MID MURRAY COUNCIL DEVELOPMENT ASSESSMENT PANEL
THIRD PARTY REPRESENTATIONS RECEIVED
BOOK 3

Representation No.	Name
48	Tracey Hopkins
49	Sally Gethin-Jones & Harry Clarkson
50	Danielle & Robert Thomas
51	Tim & Janet Kelly
52	Pam Kelly
53	Peter J Royal
54	Peter Graetz
55	Pam Graetz
56	Gillon McLachlan
57	Dr Caroline Crawford
58	Ken & Robin Prokopec
59	Tanya Martin
60	David Jaunay
61	Malcolm Linke
62	Robert Pollitt
63	Barbara Gray
64	Josephine Henderson
65	David Rochow
66	Michael & Teresa Saegenschnitter
67	Rachel Kuhn
68	Shane Zakelj
69	Merle Clarke
70	Steven Kuhn
71	Catherine Johns
72	Gianna Bau
73	Lorna Gillies
74	Jeffery Gillies
75	CK Johnson
76	JM McGorman & McGorman Family Pty Ltd
77	McGorman Holding Pty Ltd
78	Hiedi Smith
79	Amanda Vance
80	Ian Fox

LTP/15/357

48

Dawn Stewart

From: Nelson, Tracey (AGD) <Tracey.Nelson@sa.gov.au>
Sent: Wednesday, 20 May 2015 3:52 PM
To: Dawn Stewart
Subject: Submission Document
Attachments: palmer.hopkins.pdf

Hi Dawn

I would be most grateful if you could quickly scan your eye over this to ensure it is sufficient to preserve my position.

As I said earlier today, I now calculate that I have until the 3rd June at 5.00 pm, if in person or by mail to respond and until midnight if by email. I base this calculation on the correspondence dated 12th May 2015 received from the Mid Murray Council in regards to potential administrative oversights in various notification commitments.

In the correspondence I was invited to nominate an extension date – (suggested one to two weeks).

I respectfully nominate the 3rd June 2015. Obviously if I have finalised my response to the Application it will be submitted prior to that date.

I would be grateful if you could confirm that the attached document is sufficient.

Kind Regards

Tracey Nelson | Solicitor/Prosecutor
Office of the Director of Public Prosecutions

** *Please note my new email address below & amend your records if necessary.*

GPO Box 464, Adelaide SA 5001, DX: 336
☎(08) 84633494 Fax: (08) 8207 1799
New email address – tracey.nelson@sa.gov.au

From Tuesday 28 April 2015, the @agd.sa.gov.au email style is changing to comply with the mandatory requirement for 'One Government, One Email'.

DEVELOPMENT ACT, 1993

REPRESENTATION ON APPLICATION
CATEGORY 3

Development Number 711/072/14

My Name TRACEY Hopkins My Telephone Number 0439802598

My Postal Address 37 Adelaide - Mannum Road
Palmer SA (P.O Box 37 Palmer) Postcode 5237

This representation is in relation to the application by: *Trustpower Australia Holdings Pty Ltd*

for consent to establish the *Palmer Wind Farm*

The address of my affected property is 37 Adelaide - Mannum Rd
Palmer SA 5237

The specific aspects of the application to which I make comments on are:

Please See Attached :

My concerns would be overcome by:

Refusal to grant the Development Application to Trustpower Aust Holdings PTY LTD for the Palmer Wind Farm

☐ I do not wish to be heard by the Development Assessment Panel

☑ I do wish to be heard personally by the Development Assessment Panel

☑ I will represent myself
or

☐ I will be represented by _____

Date 20/5/15 Signed Tracy Hopkins

In principle I accept that the assessment can only occur against the provisions of the Development Plan. To this end I intend to comment on the following:

- Finalised layout and community consultation;
- Attitude to variations to the development parameters (any deviations);
- Form of public consultation on final selection of turbines;
- Constructions Hours;
- Operation of Rain Shadow Effect;
- Consideration and effect of parallel community consultation and agency consultation and any subsequent changes;
- The impact of Group C turbines on the Harrison's Gorge area;
- Site restoration timeframes;
- CEMP's and OMP's to be made available to the community and ongoing compliance to be transparent;
- Inaccuracy in identification of ALL dwellings within the proposed development zone;
- Costs to remediate impaired communication by phone, wifi and access to T V and radio;

Specific aspects of the application and their adherence to the Council wide Objective to which I seek to make comment are:

- Environmental issues- native vegetation, fauna, noise pollution;
- Hazards- shadow flicker and debris;
- Construction issues – noise, dust, access, hours of operation, siting of work stations;
- Landscape and Visual amenity;
- Loss of property values;
- Nature of Community Consultation;
- Good Neighbour Deed;
- Ground Water Use;

Tracey Hopkins 20/5/15

Dawn Stewart

From: Dawn Stewart
Sent: Wednesday, 20 May 2015 4:29 PM
To: 'Nelson, Tracey (AGD)'
Subject: RE: Submission Document

Hi Tracey,
I have had your submission checked and it has been accepted. It would be appreciated if you could provide the elaborated submission as soon as possible prior to 3rd June 2015, this being the cut off date.

