Ecology Report confirms the offsets will be secured onsite within areas of Silvertop Ash Open Forest, Red Stringybark Open Forest and Box Gum Woodland.



**Figure 10:** Proposed Environmental Offset Locations – Crookwell 3 East

As a result of the deletion of Turbine A18, the 8.81 ha of vegetation envisaged to be cleared will now be reduced to approximately 8.46 ha, noting that the area for that turbine consists of Silvertop Ash Open Forest and Red Stringybark Open Forest. The Department also considers that the specific location of proposed offsets have not been sufficiently detailed or identified and need to be aligned with the final extent and type of vegetation to be cleared. This can accurately occur after the Applicant's detailed design stage of the development has commenced.

The Department recommends a condition requiring the Applicant to develop a Biodiversity Offset Package in consultation with OEH, which is to be submitted to and approved by the Department prior to the commencement of construction. It is also recommended that Biodiversity Offset Package detail the following:

- the extent and types of habitat that will be lost or degraded as a result of the final design of the project;
- the objectives and biodiversity outcomes to be achieved;
- the final suite of biodiversity offset measures selected and secured, which must be supported by suitable metric method (such as the BioBanking Assessment Methodology);
- evidence that the offsets have been formally acquired;
- any monitoring requirements to ensure outcomes of the package are achieved;
- proposed long term management actions, roles and responsibilities; and
- key milestones, performance indicators, corrective actions and timeframes for the completion of all actions outlined in the package.

The Department considers the recommended condition will ensure appropriate offsets are established and finalised prior to any the removal of existing vegetation on the development site.

### Conclusion and Recommendations

The Department's assessment found that the construction and operation of the proposed wind farm would have acceptable impacts, subject to the recommended conditions. Essentially, two of the proposed 29 turbines were considered to have significant impacts as they are located in forested areas. The Department's recommended deletion of one of those two turbines (A18) and the environmental offset proposed for the development would however ensure that the impacts on native vegetation would be minimal and manageable.

The Department concludes that subject to the implementation of the Department's recommended conditions, the potential impacts on flora and fauna as a result of construction activities would be insignificant and manageable.

## 5.2. Visual Impacts

### Issue

The proposed turbines have the potential to impact on the visual amenity of those receivers with views towards the wind farm, as well as the landscape values surrounding the proposal. The turbines may also contribute to cumulative visual impacts as a result of the other Crookwell wind farms and the Gullen Range wind farm in the area.

### Submissions

Visual amenity impacts resulting from the construction of turbines in a natural landscape setting have been raised as a key concern in several of the public submissions received on the proposal.

### Consideration

The Applicant engaged Green Bean Design to undertake a Landscape and Visual Impact Assessment of the proposal. This assessment adopted a maximum turbine tip height of 157m which presents a worst case scenario.

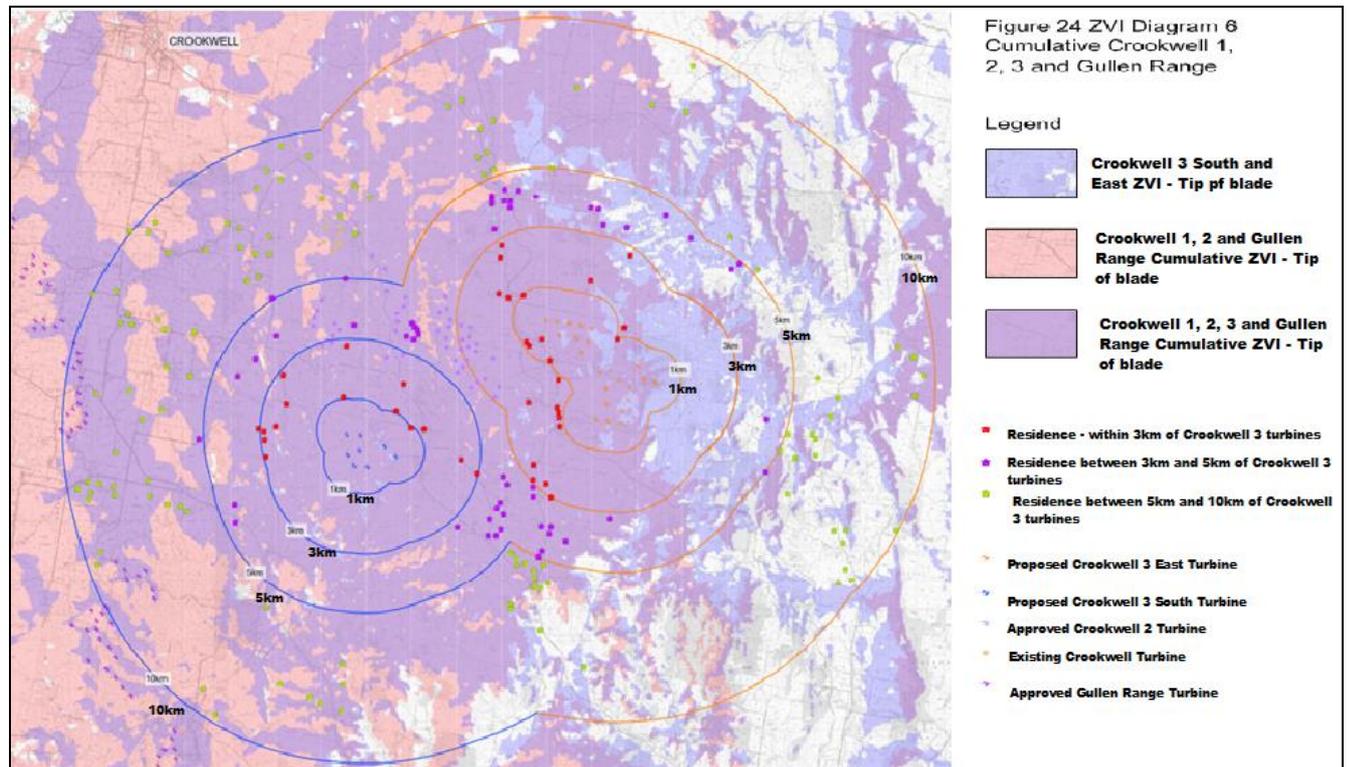
The assessment included 30 wind turbines (up to 22 within Crookwell 3 East and 8 within Crookwell 3 South) and associated electrical and access infrastructure. The Applicant has since removed 1 turbine (A19 in Crookwell 3 East) due to potential impacts on remnant vegetation, thereby proposing up to 29 wind turbines. Apart from the wind turbines, the Applicant proposes up to three wind monitoring towers (80-100m in height, to about turbine hub height level), one at the south site and two at the east site.

The Applicant's assessment considered a range of guidelines, including *Wind Farms and Landscape Values National Assessment Framework* (Australian Wind Energy Association and Australian Council of National Trust, June 2007), *Draft NSW Planning Guidelines Wind Farms* (NSW Department of Planning & Infrastructure, December 2011) and *Best Practice Guidelines for Implementation of Wind Energy Projects in Australia* (Auswind, December 2006). The assessment included a desktop analysis and field inspections. The overall visibility of the proposed turbines was determined within a 10km radius of the wind farm and depicted in Zone of Visual Influence diagrams.

It is to be noted that any micro-siting of the proposed turbines is to be only permitted with the written agreement of the Secretary and is limited to a location allowance of 100 metres radius (as long as impacts remain consistent with that assessed).

**Figure 6** below shows the intervisibility of the proposed and surrounding wind turbines from residential locations. Six Landscape Character Areas (LCAs) were also developed to identify the different components of the landscape character. The LCAs identified were as follows:

- LCA 1 – Undulating grasslands;
- LCA 2 – River valley and drainage lines;
- LCA 3 – Waterbodies;
- LCA 4 – Simple slope and ridgeline areas;
- LCA 5 – Timbered areas (cultural and remnant native); and
- LCA 6 – Settlements.



**Figure 6:** Zone of Visual Influence

A cumulative visual assessment was carried out by the Applicant, incorporating the Crookwell 1, Crookwell 2, subject Crookwell 3, and Gullen Range wind farms. The assessment determined that whilst there would be some inter-visibility between the site and other wind farm turbines, there is unlikely to be a significant increase in visual impact arising from cumulative impacts. This is because of existing screening or partial filtering of views toward the site and the other wind farms.

The Department engaged O'Hanlon Design Pty Ltd to undertake an independent expert review of the Applicant's assessment. The potential cumulative visual impacts for receivers located within 2km of the proposed development have been assessed taking into account views towards Crookwell 1, 2 and 3 and the Gullen Range Wind Farm. The potential visual impacts for receivers located between 2km and 6km have also been assessed. The Department considers that view locations more than 6km from the wind farm would experience a low to nil visual impact. **Table 4** below outlines the Department's assessment of the potential visual impacts on non-residential receivers located within 2 km of the closest proposed Crookwell 3 turbine.

The potential level of visual impact resulting from the installation of the turbines (low, moderate or high) has been derived by the consideration of the level of visual sensitivity and other factors, including how well the proposal would correspond with the existing visual environment. The visual sensitivity is how visible a change to the existing landscape would be, which is influenced by the distances between the turbines and viewer, topography, type of receiver. The impact is then the combined effect of these factors. For example, a high visual sensitivity level and a low capability of the proposal to blend with the existing environment would give an overall high visual impact.

The Applicant presents a range of potential mitigation measures to reduce the visual impacts, including using an off-white rather than white colour for the turbines to reduce visual contrast and using a matt finish to avoid reflected sunlight. The Applicant has also committed to undertake screen planting in locations agreed between the Applicant and local landowners within 3km of the turbines. The Department agrees these measures are likely to reduce the visual significance of the turbines, and vegetation screening will ease the visual dominance of the wind farm, but has recommended additional measures to strengthen these, as discussed below.

**Table 4:** Closest Non-Associated Residential Receivers (within approximately 2 km of the proposed south and east sites)

Non-associated receiver <i>Distance to closest proposed turbine</i>	Impact of Wind Farm <i>High, Medium, Low</i>	Cumulative Impact <i>High, Medium, Low</i>	Representative photomontage, where provided by Applicant
<p>R19 "Wombat Hollow"  1.1km South 6.1km East</p>	<p><b>High</b>  R19 is between Crookwell 2 Wind Farm and proposed Crookwell South Wind Farm and would have direct and close views to the proposed turbines, with distant views towards the Gullen Range Wind Farm.</p>	<p><b>Low</b>  Combined view between Crookwell 2 and proposed wind turbines through 25° angle. The Gullen Range Wind Farm would be in the distant background.</p>	<p><b>Representative photomontage 1</b></p>  <p>'Wombat Hollow' non associated property (R19). Proposed view with turbine markers (blue are Crookwell 3 South and purple are approved Gullen Range turbine markers).</p> <p>As identified in the Applicant's visual assessment, there is a hilltop viewing point at Wombat Hollow. The Department therefore considers vegetation screening may only partially screen the view of the south turbines rather than completely concealing the view (with towers being concealed but the nacelle and blades not completely concealed). The Department further considers that as well as the landscaping treatments, if the wind turbine structures are painted matt off-white or grey and the blades are finished with a surface treatment that minimises any potential for glare or reflection (as recommended), the entire wind farm structures are unlikely to be visually distinct from the landscape.</p>
<p>R8 "Narangi"  1.1km South 7.8km East</p>	<p><b>High</b>  R8 is between Crookwell 2 Wind Farm and proposed Crookwell South Wind Farm and would have direct and close views to the proposed turbines, with distant views towards the Gullen Range Wind Farm.</p>	<p><b>Moderate</b>  The Crookwell 3 East wind turbines would be viewed as partial distant background to the approved Crookwell 2 wind farm and result in a low cumulative effect. The Crookwell 3 South wind turbines would be viewed as partial foreground, with the southern portion of the Gullen Range wind farm in the distant background and resulting in a moderate cumulative effect.</p>	<p><b>Representative photomontage 2</b></p>  <p>'Narangi' non associated property (R8). Proposed view with turbine markers (blue are Crookwell 3 South, orange are proposed Crookwell 3 East and purple are approved Crookwell 2 turbine markers).</p> <p>The Department notes the visual landscape from this receiver would change and the cumulative impact may not be adequately addressed by landscaping treatments alone. A submission from R8 states concerns with the cumulative visual impact as a result of Crookwell 1, 2 and 3, and the resulting loss of the rural visual landscape views. The submission also states that all 8 turbines of Crookwell 1 can also be viewed from R8. The Department notes that given the Crookwell 1 turbines are located approximately 6km from R8, it is likely those turbines would also be viewed. Therefore, whilst the Department's recommended condition requires the Applicant to undertake landscaping treatments to those dwellings located within 6 km of a turbine, the Department has also recommended a separate condition requiring the Applicant to undertake additional procedures with respect to R8 (as well as for R62, R63, R64, R65 and "Rainmore"). These additional procedures require the Applicant to formally write to this landowner to state that it will proceed to negotiate visual impacts on its property. If no agreement has been reached within one year of the commencement of that process, the Applicant is then to write to the landowner and advise that the landowner can require the Applicant to acquire its property. If such a request is then made by the landowner (within three months of the date of service of the notification that the landowner can require the Applicant to acquire the property), the Applicant is to proceed with the acquisition. The Department considers that the first step of negotiation will provide an opportunity to determine mitigation measures and reduce the development's contribution to the cumulative landscape impact.</p> <p>Subject to the implementation of these conditions, the high visual impact from the Crookwell 3 wind farm alone and the moderate visual impact from the cumulative effect of the subject and surrounding wind farms, can be reduced to a level at which the wind turbine structures (existing, approved and proposed) could be less dominant in the landscape and not overburden the rural landscape, as viewed from R8. The Department is also satisfied that acquisition of this property is also an appropriate alternative option.</p>
<p>R20 "Normaroo"  2km South 5.5km East</p>	<p><b>Low to Moderate</b>  R20 is close to the Crookwell 2 boundary (approx 1km from the closest Crookwell 2 proposed turbine).</p>	<p><b>Low</b>  The Crookwell 3 East turbines would be viewed (partial) as a background to the approved Crookwell 2 wind turbines, therefore resulting in a low cumulative effect.</p>	<p>The Applicant has indicated that there are existing plantings which will screen full views of the Crookwell 3 southern turbines from R20. The Department has not received any photomontages showing this specific viewing direction. While there is likely to be a low cumulative effect from the combined view of Crookwell 3 East and approved Crookwell 2, the property would also have foreground and distant views towards the Gullen Range, Crookwell 1, Crookwell 2 and Crookwell 3 wind farms. The Department is however satisfied that its recommended conditions including the requirement for landscaping treatments to visually screen dwellings within 6 km of the proposed turbines and developing a Design and Landscaping Plan would address the potential low to moderate impacts on this receiver.</p>

