



NSW GOVERNMENT  
**Department of Planning**

***MAJOR PROJECT ASSESSMENT:  
Conroy's Gap Wind Farm***

Director-General's  
Environmental Assessment Report  
Section 75I of the  
*Environmental Planning and Assessment Act 1979*

May 2007

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## EXECUTIVE SUMMARY

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EPURON Pty Ltd (formerly Taurus Energy Pty Ltd)<sup>1</sup>, the Proponent, is seeking the Minister for Planning's approval for the construction and operation of up to 15 wind turbines at Conroy's Gap on the Black Range, approximately 17 kilometres west of Yass in the Yass local government area (see locality plan, Figure 1). The turbines will be capable of generating up to 30 megawatts (MW) of electricity.

The project involves:

- construction of up to 15 wind turbines, with blades of up to 46 m long mounted on tubular steel towers up to 80 m high at the hub (total turbine height of up to 126 m);
- electrical connections between wind turbines using a combination of underground cables and overhead concrete pole power lines;
- substation and transmission line connecting the wind turbines to TransGrid's existing Yass-Wagga Wagga 132kV transmission system which crosses the site;
- onsite control room and equipment storage facilities;
- access roads around the site and minor upgrades to the local road network, for installation and maintenance of wind turbines; and
- temporary construction infrastructure including a site office and facilities.

The Conroy's Gap wind farm will generate up to 99,000 MWh of renewable energy per annum, equivalent to the annual average electricity consumption of around 12,600 homes. At this generating capacity, up to around 94,000 tonnes of carbon dioxide (equivalent) emissions per annum would be avoided. This is equivalent to removing some 18,800 typical cars off our roads over the anticipated 30 year life of the project. The Project would also result in the avoidance of consumption of substantial quantities of water and the emission of other pollutants that would otherwise result from coal or other fossil fuel-fired power stations.

The wind farm project has a capital investment value of \$50 million. It will employ approximately 50 people during construction and up to five during the operational life of the project.

A total of 50 submissions were received as a result of the public exhibition of the Environmental Assessment. The Department of Natural Resources, Roads and Traffic Authority, Civil Aviation Safety Authority, the Heritage Office, Department of Primary Industries and the Department of Lands and Yass Valley Council also provided submissions on the project.

The majority of the submissions objected to the proposal and raised a number of issues concerning visual impact, operational noise from the wind turbines, flora and fauna impacts, project justification, depreciation in property values, bushfire risk and various construction related impacts (including erosion and sediment control and road traffic).

The Department has assessed the Environmental Assessment, Submissions Report and the 50 submissions received during the public exhibition of the proposal and is satisfied that the impacts of the project can be mitigated and/ or managed to ensure an acceptable level of environmental performance through the Proponent's statement of commitments (see APPENDIX A) and the Department's recommended conditions in APPENDIX A. The recommended conditions cover on-going compliance mechanisms, independent reviews, community consultation and complaints management, performance audits and specific conditions to address key issues identified during the assessment process such as visual amenity and noise.

The site is considered to be suitable for the proposed project and will provide a range of benefits to the region and State. Consequently, the Department recommends the project be approved, subject to the recommended conditions of approval.

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<sup>1</sup> On 1 January 2007, the Proponent advised that the company, Taurus Energy Pty Ltd, will now be known as EPURON Pty Ltd

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# 1 BACKGROUND

## 1.1 Site Description

The proposed wind farm is located on the Black Range, approximately 17 kilometres west of Yass (refer to Figure 1). The Black Range rises over 300 metres above the surrounding valleys at an elevation of approximately 800 metres above sea-level. The proposed site extends over approximately seven kilometres of the range covering 370 hectares, oriented in a north-south direction. The project footprint, however, is only approximately seven hectares of this. The land is described as Lots 183 and 189 DP 753596; Lots 207, 208 and 298 DP 753596; Lots 53, 60, 79, 80, 81, 82, and 167 DP 753633; and Lots 94, 99 and 104 DP 753633 and is currently comprised of four privately owned properties.

There are no major watercourses present on the site, however, several small or intermittent watercourses persist and drain towards Jugiong Creek and Lake Burrinjuck. Typical of much of the farming land on the western slopes of the Great Dividing Range, the site is characterised by pastures with light scattered timber. A trigonometric station, survey marker and wind monitoring tower are also present on the site. A 330kV transmission line and two 132kV transmission lines cross the site.

## 1.2 Surrounding Land Uses

The site is surrounded by a number of farming properties and residences which are used primarily for sheep and cattle grazing. Lake Burrinjuck and the Burrinjuck Nature Reserve are located between three and 15 kilometres to the south, south-west of the site. Whilst the lake's primary purposes are for energy production and water supply, the lake and its surrounds are also used for fishing, water sports, walking and other nature-based recreation activities. The Burrinjuck Tourist Park is located adjacent to the lake at Woolgarlo, approximately 2.5 kilometres south of the southernmost turbines. Approximately two kilometres west of the site is a small quarry on Paynes Road. The Hume Highway and Burrinjuck Road are located approximately three kilometres to the north and west of the site, respectively.

Bookham (eight kilometres west), Bowning (eight kilometres north-east) and Yass (17 kilometres east) are the nearest towns to the site.

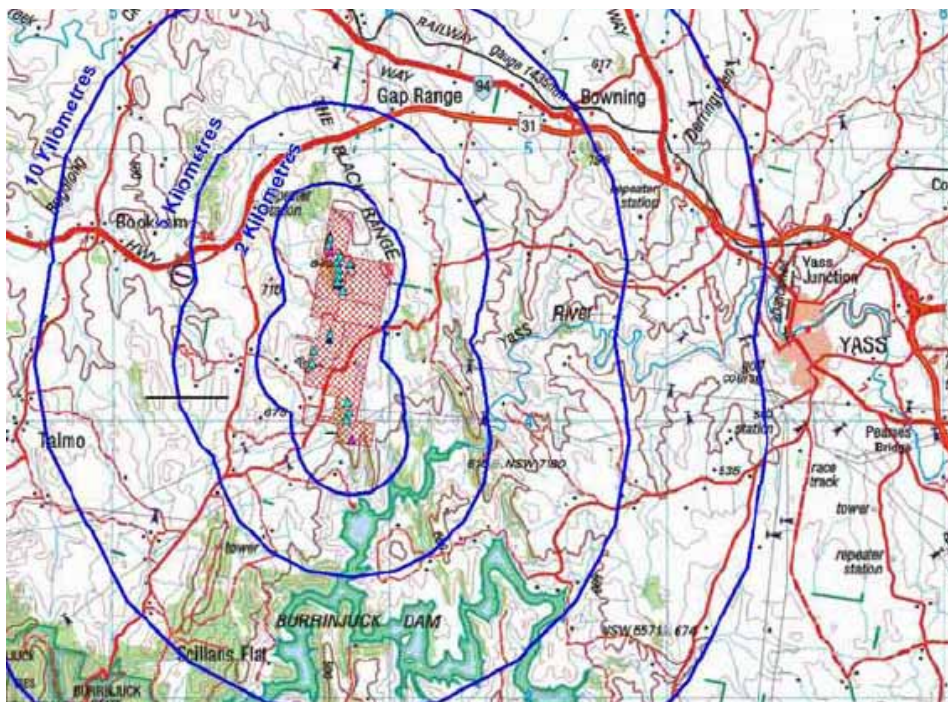


Figure 1. Location of Conroy's Gap wind farm in the context of the broader area

## 2 PROPOSED DEVELOPMENT

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### 2.1 Approval Originally Sought

EPURON Pty Ltd is seeking the Minister for Planning's approval for the construction and operation of up to 15 wind turbines at Conroy's Gap on the Black Range, Southern Highlands of NSW (refer to Figure 1). The turbines will be capable of producing up to 30 megawatts (MW) of electricity. The turbines have an expected economic life of 20 to 30 years after which time they would be replaced, overhauled or removed from the site. It should be noted, however, that this project does not include the replacement and recommissioning of wind turbines after this initial 30 year period. The Proponent states that any proposal for replacement and recommissioning of the wind farm after this period would be subject to further assessment under the Act.

The main components of the wind farm include:

- construction of up to 15 wind turbines, each with three fibreglass blades of up to 46 m long connected to the nacelle and mounted on a tubular steel tower (five metres at the base tapering to three metres at the top) up to 80 m high at the hub (total turbine height of up to 126 m). Figure 4 shows a typical wind turbine;
- electrical connections between wind turbines using a combination of underground cables and overhead concrete pole power lines;
- substation (approximately 70 metres X 70 metres) to convert power from an on-site reticulation voltage of 22 or 33 kV to a transmission voltage of 132kV in order to connect the wind turbines to TransGrid's existing Yass-Wagga Wagga 132kV transmission system which crosses the site;
- onsite control room (approximately 10 metres X 5 metres located adjacent to the substation) and equipment storage facilities;
- access roads around the site (unsealed and up to six metres in width) and minor upgrades to the local road network, including Paynes Road and Black Ranges Road, for installation and maintenance of wind turbines; and
- temporary construction infrastructure including a site office and facilities.

Figure 2 shows the proposed layout of the project, including location of the turbines, substation, powerlines and access tracks.

The proposed project involves a capital investment value of \$50 million and would employ approximately 50 people during the construction period and up to five during the operational phase.

Two types of wind turbines are under consideration:

- Type A – turbines have a generating capacity ranging from 1.5MW to 2.0MW, 78-80 metre hub height and 77-83 metre blade diameter. Typical turbines include the RE Power MM82; and
- Type B – turbines have a generating capacity ranging from 1.8 MW to 3.0 MW, 78-80 metre hub height and 87-92 metre blade diameter. Typical turbines include the Vestas V90 1.8 MW and Suzlon S88 2.1 MW.

Depending on the final turbine selected for use in the wind farm, the Proponent has identified two possible layouts for the wind turbines (see Figure 3). These two layouts differ only in minor respects as a result of the different size of the turbines and the requirement for minimum distances from each turbine to ensure maximum efficiency.

Construction is proposed to take approximately six months with wind turbines being installed at a rate of two to four per week once footings are in place.

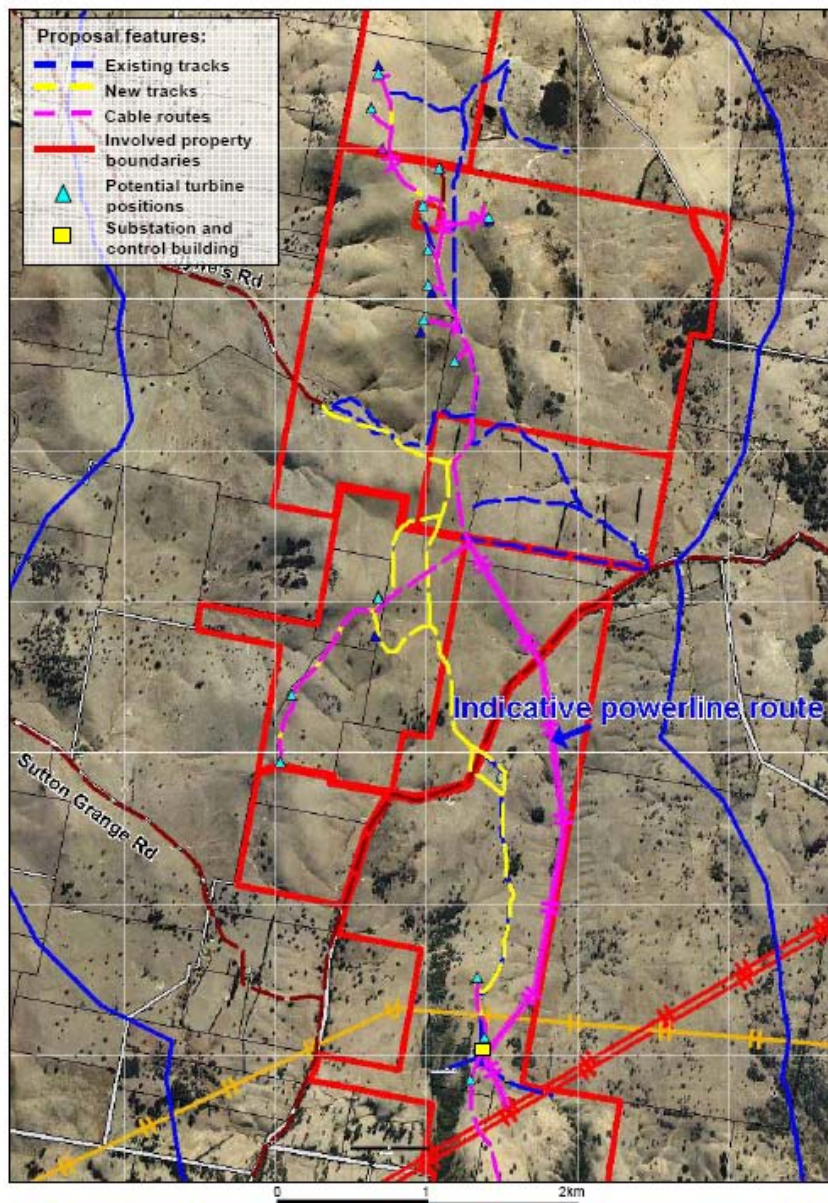


Figure 2. Site Layout  
Source: Environmental Assessment

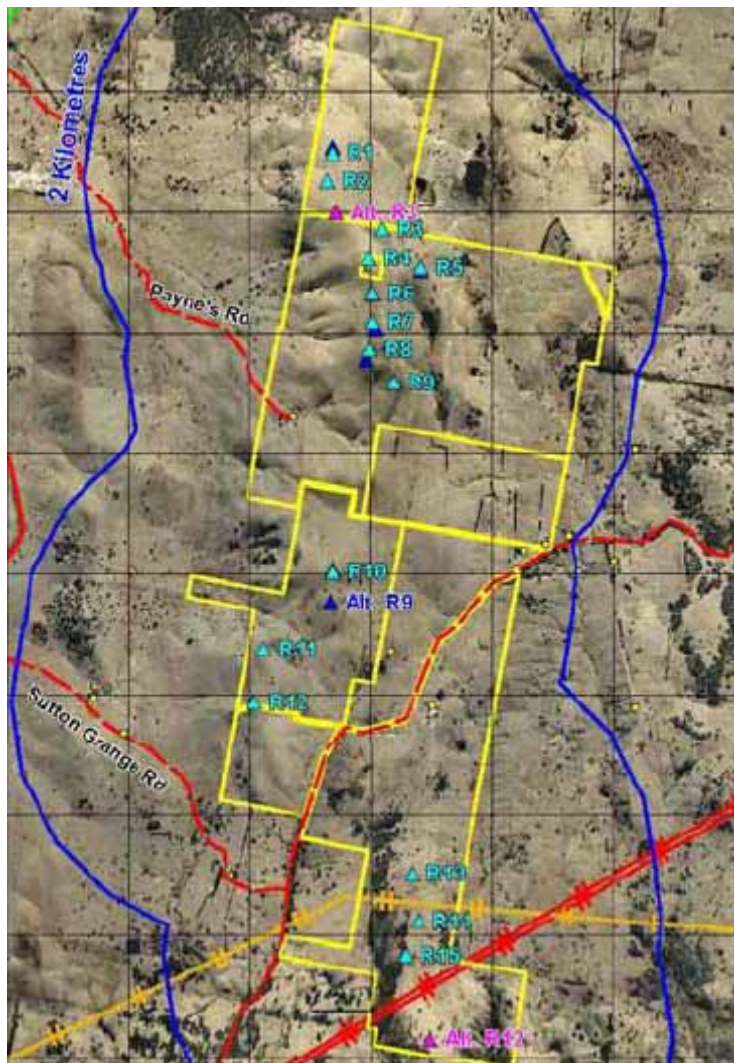


Figure 3. Proposed turbine layout (Source: Environmental Assessment)

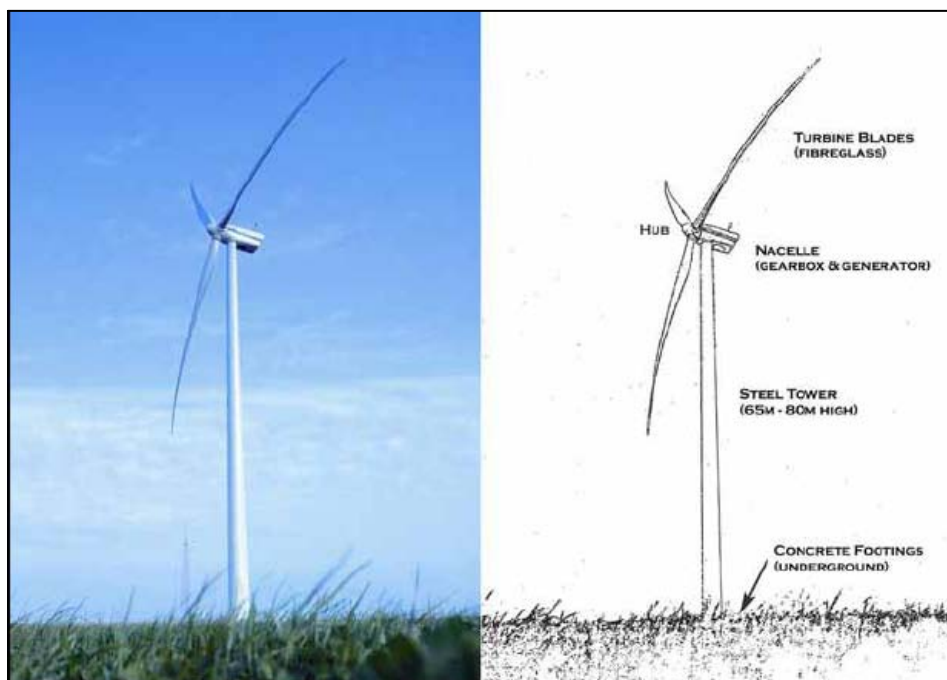


Figure 4. Typical wind turbine (Source: Environmental Assessment (photo: Vestas International))

## 2.2 Justification

The Proponent provided the following justification for the project:

- production of up to 99,000 MWh of renewable electricity per year, sufficient for the average consumption of up to 12,700 homes;
- reduction in greenhouse gas emissions of up to 99,000 tonnes of carbon dioxide (equivalent) per year. This would equate to removing up to 19,800 typical cars from our roads over the envisaged 30 year life of the project;
- savings in water consumption of around 118 to 130 million litres per annum of potable water used in coal fired power stations;
- annual savings in pollution from coal fired power stations of up to 561,000 kilograms of sulfur dioxide, up to 243,000 kilograms of nitrogen oxides, up to 2180 kilograms of particulates as well as a reduction in emissions of metals such as lead, mercury, manganese and nickel as well as hydrochloric acid and volatile organic compounds;
- provision of a community fund of \$25,000 per year for local community and environmental projects;
- provision of local jobs and injection of up to \$10 million into the local economy; and
- improved security of electricity supply through diversification.

Based on the Department's own calculations, it is considered that the Proponent has slightly overestimated the CO<sub>2</sub> savings of the proposal, the number of homes it could theoretically power for a year and the equivalent number of cars taken off the roads (refer to section 5.3 for calculations). Nevertheless, the Department considers that the proposed wind farm would make a valuable contribution towards offsetting the emissions of CO<sub>2</sub> and other gases, particulate emissions and other pollutants that would otherwise be produced if the equivalent power supply was provided by fossil-fuel combustion. The Project would also result in the avoidance of substantial quantities of water that would otherwise result from coal or other fossil fuel fired power stations.

Based on calculations at other wind farms, the energy used to produce, transport, operate and decommission the wind farm would be paid back by the wind farm in around three months.

The Department broadly supports the development of wind farms as a form of renewable energy, subject to suitability of the location of these wind farms. This is consistent with Commonwealth and State policies promoting the production and uptake of renewable energies as a means of addressing climate change.

As noted above, the Proponent has committed to providing \$25,000 per annum for a community fund which will provide benefits to the broader community and in part address the concerns of adjoining residences who will otherwise receive no direct financial benefit from the proposal. The Department supports this contribution, however, considers it appropriate to adjust the amount in accordance with the Consumer Price Index (CPI) in order to maintain the buying power of the fund over time. This has been reflected in the Department's recommended conditions.

In late 2006, Yass Valley Council amended its section 94 contributions plan to include a community enhancement program component. The program identified a number of community facilities for which contributions could be put towards such as upgrades to parks and a new swimming pool and recreation centre. Council considers that such a contribution is appropriate where, for example, development may have a negative impact on the community, or a development will benefit from the use of resources or position within a locality and a developer may offer some form of "compensatory" payment to the community. The Plan identifies more significant development such as mining and energy generation (including wind farms) or other major industrial development as being candidates for providing contributions towards these facilities. The process by which Council intends to implement this plan is through the use of section 93F planning agreements. The Department notes this is a voluntary agreement whereby the Proponent and usually the local Council enter into an agreement. Whilst this community program has merit, the Department is concerned about the practicality of implementing this program for the proposed wind farm. This is because:

- a significant time has elapsed between the public exhibition of the EA and Council's identification of this plan;
- planning agreements are voluntary so there is no obligation on either party to enter into it;
- it is understood that Council has not approached the Proponent about entering into such an agreement; and
- there is no formula upon which to determine an appropriate contribution.

The Department considers that in the circumstances, the Proponent's commitment to contribute \$25,000 per annum over the life of the project (and the Department's recommended adjustment for CPI) would have the same effect as implementing Council's contributions plan. Furthermore, there are no limitations on how the community fund offered by the Proponent may be spent and as such, some of this money could go towards the facilities identified in Council's plan.

## 2.3 Ecologically Sustainable Development

The project embodies the principles of Ecologically Sustainable Development (ESD). The principles of ESD include the precautionary principle, intergenerational equity, conservation of biological diversity and ecological integrity and improved valuation, pricing and incentive mechanisms.

These four principles aim to prevent and reverse adverse impacts of economic and social activities on the ecosystem, while continuing to allow the sustainable, equitable development of societies. The application of these principles to the Conroy's Gap wind farm is discussed below.

### The Precautionary Principle

The development of wind farms goes to the very core of the precautionary principle as it relates to climate change. That is, whilst some uncertainty exists as to the magnitude of effects that climate change will have on the environment, it is not a justifiable reason to not do anything about addressing it. To this end, wind farms can play a role in diversifying our energy sources and providing an emission-free alternative to greenhouse gas emitting power stations.

For the wind farm itself, its environmental consequences have been assessed using appropriate specialists in relevant disciplines. The assessment process involved analysis and interpretation of the potential environmental impacts associated with the project. Where uncertainty exists, measures have been proposed to address it.

The Department's assessment did not identify that the Project would result in any serious or irreversible damage. Most of the proposal's potential impacts are considered to be limited or otherwise readily manageable. Ongoing environmental monitoring and adaptive management measures of particular environmental issues will ensure that potential impacts are addressed.

### Intergenerational Equity

The project is consistent with the principles of social equity and intergenerational equity through the harnessing of a renewable resource for energy production. The generated electricity can displace a certain amount of harmful greenhouse gas emissions, particulates and other pollutants that would otherwise have been created by conventional coal fired power stations and other fossil fuel power generators. This contributes in a positive way to improving the health, diversity and productivity of the environment for the benefit of future generations.

### Conservation of Biological Diversity and Ecological Integrity

The Proponent's assessment identifies that the project presents a risk to certain avian and bat species and could result in the death of a number of animals every year, largely as a result of blade strike. The Proponent's assessment, however, concludes that the risk is relatively low and could be adequately managed through an adaptive management approach. This approach would involve stringent environmental monitoring to enable any problems to be readily identified and addressed to ensure they do not become a greater problem that could affect ecological processes or biological diversity.

### Improved Valuation, Pricing and Incentive Mechanisms

The project will alter the acoustic and visual environments. The impacts or 'external costs' imposed upon the non-associated properties (externalities) are internalised to some extent by the Proponent bearing the cost of implementing mitigation measures for noise, visual and flora and fauna impacts. The recommended conditions of approval impose certain obligations on the Proponent including: compliance with noise limits based on adopted noise criteria and regular compliance monitoring; provision of landscaping measures to ensure that both the broad landscape and individual residences views would be moderated to acceptable levels; and adaptive management measures to minimise impacts on bird and bat strikes.

## 3 STATUTORY CONTEXT

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### 3.1 Environmental Planning Instruments

Under the *Yass Local Environmental Plan 1987* (Yass LEP), the proposed wind farm is located on land zoned 1(a) Rural Agriculture. Under this zone, the wind farm is permissible with development consent as an innominate use.

The objective of this zone is to set aside certain land for agricultural purposes and purposes incidental thereto. The Department is satisfied that the project is consistent with this objective as the presence of a wind farm would not preclude the use of the site for agricultural pursuits.

There are no State Environmental Planning Policies that substantially govern the carrying out of the project.

### 3.2 Major Project

On 7 December 2005, the Director-General of the Department of Planning, as delegate of the Minister for Planning, formed the opinion that the proposed development is a project to which Part 3A of the Act applies as it is development of a kind that is described in Schedule 1 of *State Environmental Planning Policy (Major Projects) 2005* (Major Projects SEPP). In particular, the proposed development satisfies clause 24 of the Major Projects SEPP as it is an electricity generating work that involves a capital investment value of more than \$30 million.

### 3.3 Minister's power to approve

Under section 75J of the *Environmental Planning and Assessment Act 1979* (the Act), the Minister may approve (or disapprove) of the carrying out of a project to which Part 3A of the Act applies.

### 3.4 Statement of Compliance

On 18 March 2006, Director-General's environmental assessment requirements for the preparation of an Environmental Assessment (EA) for the proposed project were issued. On 29 July 2006, the EA was considered to be compliant with the environmental assessment requirements for the purposes of section 75I(2)(g) of the Act.

### 3.5 Environmental Assessment

In accordance with section 75H(3) of the Act, the EA was placed on public exhibition from 9 August 2006 until 22 September 2006 at the Department's head office, Yass Valley Council's office and the Yass Valley library. The EA has also been made publicly available via a link from the Department's website to the Proponent's website.

## 4 CONSULTATION AND ISSUES RAISED

### 4.1 Issues Raised in Submissions

A total of 50 submissions were received in response to the public exhibition of the EA. The issues raised in submissions have been taken into consideration as part of the Department's assessment of the project. The following table summarises the sources of submissions received.

*Table 1. Summary of Submissions Received*

Submission source	No of Submissions
Public <ul style="list-style-type: none"> <li>• Individuals (41)</li> <li>• Community Groups (2)</li> </ul>	43
Public Authorities <ul style="list-style-type: none"> <li>• Department of Natural Resources</li> <li>• Department of Primary Industries</li> <li>• Department of Lands</li> <li>• Roads and Traffic Authority</li> <li>• Civil Aviation Safety Authority</li> <li>• Heritage Office</li> <li>• Yass Valley Council</li> </ul>	7
<b>Total</b>	<b>50</b>

The majority of public submissions either objected to the proposal or raised issues of concern. Many of these submissions were received from those in relative proximity to the site of the proposed wind farm. Nine submissions were received in support of the project. A summary of issues raised in public submissions is outlined below in Table 2 and discussed in further detail in the following chapter. Issues raised in agency submissions are discussed throughout the following chapter.

*Table 2. Summary of Issues Raised in Submissions*

Issues	Details
Visual impact	<ul style="list-style-type: none"> <li>• wind turbines will dominate and scar the landscape.</li> <li>• degrade the surrounding scenic qualities and values of the Black Range</li> <li>• wind turbines should be located in areas away from people, such as in National Parks</li> </ul>
Noise impact	<ul style="list-style-type: none"> <li>• wind turbines disturb the peace</li> <li>• modulating sounds generated by the wind turbines will be annoying</li> <li>• effect of temperature inversions on noise propagation (a weather condition claimed to be a feature of the locality)</li> </ul>
Flora and fauna impact	<ul style="list-style-type: none"> <li>• bird and bat deaths from blade strikes, in particular, the wedge-tailed eagle</li> <li>• impact of turbine lighting on nocturnal birds and animals</li> </ul>
Depreciation of land values	<ul style="list-style-type: none"> <li>• appropriateness of comparing Crookwell land value study to the Yass region</li> <li>• development will result in decreased property values for neighbouring properties</li> </ul>
Project justification	<ul style="list-style-type: none"> <li>• wind farms only provide negligible useful electricity</li> <li>• wind farms will not result in the closing down of any power stations and a reserve of power will still be required to operate in the background</li> <li>• better technology exists for electricity generation, such as solar</li> </ul>
Hazards and risk	<ul style="list-style-type: none"> <li>• bushfire risk – in relation to the location of the turbines on bushfire-prone ridge tops and impact of lightning strikes</li> <li>• shadow flicker</li> </ul>

## 5 ASSESSMENT OF ENVIRONMENTAL IMPACTS

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### 5.1 Visual Amenity

#### *Issue*

The impact of the proposed wind farm at Conroy's Gap with respect to visual amenity is one of the key issues raised in public submissions. Indeed, of those objecting to the proposal, many considered that the location of the proposed wind farm on the Black Range was inappropriate due to its negative visual impact on both their home and surrounding area. The Department received three submissions criticising the Proponent's contention that people living in rural areas do not value the landscape highly and have a pragmatic approach to the area in which they live. Three submissions were received which considered the wind farms would be a visual asset to the area.

As with all development that results in a change to the landscape, the impact of this change as either positive or negative will always be subject to debate. Furthermore, there are no absolute rules when assessing visual impacts, particularly of wind farms, and each development must therefore be assessed on its merits and in the context of the landscape in which it is proposed.

#### *Consideration*

The proposed project involves the construction of up to 15 wind turbine generators at Conroy's Gap on the Black Range. The Proponent states that each turbine will be up to 126 metres in height, comprising three blades of between 38 and 46 metres in length mounted on a tubular steel tower 80 metres high (refer to Figure 4). To assess the effect of the proposed wind farm from various viewpoints within the surrounding landscape, a visual impact assessment was included in the EA. The assessment methodology used included an assessment of the quality of the landscape, that is, its visual appeal, identification of important views to the wind farm and distance to the site, identification of the type of user in the surrounding area including the duration of exposure and dominance of exposure to determine their visual sensitivity, assessment of the degree of change brought by the introduction of the wind farm into the landscape and whether the landscape is able to absorb that change. The Department is generally satisfied with this assessment approach and considers that it provides a useful basis upon which to assess the visual impact of the wind farm.

There are two key issues that must be considered when assessing the visual impact of a wind farm: the effect on the quality of the broad landscape that is going to be intruded upon; and the effect on individual receptors.

#### Broad Landscape Impacts

The landscape of Conroy's Gap and the broader region is described as an area that is dominated by agricultural uses, primarily pasture land with light scattered trees located on rolling hills and along roads and isolated larger areas of remnant vegetation. The Hume Highway cuts through this area introducing a strong built form which contrasts with the rural feel of the area. The Black Range is located around 840 metres above sea level and is over 300 metres above some of the surrounding landscape. There are several homesteads in the area, many of which have exotic trees planted nearby. Lake Burrinjuck, located between three and 15 kilometres to the south-south west of the site, is a key landscape component in the area (refer Figure 1).

The visual assessment identifies a number of towns surrounding the site including Bowning, Yass, Bookham and Goondah which have an historic feel to them. The assessment also notes the increasing number of rural residential subdivisions occurring around Yass with some located near the site. The Proponent also notes that there is some historical significance to the region as part of the original route of the expedition of Hamilton Hume and William Hovell to Port Phillip runs through it. The Black Range Road forms part of this track.

In terms of overall scenic quality, the visual impact assessment concludes that the area surrounding the proposed wind farm could be described as either low or moderate scenic quality. That is, the area is fairly common and typical of the surrounding region, however, the area contains a few special landscape features such as the Lake Burrinjuck and Yass River area which is considered to be of moderate to high scenic quality.

The siting of the individual turbines on the top of ridge lines in order to maximise exposure to the wind and hence, energy production, ensures that these turbines are highly visible structures in the landscape. Indeed, the

Proponent's visual impact assessment suggests that the proposed wind farm at Conroy's Gap will be visible at distances greater than 15 kilometres in some directions. In particular, the wind farm will be highly visible in locations east of Mount Bowning (approximately eight to 10 kilometres north-east of the site), to the east of the site around Black Range Road and the Yass River, to the west on land between Black Range and the ranges to the west (greater than five kilometres west) and will be especially visible from within five kilometres to the south west of Black Range (refer to Figure 5).

The wind farm will be visible from the towns of Bowning, Yass, Bookham and Goondah although the degree to which the number and expanse of wind turbines can be seen varies considerably. Close to the site on the west side of Black Range, exposure to passing motorists along the Hume Highway will be high as the road travels in a direction heading straight towards the site. Views will be more intermittent travelling east along the highway. The wind farm will also be visible from several locations on or around Lake Burrinjuck from within three or four kilometres from the site although given the Lake is located to the south of the site, only a limited number of turbines are expected to be seen and the field of view would be quite narrow. People using the Hume-Hovell track and the nearby camp site will experience views of the wind turbines as they pass through the area.

Several photomontages have been presented in the EA which illustrate the extent to which the wind turbines will be visible from a number of vantage points (see figures on following page). Whilst the turbines will be considerably larger than any other structure within the landscape and hence would initially appear to be visually dramatic, it is also clear that the further an area is from the wind farm site, the less dominant the wind turbines will appear in the landscape. The Department's experience from other wind farm proposals suggests that the greatest visual impacts of the wind farm occur within a four kilometre radius of a wind turbine<sup>2</sup> and decreases with distance thereafter.

The Department acknowledges that a more moderate appreciation of the area's landscape may not be accepted by some of local community, as has been suggested in submissions, however, the Department's consideration of the landscape value at a regional, if not State-wide perspective, is necessary in the consideration of any wind farm proposal. The wind farm would be located in an area that has already been significantly modified since settlement. This modification has largely occurred as a result of long-term agricultural practices and settlement. Much of the original woodland vegetation has been removed for pasture establishment which has led to problems with erosion and dry-land salinity in some areas. There is also a network of local roads, power lines and telecommunication towers. The Hume Highway is located approximately three kilometres north of the site. Several high voltage transmission lines also cross within or near the site. The Department accepts the Proponent's conclusion that the proposed wind farm is generally located in an area of low to moderate scenic quality and is satisfied that the site provides a suitable setting for a wind farm development.