Kind Regards
Dawn Stewart
Grants Funding Coordinator/Senior Administration Officer
Development & Environmental Services
Ph 8564 6020
Fx 8569 1931
Web www.mid-murray.sa.gov.au

From: Nelson, Tracey (AGD) [mailto:Tracey.Nelson@sa.gov.au]
Sent: Wednesday, 20 May 2015 3:52 PM
To: Dawn Stewart
Subject: Submission Document

Hi Dawn

I would be most grateful if you could quickly scan your eye over this to ensure it is sufficient to preserve my position.

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I would be grateful if you could confirm that the attached document is sufficient.

Kind Regards

Tracey Nelson | Solicitor/Prosecutor
Office of the Director of Public Prosecutions

IEMAIL20156024
Original IET20156352

Melissa Marschall

From: Nelson, Tracey (AGD) <Tracey.Nelson@sa.gov.au>
Sent: Wednesday, 3 June 2015 2:22 PM
To: PostBox
Subject: IEMAIL20156024 - 711/072/14 - FW: Response to Submission
Attachments: Mid Murray Countil Submission. Hopkins.docx; Hopkins Montage.pdf; Open Letter to the Mid Murray Council.docx

Please find attached email.

Tracey Nelson | Solicitor
Office of the Director of Public Prosecutions

** *Please note my new email address below & amend your records if necessary.*

✉ GPO Box 464, Adelaide SA 5001, DX: 336
☎(08) 84633492 Fax: (08) 8207 1799
New email address – tracey.nelson@sa.gov.au

From Tuesday 28 April 2015, the @agd.sa.gov.au email style is changing to comply with the mandatory requirement for 'One Government, One Email'.

From: Nelson, Tracey (AGD)
Sent: Wednesday, 3 June 2015 2:13 PM
To: 'Dawn Stewart'
Subject: Response to Submission

Good afternoon Dawn

I assume that my earlier cover sheet advising council of my intentions is still valid.

Please find attached:

Submission to the CDAP with regards to the Trustpower Pty Ltd, application .
Document- Letter;
Document – Montage.

Many thanks

Tracey Nelson | Solicitor
Office of the Director of Public Prosecutions

** *Please note my new email address below & amend your records if necessary.*

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REPRESENTATION FOR DA711/072/14 – Palmer Wind Farm

Representor: Tracey Hopkins (0439802598)

Affected Residence: 37 Adelaide – Mannum Road, Palmer (C123).

Attention: Council Development Assessment Panel

I respectfully ask that the Presiding Member and the Council Development Assessment Panel receive this submission and give its contents due consideration.

I have previously written to Council (made attention Russel Peate) asking that an open letter from community members be tabled at a council meeting and made available to **all** member of Council. Mr Peate responded to that request and informed me that they correct mechanism was for the letter to go to the CDAP. The letter was not tabled at Council.

Please find attached letter.[1] I am still of the view that the correct recipients were the Council.

Attitude to the Application

As an affected non-stakeholder resident, with a property situation centrally to both Areas B and C I am strongly opposed to Trustpowers Pty Ltd's ("TP") application and any conceptual proposal for a windfarm in the Palmer/Sanderston regions.

Our property is situated on Randell Road (Adelaide Road), the entrance being directly opposite the local mascot *"Bear Rock"*. A winding and steep road leads to our residence which is located atop Palmer Hill with 180 degree vista overlooking Harrison Gorge and down to Murray Bridge.

The attached Montage commissioned by WAX design will provide a visual demonstration of the profound and deleterious impact which this proposed development will have on our visual amenity (being only one of several deleterious impacts). [2]

I understand that the "TP" application is to be assessed by the Mid Murray Council Development Assessment Panel ("CDAP") in accord with the *Development Act, 1993* and the policies contained in the Mid Murray Development Plan. I submit that the application does not comply with a number of the Council wide objectives and Principles of Development Control ("PDC"s)

"TP" are seeking approval for the use of the nominated land for the installation of up to 114 wind turbines and other buildings and related structures needed for the purpose of generating electricity from wind and then transmitting this electricity to the national grid (including above ground and underground transmission cabling and a substation). This includes supporting infrastructure, buildings and structures (including access tracks, wind monitoring masts and management and monitoring

[1] Open letter to the Mid Murray Council

[2] See attachment 1.

facilities) that are necessary for the ongoing operation and maintenance of the development.

Up to 114 WTGs (with a maximum height to blade tip of 165m) and associated infrastructure to be generally in accordance with the indicative locations within the turbine corridors shown. Before the development starts, final layout plans showing exact locations of all infrastructure within the surveyed area will be prepared to the satisfaction of the Mid Murray Council.

Comment

The proposed development is not to exceed the "nature of development", ie – not more than 114 turbines of a maximum height of 165m and maximum 3.3 MW capacity (total maximum capacity up to and not exceeding 375 MW), etc. In the instance where there is deviations greater than approved from the nature of approved development, a completely new application will be required. Even in the instance of a very minor variation.

Given the current "corridor" effect and the continuing reference to the "iterative process" what scope will there be for the community to provide comment on the finalised layout plans of the turbines before all approvals are finalised and construction commences?

ANY variations or major works that deviate from the approved plans (if it is approved) will require a new application, assessment process and public consultation, and will not be assessed as a variation to the existing approval.

It appears that the maps misrepresent the number of affected residences. From review of all they maps fail to see that all non host landholders are accurately represented. This must be remedied to the satisfaction of the community.

I note in the attached correspondence by Mr Geoff Parsons that this issue is also discussed. Because the public consultation being carried out in concurrence with Agency consultation, if any changes are required by the Agencies, the application is to re-undergo the public notification process. The community must be able to understand what the changes are and what they mean.