<b>Non-associated receiver</b> <b>Distance to closest proposed turbine</b>	<b>Impact of Wind Farm</b> <i>High, Medium, Low</i>	<b>Cumulative Impact</b> <i>High, Medium, Low</i>	<b>Representative photomontage, where provided by Applicant</b>
<p>R58 &amp; R59</p> <p>5.9km South 1.3km East</p>	<p><b>High</b></p> <p>R58 and 59 are located between the proposed Crookwell South and East turbine sites and the approved Crookwell 2 wind farm. The receivers have views toward the Crookwell East turbines.</p>	<p><b>None</b></p> <p>Crookwell 1, 2, proposed Crookwell 3 South and Gullen Range wind farms are not visible from these receivers.</p>	<p>Whilst cumulative visual impacts on these receivers are unlikely due to existing screening and topographical features, the Department notes the proposed Crookwell 3 East turbines will be present in foreground views from these receivers.</p>  <p>View north to east from Woodhouselee Road, within the vicinity of R58 and R59 (Reproduced from the Applicant's EIS)</p> <p>The Department considers that the recommended landscaping treatments to visually screen dwellings within 6 km of the proposed turbines would help to partially screen the views towards the eastern proposed site and be able to better integrate in the foreground landscape, rather than be dominating from, and highly contrasting to, the existing landscape. The Department is satisfied the implementation of the recommended design and landscaping measures would reduce the high visual impact of the Crookwell 3 East turbines to a lower level at which point the turbines would not be dominating and fully visible.</p> <p><b>Representative Photomontage 3</b> (note these have not been taken directly from receivers R58 and R59 but have been used as an indicative photomontage in the absence of one produced for these specific receivers).</p>  <p>Photomontage Location G - Woodhouselee Road (view from road corridor), existing view</p>  <p>Photomontage Location G - Woodhouselee Road (view from road corridor), proposed view Distance to closest turbine 1.4km</p>

Non-associated receiver <i>Distance to closest proposed turbine</i>	Impact of Wind Farm <i>High, Medium, Low</i>	Cumulative Impact <i>High, Medium, Low</i>	Representative photomontage, where provided by Applicant
<p>R61 "Wallarooobie"  5.9km South 1.3km East</p>	<p><b>High</b></p> <p>R61 is located between the proposed Crookwell South and East turbine sites and the approved Crookwell 2 wind farm. The receiver has views east toward Crookwell East turbines.</p>	<p><b>None</b></p> <p>Crookwell 1, 2, proposed Crookwell 3 South Site and Gullen Range wind farms are not visible from these receivers.</p>	<p><b>Representative Photomontage 4</b></p>  <p>Photomontage Location N - Residential dwelling, Wallarooobie (R61), existing view</p>  <p>Photomontage Location N - Residential dwelling, Wallarooobie (R61), proposed view Distance to closest turbine 1.4km</p> <p>The Department notes the existing vegetation on the western side of the property reduces the contrasting views of some of the eastern turbines and the turbines do not appear to dominate the landscape. The Department considers that the recommended conditions with respect to visual amenity would address the high visual impact likely to occur at this receiver.</p>
<p>R62 "Cottonwood"  5.9km South 1.3km East</p>	<p><b>High</b></p> <p>R62 is located between Crookwell South and East turbine sites and the approved Crookwell 2 wind farm. Views towards the proposed south turbines are screened by landform and vegetation. There are views north through to east toward proposed Crookwell 3 east turbines.</p>	<p><b>None</b></p> <p>Any substantive views toward the approved Crookwell 2 wind farms are blocked by Pigmans Hill. Views towards the distant Gullen Range and Crookwell 1 wind farms are screened by landform and vegetation.</p>	<p>This receiver would not be subject to cumulative visual impacts. The views of the proposed east turbines are likely to be visually dominating, given the entire structure of some of these turbines could be viewed. Due to the elevated landform on which the turbines are to be situated, vegetation screening and external design incorporations are not likely to reduce the high visual impact. A submission from receiver R62 has been received stating an objection to the wind farm on the grounds of visual amenity impacts. The receiver notes that the proposed Crookwell 3 east turbines would be visually intrusive and that the Applicant has disregarded the 2km setback recommended in the draft NSW guidelines. The Department notes the residents of R62 are seeking to sell their property so as to relocate closer to health facilities and that they consider their past unsuccessful attempts to do so may be partly due to their close proximity to the proposed development. The Department therefore has recommended that apart from requiring the Applicant to undertake landscape treatments around this property, the same additional procedures included as a recommended condition for R8 above (as well as for R63, R64, R65 and "Rainmore" below) should also apply to R62. The additional procedures will provide R62 with the option for acquisition where no negotiated visual impact agreement can be reached.</p> <p><b>Representative Photomontage 5</b></p>  <p>Woodhouselee Road</p> <p>Non associated residential dwelling (R62)</p> <p>"Cottonwood" non-associated property (R62) - proposed view with turbine markers (orange are proposed Crookwell 3 East turbine markers)</p>

Non-associated receiver <i>Distance to closest proposed turbine</i>	Impact of Wind Farm <i>High, Medium, Low</i>	Cumulative Impact <i>High, Medium, Low</i>	Representative photomontage, where provided by Applicant
<p>R63 "Rocky Corner"  6.3km South 1.1km East</p>	<p><b>High</b>  R63 is close to the proposed Crookwell 3 East turbine site, between the east and south turbine sites. There would be partial views of the proposed Crookwell East turbines.</p>	<p><b>Low</b>  Views to the approved Crookwell 1, 2 and Gullen Range turbines would be partially screened.</p>	<p>Although no photomontage for this receptor has been produced by the Applicant, this receiver and R8 are a similar distance from their respective boundaries to the proposed eastern and southern turbine sites respectively. Although the Applicant has stated the close views towards the proposed eastern turbines from R63 would be partial, landscaping treatments alone are unlikely to address the high visual impact at this receiver.</p> <p>The Department therefore has recommended that apart from requiring the Applicant to undertake landscape treatments around this property, the same additional procedures included as a recommended condition for R8 and R62 above (as well as for R64, R65 and "Rainmore" below) also apply to R63. The additional procedures include a negotiation process which will provide both the Applicant and the landowner an opportunity to determine visual minimisation or mitigation measures for the proposed Crookwell 3 eastern turbines (whichever specific ones are relevant). Where no agreement can be reached, R63 may require the Applicant to acquire its property.</p>
<p>R64 "Valdarman Hill"  5.9km South 1.1km East</p>	<p><b>High</b>  R64 is located between Crookwell South and East turbine sites and the approved Crookwell 2 wind farm. Views toward Crookwell 3 South turbines are screened by landform and vegetation.</p>	<p><b>Low</b>  Views to the approved Crookwell 2 wind turbines are partially screened. Cumulative impacts would be limited to views between the Crookwell 2 and proposed Crookwell 3 East wind turbines.</p>	<p><b>Representative Photomontage 6</b></p>  <p>Photomontage Location H - 'Valdarman Hill' non associated property (R64). Proposed view with turbine markers.</p> <p>Given the proximity of the proposed eastern turbines adjacent to Woodhouselee Road and the hilltop locations of these turbines, there would be clear and almost complete views of the turbine structures. Landscaping treatments alone are not likely to assist in breaking up some of these views. It is recommended that the condition requiring the Applicant to negotiate visual impact agreements, and where no agreement is reached, the receiver may seek acquisition of its property, be applicable to receiver R64.</p>
<p>R65 "Windalee"  5.9km South 830m East</p>	<p><b>High</b>  R65 is located close to R64, and between Crookwell South and East turbine sites and the approved Crookwell 2 wind farm. Views to Crookwell 3 South are screened by landform and vegetation. Views extend toward Crookwell 3 East turbines.</p>	<p><b>Low</b>  Views to approved Crookwell 2, proposed Crookwell 3 and Gullen Range wind turbines are partially screened by landform. Cumulative impacts would be limited to partial views toward the approved Crookwell 2 and proposed Crookwell East wind turbines.</p>	<p>A portion of the proposed eastern turbines would be completely visible. Landscaping treatments alone are not likely to assist in breaking up some of these views. A submission from this receiver has been received objecting to the development based on visual impact and potential shadow flicker. The resident has stated that of the 17 wind turbines that will be visible, removing the five closest ones in front of their house, being A1, A2, A3, A6, A8 would retain part of their visual amenity. The Department considers that the recommended condition requiring the implementation of additional procedures (as outlined above for R8, R62, R63, R64) must apply to R63. These additional procedures would provide adequate scope for a negotiated visual impact agreement between the Applicant and landowner, with the opportunity for land acquisition provided as an alternative.</p> <p><b>Representative Photomontage 7</b></p>  <p>Photomontage Location P - Residential dwelling, Windalee (R65) Proposed view with turbine markers.</p> <p>Distance to closest turbine 830m Photo location coordinates: Easting 740263 Northing 6174251 (AusGeod84)</p> <p>Proposed Crookwell 3 East turbine marker</p>

Non-associated receiver <i>Distance to closest proposed turbine</i>	Impact of Wind Farm <i>High, Medium, Low</i>	Cumulative Impact <i>High, Medium, Low</i>	Representative photomontage, where provided by Applicant
<p>R66 "Little Vale, (1)"  8.7km South 1km East</p>	<p><b>High</b></p> <p>R66 is on the northern side of the proposed Crookwell 3 East turbine site. Views south west toward Crookwell 3 South are screened by landform. Views east to south east extend toward Crookwell 3 East turbines.</p>	<p><b>None</b></p> <p>Any views toward the approved Crookwell 2 wind farm are blocked by landform. Similarly, views towards proposed Crookwell 3 South turbines are screen by landform, as are views toward the distant Gullen Range and Crookwell 1 wind farms.</p>	<p>The Department notes that while a portion of the proposed Crookwell 3 East turbines are located 1 km away, the view to the closest turbines does not present the turbines as being highly dominant because of the topography and vegetation surrounding these turbines. The recommended condition requiring the Applicant to undertake landscaping treatment works at dwellings located within 6 km of the turbines would further assist to reduce the visibility of these turbines.</p> <p><b>Representative Photomontages 8 (first photo shows existing view, second and third show view with the proposed turbines)</b></p>  <p>Photomontage Location I - 'Little Vale' non associated property (R66). Proposed view with turbine markers.</p> <p>Distance to closest turbine 1.1km Photo location coordinates: Easting 743529 Northing 6174329 (GDA 94)</p> <p>Proposed Crookwell 3 East turbine marker</p>

Non-associated receiver <i>Distance to closest proposed turbine</i>	Impact of Wind Farm <i>High, Medium, Low</i>	Cumulative Impact <i>High, Medium, Low</i>	Representative photomontage, where provided by Applicant
R67 "Little Vale, (2)"  9.1km South 1.2km East	<b>Moderate</b>  Views to Crookwell 3 South turbines are screened by landform and vegetation. Partial views east to south east extend toward Crookwell 3 East turbines.	<b>None</b>  Views to approved Crookwell 2 wind turbines are blocked by landforms. Views toward Crookwell 1, proposed Crookwell 3 South and Gullen Range turbines are screened by landform.	Views of the proposed eastern turbines would be visible from this receiver location. The recommended landscaping and external design conditions are considered appropriate for this receiver.
R68 "Meadowvale" (Crookwell 2 associated resident)  6.5km South 1.4km East	<b>High</b>  R68 is close to the north west boundary of the proposed Crookwell 3 East turbines site. Views south west toward Crookwell 3 South are screened by landform. Views east to south east extend toward Crookwell 3 East turbines.	<b>Low</b>  Views toward wind turbines within the approved Crookwell 2 wind farm are screened by vegetation. Views toward proposed Crookwell 3 South, Crookwell 1 and Gullen Range turbines are screened by landform. There are limited views of the Crookwell 2 and Crookwell 3 East turbines.	The recommended landscaping treatments to visually screen dwellings within 6km of the proposed turbines would be sufficient to reduce the visibility of the eastern proposed site.
R69 "Atholvale"  6.9km South 1km East	<b>Moderate-High</b>  R69 is close to the north west boundary of the proposed Crookwell 3 East turbines site, adjacent to R68. Views toward the Crookwell 3 South wind turbines are screened by tree cover. Views east to south east extend toward Crookwell 3 East turbines.	<b>None</b>  Views toward Crookwell 2 wind farm are screened by vegetation to the west of the dwelling. The distant Gullen Range and Crookwell 1 wind farms are screened by tree cover.	<p>There are direct views of a portion of the proposed eastern turbines from the dwelling and given there is no tree cover along that portion of turbines, there is high visibility of these turbines. Should there be plantings of trees along the side of the property the visibility would be reduced to moderate to low as the views would become partial rather than full views. The Department considers subject to the recommended conditions requiring the visual screening of dwellings within 6 km of the proposed turbines the visual amenity impact at this receiver are likely to be reduced and managed to an acceptable level.</p> <p><b>Representative Photomontage 9</b></p>  <p>Photomontage Location R - Residential dwelling, Atholvale (R69), existing view</p>  <p>Photomontage Location R- Residential dwelling, Atholvale (R69) proposed view Distance to closest turbine 1.1km</p>