#### Local Views From Surrounding Residences and Viewpoints

The second aspect of the visual impact assessment considered the impact on surrounding residences and viewpoints. The Proponent considered the visual impact from 20 key viewpoints of surrounding residents, towns, roads and railway and recreational areas within 15 kilometre distance of the project site. A zone of visual influence map was prepared to identify areas where the proposed wind farm could be viewed. This model showed that the wind farm will be visible in all directions, however, the number of individual turbines that will be seen from any one point varies from none, to several, to all (see Figure 5). It should be noted that the assessment does not take into consideration intervening vegetation and as such, is somewhat conservative in nature.

To determine the visual impact of the wind farm from major viewpoints, the Proponent states that consideration must be given to both the visual sensitivity of the user in the landscape and the contrast that the wind farm will create in the landscape and whether the landscape can absorb that change. The Proponent's analysis took account of the visual catchment, duration and dominance of exposure and how the user values the landscape. Residences that would be most impacted by the proposed development were identified through this process.

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<sup>2</sup> See Environmental Impact Assessment Reports for the Crookwell II wind farm and Woodlawn wind farm, Department of Planning dated May 2005 and August 2005, respectively

Representative Photomontages of the Conroy's Gap wind farm.



Photomontage from the "Cooinda" property on the way to Lake Burrinjuck (approximately two kilometres SW of the site)



Photomontage from the Hume Highway near Bookham (approximately five kilometres west of the site)



Photomontage from the Hume Highway near Mount Bowing (approximately 10 kilometres NE of the site)

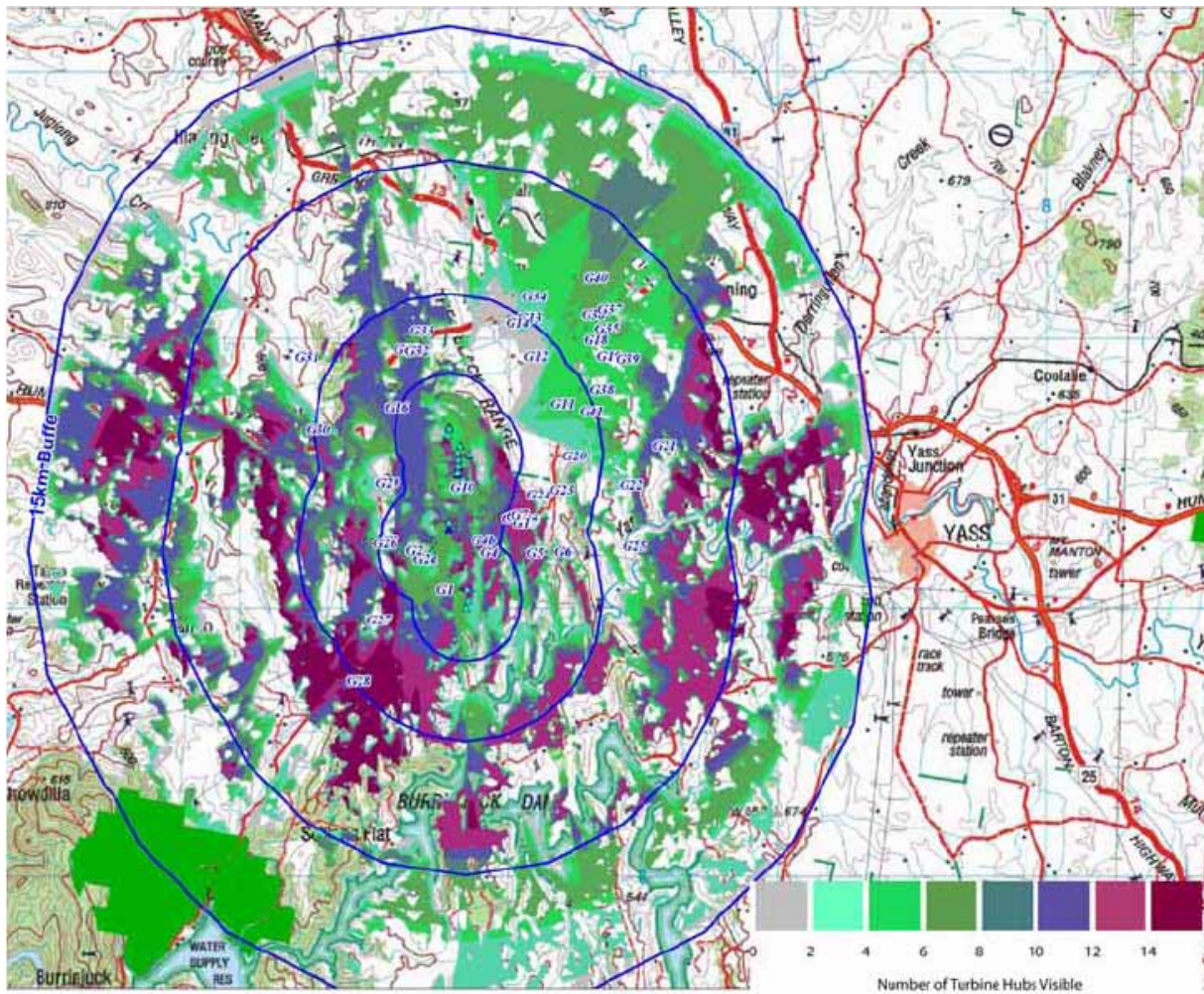


Figure 5. Zone of Visual Influence of the Conroy's Gap wind farm  
 Source: Environmental Assessment (from Garrad Hassan)

The Proponent notes that the area directly around the site that has close range views of the turbines and infrastructure will be the most impacted. There are 10 residences where one or more turbines will be located less than two kilometres from their home. Half of these residences are located on the site and are associated with the proposed development. The location of residences surrounding the project site is shown in Figure 6. Several other homes in the area will also experience a moderate to high visual impact from the wind farm, particularly those located within five kilometres of the site to the south, east and west.

For those properties to the south that are in close proximity to the site, it is noted that they will not see all the turbines although the ones that can be seen will tend to dominate. The Proponent considers that those residents located along Black Range Road to the east of the site are possibly the most sensitive to the wind farm as the majority of properties are the result of more recent subdivisions and are likely to have been purchased for their aesthetic quality. Indeed, the Proponent notes that the project was scaled back to account for visual impacts in this area. The Proponent considers that with the turbine layout as proposed, views to the wind farm from the east will now largely be screened by the east ridge, so only around half the turbines will be visible.

To the immediate west of the site, the Proponent contends that most homes will be screened from some or all of the turbines, however, individual turbines that will be seen are likely to be quite dominant as these houses are located around two kilometres from the turbines.

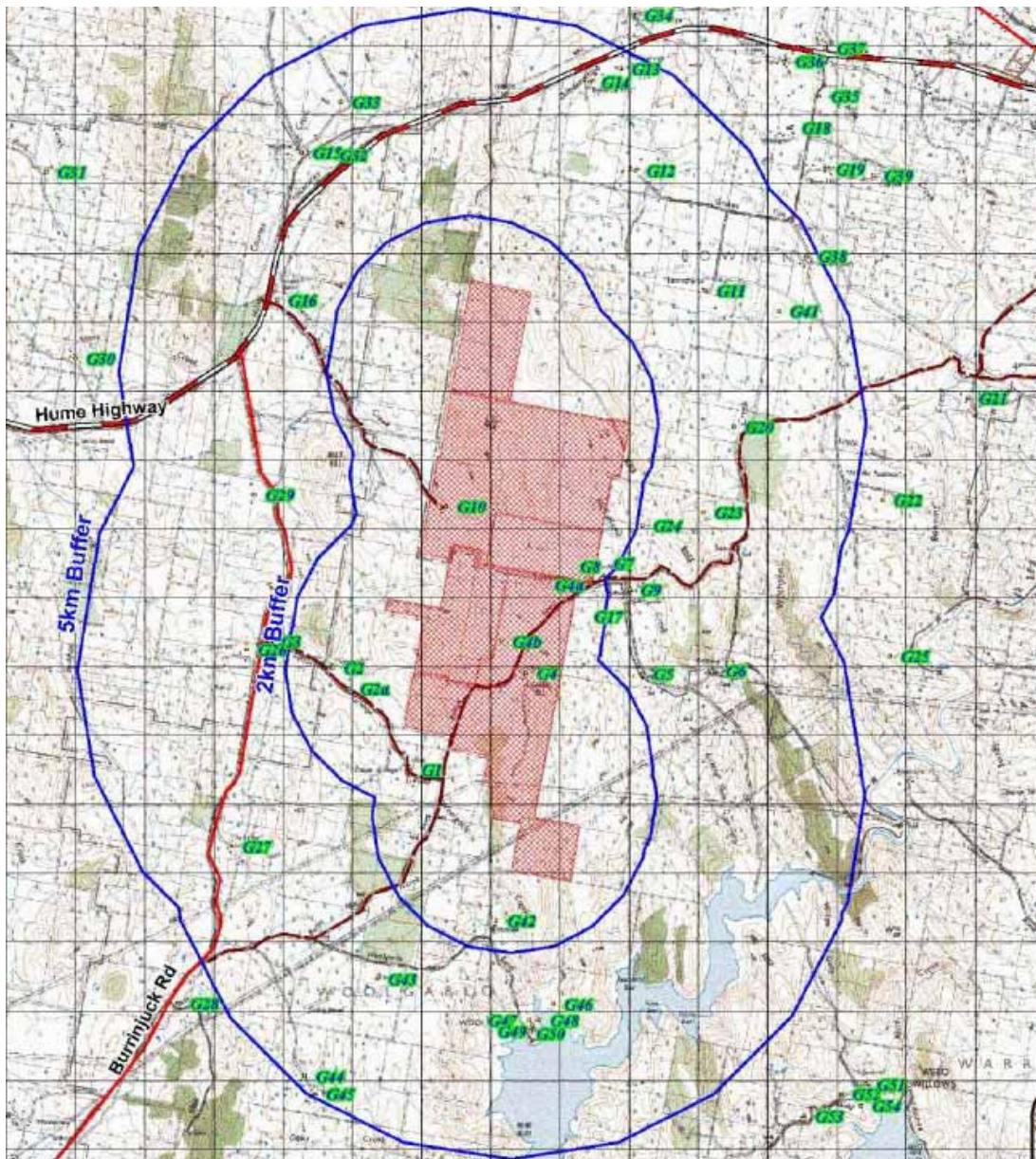


Figure 6. Location of residences in relation to the proposed wind farm site

A number of measures were committed to by the Proponent to mitigate the impacts of the wind farm in the landscape, particularly on properties that were identified as being exposed to moderate to high visual impact. These include:

- provision of landscaping materials to screen the wind farm from houses or outdoor entertaining areas where the visual impact to residences is high;
- painting of the wind turbines with light off-white/light grey; and
- painting of the substation and other on-site structures with grey to blend into the surrounding environment and plantings using locally native species around the perimeter of the substation and control room to screen them from view.

The Department recognises that many people living in proximity to the proposed wind farm are concerned about the negative visual impact it will have, however, the Department is satisfied that these impacts are not unreasonable, particularly when considered in the broader context of the environmental benefits of the proposal. The Department is satisfied that mitigation measures could be adopted to further ameliorate any residual impacts of the proposal.

As noted previously, the Department received three submissions objecting to the Proponent's contention of how rural residents perceive their landscape. The Department required the Proponent to substantiate these claims. In its Submissions Report (refer APPENDIX A), the Proponent responded by noting that its assumptions were developed from a number of sources including the public consultation days, feedback forms, personal conversations and outcomes of previous visual assessments. Importantly, the Proponent notes that the comment was made in relation to primary producers that obtain an income from the land rather than rural residential landholders but that regardless of the user type, unscreened or unfiltered views from a house tend to be valued highly. The Proponent acknowledges that not everyone would agree with the generalisations made and that there are a range of views, which was noted in the EA.

Whilst there may be some people who are less concerned about the landscape in which they reside, there are clearly many people that choose to live in rural areas because of the landscape. Indeed, the Department received numerous submissions from members of the public objecting to the proposed wind farm on the basis that the proposed wind farm would spoil the view from their home. The Department's experience in the assessment of other wind farms throughout the State is that this is a common reason for objecting to a proposal. In particular, these submitters note that unlike in urban situations, the home is not just occupied in the morning or evening and weekends, but is occupied day and night, all year and is often their place of work. It is clear from these submissions, that many rural residents have a strong association with their land with many properties being in the family for several generations.

The issue of locating wind farms in rural areas has been explored in many assessments undertaken both within NSW and elsewhere within Australia and overseas. It has been argued by proponents of wind farms that the issue of visual amenity from rural properties is largely immaterial where the wind farm is proposed to be located within a rural zone. This is because these zones, unlike rural residential or urban village zones, place a focus on providing land for the purposes of agriculture rather than protecting amenity, be it of a visual or acoustic nature. The same is true of the rural zone in which the project is located. The 1(a) Agriculture Protection Zone objective is to provide land for agricultural purposes and purposes incidental thereto. Agricultural pursuits (excepting feedlots, poultry farms and the like) are permissible without development consent.

Rural and residential zones have different objectives and allow for different development types which translate to different amenity expectations. For example, rural activities may commence early in the morning and may utilise noisy machinery, thereby detracting from the amenity of the area. This would not generally be expected in a residential zone. Whilst the Department recognises the genuine concerns of those residents living in a rural zone, the Department considers that these concerns must be tempered with consideration of the objectives and permissibility of development in the rural zone. The Department is satisfied that the proposed wind farm is permissible and is consistent with the objectives of the rural zone.

Notwithstanding the zoning of the area, the Department must still assess the environmental impact of the wind farm, including its effect on visual amenity. As previously discussed, the Department is satisfied that the proposed development would not unreasonably impact upon the visual amenity of the broader area, however, methods to reduce the level of impact of the turbines in the landscape as well as at individual properties to as low as reasonably possible, must be considered.

One tool that has been used by the Department when looking at ways to lessen the impact of a wind farm on an individual or group of residences is to either require that certain turbines be removed or otherwise relocated. In the case of this proposal, it is the Department's view that any individual residence is unlikely to be assisted by such an approach. This is because the wind turbines are proposed to be located generally in a single north-south facing row along the ridge top. The removal of one or more from the top or bottom of the row, or from within is unlikely to make a significant difference to the overall appearance of the wind farm. As such, to mitigate a single property, the only solution would be to remove all the wind turbines. For the reasons already stated, the Department does not consider this to be warranted.

Another measure is to provide landscape treatment to nearby affected residents, as committed to by the Proponent for this proposal. Due to the level of elevation of the site with respect to the surrounding landscape, landscape screening on neighbouring properties would only provide a limited form of amelioration and could also result in the loss of views. The size of the turbines means that they are unlikely to be able to be fully screened.

Nevertheless, the Department does consider that provision of landscaping on neighbouring properties may reduce the potential visual dominance of the turbine(s). Should the Minister determine to approve the proposal, the Department recommends that the Proponent be required to offer landscaping to all owners of residential dwellings with views of turbines located within four kilometres of their dwelling, not just those that are likely to be most affected. This is reflected in the Department's recommended conditions (see APPENDIX A).

The Department supports the Proponent's mitigation measures with respect to the substation and control and facilities room which include locating the facilities to minimise the visual impact from roads and surrounding properties, landscape screening around the perimeter using species representative of the surrounding vegetation and painting the structures grey to blend in with the surrounding landscape. These measures are reflected in the Department's recommended conditions of approval.

### *Conclusion*

The Department recognises the very strong and genuine concerns of the potentially affected residents. It is understood that many within the local community (whom have no financial benefit from the project) have strong negative feelings about the proposed wind farm. In some cases this is independent of the actual proximity to the turbines.

In assessing any wind farm proposal, the Department considers it necessary that the landscape value be seen from a regional, if not State-wide perspective. The Department's assessment is consistent with the general approach taken at the Bald Hills Panel Inquiry<sup>3</sup> in that a wind farm would have to impact landscapes of regional, if not state or national importance, in order for it to be refused in totality on the basis of scenic quality alone. While recognised as a genuine concern of local residents, the Department is not satisfied that the residual amenity impacts of the project in the context of the Conroy's Gap region are sufficient to negate the significant environmental and economic benefits presented by the proposal.

Nevertheless, the Department recognises that the proposed project will alter the landscape and views of the site. The acceptability of changes to the visual outlook will always be subject to debate because of the subjectivity of individual likes and dislikes. However, the Department considers that the site is a suitable setting for a wind farm in a landscape rated of low to moderate significance, modified by strong built elements nearby including the Hume Highway and high voltage power lines, and is satisfied that the impacts of the wind farm are within reasonable bounds. The Department's recommended conditions of approval will serve to reduce the visual amenity impact of the proposal.

## **5.2 Noise**

### *Issue*

The Conroy's Gap area is primarily used for agricultural (grazing) purposes. Residential dwellings surrounding the proposed wind farm have an ambient acoustic background that is primarily dominated by natural sources which are largely influenced by the wind. The Hume Highway, located to the north of the site, carries a continuous stream of traffic and houses located nearby would have background noise levels influenced by road traffic. A key concern raised in submissions relates to the perceived negative impact the wind farm will have on the acoustic amenity of the area, with particular concern expressed about the noisiness of turbines operating at night and disturbing sleep.

The impact of wind farms on the surrounding acoustic environment is a common issue raised by residents where wind farms have been proposed. Issues such as the impact of infrasound, effects on sleep disturbance and the modulation of turbines are often cited as reasons for concern. A number of these issues have largely been addressed as a result of advances in technology and positioning of the turbine blades upwind of the towers, however it is clear that wind turbines will add an additional source of noise to an area and the impact of this must therefore be assessed.

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<sup>3</sup> See *Bald Hills Wind Farm Project: EES, EES Supplement and called-in permits, Panel Report* dated 24 June 2004

The Department also received a detailed submission from a member of the public expressing concern with the methodology used to predict the impact of the wind farm including the type of noise model used and the meteorological conditions under which the predictions were made. This submitter also considers that a 5 dB(A) penalty should be applied to take account of the impulsive character of wind turbine noise.

### *Consideration*

#### Noise Predictions

The Proponent undertook a noise impact assessment as part of its Environmental Assessment to assess the impact of the proposed wind farm on surrounding residences. This assessment was undertaken in accordance with the South Australian Environment Protection Authority's *Wind Farms – Environmental Noise Guidelines 2003* (SA Guidelines). These guidelines have been adopted by the Department of Environment and Climate Change (DECC) as the basis upon which to undertake noise assessments for wind farms in this State.

Background noise data was collected at several properties around the proposed wind farm site. These properties were generally selected on the basis that they could provide an indicative background noise level for nearby locations in that vicinity. This approach is common in noise impact assessment. The Proponent notes, however, that further background monitoring would be useful to confirm the ambient noise levels at houses in close proximity to the Hume Highway.

Under the SA Guidelines, the following noise criterion for new wind farms applies:

*"The predicted equivalent noise level ( $L_{Aeq,10}$ ), adjusted for tonality in accordance with the SA Guidelines, should not exceed:*

- 35 dB(A), or
- the background noise ( $L_{A90,10}$ ) by more than 5 dB(A)

*whichever is the greater, at all relevant receivers for each integer wind speed from cut-in to rated power of the wind turbine generator".*

These noise limits only apply to residences where a noise agreement with the Proponent is not in place. A noise agreement is an agreement between the wind farm operator and a landowner (commonly those landowners upon which a turbine is to be located) whereby a level of compensation agreed between the parties is provided to the landowner to account for any potential negative noise impacts arising from the operation of the turbines. It should be noted that where a noise agreement is in place, this does not mean that the wind farm is able to unreasonably interfere with the amenity of an area. In situations where a noise agreement is in place, the Proponent states that the noise limits set by the World Health Organisation (WHO) with respect to sleep disturbance in its *Guidelines for Community Noise* would be met. These guidelines are based on the lowest levels of noise that affect health. The key guideline relevant to this proposal is the night-time noise criteria inside bedrooms which is  $L_{Aeq(8 \text{ hours})}$  30 dB(A).

To assess compliance of the proposed wind farm against the SA Guidelines and WHO Guidelines, the Proponent used the ISO 9613 Part 2 noise model to predict the noise levels of the wind farm at nearby residences over the range of wind speeds that the wind turbines will be operating. The Proponent states that this model is the most appropriate for use in rural settings and accounts for geometric spreading, atmospheric absorption, ground effects and barriers. The Proponent contends that validation studies have demonstrated that the ISO model tends to slightly overestimate noise levels at nearby dwellings.

Three scenarios were assessed:

- Layout A, based on a turbine layout using Repower MM82 turbines (or equivalent turbines);
- Layout B, based on a turbine layout using Vestas V90 (or equivalent) turbines; and
- Layout C, based on a turbine layout using Suzlon S88 (or equivalent) turbines.

The Suzlon S88 has the greatest sound power level at 106.3 dB(A) followed by the Repower MM82 (104.0 dB(A)) turbines and Vestas V90 (102.6 dB(A)) turbines. Figure 3 shows the turbine layouts.

The results of the modelling for layouts A and B suggest that the noise limits (as determined by the SA Guidelines) could be achieved at all surrounding residential dwellings. For layout C, the limits could be met at all properties with the exception of dwelling G42 Riverview (located 930m south of the closest turbine) which is predicted to exceed the guidelines by approximately 3 dB(A) in the wind speed range of 3-6 m/s and G1 Sutton Grange (located 1.5 km west of the nearest turbine) which is predicted to exceed the guidelines by around 2 dB(A) in the wind speed range of 3-6 m/s.

For the Riverview property, the Proponent notes that the results are based on using representative background noise data and that whilst geographically similar to the representative location, the property would in practice have differing noise level characteristics. For this reason, the Proponent suggests that further monitoring would be required to confirm the actual background at this location.

In all cases, modelling showed that the WHO Guidelines for those properties where a noise agreement is proposed (that is, the associated landowners) could be met.

In addition to the two properties identified by the Proponent where the SA Guidelines could be exceeded, the Department notes that for the proposed layout C, another dwelling, G7 Bernado (located to the east of the turbines), may also be at risk at wind speeds of around 6-7 m/s where noise compliance is only just achieved.

The Department acknowledges that the Proponent has yet to determine which of three possible classes of turbines it may use in the project. Given the predicted exceedances using the Suzlon S88 turbines, the Department considers that the Proponent needs to carefully consider the detailed design and tendering process so that required noise limits can be achieved. The Department notes that depending on final turbine selection, sector management strategies (such as switching off turbines under certain conditions) may be required in order to meet the noise criteria. Importantly, this would not affect the viability of the project. The Proponent acknowledges this and has committed to meeting the noise criteria set by the SA Guidelines for all non-associated residences.

Whilst the Department is supportive of the Proponent's commitment to meet the limits set under the SA Guidelines for all non-associated residences, where noise modelling undertaken by the Proponent predicts that the noise level at a residence would be lower than that otherwise recommended by the Guideline (but still above a base level of 35dB(A)), the Department considers it appropriate to set the noise limit at that lower level. In some circumstances, predicted noise levels are up to 10 dB(A) lower than the limit that would otherwise be set under the SA Guidelines. This ensures best-practice measures are adopted in the operation of the wind farm and is consistent with both DECC and Departmental policy for all new development. This position is reflected in the Department's recommended conditions.

Furthermore, as a safeguard for the community, once the Proponent has selected the final turbine model and layout, the Department recommends the Proponent be required to submit a detailed noise compliance assessment plan prior to the commencement of operation of the wind farm demonstrating how compliance with the noise criteria will be achieved. In addition, the Proponent should be required to undertake noise monitoring following the commencement of operation in order to demonstrate compliance with the noise criteria at all residential receivers. Should monitoring demonstrate the wind farm is exceeding the noise limits set under the approval, ameliorative measures would need to be undertaken to rectify this situation. Such measures should be outlined in a noise management plan. The Department considers that noise monitoring should also be required where credible noise complaints are received.

For project-involved residences and any other landowners to which a voluntary noise agreement is in place, the noise limits discussed above would not apply. This is consistent with the SA Guidelines and acknowledges that any agreement between the Proponent and a landholder will in part compensate to the extent agreed between the parties for any loss of amenity due to noise. However, it is important that such landholders be fully informed of noise impacts at their residences. To this end, the Department recommends that the Proponent disclose the noise impact at a residence when entering into any financial agreement with a landholder. As noted above, there is still an obligation on the Proponent to minimise impacts on the amenity of residences to which an agreement is in place and this is reflected in the Department's recommended conditions.

As identified above, the Department received a detailed submission from a member of public concerned about a number of issues relating to the noise assessment, including use of the ISO 9613 Model to make predictions about the noise generated from the wind farm, noise measurement locations, lack of consideration of temperature inversions and issues regarding modulation. The Proponent has responded to these and other issues in its Response to Submissions Report (see APPENDIX A) with the key responses discussed below.

#### Noise Propagation Model

With respect to the use of the ISO 9613 model, the Proponent acknowledges that all models have their limitations and the ISO Model is no exception. Nevertheless, the Proponent contends that the assumptions made with this model provide for a conservative prediction and that it is generally more conservative than other models commonly used in wind farm noise assessments. The Department is satisfied that the ISO Model is a suitable model to be used in the assessment of noise impacts for this wind farm and notes that the DECC has accepted the use of this model for other wind farms within NSW such as the Taralga wind farm located approximately 110 kilometres north-east of Conroy's Gap.

#### Atmospheric Stability

Regarding temperature inversions, the main issue appears to stem from work undertaken by Dr G.P van den Berg<sup>4</sup> which looked at the effect of atmospheric stability<sup>5</sup> on a wind farm at Rhede. The key findings are summarised as follows:

- *actual sound levels at receiver locations are considerably higher than that predicted in a stable atmosphere.* This occurs because the equation that determines wind speeds and which underlies wind turbine noise models is only valid under neutral atmospheric conditions. The result is that under stable atmospheric conditions, the wind speed at the hub height and by association, the sound power level of the turbine, is usually underestimated. Hence, the actual noise level at the receiver would be greater than predicted. Furthermore, due to the low wind speeds at ground level, noise from the wind turbine would be more pronounced as there is little masking effect from wind-induced sound from vegetation. The issue regarding the validity of the noise model has been discussed above; and
- *wind turbines can produce sound with an impulsive character that is more pronounced under stable atmospheric conditions.* This happens for two reasons. The first is due to a complex interaction between the wind and the way in which it hits the turbine blade in a stable atmosphere. In particular, as wind speeds vary over the rotor length, there is a change in the character of the sound such that the 'swishing' sound common to wind farms is enhanced. The second is that under stable atmospheric conditions, large fluctuations in wind velocity (at the scale of the turbine) tend to vanish and turbines in a wind farm tend to rotate at a similar speed and with fewer fluctuations (that is the turbines appear to turn synchronously) resulting in an enhancement of the swishing sound to a more audible thumping sound for periods of time.

This combination of effects, or "the van den Berg effect" as it is commonly referred, was the subject of much discussion during the recent Land and Environment Court proceedings for the Taralga wind farm<sup>6</sup>, particularly as it related to impulsive (or modulating) noise. Evidence was heard from Dr van den Berg as well as the author of the SA Guidelines, Mr Jason Turner. The key discussion points related to whether the van den Berg effect was likely to occur at the site and secondly, whether the SA Guidelines as currently drafted took into consideration the effect of modulation.

With respect to the first issue, one thing made clear in the Court proceedings was that the van den Berg effect (if it was to occur) was most likely to occur under stable atmospheric conditions when temperature inversions tend to occur and in the case of the Taralga wind farm, only at five houses located between 643m and 1235m from the

<sup>4</sup> Dr G.P van den Berg is a scientist based at Groningen University in the Netherlands. His thesis *The sound of high winds: the effect of atmospheric stability on wind turbine sound and microphone noise* and associated journal papers discuss the issue of the effect of atmospheric stability on wind turbine noise using a case study of a 17 turbine wind farm located on relatively flat terrain at Rhede, on the border of Germany and The Netherlands. <http://dissertations.ub.rug.nl/faculties/science/2006/g.p.van.den.berg/>

<sup>5</sup> Atmospheric stability refers to the relative stability of parcels of air relative to the atmosphere that surrounds them. Three conditions are generally described namely stable, neutral or unstable. A stable atmosphere is the least turbulent whilst an unstable atmosphere is the most turbulent.

<sup>6</sup> For details of the judgment, go to:

<http://www.lawlink.nsw.gov.au/lecjudgments/2007nswlec.nsf/61f584670edbfba2ca2570d40081f438/8c85a53a35f34d11ca25728e000cd322?OpenDocument>

nearest proposed turbine. Chief Justice Preston noted that *'although there is an infrequent likelihood of occurrence of the van den Berg effect, it is not able, on the evidence, to be dismissed out of hand. However, when it did occur (if it did occur),..., it would probably be on a cold, still, winter's night..'*

With respect to the second point, Mr Turner contended that the Guidelines took into consideration the fundamental characteristics of wind farms, including the swishing or modulating sound made by turbines as they passed the tower. Dr van den Berg argued that it was impossible for the Guidelines to have factored in the van den Berg effect as this effect was only described in the literature after the Guidelines had been published. Mr Turner conceded that whilst the van den Berg effect was not known at the time of drafting the Guideline, he adopted a very cautious approach in order to accommodate the impacts of any and all noise effects caused by wind farms.

It should be remembered that the van den Berg effect has only been studied at one wind farm (at Rhede) and has not been the subject of further assessment at other wind farms around the world. The Rhede wind farm is different from the proposed Conroy's Gap wind farm for a number of reasons, including that the Rhede wind farm is located on relatively flat land whilst the Conroy's Gap wind farm is located on hilly terrain; and secondly, the type of turbines differ as at Rhede, the hub height is 98 metres with 35 metre blades, whilst at Conroy's Gap, the hub height is proposed to be between 78 to 80 metres high with blades between 39 to 46 metres. As a result, the Department considers that it is difficult to translate the results from the Rhede wind farm to the proposed Conroy's Gap wind farm.

Notwithstanding, the Department cannot discount the potential for the van den Berg effect to occur at the Conroy's Gap site. Consideration must therefore be given to how this should be dealt with if the project were to be approved.

One objector suggested that a standard 5 dB(A) penalty should be applied to all measured noise levels to account for the van den Berg effect. The Department does not consider this an appropriate response in the circumstances. This is because the 5 dB(A) penalty is an arbitrary amount based solely on applying penalties for other potentially annoying characteristics such as tonality. This view is supported by the DECC who has previously advised that the SA Guidelines contain one of the most stringent assessment approaches in the world and currently represent world's best practice. Further, the DECC was not satisfied that there currently exists a sufficient body of scientific and community dose response evidence to support an assessment approach more stringent than current world's best practice and therefore did not support the application of an additional penalty for modulation in any conditions of approval.

For the Taralga wind farm, His Honour concluded that people would be unlikely to be outside on nights when a temperature inversion was in effect and hence, any protection should be for those occupants located within a dwelling. His Honour went on to note that the façade of a building has the effect of reducing the transmission of exterior noise even when there are windows left open. The 'façade effect' as it is commonly termed, usually achieves a mitigation of 10 dB(A). His Honour also noted expert evidence given on the matter which stated that additional ameliorative measures to enhance the sound suppression of the façade could be provided to increase the noise mitigation to 15 dB(A) for a select number of dwellings located close to the wind farm and hence address any noise impacts. The Judge concluded that the offer to provide such measures would have the same effect as imposing a penalty, as was also suggested by objectors of the Taralga wind farm, but in a much more pragmatic way.

Whilst this may be appropriate for some dwellings, the Department notes that it does not have the power to force a landowner to accept this form of amelioration. For this proposal, the Department considers a more flexible approach should be undertaken to deal with issues such as the van den Berg effect and other annoying characteristics of wind farms. The Department highlights this would be consistent with the SA Guidelines which states that annoying characteristics of wind farms, which may include infrasound or adverse mechanical, noise should be rectified. This may mean switching off turbines under certain conditions or operating them in a low-noise mode, or alternatively, it may involve the Proponent undertaking façade treatment or the like on affected properties. Indeed, the Proponent has committed to implementing adaptive management measures such as switching turbines off under certain conditions if issues arising from atmospheric stability are found to be a problem.

Tonality is dealt with separately under the SA Guidelines. These Guidelines recommend that a 5 dB(A) penalty be attached to the measured noise level where tonality is shown to be characteristic. The Proponent's assessment concludes that tonality is not characteristic of the proposed wind farm, however, as a safeguard, the Department recommends that a condition imposing a 5 dB(A) penalty where audible tones are present be included in any instrument of approval.

The Department is satisfied that potential noise impacts relating to temperature inversions and atmospheric stability have been adequately addressed. The Department supports the Proponent's approach and recommends that adaptive management measures be detailed in a noise management plan for the project, to be approved by the Director-General.

#### Application of Noise Criteria

The submission also raises concern that compliance with the noise criteria has only been applied at the dwellings and not, as the submitter contends is more appropriate, at the residential boundary. The submitter argues that if the limit were only to apply at the residential dwelling, the remainder of the property would potentially experience noise levels above the criteria which could in turn have implications for the future use of that property, eg. for future subdivision.

The SA Guidelines acknowledge this issue and note that where a wind farm is proposed to be located near an area zoned primarily for residential development that is yet to be fully developed, noise compliance should be assessed at the zone boundary, rather than within 20 metres from the dwelling as is otherwise recommended. For the purposes of this proposed wind farm, the Department notes that the area including and surrounding the site is zoned 1(a) Rural Agriculture, which allows a mix of uses including dwelling houses, with the primary purpose of the zone to set aside certain land for agricultural purposes and purposes incidental thereto. Under the Yass LEP, there are several other zonings which state their primary purpose as being for residential development suggesting that whilst dwellings may be considered as "purposes incidental to agriculture", the 1(a) zone's focus is not for residential development. As such, the Department is satisfied that the Proponent's noise assessment is consistent with the requirements of the SA Guidelines.