Relevance of "WTG B 10"

A dwelling, located near WTG B10, will not be used for residential purposes by agreement with the land owner, unless the wind farm noise level at the dwelling is less than 45dB(A) and shadow flicker limits are within the prescribed guidelines unless a reasonable limit for increased shadow flicker is agreed with the landowner. This dwelling is labelled "R139" on the plans.

Comment

What is the relevance of this particular residence in respect of all other turbines? Is the relevance related to the substation?

If there is concern that this turbine may exceed the approved noise level at 45dB(A), what does this mean for other areas where the maximum dB is at 35 dB(A) is lower. That is, it is possible for this host (LIntern's) to agree to non-residency in perpetuity, but what about other land holders who cannot have the luxury of this.

Why have TP imposed such a condition? What do they think might occur if the noise levels exceed the agreed ad approved noise level at 45 dB(a)?

TP state they have been committed to developing this project in a manner that maximizes the benefits to the local, regional and national community. At the same time, TP has also been committed to eliminating or minimizing the impacts on the local community.
The Project concept presented in this development application report is the result of over 12 months of detailed work to develop a concept that avoids or minimises impacts. TP also state is now at a stage where the applicant is confident that it can be constructed subject to a detailed design that can comply with reasonable specific siting criteria (e.g. noise, heritage, native vegetation).

With the most recent research and developments in noise associated with Windfarms as well as possible associated health consequences, how committed are "TP" to avoiding or minimising impacts for affected residents?

There is a growing body of information and knowledge which ought to put not only windfarm developers on notice but also anybody who is complicit in the approval, development, construction or maintenance of windfarms.

Will "TP" decommission the turbines if the evidence is deemed incontrovertible?

Overview of Key Areas of Impact
The Development Plan Assessment analysis concluded that the proposed development is not **significantly** at variance with the Mid Murray Council Development Plan. In addition it identifies that the proposed Palmer Wind Farm **adequately** and appropriately addresses potential impacts, particularly those associated with noise, protection of flora and fauna, European and Aboriginal heritage and traffic movements in a manner sought by the Development Plan.

Impact Assessments

A range of impact issues were considered and assessed with specialist input. These included:

- Landscape and Visual Impact Assessment
- Flora and Fauna Assessment

- Noise Impact Assessment
- Cultural Heritage Site Assessment
- Traffic Impact Assessment
- Civil, Geology, Geotechnical and Hydrology Assessment
- Electromagnetic Interference Assessment
- Aeronautical, Aviation and Qualitative Risk Assessment and Obstacle Lighting Review
- Shadow Flicker and Blade Glint Assessment
- Economic Impact Assessment
- Fire and Bushfire Impact
- Health Impacts

Development Plan Assessment
An **"on balance"** assessment reviews all policies contained in the Development Plan. These policies are guidelines for achieving the desired planning outcomes rather than being strictly applied "rules".
Rarely does any project, of any scale, align with all the policies within a Development Plan. The key question is whether the proposal, on balance, achieves the land use planning outcomes sought by the policies in the Development Plan and minimises any potential impacts.
The planning staff of the Council will undertake their own Development Plan Assessment which will be provided to the Council Development Assessment Panel for their consideration and determination.

Comment

How is it possible for this statement to be adequate? To say that "on balance" that the application is compliant with the Development Plan. Given the enormous impact that this development will have on the whole community, if not all objectives are not consistent with the Mid Murray Development Plan, the outcomes are likely to be significant.

On this basis alone, the development should not be approved.

Key Areas

1. **Environmental damage: land, watercourses and ground water, native vegetation, fauna and noise pollution.**

The impact of the proposal is in conflict with council wide objective 29 and Principles of Development Control (PDCs) 39, 42, 43, 87, 92, 93, 163, 164, 168, 169, 170, 175, 176, 180, 185, 190, 192, 196, 197, 199, 215, 397, 398; rural zone objectives 6, 16, 17, 23 and rural zone PDCs 4, 6, 7, 12, 18; and hills policy area objectives 1, 2, 3 and hills policy area PDCs 1 and 4a.

Environment Protection and Biodiversity Conservation Act, 1999

The Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act) is a Commonwealth Act that can apply to projects that have the potential to have an impact on species or communities that are protected by the Act.
Under this Act, a project that results in an action that may have a significant impact on a matter of national environmental significance, or occurring on Commonwealth land, must prepare a referral under the EPBC Act. This assists the Commonwealth to decide whether the proposal is a controlled action and requires assessment and approval.

Comment

I note from the submission that a separate referral will be lodged under the EPBC Act and, if required, approval sought if deemed a controlled activity. I also note that there was discussion about the Peppermint Box Grassy Woodland. It appeared that there was insufficient of this species to warrant exclusion but I am not clear what referral lines have been followed by the Council with regards to protection of this species.

I also note that the Recovery Plan for the Peppermint Box Grassy Woodland of South Australia, 2012 incudes as its key threats:

- incompatible agricultural practices including cultivation, fertiliser application or detrimental grazing regimes;
- changes in the use and management of Peppermint Box Grassy Woodland remnants or adjoining areas;
- **clearance associated with new developments such as urban and peri-urban expansion, wind farms, mining, transport and other activities;**
- ongoing decline and degradation due to existing weed infestations, feral predators, past fragmentation and small patch size of remnants;
- impacts of recreational activities such as 4WD and trail bikes;
- inappropriate or altered fire management regimes; and
- ecological impacts of climate change. [3]

Comment

Has the Council referred the Development Application ("DA") to the Murray Darling Basin Natural Resource Management Board? ("MDBNRM")? If so, has the MDBNRM response been received by Council?

