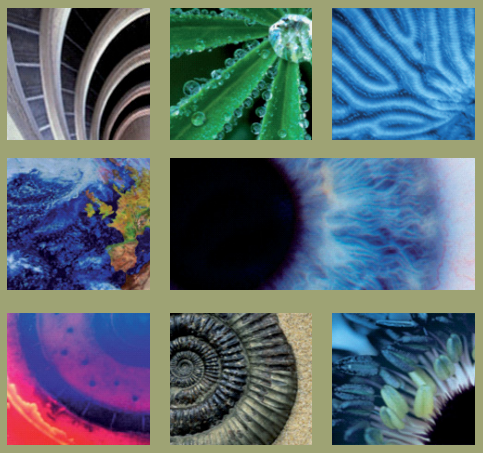

Response to Public Submissions for Black Springs Wind Farm

Prepared for
Wind Corporation Australia Limited
Level 42 AAP Centre
259 George Street
Sydney NSW 2000

Job Reference 23219 - June 2007

HARPER SOMERS O'SULLIVAN

PLANNING ▸ SURVEYING ▸ ECOLOGY

A member of RPS Group Plc

PREPARED BY:
RPS Harper Somers O'Sullivan Pty Ltd
PO Box 428
Hamilton NSW 2303
Tel: (02) 4961 6500
Fax: (02) 4961 6794
Web: www.rpshso.com.au

PROJECT: **RESPONSE TO PUBLIC SUBMISSIONS – BLACK SPRINGS WIND FARM**	
CLIENT:	WIND CORPORATION AUSTRALIA LTD
OUR REF	23219
DATE:	JUNE 2007
APPROVED BY:	S MCCALL
SIGNATURE:	
CHECKED BY:	T LAMBERT
SIGNATURE:	

RESPONSE TO PUBLIC SUBMISSIONS

Pursuant to Part 3A of the *Environmental Planning and Assessment Act 1979*, the Environmental Assessment for the proposed wind farm at Black Springs NSW was placed on public exhibition from Thursday 25 January 2007 until Friday 9 March 2007, at the following locations:

- **Department of Planning**
  Information Centre, 23-33 Bridge Street, Sydney

- **Oberon Shire Council**
  137-139 Oberon Street, Oberon

- **Oberon Library**
  Corner of Dart and Fleming Streets, Oberon

- **Black Springs General Store "Charlie's on Abercrombie"**
  Abercrombie Road, Black Springs

- **Oberon Visitor Information Centre**
  48 Ross Street, Oberon

A copy of the Environmental Assessment was also placed on the Department of Planning website: www.planning.nsw.gov.au

A total of 85 submissions were received by the Department of Planning, with 79 from the community, 1 from Oberon Council and 5 from Government agencies. Following is the proponent's response to a summary of the relevant issues raised in the submissions.

COMMUNITY SUBMISSIONS

Noise

- *Why not measure all year to assess seasonal variation?*
- *Dispute with Van den Burg effect findings*
- *How can you correlate noise at the wind monitor tower to that for the turbines*

Seasonal variation of background noise is considered unnecessary as the measurements which were undertaken in February/March 2005 are considered to be sufficiently representative of the warmer and cooler periods of the year, resulting in a study which includes minimum and maximum background noise levels included in the analysis. The main source for seasonal variation of background noise would be birdlife which is highest during spring-periods. As the measurement was during the peak summer period, the measured background noise is deemed representative. Although the sound spreading will have a more downward trend during times of temperature inversion this effect is assumed to be negligible as the sound pressure level at a specific location highly depends on the wind speed vector. The model used for the noise assessment has incorporated a conservative factor for air absorption (Meteorological correction factor = 0) and therefore represents a worst case scenario. The International Energy Agency (IEA) and the ETSU study of noise propagation conclude that complex noise models do significantly differ from the straightforward models and therefore recommend using the straightforward spherical propagation model as used in the assessment for Black Springs Wind Farm. The climatic

conditions on the site do not suggest that temperature inversions occur for prolonged periods and therefore the results are deemed conservative and accurate.

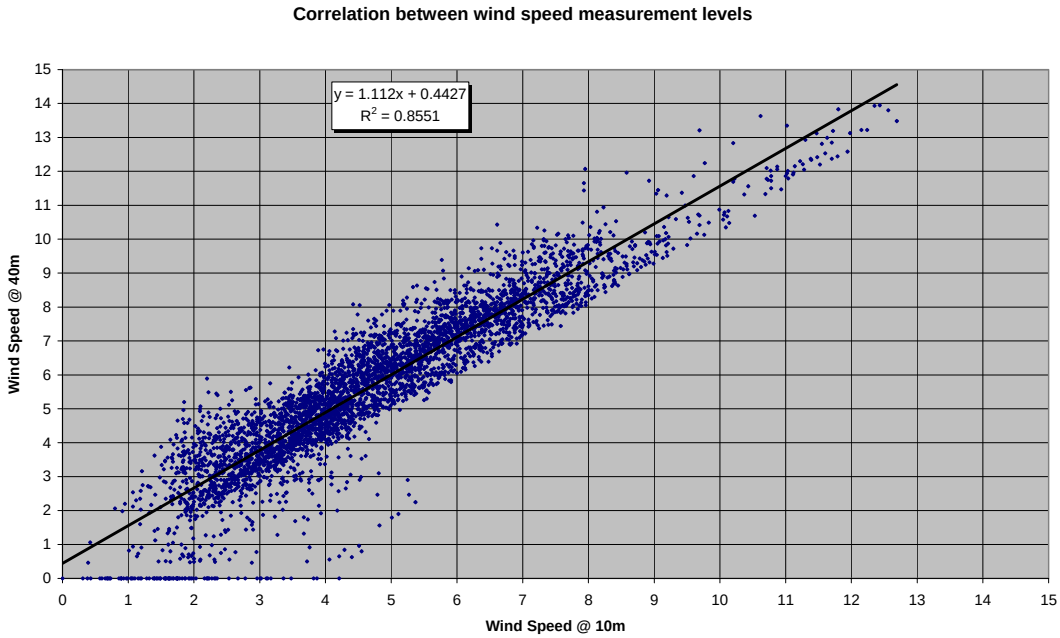

Figure 1: Correlation between 10m and 40m wind speed at the Daisybank Monitoring Mast

An analysis of the wind speed correlation between the 10m level and the 50m level indicates that the so called "Van-Den-Berg" effect of very high wind speeds at hub height even when it is almost calm at the 10m level does not occur on this site (Figure 1). The "Van-Den-Berg" effect is a specific situation detected by G.P. van Den Berg and published in the Journal for Sound and Vibration describing the situation (especially in cold winter nights) where wind speeds at or near ground level are very low while at hub height the wind speeds are considerably higher than the normal wind shear profile would assume. This could result in a situation with no background noise at a receiver location but considerable noise impact from turbines operating at rated capacity. The measurements conducted on site do not indicate such a situation as the difference between the 10m level and 40m level (highest measurement level) and do not show a tendency toward this effect (Figure 1).

- *Noise impacts*
  - *What if turbines change?*
  - *Comment that noise over 35dB(A) causes sleep disturbance*
  - *Noise suggested to be emitted 24 hours a day, 7 days a week*

The noise emissions associated with the turbine model used for the assessment presents the maximum noise levels proposed. The noise criteria used in the assessment sets the benchmark for the worst case scenario and should a different turbine be constructed it will have to comply with the limits modelled in the assessment.

The World Health Organisation *Guidelines for Community Noise* (1999) list guidelines with relation to health and noise disturbance:

> In the following, guideline values are summarized with regard to specific environments and effects. For each environment and situation, the guideline values

> take into consideration the identified health effects and are set, based on the lowest levels of noise that affect health (critical health effect). Guideline values typically correspond to the lowest effect level for general populations, such as those for indoor speech intelligibility. By contrast, guideline values for annoyance have been set at 50 or 55 dBA, representing daytime levels below which a majority of the adult population will be protected from becoming moderately or seriously annoyed, respectively.
>
> To protect the majority of people from being seriously annoyed during the daytime, the sound pressure level on balconies, terraces and outdoor living areas should not exceed 55 dB LAeq for a steady, continuous noise. To protect the majority of people from being moderately annoyed during the daytime, the outdoor sound pressure level should not exceed 50 dB LAeq. These values are based on annoyance studies, but most countries in Europe have adopted 40 dB LAeq as the maximum allowable level for new developments (Gottlob 1995). Indeed, the lower value should be considered the maximum allowable sound pressure level for all new developments whenever feasible.
>
> At night, sound pressure levels at the outside façades of the living spaces should not exceed 45 dB LAeq and 60 dB LAmax, so that people may sleep with bedroom windows open. These values have been obtained by assuming that the noise reduction from outside to inside with the window partly open is 15 dB. (WHO 1999)

Noise from wind turbines is only emitted when the turbines are operating, not 24 hours a day, seven days a week. The turbines only operate at wind speeds between 4m/s and 25m/s.

Visual Amenity

- *Visual impacts*
  - *Forestry harvesting potential views altered*
  - *Loss of natural amenity*
  - *Visual eyesore*
  - *Impact on village amenity*

Harvesting of the forestry resource within the Black Springs region may have the potential to partially influence the visual presence of the proposed wind turbines. However, as the turbines are proposed to be 124m above ground level, the impact that any forestry would have directly adjacent to the wind farm would be minimal with respect to views towards the wind farm where forestry is either part of the middle and/or background vista, as the turbines would be visible above any forestry located around the wind farm. Forestry harvesting would have a greater impact where the forest is located close to the viewing location and where it currently screens views. However, in these circumstances the wind farm would form only a part of the landscape view at such a distance. Only one house is currently located adjacent to the wind farm with Forestry directly between the residence and the site. This house is located near the base of a hill sloping away from the wind farm and has extensive planting located around the dwelling. It is not expected that the wind turbines will be visible due to the topographical influence of the landform plus the existing screening vegetation. Therefore, the influence of forest harvesting is considered to be minimal on the visual impact of the wind farm.

The loss of natural amenity was raised in some submissions. The scenic quality of the landscape is addressed in Section 4 Scenic Quality of the Visual Impact Assessment, submitted as part of the Environmental Assessment for the proposal. The natural amenity referenced in the submissions is the result of extensive landscape modification associated with the establishment of agricultural practices

since occupation of the region by Europeans. The landscape consists of large tracts of cleared land used for grazing or cropping and extensive areas of forestry that involves the rotational clearing of vegetation. Therefore, the natural amenity of the area relates to a modified landscape that incorporates working agricultural practices that continually alter the visual impact on the degree of naturalness of the area. The establishment of a wind farm is considered to be consistent with the existing impacts imposed on the naturalness of the amenity of the area by the current agricultural and forestry practices.

The Visual Impact Assessment also details how people's perception of wind turbines varies from one of beauty to that of a visual eyesore. Public perceptions involve perceptions from a range of viewers and one answer will not satisfy all viewers. The number of turbines, pattern of distribution and blade motion all contribute to the perception of the wind farm. A review of wind farm public opinion surveys by Collett (1995) carried out in the UK indicated that visual impact of wind turbines are perceived to be less intrusive once constructed than generally anticipated before works commenced. The perception that the wind turbines are a visual eyesore is an individual perception that those parties who feel this are entitled to express.

Due to the topography between the wind farm location and the Black Springs Village, the proposed wind turbines will not be visible from the majority of the village. Therefore, there will be very little if any impact on the visual amenity of the village.

- *Industrial proposal in-appropriate in the rural landscape*

Wind turbines are not new structures to the rural landscape. After the 1930's, some isolated rural communities used wind turbines to create direct current electrical power. To maximise the potential of a wind farm, they require a good wind resource and a large expanse of land to provide adequate spacing between turbines. Wind turbines are ideally suited to rural landscapes as they harvest the energy provided by wind across large areas though they only occupy a small footprint. This combination of the need for large areas though only occupying a small footprint is provided in the rural landscape with minimal impact on farming operations. Cropping or stock can occur right up to the base of each turbine. Placement of wind farms in industrial areas would require extensive areas of industrial zoned land, which in practice are generally much smaller than the area required for a wind farm and not located in suitable wind resource areas. The rural landscape also provides lower wind turbulence resulting from ground impacts than would be expected in an industrial landscape. Wind turbulence can significantly influence the spacing between turbines and the generating capacity of a wind farm. Wind turbulence would be generally higher in an industrial area compared to a rural landscape due to the density and size of the industrial buildings and structures. Additionally, in contrast to coal-fired, gas or nuclear electricity production, wind turbines produce electricity without the need for water. Therefore, wind farms provide an alternate significant long-term "drought proof" income for farmers and supplement the viability of the farm.