Non-associated receiver <i>Distance to closest proposed turbine</i>	Impact of Wind Farm <i>High, Medium, Low</i>	Cumulative Impact <i>High, Medium, Low</i>	Representative photomontage, where provided by Applicant
<p>R70 "Snowgums"  6.4km South 1.8km East</p>	<p><b>Low</b>  R70 is close to the north west boundary of the proposed Crookwell 3 East turbines site, adjacent to R68. Views to Crookwell 3 South turbines are screened by tree cover. Views extend toward Crookwell 3 East turbines.</p>	<p><b>Low</b>  Views to Crookwell 2 turbines are screened by tree planting. Views to Gullen Range and Crookwell 1 wind farms are screened by tree cover.</p>	<p>As a result of existing tree cover, the partial views of the proposed Crookwell 3 east turbines and approved Crookwell 2 turbines are not significant. Should the landowner request additional visual screening measures at its property, the visibility of the turbines would be further reduced.</p> <p><b>Representative Photomontage 10</b></p>  <p>Snowgums (R70) Proposed view with turbine markers (orange is proposed Crookwell 3 East turbine marker and purple is approved Crookwell 2 turbine marker)</p>
<p>R106 "Rosedale"  9km South 1.8km East</p>	<p><b>Moderate-High</b>  R106 is close to the north boundary of the proposed Crookwell 3 East turbines site. Views to proposed Crookwell 3 South turbines are screened by landform. Views to proposed Crookwell 3 East are screened by tree cover and planting but some turbines can be fully viewed due to limited vegetation cover.</p>	<p><b>None</b>  Views to approved Crookwell 2 wind farm are screened by tree planting and landform. Views to the distant Gullen Range and Crookwell 1 wind farms are screened by tree cover and landform.</p>	<p>The Department considers that should there be plantings of trees along the side of the property from where the proposed turbines are visible, the visibility would be reduced to moderate to low. The Department considers subject to the previously recommended condition requiring the visual screening of dwellings within 6km of the proposed turbines, the potential visual amenity impact at this receiver is likely to be reduced and managed to an acceptable level.</p> <p><b>Representative Photomontage 11</b></p>  <p>Photomontage Location J - 'Rosedale' non associated property (R106), existing view</p> <p>Photomontage Location J - 'Rosedale' non associated property (R106), proposed view Distance to closest turbine 1.8km</p>

In addition to the above, there are some residential receivers located between 2km and 6 km of the closest proposed turbines which are predicted to experience a moderate to high visual impact, as listed in **Table 5** below.

**Table 5:** Residential Locations between 2km and 6km

Residence	Distance to Turbine	Impact
R1 'Evermore'	2.8km	Moderate to high
R2 'Bendemere'	2.3km	Moderate to high
R3 'D'Ambrosio'	2.5km	Moderate to high
R5	2.9km	Moderate to high
R6	2.9km	Moderate to high
R7 'Emohruo'	2.9km	Moderate to high
R55	2.8km	High
R57 'Kenrich'	2.7km	High
R60 'Pejar Park'	2.4km	Moderate
R97	2.6km	Low to moderate
R4	3.1km	Moderate to high
R16 'Calamondah'	3.3km	Moderate
R36 'Tyrendarra'	4.1km and 3.8km	Low to moderate
R37 'Carinya'	3km and 4.6km	Low to moderate
R40 'Tyrendarra'	4km and 3.8km	Low to moderate
R53	3.4km	High
R54 'Ginmara'	3km	High
R56 'Mathlie'	3.2km	High
R84 'Nierrina Heights'	3.1km	High
R49 (under construction)	4.8km	Low to moderate
R50	4.2km	Low to moderate
R51	4.1km	Low to moderate
R52 'Mount Wayo'	4km	Low to moderate
R83 'Trappers Folly'	4.3km	High
R125	4km	Moderate
R126	4.2km	Moderate
R128 'Bannister'	4.4km	Moderate
R129	4.6km	Low to moderate
R12	5.5km	Moderate
R13	5.6km	Moderate
R14 'Foxground Hayeselton'	5.5km	Moderate
R15	5.3km	Moderate
R43 'Rullawayo'	5.8km	Moderate to high
R47	5.3km	Low to moderate
R48 'Rolling Hills'	5.3km	Low to moderate
R127	5.2km	Low to moderate

Given the closest receiver within this radius is at 2.3km from the nearest turbine, it is unlikely that the turbines will be the dominant views from these receivers. The Department considers that its recommended condition requiring the Applicant to undertake landscaping treatments at residential dwellings with views of a turbine(s) located within 6 kilometres of their dwellings would assist in reducing the visibility of the turbines from those dwellings.

In addition to the residences, receiver R39, the St Stephen's Pejar Anglican Church has been found to experience low visual impacts. Also receiver R80a, also a church with a potential future residential receiver, is located approximately 1.7km away from the site. R80a has been assessed to experience a moderate visual impact and therefore this receiver has been included in the recommended landscaping condition.

Receiver "Rainmore" (R117, R118, R119) is a potential future residential dwelling. The wind farm is approximately 1.5km from Rainmore and the land is between the proposed south site and the approved Crookwell 2 site. The future dwelling would have large expansive cumulative views of the proposed South Site, Crookwell 2 wind farm and Gullen Range wind farm. It is also

noted that in its submission to the Department, this property owner has requested its property be purchased by the Applicant. The Department considers that this receiver should be given an opportunity to develop a negotiated visual impact agreement with the Applicant before the requirement of acquisition of its property is considered. The Department has therefore recommended this receiver be included in the condition requiring the Applicant to develop negotiated visual agreements. In cases where agreements cannot be achieved, the acquisition of the affected property is to be sought.

It is noted that the Applicant's assessment found that all motorist viewing points would experience low to nil impacts. It was also found that shadow flicker is unlikely on motorists and blade glint would be minimal.

Shadow flicker is the pulsating shadow created by the moving blades, when the sun is low in the sky. The Applicant engaged Garrad Hassan Pacific Pty Ltd to undertake a shadow flicker assessment of the development. The assessment found that the operation of the development would achieve the standard of no more than 30 hours of shadow flicker at all non-associated receivers and most associated receivers, apart from associated receiver 79. This receiver is located amongst mature trees which appear to screen the majority of views toward the turbines.

### **Conclusion and Recommendation**

The independent expert review by O'Hanlon Design Pty Ltd of the Applicant's LVIA found that the LVIA incorporates all the key elements that would be provided in a standard visual assessment and that the methodology employed is consistent with similar widely used methodologies. It also found that the Crookwell 3 wind farm as a standalone component in the landscape is likely to be considered an acceptable impact. The IER however found that further information should be provided by the Applicant to adequately describe the level of predicted cumulative visual impacts. This was a key recommendation in the independent expert review, specifically stating that the cumulative impact assessment of the proposal should take into consideration the nearby wind farm developments including the established Crookwell 1 wind farm, approved Crookwell 2 wind farm, and established Gullen Range wind farm. The Department concurred with the findings and recommendations of the independent expert review. As such, the Applicant further engaged its consultant Green Bean Design and provided a supplementary report in its Response to Submissions. The supplementary report addressed the recommendations of the independent expert review and provided further cumulative assessment of the proposal for dwellings within 2km of proposed wind turbines.

The Department acknowledges that the development will cause visual impacts due to the height of the turbines, their location on ridgelines and lack of vegetation. The Department however concludes that the development can proceed subject to the implementation of the recommended conditions as outlined above, noting that mitigatory measures are available.

In order to address the outstanding visual impact concerns as identified in the above, the Department recommends a condition in which the Applicant is required to, at the request of any owners of residential dwellings or businesses with views of a turbine(s) located within 6 kilometres, provide and bear the full cost of landscaping treatments to visually screen these premises. The Applicant must formally write to each of these owners with respect to their right to make such a request. To also ensure these requests are submitted in a timely manner, the Department recommends that such requests may be made in writing by the owner of the dwelling or business within six months from the commencement of operation of the project, and landscaping treatments agreed between the owner of the dwelling and the Applicant be implemented and completed within 12 months of such an agreement.

In addition to this, the Department recommends that the Applicant be required to ensure all residents, business owners or a public authority, whose dwelling, business or public area, may be subject to moderate to high visual impact, are consulted regarding impact minimisation

measures, and the outcomes of this consultation process used to inform the required Design and Landscaping Plan.

The Department also recommends additional procedures apply to six receivers, being R8, R62, R63, R64, R65 and "Rainmore". These additional procedures will provide opportunities to negotiate the extent of predicted impacts (through agreed impact minimisation and mitigation measures), and where no agreement is reached, the option of land acquisition within stipulated timeframes.

The Department has also recommended a range of external design conditions for the turbines and associated infrastructure, including that the wind turbine be painted matt off-white or grey and the blades must be finished with a surface treatment that minimises any potential for glare or reflection.

To ensure the development is designed and operated in a manner which avoids shadow flicker impacts, the Department has recommended a condition requiring that shadow flicker be no more than 30 hours per year at any residence not associated with the project has been recommended.

The Department considers that subject to the implementation of the above recommended conditions, the potential extent of visual impacts arising from the proposed development, in combination with the surrounding existing and approved wind farms (Crookwell 1, Crookwell 2 and Gullen Range), can be appropriately minimised and managed.

### 5.3. Noise Impacts

#### Issue

The Applicant's noise assessment included predictions for wind turbine noise levels from the operation of the proposed Crookwell 3 Wind Farm alone, as well as predictions for a cumulative scenario under which all three Crookwell wind farms would be operating at the one time. The results and consideration of the stand-alone and cumulative wind farm noise level scenarios are detailed in this chapter.

The Applicant's noise assessment has identified that there would be noise level exceedances from the proposal alone at neighbouring receivers. Exceedances were found at non-associated receivers 63, 64, 65, 66, 67, 8, 19, 58, 59, 60, 61, 62, 68 and 69, with the highest difference in exceedance being 7.1 dBA above the relevant criterion at receiver 66 under the MM92 turbine model.

Cumulative noise levels were also measured, taking into account the other Crookwell wind farms. In this regard, several exceedances at non-associated receivers were identified (refer **Appendix F**). The maximum cumulative noise exceedance was at receiver H66 Little Vale and is 7.1 dBA (criterion of 35 dBA). The highest night-time cumulative noise exceedance is also predicted to be at receiver H66 Little Vale at an exceedance of 7.1 dBA.

While the highest exceedance under the cumulative scenario is the same as that under the Crookwell 3 wind farm alone scenario (7.1 dBA at receiver H66), there are also exceedances at other receivers under the cumulative scenario. For example receivers 20, 70 and 71 would experience noise levels above the criteria under the cumulative scenario but not under the Crookwell 3 wind farm only scenario.

#### Submissions

The Department notes that noise was a key issue raised by the local community, as well as the noise assessment methodology employed by the Applicant, including measuring low frequency noise in accordance with the appropriate guidelines.

## Consideration

Noise generated by the operation of wind turbines has been assessed by SLR Consulting Australia Pty Ltd, on behalf of the Applicant, in accordance with the South Australian Environment Protection Authority *Wind Farms Environmental Noise Guidelines February 2003*, the Department's *Draft NSW Wind Farm Guidelines* and other relevant limits and guidelines.

The assessment predicted noise operational noise levels for sensitive receivers located within 6 kilometres of the proposed wind farm development. The South Australian Guidelines and the Draft NSW Wind Farm Guidelines require that the noise generated by the operation of wind turbines do not exceed a noise level of 35 dB(A) LAeq or the background noise level by more than 5 dB(A) (whichever is greater) at surrounding "non-associated" landowners.

The Proponent has proposed a noise limit of 45 dB(A), or background plus 5 dB(A), whichever is higher, for associated receivers, consistent with the World Health Organisation (WHO) recommendations for external noise levels.

SLR Consulting Australia Pty Ltd assessed the predicted levels of swish, discrete tones and low frequency noise and found that the noise would not exceed 60 dBC for any receiver location, which is also the night-time criteria as proposed by the Draft NSW Wind Farm Guidelines.

As the Draft NSW Wind Farm Guidelines differentiate between daytime (7:00am to 10:00pm) and night-time (10:00pm to 7:00am), night-time criteria and predicted noise levels were also determined by the Applicant and provided in its Noise Impact Assessment (**Table 3** below shows these).