What is their attitude to allowing windfarm development in areas classified as housing critically endangered such as the Peppermint Box Grassy Woodland?

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[3] National Recovery Plan for the **Peppermint Box (*Eucalyptus odorata*) Grassy Woodland of South Australia** ecological community , 2012.

Threatened ecological communities
Two EPBC listed ecological communities were recorded within the project area. *Lomandra effuse* Tussock Grassland is a nationally threatened ecological community listed as critically endangered under the EPBC Act. Thirteen sites contained the grassland community: ten in Area A and three in Area C, two of which qualified as Threatened Ecological Community (Class B).

Lomandra effusa grasslands were mapped within proposed site access/underground transmission line locations. *Lomandra* grassland is considered a Priority 1 threatened plant community in SA.[4]
The examples of this community within the project area would respond to management but are not considered of sufficient quality to justify their inclusion in a Heritage Agreement.

Eucalyptus odorata (Peppermint Box) Woodland is a nationally threatened ecological community listed as critically endangered under the EPBC Act. Degraded patches of *Eucalyptus odorata* (Peppermint Box) Woodland were present within the turbine corridor in Area C. The vegetation community was present at six locations within Area C of which four sites, 1, 2, 4 and 5 qualified as Condition Class C areas. Condition Class C patches do not meet condition criteria to be considered part of the EPBC Act listed community, however could be rehabilitated to the listed ecological community.

As well as being nationally significant, *Eucalyptus odorata* (Peppermint Box) Woodland is considered a poorly conserved plant community within SA[5] and a regionally threatened plant community, with less than 1 % of the remaining areas in the SA Murray Darling Basin formally conserved.[6]
Woodland communities containing *E. odorata*, *E. porosa*, *E. leucoxylon* and *E.fasciculosa* are not well conserved and often occur as small, degraded and fragmented patches.

Due to their open nature, grassy woodlands are extensively grazed, and as a result they often a lack a native understorey layer and exhibit poor regeneration.[7] There is opportunity to manage woodland areas for conservation, e.g. through grazing management and formal protection of the larger, better condition patches through Heritage Agreements.

Comment

Is the Panel intending to pursue to position of the Peppermint Box Woodland?

Environmental Noise Guidelines.

PDC 397(a)(i) of the Mid Murray Development Plan;

[4] Neagle 1995.
[5] Ibid.
[6] Kahrimanis et al. 2001.
[7] Ibid.

- Site turbines so that noise levels from the wind farm comply with the SA EPA Wind Farms;

2013 results from the EPA: South Australia- Waterloo Windfarm Environmental and Noise Study SA EPA Guidelines[8], found:

"No evidence linking the noise from the wind farm to adverse impacts on residents" This broad-brush finding was heavily criticised by Professor Colin Hansen from the University of Adelaide. Professor Hansen conducted a parallel noise study at the same location, with very different results.

The current SA EPA wind turbine noise guidelines do not mandate measurement of infrasound and low frequency noise.

Comment

Given the lack of faith in the South Australian EPA guidelines and method of testing for noise, will TP agree to independent noise monitoring studies rather than those undertaken by the EPA?

What will the penalty be if TP fail to comply with the noise guidelines in South Australia? In such an instant, would they not be claiming the RET fraudulently.

I do not accept the basic tenets of noise guidelines as suggested by the applicant. I refer the CDAP to the most recent work of Stephen Cooper.[9] No doubt many of the other submissions make reference to this body of work. I will not go into further detail, but urge the Panel to review this work.

Wind turbines emit noise in a wide spectral band that includes low frequency and infrasound. These sound emissions are known from laboratory studies to cause ill effects in both animals and humans. The positioning of these turbines in clusters means there is a strong likelihood that there will be resonances between them which will work to exacerbate the sound. It is generally accepted that the noise is not only from mechanical sources but also from the pressure difference as each blade passes the tower. The noise that residents experience will be constant.

Comment

Is the panel considering obtaining any advise on the cluster effect, both in terms of this development as a standalone proposition and also in relation to the cumulative effect of both Palmer and Keyneton?

[8] EPA Waterloo

[9] Cape Bridgewater Windfarm Acoustic Study, 21 January 2015.

2. Community Impacts

The proposed renewable energy facility does not benefit the environment, evidenced by the conflicts cited above, does not benefit the community, as more residents lose financially and in terms of lifestyle than benefit as a result of lease payments or neighbour agreements, and does not benefit the state as the vast majority of money associated with the development flows either interstate or overseas, leaving only inflated power prices for South Australians. This is in conflict with council wide objectives 96, 97, 98; council wide PDCs 78, 92, 163, 168, 188, 396, PDC's 55,79,88,91,160,162,163,167,188,388; rural zone objectives 6 and 17; rural zone PDCs 4, 6, 7, 16 and 19 and hills policy area objectives 1 and 2;

2.a.Property Values

The effect on property values in the region is in conflict with council wide objectives 9, 25, 29, 98; council wide PDCs 55, 79, 88, 91, 160, 162, 163, 167, 188, 388, 398; rural zone objective 16 and PDC 19 and hills policy area objectives 1 and 2.