- *Transmission line - Gibbs inquiry – and visual impact of wind farm*

Section 7 and 8 of the *New South Wales Government Inquiry into High Voltage Transmission Line Development* (Gibbs, 1991) relates to Community Concerns (General) and the effect of transmission lines on landowners and the environment. The concerns listed that transmission lines were placed on private property, which was particularly prevalent in the Oberon region, and that this in turn devalues the land. The potential to place electricity transmission lines on Crown land such as

National Parks or Forestry land was reviewed. National Parks were considered as land in trust for the public and that dissecting this land with transmission lines would result in unacceptable impacts on the environment. National Parks also had a similar view to the Forestry Commission, which considered that cleared grazing land is more appropriate for the construction of transmission lines because they have only minimal effect on the grazing capacity, where as pine plantations have a capital investment on establishment on a per hectare basis that substantially exceeds that of a typical grazing property. Section 7 concluded that while the Electricity Commission policy is designed to pay sufficient regard to the protection of the environment and Aboriginal sites in selecting new transmission line routes, it would be advantages to have full and early consultation with local inhabitants and groups to complement the procedure.

Section 8 details that the Electricity Commission may have sometimes proceeded in a high handed and inconsiderate manner and that the need for early consultation was widely supported. The inquiry states that the Electricity Commission had endeavoured to involve the community in the development of proposals, though the public was not involved closely enough at an early stage. The development of transmission lines is undertaken under Part V of the *Environmental Planning and Assessment Act 1979*, where the determining authority is the electricity Commission or another government authority. The Inquiry recommends that an independent tribunal be established to ensure a fairer and more equitable outcome. The Commissioner of the Soil Conservation Service stated that in his opinion current land use and visual impact should be only minor considerations and that the land capability should be the basis for siting new transmission lines. The Inquiry recommended that a balanced decision that takes into account the relevant circumstances and balances one requirement against another.

The main outcome from the Gibbs Inquiry is that the Part V procedure for assessment can result in an inequitable decision process and recommends an independent tribunal oversee the decision for new projects. The proposed development is being assessed under Part 3A of the *Environmental Planning and Assessment Act 1979* and therefore the assessment of the project is made by the Department of Planning. As recommended by the Inquiry a balanced assessment of the potential impacts has been undertaken for the project. Part of this assessment was conducting community consultation. Further community consultation has been undertaken during the exhibition period and in May 2007. An Addendum to the Community Consultation Report has been provided with this response. The Environmental Assessment contains the relevant studies undertaken as part of the assessment process. This included the examination of the potential visual impacts and recommendation of mitigation measures that will minimise any impacts. Therefore, the proposal has been developed and the assessment process followed in a similar manner to that recommended by the Gibbs Inquiry.

Shadow Flicker

- *Shadow flicker impacts on residents and road users*

The shadow flicker study considered the potential influence shadow flicker may have on residences up to 2km from the wind turbines. No dwellings not associated with the project will be influenced by shadow flicker. In the unlikely event that the participating residences experience an annoying level of shadow flicker, mitigation measures to effectively eliminate any impact, such as vegetation screening, will be implemented.

Shadow flicker is influenced by the position of the sun through the day and through the year, turbine orientation and the absence of significant levels of cloud. Shadow flicker influences on road users may occur at certain times of the day through out the year. To mitigate any potential impacts, caution signage will be erected along Campbell's River Road to inform drivers that they are approaching the wind farm site.

Land Value / Financial

- *Land value depreciation (local agent predicts 15 - 20%) and impacts on subdivision potential.*

The Property Values Assessment (Appendix J of the Environmental Assessment) reviewed published reports on the potential for wind farms to influence property values and examined the land sale of Winton Park. One of the submission received included advice from Meares and Associates regarding the potential for the wind farm to result in a devaluation of nearby properties. The advice outlined by Meares and Associates is not supported by any property sale evidence, but is based on an assumption that property values could decrease by around 15 – 20%. The sale of Winton Park does not support the argument of land value depreciation or impact on subdivision potential for the area. Winton Park sold for a record price of $5.875M with full disclosure of the wind farm proposal. The purchase price is representative of full market value. The purchaser has since elected not to participate in the wind farm, forgoing any revenue stream from the proposal and has lodged a subdivision application. This clearly demonstrates that land values and subdivision potential is still considered highly viable adjacent to the wind farm proposal. Extrapolating this to the wider Black Springs area, the fear of decreasing land values and reduced subdivision potential appears purely speculative.

The subdivision process is governed by local planning instruments and the rights of all landowners in the area to subdivide their land will not be affected by the proposal. Future residential developments very close to the wind farm have the potential to be influenced by noise, though this can be mitigated through design and material selection that reduces any potential acoustic impacts. Through appropriate location, siting and orientation, future dwellings can also minimise any unwanted views of the wind farm.

- *Dismantling of turbines will be a cost to the tax payers*

The project is to be privately owned. Therefore the responsibility of decommissioning the wind farm and dismantling the turbines will be at the expense of the proponent, not the tax payers. This is also stipulated in the lease agreement between the wind farm operator and the landowner.

- *Suggestion that turbines must be turned on with little or no wind to prevent damage*

The turbines are only powered by wind energy. The turbines are not powered by electricity from the grid to turn them. The turbines will only operate between wind speeds of 4m/s to 25m/s. No damage occurs to the turbines during little or no wind.

- *Drying effect of turbines on landscape*

The turbines do not contribute a drying effect to the landscape. The suggestion that wind turbines operate like electric fans and blow air is a general misunderstanding. As the turbines are wind powered and only operate when sufficient wind is present, they do not force air over the landscape as an electric fan would. The air flowing over the blades results in a change in air pressure around the blade and a lifting moment results, similar to the lift generated by an aeroplane wing or helicopter blade. The lifting moment is the force that turns the blade. No mechanical driving mechanism turns the blades. As such no forcing of airflow occurs and therefore no drying effect results from the rotation of the turbine blade.

- *Other general comments on wind farms*

Some general misconceptions were listed in the some of the response submission. To respond too many of these, a paper by Dr Mark Diesendorf titled *Refuting fallacies about wind farms* has been attached. The paper addresses many of the general misconceptions regarding wind farms that were included in some of the submissions.

- *Lack of provision for compensation of severely affected adjoining and adjacent landholders. Understands that Taralga wind farm proponents required by law to purchase properties deemed by the Land and Environment Court as severely affected, at full market price pre wind farm.*

Below is *selected extracts* from the findings of Taralga Wind Farm NSW Land and Environment Court judgment. A full copy of the findings is available at: http://caselaw.lawlink.nsw.gov.au/isysquery/2697edb9-3851-4a72-83f5-114c8124c91a/1/doc/

Ruling in relation to property acquisitions

157 The third is that, whilst I have decided, for reasons I have given below, there are two properties which are sufficiently impacted that it is appropriate to require RES Southern Cross to purchase them (should their owners elect to sell), that is a matter where, again, the choice of response is in the hands of the two landholders.

158 Although there are elements of public interest and public policy issues associated with this proposal, nonetheless, the project remains one by a private developer on land where it is permitted. It is, although of a significantly large scale, nonetheless on all fours with a similar development in any other context which met the same criteria.

159 If the concepts of blight and compensation, as pressed by the Guardians, were to be applied to this private project (a proposition which I reject) then any otherwise compliant private project which had some impact in lowering the amenity of another property (although not so great as to warrant refusal on general planning grounds when tested against the criteria in s 79C of the Act) would be exposed to such a claim.

160 Creating such a right to compensation (for creating such a right it would be) would not merely strike at the basis of the conventional framework of landuse planning but would also be contrary to the relevant objective of the Act, in s 5(a) (ii), for "the promotion and co-ordination of the orderly and economic use and development of land".

The cumulative impact on the Ross property

243 The composite noise map provided by the Guardians shows that noise levels at the Ross house will not comply with the SA guidelines.

244 I am satisfied that the likelihood of this non-compliance, when coupled with the severe visual impact of the proposal on the Ross property, renders these impacts unacceptable. It is therefore appropriate to provide Mr and Mrs Ross with the option of requiring RES Southern Cross to purchase their property. The conditions are also to be amended to provide for this.

245 Two options have been presented as a basis for such purchase by RES Southern Cross. The first, a conventional one used in other private development circumstances such as mines, is being proffered by the Minister. The second is one which would impose an acquisition regime analogous to that in the Land Acquisition (Just Terms Compensation) Act 1991.

246 As earlier noted when dealing with the concept of blight, although there is a significant public interest element in this proposal, it is not, in itself, a public proposal. I do not consider that it is reasonable to impose the more onerous regime which has been accepted, on public policy grounds, as appropriate for public project acquisitions, to be applied in this instance.

247 Although I accept that this obligation for acquisition of the Ross property was not adopted by RES Southern Cross, I do not understand that this conclusion is vigorously resisted for this property.

Cloverlee

248 The composite noise map provided by the Guardians shows that noise levels at this property will not comply with the SA guidelines. However, as earlier noted, this property does not have an existing dwelling.

249 As discussed earlier, there would be a significant visual impact on any dwelling proposed to be constructed at RES Southern Cross's hypothetical dwelling location on this property.

250 Although RES Southern Cross said that such a dwelling could be shielded from the noise by appropriate design restrictions and protected from the visual impact by enclosing landscaping, such a necessarily inward looking dwelling and dwelling curtilage would quite radically restrict the amenity of any residents of such a dwelling and be inconsistent with the nature of a rural (in contrast to an inner city) dwelling.

251 Curing the noise and visual impacts of any such dwelling might be possible by the removal of a significant number of turbines from the proposal. It is clear from Mr Liebmann's evidence that such a cure would likely render the proposal unviable.

252 This property and the Ross property are the two properties which are most severely impacted, as to the ability of person's resident on them to have an appropriate level of day-to-day amenity. The affectation of these two properties is quite significantly greater than that on any of the other properties in the vicinity of the proposed wind farm.

253 Although resisted by RES Southern Cross, I am satisfied, on balance, that this property should also be subject to the option for its owner to require acquisition by RES Southern Cross on the same basis as for the Ross property. The conditions are also to be amended to provide for this.

Land Acquisition

4 Following commencement of construction, if requested by the landowners of the land referred to in Schedule 2 of this consent, the Applicant must, within six (6) months of receipt of a written request from the owner of that land, proceed to acquire the property in accordance with the acquisition procedure detailed under conditions 5 to 8 inclusive, of this consent. Any such request by a landowner to have their property acquired must be received by the Applicant within three (3) years of the commencement of Operation.

Note: This condition does not prohibit the landowner of the land referred to in this condition from entering into a negotiated agreement with the Applicant with respect to visual and noise impacts associated with the development. Should an agreement be reached, the Applicant shall forward a copy of the agreement to the Director-General as soon as practicable.

5 Within three (3) months of receiving a written request from a landowner with acquisition rights (determined by condition 4) of this consent), the Applicant must make a binding written offer to the landowner based on:

> *(a) the current market value of the owner's interest in the property at the date of this written request, as if the property was unaffected by the development the subject of this consent, having regard to:*
>
> > *(i) the existing use and permissible use of the land in accordance with the applicable environmental planning instruments at the date of the written request to purchase the property; and*
> > *(ii) presence of improvements on the property and/or any approved building or structure which has been physically commenced at the date of the landowner's written request, and is due to be completed subsequent to that date, but excluding any improvements that have resulted from the implementation of any conditions of this consent;*
>
> *(b) the owner's reasonable compensation for disturbance allowance and, where relevant, relocation costs within the Upper Lachlan or Goulburn local government area, or within such other location as may be determined by the Director-General; and*
> *(c) the owner's reasonable costs for obtaining legal advice and expert witnesses for the purposes of determining the acquisition price of the land and the terms upon which it is to be acquired.*

6 In the event that the Applicant and the relevant land owner cannot agree (within six weeks of the binding written offer to the landowner) on the acquisition price referred to under condition 5 of this consent and/or the terms of the acquisition, then either party may refer the matter to the Director-General.