**Table 3:** Night-time exceedances

Receiver Number	Turbine Model			
	GE 2.5xl	Vestas V90	Vestas V100	Repower MM92
	Exceedance	Exceedance	Exceedance	Exceedance
8	4.3 dBA @ 9.6 m/s	2.1 dBA @ 9.6 m/s	2.2 dBA @ 9.6 m/s	4.5 dBA @ 9.6 m/s
19	4.5 dBA @ 9.6 m/s	2.1 dBA @ 9.6 m/s	-	1.4 dBA @ 8.2 m/s
20	4 dBA @ 9.6 m/s	3.3 dBA @ 9.6 m/s	3.1 dBA @ 9.6 m/s	4.1 dBA @ 9.6 m/s
58	0.4 dBA @ 8.2 m/s			1.8 dBA @ 8.2 m/s
59	1.2 dBA @ 8.2 m/s			2.5 dBA @ 8.2 m/s
60				0.1 dBA @ 8.2 m/s
61				2.7 dBA @ 8.2 m/s
62	1.4 dBA @ 8.2 m/s			2.7 dBA @ 8.2 m/s
63				0.8 dBA @ 8.2 m/s
64	3.1 dBA @ 8.2 m/s	1.7 dBA @ 8.2 m/s	1.9 dBA @ 8.2 m/s	4.2 dBA @ 8.2 m/s
65	3 dBA @ 8.2 m/s	1.7 dBA @ 8.2 m/s	1.8 dBA @ 8.2 m/s	4.1 dBA @ 8.2 m/s
66	6.9 dBA @ 9.6 m/s	3.6 dBA @ 9.6 m/s	3.9 dBA @ 9.6 m/s	7.1 dBA @ 9.6 m/s
67	4.5 dBA @ 9.6 m/s	1.4 dBA @ 9.6 m/s	1.2 dBA @ 9.6 m/s	4.7 dBA @ 9.6 m/s
68	1.2 dBA @ 8.2 m/s			2.1 dBA @ 8.2 m/s
69	3 dBA @ 8.2 m/s	1.7 dBA @ 8.2 m/s	1.7 dBA @ 8.2 m/s	4 dBA @ 8.2 m/s
70	2.5 dBA @ 8.2 m/s	2 dBA @ 8.2 m/s	1.8 dBA @ 8.2 m/s	3 dBA @ 8.2 m/s
<b>Total Exceedances</b>	<b>13</b>	<b>9</b>	<b>8</b>	<b>16</b>

**Note:** shaded hatched area indicates no exceedances detected.

The draft NSW Wind Farm Guidelines note that the recommended acceptable night-time amenity level for a rural area is 40 dBA (and 45 dBA is the maximum level). Of the residential receivers to experience night-time exceedances, some of those exceedances would be above 40 dBA but none are above the 45 dBA. These particular receivers are outlined below and the predictions, including specific criteria, are approximated levels:

- H64 and H65 (under the MM92 turbine model)
  - 40 dBA at wind speeds of 8.2 m/s (with specific night-time criteria being 36 dBA);
  - 40.5 dBA at wind speeds of 9.6 m/s (specific night-time criteria being 40 dBA); and
  - while a noise level of 40.5 dBA at 10.9 m/s at both of these receivers is also predicted, the specific night-time criteria is above this (being 41.5 dBA).
- H66 (under MM92 turbine model)

- 40.5 dBA at 8.2 m/s (with specific night-time criteria being 35 dBA);
- 41 dBA at 9.6 m/s (with specific night-time criteria being 35 dBA); and
- 41 dBA at 10.9 m/s (with specific night-time criteria being 36 dBA)
- H63 (under MM92 turbine model)
  - 40.5 dBA at 8.2 m/s (with specific night-time criteria being 40 dBA).
- H64 and H65 (under GE 2.5xl turbine model)
  - 40.5 dBA at 9.6 m/s (specific night-time criteria is 40 dBA).
- H66 (under GE 2.5xl turbine model)
  - 41.5 dBA at wind speeds of 9.6 m/s and 10.9 m/s (specific criteria is 35 dBA and 39 dBA respectively).

The Applicant provided the allowable noise limits for the wind farm to ensure cumulative operational noise does not exceed the relevant criteria.

As noted by the EPA, the allowable noise limits provided by the Applicant at sensitive receiver locations for each turbine modelled are likely to meet the criteria in the South Australia Guidelines. The EPA has stated to the Department that it is able to licence the proposed development, subject to the limits it has recommended to the Department. The Department has adopted these limits.

In cases where no noise exceedances of the predicted allowable noise limits are found, the worst-case noise level (under the noisiest MM92 turbine model) generated by Crookwell 3 wind farm has been adopted as the cumulative noise limiting criteria. This applies to receivers 2-7, 19, 60, 61, 68-70 and is stipulated in Table F2 of the recommended condition. Then, the noise level from the proposed wind farm alone, which satisfies the cumulative criterion, is to be adopted where the predicted worst case cumulative level (under noisiest MM92 turbine) is above the applicable criterion but the predicted best-case cumulative level is below the criterion, this applies to receivers 58, 59, 62, 63, 64, 65 (with all other residences, other than those that are associated or have a valid private negotiated agreement, being limited to 35 dBA across all wind speeds). This is stipulated in Table F1 of the recommended noise limiting condition.

The worst case noise level predictions from Crookwell 3 would result in an exceedance of 7.1 dBA. The Applicant has also identified the maximum noise levels that can be generated from Crookwell 3 in order to meet the cumulative criteria at specific sensitive receiver locations. The Department considers that the occurrences of the maximum potential noise exceedances, including 7.1 dBA exceedance, under the cumulative scenario would be unlikely if noise management measures are implemented. The Applicant has stated that it would apply sector management measures to deal with such circumstances where exceedances of the relevant noise criteria are found to occur. Such measures include restrictions on turbine operation with respect to wind speed or direction if noise monitoring detects actual or potential noise impacts above established noise criteria.

The Department notes the noise predictions are a worst case, where no mitigation has been included. It is also noted that the Applicant is proposing to negotiate and enter into noise agreements with receivers 8, 66 and 67. The Department however notes that if these noise agreements are not reached, the Applicant will be required to ensure noise at these three receivers is no more than 35 dBA (refer to Table F1 of the recommended condition).

As part of its Response to Submissions, the Applicant provided the likely noise levels to be generated by the Crookwell 3 wind farm alone to ensure that the cumulative operation of Crookwell 1, 2 and 3 wind farms would not exceed the relevant criteria.

## Conclusion and Recommendations

The Department has had ongoing consultation with the EPA and the Applicant to determine the noise limits adopted above. The adopted noise limits and approach to operational noise management is to ensure that the proposal is consistent with the criteria in the *Wind Farms*

*Environmental Noise Guidelines February 2003* (South Australian EPA Guidelines). Apart from the setting of noise limits for the proposal, the Department has recommended conditions relating to noise monitoring and management so as to ensure the proposal is compliant with the requirements of the consent.

The Department recommends a condition requiring the Applicant to submit a Noise Compliance Plan to the Secretary, prior to the commissioning of the proposed turbines. The Plan must include an assessment of the performance of the development against the noise criteria contained in the recommended condition, including a commitment that noise compliance monitoring will be undertaken within three calendar months of the commissioning of the wind turbines. As part of this condition, all noise compliance monitoring results are required to be submitted to the Secretary within one month of completion of the monitoring and the Secretary may request additional noise compliance monitoring to be undertaken and completed within a specified timeframe.

The Department also recommends that requirements for ongoing and long term compliance with the operational noise limits be described in a Noise Management Plan. The Noise Management Plan would provide procedural details for ensuring compliance and corrective actions in response to incidences of noise exceedances that may arise.

Whilst the Department considers that the Applicant has undertaken its Noise Impact Assessment in accordance with the relevant guidelines, should any landowner believe that the predicted noise levels at their property have not been adequately accounted for then an appropriate avenue for investigation should be provided to that landowner. The Department has recommended a condition which states that any landowner (or resident) whose residence is within 3 kilometres of a proposed turbine may ask the Secretary in writing for an independent review of the noise impacts of the development on his / her land. If the Secretary is satisfied that an independent review is warranted, then the Applicant may be required to consult with the landowner / resident to determine their concerns and monitor compliance with the operational noise criteria.

The Department considers that subject to the implementation of the above recommended conditions, the potential noise impacts of the development, in combination with the noise from operating Crookwell 1 wind farm and approved Crookwell 2 wind farm, can be appropriately addressed and managed to avoid significant adverse impacts.

## **5.4. Bushfire and Firefighting**

### **Issue**

As the wind turbine structures will house equipment containing electrical and mechanical components (which contain flammable oils and hydraulic fluids), there is a risk the turbines can catch on fire and trigger a bushfire. There is also a risk that due to the height of the turbines (152 metres when constructed), the ability to fight bushfires via aerial water dropping is constrained or not possible and creates a safety hazard for firefighters.

### **Submissions**

The risks of the proposed wind turbines catching on fire, as well as lightning striking the turbines and the turbines obstructing aerial firefighting, have all been raised as key concerns in the majority of public submissions received on the proposal.

### **Consideration**

It is noted the Applicant has considered the updated guideline *Planning for Bush Fire Protection 2006* (NSW RFS). This guideline outlines a combination of strategies including minimising the impact of radiant heat and direct flame contact by separation of the development from bush fire hazard, enabling relatively safe access for the public and fire-fighting operations, providing adequate water supplies for fire suppression operations and facilitating the maintenance of

Asset Protection Zones, fire trails, access for firefighting and on-site equipment for suppressing fire.

The Applicant has proposed a suite of mitigation measures that address the relevant strategies outlined in *Planning for Bush Fire Protection 2006*, including shutting down turbines during a bushfire in the area (and automatic shutdown of any overheating turbine mechanism), lightning protection on each turbine, adequate road access for heavy firefighting equipment, access to adequate provision of water supply and vehicle turn-around facilities at each tower site. The Applicant has also committed to preparing a Bushfire Risk Management Plan. The Applicant has further committed to consult with RFS in regard to the adequacy of its bushfire prevention measures.

Crookwell Aerodrome generally supports aviation aircraft undertaking training, aerial work and private operations. The NSW Rural Fire Service (RFS) has identified the aerodrome as a potential operating base for its aerial firefighting activities as it has been used in the past for such activities. RFS advised that fixed wing fire assets are more likely to use the Crookwell airfield than helicopters and RFS has a requirement that the departure and arrival areas from the airfield remain obstacle free. The Department notes that Crookwell aerodrome is not affected by the proposal (see consideration on Obstacle Limitation Surface in Section 5.6). The Department notes that while RFS did not lodge a submission on the development and has made no specific objections, RFS has noted to the Applicant that wind farms may cause restrictions to aerial fire firefighting. The Department has however recommended the Applicant to implement specific management measures, as detailed below during the construction and operation stages of the development. These measures include the provision of adequate ground based firefighting equipment at the wind farm site and the development of management plans (which will include the option of potentially switching turbines off). The Department considers these measures would reduce the potential restrictions to fire firefighting.

The Department has also had further discussions with the Division of Resources and Energy of the Department of Trade and Investment with respect to the potential risk of turbines catching fire and turbines preventing firefighting in rural areas. Resources and Energy consulted NSW Fire and Rescue and advised that a search of the Australian Incident Reporting System Database by Fire and Rescue found no incidences of fires involving wind turbines in the past 5 years. Resources and Energy also noted evidence from South Australia and Victoria which considered that wind turbines do not cause fires, rather allow for improved access in fighting fires (as a result of bushfire management measures that may be developed and implemented on wind farm sites). The access tracks to be formed as part of the proposal will also provide access in fighting fires.

The South Australian Country Fire Service (CFS) has developed the fact sheet *CFS Fact Sheet - Understanding Aerial Firefighting* (February 2013) which states that if vertical obstructions exist in the airspace around a fire, including power lines, tall trees and wind turbines, a dynamic risk assessment be undertaken before an aircraft to be used for aerial firefighting is committed to commence that operation. It is noted that the fact sheet states that the final decision for the deployment of an aircraft remains with the pilot-in-command of the firefighting operation.

### **Conclusion and Recommendations**

The Department notes that given there is still a risk that the proposed wind turbines can firstly ignite a fire and secondly, have the potential to limit aerial firefighting, the Department recommends conditions requiring the Applicant to provide for asset protection consistent with relevant Rural Fire Service guidelines (*Planning for Bushfire Protection 2006 and Standards for Asset Protection*) and provide for necessary emergency management, including appropriate firefighting equipment and water supplies on site to respond to a bush fire. The Department has recommended a further condition which requires the Applicant to, throughout the life of the development, regularly consult with the local RFS about details of the Development, including the construction timetable, the final location of all infrastructure on the site and contact information. The Applicant must comply with any reasonable request of the local RFS to reduce the risk of bushfire, minimise impacts on bushfire fighting operations and to enable fast access

in emergencies. The Department has also recommended that the Applicant prepare a Bushfire Management Plan for the development which is to detail measures to prevent fires during construction and measures to prevent and manage fires during operation. The plan for the operational stage is to include management operations to assist bush firefighting in the vicinity of the development (including potentially switching off turbines).

The Department considers that the likelihood of the development catching on fire, or any component causing a fire is low. The Department is satisfied that subject to the implementation of the proposed management measures and the Department's recommended conditions, these fire risks can be appropriately addressed and managed.

## 5.5. Traffic and Transport

### Issue

Construction materials (namely tower sections, blades and nacelles) will likely be delivered from overseas via sea freight into Port Kembla. From here, materials will be transported by road to the proposed development site.

### Submissions

RMS did not raise any concern in regards traffic volumes and consequential impacts at the proposed site access intersections.

Goulburn Mulwaree Council requested that the 'Goulburn Bypass' segment be clearly outlined as any right turns from Sydney Road into Union Street will pose problems for oversized vehicles. Goulburn Mulwaree Council requested further consultation with the Applicant when the routes can be specified. The Department notes that the Applicant has committed to consult with Goulburn Mulwaree Council when developing its Traffic Control Plan prior to construction.

The Applicant's Traffic Impact Assessment concluded that the predicted vehicle generation of the proposed development, along with the cumulative impact of the adjacent Crookwell 2 wind farm will not have a significant impact on the existing road network. The Assessment concluded that the swept path for Over-Dimensional vehicles may require some intersection or road network upgrades, which can be determined during preparation of a Transport Management Plan.

With respect to issues raised by Crown Lands, an internal access track within the Crookwell 3 South site is to traverse Crown Lands, which is held under Permissive Occupancy 1517 for grazing by one of the host landowners subject to this development. Crown Lands therefore state that it requires the track to be authorised via suitable easements with compensation and fees claimed in the normal manner. The Applicant has replied and will seek a suitable easement from Crown Lands for that internal access track.

Also, within the proposed Crookwell 3 East site, Crown Lands has identified several encroachments over Crown Lands by proposed internal access tracks and the temporary batching concrete batching plant. Crown Lands has also identified that the blades from proposed turbine A13 may potentially impact on the use of an adjoining Crown road by the public and as such may become breaches of Section 5(1) of the Roads Act 1993. In this circumstance, Crown Lands request that turbine A13 be relocated so that there is no impact on the Crown road nor is traffic impeded. If the turbine is unable to be relocated, Crown Lands has stated that the affected section of Crown road should be closed.