The application refers to *"many studies"* (2) by independent organisations around the world that have failed to find any correlation between wind turbines and declining property values.[10] This is an extraordinary statement firstly because of the paucity of research which is relied upon and the lack of any independent studies. Studies emanating from the Clean Energy Council could not be seen as *"independent"*.

Hudson Howells, go on to posit that some studies have found positive property value impacts associated with:

- Improved regional amenities and infrastructure including local roads, firefighting access roads, etc.
- Increased regional incomes, jobs and property demand.
- Additional rental income from hosting towers. **(host benefit only).**
- Provision of a drought-proofing income streams. **(host benefit only).**
- Provision of post-retirement income for farmers. **(host benefit only).**
- Improved biodiversity via less intensive farm activity. **(host benefit only).**
- Prevention of land subdivision and slowing down the process of productive
- agricultural land changing to rural residential uses in the short to medium term with
- the shift caused by the additional income generated from the wind farm making. **(host benefit only).**
- agricultural use more viable. **(host benefit only).**
- Erosion control and passive wind protection for stock from sub stations and turbine tower structures. **(host benefit only).**

[10] the Lawrence Berkeley Study, United States, States http://eetd.lbl.gov/ea/ems/reports/lbnl-2829e.pdf, reported in Wind Energy the Facts, Clean Energy Council, March 2013.

Comment

This list is incredibly misleading. These financial gains are just that, they do not inherently improve property values, all they do is boost the income for hosts. This aspect of the application is self-serving and misleading.

In the Family Court of Australia Federal Magistrate Kate Hughes has accepted that wind farms slash the value of surrounding properties, saying she found it *"hard to imagine"* any prospective buyer could ignore such a development. She ruled that a property would be worth 17% less if a 14 turbine facility were erected next door. For one part of the property she accepted a 33% fall in value was likely. This ruling followed an earlier decision by South Gippsland Shire Council to cut rates for one land owner on the basis his property would lose value because of an adjacent wind farm yet to be built. The resident had his land value reduced by 32%. **Still the Wind industry continue to deny this.**

In October 2013, a 33 page study was released by a Goulburn Real Estate consultant and registered valuer, Peter Reardon.[11] The Reardon Report identified detriments to property values to be in the range of between 33% and 60%. It is inconceivable that properties within close proximity to a windfarm will not reduce in value, in some instances becoming almost unsaleable.

Mr Reardon, was commissioned by a concerned farmer worried about the future impact on his property. He said the impact on land values from wind farms was a "no brainer" and the real issue should be about compensation to neighbours from wind farm operators.

2.b Good Neighbour Deed

Given the proximity of our property to a turbine we were contacted by TP in relation to the Good Neighbour Deed "Deed". This document was insulting and presumed that small amounts of cash would resolve our concerns. **THAT IS RUBBISH.** The document itself was also insulting and provided for very little ongoing control over our property. It effectively *"gagged"* any signatory from complaining about noise. The Deed was constructed such that a signatory could only complain if the noise levels exceeded the permitted levels. It is my submission that individuals can be adversely affected by *"so called"* compliant noise levels. In this situation there was no remedy for the affected signatory.

The Deed was mean spirited and devolved a range of legal rights from the land holder to TP. The Deed is non-transferable.

[11] (www.stockjournal.com.au/news/agriculture/property/general-news/wind-farms)

The Deed also assumed that non host landholders would be silenced if they were paid a small annuity. This is insulting and short sighted. My opposition to this development has **NOTHING** to do with money.

2.c Community Participation.

TP prides itself in fostering strong landholder and community relationships at all its projects, they state, with an impressive commitment to the communities where its projects are based. In New Zealand it has developed the 'Lend A Hand' foundation, which supports community groups and causes through funding, mentoring and the provision of goods and services. TP has implemented the same community support structure at its Snowtown Wind Farm in South Australia – which continues to be well received by the community.(according to TP).

It was not my experience that TP were interested in fostering positive relationships with the community.

With respect to dwellings on 'non-host' land, the project has been designed to:

- Maintain a 1km separation between turbines and dwellings in accordance with Council.
- There are a number of dwellings or buildings that are located in the vicinity of the project areas.
- Every effort has been made to identify all buildings that appear to be private residences.
- **However, it is acknowledged that the topography and limited access in this region generally has made confirmation difficult.**

Comment

I find it totally unacceptable that there are possibly some residences who are unaware of this application and what is being proposed.

How can the application be complete if there is the slightest possibility that some affected residences may not have been included in the public consultation? How can TP say that they have met all of their obligations to consult?

What level of community consultation is available after various planning approvals have been granted?

TP did not adhere to their own values when it came to community consultation. Examples include:

2.c(.i) Engage early

TP must be the first to inform about the project, its context, its risks and benefits and anything else that will potentially impact communities.

This did not occur. The first we knew about the project was on the ABC morning news in September 2013. We had no idea whatsoever that a windfarm was muted for the area.

Residents who knew of this project, admitted on specific inquiry that they had known since 2009-1010 that this was proposed. Ever since that point we have been on the back foot.

2.c.(ii) Be an effective communicator

Talk **with**, not **at**. Be inclusive in communication, consider others point of view. Use transparent, simple and straightforward communication. Do not go under the radar. Be aware who might be listening.