> *Upon receiving this request, the Director-General shall request that the President of the NSW Division of the Australian Property Institute*

appoint a qualified, independent valuer, or Fellow of the Institute, to consider submissions from both parties, and determine a fair and reasonable acquisition price for the land, and/or terms upon which the land is to be acquired.

Within 14 days of receiving the independent valuer's determination, the Applicant must make a written offer to purchase the land at a price not less than the independent valuer's determination.

If the landowner refuses to accept the offer within 6 months of the date of the Applicant's offer, the Applicant's obligations to acquire the land shall cease, unless otherwise agreed by the Director-General.

7 The Applicant shall bear the costs of any valuation or survey assessment required by the independent valuer/Fellow of the Institute, all relevant costs associated with determination of the acquisition price incurred through the processes referred to under condition 5 and condition 6 of this consent.

8 In the event the Applicant and the landowner agree that only part of the property that is subject to an acquisition request under condition 5 of this consent is to be acquired, the Applicant shall bear the reasonable costs associated with obtaining approval for any plan of subdivision and registration of the plan with the Office of the Registrar-General.

WCA's response:

The impacts on the Ross and Cloverlee properties related to both high visual impact and noise impacts and the fact that that there exists an inability for those residents to achieve an appropriate level of day-to-day amenity.

The basis for the decision that a potential high visual impact will adversely affect the Ross property was based on the effect of local topography and the layout of the wind farm. The property in question would be effectively dominated by the wind turbines. Additional to this, it was considered that there is no viable opportunity to ameliorate the visual impact on the Ross residence by landscaping.

The findings for the Cloverlee property related to the fact the wind turbines would surround the property on a number of sides and that any future development would not sufficiently be able to mitigate day to day amenity.

The loss of day to day amenity is the basis of the court ruling the proponent should purchase the properties. Also contributing to the loss of daily amenity is the cumulative impact of the potential noise levels to exceed the SA Guidelines and that landscaping will not mitigate the visual impact due to the turbines surrounding or dominating each property. It is noted that the requirement for purchasing of the properties is subject to the land owner's agreement. An additional option is for the land owners to enter into a negotiated agreement with the Applicant with respect to visual and noise impacts associated with the development.

Additionally, the Honourable CJ Preston stated:

Whilst I have decided, for reasons I have given below, there are two properties which are sufficiently impacted that it is appropriate to require RES Southern Cross to purchase them (should their owners elect to sell), that is a matter where, again, the choice of response is in the hands of the two landholders.

Although there are elements of public interest and public policy issues associated with this proposal, nonetheless, the project remains one by a private developer on land where it is permitted. It is, although of a significantly large scale, nonetheless on all fours with a similar development in any other context which met the same criteria.

If the concepts of blight and compensation, as pressed by the Guardians, were to be applied to this private project (a proposition which I reject) then any otherwise compliant private project which had some impact in lowering the amenity of another property (although not so great as to warrant refusal on general planning grounds when tested against the criteria in s 79C of the Act) would be exposed to such a claim.

Creating such a right to compensation (for creating such a right it would be) would not merely strike at the basis of the conventional framework of landuse planning but would also be contrary to the relevant objective of the Act, in s 5(a)(ii), for "the promotion and co-ordination of the orderly and economic use and development of land".

In response to the claim for compensation on affected residents received in some of the public submissions, as per the Taralga Wind Farm ruling, the circumstances at Black Springs differ significantly. The noise modelling demonstrates that the noise limits will be acceptable for the residents in accordance with the SA guidelines, therefore no noise impacts are relevant for these residences. The visual impact on individual non-participating residences adjacent to the Black Springs Wind Farm can be mitigated through on-site landscaping. The impacts on the 'Kalgoorlie Hall' and Swatchfield residences are considered acceptable for the following reasons:

- the turbines have been arranged in a linear layout with respect to the affected residence to reduce the visual prominence of the wind farm;
- the viewshed impacted upon by the wind turbines only forms a small part of the total 360° viewshed from these residences (62° of the viewshed for 'Kalgoorlie Hall' and 42° for the Swatchfield residence);
- the orientation of both Swatchfield residences is towards the east, not towards the wind farm;
- the orientation of the 'Kalgoorlie Hall' residence is towards the east, though some living areas are orientated toward the north and the wind farm;
- existing vegetation adjacent to the 'Kalgoorlie Hall' residence and a wind break along the property boundary reduces the view towards the proposed turbine sites;
- additional landscaping measures will provide appropriate screening of the wind turbines and has been offered by the proponent to further reduce any potential visual impacts.

It is considered that none of the non-participating properties are in any way severely impacted. It is acknowledged that the Swatchfield and Kalgoorlie residence have an effect but the visual impact alone is not considered to be a severe impact. Therefore, considering all of these factors, the visual impact on the residences is acceptable.

The Black Springs Wind Farm is a compliant private project that is permissible on the site under the Oberon LEP 1998. As stated by the Honourable CJ Preston:

Creating such a right to compensation (for creating such a right it would be) would not merely strike at the basis of the conventional framework of landuse planning but would also be contrary to the relevant objective of the Act, in s 5(a)(ii), for "the

promotion and co-ordination of the orderly and economic use and development of land".

Considering the findings of the Taralga Wind Farm judgment, the comments by the Honourable CJ Preston with respect to potential compensation precedent for private projects, noise emanating from the turbines will comply with the SA guidelines and that any potential visual impacts on non-participating residences adjacent to the Black Springs Wind Farm can be mitigated through the offer of vegetation planting, the requirement for compensation is not appropriate and will not be entered into in this circumstance.

Energy

- *Wind power and grid connection concerns re network reliability*

Wind power forms only part of the electricity generation mix that makes up the NSW Electricity Grid. Electricity grids are designed to handle variability in both supply and demand and the local grid is capable of incorporating the electricity generated by the proposed wind farm. Any generation from the wind farm must comply with stringent NEMMCO guidelines. The electricity that would be generated from the wind farm would connect to the 66kV overhead transmission line that transects the site. This line which currently feeds into the 11/33kV substation in Oberon would be extended to the 66kV substation located at Carter Holt Harvey Timber Mill. This would require a 200m extension of the existing transmission line. This will improve the quality of supply for the Oberon, Burraga, Black Springs and Oberon network. Electricity is then redistributed from the substation to the local network in a controlled manner and will not reduce network reliability.

All sources of electricity generation require backup from other sources of generation. Wind generated power is no exception. Wind power generation replaces the requirement for the same amount of energy to be produced by a greenhouse gas emitting power station, but due to the requirements of security and reliability associated with the electricity grid it will not replace the need for other sources of power generation, especially in the short term. Therefore, claims that wind power requires back up generation capacity are true, but this is true for all forms of electricity generation. Even a single coal or gas fired power station requires additional back up. Wind power generation is part of the mix of electricity generation and contributes to reducing the amount of greenhouse gas emitted in the generation of electricity.

- *How are generating capacity hours worked out and justify wind power in relation to maintaining conventional capacity?*

Wind power is essential in reducing Australia's reliance on fossil fuel based energy generation. This will provide further stability and security to Australia's energy supply portfolio, essential in meeting projected demand increases out to 2030. At the recent APEC Summit held in Darwin the theme of the conference was "Achieving energy security and sustainable development through efficiency, conservation and diversity." Wind generation aims to allow the government to meet these aims to diversify the generation portfolio with a sustainable and efficient resource.

Using wind measurements taken from the Black Springs wind farm over the past eighteen months a capacity factor for the wind farm is calculated using the frequency

of winds and the times at which they are blowing. These measurements have proven that there is an adequate resource at the site to support an 18.9 megawatt project.
The attached Energy Calculation Summary shows the gross potential energy production and then accounts for line losses and other factors which may reduce the generation of the project. The net energy calculation therefore takes into account the frequency with which winds blow at the site.

- *Comment on the claim the site has a marginal wind resource.*

Wind farms require a wind resource typically at levels averaging greater than 7m/s. Many factors influence the amount of electricity that is generated from a wind resource and this in turn influences the return on the wind farm investment. Therefore, as stated in the Environmental Assessment, the data collated from the monitoring mast located on the proposed site has confirmed the wind resource is suitable to commercially operate nine wind turbines.

- *Please explain the comparison to Crookwell and Blayney Wind Farms operating at 21% efficiency and the expected generation capacity for Black Springs.*

The operating capacity of a wind farm is the result of many factors including, but not limited to, wind conditions, turbine model, optimisation of turbine layout, local topography, electrical efficiency, and operational availability of turbines. These characteristics can vary significantly between wind farms. Therefore, it is not reasonable to compare the operating efficiency between wind farms. Each wind farm proposal must be assessed on the actual conditions of the proposed location. The assessment for the Black Springs site has resulted in an estimated annual net energy production of 46.42 GWh/year, with an estimated capacity factor of 28%. The calculations demonstrating how the estimated capacity factor has been generated are contained in the attached Energy Calculation report.

- *Why are turbines being pulled down in Germany?*

Some German Wind Farms, having been constructed in the 1980's are now being decommissioned. This however is not due to lack of energy generation or market interest, as wind powered energy generating and market interest in wind power in Germany continue to grow strongly. In 2004, the total energy output of wind energy generators in Germany was 2, 000MW. In 2012 it is expected to reach 30 000MW (Gipe 2003).

Decommissioning is occurring as a result of technology, which was developed in the 1980's, becoming obsolete and new technologies emerging. Another reason for decommissioning can be explained by the rising operations and management costs throughout the operational life of the older style turbines (Gipe 2003).

Many of the older Wind Parks in Germany are being dismantled to allow for larger more efficient models to be installed.

Electromagnetic Interference

- *Electromagnetic Interference – TV reception and Burraga Fire Tower radio links needs to be assessed*

If Burraga Fire Tower radio link experience radio interference as a result of the erection of the wind turbines, the proponent has stated that a radio receiver and transmitter repeater station will be installed on the turbine that interferes with the signal.

An On-site Signal Interference Study will be prepared relating to television and telecommunication signals pre and post construction. This study should allow quantitative comparison after installation with a comparison survey. The results of the On-site Signal Interference Study shall be provided to the Department of Planning Officers for consultation with the Wind farm Monitoring and Review Committee and the wind farm operator. Remedial measures, if required, may include improved antennae, relocation of a transmitter, installing a repeater or cabling from a location clear of interference.

Traffic

- *Traffic movements and degrading of roads (Council wants S94 contributions for road improvements)*
    - *Road safety issues during construction and ongoing*

A Traffic Management Plan will be prepared as part of the Construction Environmental Management Plan and Operational Environmental Management Plan. The Traffic Management Plan will detail measures to ensure road safety measures are implemented during the construction period and for any on going activities associated with the operation of the wind farm. Such measures will include advising the community of traffic movements relating to the construction of the wind farm and placing traffic controllers at locations where construction traffic are required to carry out potentially hazardous manoeuvres, such as access into the site from Campbell's River Road.

The proponent is willing to conduct a pre-construction road review followed by a post construction road review. Any damages found to be directly attributable to the construction and operation of the project will be restored to the condition they were found in prior to construction of the wind farm.

- *Impacts on timber haulage during construction*

Minimal impact on timber haulage is expected as construction traffic will mainly consist of utilities and trucks. The movement schedules for the large turbine components will be advertised to the local community to advise of any potential slow traffic movements or delays.

The impact on timber haulage is expected to be minimal however as there are only nine turbines in total to be transported to the site. Furthermore these will arrive on a Just-in-time-Basis, meaning they will not all be transported at once.