With respect to the issues raised by Crown Lands, the Applicant agrees that all encroachments over Crown Land road reserves and air space should be subject of a road closure and purchase application. This would be done on behalf of the adjoining landowner that is also a host landowner for this development. In instances where a road closure is not practical, the Applicant has stated it will seek an easement over the subject areas, or seek approval for a licence under the *Crown Lands Act 1989*. The Applicant has also stated that the proposed temporary concrete

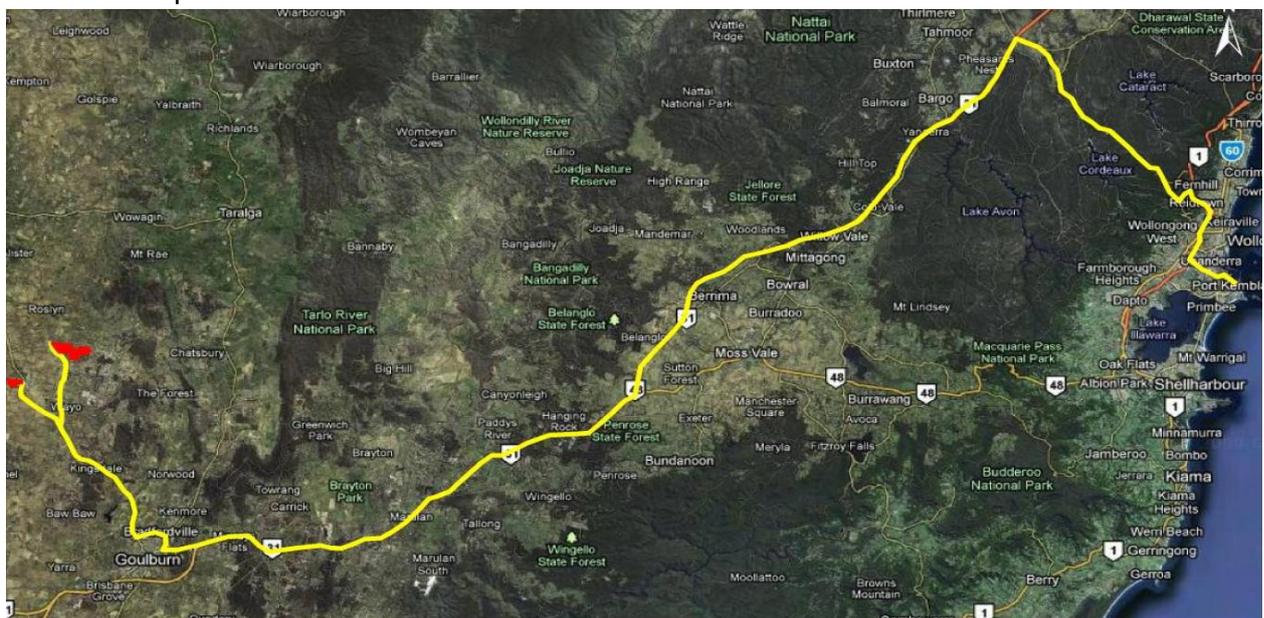
batching plant has been relocated further east within the same area to avoid Crown road encroachment.

### Consideration

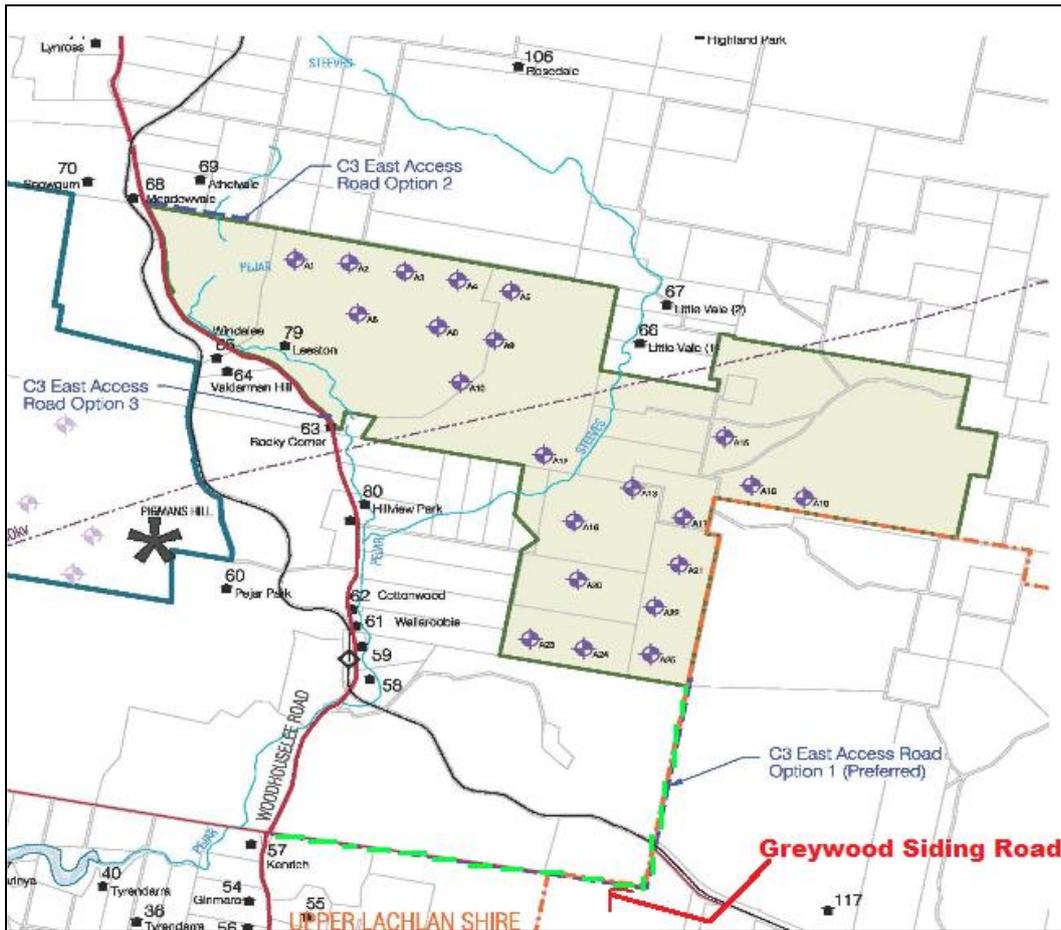
The Applicant engaged URS Australia Pty Ltd to prepare a Traffic Impact Assessment to assess construction and operational impacts of the proposal on the existing transportation network. The Traffic Impact Assessment has divided the proposed construction delivery route from Port Kembla to the site into key three sections:

- Port Kembla to Goulburn: roads from Port Kembla to Goulburn are generally national highways or state roads able to accommodate Over-Dimensional vehicles (required to transport the larger and bulkier components, including tower sections and turbine blades). Mount Kiera Road will be used for traversing the Illawarra escarpment as it is stated to be suitable for large vehicles with fewer steep grades. Over-Dimensional vehicles will turn south at the Mount Kiera Road / Hume Highway intersection and travel onwards to Goulburn.
- Goulburn Bypass: the Goulburn Bypass is a designated Over-Dimensional route between Hume Highway and Goulburn. A number of constraints are identified on this route including a school, adjoining residential development, low-lying overhead cabling and intersections with limited manoeuvrability for Over-Dimensional vehicles. The Applicant has stated these constraints will be identified during its preparation of a Traffic Control Plan that it has committed to prepare prior to construction. The Traffic Control Plan is to be prepared in consultation with Goulburn Mulwaree Council, Upper Lachlan Shire Council and RMS.
- Goulburn to the development site: once through Goulburn, Over-Dimensional vehicles will continue north along Crookwell Road for approximately 19km to the intersection of Crookwell Road and Woodhouselee Road. Vehicles accessing Crookwell 3 South will continue through the intersection for another 7km until turning left into the Crookwell 3 South site. Vehicles accessing Crookwell 3 East will turn right at the Crookwell Road / Woodhouselee Road intersection and continue heading north along Woodhouselee Road for another 11km until turning right into the Crookwell 3 East site. **Figure 11** below shows the proposed delivery route from Port Kembla to the development site.

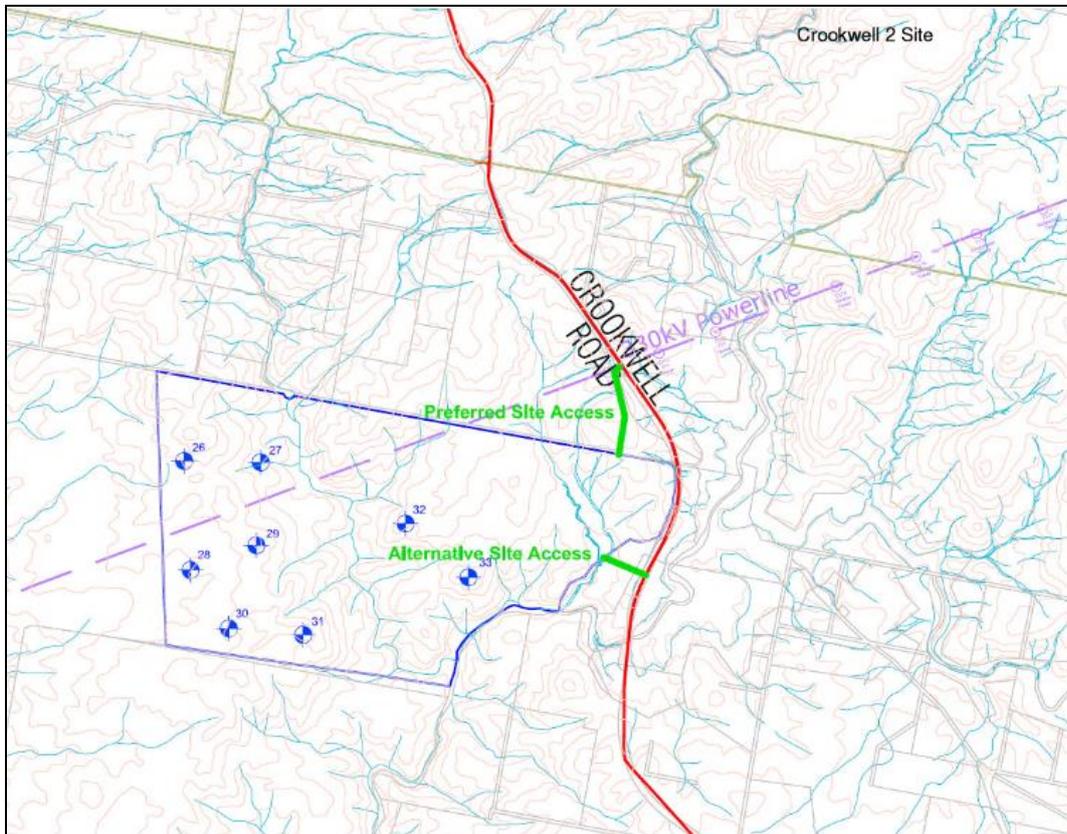
Three access points to the Crookwell 3 East site are proposed (options 1 to 3), and two separate options for access points to the Crookwell 3 South site (options 1 to 2). These are shown in **Figures 12** and **13** below, with the use of Greywood Siding Road (Crown Road, not gazetted) being the preferred option for the east site (option 1) and the use of Old Crookwell Road being the preferred option for the south site (option 1). The preferred routes would be designed (as part of construction) to cater for the Over-Dimensional vehicles, construction vehicles and personnel vehicles.



**Figure 11:** Proposed Construction Material Delivery Route – Port Kembla to Crookwell 3 Site



**Figure 12:** Options to access Crookwell 3 East Site, with option 1 being preferred.



**Figure 13:** Options to access Crookwell 3 South Site

SIDRA modelling was carried out to analyse the performance of the existing road network against the anticipated vehicle volumes expected during construction of the development. The modelling also accounted for additional traffic volumes to be generated by Crookwell 2 wind farm should Crookwell 2 and 3 wind farms be constructed at the same time. This is because the Crookwell 2 development has three proposed sites accesses within the vicinity of the proposed Crookwell 3 wind farm, one on either side of Crookwell Road (north of the preferred Crookwell 3 South site access) and one on Woodhouselee Road (located south of Boltons Lane site access option). Modelling was carried out for the two key intersections at the access points to both of the East and South sites:

- Crookwell Road / Crookwell 3 South site access; and
- Woodhouselee Road / Crookwell 3 East site access.

Based on an 18 month construction phase, as assumed in the Traffic Impact Assessment, it is anticipated that approximately 1603 peak one-way vehicle movements would be generated per month by the development. There would be an estimated 61 peak AM and 61 peak PM traffic movements (with an additional 124 peak AM and 124 peak PM traffic movements associated with Crookwell 2 wind farm). This estimation of traffic generation is inclusive of Over-Dimensional vehicles, heavy vehicles and light vehicles and it is to be noted that as a 12 to 15 month construction period is more likely, the total traffic to be generated may be less than that anticipated.

It is noted that traffic to be generated for the operation of the development is likely to be insignificant, as it will comprise of limited vehicles entering and exiting the site primarily for maintenance or inspection purposes.

The Department notes that the Applicant has also committed to preparing a dilapidation report prior to movement of heavy and oversize vehicles for the construction stages and to rectify any deterioration in pavement quality as a result of the development's road usage.

### **Conclusion and Recommendations**

In providing development consent for the Crookwell 2 wind farm (in June 2005), the Department conditioned several road network upgrade requirements prior to the commencement of heavy vehicle movements to and from Port Kembla and the Crookwell 2 site. The Applicant has advised that the road works for the Crookwell Road/ Woodhouselee Road intersection upgrade have been completed as part of the Crookwell 2 wind farm construction consent. Notwithstanding this, the required Traffic Management Protocol (refer to below) will need to demonstrate that all the road network upgrade requirements under the Crookwell 2 consent (as relevant to Crookwell 3) have been completed. This will ensure that prior to Crookwell 3 construction, site access to Crookwell 3 from Port Kembla has been sufficiently upgraded to permit the safe passage of vehicles (including Over-Dimensional vehicles).

The Department notes that the access routes to the Crookwell 3 East and South sites need to be clearly outlined and the management measures for construction vehicles traveling along the routes need to be confirmed and agreed on between the relevant road authorities (Upper Lachlan Shire, Goulburn Mulwaree Councils, RMS and Crown Lands).