Nevertheless, in developing recommended conditions for the proposed wind farm, the Department recognises that it is important to protect not only existing residences but that consideration should also be given to future dwellings in certain circumstances. To this end, the Department recommends that for all vacant parcels of land within five kilometres of the site, noise mitigation measures should be provided for no more than one new dwelling constructed on that site (where erection of a dwelling was permissible at the time of any approval by the Minister) and where noise monitoring at that location shows that the noise levels would exceed the criteria outlined in the SA Guidelines.

As noted in a panel report for a wind farm in Victoria<sup>7</sup>, *"The planning scheme does not confer on the adjoining landowners any special rights to the peaceful existence that they currently enjoy. Only noise levels outside EPA standards are not permitted, and these would not be exceeded by the proposed development."* The Department notes that the same is true of the proposed wind farm at Conroy's Gap. Minor exceedances of the recommended noise limits may occur at three properties if a Suzlon S88-type wind turbine is used. However, as the Proponent has the option of either using a less noisy turbine or adopting sector management strategies to ensure compliance, the Department is satisfied that the proposed wind farm could be operated within the noise criteria under the SA EPA's Environmental Noise Guidelines for Wind Farms.

#### Background Noise

Another matter requiring further consideration relates to the background noise data collection. The SA Guidelines recommend a minimum number of 2000 data points be collected every 10 minutes to obtain background noise levels. For this noise assessment, the Department notes that this was not always achieved at each of the background monitoring locations. The Department also notes a recommendation from the noise assessment that further background monitoring at properties close to the Hume Highway should be undertaken to obtain a more representative view (the Proponent argues that for properties located closer to the Highway, the background

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<sup>7</sup> See *Wonthaggi Wind Farm Environmental Effects Statement and Permit Application 0266, Panel Report* dated September 2003

noise would likely be higher than that presented in the EA). Whilst the Department is satisfied that the revised background data is unlikely to significantly alter the outcomes of the assessment, the Department considers it appropriate to require the Proponent to develop a program for collecting further background noise data with representative coverage of seasonal (spring, summer, autumn, winter) noise variations in order to finetune the data. This is reflected in the Department's recommended conditions of approval.

#### Infrasound

The Department received a couple of submissions from members of the public raising concern over the impact of infrasound (low-frequency noise generally less than 20 hertz) generated from wind turbines and that it can result in ill-health effects. A number of published studies have shown that there is no causal link between ill-health effects and infrasound emitted by wind turbines, but that it is rather one of potential annoyance. Furthermore, the level of low frequency noise emitted by modern up-wind turbines is below the detectable threshold<sup>8</sup>. The Department is satisfied that the proposed wind farm would not result in ill-health effects from infrasound.

#### Construction Noise

The Proponent's assessment shows that some associated landowners are anticipated to receive elevated construction noise levels when the turbine foundation civil works being undertaken are nearby. Noise levels are predicted to otherwise be well below the ambient background or close to. The Proponent considers construction noise impacts to be acceptable given the short duration of the works. That is, the Proponent's assessment of blasting noise and ground vibration during turbine foundation works shows that the project will meet the relevant criteria.

The Department is satisfied that construction noise is unlikely to be an issue. A construction noise management plan is recommended to detail management measures to be adopted during the construction period.

#### *Conclusion*

Overall, the Department is satisfied that the noise impact assessment is appropriate and a conservative prediction of potential noise impacts at residences adjacent to the proposed wind farm. The Proponent has demonstrated that the proposed wind farm could operate within the noise criteria determined under most operating conditions or is able to implement mitigative works through detailed design to achieve compliance.

Construction noise impacts, including vibration, are generally within acceptable limits. The Department is satisfied that any construction noise impacts would be short term and of a minor nature and could be adequately managed through the Proponent's statement of commitments and recommended conditions.

### **5.3 Energy and Greenhouse Gases**

#### *Issue*

Wind farms are an intermittent source of energy where production is dependent on wind blowing at a rate sufficient to initiate generation and not too fast where, for safety considerations, the turbines cut out.

To make up for the intermittency of power supplied to the grid from wind turbines, certain stand-by generation or ancillary services from other power plants, potentially including those producing greenhouse gas emissions, may be required. This intermittency and the need to call on the ancillary services brings into question the actual greenhouse gas savings attributed to a wind farm. Indeed, the issue of intermittency and the need to supply ancillary services was an issue raised by a number of objectors to the proposed wind farm who suggested that the greenhouse gas savings of the Conroy's Gap wind farm as stated in the EA are false, misleading and grossly overstated.

Several submissions also consider that other renewable technology such as solar in addition to nuclear power is the way of the future and money would be better spent investing in these technologies rather than wind.

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<sup>8</sup> See British Wind Energy Association (BWEA) *Low Frequency Noise and Wind Turbines Technical Annex*, February 2005 and references therein <http://www.bwea.com/pdf/lfn-annex.pdf>, accessed 2 February 2007.

### Consideration

In NSW, currently around 90% of our electricity needs are provided by non-renewable coal-fired power stations and as such, contribute the greatest share of base load production<sup>9</sup>. Based on the rules which govern the National Electricity Market (NEM)<sup>10</sup>, of which NSW is one of five participating states, electricity that is provided to the NEM by wind farms will displace an equivalent amount of electricity provided by base load generators, thus reducing the fuel required to be burned for these generators. Accordingly, greenhouse gas savings associated with wind farms are usually presented as a proportion of CO<sub>2</sub> that is saved from being generated by the base load generators of electricity.

In general terms, for every kilowatt-hour of electricity produced by non-renewable generators, approximately one kilogram of CO<sub>2</sub> will be emitted to the atmosphere. For NSW, this ratio is slightly less at 0.947 tonnes CO<sub>2</sub>-e/MWh in 2007 (the NSW Pool Coefficient)<sup>11</sup> due to the mix of energy sources used in the State (that is, it includes both renewable and non-renewable energy produced in the State). With respect to the Conroy's Gap wind farm, the Proponent states that the proposed project has the potential to offset the equivalent of between 90,000 and 99,000 tonnes of CO<sub>2</sub>-e emissions per year (as it will produce between 90,000 and 99,000 MWh of electricity). This represents a saving of between 2.7 and 3.0 million tonnes of CO<sub>2</sub>-e emissions over the anticipated 30 year life of the wind farm. The Proponent has calculated this figure using two assumptions: firstly, that the wind farm's capacity factor is between 34 and 37% (capacity factor is the ratio of average actual annual energy output to the theoretical maximum output); and secondly, that for every megawatt of electricity produced, one kilogram of CO<sub>2</sub> would be offset.

One submitter questioned the Proponent's stated capacity factor of around 35% for the wind farm noting that the world average return is only between 10 and 28 percent and that for Crookwell I and Blayney it is only 15% and 17%, respectively. It is not possible for the Department to confirm the Proponent's stated capacity factor as this information is of a confidential nature, however, regardless of the actual amount, there will still be savings. Furthermore, the Department notes that each site will have a different wind resource, different topographic features, different wind turbines and technology, different transmission constraints, different operating conditions and different market conditions and therefore, it is difficult and not appropriate to compare the capacity factor of this wind farm against others. A recent discussion paper released by the Commonwealth Government with respect to wind farms suggests that in Australia, existing wind farms are producing capacity factors of between 30 and 35%<sup>12</sup>.

Putting aside issues pertaining to the accuracy of the capacity factor, the Department notes that the Proponent has overestimated the greenhouse gas savings by assuming a one to one saving rather than using as a minimum, the NSW pool coefficient. Using this value, the proposal could be expected to have savings of around 85,000 to 94,000 tonnes of CO<sub>2</sub>-e emissions per year; still a substantial amount.

With respect to concerns raised in submissions over the intermittent nature of wind farms, it would appear that these concerns have been derived from the belief that the component of ancillary services, known as the 'spinning reserve', used to cope with load variations would need to be increased in order to smooth the "noise" from intermittent wind generated electricity that is supplied to the NEM. According to objectors, it follows that greenhouse gas producing fuels will be required to supply this extra spinning reserve, thereby cancelling out the greenhouse gas savings attributed to the electricity generated by the wind farm.

<sup>9</sup> A base load power plant is one that provides a steady flow of power regardless of total demand by the grid. These plants run at all times through the year except in the case of repairs or scheduled maintenance. In NSW, base load is primarily provided by coal-fired power plants although gas turbine also has the potential to be used for base load power. Fluctuations, peaks or spikes in customer power demand are handled by smaller and more responsive types of power plants, eg. gas turbine and hydro.

<sup>10</sup> Electricity supply and distribution within NSW is managed through the National Electricity Market (NEM) which involves all East Coast States, including South Australia. The NEM is operated by the National Electricity Market Management Company (NEMMCO), which is jointly owned by the participating States. NEMMCO is responsible for ensuring that electricity supply and distribution systems maintain a balance between the aggregate demand for electric power and the total power generated by all power plants feeding the system.

<sup>11</sup> The NSW Pool Coefficient for a year is the simple average of the five 'Annual Pool Values' from previous years, lagged by two years. In broad terms, the Annual Pool Value is calculated as the average rate of emissions of greenhouse gases per unit of electricity sent out to the New South Wales grid in that calendar year by a defined set of generators and via the interconnectors linking New South Wales with Queensland, Victoria and South Australia. See NSW Greenhouse Gas Abatement Scheme, Fact Sheet – The NSW Pool Coefficient, November, 2005.

<sup>12</sup> Commonwealth Government (May 2006) *National Code for Wind Farms: A Discussion Paper*

Contrary to opinions expressed by those objecting to the Conroy's Gap wind farm, it is highly unlikely that there will be a need to increase the reserve/ ancillary system stand-by capacity, (that is, to burn more fuel to accommodate frequency and power fluctuations of the wind farm), because the highest load on the reserve system is when the wind turbines are not generating. Increases in wind farm output cause the ancillary service to reduce their output, thereby decreasing greenhouse gas emissions. In situations under which the wind farm has decreased its output to zero, the ancillary service would increase to meet the prevailing load on the system (as if there was no wind farm).

Should the contribution of intermittent generation to the NEM rise significantly in the future (beyond around 10% of generation), it is expected that there may be a need for further ancillary services to be employed. This would particularly be the case where a wind turbine is generating at capacity and then has to switch off when the wind speeds exceed the safe operating limit. The Department has been advised by the former Department of Energy, Utilities and Sustainability, however, that the variability of wind farm output can be dampened by relatively simple measures such as capping output, controlling the rate of change in output during critical periods and increasing interconnector capacity. Furthermore, given that the wind farms are geographically dispersed this situation may not be as severe as might be supposed.

### *Conclusion*

The Department accepts that in reality, it is unlikely that wind generators will displace an exact equivalent of the amount of energy produced by greenhouse gas-emitting sources since it is recognised that there are network losses to take into account. Nevertheless, the Department is satisfied that renewable energy sources such as wind have the capacity to offset greenhouse gas emissions produced by non-renewable power sources (such as coal and gas) and that they have a valuable role to play in reducing the amount of greenhouse gases emitted from anthropogenic sources.

Wind farms are consistent with the highest level of government and international policy. The Commonwealth Government's support for renewable energy provision is expressed through the National Greenhouse Strategy (NGS) and the Mandatory Renewable Energy Target (MRET) scheme, and at the State level through the NSW Greenhouse Office and programs such as the NSW Greenhouse Gas Abatement Scheme. More recently, the NSW Government announced the proposed introduction of a mandatory NSW Renewable Energy Target (NRET), relating to all electricity consumed in NSW. NRET is patterned on the MRET scheme and will provide ongoing support to the renewable energy industry, aimed at providing long term greenhouse benefits. NRET will require a proportion of electricity consumed by NSW consumers to be sourced from renewable electricity generation anywhere in the National Electricity Market. The renewable energy target levels will be 10 per cent of NSW end use consumption by 2010 and 15 per cent by 2020.

Based on sent-out electricity production of between 90,000 and 99,000 MWh per annum, the Conroy's Gap wind farm has the potential to offset around 85,000 to 94,000 tonnes of CO<sub>2</sub>-e emissions per year. This equates to the annual electricity consumption of around 11,400 to 12,600 homes (based on an average consumption rate of 7859 kWh in 2004-2005 (latest available figures provided by the Department of Energy, Utilities and Sustainability)) or the equivalent reduction in greenhouse gas emissions of taking 17,000 to 18,800 typical cars off the road for 30 years. This is not an insignificant contribution.

Wind farms provide emission free power and have a role to play in a diversified and more sustainable future energy sector.

## **5.4 Flora and Fauna**

### *Issue*

The key impacts on flora and fauna during the construction phase are loss of habitat and habitat degradation from vegetation clearing/trampling and soil disturbance. Impacts from the project during the operational phase are primarily associated with the movement of the turbine blades and the presence of transmission lines which have the potential to cause bird and bat strikes.

The Department received a number of submissions from members of the public expressing concern with the project due to its potential effect on birds, particularly wedge-tailed eagles. The former Department of Natural Resources expressed concern in relation to the loss of native vegetation and its effect on dry land salinity.

### *Consideration*

The Proponent undertook a biodiversity assessment based on field work undertaken during early November 2005 and early March 2006. The assessment characterised the biodiversity attributes of the site with particular attention given to species and communities listed under the *Threatened Species Conservation Act 1995* (TSC Act) and the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) and determined the likelihood and level of impact that may result during the construction and operation of the project.

The Proponent acknowledges that there are some limitations to the flora survey undertaken due largely to the extended drought period which preceded the survey period. Furthermore, whilst the survey was undertaken during a wet spring season, annuals or species such as rock orchids which flower outside this season may not have been recorded. Notwithstanding, the Proponent contends that there was a low probability of overlooking any species of conservation significance due to the known habitat requirements of threatened species that have been recorded in the region.

Similarly, the Proponent notes that the limited duration and intensity of the fauna survey may have resulted in the omission of some sparsely distributed, ephemeral or seasonal species, although given the quality and diversity of habitat at the site, the Proponent considers its assessment appropriate. The bat survey was also noted to have some limitations as the Anabat system is intended for species identification rather than abundance or habitat utilisation.

A referral was also made to the then Commonwealth Department of the Environment and Heritage (now Department of the Environment and Water Resources) as there were several threatened flora or ecological communities listed under the Commonwealth EPBC Act that had the potential to be located within the search area (taken as the subject site plus a 30 kilometre buffer). An assessment relating to migratory birds was also referred to the Commonwealth for its consideration. The Commonwealth concluded that the proposed wind farm would not have a significant impact on matters of National Environmental Significance and as such, did not constitute a 'controlled action' under the EPBC Act.

### Flora

The Proponent notes that the majority of the site is farmland that has been cleared and grazed for many decades. Indeed, the site is considered to be one of the most heavily cleared in the area, with the general loss of all indigenous eucalypts over large parts of the 'Linbrook' and 'Springvale' properties. The biodiversity assessment also identifies the presence of remnant native vegetation which broadly fit into three vegetation types including Red Stringybark-Broad-Leaved Peppermint-Red Spotted Gum Forest, 'Ferndale' Dry Shrub Forest Remnants and Box-Gum Woodland.

The Proponent notes that a few small areas of remnant groundcover, shrubs and eucalypts derived from the Red Stringybark Forest (more generally known as the Widespread Tablelands Dry Shrub/ Tussock Grass Forest) occur on ridge crests and upper slopes of the proposed turbine sites. The Dry Shrub Forest occurs on the 'Ferndale' property and remnants are generally limited to the ridge tops and upper slopes. Box-Gum Woodland characterised by Blakely's Red Gum and Yellow Box is present in a discontinuous linear remnant adjacent to Black Range Road in the vicinity of the proposed power line and track crossing points. The woodland community is also present as secondary grassland in the northern part of the site on the McCullums Creek valley floor and lower slopes (refer Figure 7). This area is considered to be in sufficiently good condition to be regarded as an example of the White Box Yellow Box Blakely's Red Gum Woodland Endangered Ecological Community (Box-Gum EEC) listed under the TSC and is of moderate-high conservation significance. This area of remnant vegetation is also considered to form part of the Grassy White Box Woodland Threatened Ecological Community listed under the EPBC Act.

A number of threatened flora species are also known to occur in the area. Two plants of the Yass Daisy, listed under both the TSC Act and EPBC Act were recorded in the north-east part of the site (refer Figure 7). The Proponent notes that a sizeable population (in the hundreds) of these daisies were also observed over the fence,

immediately north of the site and also scattered in roadside remnants along Black Range Road, east of the subject site. Potential habitat for the Burrinjuck Spider Orchid (also listed under the TSC Act and EPBC Act) is identified at the site in small remnant stands of dry shrub forest although it was not specifically recorded as the surveys were undertaken outside its flowering period (late August to October).

As noted above, the greatest risk to flora on the site will occur during the construction phase. The Proponent's assessment indicates that approximately 4.9 hectares of vegetation would need to be cleared and would be permanently lost for the duration of the wind farm's operational life. Of this, approximately 4.3 hectares would comprise native secondary grassland derived from dry shrub forest with the balance being comprised of exotic grassland. The assessment also notes that a further 2.1 hectares of native secondary grassland and exotic grassland vegetation would be temporarily lost during the construction phase, however it would be reinstated following the conclusion of construction. Importantly, the Proponent notes that by routing the power line through cleared parts of the 'Ferndale' property and siting the southern turbines to the east of remnant forest patches, no native forest would need to be cleared. Furthermore, the Proponent states that using Paynes Road to access the site rather than Black Range Road would avoid the need to remove or trim branches from trees alongside Black Range Road.

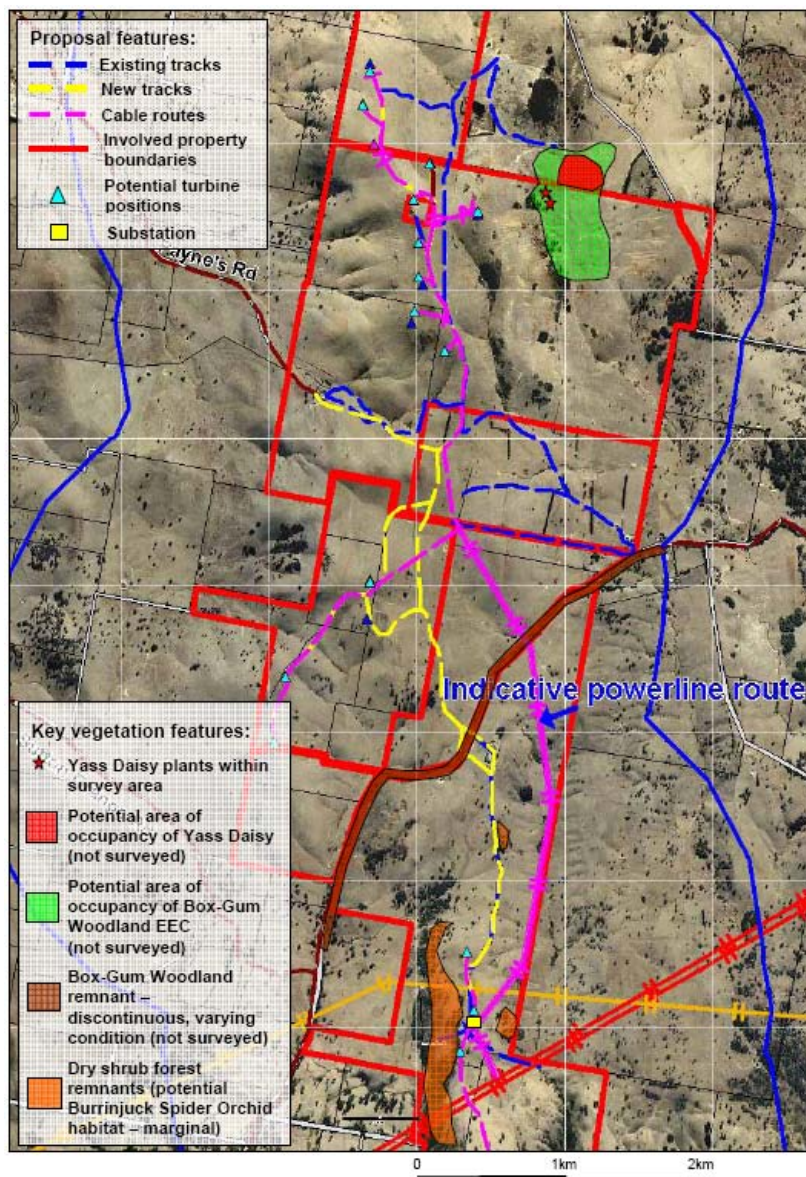


Figure 7. Location of potential or actual threatened species and ecological communities at the subject site

The Proponent notes that the proposed development would not impact upon the northern valley (McCullums Creek) area where the Box-Gum EEC occurs or the associated Yass Daisy habitat. Indeed, this area was removed from the proposal in light of the results of the biodiversity, visual and noise assessments.

The Proponent has identified a range of measures to minimise the impact of the wind farm on flora at the site, including undertaking further survey work during the Burrinjuck Orchid's flowering period prior to clearing of any potential habitat, micro-scale site selection to avoid remnant eucalypts, appropriate stabilisation of exposed areas, weed management, measures to reinstate topsoil, subsoil and weathered rock to approximate the original profile as far as practicable and provision of appropriate fire fighting equipment. The Department supports these measures and their inclusion in the Proponent's statement of commitments.

The Department also recommends the Proponent be required to prepare and implement a Flora and Fauna Management Plan to outline measures to protect and minimise loss of native vegetation and native fauna habitat as a result of construction of the project, with particular emphasis on how habitat for the Yass Daisy and Burrinjuck Orchid is to be protected. A condition requiring the Proponent to establish clearly defined work areas is also recommended in order to prevent uncontrolled or inadvertent access to areas being protected. The recommended conditions of approval also recommend a buffer area of at least 50 metres where the Yass Daisy or Burrinjuck Spider Orchid or their habitat is identified. As such, there may be a requirement for wind turbines (or other equipment) to be moved from the proposed locations. The recommended conditions allow for turbines and other infrastructure to be moved up to 250 metres from the proposed location subject to approval by the Director-General. If infrastructure is proposed to be located more than 250 metres from that proposed, further approval under the Act will be required. This is similar to the approach taken by the Court for the Taralga wind farm.

In its submission, the Department of Natural Resources, raised concern with the removal of vegetation on highly erodible soils at the site and its potential to exacerbate localised dry land salinity and contribute to erosion and sedimentation. The DNR considers the Proponent should be required to offset any vegetation loss to address these issues. In its response to submissions, the Proponent notes that it will not be clearing any significant tree or shrubs from the site. The Proponent considers that the loss of herbaceous vegetation as a result of the proposal would not significantly affect groundwater recharge performance at the site. The Proponent has committed to rehabilitating disturbed areas with native grasses as soon as practicable.

The Department is satisfied that the risk of the proposal exacerbating dry land salinity as a result of the loss of herbaceous vegetation is sufficiently low so as to not warrant vegetation offsets. The Department supports the rehabilitation of the site with native grasses and undertaking landscaping at the site using locally native species to screen the substation and control rooms. This is reflected in the Department's recommended conditions of approval.

#### Fauna

The Proponent undertook a fauna survey which sampled the range of habitats likely to be directly affected by the proposed project, particularly the ridge tops as well as areas likely to be suitable for threatened species. Forty nine fauna species were recorded including seven terrestrial mammals, three microbats, 25 birds, eight reptiles and six frogs. The most abundant mammal at the site was the introduced European Rabbit which the Proponent notes is likely to be a principal food source for local Wedge-tailed Eagles. Magpies, Richards Pipits and Wedge-tailed Eagles were the most commonly recorded avifauna species at the site. The Proponent concludes that the overall survey results suggest a low abundance and diversity of fauna at the site.

No threatened species listed under the TSC Act or EPBC Act were recorded on the site during the survey period, although the threatened Superb Parrot was recorded along Black Range Road approximately three kilometres east of the site. Other threatened species with the potential to occur on the site were identified, assessed and rated as to their potential to be impacted by the proposal. Parts of the site were considered to have a moderate potential to provide habitat for nine threatened species including two microbats, six birds and one invertebrate although the Proponent's assessment of significance concludes that the proposal is not likely to significantly affect the life cycle or habitat of these species. The Department supports these conclusions.

The impact on birds and bats from blade strike is a key area of concern for wind farms. The Department received a number of submissions from members of the public in relation to this issue, with several expressing particular concern in relation to the potential impact of the proposal on the local Wedge-tailed Eagle population.

To assess the impact of the proposal on avifauna species either located on or with the potential to occur on the site, a risk assessment was undertaken. The risk assessment identifies and evaluates risks posed by the proposal with respect to collisions with wind turbines causing death (often referred to as blade strike) and habitat loss or avoidance caused by the presence of the turbine and infrastructure and takes into consideration mitigation measures proposed by the Proponent. The assessment drew on past experiences at other sites and from what is known of the ecology and behaviour of different species at risk of collision with wind farm infrastructure, such as what height species fly at or where they forage.

For potentially at-risk birds including the Peregrine Falcon, Spotted Harrier and Barking Owl, the assessment concludes that the risk at both an individual and population level is either low or moderate. For the Wedge-tailed Eagle, however, the assessment concludes there is a moderate to high risk to the population. Wedge-tailed Eagles are a high order predator and occur at a low density in the landscape. The mainland species is not listed as threatened, however, the Tasmanian Wedge-tailed eagle (a sub-species of the mainland) is listed under both State and Commonwealth legislation as endangered. The assessment notes that for this and other raptor species, the risk from the proposal is related primarily to foraging activity and thus, the risk could be reduced by managing the availability of prey on the site. To reduce the attractiveness of the ridge to foraging raptors, the Proponent states that it will implement a number of measures including the control or removal of rabbits, carrion and young lambs on the turbine ridges. The Proponent notes that ongoing monitoring of birds, particularly Wedge-tailed eagles will need to be undertaken during the operational phase of the wind farm to assess blade strike mortality, habitat avoidance and impact on breeding success.

An adaptive management approach would also be adopted by the Proponent such that where impacts exceed a certain threshold, which will be detailed in a management plan, mitigation measures would be implemented. Such measures identified by the Proponent include adjustments or enhancements to turbines and associated infrastructure, installation of flight diversion and deterrent structures, removal of local food sources or insect-attracting light sources, compensatory off-site habitat protection or enhancement, nest site protection, sponsoring the care of injured birds and the periodic shutdown of one or more turbines as required.

The bat survey identified three bat species at the site, none of which are listed as threatened. The assessment also identified two endangered bat species known to occur in the area but concluded that foraging and roosting potential at the site was marginal and hence the proposed development was unlikely to impact upon these. The Proponent notes that the relative vulnerability of the various bat species in Australia to blade strike is not well known, although overseas studies suggest that higher flying 'tree bats' are disproportionately affected by blade strike. The White-striped Mastiff/ Freetail bat is such a species that may be more vulnerable to blade strike due to its high flight and low rate of echolocation. This species was found at the site.

The Proponent notes that the risk to bats could be reduced by avoiding or reducing the use of lights on or near the towers. Indeed, the Department received a small number of submissions expressing concern over the use of lighting and its potential to affect insectivorous fauna (as well as being unsightly). The Department received a submission from the Civil Aviation Safety Authority (CASA) which stated that obstacle lighting would not be required for this wind farm. Should the Minister determine to approve the project, the Department recommends a condition which states that no external lighting is permitted (except low intensity security lighting), unless otherwise directed by the Director-General or CASA. As such, the Department is satisfied that the risk to fauna such as microchiropteran bats from collision with turbines would be reduced.

The Department recognises the proposed wind farm's potential to impact upon the local Wedge-tailed eagle population and considers it essential that should the Minister approve the project, the Proponent be required to undertake ongoing monitoring of bird as well as bat species at the site. An adaptive management approach should also be adopted to address any emerging issues arising from the results of monitoring. Should the Minister determine to approve the proposed wind farm, the Department recommends the Proponent be required to prepare and implement a Bird and Bat Management Program. This program must incorporate ongoing

monitoring and a decision matrix that clearly sets out how the Proponent would respond to the outcomes of the monitoring work.

In addition, the Department considers it appropriate to impose a financial penalty on the Proponent where the proposed wind farm results in the death of a Wedge-tailed eagle. This is similar to the recent Land and Environment Court decision on the nearby Taralga Wind Farm which imposed a \$1500 fine for every death, made payable to the NSW Wildlife Information and Rescue Services (WIRES). The imposition of a penalty in-part compensates for the loss of the bird and is consistent with the polluter-pays principle.

### *Conclusion*

The Department recognises the limitations of the biodiversity survey undertaken for the proposal, however, it is generally satisfied that the survey provides a useful basis upon which to undertake an assessment of the proposed development's impact on flora and fauna. The Department considers that the proposed wind farm will not have a significant impact upon flora and non-avian fauna provided measures are taken to carefully position infrastructure to avoid the removal of trees, threatened species and the destruction of rocky outcrops.

Similarly, the Department considers that the potential risk of bird and bat deaths from the operation of the wind farm would be low and that impacts could be adequately managed provided the Proponent implements the measures it has committed to undertake and operates the project in accordance with the Department's recommended conditions of approval.

## **5.5 Hazards and Risk**

### *Issue*

The potential for wind turbines to start bush fires, or to fuel them once they start, has been raised in a number of submissions. One submission also objected to the proposal on the basis of turbines and the substation being inappropriately located on ridge tops (ridge tops are classed as bushfire prone areas), especially as they contain fuel. Submissions also expressed concern regarding lightning strikes and the potential to start fires.

Submissions also raised concern in relation to the impact of shadow flicker and blade glint on surrounding property as well as the potential for the wind farm to distract drivers by both their presence and shadow flicker.

### *Consideration*

#### Bushfire Risk

The Proponent notes that summer conditions in the Yass district can be hot and dry with high wind speeds, producing a local grass fire hazard. The steep topography and absence of built areas or natural fire breaks (such as watercourses) are identified as being factors that may assist the rate of spread of wildfires at the site, however, the Proponent notes that there are also mitigating factors at the site including, the sparse and fragmented nature of woodland, low density of human settlement and assets, the local presence of the Rural Fire Service at the Springvale property and the grazing regime which keeps paddock fuel sources low.

The Proponent identifies both construction and operational factors associated with the wind farm that have the potential to influence bushfires. With respect to construction, the key issue relates to flammable material such as fuel being brought on to site. The Proponent states that this would be managed through appropriate storage and handling as per manufacturer's instructions and keeping appropriate fire fighting equipment on site during high fire danger periods. The Rural Fire Service (RFS) would also be consulted during the construction phase. The Department is satisfied that any fires during construction could be adequately managed and supports the measures proposed by the Proponent.

The Department notes the importance of keeping the RFS informed of construction works at the site and recommends as part of any conditions of approval, a bushfire management plan be prepared and implemented, in consultation with the RFS. The recommended conditions also require the Proponent to comply with any reasonable request of the local RFS to reduce the risk of bushfire and to enable fast access in emergencies throughout the life of the project.

During operation, the key issues include turbine ignition, lightning strikes, the location of the substation, control room and aerial cables and interference with fire-fighting operations. Objectors to the proposal raised particular concern with lightning strikes and fuel being kept on the premises. One submission also noted the fire that occurred at the wind farm at Lake Bonney, South Australia in January 2006 and raised concern that the same could happen at Conroy's Gap.

The Proponent states that fires due to equipment failure in modern turbines are very rare. One of the safety features of turbines is that they will automatically shut down if ambient temperatures exceed the safe operating range, or components overheat. Nevertheless, in the event a turbine catches fire, the generally low fuel levels in surrounding pasture, ready visibility of most of the turbines and local presence of rural fire service equipment and personnel would assist in the detection, response and control of the fire. For the substation, the Proponent states that it will be bunded such that the capacity exceeds the level of transformer fuel stored and an asset protection zone established to reduce the potential for a fire to spread if it occurs. Regular inspections and maintenance will also be undertaken. With respect to concerns regarding lightning, the Proponent states that all turbines will have lightning rods installed to ground strikes and minimise damage and fire risk. The Proponent considers that the presence of the wind farm would not be a hazard to fire fighting helicopters and planes as there are no large water bodies in the immediate vicinity and hence, such aircraft are unlikely to fly close to the turbines.

The Proponent states that turbines would also be shut down following notification of a bushfire event in the locality or in extreme fire conditions.

The local RFS did not make a formal submission during the public exhibition of the proposal, but has previously commented on the fire risk potential for wind turbines at other wind farm proposals and stated that it does not consider that turbines themselves present any greater risk of fire than other infrastructure.

The Department is satisfied that the potential for wind farms to cause a fire or to fuel them once started is low provided appropriate precautionary measures are implemented to minimise risk. As noted above, the Department recommends a bushfire management plan be implemented, following consultation with the RFS. Appropriate fire fighting equipment should be kept on-site at all times with personnel trained in its use. The local RFS should be consulted with regularly to ensure they are familiar with the project.

#### Shadow Flicker and Blade Glint

Shadow flicker is produced by the shadow cast by rotating turbine blades. It results in a pulsating shadow (often referred to as 'chopping the light') which can be annoying. The effect of shadow flicker attenuates with distance and is generally not noticed beyond around 500-1000 metres from a turbine (or approximately 10 rotor heights)<sup>13</sup>. It has been suggested that no dwelling should experience more than 30 hours of shadow flicker per annum<sup>14</sup>. Concern was raised in a number of submissions regarding the effects of shadow flicker and questioned the Proponent's commitment to turn the turbines off under unfavourable conditions.

To assess the impact of shadow flicker for this wind farm on motorists and residences, shadow flicker diagrams were prepared. The diagram prepared for residences shows that the associated property "Linbrook", the non-associated property "Grenville" and a proposed house along Black Range Road may be affected by shadow flicker for several hours per year. Shadow flicker may also present an issue for passing motorists travelling southbound along Black Range Road at certain times of the day.