Socio-economic and Consultation

- *Lack of consultation with affected landowners and community – no useful feedback.*

Two additional consultation days have been undertaken in response to the communities concern that insufficient community consultation had been undertaken and to provide the opportunity to provide useful feedback to the community. The Community Information Days were held on Thursday 1st March 2007 and Saturday 19th March 2007. The second community information day was conducted due to concern by some members of the Black Springs Community that the previous session held on Thursday 1st March 2007 was insufficient as some members would be unable to attend during office hours.

Between 40 and 50 Black Springs and Oberon Shire residents attended the information day on the 1st March. A display was setup with handout copies of the display available for visitors to take home with them. A number of residents known to be objecting to the proposal were contacted the evening prior to the consultation to personally invite them to discuss their objections with the proponent.

On Saturday the 19th May 2007 the additional Community Consultation day was held at the Black Springs Town Hall from 9am to 2pm. It was originally planned to conclude the day at 5pm however due to only 8 people attending the consultation it was decided to conclude the day early. Contact details for Angus Holcombe, consultant to Wind Corporation Australia, were left at the Hall for those who arrived after 2pm.

Based on the limited attendance, it would appear that very few members of the community remain unaware of the project or feel that they require any further information regarding the proposal. The limited attendance may also be attributed to personal consultations conducted by Steve McCall a Community Consultant on Thursday and Friday preceding the Saturday consultation.

An addendum to the Community Consultation Report outlining the additional consultation undertaken has been prepared.

- *No socio-economic benefit*
    - *The responses indicate that wind farms divide communities*
    - *What are the associated Jobs?*

There are a number of potential socio-economic benefits that could result from the development of the wind farm. The construction of the wind farm will require labour and resources that would be provided from the Oberon and Black Springs area. Additionally, the potential for increased tourism opportunities also adds significant potential for further spending in the local community. These activities inturn inject new investment dollars into the area, where a percentage is spent by the recipient. The re-spending of additional investment dollars in the area results in multiplier effects which ensure that the benefits are spread through the community. The indirect investment in local companies through construction and on-going tourism potential will contribute to the development of employment through the local area. Attached is a table demonstrating how tourism contributes to the economic benefit of an area through economic multiplier effects.

Perceived polarisation among community members is common on subjective issues such as the establishment of a wind farm. To assist in achieving community cohesion, WCA will establish a community development fund generated from the revenue received by the wind farm operation. The fund will provide a source of funding for community related projects. The purpose of the fund is to provide the local community with a direct economic benefit from the operation of the wind farm and foster a relationship of goodwill between the developer and the community. It is hoped that the establishment of the fund and the direct benefits for the Black Springs community will help to mitigate any perceived community polarisation by bringing the community together through positive outcomes for the town.

- *Not compatible with Council DCP O*

The matters relating to compliance with the requirement s under DCP O are listed in the response to Oberon Council's submission.

- *Impact on future expansion of Black Springs*

The future expansion of Black Springs will not be impacted by the development of the wind farm. As previously stated, the rezoning and subdivision process is governed by local planning instruments and the rights of all landowners in the area to rezone and/or subdivide their land will not be affected by the proposal. Through appropriate location, siting and orientation, any future dwellings associated with the expansion of Black Springs can minimise any unwanted views of the wind farm.

- *Strong local support for wind farm those less vocal than opponents*

It is encouraging to receive submissions that suggest that the local support for the wind farm is quite strong, even though they are less vocal than the objectors. It is difficult to ascertain the positive support for the wind farm compared to those objecting when some objectors are extremely vocal. The community information days illustrated that there is significant community support for the proposal, though some supporters felt intimidated by the vocal objectors and were reluctant to list their support either in writing or by recording their name. It is disappointing to note that intimidation of supporters and the project landowners by some objectors has been observed.

Flora and Fauna

- *Flora and fauna impacts;*

The Flora and Fauna Assessment prepared by Harper Somers O'Sullivan carefully considered the likely impacts upon flora and fauna as a result of the proposed wind farm development. This included extensive field data collected by bat expert Glenn Hoye, ornithologist Peter Ekert, ERM and additional studies by Harper Somers O'Sullivan ecologists. All of these field studies targeted, and were focussed upon, the main relevant issues. These included presence / absence of threatened species and vegetation types, bird and bat behaviour and site utilisation, and consideration of appropriate turbine locations.

The assessment revealed that the site is an excellent location for a wind farm, being predominantly cleared of native vegetation and habitats likely to support threatened fauna or flora. The assessment was undertaken in accordance with the Department of Planning's Director-General's Requirements and in accordance with best practice

assessment methodology. This included reference to Commonwealth and State guidelines and those of AusWEA, the principal representative body of the Australian wind industry.

In accordance with the TSC Act 1995 and EPA Act 1979 a 7-part test was prepared to assess the impacts of the proposal in detail. It concluded that a significant impact was unlikely to occur upon any flora or fauna as a result of the proposed wind farm

Nevertheless, an adaptive management program will be implemented to ensure that the actual impacts are not greater than those predicted in the Ecological Assessment. The main components of the adaptive management program will be the preparation of an Operational Environmental Management Plan which will include a Bird and Bat Monitoring Program. In brief, the adaptive management program will cover issues such as:

- pre-determining mortality thresholds;
- identifying 'at risk' species for regular monitoring of movements and mortality;
- monitoring in accordance with AusWEA's standards and according to a standardised, repeatable methodology;
- developing a decision matrix that identifies how to respond to outcomes of monitoring results;
- where thresholds are exceeded responding by looking at turning off turbines at specific times, erecting diversion structures, enhancing off-site habitats and prey populations; and
- consideration of compensatory payments to local conservation initiatives or WIRES following mortality of significant species.

In conclusion, it is considered that the impacts upon flora and fauna have been adequately addressed by the flora and fauna assessment and that all possible measures will be implemented to ensure that impacts upon the ecological values of the site are minimised and managed for the life of the project.

- *Preservation of the surrounding environment (sub alpine area),*

The surrounding environment will not be affected by the proposal. The actual direct impacts of the development are limited in nature owing to the highly modified environs in which the turbines and associated infrastructure are to be constructed. In fact, preservation of the cool-climate sub alpine environs is dependant on combating global warming, which the development of the wind farm will contribute to.

- *Concerned about Bird and Bat strikes with blades and dismisses biodiversity (30 fauna bird species threatened in area when comparing NPWS database) – not been properly considered when designing the farm;*

It is unknown what constitutes the 'area' but it is disputed that there are 30 threatened bird and or general fauna species that are likely to occur in the immediate environs. Harper Somers O'Sullivan considered all 11 threatened species on the entire Oberon 1:100 000 map sheet. These results plus habitat assessment resulted in 22 fauna species being considered. It is disputed that there are 30 different threatened species in the 'area'. In any case, the assessment has shown that no threatened fauna are likely to be significantly impacted as a result of the proposal. Consideration was given to impacts upon wildlife when locating turbines in previously disturbed open habitats.

- *9 Turbines, 124m tall in huge concrete bases, fauna is discouraged along with birdlife by replacing natural dams with troughs- where do the animals and birds go that has not been destroyed.*

The 'huge' concrete bases occupy a negligible area when compared to surrounding cleared pasture, pine forest and remnant native forests / woodlands. The loss of a relatively small area of disturbed environs is considered to be negligible in relation to the surrounding existing habitats. Similarly, the nine turbines are not expected to result in significant avoidance areas or loss of foraging habitat for any species. The existing dams are not 'natural', they were constructed by settling farmers for the purposes of water storage and agriculture. While they may provide some additional aquatic habitat, such habitat is not expected to be significant, except for the large farm dam located outside of the study area to the south east that support the threatened Blue-billed Duck. That dam is not near the proposed development, nor is it proposed to be modified as a result of the development. In addition, the existing dams will not be affected by the proposal. In conclusion, habitat loss is expected to be negligible and it is unlikely that local animals including birds will be subject to significant relocation impacts.

- *Will forever disturb the local wildlife such as the Wedge tailed eagle (protected endangered species);*

The Wedge-tailed Eagle is not listed as endangered under the State TSC Act 1995 or the Commonwealth EPBC Act 1999. It is acknowledged that it is listed as a protected species, as are all native fauna in NSW.

As stated in the report, there have been some recorded deaths of Wedge-tailed Eagles at wind farms in Australia. However field studies conducted at Stanwell's Toora Wind Farm in South Gippsland found no evidence of significant levels of bird mortality with any impacts confirmed to localised indirect effects on common farmland birds. Species such as Wedge-tailed Eagles were regularly observed before and after operations began, but avoided the turbines by flying around or between them (AusWEA 2004). Some minor changes to the local distribution and abundance of this species may be expected as a consequence of the ongoing operation of the turbines, although these impacts are not expected to be significant.

It should be noted that while the adaptive management program would monitor and attempt to minimise impacts upon species such as the Wedge-tailed Eagle, this species is very common, occurring throughout almost the entirety of mainland Australia. Although substantial impacts upon this species are unlikely, in the event that mortality occurs it is not expected that this would be a significant concern such that the windfarm should not be approved.

Aviation

- *CASA response*

CASA indicated that prior to CASA commenting on the proposal, the project would have to be assessed by Air Services Australia. Air Services Australia has finalised their assessment and has indicated that the Lowest Safe Altitude (LSALT) for the area would need to be raised because Turbine 6 impeded the LSALT and that the LSALT would need to be raised by 100 feet to 5500 feet. The process to raise the LSALT takes six months and WCA are to advise Air Services Australia of a construction date following an approval of the project.

CASA have now been forwarded this information and are currently preparing their response. The CASA response will be forwarded once it is received.

Straits Resources:

- *Helicopter surveys of the area*
- *Road & cabling concerns re drilling and 37m wide buffer??*
- *Sub-station and construction pad concerns re drilling*
- *Sub station at decommissioning – remove?*
- *Remove cable and pads on decommissioning to reduce hazards for future explorers*
- *Lose of access during construction and access agreement possibility*
- *Sediment controls may impede exploration*
- *Potential for easement for wind farm footprint than over entire properties*
- *Future expansion of wind farm – concerns*
- *Effect of turbines on mobile units UHF radios*
- *OHS and ice accretion – 100m radius around turbines*
- *Inclusion of Straits submission concerns due to confidentiality*
- *Period to wait until mining considered too long (27 years)*
- *Landowner contracts and future mining*
- *Sub station electrical interference with exploration techniques*
- *No consultation and entitlement to mitigation on impacts*
- *Want to meet and discuss*

On the 8th May 2007, representatives for WCA met with Straits Resources in Perth to discuss the concerns Straits Resources holds with respect to the wind farm development. All of the issues listed above were worked through and an agreed outcome for each was reached. Currently a Term Sheet is being prepared, based on the outcomes of this meeting. Once approved by both companies' boards, the Term Sheet will be provided to the Department of Planning. This Term Sheet will then form the basis of an MOU between the two companies. Straits Resources and the proponent resolved any perceived potential development conflicts and have drawn up a terms of reference that will form as the basis for a Memorandum of Understanding between the two companies. The terms of reference outlines the agreed measures that will allow both companies to actively pursue their development interests. Straits Resources has agreed to withdraw their objection to the wind farm proposal following the establishment of the Memorandum of Understanding by both parties.

GOVERNMENT SUBMISSIONS

Oberon Council:

- *Supports opponents to the wind farm and relocation to Paling Yards site on Abercrombie Road.*

The Paling Yards project has no relationship to this proposal. It is disappointing that Council opposes the wind farm development and questions the financial viability of this and other wind farms when it has developed a DCP that specifically promotes the development of wind farms in the Oberon Local Government Area. The Council's resolution that the wind farm "*is an industrial facility in the rural area*" contradicts the

Council's DCP O objective: *To restrict* (wind farm) *development to the Rural 1(a) zone only.*

- *Questions the financial viability of the wind farm*

The development of a wind farm by a private company is no different to that for any other development – the investment needs to provide a financial return. The developer has assessed the economic viability of the project and determined that the wind farm is financially viable.

- *Visual amenity, noise generation, devaluation of property values*

Council in their submission reiterates the concerns of some residents regarding visual amenity, noise, and the devaluation of properties. These issues have been addressed in the Environmental Assessment and the submission response above.