The Department has also recommended a condition requiring the Applicant to prepare a Traffic Management Protocol for the development, which is to address the requirements of Upper Lachlan Shire Council, Goulburn Mulwaree Council, RMS and Crown Lands. The Protocol is to outline the management of traffic conflicts that may be generated during construction and operation of the development, including details of traffic volumes and routes for heavy vehicles (including routes to be used during operation and maintenance stages of the development), including any necessary route or timing restriction for oversized loads.

With respect to the several encroachments over Crown Land (by road via internal access tracks or by air as a result of turbine A13 blade tips potentially impacting an adjoining Crown road), the Department notes that even though the Applicant has stated it will undertake the management

measures as recommended by Crown Lands, including seeking suitable easements from Crown Lands and/or undertaking road closures and purchase applications, there are no clear commitments that clearly specify this. The Department has therefore included a specific sub-condition for the Traffic Management Protocol which states that the Applicant must address potential impacts on Crown Lands as outlined in the Response to Submissions.

The Department notes that Woodhouselee Road is a school bus route and therefore construction activities may be required to be scheduled outside of key school timings (start and end of school day) depending on the bus routes and any likely conflicts with construction traffic. The Applicant is therefore required to consider this as part of the Traffic Management Protocol.

The Department also acknowledges that potential impacts from an increase in construction traffic could occur if not managed appropriately and supports the Applicant's commitment to prepare a road dilapidation report and repair damage resulting from construction traffic.

The Department is therefore satisfied that traffic impacts associated with the development do not pose a constraint to the development proceeding subject to the implementation of the proposed statement of commitments and recommended conditions.

## 5.6. Aviation Safety

### Issue

The Department considers there are potential safety risks for aviation as a result of the turbines. The closest aerodromes to the proposed development site are Crookwell Aerodrome (not regulated), located approximately 8km to the north west of the site and Goulburn Airport aerodrome, located approximately 27 km south-east of the site.

### Submissions

The Department of Defence advised in its submission that there are no concerns regarding the safety of military aircraft or potential interference to defence communications or surveillance radars. Defence however noted that there is an ongoing need to obtain and maintain accurate information on tall structures so as to reduce the risks associated with inadvertent collision by low flying aircraft. As such, Defence requested that "as constructed" details of the turbines be provided to the RAAF Aeronautical Information Service.

Air Services Australia advised that the proposal will not affect any sector or circling altitude, nor any instrument approach or departure procedure at Goulburn Aerodrome. However, at heights of 1082m (3550ft) AHD and 1085m (3560ft) AHD, proposed turbines A19 and A25 will affect the Lowest Safe Altitude (LSALT) on air route W10. The maximum allowable top elevation of turbines 19 and 25 without affecting the LSALT on air route W10 is 1066.8m (3500ft) AHD. Air Services has stated that it may be possible to amend LSALT on air route W10 from 4500ft to 4600ft, subject to further consultation with Air Services' policy section. It is to be noted that turbine A19 has been deleted from the scope of the development. With respect to turbine A25, the Applicant has stated that if the turbine is designed to the minimum preferred tower height of 80m (instead of the maximum proposed height of up to 100m), the turbine will not encroach the LSALT on air route W10 of 1066.8m (3500ft). If however the maximum proposed turbine envelope size for turbine A25 is used, then it will request Air Services to amend the LSALT on air route W10.

Concern was also raised by the community regarding aviation impacts. In particular, firefighting and impacts to agricultural aerial operations were raised.

### Consideration

Although the guideline *Obstacle Marking and Lighting of Wind Farms* (CASA Advisory Circular AC139-18(0)) has been withdrawn by the Civil Aviation Safety Authority (CASA) for review purposes, the Applicant has used the Advisory Circular for the purposes of risk mitigation, as recommended by CASA. Given the proposed turbines are up to 152 metres tall, they are considered as 'tall structures' under the Advisory Circular and are therefore a potential hazard to

aircraft, particularly if flying under conditions of low light. CASA also stated to the Applicant that given the maximum height of the turbines, the turbines are coincident with the base of navigable airspace and therefore are a potential hazard to aircraft. CASA therefore recommended that the Applicant consider its duty of care in deciding whether or not obstacle lighting should form part of the development.

Given the proposed turbines are considered as a potential hazard to flying aircraft and noting that the turbines are higher than those at the Crookwell 1 Wind Farm (67m) and the approved Crookwell 2 Wind Farm (128m), the Applicant proposes to light 11 of the proposed turbines (A26, A31 and A33 in the south site and A1, A3, A5, A10, A12, A15, A23 and A25 in the east site), subject to the outcomes of the detailed design stage.

The Obstacle Limitation Surface (OLS) of both Crookwell and Goulburn Airport aerodromes (which defines the volume of airspace at and around an aerodrome to be kept free from obstacles in order to enable the safe operation of the intended aeroplane operations), is not breached by the proposal. The closest of the proposed turbines to the Goulburn Airport is more than 12.6km from the edge of the OLS Outer Horizontal Surface. Whilst Crookwell aerodrome is not regulated, aircraft operators can apply Civil Aviation Advisory Publication 92-1(1) *Guidelines for aeroplane land areas*, which identifies a basic OLS extending 900m from the centreline of the runway. This basic OLS is not infringed by the proposal.

With respect to proposed turbine A25 likely to affect the Lowest Safe Altitude (LSALT) on air route W10 (if the maximum tower height is implemented), the Department acknowledges that the Applicant will request Air Services to amend the LSALT for air route W10, consistent with Air Services advice on this matter. It is noted that under the maximum tower height scenario, the LSALT procedures will be penetrated by 60ft and will need to be adjusted accordingly (through the Applicant's proposed consultation with Air Services). The Department notes that if the maximum tower height is implemented but the LSALT for air route W10 is not amended to account for this, a lower tower height would need to be used for that turbine.

The Department notes that agricultural aerial spreading or spraying operations may be affected by the placement of the turbines, including over the immediately adjoining properties of the turbines. The Applicant has however stated that through its consultation process, it has determined that the owners of the land on which the development is proposed, have no intention of using aerial application of agricultural fertilisers and/or pesticides in the future. With respect to adjoining landowners however, it was found that although most did not currently use aerial application methods, they want to retain the option for the future. It is noted that the Applicant has committed to cover the reasonable cost increase associated with aerial agricultural activity for immediately adjoining landowners, in the event they require such activities. The landowner seeking compensation for the cost increase will need to demonstrate this increase.

### **Conclusion and Recommendations**

With respect to the management of potential aviation hazards, the Department recommends a condition requiring the Applicant to prepare an Obstacle Marking and Lighting Plan in consultation with Upper Lachlan Shire Council, Air Services Australia, CASA and the Department of Defence. This plan is to be included as part of the required Construction Environmental Management Plan which requires the Secretary's approval before construction can commence. The Obstacle Marking and Lighting Plan has been recommended to ensure the marking and lighting of specific turbines is appropriately designed and minimises potential visual impact.

The Department is satisfied that the Applicant has considered potential aviation impacts and supports the conclusion that the turbines will not pose an unacceptable risk to aviation safety. The Department has recommended further conditions regarding aviation obstacles and hazards during construction and operation of the Development. These include:

- the requirement to consult with aerodrome and airport operators that have an aerodrome located within 30km of the boundaries of the site, Airservices Australia, Aerial Agricultural

- Association Australia and RFS, and provide additional mitigation and management measures for each of the potential impacts and hazards identified, prior to the commencement of construction (and to ascertain the potential need for obstacle lighting);
- the need to provide construction coordinates, heights and ground levels for the base of each turbine to the Civil Aviation Safety Authority, Airservices Australia, Royal Australian Air Force - Aeronautical Information Services, Aerial Agricultural Association of Australia and RFS, as well as all known users of privately owned local airfields; and
  - the need to consult local aerial agricultural stakeholders and fully fund any increased cost of aerial agricultural spraying on non-associated property which is directly attributable to the Development.

## 5.7. Assessment of Other Issues

The Department's consideration of other issues identified during the assessment of the Crookwell 3 Wind Farm is presented below.

### 5.7.1. Construction Noise and Vibration

As noted by EPA in its submission, some receivers will experience construction noise above the Noise Affected Level over a construction period of potentially more than 12 months. Therefore the construction hours should be limited to standard hours (7:00 am to 6:00 pm, Mondays to Fridays and 8:00 am to 1:00 pm on Saturdays).

A condition requiring this is recommended along with the requirement for the implementation of a Construction Noise and Vibration Management Plan. This Plan is to include the final schedule of works, noise management measures, including community notification, noise monitoring and complaints management requirements. The schedule of works would ascertain the nature and timing of the different construction activities to occur so that appropriate management measures can be put in place to ensure the avoidance of adverse noise impacts.

As part of the civil construction works, infrequent blasting may be required to clear obstacles (such as large rock outcrops) and prepare the wind turbine foundations. To avoid adverse blasting impacts, the Department recommends a condition that ensures air blast overpressure does not exceed 115 dB(Lin Peak). However of the total number of blasts over a 12 month period, a 5% exceedance is allowed. The absolute maximum permitted is a 120 dB(Lin Peak) air blast overpressure. The Department has also recommended that ground vibration from blasting does not exceed specific criteria (peak particle velocity criteria of 5mm per second). These blasting limitations are derived from the ANZECC 1990 guideline to minimise annoyance and discomfort at residences. The blasting limitations are also set well below levels known to cause structural damage and have been formed to minimise the likelihood of any type of structural damage to occur as a result of blasting.

The Applicant has stated that the closest anticipated distance between blasting and residences would be approximately 600metres (no. 79 Leeston, host/associated receiver). At this distance, the predicted maximum instantaneous charge of up to 21kg is likely to produce an air blast overpressure below the acceptable level of 115dB Linear. A maximum instantaneous charge of 21kg is expected to result in a vibration level of 0.81mm/s, which is well within the recommended maximum level of 5mm/s in the ANZECC Guidelines.

The Department has also recommended that prior to each blasting event the Applicant is to notify Council and potentially-affected landowners.

Noise level predictions along the regional road network to be used by construction traffic have not been provided by the Applicant. In this regard, the Department considers that the noise associated with the construction traffic is not likely to be perceptible from the noise already being generated by existing traffic volumes on the Hume Highway and regional network.

There may be high levels of traffic noise experienced at residences situated in close proximity to the construction routes. As such, the Department considers that the Applicant must ascertain the likely construction traffic noise levels to be generated by the project once the preferred route is finalised. The Applicant must form specific construction traffic mitigation and management measures prior to construction. As such, it is recommended that sub-conditions under the required Construction Noise and Vibration Management Plan include:

- details of construction traffic and an indicative schedule for construction works;
- the relevant noise criteria as it applies to a particular activity;
- details on what reasonable and feasible actions and measures would be implemented to minimise noise impacts; and
- detailed consideration of measures to be employed to ensure acoustic impacts along the heavy vehicle routes are managed and minimised.

The Department notes that the Applicant proposes night-time deliveries of construction equipment (being activities outside of the standard hours), which may impact on the acoustic amenity (including sleep disturbance) of residential receivers. To ensure the acoustic amenity of residential receivers is not adversely affected by the proposed deliveries, the Department has recommended a condition which permits such activities only in the following circumstances:

- if the construction works that generate noise are:
  - (i) no more than 5 dB(A) above rating background level at any residence in accordance with the *Interim Construction Noise Guideline* (DECC, 2009); and
  - (ii) no more than the noise management levels specified in Table 3 of the *Interim Construction Noise Guideline* (DECC, 2009) at other sensitive receivers; or
- for the delivery of materials required outside these hours by the NSW Police Force or other authorities for safety reasons; or
- where it is required in an emergency to avoid the loss of lives, property and / or to prevent environmental harm; or
- works approved through an EPL; or
- works as approved through an out-of-hours work protocol outlined in the required Construction Noise and Vibration Management Plan.

The Department considers that subject to the implementation of the above recommended conditions, the final construction traffic routes to be utilised for construction would not significantly affect the acoustic amenity of surrounding residential and other types of receivers, along those routes.

### **5.7.2. Aboriginal Heritage Impacts**

OEH raised concerns regarding the potential impacts on Aboriginal heritage items as a result of the development. The Applicant engaged Andersons Environmental Consultants Pty Ltd to undertake an indigenous (and non-indigenous) archaeological heritage assessment of the proposed development site. A desktop assessment was firstly undertaken to ascertain the level of potential for archaeological value. The results of the desktop review indicated that there are no listed heritage items located at or in the vicinity of the site. An initial field assessment was then carried out of the site to determine the possible historical land uses of the site, including sheltering and hunting resources to identify areas within the site where potential areas of artefacts, including signs of any underground artefact locations, may be present.

Detailed field surveys were completed for areas within the site in which artefacts were predicted to be located. The Pejar Local Aboriginal Land Council participated in the detailed surveys undertaken. The results of the field surveys detected 10 sites as having good potential for containing artefact finds.

The detailed surveys found:

- 17 stone artefacts in Site 1 and being of low to moderate significance;
- 8 artefacts, including quartz and Grey Silcrete fragments and comprising of a general mix of cores, flakes and a small tool in Site 2. These finds are of low to moderate significance;
- a single Brown Silcrete flake (tool) in Site 3 and of low significance;

- 2 Grey Silcrete flakes in Site 4 and of low significance;
- 2 Grey Silcrete flakes in Site 5 and of low significance;
- a single flaked core of Grey Silcrete in Site 6 and of low significance;
- 1 Brown Silcrete flake in Site 7 and of low significance;
- 41 small fragments of Brown Silcrete in Site 8 of moderate significance;
- 1 fragment of Grey Silcrete in Site 9 of low significance; and
- 7 fragments of scattered quartz in Site 10 of low significance.