2.c.(iii) Behave Appropriately

Behave in line with TP values. Demonstrate empathy. Be sensitive and respectful and acknowledge community concerns.

Comment

I attended the two community consultation workshops which were extremely difficult. The facilitator (same for both) did not encourage any criticism from the audience. Discussion was shut down and not encouraged. I felt as if my views, concerns and fears were not taken into account. The presenters for each speciality area were on the face of it neutral and respectful. Representatives from TP were defensive and some smug. To hear such comments as *"it will happen because it is the law"* were not helpful. At points those of us considered disruptive were shadowed from table to table and made to feel unwelcome. The facilitator disallowed extensive discussion if it appeared that there would be argument about certain topics. The representatives from TP were defensive and repetitive, answering in platitudes and generalities.

Empathy was never demonstrated.

As far as communication goes, some email traffic went unanswered as did questions posited on the TP Facebook page.

This was a negative and trying experience.

It quickly became apparent that those members of the community who supported the development were treated quite differently to others of us.

While we found the visual representations largely misleading, the consultant from Wax Design was professional and respectful in his approach. The simulations provided nothing but a sense of inevitability and confirmed that if this development goes ahead, the impost to our lives will be enormous.

Comment

It was brought to my attention by another member of the community about the issue of the rain shadow effect. And that this will impact on the local area. The clustering of the proposed turbines (when turning) will result in the air temperature being warmer than elsewhere, such that it will reduce the amount of rain that falls in that area: by creating an artificial pocket of higher temperatures, hence less chance of rainfall occurring. This in effect, will reduce the rainfall of the Palmer area, which is already very marginal. It is generally suggested a 5% reduction in the total yearly rain fall. So Palmer would go from 425mm to about 397mm a year.

Concern about rain shadow effect was raised repeatedly at the community consultation phase and no proper answer was ever provided. It is also of note that it was not mentioned anywhere in the application.

I ask that specific rain-shadow information is provided as part of the application process as there is potential for this to severely affect the sustainability of the Palmer area.

3. Construction Phase

The damage and disruption during construction (dust, blasting, heavy vehicles) is in conflict with council wide objectives 16, 48, 50, 51, 53, 59, 64g; council wide PDCs 39, 43g, 95, 196, 197, 198, 388; hills policy area objectives 1 and 2 and PDCs 1 and 4a.

3.1 Traffic Impact Management

- Enter into a commercial Deed of Agreement with Council on any Council road upgrade and or ongoing maintenance contributions by Trustpower prior to construction commencement.

Comment

Have any of the recent upgrades to – Davenport Terrace, Mine Road, G Ayers Road (or similar close to Tungkillo) related to this proposed development?

I find it incredible to think that works on these roads has been done contemporaneous to consideration of this application. I note that works on some of these roads were undertaken on weekends and almost into evening.

SONUS Construction Noise and Vibration Management Plan

The construction of a wind farm comprises activities such as road construction, civil works, excavation and hardstand construction, electrical infrastructure works and turbine erection requiring processes such as heavy

vehicle movements, possible concrete batching, rock trenching, loaders, excavators, generators, cranes and possible blasting. These activities are similar to other construction projects in that they generally generate short term and transient noise;
In the case of a wind farm, the construction occurs at significant separation distances.
The separation distances will result in appreciable attenuation of the noise and vibration generated by the activity.

The requirements for the CNVMP are based on the general environmental duty of the *Environment Protection Act 1993* (the EP Act) and the tailored requirements of Part 6 Division 1 Clause 23 of the *Environment Protection (Noise) Policy 2007*.

The legislative requirements effectively allow construction to occur between 7am and 7pm from Monday to Saturday, subject to the site taking reasonable and practicable noise reduction measures, and provides an opportunity to conduct works outside of these hours if noise limits can be met or "if other grounds exist that the Authority……determines to be sufficient".

Comment

How will this capacity to extend the hours of operation on somewhat random grounds be managed?

The existing EPA requirements are already generous and facilitative of the development (To the detriment of residents). The ability for TP to work outside the approved hours, (which will already destroy the peace and amenity to non-host residents) is too broad and will not protect residents.

I understand that the construction phase will be directed by the EPA guidelines, but surely these were never intended for these types of developments? Residents living in the area will be subject to industrial noise, dust, blasting etc for 6 days per week, 12 hours a day and anywhere up to a number of years.

THIS IS NOT WHY WE MOVED TO PALMER.

"Noise and vibration from blasting activities may impact on nearby sensitive receptors including residential dwellings, structures and/or wildlife" Construction traffic and movement- "Haul traffic may cause noise and vibration nuisance or damage to residential and sensitive receptors travelling to and from the site"

Comment

Again, regardless of Industrial Turbines being placed on rural land, the impact to Rural Living and Settlement zoning do not fall within council guidelines.

All CEMPs and OMPs should be made readily available to the community at all times. The community must be actively updated and notified as any changes to them occur. It is desirable these documents have full disclosure to the general public to ensure the project and its owners are being held accountable for the life of the project. The auditing process and findings on these plans and procedures should also be made readily and routinely available to the public, such as noise complaints, etc. Therefore notification of on-going monitoring of these records should not be limited to "authorised personnel" only, but should also be publically published.