- *Future impacts on the expansion of Black Springs village*

The potential expansion of Black Springs village will not be restricted by the establishment of the wind farm. As stated above, the rezoning and subdivision process is governed by local planning instruments and the rights of all landowners in the area to rezone and/or subdivide their land will not be affected by the proposal. The noise modelling demonstrates that the proposal complies with the noise guidelines set by the State Government. Any future residential development very close to the wind farm may have the potential to be influenced by noise, though this can be mitigated through design and material selection that reduces any potential acoustic impacts. Through appropriate location, siting and orientation, future dwellings can also minimise any unwanted views of the wind farm. Therefore, the wind farm will not exclude or sterilise land potentially associated with the future expansion of Black Springs village.

- *Lists clean coal technology or nuclear energy as a better option than the current proposal*

Clean coal technologies are one of a suite of new innovations that aim to reduce the environmental pollution and greenhouse gas emissions resulting from traditional coal fired power stations. The development and implementation of clean coal technology to capture and store CO_2 emissions is not yet viable, though extensive research is currently being undertaken. Media reports vary in relation to when this technology will be commercially available, with variations in implementation being reported any where from 2 to 20 years away. This technology may provide an additional measure to reduce greenhouse gas emissions in relation to existing coal fired power stations, but it is still unproven and requires further time to mature on a commercial scale. The nuclear power debate is currently in the public arena, though at this stage, current legislation prohibits the development of a nuclear power station in the state of New South Wales.

In comparison to clean coal technology, wind power generation is a proven technology that does not emit greenhouse gas, has a very small environmental footprint and the turbines proposed will return on average 33 times more power than is required to produce them. Additionally, wind turbines do not result in any radioactive waste products that currently present a challenge for the nuclear industry.

- *Concerns with policing conditions of consent*

Any conditions imposed upon a development approval for the wind farm will require certification as part of the normal planning process. Certification of works can be undertaken by Council or a private certifier to ensure that all works are undertaken in accordance with the conditions imposed as part of the consent process. Council will be responsible for policing any conditions of consent. An option offered by WCA is to establish a wind farm monitoring review committee to review the works and operation of the wind farm to ensure compliance measures are implemented. This committee would comprise of a participating and non-participating landowner, a member of Council and the Wind Farm Manager.

- *Council has lack of wind data to assess validity of the data*

The validity of the wind data is extremely important, though commercially confidential, for WCA. Any invalid wind data could jeopardise the viability of the project. Therefore, the wind data has been carefully analysed to ensure the validity of the data as part of the due diligence for the project.

- *Local residents should be funded for sound proofing*

The noise modelling demonstrates that the wind farm proposal complies with the noise criteria for all non project associated dwellings. As stated in the Noise Study, in the case where a significant level of annoyance or disturbance due to wind farm noise is experienced by a resident, and the limits presented by the SA EPA Guidelines are found to be exceeded during operation of the wind farm, mitigation measures will be investigated. Appropriate mitigation measures would include:

  - Installation of double-glazing for windows facing the wind farm;

  - Change of blade pitch to reduce noise-emissions for specific directional sectors (wind sector management). This would be implemented in exceptional cases.

WCA will perform additional background noise monitoring before construction of the wind farm to further monitor existing background noise. Once the wind farm is operating, an operational noise monitoring program will be undertaken at the same locations as the pre-construction monitoring to verify the actual noise levels generated by the wind farm. If this operational monitoring results in acceptable levels being exceeded the aforementioned mitigation methods shall be applied.

- *Non compliance with DCP O – Wind Farms*

In general, the wind farm proposal complies with the objectives of DCP O. In response to Council's concerns, the following points outline the how the project relates to specific clauses in DCP O:

  - *Dwelling closer than 750m from turbine 8*

The non complying dwelling located closer than 750m from turbine 8 is the Miller residence. The Miller residence has a contractual arrangement with the wind farm and is therefore considered an associated residence in the development, in accordance with the requirements of Clause 9h. The wind proposal therefore complies with Clause 9h.

- *Requires a viewing area*

Item 3 of the Draft Statement of Commitments within the Environmental Assessment, outlines that a viewing area and educational signage will be established to create a safe viewing location for the public. The wind proposal therefore complies with Clause 9j.

- *Turbine 7 needs to be 149m from Campbell's River Road*

Turbine 7 is located 140m from Campbell's River Road, 9m less than the 149m required by DCP O. Therefore, the wind proposal does not fully comply with the requirements of Clause 9k. The purpose of the Clause is to maintain rural aesthetic amenity and minimise any potential traffic conflicts. The difference of 9m in this circumstance is not considered significant as it will not result in any additional impacts on the rural aesthetic amenity or result in any additional potential traffic conflicts, should the turbine be relocated 149m from the Campbell's River Road.

- *Requires legal agreement that turbines will be removed on decommissioning*

Under the Part 3A process, the Minister for Planning will decide whether to grant approval or not for the project. The Minister's approval will also outline any conditions that may be imposed with the approval. Pursuant to Clause 75J (5) of the *Environmental Planning and Assessment Act 1979*, the conditions of approval may require the proponent to comply with any obligations in a statement of commitments made by the proponent. Accordingly, Item 26 of the Draft Statement of Commitments within the Environmental Assessment outlines that the wind turbines and associated above ground infrastructure will be removed and the site restored within 12 months of the project being decommissioned. Additionally, the turbines will be removed at the proponent's expense upon decommissioning.

- *Payment of Section 94 fees of $320,591 to Council prior to issuing of Construction Certificate*

The payment of section 94 fees in accordance with a contributions plan is part of the determination of the Minister under Part 3A. The proponent has proposed to undertake a photographic survey of the local roads before and after construction and will provide compensation to Council for any damage resulting from the construction traffic.

- *Septic tank application and construction required for on-site effluent disposal*

The proponent will provide a septic tank application to Council for the construction of on-site effluent disposal for the operational phase of the wind farm. During the construction phase, mobile toilet units will be established on-site and serviced by an appropriate contractor.

- *Building inspection periods – lists when inspections should occur*

The proponent has no opposition to the recommended building inspection periods that Council recommends in their submission.

Department of Lands:

- *No objection – resolve land ownership before consent is granted*

In accordance with the advice received from the Department of Lands the four lots incorrectly listed as privately owned rural land holdings are noted as Crown land under Conditional Lease to Gavin Douglas of 'Daisybank'. These lots are currently being purchased and converted to freehold land by Gavin Douglas.

The two Crown roads within the development area will remain open to all members of the public in their current state. An underground cable connecting the turbines will pass underneath the roads. The roads are currently unformed with no physical structure or formation.

Forest NSW:

- *Impacts of the installation and operation of a wind turbine on private land adjacent to the residence located in compartment 535 of the Vulcan State Forest*
- *Impacts associated with the transport and installation of wind turbines on private land adjacent to compartments 451 and 452 of the Vulcan State Forest*
- *Impacts on timber haulage traffic during construction*
- *Impact on FNSW Burraga Fire Tower radio link*

The above issues are listed as the primary concern of Forestry NSW with regard to the Black Springs wind Farm proposal. The submission also details the agreement Forestry NSW has entered to mitigate their concerns. The submission recommends the following measures:

- *Correct the Forestry agreement details within the Environmental Assessment*

It is noted that references in Appendix B Visual Impact Assessment to the Miller residence are incorrect. The references include Figure 4 page 15, Image 6 page 18 and paragraph 3 page 23. These references should read *that an agreement has been entered into between Forestry NSW and Energreen with respect to the arrangements documented in the agreement dated 27/9/2006 in Appendix D Noise Assessment*.

- *Highlight agreement re use of Forestry roads*

The agreement between Forestry NSW and Energreen documents arrangements for any road works that are required and compensation for the clearing of plantation (if required) within Vulcan State Forest.

- *Advise FNSW of transport dates to avoid impacts on timber haulage as part of EMP*

Forest NSW will be given advanced notification of turbine component haulage routes and times to mitigate any impacts of delayed travel time on the timber industry. This will be incorporated as part of the traffic notification procedure in the Construction Environmental Management Plan.

- *Install repeater for radio link at cost to developer is found affected by turbines*

In accordance with Item 13 of the Draft Statement of Commitments, any disruption to the VHF radio link between Black Springs and Burraga Fire Tower will be mitigated by the installation of a repeater station. The cost of the works will be paid for by the wind farm developer.

NSW Rural Fire Service:

- *Requests consideration is made to minimising the impact of radiant heat and direct flame contact by separating the development from bushfire hazards and, identification of asset protection zones in future development in accordance with Planning for Bushfire Protection 2001. Setbacks will depend on proximity to vegetation, vegetation type and slope;*

The proposed development is not considered residential development and therefore Planning for Bushfire Protection 2001 (PBP, 2001) does not strictly apply. However, assessment in accordance with PBP 2001 has been undertaken as a precautionary approach. This assessment is detailed within the Bushfire Risk Management Plan dated the August 2006 by Harper Somers O'Sullivan.

The assessment in accordance with PBP 2001 found that the vegetation surrounding each of the wind turbines is grassland. Grassland is classified as Group 3 Vegetation in accordance with PBP 2001. PBP 2001 requires a 20m Asset Protection Zone (APZ) between residential development and Group 3 Vegetation no matter what slope this vegetation occurs on. Although the wind turbines are not a residential development a precautionary approach has been undertaken and a minimum 20m APZ will be established around each turbine.

Given the above information the proposal considers the minimising of radiant heat and direct flame contact by the establishment of 20m APZs.

- *Adequate egress/access required for development in accordance with Section 4.3 of Planning for Bushfire Protection 2001;*

Access/egress to the wind turbines will be for maintenance measures and for fire-fighting purposes. Access roads will therefore be constructed in accordance with Property Access Roads in accordance with section 4.3.2 of PBP 2001 or Fire-trails in accordance with 4.3.3 of PBP 2001.

- *The ability of the site to provide for adequate future water supplies for bushfire suppression operation.*

No additional dams are proposed as part of the wind farm. Based on the experiences of the current drought it would be difficult to ensure that water is available at all times for bushfire fighting purposes. Several dams exist within the project area and these could be used for future fire suppression operations with the permission of the land owners.

- *Requests that Proponent identifies future management regimes for any hazard remaining within the area focusing on level of hazard posed to future development by the land or adjacent land and how hazard may change following the development;*

The proposed development is surrounded by grassland or grassy woodland, this type of vegetation is considered a low hazard. The wind turbines will have a 20m APZ surrounding each of them that will be comprised of an Inner Protection Area (IPA), an IPA will ensure that the fuel loads surrounding each wind turbine will have a fuel load of 8 t/ha or less. The continued agricultural use of the land is considered suitable to manage the fuel loads within the IPA to 8t/ha or less.

Revegetation of the property may increase bush fire risk to the development. Any proposed revegetation should be undertaken to limit spread and occurrence of fire;

No revegetation of the area around the turbines is proposed with the development of the wind farm, thereby mitigating any increase to the bush fire risk.

- *Plan of management required to include fuel management within the development and maintenance of asset protection zones in accordance with Planning for bushfire protection 2001.*

Measures to mitigate bushfire hazards and control fuel loads will be included in the Operations Environmental Management Plan.

Department of Natural Resources:

- *EMPs address erosion and sediment control measures in accordance with State Soils Policy and State Rivers and Estuaries Policy – see minimum standards attached*

The issues of concern with respect to the landscape and soils are that the soils at the infrastructure sites are sensitive structural degradation and gully erosion once disturbed. This concern also applies to the potential of soil impacts for any water course crossings and for track construction. The submission recommends that the mitigation measures listed in the Environmental Assessment Section 5.5.1 plus those listed for the Construction and Operational Environmental Management Plans be implemented and are essential to addressing these concerns.

- *Watercourse management for crossings*

The submission lists issues to consider for site specific planning in relation to watercourse crossings and their management. These measures will be incorporated as part of the Construction and Operational Environmental Management Plans. Additional advice is listed in the submission in relation to vegetation management. All of the advice received from the Department of Natural Resources will be incorporated into the Environmental Management Plans.