The additional field surveys undertaken as part of the supplementary heritage assessment found an additional 19 Indigenous heritage sites, comprising of:

- WF1 – a single isolated quartz piece of low significance;
- WF2 – 4 silcrete and quartz flakes of low significance;
- WF3 – an artefact scatter containing four silcrete stone artefacts, including flakes and cores, of low significance;
- WF4 – 2 silcrete flakes of low significance;
- WF5 – 1 quartz flake and one silcrete flake of low significance;
- WF6 – 4 pieces of silcrete of low significance;
- WF7 – 4 pieces of quartz of low significance;
- WF8 – several pieces of quartz and 1 silcrete core of low significance;
- WF9 – an artefact scatter containing 5 silcrete artefacts, including 1 core and flakes, of low significance;
- WF10 - a single silcrete core of low significance;
- WF11 – a single silcrete flake of low significance;
- WF12 – an artefact scatter containing silcrete flakes of low significance;
- WF13 – 1 silcrete flake of low significance;
- WF14 – 1 large stone artefact scatter containing more than 50 stone artefacts including quartz and silcrete material. This site has sub-surface archaeological potential and is of moderate significance;
- WF15 – 5 silcrete artefacts above a drainage line. Given its locality it is likely further artefacts may have been deposited or relocated to lower stratigraphic layers and therefore has sub-surface archaeological potential and is of moderate significance;
- WF16 – an artefact scatter comprising of 3 silcrete flakes of low significance;
- WF1 PAD – moderate archaeological potential;
- WF2 PAD – moderate archaeological potential; and
- WF3 PAD - high archaeological potential.

The Applicant has indicated that the construction of the development is likely to avoid impacts to the ten sites detected as part of the Environmental Assessment field surveys. While there is a possibility that Site 2 which contains 8 artefacts and Grey Silcrete fragments could be impacted as it is close to the proposed location for turbine A17, the Applicant has committed to the micro-siting of turbine A17 to avoid Site 2 altogether.

With respect to the additional 19 sites detected as part of the supplementary heritage assessment, the assessment recommends that sites WF1 to WF16 be avoided but where avoidance is not possible, the artefacts be collected and stored by the Pejar Local Aboriginal Land Council or relocated to an area outside of the impact zone.

With respect to the PAD sites, WF1 PAD is adjacent to a proposed access track, WF2 PAD is located adjacent to proposed turbine 26 and WF3 PAD is located across the proposed access track from proposed turbine A10. The supplementary heritage assessment states that if impact cannot be avoided at these three sites, test excavations for the PAD areas are to be undertaken. The supplementary assessment also recommends that no works are to occur in the areas of these sites until the sub-surface archaeological investigations are undertaken and reported on.

The Department notes that while the initially detected 10 sites containing artefacts are likely to be avoided as none are near the turbine locations, there is potential for the 19 sites recorded during the supplementary assessment to be impacted as a result of access roads.

While OEH considers that the supplementary heritage assessment is adequate, it has advised that given the detailed design has not been finalised, all potential impacts on indigenous heritage values across the development area may not have been identified. The Applicant has stated that as specific areas for access tracks and electrical connections were not pegged at the time of the initial surveys, it is committed to additional targeted surveys of those areas once those components of the development are pegged.

OEH has stated that given additional sites were recorded as part of the supplementary assessment, there is an ever increasing cumulative impact on Aboriginal heritage values that needs to be addressed. As such, OEH concludes that an Aboriginal Cultural Heritage Management Plan needs to be prepared and implemented. Also, a methodology for the proposed surface salvage and subsurface testing will need to be supplied to OEH prior to the commencement of excavations.

The Department has recommended a condition requiring a suite of appropriate indigenous heritage mitigation and management measures be detailed in a Heritage Management Plan. This plan is to be informed by further archaeological surveys and any required test excavations conducted for the access roads and electrical connections and be developed in consultation with Pejar Local Aboriginal Land Council, any other registered Aboriginal parties and OEH.

The Heritage Management Plan must also detail procedures for dealing with previously unidentified Aboriginal objects, including cessation of works in the vicinity of the find until appropriate significance assessments are carried out and mitigation measures are determined.

The Department is satisfied that subject to the implementation of its recommended conditions, the construction of the development would be able to be designed in a manner that avoids significant impacts on Aboriginal heritage.

### **5.7.3. Historical Heritage**

The Applicant's Historical Heritage Impact Assessment found that there were no significant items that would be disturbed as a result of the development. It was also found that all identified historical heritage items were well outside of the areas to be developed.

### **5.7.4. Blade Throw**

A submission from a local resident raised concerns that the turbines would pose the risk of blade throw, which involves a turbine's blade breaking during operation. The Department notes that blade throw is a potential public safety risk and can occur as a result of a design defect, inadequate maintenance, excessive winds during a storm event, rotor over-speed or lightning/fire.

The Department's *Draft NSW Wind Farm Guidelines* states safe operating management practices and the installation of over speed protection mechanisms should be considered in formulating a wind farm proposal. It is noted that the Applicant has committed to a range of safety practices to address the risk of blade throw, including:

- incorporating rotor over-speed protection and built-in redundancies;
- the turbines are to be certified against relevant standards, including IEC 61400-23 and IEC 62305-1/3/4 *Protection Against Lightning*;
- regular maintenance of the turbines; and
- equipping the turbines with sensors that can react to any imbalance in the rotor blades and shut down the turbine if necessary.

The Department considers that subject to the Applicant implementing all of its commitments with respect to the safety of persons, the risk of blade throw occurring would be very low.

### **5.7.5. Property Devaluation**

Concerns were raised by the community regarding the potential devaluation of their properties due to the development of the wind farm. The Applicant's Socio-Economic Impact Assessment found that studies undertaken both in Australia and overseas indicated that wind farms generally do not have a negative impact on the value of land surrounding the wind farms. It is also noted that a report commissioned by the NSW Valuer-General in 2009 found that based on sales transaction data, there are no obvious discernible impacts on land values from wind farms in the large majority of cases.

The Department considers that, while several public submissions raised concerns regarding the devaluation of their properties as a result of the installation of the proposed development, many factors, apart from the proximity of a property to any surrounding development, may influence the ultimate value of a property. The Department does recognise that impacts such as significant visual impacts and noise caused as a result of the development at non-associated receivers may cause indirect impacts on the value of their properties. The Department has however undertaken an assessment of potential visual amenity and noise impacts associated with the development and has recommended conditions so that significant impacts are mitigated and managed (refer to **Section 5.2**). Similarly, noise impacts will be limited to acceptable levels (refer to **Section 5.3**)

The Department therefore considers that requiring the Applicant to financially compensate a landowner on the grounds of property devaluation is not warranted, noting that some options for acquisition have been provided. This however does not preclude a landowner from reaching an independent agreement with the Applicant at any time.

### **5.7.6. Community benefits and contributions**

Upper Lachlan Shire Council requested that the Applicant contribute to a community enhancement fund. The Applicant proposes to enter into a Voluntary Planning Agreement under which it will contribute an annual monetary contribution of amount of \$1,666 (adjusted annually to changes in the CPI) per operating turbine forming part of the development. The annual contributions would be paid into a Community Enhancement Fund which would fund local projects within a radius of 20-30km of the Crookwell 3 Wind Farm for the benefit of the local communities.

The submission from Upper Lachlan Shire Council stated that the Applicant is to enter into a Voluntary Planning Agreement to provide contributions to the Council for a community enhancement fund in accordance with clause 3.17 of the Upper Lachlan Development Control Plan 2010 (which states that Council has adopted an annual contribution of \$2,500 per turbine per annum indexed to the CPI for Sydney (Housing) commencing at the June 2011 quarter)).

In addition to the Voluntary Planning Agreement, the Applicant commits to enter into voluntary Neighbour Benefit Sharing Agreements with all non-associated landowners with dwellings within 2km of a proposed wind turbine, should those landowners wish to enter into the agreements (with an annual total contribution amount of up to \$46,600). It is noted that in the event that any of these non-associated landowners prefer not to enter into the voluntary Agreement, the surplus funds will be added to Council's Community Enhancement Fund.

The Applicant anticipates the combined value of the Voluntary Planning Agreement and the Neighbour Benefit Sharing Agreements is to be equal to or greater than the \$2,500 per turbine amount under Council's Development Control Plan 2010.

## 6. CONCLUSIONS AND RECOMMENDATION

---

### 6.1 Conclusions

The Department supports the development of wind farms as a form of renewable energy, subject to the suitability of the location of such developments. The proposal is considered to be consistent with Commonwealth and State policies promoting the production and uptake of renewable energy sources as a means of addressing climate change. The proposed development will also contribute to Australia's Renewable Energy Target of sourcing 20% of electricity from renewable sources by the year 2020.

The key environmental impacts associated with the development relate to construction and operational ecological impacts, visual amenity impacts, operational noise impacts, bushfire and firefighting risks, traffic and transport impacts and aviation safety risks. The Department has assessed the development application, EIS, submissions received on the proposal, and the Applicant's responses to submissions. 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 key recommended conditions include specific requirements to implement appropriate construction management measures and limit construction hours to acceptable times, and a requirement through final turbine selection to verify that the final design can meet the relevant limits imposed. The Department has recommended the deletion of turbine A18 to avoid the clearing of approximately 0.35 ha native forest vegetation. To ensure the appropriate management of potential impacts on avifauna during operation of the turbines, the Applicant is also required to implement a Bird and Bat Adaptive Management Programme.

The visual assessment concluded an acceptable visual outcome for the majority of potentially affected properties except for 8 properties where vegetation screening and other minimisation measures may not succeed. These properties are subject to a stepped approach for minimising and negotiating the visual outcomes. The condition enables the relevant receiver to request that the Applicant acquire its property if no agreement on visual mitigation has been negotiated.

The Applicant is also required to ensure adequate firefighting equipment and water supplies are available on site. Other key recommended conditions require the Applicant to prepare construction and operational bushfire management plans, as well as a construction traffic management protocol. The conditions also include consultation requirements with agencies prior to the implementation of key stages of the development (as well as ongoing consultation).

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 Assessment Commission consider the findings and recommendations of this report and determine to approve the development, subject to the recommended conditions.

**Director  
Infrastructure**

**Executive Director  
Infrastructure and Industry Assessments**

## **APPENDIX A ENVIRONMENTAL ASSESSMENT**

---

See the Department's website at

[http://majorprojects.planning.nsw.gov.au/index.pl?action=view\\_job&job\\_id=6695](http://majorprojects.planning.nsw.gov.au/index.pl?action=view_job&job_id=6695)

## **APPENDIX B      CONSIDERATION OF ENVIRONMENTAL PLANNING INSTRUMENTS**

---

### **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 proposal is classified as State significant development as it is development for the purpose of electricity generating works that has a capital investment value (CIV) of more than \$30 million under clause 20 (Electricity generating works and heat or co-generation) of Schedule 1 of the State Environmental Planning Policy (State and Regional Development) 2011. Therefore, the Minister for Planning is the consent authority.

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

The aim of the Infrastructure SEPP is to facilitate the effective state wide delivery of infrastructure by providing greater flexibility in the location of infrastructure and service facilities, allowing the development of surplus government land, identifying relevant environmental assessment categories for development and relevant matters to be considered and providing for consultation with relevant public authorities.

Schedule 3 of the Infrastructure SEPP requires traffic generating development to be referred to the RMS. The proposal was referred to RMS and no objection was raised in relation to the development subject to the matters raised in its submission being addressed (refer to **Section 4** of this report).

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

The aim of the Rural Lands SEPP is to facilitate the orderly and economic use and development of rural lands for rural and related purposes, to identify the Rural Planning Principles and the Rural Subdivision Principles, to implement measures designed to reduce land use conflicts, to identify State significant agricultural land for the purpose of ensuring the ongoing viability of agriculture on that land, and to amend provisions of other environmental planning instruments relating to concessional lots in rural subdivisions.

The proposal would not conflict with the continued use of the development land for agricultural purposes as agricultural practices, such as grazing, can operate on most of the development site, except for areas on which the turbines are to be installed (but can still continue in close proximity to the turbines).

### **State Environmental Planning Policy 44 (Koala Habitat Protection)**

The aim of the Koala Habitat Protection SEPP 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 Applicant's flora and fauna assessment detected no usage of the site by koalas. The 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).

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

The development site is zoned 1(a) General Rural under the Crookwell Local Environmental Plan 1994 (CLEP 1994) and the Mulwaree Local Environmental Plan 1995 (MLEP 1995). Consideration of the relevant aims of both LEPs is provided in **Table 9** below.