The Department acknowledges that shadow flicker diagrams present a worst-case scenario as the assessment is based on it being a clear day, the sun being a point source of light with the rotors always facing directly towards or away from the sun. In reality, a number of other factors will act to reduce the actual length of time for shadow flicker to occur such as the presence of cloud cover, smoke or dust, or intervening vegetation or buildings, the incidence of the rotors facing directly towards or away from the sun and the period in which the turbines are rotating.

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<sup>13</sup> UK Department of Trade and Industry <http://www.dti.gov.uk/energy/sources/renewables/planning/onshore-wind/shadow-flicker/page18736.html> retrieved 30 January 2007

<sup>14</sup> Danish Wind Industry Association <http://www.windpower.org/en/tour/env/shadow/index.htm> retrieved 30 January 2007

To prevent shadow flicker from disrupting residences, the Proponent has committed to pre-programming the wind turbine control system to automatically shut down individual turbines during conditions that could cause shadow flicker to residences. The Department supports this approach and is satisfied that there currently exists the necessary technology for this to be implemented. A condition which reflects the Proponent's commitment is recommended should the Minister approve the project.

With respect to impacts on passing motorists, the Proponent states it will monitor the condition once the turbines are in place and implement mitigation measures to ameliorate any safety impacts arising from shadow flicker. This approach is supported by the RTA and Department, and is reflected in the recommended conditions of approval.

#### Driver Distraction

The proximity and visibility of wind turbines to the road and their potential to contribute to driver distraction and other associated safety concerns must be considered. The Department notes that driver distraction can occur as a result of a number of factors including a turbine's proximity to the road, its location on a prominent landmark or bend in the road. With respect to the proposed Conroy's Gap wind farm, several turbines are located within 500 metres of Black Range Road with the closest turbine to the Hume Highway being more than three kilometres.

During the initial period following the commissioning of the wind farm, it is likely that the wind turbines may provide a new visual focal point for drivers. For motorists travelling on the Hume Highway, the Department notes that wind turbines will clearly be visible from sections of the Highway, however, as the turbines are in view for some distance, they will not be a surprise to motorists and are therefore unlikely to compromise road safety. Along Black Range Road, the Department notes that the wind turbines will be in much closer proximity and as such, there is greater potential for driver distraction. The risk of this occurring, however, is minimised as the turbines will not appear suddenly and are likely to at least be partially screened from view along parts of the road due to intervening topography and the trees which line the road in parts. Furthermore, drivers travelling along that road are unlikely to be travelling at speed due to the road's pavement and design thereby further reducing the risk of an accident occurring.

#### Aviation

Under the Civil Aviation Regulations, the Civil Aviation Safety Authority (CASA) may determine that an object or a proposed object which intrudes into navigable airspace will be required to be provided with obstacle lighting. In the case of obstacles located outside an aerodrome, lighting may be required if the structure is greater than 110 metres above the ground level.

The proposed wind turbines are greater than 110 metres in height. The Proponent consulted with CASA to determine the need for obstacle lighting for the Conroy's Gap wind farm. In its submission, CASA stated that there is no requirement to provide obstacle lighting on the wind turbines. It did, however, ask to be provided with relevant coordinates and heights of the "as constructed" wind farm, should the Minister determine to approve the project. These requirements are reflected in the Department's recommended conditions of approval.

The Department notes that the presence of wind turbines has the potential to affect aerial spraying of agricultural crops at the site. To address this, the Department recommends the Proponent be required to fully fund the cost difference between aerial weed spraying/fertiliser application and a reasonable alternative.

#### *Conclusion*

The Department is satisfied that the risk posed by the proposed wind farm is low. The Department considers that implementation of the measures outlined above should adequately equip the wind farm in fighting, preventing or reducing the risk of fires and bushfires and that issues relating to shadow flicker, driver distraction and aviation can be satisfactorily addressed.

## 5.6 Traffic and Transport

### *Issue*

Traffic and transport related impacts will be at their greatest during the construction period, most notably during concrete pours due to the number of trucks required and transportation of the wind turbines due to the length of the vehicles.

The Department received a small number of submissions raising concern about traffic and transport issues during construction such as vehicle and faunal collisions and driver distraction. Concern was also expressed that the turbines themselves would be a distraction to drivers, particularly for those travelling along the Hume Highway. This issue has previously been addressed in section 5.5 of this report. One submission raised concern in relation to dust, road traffic noise and nuisance impacts from construction traffic travelling along Paynes Road.

A late submission was received from Council requesting a number of conditions relating to traffic and road safety be imposed, if the Minister determines to approve the project.

### *Consideration*

The Proponent undertook an assessment of the impact of the proposed wind farm as a result of traffic and transport related issues. The assessment provides a preliminary technical appraisal of the traffic and safety implications arising from the use of the selected traffic route and recommends measures for minimising traffic impacts.

Access to the site is via the Hume Highway to Paynes Road (approximately 21 kilometres south west of Yass). Proposed access tracks would cross Black Range Road for a short length near the property Ferndale in order to provide access to the southern group of wind turbines. The Proponent notes that access to some of the southern turbines could be gained via the Hume Highway then Black Range Road, although this is not the preferred route as there are many deficiencies in the alignment and grading of the road which would impact on traffic safety. Figure 2 shows the preferred traffic route and site access tracks.

Traffic volumes associated with the project will be at its greatest during the construction phase. The Proponent notes that as most of the work will be carried out by specialised crews consisting of less than 10 workers, the maximum number of vehicles entering the site over a one hour period would in general be 10. This would increase markedly during concrete pours where up to 50 concrete trucks may be required each day to establish each of the turbine footings. In general, the Proponent anticipates that most of the heavy and oversized deliveries will take place over an eight week period at a rate of four vehicles per day. A total of 2500 light vehicles, 2050 heavy vehicles and 232 oversize and overweight vehicles (all one-way movements) are expected to be generated over the six to nine month construction period. This is substantially greater than the traffic currently experienced along Paynes Road.

The Proponent notes that the wind farm will operate unattended, however, maintenance crews will access the site an average of two to three days per week. Access to the site will be undertaken using a light vehicle and is not expected to generate any traffic or safety implications.

The Proponent has identified a number of safety issues that could arise as a result of the project, including the risk of vehicle collisions (particularly during wet weather or fog), obstruction by long loads, road surface deterioration, structural failure of bridges and culverts, driver distraction, traffic noise and shadow flicker from turbines. To address these issues the Proponent has committed to implementing the following safeguards:

- clearance of roadside vegetation on the verge of Hume Highway north east of Paynes Road to increase intersection sight distance;
- preparation of traffic control plans for all operations of oversize and overweight vehicles. An oversize vehicle permit would also be required to be obtained from the RTA;
- likely upgrade to Paynes Road for pavement, drainage structures and stock grids. Widening may also be required at specific locations to permit oncoming traffic to pass safely;
- placement of a speed limit on Paynes Road, in consultation with Yass Valley Council during the construction phase;

- clearing of objects, where necessary, to ensure safe passage of long loads;
- education of drivers regarding the preferred traffic route to the site (to limit use of Black Range Road);
- monitoring of shadow flicker effects on Black Range Road and where necessary, implementation of mitigation measures to manage this;
- implementation of a monitoring program to assess traffic impacts during construction such as noise and dust and where necessary, implement measures to reduce these;
- implementation of regular scheduled maintenance of the road pavement such as grading, dust suppression and drainage control during the construction period; and
- timing of traffic movements to the site outside of periods where heavy fogs are likely.

The RTA made a submission on the EA, raising no objections to the project subject to the Department imposing a number of obligations on the Proponent. These largely pick up on the commitments made by the Proponent in the EA, however, they also include a requirement to provide appropriate regulatory signage advising of heavy vehicle movements at the junction of Paynes Road and the Hume Highway as well as requirements to ensure all vehicles can safely manoeuvre within and to the site, and that safe intersection sight distances, in accordance with RTA Guidelines, are maintained for all access locations to the site. The Department supports the recommendations of the RTA.

The Department notes there will be a significant increase in traffic volumes during the construction phase of the project. The Department supports the use of Paynes Road rather than Black Range Road as the preferred traffic route as there is greater potential for conflict on Black Range Road due to the greater number of residences along that road when compared with Paynes Road. This is reflected in the Department's recommended conditions of approval. In particular, Paynes Road only provides access to two residences (one of which is associated with the project) and a small quarry.

A submission raised concern that Paynes Road is currently unfenced thereby increasing the chance of collision with stock. The Proponent states it will liaise with the affected property owners and will offer to temporarily fence paddocks during the construction phase where the potential to impact stock is considered significant. The Department supports this approach and recommends that the details of any fencing be addressed in a Traffic Management Plan.

Council's submission requested a number of conditions be included in any conditions of approval, including:

- preparation of dilapidation reports for Paynes Road and Black Range Road where utilised by heavy vehicles associated with the project;
- preparation of a traffic management plan;
- road upgrades including sealing of Paynes Road and the provision of a gravel pad crossing over Black Range Road where heavy vehicles will cross;
- maintenance and rehabilitation of Paynes Road and Black Range Road following construction, to the satisfaction of Council;
- conditions relating to Crown Roads; and
- conditions relating to road safety during operation.

The Department generally agrees with Council's recommended conditions. Following further discussion with Council, it was agreed that a dilapidation report may not be required for Paynes Road where it is to be sealed, however, the Proponent would be responsible for the maintenance of Paynes Road and the small section of Black Range Road throughout the construction phase. The Proponent would be required to repair the pavement of Paynes Road and Black Range Road following the completion of construction to the satisfaction of Council. These conditions are included in the Department's recommended conditions of approval. It was also agreed that Paynes Road need only be sealed for the first 1.3 kilometres (up to the quarry) with any sealing after that point subject to consultation with the owner of Linbrook through which Paynes Road traverses. The Department notes that the Proponent will be required to minimise dust and manage road safety at all times along this road. A traffic management plan and dust management plan should be prepared to manage these issues during the construction of the project. Matters relating to road safety are addressed in section 5.5.

### *Conclusion*

Traffic and transport related impacts are likely to be short term in nature and restricted to the construction and decommissioning phase of the project. The Department is satisfied that issues relating to traffic and transport have been adequately identified by the Proponent with recommended safeguards for each key location. The Department considers that the implementation of the identified environmental safeguards and compliance with the recommended conditions should reduce the risk of traffic accidents and minimise structural and environmental damage.

## 5.7 Property Prices/ Land Valuation

### *Issue*

Given the variability and subjectiveness of public perception of wind farms, a perceived reduction in a particular amenity such as landscape quality or quietness could negatively affect a section of the property market. This is usually translated to lower saleability and market value of the property.

The Department received a number of submissions expressing concern that the value of their property would decrease should the wind farm be approved. Some submissions contended that their ability to sell their property had already been affected by the proposed wind farm.

### *Consideration*

As part of the Environmental Assessment, the Proponent included a report undertaken by Henderson and Horning Property Consultants which assessed the likely impact of the project on local land values by examining overseas wind farms and using the Crookwell Wind Farm developed in 1998 as a case study. The latter wind farm is the nearest existing wind farm to the Conroy's Gap site (approximately 90 kilometres by road), has similar land uses (agricultural and rural residential), and several sales have taken place since the wind farm was built. The Crookwell case study examined the sale transactions in the Crookwell area over a 15 year period (1990 to 2006).

Two submissions expressed concern with the Land Value Impact Assessment included in the EA as it was based on a study of property prices in the Crookwell area and not on property likely to be directly affected by the proposal. One submission went further to say that using the Crookwell wind farm as a comparison was not appropriate because of its different size and scale.

The Department acknowledges that any negative effect wind farms may have on property values is a major concern to local residents. However, there is limited quantifiable data which can be used to identify any valuation effects. The review of market sales in the Crookwell case study found no market evidence that having a view of the wind turbines had an effect on reducing land values.

The most extensive survey to examine the effect of wind farms on property values was undertaken in the United States and presented in an analytical report by the Renewable Energy Policy Project<sup>15</sup>. The study did not model the changes in property values, rather it was an empirical review where data from ten wind farm sites was collected and subjected to a statistical regression analysis to determine price changes in three ways:

- how property values (prices) changed over the entire period of the study for the view shed and comparable region;
- how prices changed in the view shed before and after the projects came on-line; and
- how property values changed for both the view shed and comparable community but only for the period after the project came on-line.

<sup>15</sup> Sterzinger, G *et al.* *The Effect of Wind Development on Local Property Values*, May 2003.

The results identified that in 30 separate analyses (that is, ten wind farm sites subjected to three assessments), 26 property values in the affected view shed performed better than the comparable properties. The study conclusion that "there is no support for the claim that wind development will harm property values" was qualified with a statement that more data will need to be analysed as it becomes available. This suggests that the conclusions drawn from the analysis are indicative and preliminary and should be used cautiously when translating to other sites that were not investigated.

The Bald Hills wind farm panel inquiry in Victoria examined the issues of property devaluation for neighbouring properties in a more qualitative manner. A number of property valuers and real estate agents provided submissions and appeared before the Panel Inquiry as expert witnesses. From a review of this evidence the Panel Inquiry report concluded that:

*All that appears to emerge from the range of submissions and evidence on valuation issues is the view that the effect of wind energy facilities on surrounding property values is inconclusive, beyond the position that the agricultural land component of value would remain unchanged. On this there appeared to be general agreement.*

The Department notes the concerns expressed in the submissions regarding the project's potential to adversely affect property values. It is arguable as to whether the wind farm may have a dampening effect on a sensitive section of the property buying market. In any case, the Department concurs with the Proponent's view that there would be other influences such as demand for land and housing within a commutable distance from a larger centre (such as Goulburn and Canberra) which affect property values to a more significant degree. The Department also agrees that the Crookwell case has close similarities with the proposed Conroy's Gap wind farm, particularly as the assessment included sales transactions following the approval of the Crookwell II wind farm (which will have between 46 and 50 turbines), and its experience is therefore useful for drawing insights or for verification purposes.

#### *Conclusion*

The Department notes that there will be changes to the visual landscape along with other potential impacts of the wind farm (operational noise, shadow flicker, etc), as discussed elsewhere in this report. However, it is not possible to accurately factor in how this will affect property values. There is no conclusive evidence that significant value changes, transfers or inequities would result from the project proceeding as found in the stated US survey and the Bald Hills wind farm panel inquiry.

The Department's recommended conditions of approval aim to keep the identified impacts within acceptable limits, so as to ensure that any property value effects are minimal.

## **5.8 Other Issues**

### *Erosion and Sediment Control and other Water Quality Issues*

Soil at the site is prone to erosion, as evidenced by existing gully and streambed erosion and sheet erosion on the slopes beside the northern turbine ridges. A small number of submissions stated that the proposed wind farm has the potential to reduce water quality in local streams due to increased erosion from construction activities.

The Proponent states that any impacts from erosion and sedimentation are most likely to occur during the construction and decommissioning phases of the proposal, particularly during excavation works, road works and the transport of machinery. The Proponent notes that a culvert on a drainage line on Paynes Road may need to be replaced in order to withstand the weight of the trucks accessing the site so care will need to be taken to minimise the potential for sediment-laden runoff entering the watercourse. Care will also need to be taken to minimise the area of compacted soil created by the proposal as this can reduce infiltration capability leaving surface layers of soil more susceptible to wind and water erosion.

Water quality impacts could also arise during the construction phase as a result of improperly stored or used chemicals at the site, including paints, cleaning solvents, concrete products, fuel and the like.

To minimise the potential for erosion and sedimentation and other water quality impacts, the Proponent identifies a number of commitments it will undertake, including:

- undertaking works during dry, stable conditions, as far as practicable;
- installing, where required, sediment fences and flow diversion and energy dissipation structures;
- ensuring vehicles and machinery use established tracks or routes;
- upgrading of tracks, where necessary, in accordance with best practice guidelines published by the former Department of Natural Resources (DNR);
- minimising the removal of vegetation;
- stabilising and rehabilitating disturbed surfaces as soon as possible;
- appropriately storing chemicals on site, including bunding;
- undertaking maintenance or refuelling on hardstand areas; and
- having hydrocarbon spill kits available on site.

The Department of Primary Industries was satisfied that its issues (including weed management, containment of contaminated substances, minimising disturbance to farm operations and rehabilitation of disturbed areas) had been adequately addressed by the Proponent in its Environmental Assessment.

The Department also received a submission from DNR who identified that large areas of the site are subject to erosion and sedimentation and that it objects to the creation of permanent hard surface roads in these environmentally susceptible areas unless significant justification is provided. The DNR contended that all access tracks should be rehabilitated and revegetated to maintain the long term stability of the site and minimise groundwater recharge for dry land salinity.

The Proponent responded by noting that the majority of hard surface access tracks required during the construction phase would be rehabilitated and revegetated following construction, including those tracks along the ridgelines. The Proponent states that steeper track sections on side slopes may require gravelling to ensure stability and traction. Existing hard surface roads required for access to the trig station and farming activities will be retained and upgraded as required.

The Department recognises DNR's concern and agrees that where practicable, all access tracks should be rehabilitated and revegetated following the construction phase to minimise the potential for erosion. The Department is, however, satisfied that there exists a case to retain hard surface tracks where stability and traction is a concern.

The Department supports the measures proposed by the Proponent to manage erosion and sedimentation and other water quality impacts and recommends the Proponent be required to prepare and implement an Erosion and Sediment Control Plan, in consultation with the Department of Environment and Climate Change, to provide an overarching framework for management at the site.

The Department considers that through the measures proposed to be implemented by the Proponent and the conditions recommended by the Department, potential water quality impacts associated with the project can be adequately managed.

#### *Transmission Interference*

A number of communication links and broadcast networks are present in the area surrounding the site, including the Black Mountain transmitter located in Canberra. Electromagnetic interference (EMI) has the potential to cause degradation or total loss of signal strength. The Proponent notes it may cause poor TV reception and can also result in a reduction in the coverage of mobile phone, radio and aircraft navigation communications under certain circumstances.

Wind farms have the potential to cause interference, although the level of effect is influenced by a number of factors such as the location of turbines with respect to the signal path and the characteristics/ composition of the wind turbine blades. The Proponent undertook an assessment to determine the potential effect of the wind farm on television and radio broadcast services, mobile phone services, radio communication services and aircraft navigation services.

The Proponent notes that it is difficult to assess the impact of the wind farm on television reception at specific houses although it accepts that there is the potential for impacts to occur without mitigation. Based on international guidelines, it is noted that impacts on reception are unlikely to occur more than five kilometres from a wind turbine. On this basis, the Proponent states it will undertake a monitoring program of houses located within five kilometres of the wind farm to determine any loss in television signal strength as a result of the wind farm. The Proponent states it will rectify any transmission problems, in consultation with the landowners, if they are found to occur.

The Proponent consulted with the relevant service providers of mobile phones and radio communication services and determined that there was a low risk of impact from the proposal. The Proponent has committed to undertake remedial work if an issue arises.

The Proponent consulted with Airservices Australia in relation to the impact of the proposal on aircraft radar navigation systems who concluded that critical coverage areas are unlikely to be affected. Should any effects become apparent, the Proponent has committed to implementing mitigation measures to address these.

The Department supports the Proponent's commitments and is satisfied that issues relating to transmission interference from the wind farm are not significant and could be adequately managed through the Proponent's statement of commitments and Department's recommended conditions.

#### *Heritage*

The Proponent undertook an indigenous heritage assessment in consultation with the Buru Ngunawal Aboriginal Corporation and Onerwal Local Aboriginal Land Council. The assessment notes that the area would have been used for low levels of occupation during hunting and gathering and is likely to be of low archaeological potential and sensitivity. Fieldwork undertaken at the site identified nine artefact locales containing a total of 22 stone artefacts.

The Proponent states that the proposed wind farm and associated infrastructure will avoid four of the identified locales and it is likely that some of the remaining five locales could be avoided and hence, will not be impacted. The archaeological assessment states that mitigation measures such as conservation or salvaging of the artefacts could be considered, however, due to the low archaeological significance of the identified items, should impacts be unavoidable, providing no mitigation would be justified. Should the project be approved, the Proponent states that it will give due consideration to the management and mitigation measures identified in the assessment.

The then Department of Environment and Conservation, Buru Ngunawal Aboriginal Corporation and Onerwal Local Aboriginal Land Council were provided with a copy of the Environmental Assessment. The Department did not receive a submission from these parties during the public exhibition of the Environmental Assessment.

With respect to non-indigenous heritage, the Proponent notes that the Yass Valley local government area contains 309 places of known heritage value, a number of which are also identified on State Registers and the Register of the National Estate. The Proponent's assessment concludes that the project is unlikely to impact upon National Estate heritage places or from their near approach routes as the proposed wind farm is located more than 15 kilometres from these sites. The Proponent notes, however, that the wind farm may be visible from some of the heritage places gazetted under the local environmental plan depending on local topography, vegetation and other obstructions. The Proponent considers it unlikely that the wind farm will detract from the heritage values and experiences of these places, particularly as these places are already located in a modified agricultural landscape. The Proponent has committed to providing landscaping or vegetation screening where site-specific impacts are identified.

The Department received a submission from the Heritage Office which stated that should the proposed wind farm be approved, the mitigation measures identified in the Environmental Assessment should be reflected in any conditions of approval. The Heritage Office also stated that should any further Aboriginal sites or relics be identified during the course of construction, all work in the area should cease and both its office and the National Parks and Wildlife Service (part of the Department of Environment and Climate Change) contacted to determine the appropriate course of action. Similarly, if any item or non-indigenous significance is uncovered, work should cease in the area and the Heritage Office should be contacted. The Department concurs with the Heritage Office and these recommendations are reflected in the Department's recommended conditions of approval.

The Department is satisfied that matters relating to indigenous and non-indigenous heritage have been adequately addressed by the Proponent and that the recommended conditions of approval could satisfactorily address any residual concerns.

## 6 CONCLUSION AND RECOMMENDATION

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The Conroy's Gap wind farm presents an opportunity to harness a commercial wind resource. The project will produce up to 99,000 MWh of renewable electricity per year. This would equate to a reduction in greenhouse gases of up to 94,000 tonnes of carbon dioxide per year and substantial savings in water consumption and pollution that would otherwise result from fossil fuel-fired power stations. The project thus represents a good example of a renewable energy initiative with greenhouse gas saving benefits.

The wind farm project has a capital investment value of \$50 million. It will employ approximately 50 people during construction and up to five during the operational life of the project.

The two principal issues in relation to the project are the visual amenity and operational noise impacts.

The Department acknowledges that the project will alter the visual amenity of the area. The acceptability of these changes will always be a matter of debate because of the subjectivity of individual likes and dislikes. The Department recognises the genuine concerns of some potentially affected residents and sections of the community who have a special attachment to the Black Range landscape. The Department is, however, satisfied that the site is a suitable setting for the project and that the visual impact of the project is not unreasonable because of the varying levels of vegetation screening existing at affected properties and the overall moderate value of the landscape.

As part of the framework for the broader decision making, the Department must consider the severity and ability to manage the visual impacts of the project within the context of the broader community and environmental benefits, and in particular, the potential contribution of wind farms to the much broader national, and ultimately global, objective of greenhouse gas reduction. For this project, the broader and overall strategic benefits of the proposal are considered to provide a stronger weighting than visual amenity concerns.

Should the Minister determine to approve the proposed wind farm, the Department recommends a range of measures to reduce the visual impact of the proposal. This includes controlling the colour of the turbines, limiting the amount of lighting at the site, requiring landscape screens around the substation and control buildings and requiring the Proponent to offer landscape treatments to all residences within four kilometres of the site to aid in screening views to the turbines.

The Proponent has demonstrated that the proposed wind farm would be able to operate under most operating conditions within the SA Guidelines noise criteria. Where this is not achieved, the Proponent will need to change its operations or reach agreements with affected residents.

Overall, the Department is satisfied that the impacts of the proposed project have been adequately addressed by the Proponent. The residual impacts can be suitably managed and mitigated through the Proponent's statement of commitments (see APPENDIX A) and the Department's recommended conditions in APPENDIX A.

The site is considered to be suitable for the proposed project and will provide a range of benefits to the region and State. Consequently, the Department recommends the project be approved, subject to the recommended conditions of approval.

## APPENDIX A. RECOMMENDED CONDITIONS OF APPROVAL

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### SCHEDULE 1

Major Project No:	05_0170
Proponent:	EPURON Pty Ltd
Approval Authority:	Minister for Planning
Land:	Lots 183 and 189 DP 753596; Lots 207, 208 and 298 DP 753596; Lots 53, 60, 79, 80, 81, 82, and 167 DP 753633; and Lots 94, 99 and 104 DP 753633 in the Yass Valley local government area
Project:	The construction and operation of a 30 mega watt (MW) wind farm
Major Project:	The proposal is classified as a Major Project under section 75B(1)(a) of the <i>Environmental Planning and Assessment Act 1979</i> , because it is a development of a kind described in clause 24 of Schedule 1 to <i>State Environmental Planning Policy (Major Projects) 2005</i>

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### SCHEDULE 2

In this approval, except in so far as the context or subject-matter otherwise indicates or requires, the following terms have the meanings indicated:

Act	<i>Environmental Planning and Assessment Act 1979</i>
Ancillary Facility	Temporary construction facility, for example, an office and amenities compound, batch plant (concrete or bitumen), materials storage compound
AEMR	Annual Environmental Management Report
BCA	Building Code of Australia
CEMP	Construction Environmental Management Plan
Commissioning	Commencement of testing and connection of any individual wind turbine(s) and may include concurrent construction activities.
Construction	Includes all construction work in respect of the project <b>other than</b> survey, acquisitions, fencing, investigative drilling or excavation, building/road dilapidation surveys, minor clearing (except where threatened species, populations or ecological communities would be affected), establishing site compounds (in locations meeting the criteria of the conditions), or other activities determined by the Director-General to have minimal environmental impact (e.g. minor access roads, minor adjustments to services/utilities, etc)

<b>Council</b>	Yass Valley Council
<b>dB(A)</b>	decibel (A-weighted scale)
<b>DECC</b>	NSW Department of Environment and Climate Change
<b>Department</b>	NSW Department of Planning
<b>Director-General</b>	Director-General of the NSW Department of Planning, or delegate
<b>Dust</b>	Any solid material that may become suspended in air
<b>EA</b>	Environmental Assessment for the Conroy's Gap Wind Farm entitled <i>Environmental Assessment: Proposed Development of a Wind Farm at Conroys Gap, NSW, Volumes 1 and 2</i> , dated July 2006 and prepared by <b>ngb</b> environmental
<b>Minister</b>	NSW Minister for Planning, or delegate
<b>Operation</b>	any activity at the site that results in the generation, or intended generation of electricity for contribution to the electricity grid, but does not include Commissioning
<b>OEMP</b>	Operation Environmental Management Plan
<b>Parcel of land</b>	an allotment or a number of adjoining allotments belonging to the same landowner
<b>Principal Certifying Authority</b>	The Minister or an accredited certifier, appointed under section 109E of the Act, to issue a Part 4A Certificate as provided under Section 109C of the Act
<b>Reasonable and Feasible</b>	Consideration of best practice taking into account the benefit of proposed measures and their technological and associated operational application in the NSW and Australian context. Feasible relates to engineering considerations and what is practical to build. Reasonable relates to the application of judgement in arriving at a decision, taking into account: mitigation benefits, cost of mitigation versus benefits provided, community views and the nature and extent of potential improvements
<b>Regulation</b>	<i>Environmental Planning and Assessment Regulation 2000</i>
<b>Relevant receiver</b>	has the same meaning as in the SA Guidelines
<b>RFS</b>	NSW Rural Fire Service
<b>RTA</b>	NSW Roads and Traffic Authority
<b>Project</b>	The project to which this approval applies, the scope of which is described in the documents listed under condition 1.2 of this approval
<b>Proponent</b>	EPURON Pty Ltd

<b>Publicly available</b>	Available for public inspection by a member of the general public, for example, by publishing on an internet site or at a display centre
<b>SA Guidelines</b>	The South Australian Environmental Protection Authority's <i>Wind Farms: Environmental Noise Guidelines (2003)</i>
<b>Site</b>	The land to which this approval applies
<b>Submissions Report</b>	Submissions Report for the Conroy's Gap Wind Farm (dated 23 October 2006) prepared by the Proponent in accordance with Section 75H of the Act
<b>Utility</b>	Any infrastructure or service associated with water supply, sewerage, electricity supply, telecommunications or gas supply

## 1. GENERAL CONDITIONS

### Obligation to Minimise Harm to the Environment

- 1.1 The Proponent must implement all practicable measures to prevent or minimise any harm to the environment that may result from the construction, commissioning, operation and decommissioning of the project.

### Scope of the Project

- 1.2 The Proponent must carry out the project generally in accordance with:
- Environmental Assessment: Proposed Development of a Wind Farm at Conroys Gap, NSW, Volumes 1 and 2*, dated July 2006, prepared by **ngh** environmental;
  - the Statement of Commitments outlined in Attachment 3 of Volume 2 of the EA;
  - Submissions Report; and
  - the conditions of this approval.
- 1.3 In the event of an inconsistency between:
- the conditions of this approval and any document listed from conditions 1.2(a) to 1.2(c) inclusive, the conditions of this approval shall prevail to the extent of the inconsistency; and
  - any documents listed above (other than the conditions of this approval), then the most recent document shall prevail to the extent of the inconsistency.
- 1.4 The project is restricted to the commercial generation of not more than 30MW of electricity at the site throughout the life of the project.

### Statutory Requirements

- 1.5 The Proponent must ensure that all necessary licences, permits and approvals are obtained and kept up-to-date as required throughout the life of the project. No condition of this approval removes the obligation for the Proponent to obtain, renew or comply with such licences, permits or approvals.

### Lapsing of Approval

- 1.6 This approval lapses three (3) years after the date of this approval unless the Proponent has demonstrated to the satisfaction of the Director-General that either orders have been placed for wind

turbine generators, or that work on at least one of the matters described in parts 1(a) to 1(f), inclusive, below has been completed on the site before the date on which the approval would otherwise lapse under this condition:

- (a) internal track construction;
- (b) civil works associated with the construction of the foundations for the wind turbine footings;
- (c) control room construction;
- (d) electrical substation construction;
- (e) underground cabling; or
- (f) overhead transmission line construction within the site.

## Decommissioning

- 1.7 The Proponent must notify the Director-General of its intention to decommission the project or individual turbine(s).
- 1.8 If any wind turbine generator is not used for the generation of electricity for a continuous period of 12 months, it must be decommissioned unless otherwise agreed to by the Director-General. The Proponent must keep independently verified annual records of the use of wind turbines for electricity generation. These records must be provided to the Director-General upon request. The relevant wind turbine generator and any associated infrastructure is to be dismantled and removed from the site within 18 months from the date that the wind turbine was last used to generate electricity.
- 1.9 Within one year of decommissioning either an individual turbine(s) or the entire project, the Proponent must ensure that the site is cleared of the above-ground infrastructure associated with the individual turbine(s) or entire project, as relevant, including but not limited to: all wind turbine generators (excluding turbine foundations); substation; control and facilities building; monitoring towers; electrical infrastructure; and site access tracks unless otherwise agreed by the Director-General, and the site rehabilitated in accordance with the Decommissioning Management Plan required under condition 1.11 of this approval.
- 1.10 Notwithstanding condition 1.9, where the substation, control room or overhead electricity lines have been transferred to or are in the control of the local electricity network operator (currently Country Energy) such infrastructure is not required to be removed under this approval.
- 1.11 The Proponent must remove all infrastructure where required under conditions 1.8 or 1.9 of this approval in accordance with a Decommissioning Management Plan. The Plan must be submitted for the approval of the Director-General no later than one month after notifying the Director-General that the project or a particular turbine(s) will be decommissioned. The Plan must include, but not necessarily be limited to:
- (a) a schedule for the orderly removal of the infrastructure;
  - (b) procedures to be implemented for the safe removal of the infrastructure;
  - (c) procedures for the notification of the surrounding landowners and any relevant Government agencies of the requirement to remove the infrastructure, including the timing of removal;
  - (d) procedures to notify the surrounding landowners during the activities associated with the removal of the infrastructure from the site;
  - (e) rehabilitation details including but not limited to site locations for plantings, species to be used in planting and a schedule for maintenance.
- 1.12 Prior to the commencement of Construction, the Proponent must provide written evidence to the satisfaction of the Director-General, that the lease agreements with the site landowners have adequate provisions to require that decommissioning occurs in accordance with this approval.

## 2. COMPLIANCE

### General

- 2.1 The Proponent must be responsible for the works the subject of this approval and the environmental impacts that may result from those works, and must put in place an environmental management system governing the conduct of all persons on the site, including contractors, subcontractors and visitors.
- 2.2 The Director-General may require an update report on compliance with all, or any part, of the conditions of this approval. Any such update must meet the requirements of the Director-General and be submitted within such period as the Director-General may require.
- 2.3 The Proponent must meet the requirements of the Director-General in respect of the implementation of any measures necessary to ensure compliance with the conditions of this approval, and general consistency with the documents listed under condition 1.2 of this approval. The Director-General may direct that such a measure be implemented in response to the information contained within any report, plan, correspondence or other document submitted in accordance with the conditions of this approval, within such time as the Director-General may require.

### Staging Report

- 2.4 The Proponent may elect to construct the project in discrete work packages or defined stages provided that such stages or work packages are consistent with these conditions of approval. Where discrete work packages or defined stages are proposed, the Proponent must submit a Staging Report to the Director-General at least four weeks before Construction commences (or within any other time agreed to by the Director-General). The Report must:
  - (a) describe the work packages or defined stages; and
  - (b) identify how the conditions will be addressed in each work package or defined stage.

### Pre-Construction Compliance Report

- 2.5 The Proponent must submit a Pre-Construction Compliance Report to the Director-General at least two weeks prior to the commencement of construction (or within a time agreed to by the Director-General). The Report must include details of:
  - (a) how the conditions of approval required to be addressed prior to construction have been complied with;
  - (b) when each relevant condition of this approval was complied with, including submission dates of any required report and/or approval dates; and
  - (c) any approvals or licences required to be issued by government agencies prior to the commencement of construction.