Department of Primary Industries – Mineral Resource Division:

- *Not supported due to current exploration licence (EL 5574)*

The proponent is currently forming a Term Sheet between the concerned parties which will allow for the development of both projects. This Term Sheet will be presented to the Department of Planning upon gaining approval from both companies.

- *Does not comply with Oberon LEP 1998 Clause 10 re Council consent and development in known or prospective areas of valuable deposits of minerals*

Following detailed discussions with Straits Resources since the exhibition of the Environmental Assessment, an agreement is currently being prepared which will allow for the future recovery of minerals located within the wind farm area. Therefore, further consideration has been given to the *future recovery from known or prospective areas of valuable deposits of minerals, coal, petroleum, sand, gravel or other extractive industries.* It is considered that following discussion with Straits Resources that the proposal now fully complies with Clause 10 of Oberon LEP 1998.

- *Restricted access for exploration activities is a concern, therefore a meeting to discuss an agreed way forward (DPI, Straits and proponent)should be undertaken*

In accordance with the submission, the proponent has met with Straits Resources to discuss the coexistence of the wind farm proposal and Straits exploration activities including any potential for mining. Straits Resources and the proponent are currently preparing a Terms of Reference for approval by each companies board. Once approved this sheet will form the basis of an MOU which it is anticipated will allow both companies to continue toward their respective development goals. The Terms of Reference outline the agreed measures that will allow both companies to actively pursue their development interests.

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Attachments

Community Consultation Addendum

Energy Calculation Report by Energreen

Refuting fallacies about wind farms

Tourism and Economic Multiplier Benefits Diagram

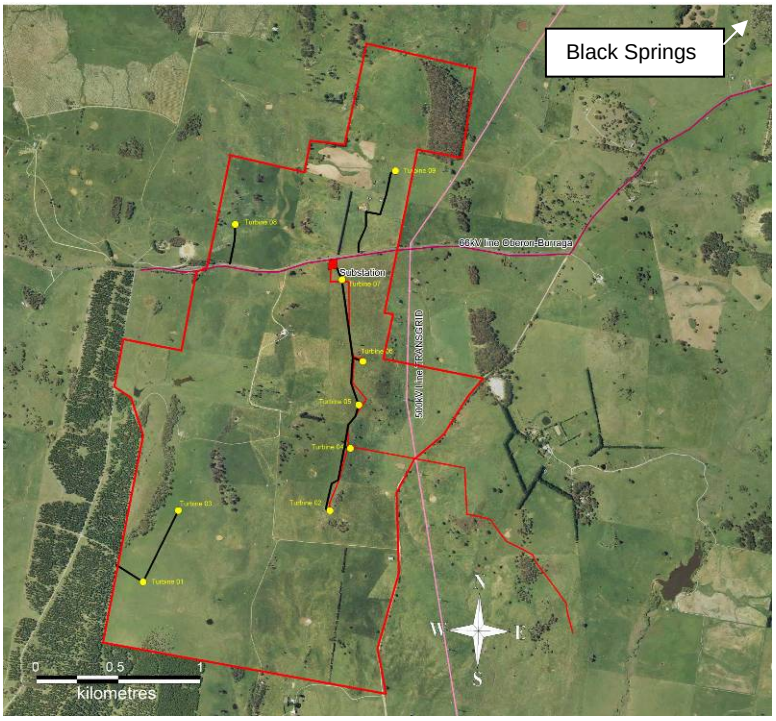
Addendum to
Black Springs Community Consultation Report

Report Prepared by: Angus Holcombe
Report Date: Tuesday, 22 May 2007
Report Status: FINAL

Energreen Wind Pty Ltd. ABN 900 9946 0518
PO Box 574
East Maitland, NSW 2323

Tel: +61 2 49 22 5061
Fax: +61 2 49 644 649

Executive Summary



The Black Springs Wind Farm proposal is based on the installation and operation of 9 Suzlon S88 Wind Turbine Generators or equivalent to be connected via underground cables across two privately held landowner's residences. The hub height of the turbines will be 80 meters and the rotor diameter will be between 80 metes and 88 meters. The turbines will have a generating capacity of 2,100 kilowatts each.

The wind farm will have a generating capacity of 47,000,000kWh, equivalent to the annual requirements of 6,000 NSW households, which will avoid the production of up to 43,660 tonnes of greenhouse gases. The installation of the Black Springs Wind Farm has the potential to promote Oberon Shire as a producer and user of renewable energy throughout Australia whilst having a potentially positive effect on the local tourism industry.

The scenic quality of the area will be impacted by the turbines, though the perception of the impact will vary according to each individual's perception of wind farms and their attitude towards renewable energy production. The turbines have been located so as to comply with all relevant standards and guidelines as well as to provide a balance between the community needs and perceptions, the environmental issues, energy output and the need to reduce the impact on climate change.

The noise study was completed by Energreen Wind using the industry best practice Windfarmer^{TM} software. The noise study adheres to the strict South Australian Environmental Protection Agency (SAEPA) and NSW Industrial Noise Policy Guidelines and is considered as conservative with real noise levels likely to be below the levels calculated.

The Black Springs Wind Farm will also provide local participating landholders with additional income, which will add to the viability and sustainability of these traditional agricultural landholdings. The project will assist the region to meet environmental objectives and the principles of Ecologically Sustainable Development through the

generation of renewable energy, and consequent greenhouse gas abatement. The proposed wind farm does not involve the removal of native vegetation or trees and is compatible with the agricultural activities currently undertaken on the land. No significant flora and fauna impacts will result from the development of the wind farm.

The proposed Black Springs Wind Farm Project will be connected to the 66kV Country Energy operated Burraga – Oberon transmission line (currently operated at 33kV). Initial discussions with Country Energy have indicated that the line is likely to be able to take the energy generated by the project. The advantage of such a connection would be increased quality of supply to Burraga and Oberon due to reduced transmission losses and the use of a sustainable and environmentally friendly electricity supply.

Wind Corporation Australia is confident that this project is not only complying with the relevant standards and guidelines but also provides significant benefits to the region such as:

- Reduce greenhouse gas emissions and help fighting the effects of Climate Change;
- Provide emission free reliable energy to the local consumers and industries in Oberon Shire;
- Improve the quality of supply in the Black Springs/Burraga area;
- Provide another potential tourist attraction;
- Provide additional jobs in the Shire during construction and operation;
- Provide business opportunities for local contractors and businesses;
- Help local farmers to generate additional income allowing them to continue their traditional business.

Designed to have minimal environmental impact we consider this project as a positive addition to the diversity of Oberon Shire.

Community Consultation Report – 1st March 2007

On Thursday 1st March a Community Consultation day was held to inform residents of the progress of the proposed Black Springs Wind Farm toward its development goals. The consultation was conducted in the Black Springs Community Hall between 9am and 5pm. Mark Foggarty, (Director – Wind Corporation Australia) and Angus Holcombe (Project manager – Energreen Wind) were present to answer questions and provide information on the project.

Approximately 45 people attended the consultation with various forms of opinion expressed. Visitors were invited to complete a survey form during the consultation with a total of 28 people agreeing to do so. Of these recipients;

2 were neutral
6 were supportive of the project, and
20 were opposed to the project

Concerns outlined by those opposed to the project included, but were not limited to;

- Devaluation of land values for residents surrounding and within 10km of the project

- Increased noise levels at surrounding residences and on proposed properties adjacent to the site
- The project was inefficient and would not produce the estimated power
- Damage to roads during construction

Those in favour of the project were so for the following reasons;

- Increased economical activity for Black Springs and surrounding areas
- Reduction in dependence on fossil fuels
- Improved and varied source of electricity generation
- Identified Black Springs as a town actively addressing climatic variations recently exacerbated by drought

There were a remaining 12 to 15 attendees who advised of their support for the project however declined to complete a survey form, in some cases due to the presence of a very vocal and parochial "No Campaigner".

At times, members of the "No Campaign" were hostile and argumentative toward those present who were in favour of the project.

Specifically "No Campaigners" stated their intention to "frustrate legal contracts between the developer and landowners" and signalled their intentions to issue claims for damages against both landowners involved in the project.

Information was also obtained which identifies the current noise levels experienced by Oberon Shire following the construction of the Timber Factory at Oberon. This has been attached to this report for viewing also.

Community Consultation Report – 19th May 2007

On Saturday the 19th May 2007 an additional Community Consultation day was held at the Black Springs Town Hall from 9am to 2pm. It was originally planned to conclude the day at 5pm however due to only 8 people attending the consultation it was decided to conclude the day early. Contact details for Angus Holcombe, consultant to Wind Corporation Australia, were left at the Hall for those who arrived after 2pm.

This additional consultation phase was conducted due to concern by some members of the Black Springs Community that the previous session held on Friday 1st March was insufficient as some members would be unable to attend during office hours. Based on the limited attendance however it would appear that very few members of the community remain unaware of the project or feel that they require any further information regarding the proposal. This limited attendance may also be attributed to personal consultations conducted by Angus Holcombe on Thursday and Friday preceding the Saturday consultation.

Prior to the consultation Angus Holcombe, as a member of Energreen Wind, consultant to Wind Corporation Australia, visited as many of those members of the community opposed and in favour of the project as he could on Thursday 17th and Friday 18th May to discuss the proposal and the concerns and ideas those residents have, based on the proposal and wind energy in Australia.

A number of people were contacted prior to Thursday 17th May to make an appointment to discuss the project however many residents declined to meet with Wind Corporation consultants.

Concerns Raised

A number of concerns and issues were consistently raised throughout discussions held on Thursday and Friday. These included but were not limited to;

- The efficiency of wind generation as compared to existing generation techniques
- The decrease in property values which could be expected following the installation of the wind farm
- That the turbines would consume electricity from the grid when the wind is not blowing. (This does not happen)
- The project receives significant State and Federal Government subsidies.
- That the project will not reduce Australia's Greenhouse Gas emissions significantly and therefore should not be allowed to proceed
- Many in favour or not opposed to the project have expressed their disgust at the treatment and accusations directed at the landowners involved in the project.
- Those residents in favour of the project proceeding have reiterated the point that many others in favour of the project are quietly supportive of the proposal.

Further Consultation

There is considerable scope for further consultation to occur with the Black Springs community. As part of Wind Corporation Australia's formal response to submissions made under the Part 3a process more photomontages will be prepared to allow for a more rigid assessment of the proposal. In conjunction with this further consultation will occur with the residents of Black Springs, prior to the response being finalised to the Department of Planning.

Consultants to Wind Corporation, Energreen Wind have also made it clear to the residents that any further requests for information or personal consultations would be accommodated and made available at the earliest possible convenience for both parties.

Black Springs Wind Farm

Energy Calculation

Document Status: FINAL-REV C
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Author: _____
Bernhard Voll

Energreen Wind Pty. Ltd. ABN 900 9946 0518
57 Carlotta Street
Greenwich, NSW 2065
Tel: 02 9438 3725 Fax: 02 9439 8657

1 Spatial Wind Speed Distribution

The wind speed distribution (at hub height) across the site is shown in **Figure 1-1.** This wind climate has been calculated using the state-of-the-art wind analysis software WAsP[1] which is used by many wind farm developers, government institutions and universities to analyse wind data measured by wind monitoring towers and calculate wind speeds for larger areas.

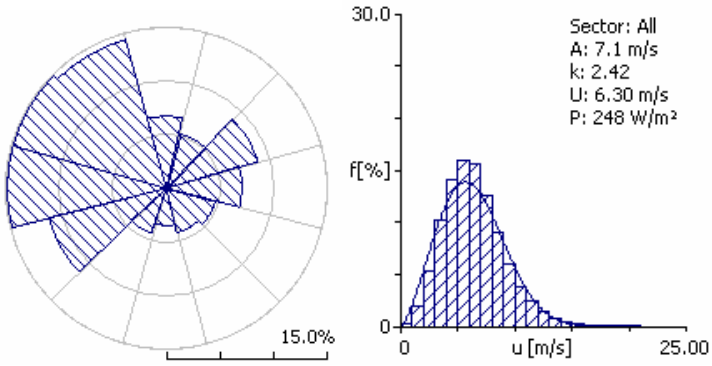

Figure 1-1: Wind Climate at Wind Monitoring Tower[2] (note: wind speed at measurement height)

The data calculated by WasP was then loaded into the Windfarmer™ software, anotrher state-of-the-art software program to analyse wind farms and optimise energy production with respect to a large number of parameters. This software has been developed by Garrad Hassan, a leading consultant in this field. **Figure 1-2** shows the wind speed map from the Windfarmer™ software.