4. Landscape and Visual Assessment

The visual amenity of the region would be seriously compromised. Council wide objectives 15, 25, 26, 50, 54; council wide PDCs 55, 78, 79, 155, 158, 159, 160, 170, 173, 190, 397; rural zone objective 6; rural zone PDCs 18, 19; hills policy area objectives 1, 2, 3; hills policy area PDCs 1, 3, 4a. are not complied wit

DESCRIPTION OF LOCALITY

Throughout the locality of the proposed development site are a number of specific and in some cases unique landscape features. For the purposes of the landscape character assessment these features have been described separately from the general description contained within the assessment of the landscape character units.

Some locales proposed for wind turbines are particular visually important and unique, making the erection of turbines offensive. One of these is Harrison Gorge.

Harrison Gorge (southeast) which would accommodate Area C.
Harrison Gorge forms a significant natural landscape feature that is part of the Eastern Mount Lofty Ranges escarpment. The Gorge is formed by a number of deeply incised water courses that run east/west across the underlying topography of the escarpment.

Reference is made in the application to two different judgements.[12] [13]
And how a wind farm development can create disparate views that impact on the rural character:

"The insertion of wind turbines into a non-industrial landscape is perceived by many as a radical change which confronts their present reality. However those perceptions come in differing hues. To residents, such as members of Taralga Landscape Guardians Inc (the Guardians), the change is stark and

[12] *Taralga Landscape Guardians Inc v Minister for Planning and Anor ((2007) 161 LGERA 1, at para 1*
[13] *ERDC No 106 of 2010 R Paltridge and Anor v District Council of Grant (June 2011 at para 25).*

negative. It would represent a blight and the confrontation is with their enjoyment of their rural setting.

To others, however, the change is positive. It would represent an opportunity to shift from the societal dependence on high emission fuels to renewable energy sources. For them, the confrontation is beneficial - being one much needed step in policy settings confronting carbon emissions and global warming."

Comment

I find reference to these decisions as misleading in the present context. It does not support the proposition that there are differing views and in the matter of *Paltridge*, these observations were obiter. It is historical fact and of extreme relevance to South Australia that the Court found very differently.

[on the issue of visual amenity we are of the opinion that the introduction of 46 turbines [height of 80 metres] into the landscape of this locality will be seen as incongruous. In terms of their height, scale and number the turbines will introduce additional, prominent and foreign elements into the locality which will detract, from the existing character and level of visual amenity, to an unacceptable degree.[14]

The decision in *Paltridge* was the springboard for the 2011 DPA interim provisions.
The subsequent legislative reigning in of the *Paltridge* decision was done to block any future court actions and in essence silenced and made powerless those of us who oppose windfarm developments. To say that windfarms are now *"envisaged"* is an artificial construct and ignores the obvious - **that visual amenity is still important.**
The proponents in the *Partridge* case were intending to erect 46 turbines at a height of 80 metres, compare this with the current dimensions – 114 turbines at 165 metres!! The DPA does **not** expunge the repugnant visual impact which this development will have on the region if this Development Application is approved. A legislative pen stroke does not suddenly improve the visual amenity for those of us resident in Palmer and Sanderston.

Comment

I posit the question – did the government have in mind the proposition that turbines could be erected in such numbers and of such a magnitude when they sought to negate our legal and social rights in this circumstance?

[14] Ibid.

The following apportionments have been outlined in the Development Application:

0-20% - Slight 20-40%- Moderate 40-60% Substantial 60-80% Severe 80-100% Extreme.

- Mount Pleasant Summit - 38%
- Eden Valley Lookout - 35%
- Cambrai - Gerschwitz road - 39%
- Angas Valley/Ridley Road intersection 40%
- Adelaide/ Mannum Rd Intersection 30%
- Outskirts of Palmer on Randall Road - 29%
- Harrison Gorge - 56% - **Substantial change.**
- Brinkworth Road- 47% **Substantial.**
- Tungkillo Township - 27%
- North of Church street and Strachan Road intersection 39%

Comment

How can this amount of visual impact be viewed as acceptable? The negative impact on homes, lives and value of properties will be horrendous.

It is my submission that the visual impacts from these vantage points, particularly into Harrison Gorge are unacceptable, the DPA notwithstanding. The description provides that the presence of turbines could not be mitigated in any way at all. Constriction of the turbines would have a devastating impact on Harrison Gorge and its environs.

Of particular note:

Viewpoint 10 represents the potential visual affect that will be experienced in the locality of Harrison Gorge and around Mine Road to the south of Palmer. The view point and general locality is important as it represents a pocket of highly valued natural landscape character. The vegetation cover and rocky outcrops provide a high degree of visual amenity in relation to natural features within the local area.

While the viewpoint is located within the wider agricultural landscape the secluded visual qualities of the valley enhance the visual qualities and experience of the landscape character.
The combination of visual enclosure and the prominence of natural elements increase the visual amenity of the area. The visual effect of the proposed development from this viewpoint is described as substantial. Due to the close proximity and vertical scale of the turbines, the landscape provides limited capacity to absorb the turbines and they will be seen as large pieces of infrastructure. The natural character of Harrison Gorge with its incised valley form and vegetation elevates the visual amenity and scenic qualities of this

defined local area. The sensitivity to visual change is increased and the potential for adverse visual effect increases.

The proposed development will be seen to alter the character of this area but will ultimately only be perceived form a defined locality along the elevated ridgelines surrounding the gorge. From within the gorge itself the development will have less of an impact as the turbines will be proportionally or completely screened from view. Hence this viewpoint is not considered to be reflective of the views experienced within the Gorge but from the approach along Mine Road.