### Construction Compliance Report

- 2.6 The Proponent must provide the Director-General with a Construction Compliance Report within six weeks of the end of the first six months of construction (or at any other time interval agreed to by the Director-General). The Environmental Representative (as required under condition 7.1 of this approval) must certify the adequacy of the report before it is submitted to the Director-General. The Report must be made publicly available and include:
  - (a) information on compliance with the Construction Environmental Management Plan (CEMP) required under condition 7.2;

- (b) information on compliance with any approvals or licences issued by relevant government agencies for Construction;
- (c) information on the implementation and effectiveness of environmental controls. The assessment of effectiveness should be based on a comparison of actual impacts against performance criteria identified in the CEMP;
- (d) a summary and analysis of environmental monitoring results;
- (e) the number and details of any complaints, including a summary of the main areas of complaint, action taken, response given and intended strategies to reduce recurring complaints;
- (f) details of any review and amendments to the CEMP resulting from Construction during the reporting period; and
- (g) any other matter relating to compliance with the conditions of approval or as requested by the Director-General.

### Pre-Operation Compliance Report

- 2.7 The Proponent must submit a Pre-Operation Compliance Report to the Director-General at least two weeks prior to the commencement of Operation (or within a time agreed to by the Director-General). The Report must include details of:
- (a) how the conditions of approval required to be addressed prior to commencement of Operation have been complied with;
  - (b) when each relevant condition of this approval was complied with, including submission dates of any required report and/or approval dates; and
  - (c) any approvals or licences required to be issued by government agencies prior to the commencement of Operation.

## 3. ENVIRONMENTAL PERFORMANCE

### Visual Amenity

#### *Off-Site Landscaping Requirements*

- 3.1 Prior to the commencement of Operation, the Proponent must consult with Council on the need to provide landscaping measures along public road reserves to minimise as far as is reasonable and feasible, the visual impact of the project on neighbouring residential dwellings and shadow flicker impacting on public roads and to report to the Director-General on the outcome of the consultation. The Proponent must then implement landscaping measures along public road reserves that are to the satisfaction of the Director-General with all landscaping permitted under this condition being completed within twelve (12) months from the commencement of Operation, or as otherwise agreed with the Director-General.
- 3.2 Prior to the commencement of Operation, the Proponent must notify in writing, all owners of residential dwellings with views of a turbine(s) located within four kilometres of their dwellings that they are eligible to have landscaping treatment on their property in order to minimise the visual impact of the project on their property. Any such owner may request the Proponent, no later than six months after commencement of Operation, to investigate such ways of minimising the visual impact of the project on their property. The Proponent must:
- (a) within 14 days of receiving the request, commission a suitably qualified person whose appointment has been approved by the Director-General, to investigate reasonable and feasible measures to minimise the visual impacts of the project on the landowner's property using landscaping measures; and
  - (b) give the landowner a copy of the visual impact mitigation report within 14 days of receiving this report.

If both parties agree on the measures that should be implemented to minimise the visual impact of the project, then the Proponent must implement those measures, to the satisfaction of the Director-General.

If both parties disagree on such measures, then either party may refer the matter to the Director-General for resolution, in which case, the Proponent must implement such landscaping measures determined by the Director-General with all landscaping being completed within six (6) months from the Director-General's determination.

### *Turbine External Design*

- 3.3 Wind turbine generators must be painted matt off-white/grey. The blades are to be finished with a surface treatment that minimises any potential for glare or reflection.
- 3.4 No advertising, signs or logos are to be mounted on the turbines, except where required for safety purposes. A corporate logo may be placed on the turbines providing it is not distinguishable by the naked eye at any location external to the site or from any publicly accessible location.

### *Lighting*

- 3.5 No external lighting at night of any infrastructure associated with the project including wind turbine generators is permitted other than low intensity security lighting, unless otherwise agreed or directed by the Director-General or Civil Aviation Safety Authority.

### *Shadow-flicker*

- 3.6 The Proponent must put in place an automated system capable of switching off individual wind turbine generators under conditions conducive to generating shadow flicker at surrounding residences or roads.
- 3.7 Wind turbine generators must be switched off under conditions conducive to generating shadow flicker at surrounding residences.
- 3.8 The Proponent must monitor the effects of shadow flicker on traffic travelling southbound on Black Range Road and undertake remedial measures in consultation with the RTA and Council to ameliorate any safety impacts arising from shadow flicker, to the satisfaction of the Director-General.

## **Noise**

### *Construction*

- 3.9 Construction activities associated with the project, including the arrival and departure of vehicles delivering or removing materials from the site, must only be carried out between the hours of:
- (a) 7:00 am and 6:00 pm, Monday to Friday;
  - (b) 8:00 am and 1:00 pm on Saturdays; and
  - (c) at no time on a Sunday or Public Holiday.
- 3.10 The following activities may be carried on outside of the hours specified in condition 3.9:
- (a) the delivery of materials required outside these hours by the Police or other authorities for safety reasons;
  - (b) where it is required in an emergency to avoid the loss of lives, property and/or to prevent environmental harm; and
  - (c) where the work is identified in the Noise Management Plan and approved as part of the CEMP.

Local residents must be informed of the timing and duration of work approved under item (c) at least 48 hours before that work commences.

- 3.11 All Construction works at the site must be undertaken in accordance with the *Environmental Noise Control Manual* and must not give rise to an 'offensive noise' as defined under the *Protection of the Environment Operations Act 1997* and accompanying Regulations.
- 3.12 During Construction and Operation, the Proponent must minimise noise emissions from plant and equipment operated on the site by installing and maintaining, wherever practicable, efficient silencers, low-noise mufflers (residential standard) and replacement of reversing alarms on vehicles with alternative silent measures, such as flashing lights.

### ***Blasting and Vibration***

- 3.13 The overpressure level from blasting operations associated with the project must not:
- exceed 115dB (Lin Peak) for more than five per cent of the total number of blasts over the period of construction; and
  - exceed 120dB (Lin Peak) at any time.

The above values apply when the measurements are performed with equipment of a lower cut-off frequency of 2Hz or less. If the instrumentation has a higher cut-off frequency, then a correction of 5dB should be added to the measured value. Equipment with a lower cut-off frequency exceeding 10 Hz should not be used for the purpose of measuring overpressure.

- 3.14 Ground vibration (peak vector sum) from the blasting operations associated with the development must not:
- exceed 5mm/s for more than five percent of the total number of blasts during construction; and
  - exceed 10 mm/s at any time,

when measured at any point within 1 metre of any affected residential boundary or any other noise sensitive location such as a school or hospital.

- 3.15 Blasting operations associated with the project may only take place:
- between 9:00 am and 5:00 pm Monday to Friday;
  - between 9:00 am to 12:00 pm Saturday; and
  - at such other times or frequency as may be approved by the Director-General.

### ***Operation***

- 3.16 Subject to condition 3.17, the Proponent must design, operate and maintain the project to ensure that the equivalent noise level ( $L_{Aeq(10\text{ minute})}$ ) from the project at each of the residential receiver locations identified in Section 3.2 of the Noise Impact Assessment prepared by Heggies Australia, dated 26 July 2006 (Attachment 7 of the EA) does not exceed:
- 35 dB(A); or
  - the existing background noise level ( $LA_{90}$ , (10 minute)) correlated to the integer wind speed at 10 metres height at the site by more than 5 dB(A),

whichever is the greater, for each integer wind speed (measured at 10m height) from cut-in to rated power of the wind turbine generator.

For the purpose of this condition, the background noise levels are to be based on the levels derived in accordance with condition 3.19.

**Note:** The noise limits in this condition do not apply to project-involved receivers, as specified in condition 3.25.

- 3.17 Where the noise modelling undertaken by the Proponent in accordance with condition 3.20 predicts that the equivalent noise level from the project at the receiver locations specified in condition 3.16 would be below the limit specified in condition 3.16(b), the equivalent noise level must not exceed:

- (a) the predicted equivalent noise level at the relevant receiver location; or
- (b) 35 dB(A),

whichever is the greater.

**Note:** The background noise levels correlated to integer wind speeds shall be derived using the regression analysis methods in the SA Guidelines.

- 3.18 At all other relevant receiver locations, noise from the project, at any given integer wind speed, must not exceed a level of  $L_{Aeq,(10\text{ minute})}$  35dB(A).
- 3.19 The Proponent must prepare a Background Noise Measurement Plan which must be submitted to the Director-General at least one month prior to commissioning of the wind turbine generators. The Plan must outline the procedure to collect additional background noise level data and coincident wind speed measured at 10 metres height at the site.

The existing and additional measurements should together provide representative coverage of seasonal (spring, autumn, summer and winter) noise variations and representative coverage of residences not associated with the project.

All background noise data measured as a result of the Background Noise Measurement Plan must be supplied to the Director-General on request.

**Note:** For the background noise data to be a robust statistical sample, sufficient noise data is required. The Proponent should aim to capture in the order of 2000 data points for each season at each monitoring location. However, it is acknowledged that the extent of typical noise logging equipment is approximately two weeks which may limit the available data to less than 2000 points. Deployment of loggers for a single two week period per season is considered adequate to provide sufficient noise data for this analysis.

- 3.20 The Proponent must prepare a revised Noise Assessment for the final turbine model and turbine layout selected which must be submitted to the Director-General prior to commissioning of the wind turbine generators. The revised Noise Assessment must demonstrate consistency with the EA and the ability of the proposed turbine model and layout to meet the requirements of conditions 3.16 and 3.18, and include:
- (a) the noise predictions of the final turbine model and layout selected at each of the receiver locations identified in condition 3.16; and
  - (b) the revised noise criteria developed in accordance with condition 3.16.

The noise criteria for the project are to be developed using background noise data required under condition 3.19.

- 3.21 The Proponent must prepare a Noise Compliance Assessment Plan which must be submitted to the Director-General prior to commissioning of the wind turbine generators. The Plan must outline how the Noise Compliance Assessment, as described in condition 3.22 will be achieved.

- 3.22 The Noise Compliance Assessment must include, but not be limited to:
- (a) an assessment of the performance of the project against the noise limits contained in conditions 3.16 and 3.18 and where relevant, condition 3.17;
  - (b) a commitment that noise compliance monitoring must be undertaken within three calendar months of the commissioning of the wind turbine generators. If prevailing meteorological conditions do not allow the required monitoring to be undertaken in this period, the Director-General must be notified and an extension of time may be sought; and
  - (c) a requirement that all noise compliance monitoring results are to be submitted to the Department within one month of completion of the monitoring. The Director-General may request that additional noise compliance monitoring be undertaken and completed within a specified timeframe.

The Noise Compliance Assessment must be undertaken generally in accordance with the procedures presented in the SA Guidelines.

**Note:** The data obtained using the compliance assessment procedures outlined in the SA Guidelines should be used to establish the noise levels contributed by the wind farm. Other predictive compliance assessment techniques, where these techniques can be justified, may be considered. Whilst not directly applicable to wind farms, the NSW Industrial Noise Policy (INP) may provide additional guidance on predictive compliance assessment techniques.

- 3.23 In the event that the Noise Compliance Assessment indicates that noise from the wind turbine generators exceeds the noise limits contained in condition 3.16 and/ or conditions 3.17 and 3.18 as relevant, the Proponent must investigate and propose the mitigation and management measures that are available to achieve compliance with the noise limits.

Details of the remedial measures and a timetable for implementation must be submitted to the Director-General for approval within such period as the Director-General may require.

Remedial measures should include, in the first instance, all reasonable and feasible measures to reduce noise from the project. Once all reasonable and feasible source controls are exhausted, remedial measures may include offering building acoustic treatments and/ or noise screening to affected residents, but may only be used to address noise limit exceedances at the absolute discretion of the relevant landowner/resident. The Proponent must also demonstrate that the relevant landowner/resident has been made fully aware of the noise levels and other implications of making any agreement.

**Note:** If the project exceeds the noise limits set under this approval, the Proponent must immediately reduce noise levels through a sector management approach. Further or alternative noise mitigation can then be investigated and incorporated as a project remedial measure.

- 3.24 Noise from the project is to be measured at the most affected point within the residential property boundary, or at the most affected point within 20 metres of the existing dwelling, where the dwelling is more than 20 metres from the boundary, to determine compliance with the noise level limits in conditions 3.16, 3.17 and 3.18.
- 3.25 The noise limits specified in conditions 3.16, 3.17 and 3.18 do not apply to on-site residences G04, G04a, G04b, G08, G09, G10, or to any other residence where noise agreements are in place between the Proponent and the respective owners of those residences. For this condition to take effect, the noise agreements must satisfy the requirements of Section 2.3 of the SA Guidelines.

**Note:** The residential receivers G04, G04a, G04b, G08, G09 and G10 are located as identified in Figure 2 and Table 2 of Attachment 7 of the EA.

- 3.26 For the purposes of conditions 3.16, 3.17 and 3.18, a positive adjustment of 5 dB(A) must be applied to the measured noise levels where audible tones are present. The presence of audible tones must be determined using the methodology in the document "*Wind Turbine Generator Systems – Part 11: Acoustic noise measurement techniques*" (IEC 61400-11:2002) or its latest edition.
- 3.27 Where reasonable and feasible, noise mitigation measures are to be provided by the Proponent for no more than one new dwelling, built on any vacant parcel of land legally existing at the date of this approval located within five kilometres of the site (but that is not part of an associated landholding at that date), upon which a residential dwelling would be permissible at the same date. Noise mitigation is to be provided if the noise level from the project at the approved location of the new residential dwelling would, without mitigation, exceed the noise limits recommended in the SA Guidelines. The mitigation measures are to achieve a noise mitigation level of  $L_{Aeq} 30$  dB(A) inside the habitable rooms of such a dwelling.

This condition only applies to new dwellings for which a development application has been lodged with the consent authority within five (5) years from the date of commencement of Operation.

**Note:** The intention is that this condition does not apply to any potential future subdivision(s) that may be approved after the date of this consent. The Proponent should liaise with the Council regularly to check the status of development applications that may be lodged involving new residential dwellings in the locality of the project site.

## Traffic and Transport

- 3.28 All heavy vehicles associated with the project arriving or departing from the site must use the Hume Highway, Paynes Road and that portion of Black Range Road that bisects the "Ferndale" property to minimise truck movements along Black Range Road.
- 3.29 Prior to the commencement of construction, the Proponent must install regulatory signage at the junction of Hume Highway and Paynes Road and at Black Range Road advising of heavy vehicle movements, in accordance with the requirements of the relevant roads authority.
- 3.30 Safe intersection sight distances (in accordance with the RTA's *Road Design Guide*) must be maintained at the junction of the Hume Highway and Paynes Road in all directions for the duration of the construction (and decommissioning) periods.
- 3.31 Prior to the commencement of construction, undertake and complete the following works along Paynes Road, to the satisfaction of Council:
- (a) upgrade with a seven (7) metre wide seal and pavement design for 5 x 10<sup>5</sup> Equivalent Standard Axles (ESA) for the first 1.3 kilometres from the junction of Paynes Road with the Hume Highway to the existing quarry, in accordance with Council's Roads Standards Policy RD-Pol-09, or its latest version;
  - (b) upgrade all drainage structures and crossings to suit 5 x 10<sup>5</sup> ESA for the first 1.3 kilometres and 2 x 10<sup>5</sup> ESA for the remaining length; and
  - (c) upgrade to a design speed for 60 kilometres/ hour.
- 3.32 Prior to the commencement of construction, the Proponent must, where necessary, upgrade Paynes Road beyond the quarry to a standard suitable for temporary use by heavy vehicles and to allow opposing traffic to pass safely during the construction period.
- 3.33 During construction (and decommissioning), the Proponent must provide a gravel crossing pad seven (7) metres wide over that portion of Black Range Road used by heavy vehicles associated with the project, to the satisfaction of Council.
- 3.34 All work within the road reserve of Paynes Road and Black Range Road is to be designed and constructed in accordance with Council's version of AUS-SPEC Design and Construction or alternative specifications that meet the minimum requirements of AUS-SPEC. Detailed drawings of the required works must be approved by Council prior to the commencement of those road works.
- 3.35 During construction (and decommissioning), Paynes Road, and that portion of Black Range Road used by heavy vehicles associated with the project, must be maintained in a safe and satisfactory condition at all times by the provision of regular maintenance and grading.
- 3.36 Following the conclusion of construction (and where relevant, decommissioning), any damage to Paynes Road and that portion of Black Range Road used by heavy vehicles associated with the project resulting from the construction (or decommissioning) traffic, except that resulting from normal wear and tear, must be repaired at the Proponent's cost and to the satisfaction of Council. Alternatively, the Proponent may negotiate an alternative arrangement for road damage with the Council.

- 3.37 The Proponent is to prepare and submit for the approval of the RTA a Traffic Control Plan(s) and Oversize Vehicle Permit application(s) for all operations involving over-sized and/ or over-weight vehicles using public roads to transport materials to or from the site.
- 3.38 Where construction materials such as road-base are sourced from within the Yass local government area, the Proponent must consult with Council to determine a suitable access route to the site and where necessary, the extent of improvement works and ongoing maintenance.
- 3.39 The swept path of the largest vehicles entering and exiting the site and manoeuvrability through the site is to be in accordance with *AS 2890.2-2002 Part 2: Off-street commercial vehicle facilities* and to the satisfaction of Council.

## Flora and Fauna

- 3.40 The Proponent must design, construct, operate and maintain the project in a manner that avoids damage to or loss of the Yass daisy, *Ammobium craspedioides* and Burrinjuck spider orchid, *Caladenia* sp. Burrinjuck or their habitat.

Where the Yass daisy or Burrinjuck spider orchid is found to occur either on, or adjacent to any infrastructure associated with the project (including access roads, wind turbine generators and buildings), the area must be fenced throughout the construction period and that component of the project (including construction components) must be relocated at least 50 metres from the daisy or orchid population but no more than 250 metres from the original location of that component.

A report detailing the location of the daisy and/ or orchid and the location of any proposed relocation of infrastructure associated with the project is to be submitted to the Director-General. Construction of this infrastructure must not commence until the Director-General has approved the position of any relocated infrastructure.

**Note:** Where any component of the project is proposed to be relocated greater than 250 metres from its original position on the grant of approval, modification of the approval or further approval under the Act will be required.

- 3.41 Prior to the commencement of construction, clearly defined works areas (including access tracks) must be established using a combination of posts, fencing or markers, and suitably marked up maps as appropriate. All on-site construction movements are to be restricted to these areas, to prevent uncontrolled or inadvertent access by vehicles or construction personnel to vegetation and fauna habitat to be protected under this approval.
- 3.42 The Proponent must make a financial contribution of \$1500.00 to the NSW Wildlife Information and Rescue Service (WIRES) for each death of a wedge-tailed eagle that has reasonably been attributed to the carrying out of the project. The financial contribution must be paid by the Proponent within one month of the Proponent becoming aware of the death. The contribution must be adjusted to take account of any increase in the Consumer Price Index over time, commencing at the March 2007 quarter.

Details of all payments made to WIRES must be reported to the Director-General on an annual basis and included as part of the AEMR required under condition 8.3.

- 3.43 Drainage lines must be kept clear of any felled vegetation with any stored vegetation being located at least twenty (20) metres from fence lines.

## Hazards and Risk

### *Bunding and Spill Management*

- 3.44 The Proponent must store and handle all dangerous goods (as defined by the Australian Dangerous Goods Code) and combustible liquids, strictly in accordance with:
- all relevant Australian Standards;
  - a minimum bund volume requirement of 110% of the volume of the largest single stored volume within the bund; and
  - the DECC's Environment Protection Manual Technical Bulletin *Bunding and Spill Management*.

In the event of an inconsistency between the requirements listed from (a) to (c) above, the most stringent requirement shall prevail to the extent of the inconsistency.

### *Aviation*

- 3.45 Details of the construction timetable for the project must be submitted to the Civil Aviation Safety Authority (CASA) prior to the commencement of construction. The Proponent must advise CASA of any change to the construction timetable that may occur from time to time.
- 3.46 Prior to the commencement of Operation, the following information is to be provided to CASA:
- "as constructed" coordinates in latitude and longitude of each wind turbine generator;
  - final height of each wind turbine generator in Australian Height Datum; and
  - ground level at the base of each wind turbine generator in Australian Height Datum.
- 3.47 In the event that aerial weed control and/or fertiliser application is restricted on the site due to the location of the wind turbine generators, the Proponent must fully fund the cost difference between aerial weed spraying/fertiliser application and a reasonable alternative, unless otherwise agreed by the Director-General.

### *Bushfire Risk*

- 3.48 Throughout the life of the project, the Proponent must consult regularly with the local Rural Fire Service (RFS) to ensure that the local RFS is familiar with the project, including the construction timetable and the final location of all infrastructure on the site. The Proponent must comply with any reasonable request of the local RFS to reduce the risk of bushfire and to enable fast access in emergencies.
- 3.49 The Proponent must:
- ensure that there is appropriate fire-fighting equipment held on site to respond to any fires that may occur at the site during construction and operation of the project; and
  - assist the Rural Fire Service and emergency services as much as possible if there is a fire on the site at any time throughout the life of the project.
- 3.50 As part of the Construction and Operation EMPs in conditions 7.2 and 7.4, the Proponent must prepare, in consultation with the local RFS, a Bushfire Risk Management Plan based on the guidelines *Planning for Bushfire Protection* (RFS, 2001 or its latest edition). The Plan must include:
- details of the bushfire hazards and risks associated with the project;
  - details of the fire-fighting equipment held on-site including the type and its location;
  - procedures and programs for liaison and regular drills with the local RFS;
  - procedures for regular fire prevention inspections by the local RFS and implementation of any recommendations;
  - procedures to be followed in the event of an actual bushfire risk to the site and/ or surrounding properties; and
  - mitigation measures including contingency plans.

### ***Safety Management System***

- 3.51 At least two months prior to the commencement of Commissioning, the Proponent must prepare a report outlining a comprehensive Safety Management System, covering all on-site systems related to ensuring the safe operation of the project. The report must clearly specify all safety related procedures, responsibilities and policies, along with details of mechanisms for ensuring adherence to the procedures. Records must be kept at the site and must be available for inspection by the Department upon request. The Safety Management System must be developed in accordance with the Department's *Hazardous Industry Planning Advisory Paper No. 9, 'Safety Management'*, and should include:
- (a) procedures and programs for the maintenance and testing of the safety related equipment to ensure its integrity over the life of the project; and
  - (b) an outline of a documented procedure for the management of change.

### **Heritage**

- 3.52 The Proponent must design, construct, operate and maintain the project in a manner which minimises the potential for impacts on any identified Aboriginal or non-Indigenous site or relic.
- 3.53 If during the course of construction any evidence of any unexpected Aboriginal archaeological site or relic is found, all work likely to affect the site or relic must cease immediately until the DECC is informed in accordance with the *National Parks and Wildlife Act 1974* and their directions complied with.
- 3.54 If during the course of construction any evidence of any unexpected non-Indigenous heritage item or archaeological relic is found, all work likely to affect the item or relic must cease and the Heritage Office contacted immediately to determine an appropriate course of action prior to the re-commencement of work in the vicinity of the item or relic.

### **Soil Quality**

- 3.55 Any fill material brought to site must be Virgin Excavated Natural Material (VENM), as defined under the publication *Environmental Guidelines: Assessment, Classification and Management of Liquid and Non-Liquid Waste*.

### **Ground Stability**

- 3.56 The Proponent must conduct detailed geotechnical investigations such as core samples in the area of the proposed turbines to determine ground stability and soundness of the strata. Details of the geotechnical investigations, including an assessment of ground stability to allow safe construction of the project and demonstration that the wind turbine generators will have no adverse effect on groundwater/aquifers, must be included as part of the CEMP.
- 3.57 Prior to the commencement of any building work on site, a certificate signed by a registered professional engineer must be submitted to the Principal Certifying Authority to certify that foundation material is sound and capable of permanently supporting all structures on the site.

### **Air Quality**

- 3.58 The Proponent must undertake the project in a manner that minimises or prevents the emission of dust from the site, including wind-blown and traffic-generated dust, including ensuring that all vehicles entering or leaving the site and carrying a load that may generate dust emissions are covered at all times, except during loading and unloading.

- 3.59 During Construction, the Proponent must ensure that a water cart, or equivalent, is available at all times for the suppression of dust, as may be necessary.

### Waste Generation and Management

- 3.60 All wastes generated on site during Construction and Operation of the project must be classified in accordance with the *Environmental Guidelines: Assessment, Classification and Management of Liquid and Non-Liquid Wastes* and disposed of to a facility that may lawfully accept the waste.

### Electromagnetic Interference

#### *Television and Radio Interference*

- 3.61 Prior to the erection of any wind turbine generator(s) on the site, the Proponent must undertake an assessment of the existing quality of the television/radio transmission available at a representative sample of residential dwellings located within five kilometres of a wind turbine.
- 3.62 The Proponent must undertake any reasonable and feasible mitigation measures to rectify any television/radio transmission problems reasonably attributable to the project at any residential dwelling located within 5 kilometres of a wind turbine that exists immediately prior to the commencement of commissioning of the project. Such measures may include:
- (a) modification to or replacement of receiving antenna;
  - (b) installation and maintenance of a parasitic antenna system;
  - (c) provision of a land line between the affected receiver and an antenna located in an area of favourable reception; or
  - (d) other feasible measures.

In the event of interference not being able to be overcome by measures outlined in (a) to (d), the Proponent must negotiate with the impacted landowner about installing and maintaining a satellite receiving antenna.

Any requested works must be completed within three months of the completion of the relevant television and/or radio reception assessment, unless otherwise agreed by the landowner. The Proponent must be responsible for all costs associated with undertaking any mitigation measures.

#### *Radio Communication*

- 3.63 In the event that any issue with radio communication service links (installed before construction of the project) arise as a result of the project (such as obstruction of transmission paths), the Proponent must consult with the operator and undertake appropriate remedial measures to rectify any issue. Such measures may include:
- (a) modification to or relocation of the existing antennae;
  - (b) installation of a directional antennae; and/ or
  - (c) installation of an amplifier to boost the signal strength.

## 4. ENVIRONMENTAL MONITORING AND AUDITING

### Bird and Bat Monitoring

- 4.1 Prior to the commencement of Construction, the Proponent must prepare and submit for the approval of the Director-General a Bird and Bat Adaptive Management Program, which takes account of bird/ bat monitoring methods identified in the current editions of *AusWEA Best Practice Guidelines for the Implementation of Wind Energy Projects in Australia* and *Wind Farm and Birds: Interim Standards for Risk Assessment*. The Program must be implemented by a suitably qualified expert, approved by the Director-General.

The Program must incorporate Monitoring, and a Decision Matrix that clearly sets out how the Proponent will respond to the outcomes of monitoring. It must:

- (a) incorporate an ongoing role for the suitably qualified expert;
- (b) set out monitoring requirements in order to assess the impact of the project on bird and bat populations, including details on survey locations, parameters to be measured, frequency of surveys and analyses and reporting. The monitoring program must be capable of detecting any changes to the population of birds and/ or bats that can reasonably be attributed to the operation of the project, that is, data may be required to be collected prior to the commencement of construction. The requirements must also account for natural and human changes to the surrounding environment that might influence bird and/ or bat behaviour such as changes in land use practices, and significant changes in water levels in nearby water bodies;
- (c) incorporate a decision making framework that sets out specific actions and when they may be required to be implemented to reduce any impacts on birds and bats that have been identified as a result of the monitoring;
- (d) identify 'at risk' bird and bat groups and include monthly mortality assessments and periodic local population censuses and bird utilisation surveys;
- (e) identify potential mitigation measures and implementation strategies in order to reduce impacts on birds and bats such as minimising the availability of raptor perches, swift carcass removal, pest control including rabbits, use of deterrents, and sector management including switching off turbines that are predicted to or have had an unacceptable impact on bird/ bat mortality at certain times; and
- (f) identify matters to be addressed in periodic reports in relation to the outcomes of monitoring, the application of the decision making framework, the need for mitigation measures, progress with implementation of such measures, and their success.

The Reports referred to under part (f) must be submitted to the Director-General on an annual basis, from the commencement of operation, and must be prepared within 2 months of the end of the reporting period. The Director-General may vary the reporting requirement or period by notice in writing to the Proponent.

The Proponent is required to implement reasonable and feasible mitigation measures as identified under part (e) where the need for further action is identified through the Bird and Bat Adaptive Management Program, or as otherwise agreed with the Director-General.

### Independent Environmental Auditing

- 4.2 Within two years of the commencement of Operation of the project, and then as may be directed by the Director-General, the Proponent must commission an independent person or team to undertake an Environmental Audit of the project. The independent person or team must be approved by the Director-General prior to the commencement of the Audit. The Audit must:
- (a) be carried out in accordance with *ISO 19011:2002 - Guidelines for Quality and or Environmental Management Systems Auditing*;
  - (b) assess compliance with the requirements of this approval, and other licences and approvals that apply to the project;

- (c) assess the environmental performance of the project against the predictions made and conclusions drawn in the documents referred to under condition 1.2 of this approval;
  - (d) review the effectiveness of the environmental management of the project, including any environmental impact mitigation works; and
  - (e) review the adequacy of the Proponent's response to any complaints made about the project through the Complaints Register required under condition 6.4.
- 4.3 An Environmental Audit Report must be submitted for comment to the Director-General within two months of the completion of the Audit, detailing the findings and recommendations of the Audit and including a detailed response from the Proponent to any of the recommendations contained in the Report.

The Director-General may, having considered the Report, require the Proponent to undertake works to address the findings or recommendations presented in the Report. Any such works must be completed within such time as the Director-General may require.

## 5. UTILITIES AND PUBLIC WORKS

- 5.1 The Proponent must identify (including, but not limited to the position and level of service) all public utility services on the site, roadway, nature strip, footpath, public reserve or any public areas that are associated with, and/or adjacent to the site, and/or are likely to be affected by any activity associated with the project.
- 5.2 The Proponent must consult with the relevant provider of the utilities identified in condition 5.1 and make arrangements to adjust and/or relocate their services as required. The cost of any such adjustment and/or relocation of services must be borne by the Proponent.
- 5.3 Any damage caused to public infrastructure as a result of the project must be repaired to the satisfaction of Council, or relevant utility provider and within such period as specified by the Council, or relevant utility provider.
- 5.4 The sites for Ancillary Facilities must satisfy the following criteria unless otherwise approved through the CEMP:
- (a) be located within the site;
  - (b) have ready access to the road network;
  - (c) be located to minimise the need for heavy vehicles to travel through residential areas;
  - (d) be sited on relatively level land;
  - (e) be separated from nearest residences by at least 200 m (or at least 250 m for a temporary batch plant);
  - (f) be located above the 20 ARI flood level unless a contingency plan to manage flooding is prepared and implemented;
  - (g) not require vegetation clearing beyond that already required for the project; and
  - (h) not affect the land use of adjacent properties.

The location of the Ancillary Facilities must be identified in the CEMP and must include an analysis against the above criteria. Where these criteria cannot be met, the CEMP must demonstrate there will be no adverse impacts from the Ancillary Facility's construction or operation.

- 5.5 Prior to the commencement of any works located on or within Trigonometrical Reserve No. 28206, the Proponent is required to obtain the consent of the Surveyor General and a licence under the *Crown Lands Act 1989*.

**Note:** Works other than low impact acts will require a non-claimant application for determination of Native title as it is unlikely that native title has been extinguished.

## 6. COMMUNITY INFORMATION AND CONSULTATION

- 6.1 Subject to confidentiality, the Proponent must make all documents required under this approval publicly available on request.
- 6.2 The Proponent must establish an internet website before Construction commences and maintain the internet website until Construction ends. This internet web site must:
- (a) indicate the date of the last update and the frequency of the internet web site updates;
  - (b) contain periodic updates of work progress, consultation activities and planned work schedules;
  - (c) be updated within one working day where significant changes in noise or traffic impacts are anticipated;
  - (d) identify relevant approval authorities and their areas of responsibility;
  - (e) include a list of reports and plans that are Publicly Available under this approval and details of how these can be accessed;
  - (f) include the contact names and phone numbers of relevant communications staff; and
  - (g) include the 24-hour complaints contact telephone number, postal and e-mail addresses.

### Complaints Management System

- 6.3 Prior to the commencement of construction, the Proponent must ensure that the following are available for community complaints:
- (a) a 24-hour telephone number on which complaints about the project may be registered;
  - (b) a postal address to which written complaints may be sent; and
  - (c) an email address to which electronic complaints may be transmitted.

The telephone number, the postal address and the e-mail address must be advertised in a newspaper circulating in the locality on at least one occasion prior to the commencement of construction and at six-monthly intervals thereafter. These details must also be provided on the Proponent's internet website. The telephone number, the postal address and the email address must be maintained throughout the life of the project.

- 6.4 The Proponent must record details of all complaints received through the means listed under condition 6.3 of this approval in an up-to-date Complaints Register. The Register must record, but not necessarily be limited to:
- (a) the date and time, where relevant, of the complaint;
  - (b) the means by which the complaint was made (eg. telephone, mail or email);
  - (c) any personal details of the complainant that were provided, or if no details were provided, a note to that effect;
  - (d) the nature of the complaint;
  - (e) any action(s) taken by the Proponent in relation to the complaint, including any follow-up contact with the complainant; and
  - (f) if no action was taken by the Proponent in relation to the complaint, the reason(s) why no action was taken.

The Complaints Register must be made available for inspection by the Director-General upon request.

## Community Information Plan

- 6.5 Prior to the commencement of Construction, the Proponent must prepare and implement a Community Information Plan which sets out the community communications and consultation processes to be undertaken during Construction and Operation of the project. The Plan must include but not be limited to:
- (a) procedures to inform the local community of planned investigations and Construction activities, including blasting works;
  - (b) procedures to inform the relevant community of Construction traffic routes and any potential disruptions to traffic flows and amenity impacts;
  - (c) procedures to consult with local landowners with regard to Construction traffic to ensure the safety of livestock and to limit disruption to livestock movements;
  - (d) procedures to inform the community where work has been approved to be undertaken outside the normal Construction hours, in particular noisy activities;
  - (e) procedures to inform and consult with those landowners who are eligible for landscaping on their property as determined under condition 3.2 of this approval; and
  - (f) procedures to notify relevant landowners of the process available to review potential impacts on radio and television transmission.