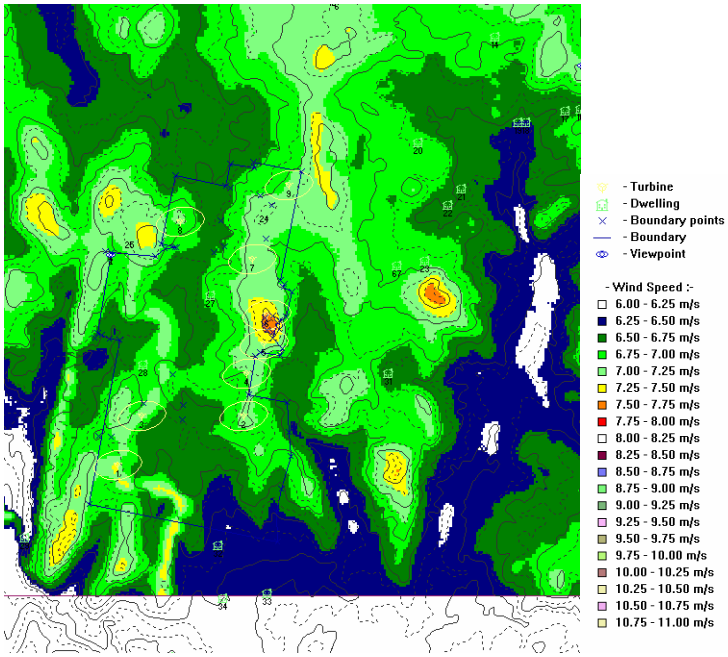

Figure 1-2: Wind Speed Map

[1] WasP = Wind Atlas Analysis and Application Program
[2] U = average wind speed in m/s, A = Weibull scale parameter in m/s, k = Weibull shape parameter, P = Wind Energy Content

2 Calculation principle

In principle all energy calculations for wind farms calculate the energy produced by a wind turbine using the wind speed distribution curve and the power curve for the individual turbine. **Figure 2-1** shows the power curve for the Suzlon S88 turbine and **Figure 2-2** shows the wind speed distribution.

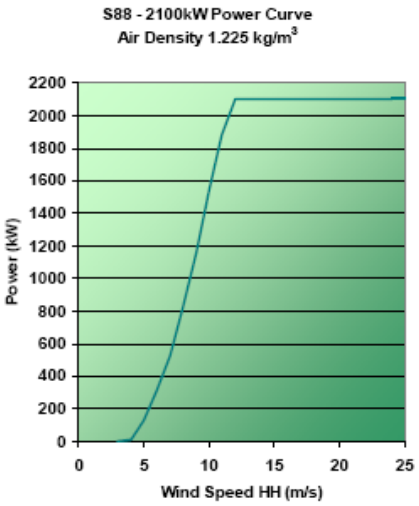

Figure 2-1: Suzlon S88 Power Curve

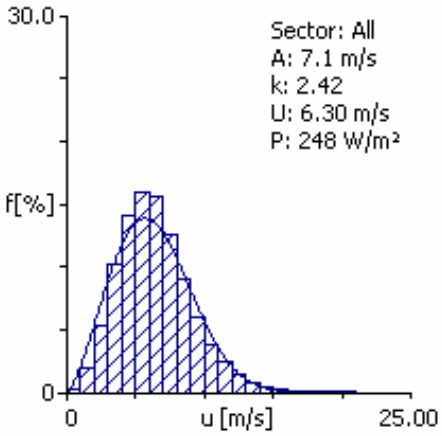

Figure 2-2: Wind Climate at Black Springs (note: wind speed at measurement height)

To arrive at the annual energy generation the percentage of a specific wind speed is used and multiplied with the power generation of the individual turbine at this specific wind speed.

Example:

- 10m/s wind speed occurs at 8.1% of time
- Wind Turbine generates 1,540kW at 10m/s

- Energy generated for 10m/s:
  E_{10} = 8.1% * 1,540kWw * 8,760h = 1,092,722.4 kWh = 1.093 GWh

This calculation is done by the Windfarmer™ software individually for all wind directions and wind speed sectors across the wind farm taking into account topographic effects, losses caused by turbulence and other turbines, electrical losses and turbine availability.

3 Energy Calculation

Once the turbines were correctly positioned and optimised with respect to noise, shadow flicker and visual impact the potential energy output of the wind farm was calculated taking into account the topography, air density, turbulences caused by any obstacles on site and the wake effect which represents the turbulences caused by turbines when the wind passes the rotor. The results of this analysis are shown below.

Ideal energy production	**52.9**	**GWh/yr**
Topographic efficiency	97	%
Array efficiency	96.1	%
Electrical efficiency	97	%
Availability	97	%
Estimated annual net energy production	**46.42**	**GWh/yr[3]**
Estimated capacity factor	28	%

The capacity factor shows the average output of the wind farm over the year compared to it's rated capacity. The calculation is shown below:

Estimated annual net energy production:	E_{net} = 46.42 GWh
Rated annual energy production	E_{max} = 18.9MW * 8,760h = 165,564 MWh = 165.56 GWh
Capacity Factor	C = E_{net} / E_{max} = 46.42/165.56 = 0.28 = 28%

The sophisticated WindFarmer™ software is able to calculate the capacity factor using the wind speed measurements taken over the last two years at the site and combining these measurements with the turbine locations.

[3] Estimated generation slightly lower than predicted due to change of location for turbine 04

Refuting Fallacies about Wind power

Dr Mark Diesendorf
Institute of Environmental Studies
University of New South Wales
27 August 2006

The following fallacies and misleading claims about wind power are being disseminated by the coal and nuclear industries and by NIMBY groups. Recently, some of them have even been repeated by Federal Government Ministers. More detailed refutations of some of the fallacies can be found in a 5-volume report by the European Wind Energy Association[1] and the fact sheets and associated background papers by the Australian Wind Energy Association[2].

Fallacy: "Wind power is one of the most environmentally damaging sources of electricity.

To the contrary, wind power has one of the lowest environmental impacts of all electricity sources. Only photovoltaics, based on either thin films or Sliver cells could possibly compete. By almost any criterion, coal is by far the worst. The reasons why wind power has very low environmental impacts are:

- It is usually installed on agricultural land that was cleared previously.
- It occupies less land area per kilowatt-hour (kWh) of electricity generated than any other energy conversion system, apart from rooftop or building-integrated solar energy, and is compatible with grazing and almost all crops (see below).
- It generates the energy used in its construction in 3-7 months of operation, yet its operational lifetime is at least 20 years[3,4].
- Therefore greenhouse gas emissions and air pollution produced by its construction are tiny and are declining with increasing size and efficiency of its wind turbines. There are no emissions or pollution produced by its operation, apart from noise over a limited range (see below).
- In substituting for coal power (see below) in mainland Australia, wind power produces a net decrease in greenhouse gas emissions and air pollution, and therefore a net increase in biodiversity.

To assess the biodiversity impacts of coal versus wind power properly, both global and local impacts must be taken into account. Global climate change resulting from the enhanced greenhouse effect is predicted to wipe out many species of animals and plants. Australian ecosystems are some of the most vulnerable to climate change. In Australia the biggest single source of greenhouse gas emissions is coal-fired power stations. By substituting for coal and other fossil-fuel power stations, wind power reduces carbon dioxide emissions and therefore saves global biodiversity.

To reduce *local* biodiversity impacts of wind farms, planning guidelines for the siting of wind developments have been put into place by the Federal, State and Local governments. Proposed wind developments must receive Federal planning approval under the Environment Protection and Biodiversity Conservation Act and also under any local regulator. These measures address the avoidance of principal bird migration routes and protection of wetlands and other specific areas of environmental importance and sensitivity.

Some of these points are expanded below.

Fallacy: "Bird kills are a common serious problem."

The main human-induced threats to birds are habitat destruction, pet cats, buildings, motor vehicles and powerlines. Only two wind farms out of thousands around the world have been a serious problem for birds, Altamont Pass in California and La Tarifa[5] on the southern tip of Spain. In the USA typical bird death rates are 2 per turbine per year, and some European studies find about one-tenth of this[6].

Australia has only limited experience with wind farms So far studies reveal an impact level even lower than predicted on the basis of Northern Hemisphere experience, and lower too than levels approved by planning authorities prior to wind farm construction. This may be because Australia's geography and bird ecology differs from that of the Northern Hemisphere: we do not experience the same concentrations of migrating birds – in particular, we lack the large numbers of night-migrating songbirds[7].

With modern wind turbines and careful siting, both bird and bat kills are rare. In comparison, on a single foggy night, about 3,000 birds were killed when they collided with the chimneys of a thermal power station in Florida, USA[8].

Fallacy: "Noise is a common problem."

Modern wind turbines are much quieter than people have been led to believe. A normal conversation can be held at the foot of a wind turbine going at maximum speed, without raising one's voice. The main sound is a 'swoosh' as each blade passes in front of the tower. A listener's perception of the sound depends on the level of background noise and declines with distance from the source. As wind speed increases, both the wind turbine noise and background noise (from wind passing through vegetation) increase as well, and the background tends to mask the wind turbine noise.

Levels of sound received by the human ear are usually measured in decibels, denoted dBA, where the 'A' adjusts for the response of the ear. Decibels are a logarithmic scale, which means that a doubling of perceived noise is equivalent to an increase of 10 dBA. Table 1 lists some indicative noise levels perceived by the normal human ear at various distances from sources.

Table 1: Indicative perceived noise levels from various sources[9]

Source or activity	**Noise level** (dBA)
Threshold of pain	140
Jet aircraft at 250 m	105
Pneumatic drill at 7 m	95
City traffic	90
Truck at 50 km/hr at 100 m	65
Conversation or busy general office	60
Car at 65 km/hr at 100 m	55
Busy road at 5 km	35-45
Wind turbine at 350 m	35-45
Quiet bedroom	30
Rural night-time background	20-40

Noise is rarely a problem beyond a distance of 400 m and yet very few dwellings in Australia are within 400 m of a large wind turbine. Personally, I recommend a set-back of at least 500 m from a residence. Licence conditions for wind farms should, and mostly do, set objective, measurable noise limits. On the rare occasions where these limits are surpassed, e.g. resulting from a faulty turbine or sound propagation resulting from peculiar topography, affected residents can have the problem fixed or the offending turbine shut down

Fallacy: "To substitute for one 1000 MW coal-fired power station, wind power would need vast areas of land." An specific example from Foreign Minister, Alexander Downer is: "it has been estimated that you would need a wind farm occupying 3200 square kilometres to produce the equivalent energy of a medium-sized power station."[10]

Wind farms are highly compatible with agricultural and pastoral land. While they span approximately 25 ha per megawatt (MW) of installed capacity, only about 1% to 3% of that land (0.25-0.75 ha/MW) is occupied by their towers and access roads, while 97% to 99% of the land can continue to be used for crops or grazing. For comparison, a 1000 MW fossil-fuelled power station has an average power output of about 850 MW. To substitute for this, about 2600 MW of wind power capacity would have to be installed, spanning 65,000 ha (650 square km), but only occupying physically 650-1950 ha (6.5-19.5 square km). An open cut coal mine to serve the coal-fired power station could occupy 100 km^2, which is 10,000 ha.

Fallacy: "Wind farms don't work."

If this myth were true, wind farm developers would go bankrupt, because they are paid for generating electricity, not just for erecting wind turbines.

Fallacy : "Wind turbines are inefficient."

Large wind turbines convert into electricity about 45% of the wind passing through the area swept out by the blades[11]. For comparison modern coal-fired power stations only convert into electricity about 35% of the energy stored in the coal.