**Table 9:** Consideration of the CLEP 1994 and MLEP 1995

LEP	Department Comment
<b>CLEP 1994 Aim</b>	
<b>1(a) General Rural</b>	
To protect, enhance and conserve the area's agricultural land (particularly prime crop and pasture land) to sustain its efficient and effective agricultural production potential.	Except for the areas on which the turbines and access tracks are to be placed, the agriculture activities that currently exist (predominately grazing) can continue unaffected by the development. The economic benefits that flow from the leasing arrangements with the associated landowners can allow for improvements in agricultural production. At the completion of the development's operating life, the turbines would either be replaced or the land be rehabilitated to its previous or better condition. Also, the access tracks considered surplus to the farmers' requirements will be rehabilitated and re-vegetated by introducing soil, mulch and grass seeds.
To protect, enhance and conserve the area's trees and other vegetation in environmentally sensitive areas where they are significant to scenic amenity or natural wildlife habitat or are likely to control land degradation.	The development is to be located on predominantly cleared land and areas of improved pasture. The Department's assessment of flora impacts is detailed in section 5.1 of this report. The assessment finds that subject to the implementation of the Department's recommended conditions, significant impacts on flora can be avoided and the residual impacts can be appropriately minimised and managed.
To protect, enhance and conserve the area's places and buildings of archaeological or heritage significance (including the protection of Aboriginal relics and places).	The specialist studies undertaken on behalf of the Applicant found that the development would not significantly impact any cultural values of the site. The Department's assessment Aboriginal heritage ( <b>Section 5.7.2</b> ) and historical heritage ( <b>Section 5.7.3</b> ) concluded that the development would not have significant impacts on cultural values.
To control development that could have an adverse impact on the rural character of the land in the zone.	The landscape in which the development is proposed has an overall medium sensitivity to accommodate change and represents a landscape that is reasonably typical of landscape character areas that are commonly found in the surrounding regional area of the New South Wales Southern Tablelands. This means that while some intrinsic characteristics of the landscape are likely to be altered (i.e. from no turbine to a turbine within a

	<p>specific area), the landscape will have a reasonable level of capability to accommodate the proposed change. Refer to <b>Section 5.2</b> of this report for the Department's assessment of visual impacts.</p>
<p>To control development that could be subjected to physical limitations such as erosion hazard, bush fire risk and flooding.</p>	<p>Erosion - the development would utilise limited land for its operation (for turbines and access tracks). The risk of increased erosion in the region and on the site as a result of the development is therefore low. To ensure however the construction of the development is undertaken in a manner that adequately manages the risk of (and controls) erosion, the Department has recommended the required Construction Soil and Water Management Plan detail erosion and sediment control measures to be utilised by the Applicant.</p> <p>Flooding and Drainage Patterns - the turbines are proposed in areas that are away from waterways. While access tracks will cross waters and drainage lines, these crossings will be appropriately managed and designed to minimise impacts. The Department has also recommended a condition requiring waterway crossings be developed in consultation with NOW and DPI (Fisheries) and be consistent with the relevant waterway crossing guidelines. The preparation and implementation of the Construction Soil and Water Management Plan is also recommended.</p> <p>Bushfire – to ensure appropriate management measures are in place to address bushfire risk, the Department has recommended a range of conditions to ensure the Applicant provides for asset protection, has appropriate firefighting equipment and water supplies on site and prepares construction and operational bushfire management plans (including having the option of potentially switching turbines off). Refer to <b>Section 5.4</b> of this report for the Department's assessment of bushfire risk.</p>
<p>To provide land for future urban development, for rural residential development and for development for other non-agricultural purposes, depending on the need for such development.</p>	<p>The development is for the provision of renewable electricity generation and will contribute to Australia's Renewable Energy Target of sourcing 20% of electricity from renewable sources by the year 2020.</p>
<p><b>Mulwaree LEP 1995</b></p>	
<p><b>1(a) General Rural</b></p>	
<p>To promote, enhance and conserve agricultural land, particularly prime crop and pasture land, in a manner which sustains its efficient and effective</p>	<p>Refer to the above consideration of the CLEP 1994.</p>

agricultural production potential.	
To promote, enhance and conserve soil stability by controlling and locating development in accordance with soil capability, as identified by the Department of Conservation and Land Management.	Refer to the above consideration of the CLEP 1994.
To promote, enhance and conserve valuable deposits of minerals, coal, petroleum, and extractive materials by controlling the location of development for other purposes in order to ensure the efficient extraction of those deposits.	A portion of the development site overlaps with one existing mineral exploration licence. It is noted that the Applicant has contacted the exploration licence holder and no response has been received from that licence holder. As noted by Trade & Investment (Mineral Resources), it is important that the Applicant continues to attempt to liaise with the licence holder with regards to the placement of the development components. The Department has recommended a condition which requires the Applicant to consult with the Mineral Resources section of Trade & Investment, and that mineral exploration licence holder, with respect to the placement of turbines and related infrastructure and their potential impact upon mineral resources. This consultation is to occur prior to the commencement of the relevant construction works.
To promote, enhance and conserve trees and other vegetation in sensitive areas and in any place where the conservation of the vegetation is significant to the protection of scenic amenity or natural wildlife habitat or is likely to control or contribute to the control of land degradation.	Refer to the above consideration of the CLEP 1994.
To promote, enhance and conserve water resources and water catchment areas for use in the public interest.	Refer to the above consideration of the CLEP 1994.
To promote, enhance and conserve localities of significance for nature conservation, including localities with rare plants, wetlands, permanent watercourses and significant wildlife habitat.	Refer to the above consideration of the CLEP 1994.
To promote, enhance and conserve places and buildings of archaeological or heritage significance, including aboriginal relics and places.	Refer to the above consideration of the CLEP 1994.
To provide land for future urban development, for rural residential development and for development for other non-agricultural purposes, in accordance with the need for that development, and subject to the capability of the land and its importance in terms of the other objectives of this zone.	Refer to the above consideration of the CLEP 1994.

## **APPENDIX C SUBMISSIONS**

---

See the Department's website at

[http://majorprojects.planning.nsw.gov.au/index.pl?action=view\\_job&job\\_id=6695](http://majorprojects.planning.nsw.gov.au/index.pl?action=view_job&job_id=6695)

## **APPENDIX D    LANDSCAPE AND VISUAL IMPACT ASSESSMENT PEER REVIEW**

---

See the Department's website at

[http://majorprojects.planning.nsw.gov.au/index.pl?action=view\\_job&job\\_id=6695](http://majorprojects.planning.nsw.gov.au/index.pl?action=view_job&job_id=6695)

## **APPENDIX E    APPLICANT'S PREFERRED PROJECT & RESPONSE TO SUBMISSIONS**

---

See the Department's website at  
[http://majorprojects.planning.nsw.gov.au/index.pl?action=view\\_job&job\\_id=6695](http://majorprojects.planning.nsw.gov.au/index.pl?action=view_job&job_id=6695)

---

**APPENDIX F PREDICTED CUMULATIVE NOISE EXCEEDANCES  
(CROOKWELL 1, 2 AND 3 WIND FARMS) – WITHOUT MITIGATION**

---

	Turbine Model			
	GE 2.5xl	V90	V100	MM92
Receptor	Exceedance (above RBL + 5 dBA)	Exceedance (above RBL + 5 dBA)	Exceedance (above RBL + 5 dBA)	Exceedance (above RBL + 5 dBA)
H8 Narangi	2.6 dBA @ 8.2 m/s	1.3 dBA @ 8.2 m/s	1.5 dBA @ 8.2 m/s	3.6 dBA @ 8.2 m/s
	4.3 dBA @ 9.6 m/s	2.1 dBA @ 9.6 m/s	2.2 dBA @ 9.6 m/s	4.5 dBA @ 9.6 m/s
	4.4 dBA @ 10.9 m/s	1.8 dBA @ 10.9 m/s	2.2 dBA @ 10.9 m/s	4.4 dBA @ 10.9 m/s
	3.3 dBA @ 12.3 m/s	0.4 dBA @ 12.3 m/s	1.3 dBA @ 12.3 m/s	3.7 dBA @ 12.3 m/s
			0.6 dBA @ 13.7 m/s	
H19	2.8 dBA @ 8.2 m/s	1.4 dBA @ 8.2 m/s	1.5 dBA @ 8.2 m/s	3.8 dBA @ 8.2 m/s
	4.5 dBA @ 9.6 m/s	2.1 dBA @ 9.6 m/s	2.2 dBA @ 9.6 m/s	4.6 dBA @ 9.6 m/s
	4.5 dBA @ 10.9 m/s	1.9 dBA @ 10.9 m/s	2.2 dBA @ 10.9 m/s	4.6 dBA @ 10.9 m/s
	1.9 dBA @ 12.3 m/s		0.4 dBA @ 12.3 m/s	2.9 dBA @ 12.3 m/s
			0.8 dBA @ 13.7 m/s	
H20 Normaroo	2.9 dBA @ 8.2 m/s	2.4 dBA @ 8.2 m/s	2.2 dBA @ 8.2 m/s	3.2 dBA @ 8.2 m/s
	4 dBA @ 9.6 m/s	3.3 dBA @ 9.6 m/s	3.1 dBA @ 9.6 m/s	4.1 dBA @ 9.6 m/s
	4 dBA @ 10.9 m/s	3.1 dBA @ 10.9 m/s	3 dBA @ 10.9 m/s	4 dBA @ 10.9 m/s
	2.1 dBA @ 12.3 m/s	1.3 @ 12.3 m/s	1.3 dBA @ m/s	2.4 dBA @ 12.3 m/s
H58	0.5 dBA @ 8.2 m/s			1.8 dBA @ 8.2 m/s
	2.1 dBA @ 9.6 m/s			2.2 dBA @ 9.6 m/s
	1.1 dBA @ 10.9 m/s			1.2 dBA @ 10.9 m/s
H59	1.3 dBA @ 8.2 m/s			2.6 dBA @ 8.2 m/s
	2.8 dBA @ 9.6 m/s			3 dBA @ 9.6 m/s
	1.9 dBA @ 10.9 m/s			2 dBA @ 10.9 m/s
			0.6 dBA @ 12.3 m/s	
H60	0.7 dBA @ 9.6 m/s			0.1 dBA @ 8.2 m/s
				0.9 dBA @ 9.6 m/s
H61	1.4 dBA @ 8.2 m/s	0.1 dBA @ 8.2 m/s		2.7 dBA @ 8.2 m/s
	3.3 dBA @ 9.6 m/s			3.5 dBA @ 9.6 m/s
	2.5 dBA @ 10.9 m/s			2.6 dBA @ 10.9 m/s
			0.4 dBA @ 12.3 m/s	
H62	1.4 @ 8.2 m/s			2.7 dBA @ 8.2 m/s
	3.3 dBA @ 9.6 m/s			3.5 dBA @ 9.6 m/s
	2.5 dBA @ 10.9 m/s			2.6 dBA @ 10.9 m/s
			0.4 dBA @ 12.3 m/s	
H64	4.4 dBA @ 8.2 m/s	3 dBA @ 8.2 m/s	3.1 dBA @ 8.2 m/s	5.4 dBA @ 8.2 m/s
	5.8 dBA @ 9.6 m/s	3.1 dBA @ 9.6 m/s	3.6 dBA @ 9.6 m/s	5.9 dBA @ 9.6 m/s
		0.4 dBA @ 10.9 m/s		3.2 @ 10.9 m/s
			0.4 @ 12.3 m/s	
H65	4.3 dBA @ 8.2 m/s	3 dBA @ 8.2 m/s	3.1 dBA @ 8.2 m/s	5.3 @ 8.2 m/s
	5.7 dBA @ 9.6 m/s	3.1 dBA @ 9.6 m/s	3.5 dBA @ 9.6 m/s	5.8 dBA @ 9.6 m/s
	3 dBA @ 10.9 m/s	0.4 dBA @ 10.9 m/s	0.8 dBA @ 10.9 m/s	3.1 dBA @ 10.9 m/s
			0.3 dBA @ 12.3 m/s	
H66 Little Vale1	4.9 dBA @ 8.2 m/s	2.9 dBA @ 8.2 m/s	3.3 dBA @ 8.2 m/s	6.3 @ 8.2 m/s
	6.9 dBA @ 9.6 m/s	3.6 dBA @ 9.6 m/s	3.9 dBA @ 9.6 m/s	7.1 dBA @ 9.6 m/s
	7 dBA @ 10.9 m/s	3.2 dBA @ 10.9 m/s	3.9 dBA @ 10.9 m/s	7.1 dBA @ 10.9 m/s
	5.8 dBA @ 12.3 m/s	2.2 dBA @ 12.3 m/s	3.9 dBA @ 12.3 m/s	7.1 dBA @ 12.3 m/s
			2.4 dBA @ 13.7 m/s (36.5 day & 35 night)	
H67	2.5 dBA @ 8.2 m/s	0.7 dBA @ 8.2 m/s	0.6 dBA @ 8.2 m/s	3.9 dBA @ 8.2 m/s
	4.5 dBA @ 9.6 m/s	1.4 dBA @ 9.6 m/s	1.2 dBA @ 9.6 m/s	4.7 dBA @ 9.6 m/s
	4.6 dBA @ 10.9 m/s	1 dBA @ 10.9 m/s	1.2 dBA @ 10.9 m/s	4.7 dBA @ 10.9 m/s
	3.4 dBA @ 12.3 m/s		1.2 dBA @ 12.3 m/s	4.7 dBA @ 12.3 m/s
			3.2 @ 13.7 m/s (36.5 day & 35 night)	
H68	1.2 dBA @ 8.2 m/s	0.8 dBA @ 9.6 m/s	0.6 dBA @ 9.6 m/s	2.1 dBA @ 8.2 m/s
	2.8 dBA @ 9.6 m/s	0.6 dBA @ 10.9 m/s	0.5 dBA @ 10.9 m/s	2.9 dBA @ 9.6 m/s
	2.9 dBA @ 10.9 m/s			2.9 dBA @ 10.9 m/s
			0.1 dBA @ 12.3 m/s (37.5 day & 35.1 night)	
H69	3 dBA @ 8.2 m/s	1.7 dBA @ 8.2 m/s	1.7 dBA @ 8.2 m/s	4 dBA @ 8.2 m/s
	4.7 dBA @ 9.6 m/s	2.5 dBA @ 9.6 m/s	2.5 dBA @ 9.6 m/s	4.9 dBA @ 9.6 m/s
	4.8 dBA @ 10.9 m/s	2.2 dBA @ 10.9 m/s	2.4 dBA @ 10.9 m/s	4.8 dBA @ 10.9 m/s
	1.2 dBA @ 12.3 m/s			2.1 dBA @ 12.3 m/s
H70 Snowgums	2.5 dBA @ 8.2 m/s	2 dBA @ 8.2 m/s	1.8 dBA @ 8.2 m/s	3 dBA @ 8.2 m/s
	3.8 dBA @ 9.6 m/s	2.8 dBA @ 9.6 m/s	2.6 dBA @ 9.6 m/s	3.9 dBA @ 9.6 m/s
	3.8 @ 10.9 m/s	2.7 dBA @ 10.9 m/s	2.5 @ 10.9 m/s	3.8 dBA @ 10.9 m/s
	0.3 dBA @ 12.3 m/s			0.8 dBA @ 12.3 m/s
H71 Lyncross				0.4 @ 9.6 m/s
H63	2.4 dBA @ 8.2 m/s	0.6 dBA @ 8.2 m/s	0.8 dBA @ 8.2 m/s	3.7 dBA @ 8.2 m/s
	2.3 dBA @ 9.6 m/s			2.5 dBA @ 9.6 m/s
	0.6 dBA @ 10.9 m/s			0.7 dBA @ 10.9 m/s

**APPENDIX G    RECOMMENDED CONDITIONS OF CONSENT**

---