## Community Enhancement Program and Contributions

- 6.6 Prior to the commencement of Construction, the Proponent must prepare and submit for the approval of the Director-General, a Community Enhancement Program to fund (or provide in kind) community infrastructure and services in the locality of the project.

The Proponent must establish a fund for the purposes of implementing the Community Enhancement Program and contribute to it, \$25,000 each year commencing upon commissioning of the project until the end of its life. The contribution must be adjusted to take account of any increase in the Consumer Price Index over time, commencing at the March, 2007 quarter.

In preparing the Program, the Proponent shall consult with the Council and local community representatives.

- 6.7 Prior to the commencement any works the subject of this approval, payment of a contribution towards bushfire fighting facilities and the ongoing administration of Council's section 94 Contributions Plan and upgrading and improvements of roads totalling \$10,190.00, must be made to Council, in accordance with Council's section 94 Contributions Plan.

This amount will remain fixed for a period of 12 months from the date of this approval and thereafter in accordance with the rates applicable in the current version/edition of the relevant section 94 Contributions Plan current at the time of the payment.

## 7. ENVIRONMENTAL MANAGEMENT

### Environmental Representative

- 7.1 Prior to the commencement of Construction of the project, the Proponent must nominate a suitably qualified and experienced Environmental Representative(s) whose appointment is to receive prior approval of the Director-General. The Proponent must employ or engage the Environmental Representative(s) throughout the life of the development. The Environmental Representative must be:
- (a) the primary contact point in relation to the environmental performance of the project;
  - (b) responsible for all Management Plans and Monitoring Programs required under this approval;

- (c) responsible for considering and advising on matters specified in the conditions of this approval, and all other licences and approvals related to the environmental performance and impacts of the project;
- (d) responsible for receiving and responding to complaints in accordance with condition 6.4 of this approval; and
- (e) given the authority and independence to require reasonable steps be taken to avoid or minimise unintended or adverse environmental impacts, and failing the effectiveness of such steps, to recommend to the Director-General that relevant actions be ceased immediately should an adverse impact on the environment be likely to occur.

The Proponent must notify and seek the approval of the Director-General of any changes to that appointment that may occur from time to time.

### Construction Environmental Management Plan (CEMP)

7.2 The Proponent must prepare and implement a Construction Environmental Management Plan in accordance with the Department's publication entitled *Guideline for the Preparation of Environmental Management Plans* (2004) or its latest revision. The Plan must include, but not necessarily be limited to:

- (a) a description of all activities to be undertaken on the site during Construction, including an indication of the duration of each activity, any coordination of the activities, and stages of construction, where relevant;
- (b) statutory and other obligations that the Proponent is required to fulfil during construction of the development, including all approvals, consultations and agreements required from authorities and other stakeholders, and key legislation and policies;
- (c) specific consideration of measures to address any requirements of the Department, Council and DECC during construction;
- (d) details of how the environmental performance of the Construction works will be monitored, and what actions will be taken to address identified adverse environmental impacts;
- (e) a description of the roles and responsibilities for all relevant employees involved in the construction of the development;
- (f) details of a program to inform the public of the timing of Construction of the project, including any requirements for temporary restrictions/ diversions to areas etc as identified in condition 6.5;
- (g) complaints handling procedures during construction and site preparation; and
- (h) the Management Plans listed under Condition No 7.3 of this approval.

The CEMP must be submitted for the approval of the Director-General no later than one month prior to the commencement of any site preparation and Construction works associated with the project, or within such period as otherwise agreed by the Director-General. Notwithstanding, where construction work is to be undertaken in stages, the Proponent may, subject to the agreement of the Director-General, stage the submission of the CEMP consistent with the staging of activities relating to that work.

Site preparation and Construction works associated with the project must not commence until written approval has been received from the Director-General. Upon receipt of the Director-General's approval, the Proponent must make the plan Publicly Available as soon as practicable.

7.3 As part of the CEMP required under condition 7.2 of this approval, the Proponent must include, but is not limited to, the following Management Plans:

- (a) an **Erosion and Sedimentation Control Management Plan** to detail measures to minimise erosion and the discharge of sediment and other pollutants to land and/or water during Construction works associated with the project. The Plan must include, but not necessarily be limited to:
  - (i) demonstration of best practice methods to be applied for the on-site control of run-off, sediments and other pollutants including specification of performance criteria for erosion, sediment and pollution control devices (such as diversionary works, discharge points etc);

- (ii) demonstration that erosion and sediment control measures will conform with, or exceed, the relevant requirements of Landcom's publication *Managing Urban Stormwater: Soils and Construction* (2004);
  - (iii) demonstration that access tracks will be constructed and maintained in accordance with the Government's publication *Guidelines for the planning, construction and maintenance of tracks* (1994);
  - (iv) description of procedures to ensure that the measures implemented to control sediment and erosion on site are maintained in working order at all times; and
  - (v) details of an erosion monitoring program during Construction of the project, including measures to address erosion, should it occur, and to rehabilitate/ stabilise disturbed areas of the site.
- (b) a **Noise Management Plan** to detail measures to minimise noise emissions associated with the Construction of the project. The Plan must include, but not necessarily be limited to:
- (i) identification of all major sources of noise that may be emitted as a result of the Construction of the project;
  - (ii) specification of the noise criteria as it applies to a particular activity;
  - (iii) identification and implementation of best practice management techniques for minimisation of noise and vibration emissions;
  - (iv) procedures for the monitoring of noise emissions; and
  - (v) description of the procedures to be undertaken if any non-compliance is detected.
- (c) a **Traffic Management Plan** to outline measures for the management and coordination of road works required under this approval and to minimise potential conflicts between different user groups. The Plan must be prepared in consultation with the RTA and Council and must include, but not necessarily be limited to:
- (i) details of measures to minimise interactions between the project and other users of the roads such as the use of fencing, lights, barriers, traffic diversions etc;
  - (ii) procedures for informing the public where any road access will be restricted as a result of the project;
  - (iii) procedures to inform vehicle drivers of the traffic routes to be used by heavy vehicles associated with the project;
  - (iv) procedures for scheduling, where possible, heavy vehicle movements outside of periods where heavy fog is likely at the intersection of the Hume Highway and Paynes Road;
  - (v) procedures to manage construction traffic to ensure the safety of livestock and to minimise disruption to livestock, and school children and limit disruption to school bus timetables;
  - (vi) speed limits to be observed along routes to and from the site and within the site;
  - (vii) minimum requirements for vehicle maintenance to address noise and exhaust emissions, particularly along roads in close proximity to residences;
  - (viii) precautionary measures such as signage to warn users of the Hume-Hovell track about the construction activities for the project; and
  - (ix) details of the expected behavioural requirements for vehicle drivers travelling to and from the site and within the site.
- (d) a **Waste Management Plan** to outline measures to manage and minimise resource consumption during Construction of the project. The Plan must include, but not necessarily be limited to:
- (i) identification of the types and quantities of waste that would be generated;
  - (ii) description of measures and actions to be taken to minimise waste generated by the Construction of the project; and
  - (iii) description of how waste would be handled and stored during Construction, and reused, recycled, and if necessary, appropriately treated and disposed of in accordance with the guidelines *Environmental Guidelines: Assessment, Classification and Management of Liquid and Non-Liquid Wastes*.
- (e) a **Dust Management Plan** to outline measures to manage and minimise emissions of dust on the site and Construction traffic routes. The plan must include but not necessarily be limited to:
- (i) identification of potential sources of dust;
  - (ii) dust management objectives consistent with DECC guidelines;

- (iii) a monitoring program to assess compliance with the identified objectives. Monitoring for dust deposition and particulate concentration must be undertaken according to the guideline "*Approved Methods for Sampling and Analysis of Air Pollutants in New South Wales*";
  - (iv) mitigation measures to be implemented, particularly during weather conditions where high level dust episodes are probable (such as strong winds in dry weather); and
  - (v) a progressive rehabilitation strategy for exposed surfaces with the aim of minimising exposed surfaces.
- (f) a **Flora and Fauna Management Plan** to outline measures to protect and minimise loss of native vegetation and native fauna habitat as a result of construction of the project. The Plan must include, but not necessarily be limited to:
- (i) plans showing terrestrial vegetation communities; important flora and fauna habitat areas; locations where threatened species, populations or ecological communities have been recorded or are likely to occur; and areas to be cleared. The plans must also identify vegetation adjoining the site where this contains important habitat areas and/or threatened species, populations or ecological communities;
  - (ii) methods to manage impacts on flora and fauna species (terrestrial and aquatic) and their habitat which may be directly or indirectly affected by the project, such as location of fencing, procedures for clearing of vegetation or soil and procedures for re-locating hollows or installing nesting boxes. Particular consideration should be given to measures to protect the Yass Daisy and Burrinjuck Spider orchid;
  - (iii) rehabilitation details, such as use of locally native species in rehabilitation and landscaping works and methods to re-use topsoil and cleared vegetation;
  - (iv) the impact avoidance and mitigation measures outlined in section 7.2 of the EA;
  - (v) a Weed Management Strategy; and
  - (vi) a program for reporting on the effectiveness of terrestrial flora and fauna management measures. Management methods must be reviewed where found to be ineffective.

### Operation Environmental Management Plan (OEMP)

- 7.4 The Proponent must prepare and implement an Operation Environmental Management Plan in accordance with the Department's publication entitled *Guideline for the Preparation of Environmental Management Plans* (2004) or its latest revision. The Plan must include but not necessarily be limited to:
- (a) identification of all statutory and other obligations that the Proponent is required to fulfil in relation to the operation of the development, including all consents, licences, approvals and consultations;
  - (b) a management organisational chart identifying the roles and responsibilities for all relevant employees involved in the operation of the project;
  - (c) overall environmental policies and principles to be applied to the operation of the project;
  - (d) standards and performance measures to be applied to the project, and means by which environmental performance can be periodically reviewed and improved, where appropriate;
  - (e) management policies to ensure that environmental performance goals are met and to comply with the conditions of this approval;
  - (f) the Management Plans listed under Condition No 7.5 of this approval; and
  - (g) the environmental monitoring requirements outlined under this approval.

The Plan must be submitted for the approval of the Director-General no later than one month prior to the commencement of Operation of the project or within such period as otherwise agreed by the Director-General. Operation must not commence until written approval has been received from the Director-General. Upon receipt of the Director-General's approval, the Proponent must make the Plan Publicly Available as soon as practicable.

- 7.5 As part of the OEMP required under condition 7.4, the Proponent must include, but is not limited to the following Management Plans:
- (a) a **Noise Management Plan** to outline measures to minimise noise emissions from the operation of the project. The Plan must include, but not necessarily be limited to:

- (i) details of procedures to ensure ongoing compliance with the operational noise limits specified in conditions 3.16, 3.17, 3.18 and 3.20 as they apply to identified receptors. This should include identification of monitoring requirements;
  - (ii) identification and implementation of best practice management techniques for minimisation of noise emissions where reasonable and feasible;
  - (iii) measures to be undertaken to rectify annoying characteristics resulting from the operation of the project such as, but not limited to, infrasound or adverse mechanical noise from component failure; and
  - (iv) procedures and corrective actions to be undertaken if non-compliance is detected.
- (b) a **Water Management Plan** to outline measures to control and manage surface water and stormwater associated with the operation of the project. The Plan must address the requirements of the Council, should there be any. The Plan must include, but not necessarily be limited to:
- surface water, erosion and sedimentation management***
- (i) measures to be implemented to minimise the potential for erosion from the site during the operation of the project and measures to maintain all erosion mitigating works; and
  - (ii) measures to rehabilitate erosion-affected areas and areas subjected to excavation (including tree and shrub species) and implementation.
- stormwater management***
- (i) description of stormwater control infrastructure at the site, including details of its maintenance.
- (c) a **Landscape Management Plan** to outline measures to ensure appropriate development and maintenance of landscaping on the site to address the visual impacts arising from the project including, turbines, site access roads, substation and control and facilities building, as far as is reasonable and feasible. The Plan must be prepared by a qualified landscape architect and meet the requirements of Council, should there be any. The Plan must include, but not necessarily be limited to:
- (i) details of landscaping to be undertaken at the site including locations for planting;
  - (ii) maximisation of use of flora species that are native to the locality and with low maintenance requirements;
  - (iii) a program for the removal of weeds introduced or spread as a result of the development at the site; and
  - (iv) a program for maintenance of all landscaped areas on the site to ensure these areas are kept in a tidy, healthy state.

- 7.6 Within three years of the commencement of Operation, and at least every three years thereafter, the Proponent must undertake a formal review of the OEMP. The review must ensure that the OEMP is up-to-date and all changes to procedures and practices since the previous review have been fully incorporated into the OEMP. The Proponent must notify the Director-General of the completion of each review, and must supply a copy of the updated OEMP on request.

## 8. ENVIRONMENTAL REPORTING

### Incident Reporting

- 8.1 The Proponent must notify the Director-General and any relevant Government authority of any incident with actual or potential significant off-site impacts on people or the biophysical environment as soon as practicable after the occurrence of the incident ("initial notification"). The Proponent must provide written details ("written report") of the incident to the Director-General and any relevant Government authority within seven days of the date on which the incident occurred.

- 8.2 The Proponent must meet the requirements of the Director-General to address the cause or impact of any incident, as it relates to this approval, reported in accordance with condition 8.1 of this approval, within such period as the Director-General may require.

### Annual Reporting

- 8.3 The Proponent must prepare and submit to the Director-General, an Annual Environmental Management Report (AEMR) throughout the operational life of the project, or as otherwise required by the Director-General. The AEMR must review the performance of the project against the Operation Environmental Management Plan, the conditions of this approval and other licences and approvals relating to the project. The AEMR must include, but not necessarily be limited to:
- (a) details of compliance with the conditions of this approval;
  - (b) a copy of the Complaints Register (referred to in condition 6.4) for the preceding twelve-month period (exclusive of personal details), and details of how these complaints were addressed and resolved;
  - (c) a comparison of the environmental impacts and performance of the project against the environmental impacts and performance predicted in those documents listed under condition 1.2 of this approval;
  - (d) results of all environmental monitoring required under this approval, including interpretations and discussion by a suitably qualified person;
  - (e) a list of all occasions in the preceding twelve-month period when environmental performance goals for the project have not been achieved, indicating the reason for failure to meet the goals and the action taken to prevent recurrence of that type of incident;
  - (f) identification of trends in monitoring data over the life of the project to date;
  - (g) a list of variations obtained to approvals applicable to the project and to the site during the preceding twelve-month period; and;
  - (h) environmental management targets and strategies for the following twelve-month period, taking into account identified trends in monitoring results.
- 8.4 The Proponent must submit a copy of the AEMR to the Director-General with:
- (a) the first AEMR to be submitted not more than fourteen months from commencement of operation of the project;
  - (b) the second and subsequent AEMRs to be submitted every twelve months thereafter; and
  - (c) the AEMR being made publicly available upon request.
- 8.5 The Director-General may require the Proponent to address certain matters in relation to the environmental performance of the project, in response to review of the AEMR and any comments received from other agencies. Any action required to be undertaken must be completed within such period as the Director-General may agree.
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## APPENDIX B. STATEMENT OF COMMITMENTS

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## ATTACHMENT 3 STATEMENT OF COMMITMENTS

### Statement of commitments:

#### Environmental impact avoidance and mitigation measures

##### Design and planning phase

Soil and water protection	
DSW1	All bridges and culverts used will be assessed prior to works to ensure that they are able to bear the predicted loads of the laden vehicles.
Flora	
DFL1	If areas of dry shrub remnant forest on the 'Ferndale' property require clearing, the areas will first be surveyed for the Burrinjuck Spider Orchid ( <i>Caladenia</i> sp Burrinjuck) during the late August-October flowering period.
DFL2	The southern turbines and access track will be sited to avoid the need to clear or trim remnant eucalypts to the west of the southern turbine sites.
DFL3	The powerline will be routed to avoid the need for clearing or trimming of the Long-leaved Box ( <i>Eucalyptus goniocalyx</i> ) forest remnant on the 'Ferndale' property.
DFL4	The Black Range Road crossing points for the proposed new tracks near the Ferndale residence will be sited in available gaps between mature Yellow Box and Blakely's Red Gum trees in the road reserve. The northern track crossing appears to be sited in such a gap; the southern crossing may need to be shifted slightly to the north (to AGD 658311 6141864) to avoid mature trees.
Fauna	
DFA1	Prior to the commencement of works, timbered areas within 2 kilometres of the turbines will be surveyed for the presence of Wedge-tailed Eagle nests, access permitting. Active nests will be monitored and breeding success recorded over the preceding breeding season (July-January). Both breeding success and habitat use behaviour at the subject site will be recorded to provide a baseline for operational monitoring and adaptive management.
DFA2	Where practicable, reticulation cabling between turbines will be installed underground to reduce bird collision risks and disturbance to habitat use patterns.
DFA3	Where practicable, power poles and overhead powerlines will be bird-safe using flags or marker balls, large wire size and wire and conductor spacing.
DFA4	If lights are required to be fitted to the towers (eg for aircraft safety), they will be red flashing lights to reduce attractiveness to insects and possibly night-flying birds (subject to CASA requirements). For similar reasons, turbine paint will be non-reflective if practicable.
DFA5	Where possible, guy lines will not be fitted to towers or associated structures. Any guy lines which need to be used will be indicated with marker balls or flags.
DFA6	The turbine towers and associated structures will not provide perching opportunities.
DFA7	Contractors and staff will be made aware of the significance and sensitivity of the Northern Valley/upper McCullums Creek valley area (potential threatened fauna habitat). The area will be protected from peripheral and indirect impacts and will not be used for site access or materials/equipment laydown.
DFA8	The southern turbines and access track will be sited to avoid the need to clear or trim remnant eucalypts to the west of the southern turbine sites.
DFA9	The powerline will be routed to avoid the need for clearing or trimming of the Long-leaved Box ( <i>Eucalyptus goniocalyx</i> ) forest remnant on the 'Ferndale' property.
DFA10	The Black Range Road crossing points for the proposed new tracks near the Ferndale residence will be sited in available gaps between mature Yellow Box and Blakely's Red Gum trees in the road reserve. The northern track crossing appears to be sited in such a gap; the southern crossing may need to be shifted slightly to the north (to AGD 658311 6141864) to avoid mature trees.
DFA1	The turbine towers will be as widely spaced as possible to reduce bird collision risks, though this must be balanced with an increased visual impact. A minimum spacing of twice the rotor diameter

1	will be used between turbines (centre to centre).
DFA1 2	At all sites, the clearing or trimming of mature and hollow-bearing trees and stags will be avoided.
DFA1 3	The turbines will be sited as far back from the edge of the ridgelines as possible to minimise disturbance to the use of updrafts by raptors.
<b>Visual impacts</b>	
DV1	The proponent will avoid locating turbines in areas of native vegetation, and minimise the removal of native vegetation for turbine bases and access roads.
DV2	Towers will be coloured light off white/grey/light blue to help reduce visual impact.
DV3	The substation and control building will be located to minimise the visual impact from roads and surrounding properties. These facilities will be coloured grey to blend into the surrounding landscape and vegetation.
DV4	No wind turbines or other infrastructure will be located on the eastern most ridgeline on the site.
<b>Operational noise impacts</b>	
DON1	Noise modelling and investigation of the operational wind farm have been undertaken as part of the Environmental Assessment to ensure that the noise levels are within State prescribed guidelines and do not pose a health risk during the operation and construction phases.
DON2	The proponent will adjust turbine selection and turbine layouts to ensure noise predictions meet the SA Noise Guidelines of 35 dB(A) or background plus 5 dB(A) (whichever is higher) for all <u>non-involved</u> residential receivers.
DON3	The proponent will adjust turbine selection and turbine layouts to ensure noise predictions meet the World Health Organisation Guidelines for Community Noise requiring 45 dB(A) or background plus 5 dB(A) (whichever is higher) for all <u>involved</u> residential receivers.
DON4	Prior to construction, the proponent will prepare and submit to the Department of Planning a noise report providing final noise predictions based on the final turbine model and turbine layout selected and demonstrating compliance with these relevant guidelines for all houses.
DON5	If minor exceedances are predicted to occur for facades that include noise sensitive uses, such as bedrooms, consideration will be given to providing mechanical ventilation (to remove the requirement for open windows) or structural acoustic treatments (such as improved glazing) to the satisfaction of the relevant residents.
<b>Health and safety</b>	
DHS1	All EMR generating infrastructure will be sited as far as practicable from residences. Underground cabling will be used where practicable to reduce the electric component of EMR.
<b>Aviation impacts</b>	
DAI1	Taurus Energy will ensure aircraft warning lighting is provided that meets CASA's requirements.
<b>Services and infrastructure</b>	
DSI1	All bridges and culverts used will be assessed prior to works to ensure that they are able to bear the predicted loads of the laden vehicles.
DSI2	The precise location of any buried services, if present, will be determined prior to excavations using Dial Before You Dig services searches and consultation with relevant agencies and landowners.
<b>Telecommunications impacts</b>	
DTC1	In the design of the project, the proponent will use wherever practical, equipment complying with the Electromagnetic Emission Standard, AS/NZS 4251.2:1999 to help minimise television and radio interference.
DTC2	In order to avoid impacts to mobile phone services, Taurus Energy will implement a (turbine) set off distance for omnidirectional antennae of 100m from the tower and for panel antennae Taurus Energy propose a 100m (turbine) set-off for 30 degrees either side of the line of sight from the panel.
DTC3	In the event that any issues with additional radio communications license links are identified as a result of the wind farm, whether prior to or post construction, Taurus Energy will consult with the operator and undertake appropriate remedial measures, which may include: <ul style="list-style-type: none"> <li>• Modifications to or relocation of the existing antennae;</li> <li>• Installation of a directional antennae; and/or</li> <li>• Installation of an amplifier to boost the signal.</li> </ul>
DTC4	Airservices Australia will carry out an investigation for Taurus Energy to determine whether the location of the proposed wind farm could have an affect on the performance of the Mt Bobbara

	radar. The investigation is expected to be completed by the end of June 2006. The proponent will formally advise the Department of Planning of the results of this investigation prior to commencement of construction.
<b>DTC5</b>	Taurus Energy will continue to work closely with Airservices Australia to mitigate any issues with Mt Bobbara radar will they be identified. The proponent will implement the mitigation measures required to ensure that the proposal creates no material impact to aircraft safety.
<b>Traffic impacts</b>	
<b>DT1</b>	The traffic impacts outlined in the Traffic Impact Study will be discussed with Yass Valley Council and the Roads and Traffic Authority.
<b>Bushfire hazard</b>	
<b>DB1</b>	The substation facility will be banded with a capacity exceeding the volume of the transformer oil to contain the oil in the event of a major leak or fire. The facility will be regularly inspected and maintained to ensure leaks do not present a fire hazard, and to ensure the banded area is clear (including removing any rainwater).
<b>DB2</b>	The substation will be surrounded by a gravelled area free of vegetation to prevent the spread of fire from the substation and reduce the impact of bushfire on the structure. The substation area will also be surrounded by a security fence as a safety precaution to prevent trespassers and stock ingress.
<b>Heritage</b>	
<b>DH1</b>	Copies of the archaeological assessment report will be forwarded to Dr Phil Boot (DEC, Queanbeyan), the Buru Ngunawal Aboriginal Corporation and the Onerwal Local Aboriginal Land Council.

## Construction phase

<b>Air quality</b>	
<b>CA1</b>	Nearby residences will be informed prior to any blasting taking place.
<b>CA2</b>	Blasting will conform to relevant safety and noise and vibration control standards.
<b>CA3</b>	If a project batching plant is established, it will not be located near residences. ( <b>Note:</b> the batching plant does not form part of the current proposal).
<b>CA4</b>	Dust levels at stockpile sites will be visually monitored. Dust suppression (eg. water sprays) will be implemented if required.
<b>CA5</b>	Product stockpiles will be protected from prevailing weather conditions.
<b>CA6</b>	Loads of dry materials will be covered where appropriate.
<b>CA7</b>	Dust filters will be installed on silos.
<b>CA8</b>	Only machinery compliant with emission standards will be used.
<b>CA9</b>	Machinery and vehicles will not be left running or idling when not in use.
<b>CA10</b>	Will dust generation be of a high level during the transport of machinery near residences, watering of sections of the route will be undertaken to reduce dust.
<b>CA11</b>	The works timetable including periods of potential dust generation will be given to local residents and advertised on site signage and in the local press.
<b>CA12</b>	Vehicles and motorised equipment will be maintained so that emissions are minimised.
<b>Water quality and catchment protection</b>	
<b>CW1</b>	All vehicles onsite will follow established tracks or routes. Work flow will be organised to minimise the number of vehicular movements across the site and thereby minimise soil compaction and the generation of mobile sediment.
<b>CW2</b>	Permanent and temporary road construction will employ best practice drainage and erosion/sedimentation control measures.
<b>CW3</b>	Moderate-high use tracks will be upgraded and constructed in compliance with DNR Guidelines (DLWC 1994).
<b>CW4</b>	Sediment traps will be installed wherever there is potential for sediment to collect and enter waterways.
<b>CW5</b>	Excavation will only be commenced during stable, dry weather conditions, operational requirements permitting.
<b>CW6</b>	Where possible, excavation will be excluded from wet drainage lines.
<b>CW7</b>	Stockpile sites will be identified and turbid water discharged from these treated by a combination of silt fencing and temporary mulching/seeding.
<b>CW8</b>	Where required, formalised crossings using bound fill will be designed to allow vehicle access across rivers and wet drainage lines to minimise soil and water disturbance.
<b>CW9</b>	Site storage areas will be identified, and bunded to prevent loss of any pollutants.
<b>CW10</b>	Hydrocarbon spill kits will be stored at the site.
<b>CW11</b>	Machinery will be operated and maintained in a manner that minimises risk of hydrocarbon spill.
<b>CW12</b>	Maintenance or re-fuelling of machinery will be carried out in hard-stand areas (ie. existing or proposed road surface or hard-stand areas beneath turbines, not on areas that either contain native vegetation, or will be revegetated).
<b>CW13</b>	Where chemicals are utilised, their application and disposal will comply with manufacturers recommendations.
<b>CW14</b>	Turbines and the substation will be bunded to contain a volume greater than the total volume of pollutants in the facility. The substation transformer will be regularly inspected and maintained.
<b>CW15</b>	If a project concrete batching plant is established, it will not be located near residences and concrete wash will be deposited in an excavated area, below topsoil level. ( <b>Note:</b> the batching plant does not form part of the current proposal).
<b>Soil protection and rehabilitation</b>	
<b>CS1</b>	An Erosion and Sedimentation Control Plan will be developed prior to the works, including maps of environmentally sensitive areas, parking and laydown areas, locations of environmental protection works and emergency response. The need for any permanent erosion and sedimentation control structures along roads and around hardstand areas will also be addressed.
<b>CS2</b>	A minimum of vegetation will be removed during excavation and construction leaving as great a

	buffer between the ridgetop works area and steep sideslopes as practicable.
<b>CS3</b>	Landforms will be stabilised and rehabilitated as soon as practicable after works. A site restoration plan will be prepared in advance which will set out protocols for restoration works, consistent with principles outlined in section 3.5 of the EA.
<b>CS4</b>	Moderate-high use tracks will be graded and drained to enhance stability. Tracks will be upgraded and constructed in compliance with DNR Guidelines (DLWC 1994).
<b>CS5</b>	Where practicable, grass surfaces will be retained on infrequently used vehicle routes to protect soils.
<b>CS6</b>	Traffic routes will be confined to already disturbed areas, where possible. The existing Paynes Road will be upgraded to access the site from the Hume Highway for construction purposes.
<b>CS7</b>	Excavation will only be commenced during stable, dry weather conditions, operational requirements permitting.
<b>CS8</b>	Subsoil will be separated from topsoil for rehabilitation purposes. All topsoil from the excavation sites will be stockpiled and replaced to its original depth for seeding and fertilising. On steep slopes, topsoil will be stabilised using, for example, jute matting. Any excess subsoil will be removed from the site and disposed of at an appropriate fill storage site.
<b>CS9</b>	On slopes check banks will be installed across trenchlines, 20-50 metres apart, following closure of the trench. These will discharge runoff to areas of stable vegetation.
<b>CS10</b>	The eroding slopes east of the northern turbines, the eroding watercourses east (McCullums Creek) and west (Stony Creek) of the northern turbines and the eroding drainage line east of the southern turbines will be protected from concentrated runoff.
<b>CS11</b>	Concrete wash will be deposited in an excavated area, below the level of the topsoil.
<b>CS12</b>	The transformer site will be securely bunded to contain any leakage of coolant.
<b>CS13</b>	Stabilisation and revegetation of excavated areas will occur progressively following works to stabilise soil, to reduce impact on adjacent water bodies and drainage lines.
<b>CS14</b>	The eroding watercourses east (McCullums Creek) and west (Stony Creek) of the northern turbines and the eroding drainage line east of the southern turbines will be protected from concentrated runoff.
<b>CS15</b>	Following the construction phase, track drainage will be inspected and repaired as required. Service tracks will have robust rollover drains installed (subject to vehicle access requirements), directing road runoff into vegetated areas away from watercourses.
<b>CS16</b>	Disturbed areas will be seeded with native grasses, where appropriate.
<b>CS17</b>	Stock will be excluded to prevent grazing and trampling in disturbed areas and areas being rehabilitated. Grazing will not occur following the rehabilitation works for 3-6 months.
<b>Flora</b>	
<b>CFL1</b>	Site stabilisation, rehabilitation and revegetation will be undertaken without delay, following the rehabilitation guidelines in the EA. A site restoration plan will be prepared in advance which will set out protocols for restoration works, consistent with principles outlined in section 3.5 of the EA.
<b>CFL2</b>	Works will avoid impacts to mature eucalypts wherever possible. Wherever practicable, excavations and vehicle/machinery movements will occur outside the canopy dripline of large eucalypts.
<b>CFL3</b>	As a general rule, disturbed areas will be used for vehicle and machinery access, materials laydown, stockpiling of cleared vegetation and the deposition and retrieval of spoil whenever practicable.
<b>CFL4</b>	Works will be avoided during, and immediately following heavy rainfall events to protect soils and vegetation at the site. Any compaction of soil resulting from vehicle access and laying of materials, particularly during saturated soil conditions, will be avoided and remediated as necessary.
<b>CFL5</b>	Excavated topsoil, subsoil and weathered rock will be stored separately and replaced in a manner that approximates the original profile as closely as possible.
<b>CFL6</b>	Where practicable, whole sods will be removed with an excavator where these areas are well-vegetated with dense root systems. Sods will be stored in moist, shaded conditions and replaced following the works. Sod storage time will be minimised and sods will be replaced in a manner that maximises the chances of re-establishment.
<b>CFL7</b>	Machinery and vehicles used in construction works will be washed before and after site access to reduce the introduction and spread of weeds and pathogens.
<b>CFL8</b>	Laydown sites for excavated spoil, equipment and construction materials will be weed-free or treated for weeds wherever practicable.
<b>CFL9</b>	Weed monitoring will be carried out at all sites after the completion of construction works and

	ongoing weed control will occur where noxious or invasive species are recorded. In particular, monitoring will be undertaken during the following late spring/early summer, and remedial action taken as required.
<b>CFL10</b>	Only certified weed free hay bales will be used for sediment control, if available.
<b>CFL11</b>	Wherever practicable, the overstorey canopy in forest communities will not be disturbed to assist weed containment and suppression.
<b>CFL12</b>	Imported materials such as sand and gravel will be sourced from sites which do not show evidence of noxious weeds or <i>Phytophthora</i> infection.
<b>CFL13</b>	Contractors and staff will be made aware of the significance and sensitivity of the Northern Valley/upper McCullums Creek valley area (Box-Gum Woodland EEC and threatened Yass Daisy habitat). The area will be protected from peripheral and indirect impacts and will not be used for site access or materials/equipment laydown.
<b>CFL14</b>	In areas dominated by exotic groundcover species, exposed soils in the excavation corridor will be lightly mulched with chipped vegetation or sterile hay, and sown with a cover crop such as oats or millet, depending on season and seed availability, or an appropriate pasture seed mix (in consultation with landowners).
<b>CFL15</b>	In areas dominated by native grasses, exposed soils will be lightly mulched with chipped native vegetation or sterile hay, and sown with Weeping Grass ( <i>Microlaena stipoides</i> ) and/or Wallaby Grass ( <i>Austrodanthonia</i> spp), or a cover crop such as oats or millet, depending on season and seed availability. In such areas, seed-bearing native pasture hay could be used for mulching, depending on availability.
<b>CFL16</b>	Fertiliser will not be used to promote revegetation in native grass-dominated areas of the site to reduce weed pressures.
<b>CFL17</b>	The development sites will be inspected for weeds prior to the commencement of works, in consultation with the Southern Slopes County Council. Noxious weeds in the vicinity of the works site (refer Table 4.2) will be treated prior to the commencement of works, subject to seasonal factors.
<b>CFL18</b>	Where cement is included in cable trench backfill, at least 20 centimetres of cement-free topsoil will be replaced as the top layer in the backfill.
<b>Fauna</b>	
<b>CFA1</b>	To protect aquatic habitats, the concrete batching plant will be well bunded, silt fences will be used around all excavation works, the duration of works will be minimised, and drainage line and creek crossings will be stabilised (consistent with Fisheries NSW guidelines).
<b>CFA2</b>	Rock and log habitat removed during the construction phase will be reinstated following the works.
<b>CFA3</b>	Any trench sections left open for greater than a day will be inspected daily, early in the morning and any trapped fauna removed.
<b>Services and infrastructure</b>	
<b>CSI1</b>	Roads and tracks used for the proposal will be upgraded as required and maintained to a standard of stability, drainage and driving surface appropriate to farming and wind farm maintenance use following the construction period.
<b>CSI2</b>	Access to private property will be maintained during the construction period.
<b>CSI3</b>	The precise location of any buried services, if present, will be determined prior to excavations using Dial Before You Dig services searches and consultation with relevant agencies and landowners.
<b>CSI4</b>	The trig station located near the proposed turbine locations in the north of the proposal site will be protected from accidental damage during the construction phase.
<b>Visual impacts</b>	
<b>CV1</b>	Access the site will be provided via Paynes Road. Black Range Road will be avoided as residences are very sensitive to changes to the existing scenic quality of the area.
<b>Construction noise impacts</b>	
<b>CCN1</b>	NSW EPA construction noise guidelines regarding work times and emission levels will be applied. Hours of work will be limited to 7am-6pm weekdays and 7am-1pm on Saturdays. No construction will occur on Sundays or Public Holidays.
<b>CCN2</b>	Machinery will use appropriate and effective exhaust mufflers and compressor silencers.
<b>CCN3</b>	Noise complaints will be responded to rapidly using monitoring equipment. If EPA criteria are exceeded, appropriate noise reduction strategies will be implemented, such as re-positioning of machinery, rescheduling works, installation of temporary noise barriers, improved vehicle noise