The disseminators of the fallacy appear to believe that wind turbines are 'inefficient' because they have lower capacity factors than conventional base-load power stations. (The capacity factor is average power output divided by rated power, expressed as a percentage.) Capacity factor is not a good measure of efficiency of performance, because it depends on the operational strategy of the whole electricity generating system. For instance, conventional peak-load plants have much lower capacity factors (2-10%) than wind farms (typically 30%, with a range 20-40%), but they are not labelled as 'inefficient'. Snowy Hydro has a typical capacity factor of around 17%.

Misleading claim: "Wind farms are subsidised."

This claim is true but misleading, because coal-fired electricity receives much greater *de facto* subsidies through the refusal of many governments to include the costs of coal's massive environmental and health damage in the price of coal-fired electricity. Coal also receives huge direct economic subsidies in several countries.

Incidentally, nuclear power in the UK and USA is generally more expensive than wind power and receives much bigger subsidies. Cumulative subsidies to nuclear power in the USA have been estimated at about US$80 billion. In the UK subsidies to nuclear power were over £1 billion per year in the 1990s;

in addition the cost of decommissioning existing UK nuclear power stations has been estimated by a Parliamentary Committee in 2006 at £90 billion.

Fallacy: Wind power is expensive.

Wind power at 7.5-8.5 c/kWh in Australia is the least expensive of all the proposed greenhouse friendly sources of electricity. Dirty coal is artificially cheap (3.5-4.0 c/kWh in eastern Australia; 5.5-6.0 c/kWh in W.A.), but genuine environmentalists oppose all new dirty coal-fired power stations. The price of electricity from base-load natural gas power stations is typically 4.5-5.0 c/kWh, but it still has half the CO_2 emissions of coal and gas reserves in eastern Australia are very limited and are not sufficient for substituting for much coal. Projected prices of so-called 'clean coal' (i.e. coal power with CO_2 capture and burial) and nuclear power start at about 9 c/kWh. Neither 'clean coal' nor nuclear power could be installed in the near future in Australia. Indeed, 'clean coal' may not be commercially available for 20 years or more. Australia has a large potential for hot-rock geothermal, but its cost is uncertain and it is unlikely to be ready for commercial operation for 12-15 years.

Fallacy: "To maintain a steady state of voltage and frequency requires much additional expense."

New types of large wind generators, that are already coming on line, with variable speed drives and power electronics, can control voltage and frequency *locally* at no extra cost. Furthermore, sudden changes in wind speed, or a sudden shut-down or start up of large amounts of wind power capacity, can be ameliorated by installing wind farms separated by large distances in different wind regimes, and by using computer control to stagger start-ups and shut-downs of individual wind turbines in a wind farm.

Fallacy: "Efficient energy use is sufficient to reduce greenhouse gas emissions."

Efficient energy use is certainly necessary and plays a vital role in the scenario study, *A Clean Energy Future for Australia*[12]. In that study it was found that cost-effective efficient energy use could just balance the growth in CO_2 emissions resulting from economic and population growth, but is not sufficient to achieve the large greenhouse gas reductions of 60% or more that are needed to protect the Earth's climate. Clean energy supply is also essential.

A variant of the above fallacy is:

Fallacy: "Since the rate of growth of electricity demand is higher than the rate of growth of renewable energy supply in some States, they should stop building renewable energy and focus their efforts on efficient energy use and demand reduction."

This fallacious recommendation assumes incorrectly that we have to choose between the implementation of efficient energy use and demand reduction on one hand and renewable energy on the other. In reality, the two courses of action are complementary, requiring different strategies, and both must be implemented simultaneously for effective reduction of CO_2 emissions.

Lower cost renewable energy technologies (wind and bioenergy) need an expanded Mandatory Renewable Energy Target (MRET)[13] and some form of carbon pricing (either a carbon tax or emissions trading scheme) in order to compete with dirty coal. With these policies we can build up manufacturing and market share. High-cost renewable energy technologies (e.g. direct solar) need increased funding for research, development and demonstration, and a temporary feed-in tariff for increasing market share.

Holding back renewable energy will not assist efficient energy use at all, because the latter does not need additional funding (although it will benefit slightly from carbon pricing). Efficient energy use already offers a huge range of cost-effective measures that are currently held back from widespread dissemination by market failures, not by price. Therefore, efficient energy use needs regulations and standards by State and Federal Governments to increase the energy efficiency of buildings (existing as well as new), appliances, equipment and industrial processes. Demand reduction also needs policies to stop the construction of new dirty coal-fired power stations.

Fallacy: "Solar electricity could replace wind power."

Not yet. Although solar electricity has huge potential in Australia, the generation cost of grid-connected solar power (around 40-50 c/kWh) is currently about 5 to 7 times that of wind power and more than 10 times that of coal power in eastern Australia. However, the gap between the cost of residential rooftop solar power and retail electricity from the grid is smaller, a factor of 3 to 4. Solar electricity will be able to play a greater role when time-of-day electricity rates and smart meters are introduced and its price is brought down by R & D, leading to improved technology, and increased market share.

Solar electricity can make a large contribution in low latitudes (e.g. Qld, NT and northern W.A.) and wind power at higher latitudes (e.g. Tas., southern NSW & southern coasts of Vic., S.A. and W.A). Thus the two renewable energy sources are complementary in a geographic sense.

Claim: "Wind farms are ugly. They should be located in valleys or industrial zones where they cannot be seen from the distance."

Wind turbines must be located at sites that are exposed to the wind, since wind power increases with the cube of the wind speed[14]. Strong and consistent winds are rarely found in valleys. In industrial zones, other buildings slow the wind, making these zones unsuitable for wind power. By its very nature wind power has a visual impact, which most people accept and a small minority dislikes. To resolve these differences, community consultation on individual wind farm proposals and State planning processes with clear guidelines are needed. Several public opinion surveys have found that the majority of respondents who originally opposed a wind farm in their district find them acceptable several years after their installation. Many respondents say that the alleged environmental impacts, noise and bird kills, are not a problem, despite initial fears promoted by NIMBY groups.

Fallacy: "Since wind power is an intermittent source, it cannot replace coal-fired power unless it has expensive, dedicated, long-term storage."
A variant is: "Wind farms don't reduce CO_2 emissions, because coal-fired power stations have to be kept running to back up the fluctuations in wind".

Both these statements are wrong and have been answered in more detail in a separate article. The short answer is:

With or without wind power, there is no such thing as a perfectly reliable power station or electricity generating system. Electricity grids are already designed to handle variability in both demand and supply. To do this they have different types of power station (base-load, intermediate-load and peak-load) and reserve power stations. Wind power adds a third source of variability that can be integrated without major technical difficulties into such an already variable system. The total wind power generated by several dispersed wind farms varies smoothly and therefore cannot be described accurately as 'intermittent'. As the penetration of wind power increases, so do the additional costs of reserve plant and fuel used for

balancing wind power variations. When wind power supplies up to 20% of electricity generation, these additional costs are still relatively small[15,16,17,18].

Of course, to completely replace a 1000 MW coal-fired power station, either by retiring an existing station or deferring a new one, sufficient wind power capacity has to be installed (2600 to 2700 MW). Opponents of wind power hypocritically claim that there is insufficient wind power to replace a coal-fired power station, while opposing the construction of wind farms.

Endnotes

[1] European Wind Energy Association 2003, *Wind Energy: The Facts*. Vols 1-5. www.ewea.org/index.php?id=91 (accessed 3/7/2006).
[2] www.auswea.com.au/WIDP/factsheets.htm
[3] E.g. Danish Wind Industry Association 1997, *The Energy Balance of Wind Turbines*, www.windpower.org
[4] Energy balances calculated by Vestas, the world's largest manufacturer of wind turbines, can be accessed at www.vestas.com/uk/environment/2005_rev/energybalance.asp (accssed 4/1/06).
[5] This wind farm, situated on the southern tip of Spain opposite Gibralter, is in the middle of one of the main bird migration routes between Europe and North Africa.
[6] European Wind Energy Association 2003, *Wind Energy: The Facts*. Vol. 5: Environment, pp.182-184, www.ewea.org/fileadmin/ewea_documents/documents/publications/WETF/Facts_Volume_4.pdf
[7] Australian Wind Energy Association, *Wind farms and Bird and Bat Impacts*. www.auswea.com.au/WIDP/assets/8Bird&BatImpact.pdf
[8] Maehr DS, Spratt AG and Voigts DK 1983, Bird casualties at a central Florida power plant, *Florida Field Naturalist* 11(3): 45-49. (http://futureenergy.org/FloridaFieldNatural.pdf, accessed 5/1/2005)
[9] Australian Wind Energy Association 2004, *The Noise Emissions associated with Wind Farms in Australia*. Background paper. www.auswea.com.au/WIDP/assets/6Noise.pdf (accessed 4/7/2006).
[10] Downer, A 2006, cited in *Sydney Morning Herald*, 24 May, p.1.
[11] The maximum theoretical extraction of wind power is 59%.
[12] Saddler H, Diesendorf M and Denniss R 2004, *A Clean Energy Future for Australia*. Clean Energy Future Group, Sydney and Melbourne. wwf.org.au/ourwork/climatechange/publications/
[13] Initially the level of a carbon tax or the price of tradable emissions permits is likely to be too low to assist renewable energy sources to compete with dirty coal, although it would assist natural gas to compete with coal. Hence a MRET is needed as well and must be kept until the carbon price makes it redundant.
[14] E.g. doubling the wind speed gives $2^3 = 8$ times the wind power.
[15] ILEX, 2002, *Quantifying the System Costs of Additional Renewables*. ILEX/UMIST, www.dti.gov.uk/energy/developep/080scar_report_v2_0.pdf/.
[16] Carbon Trust and DTI, 2004, *Renewable Networks Impact Study: Annex 1 – Capacity Mapping and Market Scenarios for 2010 and 2020.* www.carbontrust.co.uk/Publications/publicationdetail.htm?productid=CT-2004-03 (accessed 6/7/06).
[17] Dale, L., Milborrow, D., Slark, R. and Strbac, G., 2004, Total cost estimates for large-scale wind scenarios in UK. *Energy Policy* **32**, 1949-1956.
[18] UKERC 2006, *The Costs and Impacts of Intermittency*. UK Energy Research Centre, www.ukerc.ac.uk/content/view/258/852 (accessed 27/8/2006).

Local and Regional Economies Benefit

Interstate, intrastate & international visitors spend money on:

Accommodation
Food & beverages
Attractions
Tours
Souvenirs
Entertainment
Shopping
Transport
Personal care services
Fuel

The tourism industry pays for:

State taxes
Local government rates & charges
Services (water, gas, electricity)
Wages & salaries
Food / beverages
Entertainment
Agent's commissions
Advertising / promotion
Legal & professional services
Purchase of stock
Transport & freight
Administrative & general expenses
Repairs & maintenance
Capital asset replacements
Rental of premises
Licenses
Insurance
Laundry & cleaning Services
Printing & publishing
Internet & e-commerce

Community recipients include:

Accountants
Appliance stores
Architects
Auto repairs
Bakers
Bait & tackle suppliers
Builders & cabinet makers
Butchers
Carpenters
Charities
Chemists
Cinemas
Cleaners
Clothing stores
Clubs
Cottage industry
Cultural organisations
Department stores
Dry cleaners & laundries
Engineers
Farmers
Fast food outlets
Financiers
Fishermen
Furniture stores
Gardeners
Gift shops
Golf courses
Government services
Hairdressers
Hiring services
Hotels & liquor outlets
Importers
Insurance agencies
Landlords
Machinery manufacturers
Marine services
Medical services
Motor vehicle dealers
Newsagencies
Office equipment suppliers
Panel Beaters & spray painters
Petrol stations
Photographic services
Plumbers
Primary producers
Printers & publishers
Real estate agents & developers
Restaurants
Sporting events
Sporting equipment
Supermarkets
Travel agents
Taxi / hire car services
Video hire services
Wholesalers . . . . . .
and hundreds of other businesses

SOURCE: ADAPTED FROM WORLD TOURISM ORGANISATION PUBLICATION