	control, reduced work times, 'quiet work practices' and the provision of respite periods.
<b>CCN4</b>	The timing, nature and need for the works will be well publicised in the local community.
<b>Traffic impacts</b>	
<b>CT1</b>	Traffic Control Plans and Oversize Vehicle Permits will be prepared and submitted to the Roads and Traffic Authority for all the operations of over size and over weight vehicles on all the public roads involved in the transport of materials to the site.
<b>CT2</b>	A procedure will be established to monitor the traffic impacts during construction, such as noise, dust nuisance and travel times and work methods modified to reduce the impacts.
<b>CT3</b>	Regular scheduled maintenance of gravel pavements such as grading, dust suppression and drainage control will take place during the construction period.
<b>CT4</b>	Traffic impacts will be reduced by the scheduling of high impact movements to account for varying traffic flows on the Hume Highway. These movements if possible will be scheduled for periods when heavy fogs are unlikely.
<b>CT5</b>	The roadside vegetation will be cleared on the verge of the Hume Highway on the southbound carriageway northeast of Paynes Road to increase the intersection sight distance.
<b>CT6</b>	The Roads and Traffic Authority are generally not in favour of speed restrictions on the Hume Highway because of the loss in efficiency of the route. Any use of speed controls for specific short-term activities will be included in a Traffic Control Plan.
<b>CT7</b>	The pavement, drainage structures and stock grids on Paynes Road require inspection and probable upgrading. The existing narrow pavement requires widening at specific locations to permit opposing traffic to pass safely.
<b>CT8</b>	A speed limit will be placed on the Paynes Road at least for the period of construction. The speed restriction will be included in the traffic management plans to be submitted to the Yass Council.
<b>CT9</b>	The clearances to objects on the inside of curves need to be checked to ensure the safe passage of long loads up to 46 metres (turbine blades).
<b>CT10</b>	A traffic management plan will be required for the intersection of the construction track with Black Range Road to ensure the safe crossing of construction vehicles.
<b>CT11</b>	A procedure will need to be established to ensure that all construction and related traffic are aware of the preferred site access route via the Hume Highway and Paynes Road.
<b>Health and safety</b>	
<b>CHS1</b>	Workplace health and safety protocols will be developed to minimise the risk of fire for workers during construction and during maintenance in the control room and amenities.
<b>CHS2</b>	The safety of the workforce will be managed by strict safety procedures, good design of site tracks, and regular maintenance. If an incident occurs, communications to ambulance or medical services will be via phone or radio.
<b>CHS3</b>	Investigations will be undertaken to ensure that roads and bridges are adequate to handle the loads required and to identify strategies to reduce the risk to other motorists during the construction and decommissioning phase.
<b>CHS4</b>	Site fencing will be installed where work staff consider that there is a risk to the safety of the general public (ie. when the trench is left open for extensive periods).
<b>Bushfire hazard</b>	
<b>CB1</b>	The Rural Fire Service will be consulted in regard to the adequacy of bushfire prevention measures to be implemented on site during construction, operation and decommissioning. These measures will in particular cover hot-work procedures, asset protection zones, and safety, communication, site access and response protocols in the event of a fire originating in the wind farm infrastructure, or in the event of an external wildfire threatening the wind farm.
<b>CB2</b>	Flammable materials and ignition sources brought onto the site, such as fuels, will be handled and stored as per manufacturer's instructions.
<b>CB3</b>	Appropriate fire fighting equipment will be held on site when the fire danger is very high to extreme, and a minimum of one person on site will be trained in its use.
<b>Community and economic impacts</b>	
<b>CCE1</b>	The proponent will maximise the use of local contractors and manufacturing facilities in the construction of the wind farm (refer section 8.4).
<b>CCE2</b>	The proponent will liaise with local industry representatives to maximise the use of local contractors and manufacturing facilities in the construction of the wind farm.
<b>CCE3</b>	A conflict mediation process will be established and implemented through the project EMP.

<b>Land use and management</b>	
<b>CLU1</b>	Consultation and liaison will be undertaken with involved landowners regarding site fencing, weed control and stock access during the construction period.
<b>Resource use efficiency and waste</b>	
<b>CRE1</b>	Excavated material will be used in road base construction and as aggregate for footings where possible, surplus material will be disposed of in appropriate locations on site (on agreement with the landowner), finished with topsoil, and revegetated.
<b>CRE2</b>	Surplus topsoil will be stockpiled on site during construction, and following construction will be spread on the site (particularly over hardstand areas and access roads) to assist in revegetation.
<b>CRE3</b>	Waste will be reused or recycled whenever possible. Separate recyclable materials receptacles will be provided (eg. for glass, plastics and aluminium).
<b>CRE4</b>	Packaging materials and general construction wastes will be disposed, with Council's approval, at Council operated waste disposal centres.
<b>CRE5</b>	Toilet facilities will be provided for onsite workers and sullage from contractor's pump out toilet facilities will be disposed at the local sewage treatment plants or other suitable facility agreed to by Council.
<b>CRE6</b>	Risk of chemical spills will be minimised and protocols will be in place to ensure prompt and effective clean up of any accidental spills.
<b>CRE7</b>	The contractor will implement a Spill Control Plan as part of its Erosion and Sediment Control Plan. Spill Control Plans will identify persons responsible for implementing the plan if a spill of a dangerous or hazardous waste will occur. Any spill that occurs, regardless of size or type of spill, will be reported to the Construction Manager. The event and clean up processes will be recorded and passed to the Yass Valley Council. If the spill or hazard reaches surface waters the EPA will be notified.
<b>Heritage</b>	
<b>CH1</b>	The proponent will give due consideration to the discussion in regard to management and mitigation of Aboriginal artefact locales and Survey Units as outlined in the attached Aboriginal Archaeological Assessment, Section 11.

## Operational and post-operational phases

Fauna	
OFA1	Sheep may be preferable to cattle as grazing stock on the turbine ridges (farm operational requirements permitting) to reduce the incidence of insects, which could provide prey for smaller raptors, owls, insectivorous passerines and bats.
OFA2	Vegetation at the turbine sites will be kept low to allow a high level of carcasse detectability. The use of dogs to find carcasses could improve search efficiency.
OFA3	<p>The OEMP will contain details of a three-tiered monitoring program for bird and bat mortalities and habitat utilisation impacts:</p> <p><b>1. First six months of operation</b></p> <ul style="list-style-type: none"> <li>- a more intensive period of monitoring because birds and bats are in the process of habituating to the new development, and sensitive species may experience higher levels of mortality during this period.</li> <li>- during this period all turbine sites will be surveyed to determine variation in impact over the study area. Surveys will include monthly dead bird and bat searches (with at least two scavenging trials), bird utilisation surveys, observation of bird avoidance/diversion behaviour and targeted surveys for species of concern.</li> <li>- if practicable, a reference site located between 500 metres and 1,500 metres from the turbines will also be surveyed.</li> </ul> <p><b>2. First three years of operation</b></p> <ul style="list-style-type: none"> <li>- an extended period of monitoring to assess mortality rates and trends over successive seasons and longer term changes to local species abundance, habitat use patterns and possibly breeding success.</li> <li>- the survey may be limited to representative or higher risk turbine sites, based on the results of the first six months of monitoring.</li> <li>- surveys will include monthly dead bird and bat searches, bird utilisation surveys, observation of bird avoidance/diversion behaviour and targeted surveys for species of concern.</li> <li>- dead bird and bat searches may be extended beyond three years if thresholds are exceeded and adaptive management responses are required to be implemented.</li> <li>- if any active Wedge-tailed Eagle nest sites are located within 2 kilometres of the turbines, these nests will be monitored during breeding seasons (July-January) for at least 5 years following the commencement of operations to determine any impacts on breeding success caused by bladestrike mortality or habitat alienation. Ideally, breeding success at a comparable reference nest site not affected by the wind farm will also be monitored concurrently.</li> </ul> <p><b>3. Ongoing monitoring</b></p> <ul style="list-style-type: none"> <li>- mortality inspection and reporting will be continued for the life of the wind farm. The inspection regime will be linked to turbine inspection and maintenance cycles. Mortalities of any significant species (including threatened species and Wedge-tailed Eagles) will be reported to DEC.</li> <li>- monitoring methods and data standards for dead bird searches, indirect disturbance impact assessment and habitat avoidance studies will be based on protocols in the Interim Standards for Assessing the Risks to Birds from Wind Farms in Australia (Brett Lane and Associates 2005).</li> </ul>
OFA4	Given the concentration of operational and proposed wind farms in the Southern Tablelands region, monitoring of bird and bat impacts will ideally be coordinated and consistent with monitoring programs conducted at other wind farms, and the results of monitoring collected and published by AusWEA or government.
OFA5	Mortality and habitat avoidance thresholds will be developed and used to trigger specific management responses to mitigate impacts.
OFA6	Thresholds for mortality rates and habitat impacts for threatened or sensitive bird and bat species will be determined for each of the three monitoring periods during the development of the monitoring program, having regard to species reproductive potential, conservation status and

	experiences at other Australian wind farms.
<b>OFA7</b>	Management responses to monitoring threshold exceedances will be dependant on the cause and the impact, but could include further research, detailed risk modelling and population assessments, adjustments or enhancements to turbine and associated infrastructure, the installation of flight diversion or deterrent structures, blade painting (refer Hodos <i>et al.</i> 2001), removing local food sources or insect attracting light sources, compensatory off-site habitat protection or enhancement, nest site protection, sponsoring the care of injured birds and the periodic shutdown of one or more turbines (on a daily or seasonal basis).
<b>Visual impacts</b>	
<b>OV1</b>	The proponent will provide landscaping material to landholders where the visual impact of the wind farm is high to screen views of the wind farm from houses or outdoor entertaining areas around the site.
<b>OV2</b>	Plantings will be used around the substation and control building facilities to screen them from the surrounding landscape. Planting will utilise local native species.
<b>OV3</b>	The proponent intends to prevent shadow flicker from disrupting residences and motorists by pre-programming the wind turbine control system to automatically shut down individual wind turbines during conditions that could cause shadow flicker to residences or road users.
<b>OV4</b>	Taurus will monitor reports of blade glint for a period of 12 months after installation, and will consult with owners of any affected residences with a view to undertake the installation of mitigation measures such as screening. Where blade glint becomes a significant issue at a particular residence, the proponent will provide the landowner with appropriate screening to ensure that the residence is not affected. Screening using tree planting will be offered to residents affected by blade glint within 2 kilometres of the turbines.
<b>Noise impacts</b>	
<b>OON1</b>	If minor exceedances are predicted to occur for facades that include noise sensitive uses, such as bedrooms, consideration will be given to providing mechanical ventilation (to remove the requirement for open windows) or structural acoustic treatments (such as improved glazing) to the satisfaction of the relevant residents.
<b>Community and economic impacts</b>	
<b>OCE1</b>	The proponent will establish a Community Fund and contribute \$25,000 per annum during the operation period for community projects such as local Landcare and environmental projects (such as Box-Gum Woodland reserves, erosion remediation, riparian revegetation, pest and weed control, salinity mitigation), sporting and other facilities, development of recreation opportunities (such as walking tracks, horse-riding trails, picnic areas, parks), road and telecommunications improvements, Rural Fire Service support, heritage management and academic scholarships.
<b>OCE2</b>	A conflict mediation process will be established and implemented through the project EMP.
<b>OCE3</b>	The proponent will assist with the development of the wind farm as a local tourism and educational resource if there is local interest and support in the concept.
<b>Telecommunications impacts</b>	
<b>OTC1</b>	Once the wind farm is operational, the proponent will undertake a monitoring program of houses within 5km of the wind farm to determine any loss in television signal strength.
<b>OTC2</b>	In the event that TVI is experienced by existing receivers in the vicinity of the wind farm, the source and nature of the interference will be investigated by Taurus Energy. Will investigations determine that the cause of the interference is due to the wind farm, Taurus Energy will implement mitigation measures at each of the effected receivers in consultation and agreement with the landowners. Specific mitigation measures may include: <ul style="list-style-type: none"> <li>• Modification to or replacement of receiving antenna;</li> <li>• Provision of a land line between the effected receiver and an antenna located in an area of favourable reception;</li> <li>• Improvement of the existing antenna system; or</li> <li>• In the event that interference cannot be overcome by other means, negotiating an arrangement for the installation and maintenance of a satellite receiving antenna at Taurus Energy's cost.</li> </ul>

<b>OTC3</b>	In the event that any issues with additional radio communications license links are identified as a result of the wind farm, whether prior to or post construction, Taurus Energy will consult with the operator and undertake appropriate remedial measures, which may include: <ul style="list-style-type: none"> <li>• Modifications to or relocation of the existing antennae;</li> <li>• Installation of a directional antennae; and/or</li> <li>• Installation of an amplifier to boost the signal.</li> </ul>
<b>OTC4</b>	Taurus Energy will continue to liaise closely with Airservices Australia in order to ensure air safety is maintained. The proponent will ensure that the requirements of Airservices Australia and CASA are met in the development of the Conroys Gap wind farm.
<b>Traffic impacts</b>	
<b>OT1</b>	The effects of 'shadow flicker' will be monitored from Black Range Road to determine the degree of impact on southbound motorists.
<b>Health and safety</b>	
<b>OHS1</b>	Start-up and shutdown (including safety shutdowns) will be fully automated, with manual interruption available via onsite control systems and remote computer.
<b>OHS2</b>	The substation area will be surrounded by a security fence as a safety precaution to prevent trespassers and stock ingress.
<b>OHS3</b>	The National Health and Medical Research Council (NHMRC) Interim guidelines on limits of exposure to 50/60 Hz electric and magnetic fields will be adhered to (24 hour exposure: 1000mG, occupational exposure: 5000mG).
<b>OHS4</b>	All EMR generating infrastructure will be sited at a safe distance from residences.
<b>OHS5</b>	If shadow flicker is found to be a nuisance to residents or motorists, conditions will be pre-programmed into the control system and individual wind turbines automatically shut down whenever these conditions are present.
<b>OHS6</b>	Wind turbines, substation, control building, and the associated above ground electricity infrastructure are to be removed and the site restored once the wind farm is decommissioned.
<b>OHS7</b>	Workplace health and safety protocols will be developed to minimise the risk of fire for workers during construction and during maintenance in the control room and amenities.
<b>OHS8</b>	The safety of the workforce will be managed by strict safety procedures, good design of site tracks, and regular maintenance. If an incident occurs, communications to ambulance or medical services will be via phone or radio.
<b>Aviation impacts</b>	
<b>OAI1</b>	Taurus Energy will provide the location and height of each tower to CASA and the RAAF once constructed for inclusion in relevant databases, maps and charts.
<b>OAI2</b>	Taurus Energy will provide the location and height of each tower to the Australian Aerial Agriculture Association.
<b>Bushfire hazard</b>	
<b>OB1</b>	Asset protection zones, based on RFS advice, will be maintained around the control room, substation and in electricity transmission easements. Workplace health and safety protocols will be developed to minimise the risk of fire for workers during construction and during maintenance in the control room and amenities.
<b>OB2</b>	Shut down of turbines will commence following notification of a bushfire event in the locality, in extreme fire conditions and if components reach critical temperatures.
<b>Land use and management</b>	
<b>OLU1</b>	Consultation and liaison will be undertaken with involved landowners regarding site fencing, weed control and stock access during the operational phase.
<b>OLU2</b>	Affected landholders and riding clubs will be consulted regarding horse-riding impacts and mitigation options, such as tree and shrub planting and the development of alternative trails.
<b>OLU3</b>	Depending on demand and interest, the wind farm may be promoted by Taurus Energy as a local tourist attraction using information leaflets and viewing platforms.

<b>OLU4</b>	Taurus Energy will liaise with landowners whose properties will not be able to be treated using aerial methods.
<b>Heritage</b>	
<b>OH1</b>	The proponent will make funds available for vegetation screening in cases where the wind farm is visible from non-indigenous heritage items and detracts from heritage values or visitor experiences.
<b>Infrastructure removal</b>	
<b>OIR1</b>	Individual wind turbines not used to generate electricity for a continuous period of 12 months will be removed unless extenuating circumstances apply.
<b>OIR2</b>	Prior to construction, written evidence will be provided to the Director General, that the lease agreement(s) with the site landowners have adequate provisions to meet the decommissioning requirements, that the site be restored to a similar condition as existed before the development.
<b>Decommissioning</b>	
<b>OD1</b>	Decommissioning will employ all relevant measures included for the construction phase.
<b>OD2</b>	Prior to decommissioning, the state of creek and drainage line crossings will be inspected and upgraded where required to minimise the impact of vehicle crossings.

## APPENDIX C. SUBMISSIONS REPORT

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# TAURUS ENERGY

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## Response to Public Submissions - Conroy's Gap Wind Farm

In accordance with Part 3A of the *Environmental Planning and Assessment Act 1979*, the Environmental Assessment for the proposed Conroy's Gap wind farm was placed on public exhibition for the period 9<sup>th</sup> August to 22<sup>nd</sup> September, 2006.

A total of 22 submissions were received, 4 from Government agencies (DNR, RTA, DoL, CASA) and 18 from the community.

The proponent's response to issues raised in the submissions are presented below. Items in blue ink are from the Response to Submissions provided by the Department of Planning.

### COMMUNITY SUBMISSIONS

#### Issue: Flora and Fauna

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- 1) The wedge tailed eagle is considered to be a common species in the Washpen Creek Valley and is also considered to be a dominant native predator in the Blakely's Red Gum-Yellow Box Woodland ecosystem. If, as is stated in the EA, the local population is likely to be threatened by the proposal, there is concern that the whole ecosystem of the valley could be affected as the dominant predator would be removed from the ecosystem. This issue should be explored further.*

##### Proponent's response

The Environmental Assessment does not state that the local wedge-tailed eagle population is likely to be threatened by the proposal.

The local population may potentially be affected directly by blade strike or indirectly by habitat loss. The EA states that, while some blade strike risk exists, blade collisions are expected to be rare. This conclusion is based on experiences at other wind farm sites and risk modelling documented in the Biodiversity Assessment (BA) in section 5.3.2.

The BA and EA also discuss the potential of the wind farm to reduce access to eagle hunting habitat and so affect breeding success. Again, based on the continuing use of habitat around wind farms by wedge-tailed eagles at other wind farm sites, hunting behaviour and breeding success are not expected to be significantly affected by the wind farm. This risk would be managed using a blade strike and breeding monitoring program and adaptive approach outlined in the EA.

- 2) A wedge tailed eagle's nest has been identified on a property on Graces Flat Road, within a couple of kilometres of the development site. Significant concern is raised regarding the impact the development will have on young eagles whilst they are learning to fly. This issue should be considered further.*

##### Proponent's response

As noted above, the wind farm is not expected to result in significant blade strike impacts to local wedge-tailed eagles, including young birds. This is based on the experiences at other wind farm sites in Australia, where wind farms are present within eagle home ranges. It is

proposed that direct blade strike impacts and breeding success would be monitored as part of an adaptive environmental management plan. The Grace's Flat nest site could be used for this monitoring, subject to landowner agreement.

## **Issue: Visual Impact**

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*3) On what basis do you assert that "Primary producers place a low value on the landscape"? Many submissions have noted that they are primary producers and place a high value on the landscape. On this basis, would it alter the conclusions of the visual assessment in Chapter 6 of Attachment 8? If so, then a revised assessment should be provided.*

### Proponent's response

The assumptions of views of the landholder views of the landscape were developed from a number of sources including public consultation days, feed back forms, personal conversations and outcomes of previous visual assessments.

The conclusion was reached that, on the whole, landholders that earn an income from the land have a pragmatic approach to the landscape and tend to value the landscape as a means of production mainly and any other values are secondary. The landscape that can be seen today in the area has evolved through the activity of primary production, where landscape visual quality is a secondary consideration.

This view was borne out at the public consultation day. It was observed that the rural residential landholders, not primary producers, had concerns over the visual impact as they have chosen to live in the area for its visual quality - this has been reflected in the report. However, primary producers tended to be concerned about other issues such as decreases in property values. The impact the turbines have on the visual aesthetic of the landscape was a secondary consideration.

It is understandable that some landholders do not agree with the necessary generalisations about landscape values. Public perception takes in a whole range of views and any assumptions made about perception will not fit all those that view the landscape. This is acknowledged in the Visual Impact Assessment.

It should be noted that the report acknowledges (on page 22) that regardless of user type unscreened or unfiltered views from a house tend to be valued highly.

On this basis the assessment in the report should not change.

*4) How will the Proponent implement a system to switch off turbines during periods of shadow flicker impacts?*

### Proponent's response

If shadow flicker is found to be a nuisance to residents or motorists, the time and date where shadow flicker would occur for the affected location will be pre-programmed into the wind turbine control system and individual wind turbines automatically shut down during these times.

*5) How have the objectives of the Yass Local Environmental Plan been taken into consideration as part of the assessment of the wind farm? A number of submissions consider that the proposal may contradict the expectations and objectives of the plan, particularly in relation to visual amenity.*

Proponent's response

The objectives of the land subject to the proposal contained in the Yass Valley LEP are addressed in section 5.1 of the EA. The overarching objectives of the LEP do not cover amenity issues and there are no amenity objectives for the zoning subject to the development proposal.

The land within and surrounding the proposal site is zoned 1(a) Rural Agriculture. The objective of this zone is to set aside certain land for agricultural purposes and purposes incidental thereto. If not prohibited, developments other than agriculture, dams and forestry require development consent. Wind farms are not prohibited under the LEP, but require development consent.

As well as land in zone 1(a), the wind farm would be visible from land in zone 1(b) Rural Highway Zone. The objective of this zone is to maintain a corridor along major National and State highways so as to protect those roads from traffic-generating developments which may affect the efficient and safe movement of the travelling public, and from those developments which would have an adverse impact on the amenity of the rural countryside.

The turbines would also be visible, to a lesser extent, from land zone 1 (c2) Rural Residential – Hobby Farms (located several kilometres to the east of the proposal site) and 1 (d) Rural Smallholdings (near Bookham to the west). These zones have a general objective of ensuring that protection and maximum public benefit is derived from certain areas of high environmental, aesthetic or recreational value.

The visual impact of the proposal on these areas has been addressed in the Visual Assessment (particularly section 6). The assessment includes specific locations within these zones, and in each of these areas takes into account scenic quality, the nature of existing developments and the attitudes and values of residents.

## **Issue: Land use**

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*6) Has the proponent taken into consideration the fact that the area is intensively settled with smaller rural allotments, with plans for future subdivision in the area?*

Proponent's response

The land surrounding the proposal site is zoned 1(a) Rural Agriculture. Yass Valley Council has received a proposal for a 20 lot subdivision to the east of the proposed wind farm site. There is potential for further concessional lot applications in the surrounding district. Pressures for subdivision can be expected to continue, especially between Yass and the proposal site.

The rights of land owners adjoining the proposal will not be affected by the proposal. These land owners can still construct and subdivide their land subject to local planning instruments.

The assessment of social, economic and environmental impacts of the wind farm proposal on existing residences in the locality would have equal relevance to future dwellings. In particular, the visual and noise impacts identified and assessed for non-involved landowners surrounding the development would also apply to new residents in these areas.

The visual assessment found that, from the majority of view points around the wind farm site, the visual impact is moderate to low. In developing the proposal, the original layout was amended to remove turbines from the ridgeline east of the Black Range trig ridge. This will avoid much of the visual impact on viewpoints located east of the site.

For new residences constructed close to the proposal, impacts such as noise can be ameliorated using a range of materials and design techniques in the construction of these homes.

The EA (section 7.3.2) addresses land value and development potential issues and concludes that the wind farm would not be expected to adversely affect the value of surrounding properties, the development potential of properties to the east of the site or the underlying agricultural productive capacity of the land.

The wind farm development is reversible over a 30 year timeframe and would effectively 'quarantine' the ridgelines of the subject site from residential and other development pressures which may detract from scenic values. The revenue provided by the wind farm may also allow the involved landowners to resist subdivision pressures.

*7) What consideration has been given to impacts from the wind farm on tourist park operations near the Burrinjuck Dam?*

Proponent's response

The EA notes that Burrinjuck Waters State Park, located 3-4 kilometres southwest of the subject site, provides fishing, water sports and nature-based recreation opportunities. Burrinjuck Tourist Park is located beside the lake at Woolgarlo around 2.5 kilometres south of the southernmost 'Ferndale' turbines. The main potential impact of the proposal on recreational activities on visitors to these destinations would be visual. Along with Lake Burrinjuck, these areas were included in the visual assessment, including the Zone of Visual Influence analysis (section 4.4.2) and under areas 7 (Lake Burrinjuck) and 10 (Black Range West) of the visual sensitivity assessment (section 4.4.3), visibility assessment (section 5) and visual assessment (section 6). These areas were considered to have moderate – high visual sensitivity and the proposal would have moderate visual impact.

The primary access roads to these destinations run to the west of the proposal site. Wind turbines would be visible from these routes. Turbines would also be intermittently visible from Black Range Road, a secondary access route from Yass. The Visual Assessment concludes that the transient appearance of the turbines in this highly modified rural landscape is considered unlikely to significantly affect the experiences of recreational travellers on these access roads. The Visual Assessment also notes that recreational users are typically less sensitive to the visual landscape while travelling to the destination, compared to their sensitivity following arrival at the destination.

The turbines would not be visible from the campground and visitor facilities at the Burrinjuck Waters State Park, which is low in the landscape and surrounded by forest. The Zone of Visual Influence Analysis undertaken by Garrad Hassan Pty Ltd (Figure 3 in the Visual Assessment report) indicates that no turbines would be visible from the Burrinjuck Tourist Park. This is due to the steep slopes behind the resort which would screen the ridge tops to the north.

The turbines would however be visible from the water and shoreline of parts of Lake Burrinjuck. The wind farm will be visible high above the Lake, particularly from approximately 8 kilometres due south of Black Range. The southern most group of turbines will be highly visible. There will be limited views of the turbines available from other parts of the Lake as the steep edges of the lake will generally screen the site. The turbines may not be in a regular field of view for users of the lake because of their elevation above the Lake.

The wind farm will be visible from the Lake over a distance range of 5-15 kilometres from the proposal site. The viewpoints from where the wind farm will be most visible are around 8 to 9 kilometres. From that distance, the wind farm will be of moderate visibility particularly as the wind farm will be viewed looking along the wind farm and the wind farm will be narrow in the field of view from the Lake. The Visual Assessment found the contrast of the wind farm to the surrounding modified landscape to be acceptable and judged the visual impact to be moderate.

## **Issue: Noise**

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8) A number of noise related issues were raised in this attachment. These issues have been summarised as points 8-1 to 8-11 as follows.

*8-1. The proponent has “cherry picked” the applicable guidelines and selected The SA EPA noise guidelines as the most favourable criteria to apply to the project. For example: “Annoying Characteristics” of noise in the SA EPA Noise Guidelines for wind farms have been used to excuse impulsiveness of turbine noise while failing to apply ‘Modifying Factor’ adjustments for impulsiveness under Section 4 of the NSW Industrial Noise Policy. Refer also to WHO reference below.*

### Proponent’s response

The Department of Planning (DoP) set the terms of reference (Director General’s Requirements) for all assessment studies. The relevant requirement for noise DGR’s for Conroy’s Gap were;

*“Operational Noise – comprehensive assessment of the noise impacts associated with the proposal (including ‘infrasound’) to be undertaken in accordance with the DEC’s Industrial Noise Policy and Wind Farms – Environmental Noise Guidelines, South Australian Environment Protection Authority (February 2003). If any Noise Agreements with residents are proposed for areas where noise criteria cannot be met, sufficient information should be provided to enable a clear understanding of what has been agreed, and what criteria have been used to frame any Agreements.”*

It was confirmed with the DoP that the assessment of WTG noise for each receiver would be covered by the SA EPA Guideline, and that the INP portion be limited to issues including;

- site selection for background noise measurements,
- description of sites,
- equipment used,
- graphing of results,
- determining the Amenity noise criteria for all time periods, and
- the INP assessment methodology would be adopted for fixed stationary noise sources such as transformers.

It is important to realise that impulsive noise is not necessarily the same as modulation. Impulsive noise is characterised by its sharp rise in level or a high peak (or series of peaks) of short duration i.e. gunshot, hammer strike etc. Modulation refers to a sound pressure level that has a repetitive cycling (varying) sound pressure level. To the best of our knowledge there is no empirical evidence to suggest WTG noise is impulsive in nature.

Neither the SA EPA Guidelines, nor Section 4 of the NSW INP, explicitly lists modulation as characteristic requiring a penalty.

Indeed the SA EPA Guidelines “have been developed with the fundamental characteristics of noise from a wind farm taken into account. These include the aerodynamic noise from the passing blades (commonly termed “swish”)”. Our interpretation is that this includes modulation, in our view this still holds as “passing’ blades suggests a time varying event that given the cyclical nature of WTG’s, is repeating and therefore modulating. This has recently been confirmed with the original author of the SA EPA Guidelines.

The fundamental characteristics of wind farm noise have been built into the assessment procedure. This was the justification for lowering the minimum limit used by the NZS6808 standard from 40 dBA to the 35 dBA minimum limit imposed by the SA EPA Guideline. It ‘assumes’ such characteristics are inherent and therefore no additional penalty need apply.

### *8-2. The ISO 9613 noise model is used outside its stated limitations.*

#### Proponent’s response

All noise models have limitations. Investigations have shown that calculated noise levels by ISO 9613 were generally more conservative (predicted higher levels) than other commonly used standards such as CONCAWE and NORD2000.

Furthermore, it is expected that due to the elevated nature of WTG’s the predicted propagation of noise according to ISO9613 are indeed conservative as the standard assumes downwind propagation and/or medium level temperature inversion and its algorithms have been determined empirically through measurement of predominantly ground based sources where such affects are significant. Such enhancement effects are not as pronounced for such elevated sources as WTG’s because:

- the wind profile at elevated positions is relatively uniform compared to ground based sources and hence enhancement due to wind not as significant an effect
- inversions generally are not present or strong at high elevations, and hence enhancement due to inversions is not as significant an effect
- the noise sources are generally not acoustically shielded at high elevations

The net result is that the ‘in built’ ISO9613 assumed propagation enhancement effects are not as pronounced for WTG sources and the resulting ‘over prediction’ serves as additional conservatism.

### *8-3. No evidence of input is presented detailing how the ISO 9613 model has been applied.*

#### Proponent’s response

The model has been implemented using sophisticated 3-dimensional computer noise model. The model assumptions/inputs that have been included in the text of the report include:

- location of WTG sources
- location of sensitive receivers
- distance from each WTG to each receiver
- the sound power level (SWL) and frequency spectra of modelled turbines, and their respective variation with wind speed

*8-4. An unjustifiable level of accuracy is quoted for noise predictions.*

Proponent's response

The estimated accuracy is stated for the noise model only. No statement is made regarding the accuracy and veracity of guideline methodology assumptions and model inputs. To do so would be a most difficult task well outside the scope of the subject assessment.

*8-5. There is no evidence of any margin for error having been applied to the noise predictions.*

Proponent's response

The assessment methodology does not prescribe any application of 'margin for error'. It should be noted that the choice of prediction standard serves as means of predicting a conservative result (as discussed above).

By its very nature the EPA Guideline assesses amenity over an average period. No assessment method is able to be 'absolute' given the high degree of variables involved.

*8-6. There is no evidence of temperature inversion conditions being assessed as required under NSW Industrial Noise Policy.*

Proponent's response

NSW INP temperature inversion assessment was not prescribed in our consultation with DoP. In addition, detailed assessment of the likelihood of inversion conditions is not considered necessary as ISO-9613 algorithms generally account for down wind and moderate temperature inversion conditions in the standard analysis. As discussed in response 8-2 and 8-10, it is unlikely that temperature inversions have a significant effect for elevated noise sources such as WTG's.

*8-7. Manufacturer testing for certification of the proposed turbines has been carried out in an unstable to neutral atmosphere. The critical noise condition for this project occurs at night in a stable atmosphere and lower temperatures.*

Proponent's response

Atmospheric stability conditions during IEC 61400-11 testing are unknown, however given the prevalence of unstable to neutral conditions such conditions are more likely during the test phase.

Detailed manufacturer's tests against the 'stable' atmospheric conditions which are purported to be the critical noise condition for this project are not available.

*8-8. Correlation of ground level wind speeds, 10m height wind speeds and turbine noise levels appear to have been done for neutral or unstable atmospheric conditions. The critical noise case for this project will occur in a stable atmosphere.*

Proponent's response

In regards to determining the noise emitted from the WTG's, as stated above, it is uncertain as to what atmospheric stability conditions were present during IEC 61400-11 tests. However, it would be reasonable to assume that these were unstable to neutral conditions, and therefore our results would also reflect the effect of these conditions on turbine noise emissions. The lack of data outlined in 8-7 does not allow further analysis of this issue.

However, in regards to determining the noise limit criteria curve, background noise levels are measured and then analysed in relation to wind speeds at the 10m reference tower. Accordingly, no calculation of local ground wind speed conditions is made, and no direct assumption of stable, neutral or unstable conditions is made in the analysis procedure. The noise monitoring data used in calculating the criteria curve includes the full variety of conditions (including any stable, neutral and unstable conditions) that were experienced during the background noise monitoring periods.

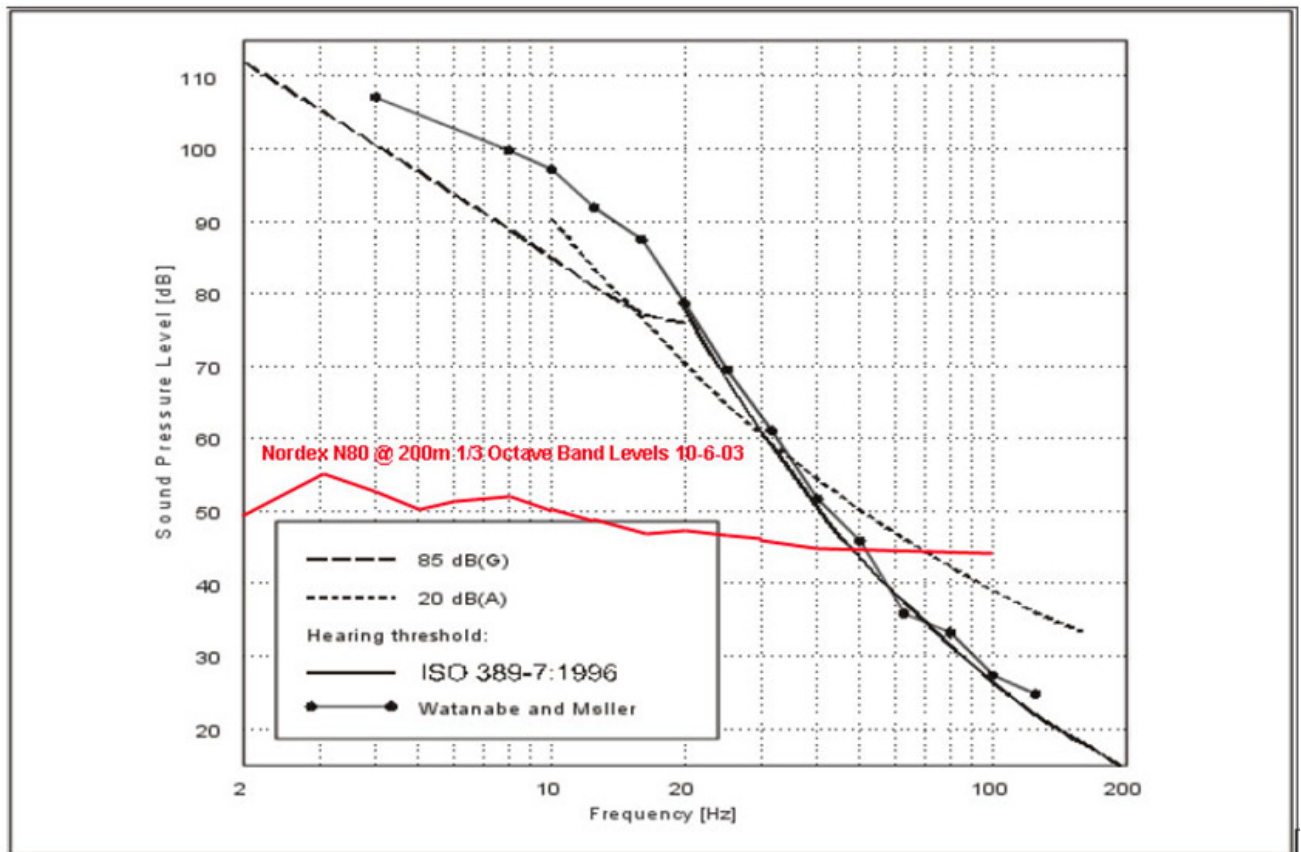
*8-9. No C-weighted data for turbine noise has been provided for assessment of low frequency noise as required by Section 4 of the NSW Industrial Noise Policy.*

Proponent's response

The INP was not the governing policy for assessment; therefore this information was not required. In addition, C-weighted data from WTG's is generally unavailable.

The noise report clearly notes that modern wind turbines do not give rise to infrasound.

The following table is an extract from a paper given by Dr Andy McKenzie during the Australian Wind Energy Association (AusWEA) sixth annual conference AUSWIND 2004, titled "*Infra-sound, Low Frequency Noise, & Vibration from Wind Turbines*". This shows commonly referenced 'threshold' curves against a measured level from a typical 80 metre wind turbine. It can be seen that for low frequency and infra-sound the level is generally well below the 'threshold' levels of human hearing.

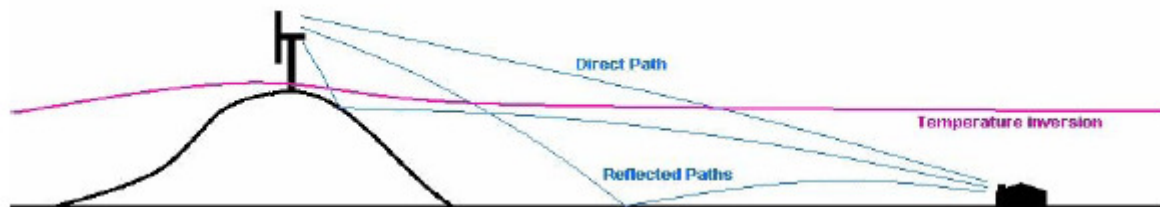


8-10. The proponent has failed to consider acoustic conditions in the context of the accompanying atmospheric and aerodynamic effects around the turbines.

#### Proponent's response

It is assumed that this claim refers to the beginning of the discussion paper that depicts and explains the critical noise case:

*The critical noise case to be considered for this project is as illustrated below*



*The essential features are:*

- 1. It is night time and strong temperature inversion conditions prevail.*

As shown in the diagram the temperature inversion would generally be below the height of the wind turbine.

- 2. The free stream wind velocity profile in front of the ridge reflects stable atmospheric conditions.*
- 3. Topographic features accelerate wind speeds over the ridge, boosting speeds at the turbine. Conditions above the ridge allow the turbine to operate at maximum power while dwellings downwind of the ridge remain in low velocity air*

Baseline monitoring of background noise levels was conducted during similar conditions and therefore account for low velocity air at ground level and are included in establishing baseline conditions.

- 4. Sound received at the dwelling arrives via a variety of paths*
  - a. Direct atmospheric propagation from the turbine*
  - b. Reflections from the ground*

*Both paths are affected by the inversion, and sound refraction occurs as a result of both the temperature gradient and the wind velocity gradient. The intensity of both effects is linked and heightened by the meteorology. The result is that sound which makes its way below the inversion propagates as if in a two dimensional tunnel.*

The diagram incorrectly shows the direct path as being un-affected by the temperature inversion. Compared to 'normal' atmospheric temperature gradient conditions the direct path would be bent downwards by the inversion and the result would be direct path noise would not propagate as far. Direct path noise at distance would actually be lower compared to 'normal' atmospheric temperature gradient conditions.

Refraction of the reflected path, whilst possible under such conditions, is unlikely to adversely affect wind turbine noise levels as the reflected path intensity is significantly lower than the direct path. The reflected path intensity is determined by the reflection loss, which is a function of the angle of incidence, ground hardness and ground cover and is frequency dependant. Generally the higher the angle of incidence the greater the amount of acoustic energy that is absorbed or lost during the reflection.

For the case of an elevated noise source such as a wind turbine on top of a local hill the direct path may not propagate as far as what it may under neutral conditions and the reflected path whilst it may propagate further, is generally of a lower intensity than that of the direct path. The net effect is that noise propagation under temperature inversion conditions would not be expected to be higher than under neutral conditions.

*5. Sound propagation from the turbine is assisted by the above conditions while masking of turbine noise by background noise is minimal or absent at ground level.*

As discussed above, sound propagation of WTG's under these conditions is not expected to be assisted. During temperature inversion conditions it would be expected that wind induced noise at ground level would be low (as still conditions at ground level are expected). However, it should also be noted that under such conditions the noise level from other ground based noise sources (traffic on Hume Highway) can be significantly elevated, due to the enhancing effects the temperature inversion has on such sources which are below the inversion level. If background levels are raised as result of the temperature focussing noise from otherwise distant sources, then residual wind turbine noise would be further masked.

Anecdotal evidence of this exists where residents noted they were able to hear the distant highway and isolated trucks etc. under such conditions.

*8-11. Noise levels have been applied only at dwellings not at the most critical noise boundaries of properties.*

#### Proponent's response

The SA EPA criteria (and the NSW INP) prescribe the assessment location to be places of residence and that amenity be preserved within the curtilage of the home. Such an approach is applied to noise assessments from other industries (such as mining) also.

*8-12. Acoustic testing of the wind turbines was conducted for wind speeds up to 10 m/s. The turbines are rated for operation in wind speeds of 13 m/s. The higher wind speed can be expected to occur or be exceeded on site.*

#### Proponent's response

Available data for the proposed WTG's was limited to the wind range in which they have been tested.

Whilst it is expected that the WTG's will operate in wind speeds greater than those tested, it is most unlikely that extended data would make any difference to the assessment outcome. The sound power level (SWL) of WTG's increases with wind speed at a lesser rate than typically what the baseline ambient noise levels do. The most critical area of assessment is typically where the **Background + 5 dBA** curve meets the minimum 35 dBA line, sometime referred to as the 'knee point' in the graph. This varies with each particular site, but typically occurs in the 5-7 m/s range.

Accordingly, wind turbine tests are carried out to cover these most critical areas. All available data has been used for analysis of the wind turbines.

*8-13. WHO guidelines for sleep disturbance assume 15 dB attenuation at building facades. The NSW Noise Guidelines specify 10 dB for this. No evidence is presented that the higher level of attenuation assumed for the project holds true for rural Australian homes.*

### Proponent's response

There is nothing to suggest the WHO attenuation is based upon 'well insulated European houses with double insulation'. 15 dBA sound transmission loss is easily achieved by typical building construction and glazing. 10 dBA is commonly adopted as this value is generally achieved for typical bedrooms with all windows open. It is worth remembering that the WHO noise limits are only being applied to project involved residences.

*8-14. Where SA EPA guidelines exceed WHO guidelines for sleep disturbance the Noise Assessment notes that the more lenient criteria will be applied.*

### Proponent's response

This occurs at high wind speeds with high ambient noise levels (wind in trees etc.) and only when background masking reduces the intrusiveness of external noise. The WHO policy does not consider the masking effects of surrounding noise levels, as these increase with higher wind speeds it would not make sense to apply a stricter noise limit to involved houses than would apply under SA EPA Guidelines to neighboring houses.

*8-15. Taken as a whole, the project Noise Assessment adopts an advocacy stance, presenting a "marketing" perspective of the acoustic merits of the proposal. It fails to provide balanced material on which to base a dispassionate assessment of the likely impact on property owners.*

### Proponent's response

On the whole the noise assessment attempts to;

- follow the methodology of the SA EPA Guideline;
- use available WTG data;
- capture and use significant baseline noise monitoring data;
- use the latest in sophisticated computer noise modelling techniques;
- take consideration of latest 'emerging issues';
- adopt prediction standard algorithms that are generally conservative (predict higher level); and,
- form an independent and balanced assessment of outcomes.

There are countless factors that influence wind turbine noise generation, noise propagation, background masking, subjective response to noise and attenuation of noise through structures, etc., and it is not possible to calculate each and every aspect or potentiality. The assessment simply applies a recognised methodology that has been developed with the intent of finding an equitable outcome for all.

## **Issue: Meteorology**

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*9) One submission contends that Conroy's Gap and the Black Range dictate most of the local weather pattern with the cyclical storms and rain coming from the north, following the range westward and spreading to the lower terrain and along Yass River. What impact will the turbulence from the wind turbines have on the storm and rain patterns in the area?*

### Proponent's response

Computer modelling by researchers at Princeton University in the United States (Baidya *et al.* 2004) suggested that large wind farms can affect local weather by slowing wind behind the hub and creating vertical eddies, and drying and heating the air on the ground. Temperatures were found to increase by approximately 0.7°C and wind speed by approximately 0.6 metres/second at ground level. The researchers found that the effects on weather could be reduced by using more efficient, low turbulence rotors.

However, CSIRO's Dr Peter Coppin (Atmospheric Research Division) has noted that this effect on weather from wind farms is quite small and the impact on agriculture would be negligible (ABC Online 2004). Dr Coppin said that people living near wind farms didn't need to worry, as wind farms would have little impact on weather conditions near the ground.

Wind speed impacts should be confined to a distance from each turbine equivalent to 10 times the vertical height of the turbine (SEDA 2002). A distance of up to 1.25km (SEDA 2002) around each wind turbine is likely to experience warmer night temperatures and faster wind speeds on average, although this attenuates rapidly with distance from the turbine. It is considered unlikely that the Conroy's Gap wind farm would significantly affect regional or local rainfall patterns. The impact on local weather, vegetation and land use would be minor and would not warrant mitigation.

## **Issue: Fire Risk**

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*10) A number of submissions are concerned about fire risk. One submission in particular raised concern that sparks from a burning turbine could spread over a large area because of the turbine's height and that the fire would be difficult for a volunteer rural fire service to control. How does the Proponent propose to manage issues such as these?*

### Proponent's response

Representatives from the RFS were present at the proposal site during the Planning Focus Meeting, to ensure that this issue was properly considered. The key issues identified by these representatives were access to the site in the event of a fire, potential for containment lines, potential for the substation to start a fire, and activities such as hot welding in fire danger periods. The representatives commented that the development was not substantially different to other infrastructure risks in the area and therefore they held no large concerns over the issue from a bushfire risk perspective.

The main potential causes of turbine ignition are internal electrical or equipment failure, bushfire and lightning strike. A turbine ignition risk exists, but the overall risk is assessed as low.

The Environmental Assessment (section 7.3.8) makes the point that fires due to electrical or equipment failure are very rare in modern wind turbines. Turbines are designed to shut down automatically if ambient temperatures exceed the safe operating range, or if components overheat.

Turbines can also be shut down following notification of a bushfire in the locality or in the event of extreme fire conditions.

The turbines will be fitted with lightning protection, which is designed to effectively earth any lightning strike. The presence of lightning rods on the turbines would in fact reduce the general risk of wildfire at the site caused by lightning strikes. Relatively minor damage to turbines is expected from lightning strike. At Crookwell, east of the site, a direct strike

resulted in damage to one of the turbine blades, which was able to be repaired onsite. No fires were ignited. The risk of fires being caused by lightning strikes to turbines is remote.

In the event of a fire within a wind turbine or within the substation, the NSW Fire Brigade would have responsibility for control, with the RFS involved in a support role. These officers are trained in the control of structural fires and fires involving electrical infrastructure, which is relatively abundant in the district.

The NSW Fire Brigade, RFS and Council would be consulted regarding safety, communication, site access and response protocols in the event of a fire originating in the wind farm infrastructure, and also in the event of an external wildfire threatening the wind farm. Written endorsement of these procedures would be sought from the RFS and submitted to DoP, before the commencement of the construction phase. Auditing would occur as part of the Project Environmental Management Plan.

## **Issue: Expansion Plans**

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*11) If the wind farm is approved, does the Proponent have any future plans to expand the wind farm at this site?*

### Proponent's response

There are no plans to expand the wind farm at the site.

## **Issue: Fuel Storage**

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*12) What quantity of fuel/ oil will be held at the site, including fuel/ oil contained within the turbines, control buildings, substation, transformers etc.?*

### Proponent's response

There is no fuel contained at the site during the operational phase; during the construction phase small volumes may be stored on site to service the construction vehicles and equipment. This would be stored in accordance with industry standard protocols and relevant regulations. Small volumes of oil may be stored on site for top-up of gearboxes and other components, bulk volumes required for irregular oil replacements would not be permanently stored on site and would be brought to site as required. REPower has provided the following lubricating oil quantities in relation to the 2 Megawatt MM82 and MM92 turbines:

- Gearbox oil < 400 litres
- Other grease and oils within turbine < 90 kilograms
- turbine transformer oil ~700 kilograms

This is indicative of lubricating fluid quantities typically contained within modern wind turbines. All modern wind turbines under consideration have oil pans sufficient to contain their lubricating fluids in the event of a leak or rupture.

## **Issue: Traffic and Site Access**

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*13) The traffic assessment report notes that Payne's Road is unfenced and as such, there is an increased chance of collision with stock. Could the Proponent please provide fencing along Payne's Road and sheep yards, if requested by a landowner whose property is adjacent to the road, to address this impact?*

### Proponent's response

Taurus Energy will discuss the situation with relevant landowners and will offer to temporarily fence paddocks where the potential to impact stock is considered significant. Fencing would be removed at the end of construction.

*14) Will access to the communications sites change if the proposal is approved (particularly the emergency services comms)?*

### Proponent's response

No changes will be made to access to the communications sites.

*15) Will emergency services need additional permission to get access?*

### Proponent's response

No additional access permission will be required by emergency services.

## **Issue: Grid Connection**

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*16) How does the Proponent propose to get the power from the turbines "on-line" at either of TransGrid's existing 132kV lines as it is considered that both of these lines are already on-line?*

### Proponent's response

Appropriate "cut over" procedures will be in place to ensure continuity of supply during the commissioning of the wind farm. The existing line will temporarily be taken out of service to allow connection of the new power line; this will not involve reduction of power supply to any customers. In the event that Transgrid is unwilling to allow the line to be taken out of service for a short period, the cut-over could be carried out using live line techniques.

*17) Is there sufficient capacity within the 132kV lines to carry the extra input of power from the wind farm?*

### Proponent's response

TransGrid has confirmed that there is sufficient capacity in the lines to accept the extra power from the wind farm.

## **Issue: Compensation**

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*18) A number of submissions consider it unfair that only the landowners with wind turbines located on their property will benefit monetarily from the scheme. Is it possible for the*

*Proponent to compensate other landowners on a sliding scale based on distance from the project?*

Proponent's response

In order to minimise the visual impact of the proposal, the proponent has committed to offering screening by way of tree planting to all residences within a 2km radius of the wind farm. This process will be carried out by the proponent individually with each land owner so that the screening is appropriate to the impact and to the property. This would be carried out within 3 months of the construction phase completion.

The proponent's intent is to mitigate noise impacts to ensure compliance with the relevant guidelines rather than offer compensation after the fact.

As the proponent intends to mitigate these impacts, monetary compensation is not considered to be appropriate.

The local community will receive direct benefits from the community fund, whereby \$25,000 per annum will be offered for local community projects.

In addition, the local community will receive indirect benefits including economic and environmental benefits as outlined in the EA.

# GOVERNMENT SUBMISSIONS

## Department of Natural Resources (DNR)

### Soil and Landscape Issues

The majority of the area involved in the proposal has been mapped by DNR as Rural Land Capability Class VI. These are undulating ridge tops and moderate side slopes which would be affected by turbine and road construction works. There are limited areas on the involved properties classified as vulnerable (steep and highly erodable). These are steep side slopes which are largely outside the construction area, but may be indirectly affected by runoff and sedimentation.

The proponent acknowledges that the proximity of the development to these vulnerable areas makes effective erosion and sedimentation control imperative.

The risks to soil and water values are considered manageable using best practice works design, erosion control measures and site rehabilitation. A detailed Erosion and Sedimentation Control Plan will be developed prior to the works, including maps of environmentally sensitive areas, parking and lay down areas, and locations of environmental protection works and emergency response resources (Commitment CS1).

A site restoration plan will also be prepared in advance which will apply the best practice principles outlined in section 3.5 of the EA (Commitment CS3). Disturbed areas will be stabilised and rehabilitated progressively during the construction period.

While hard surface access tracks will be required to each of the turbine sites during the construction phase, most of these tracks would be rehabilitated and revegetated following construction (Commitment CS5). These will include tracks along ridgelines which access the turbines. Steeper track sections on side slopes may require gravelling to ensure stability and traction.

Drainage techniques such as out sloping and rollover drainage banks will be used where appropriate on revegetated tracks to assist long term track stability.

Existing hard surface roads required for trig access and farm activities will be retained and upgraded as required.

The proponent has committed to applying the *Guidelines for the Planning, Construction and Maintenance of Tracks* (DLWC 1994) referred to in the submission (Commitment CS4). The methods and outputs of the Environmental Assessment are consistent with guidelines in the publication *Soil and Landscape Issues in EIA*, Technical Report No. 34 (DLWC 2000). The preparation of the detailed Erosion and Sedimentation Control Plan for the project will draw on standards and techniques contained in *Managing Urban Stormwater* (Landcom 2004).

The area directly affected by the proposal is already cleared of native woody vegetation, and now carries mixed native-exotic pasture. There is evidence of past erosion and topsoil loss, and active erosion is continuing on slopes in the north of the study area. The groundwater recharge function of the ridges and slopes has been significantly diminished by the loss of soil and native woody vegetation. The loss of small areas of shallow-rooted herbaceous vegetation and the thin soil layer under the turbine bases and steeper track sections is unlikely to significantly affect the recharge potential of the site.

### Relevant Commitments

<b>CS1</b>	An Erosion and Sedimentation Control Plan will be developed prior to the works, including maps of environmentally sensitive areas, parking and lay down areas, locations of environmental protection works and emergency response. The need for any permanent erosion and sedimentation control
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	structures along roads and around hardstand areas will also be addressed.
<b>CS2</b>	A minimum of vegetation will be removed during excavation and construction leaving as great a buffer between the ridge top works area and steep side slopes as practicable.
<b>CS3</b>	Landforms will be stabilised and rehabilitated as soon as practicable after works. A site restoration plan will be prepared in advance which will set out protocols for restoration works, consistent with principles outlined in section 3.5 of the EA.
<b>CS4</b>	Moderate-high use tracks will be graded and drained to enhance stability. Tracks will be upgraded and constructed in compliance with DNR Guidelines (DLWC 1994).
<b>CS5</b>	Where practicable, grass surfaces will be retained on infrequently used vehicle routes to protect soils.
<b>CS8</b>	Subsoil will be separated from topsoil for rehabilitation purposes. All topsoil from the excavation sites will be stockpiled and replaced to its original depth for seeding and fertilising. On steep slopes, topsoil will be stabilised using, for example, jute matting. Any excess subsoil will be removed from the site and disposed of at an appropriate fill storage site.
<b>CS9</b>	On slopes check banks will be installed across trench lines, 20-50 metres apart, following closure of the trench. These will discharge runoff to areas of stable vegetation.
<b>CS10</b>	The eroding slopes east of the northern turbines, the eroding watercourses east (McCullums Creek) and west (Stony Creek) of the northern turbines and the eroding drainage line east of the southern turbines will be protected from concentrated runoff.
<b>CS13</b>	Stabilisation and revegetation of excavated areas will occur progressively following works to stabilise soil, to reduce impact on adjacent water bodies and drainage lines.
<b>CS14</b>	The eroding watercourses east (McCullums Creek) and west (Stony Creek) of the northern turbines and the eroding drainage line east of the southern turbines will be protected from concentrated runoff.
<b>CS15</b>	Following the construction phase, track drainage will be inspected and repaired as required. Service tracks will have robust rollover drains installed (subject to vehicle access requirements), directing road runoff into vegetated areas away from watercourses.
<b>CS16</b>	Disturbed areas will be seeded with native grasses, where appropriate.
<b>CS17</b>	Stock will be excluded to prevent grazing and trampling in disturbed areas and areas being rehabilitated. Grazing will not occur following the rehabilitation works for 3-6 months.

### **Watercourse Management**

The wind farm project will involve the likely replacement of a culvert on Payne's Road, on an intermittent drainage line in the Stony Creek catchment.

The works will be undertaken during dry weather (Commitment CW5), with low or no flows. The replacement culvert and rehabilitation works will be consistent with NSW Fisheries guidelines (NSW Fisheries 1999, 1999a) (Commitment CFA1), and with the Minimum Standards for culverts provided in Attachment 1 of the DNR submission.

The turbines and turbine access tracks are located on ridgelines and will not involve crossing or excavating local watercourses. Aside from the replacement culvert on Payne's Road, no new major or minor watercourse crossings would be required for the wind farm project.

There is potential for watercourses to be impacted from sediment-laden runoff from tracks and turbine development sites, particularly during heavy rain. These risks would peak during the construction phase and diminish progressively as the site is stabilised and revegetated. The proponent will employ best practice works design, erosion control measures and site rehabilitation to manage these risks (Commitments CW2, CW4, CW7).

A detailed Erosion and Sedimentation Control Plan will be prepared prior to the works, including maps of environmentally sensitive areas, parking and lay down areas and locations of environmental protection works and emergency response resources (Commitment CS1).

### **Relevant Commitments**

<b>CS1</b>	An Erosion and Sedimentation Control Plan will be developed prior to the works, including maps of environmentally sensitive areas, parking and lay down areas, locations of environmental protection works and emergency response. The need for any permanent erosion and sedimentation control structures along roads and around hardstand areas will also be addressed.
<b>CW2</b>	Permanent and temporary road construction will employ best practice drainage and erosion/sedimentation control measures.
<b>CW4</b>	Sediment traps will be installed wherever there is potential for sediment to collect and enter waterways.
<b>CW5</b>	Excavation will only be commenced during stable, dry weather conditions, operational requirements permitting.
<b>CW7</b>	Stockpile sites will be identified and turbid water discharged from these treated by a combination of silt fencing and temporary mulching/seeding.
<b>CFA1</b>	To protect aquatic habitats, the concrete batching plant [not part of proposal] will be well bunded, silt fences will be used around all excavation works, the duration of works will be minimised, and drainage line and creek crossings will be stabilised (consistent with Fisheries NSW guidelines).

## Vegetation Management

Approximately 4.3 hectares of native secondary grassland derived from dry shrub forest types would be removed during the construction of the turbines, substation and access tracks. Most of the 3.75 hectares of this mixed native-exotic pasture under the new turbine access tracks will be revegetated with native grasses. For each turbine, around 28 square metres of mixed pasture would be permanently lost (for up to 30 years) under the base of the turbines (totalling 0.04ha).

The historical clearing of forest vegetation on ridges and slopes in the district has contributed to localised dry land salinity outbreaks on lower slopes, including parts of the involved properties. No significant tree or shrub clearing will be required for the project. The project has been specifically designed to avoid forest remnants and the need for tree clearing (Commitments DFL2, DFL 3, DFL4, CFL2). The selection of Payne's Road as the primary access route for the site will also avoid the need to trim branches from trees overhanging Black Range Road.

The groundwater recharge function of the ridges and slopes at the turbine sites has been considerably diminished by the loss of soil and native deep-rooted vegetation. The limited loss of herbaceous vegetation that would result from the proposal is not expected to significantly affect groundwater recharge performance at the site. The works are therefore considered unlikely to exacerbate salinity outbreaks in the local area, and no offset plantings are considered to be warranted.

In view of the absence of native forest vegetation or wetland habitats in the development area, the proposal is also not expected to affect fauna connectivity and corridor values.

Because little or no tree clearing is anticipated, prescriptions for the treatment of waste timber waste were not included in the EA. The EA does contain commitments relating to the protection and use of topsoil and sods in revegetation (Commitments CFL5, CFL6, CFL 15 and EA Section 3.5).

## Relevant Commitments

<b>DFL2</b>	The southern turbines and access track will be sited to avoid the need to clear or trim remnant eucalypts to the west of the southern turbine sites.
<b>DFL3</b>	The power line will be routed to avoid the need for clearing or trimming of the Long-leaved Box ( <i>Eucalyptus goniocalyx</i> ) forest remnant on the 'Ferndale' property.
<b>DFL4</b>	The Black Range Road crossing points for the proposed new tracks near the Ferndale residence will be sited in available gaps between mature Yellow Box and Blakely's Red Gum trees in the road reserve. The northern track crossing appears to be sited in such a gap; the southern crossing may

	need to be shifted slightly to the north (to AGD 658311 6141864) to avoid mature trees.
<b>CFL2</b>	Works will avoid impacts to mature eucalypts wherever possible. Wherever practicable, excavations and vehicle/machinery movements will occur outside the canopy drip line of large eucalypts.
<b>CFL5</b>	Excavated topsoil, subsoil and weathered rock will be stored separately and replaced in a manner that approximates the original profile as closely as possible.
<b>CFL6</b>	Where practicable, whole sods will be removed with an excavator where these areas are well-vegetated with dense root systems. Sods will be stored in moist, shaded conditions and replaced following the works. Sod storage time will be minimised and sods will be replaced in a manner that maximises the chances of re-establishment.
<b>CFL15</b>	In areas dominated by native grasses, exposed soils will be lightly mulched with chipped native vegetation or sterile hay, and sown with Weeping Grass ( <i>Microlaena stipoides</i> ) and/or Wallaby Grass ( <i>Austrodanthonia</i> spp), or a cover crop such as oats or millet, depending on season and seed availability. In such areas, seed-bearing native pasture hay could be used for mulching, depending on availability.

## **Roads and Traffic Authority (RTA)**

The RTA recommendations are appropriate and workable, and generally consistent with the proponent's Statement of Commitments.

In particular, the points in the RTA submission are covered as follows:

- point 2 (roadside vegetation clearing) is covered by Commitment CT5;
- point 5 (Payne's Road upgrade) by Commitment CT7;
- point 6 (preferred route notification procedure) by Commitment CT11;
- point 7 (shadow flicker monitoring on Black Range Road) by Commitment OT1;
- point 8 (avoiding fog at Hume Highway intersection) by Commitment CT4;
- point 9 (Traffic Control Plans and Oversize Vehicle Permits) by Commitment CT1;
- point 10 (traffic impact monitoring) by Commitments CT2 and CT3; and
- point 11 (traffic scheduling on Hume Highway) by Commitment CT4.

Signage (point 1) will be addressed in the preparation of a Traffic Management Plan for the intersection of Payne's Road and The Hume Highway (CT10).

### **Relevant Commitments**

<b>CT1</b>	Traffic Control Plans and Oversize Vehicle Permits will be prepared and submitted to the Roads and Traffic Authority for all the operations of over size and over weight vehicles on all the public roads involved in the transport of materials to the site.
<b>CT2</b>	A procedure will be established to monitor the traffic impacts during construction, such as noise, dust nuisance and travel times and work methods modified to reduce the impacts.
<b>CT3</b>	Regular scheduled maintenance of gravel pavements such as grading, dust suppression and drainage control will take place during the construction period.
<b>CT4</b>	Traffic impacts will be reduced by the scheduling of high impact movements to account for varying traffic flows on the Hume Highway. These movements if possible will be scheduled for periods when heavy fogs are unlikely.
<b>CT5</b>	The roadside vegetation will be cleared on the verge of the Hume Highway on the southbound carriageway northeast of Payne's Road to increase the intersection sight distance.
<b>CT7</b>	The pavement, drainage structures and stock grids on Payne's Road require inspection and probable upgrading. The existing narrow pavement requires widening at specific locations to permit opposing traffic to pass safely.
<b>CT10</b>	A traffic management plan will be required for the intersection of the construction track with Black

	Range Road to ensure the safe crossing of construction vehicles.
<b>CT11</b>	A procedure will need to be established to ensure that all construction and related traffic are aware of the preferred site access route via the Hume Highway and Payne's Road.
<b>OT1</b>	The effects of 'shadow flicker' will be monitored from Black Range Road to determine the degree of impact on southbound motorists.

## **Department of Lands (DoL)**

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The Department identifies the following Crown land that may be affected by the proposal:

- Crown public roads

The EA notes that approval under section 138 of the *Roads Act 1993* will be required for proposed upgrading works on Payne's Road. While the provisions of s. 91 of the EP&A Act relating to Integrated Development do not apply to the proposal, the proponent would seek appropriate approvals and licences as required.

It is noted that under s. 75V of the Act the s. 138 approval cannot be refused by the relevant roads authority (if approval is granted by the Minister for the Project) and that has to be substantially consistent with the Minister's approval.

There are at least 3 locations where paper roads are likely to be crossed with underground cables and/or access tracks. No major equipment will be located within the boundaries of these Crown roads.

- Trigonometrical reserve

The EA notes that, depending on final cable routes, the proposal may involve the laying of electrical cabling through the Black Trig reserve located in the north of the proposal site. In its submission, the Department of Lands advises that the consent of the Surveyor-General and a licence under the Crown Lands Act would be required if this were the case. If the Trigonometrical Reserve would be affected by the proposal, the proponent will obtain all necessary consents and licences for works affecting the reserve, including non-claimant Native Title applications as required.

The potential impacts of the proposal on telecommunication transmissions are addressed in section 7.3.7 of the EA and related commitments.

It is likely that there will be no impact on the trig reserve; however final site design may require access through the reserve and laying of cables depending on local ground conditions. It is intended that this is avoided where practical; otherwise the relevant consents will be sought.

- Perpetual lease no. 127560

Discussion with Mr Stephen Watts (Land Management Officer, Crown Lands NSW, Goulburn) on 16<sup>th</sup> October 2006 indicated that conversion of perpetual lease 127560 (lot 207 DP 753596) to freehold land is currently being undertaken. The Department of Land estimates that the conversion process will take approximately 3 to 4 weeks to complete.

## **Civil Aviation Safety Authority (CASA)**

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Airservices Australia Procedure Designers have determined that the proposal will not have any adverse effect on the grid lowest safe altitude or on the route lowest safe altitude on any of the air traffic routes in the area.

Notification to this effect with supporting Airservices Australia e-mails was sent electronically by the proponent to Mr Anthony Rohead (District Aerodrome Inspector - CASA) on 25/09/06. We are expecting CASA's formal response shortly and will forward this under separate cover.

## APPENDIX D. ENVIRONMENTAL ASSESSMENT

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