Comment

Our property (C123), is situated on the hill above Mine Road and abuts Harrison Gorge. This represents Area C. This will have a devastating impact on the visual amenity of our property. Our property is elevated and provides a 180 panorama of Harrison Gorge and down Reedy Creek Road towards Murray Bridge. As evidenced from the Montage, all aspects of our view will be negatively impacted by turbines.

Area B which runs from Randell Road commences from the boundary of our property on the other side of the road. In short, we are flanked by turbines, from Areas C and B.

The descriptions given in the WAX Design report on visual impacts also further cements our fate by its description of the visual impacts of the sub station.

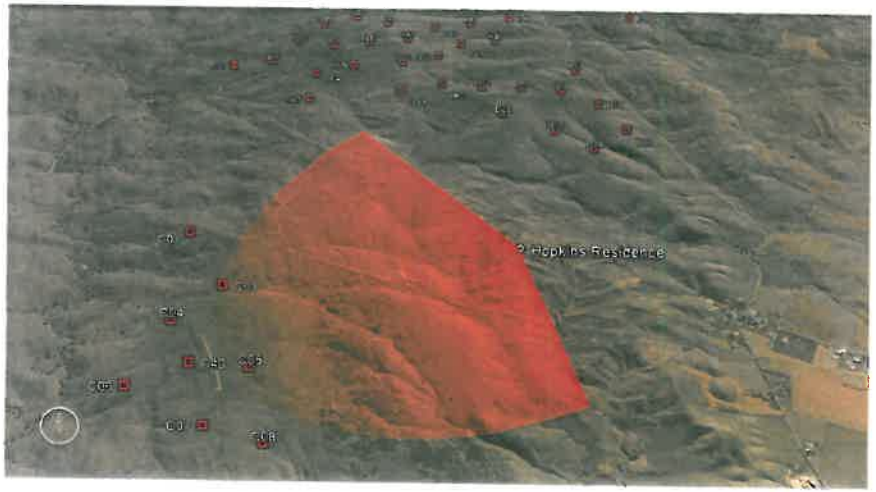
While the visual effect of the substation in relation to the overall effect of the wind farm is minimal, from local viewpoints around Randell Road and Borthwick Brae Road, the degree of visual change within the rural landscape will increase and the substation will be a noticeable development form.

The localised areas of significant visual effect will be experienced from elevated viewpoint looking towards Harrison Gorge which represents specific areas of high scenic value and will be impacted by the turbines associated with Group C.

HOPKINS RESIDENCE | Tranquill Road, [illegible] Adelaide Road

Panoramic simulation around your property based on 360° (red box indicates enlargement of simulation to 120° field of view see below)

Detailed view and simulation looking at most visible wind turbines (field of view is based on 120°)



Location plan and adjacent wind turbine positions (120° field of view shown in red)

The simulation has been developed using a best practise approach in order to provide an indication of the potential visual effect that will result from the development of the Palmer Wind Farm in the vicinity of your property.

The simulation does not represent a realistic image of the wind farm, rather a 'worst case' scenario that excludes vegetation, local landforms and buildings in the landscape. However, the modelling of the local terrain and the computer model of the wind turbines accurately portrays the scale and extent of the wind farm in the landscape.

Simulation methodology

- A surveyed digital terrain model at 2 m contour resolution is used to represent the topography that will be experienced around the property
- A high resolution aerial photograph is superimposed on the digital terrain model to provide a reference to local roads, buildings and vegetation groups in the landscape
- An accurate digital 3 dimensional model of the turbine is created (based on a maximum height of 165 metres)
- A digital 3D model of the wind farm is place onto the digital terrain model, using GPS (global positional system) coordinates and trigonometrically aligned to local features to verify the position of the turbines
- Viewpoints are selected using survey information provided by Trustpower

Viewing of simulations

The simulation provides only a representation of the potential visual effect. To appreciate the scale of the turbines in the landscape, it is recommended that the simulation is printed at A3 (can be printed at A2) and is viewed at a distance 50 to 60 mm with the page curved around the viewer's head. While this focal length may cause some blurring of the image, the scale of the landscape and turbines will increase.

Alternatively, the detailed simulation can be enlarged on the computer screen to 200% of the original size of the PDF.

Wind Farm Proximity:

Nearest wind turbine to property: **B04**

Distance to nearest wind turbine: **1,907 m**

Heading to nearest wind turbine: **24.64°**

Location reference: **R123**

Simulation produced by Convergen in association with WAX Design

Trust power

21 January 2015

Attention: Mr Russell PEATE
Chief Executive Officer
Mid Murray Council

Dear Sir

Re: Results of an acoustic testing program conducted by Mr Steven Cooper into the Cape Bridgewater Windfarm (Victoria) operated by Pacific Hydro. "The Study".

The Mid Murray Council "MMC" will no doubt be aware of the results of the study conducted by Acoustician Mr Steven Cooper with the cooperation of Pacific Hydro, into the Cape Bridgewater Windfarm. It is not the purpose of the communication to inform the Council of the precise results of that study rather, the purpose of this letter is to express our concern that the Council and the Development Assessment Panel "The Panel" be aware of the results of the study and what implications these have for the planning approval for the Mid Murray Council vis the proposed Trustpower Windfarm.

In recent years the State Planning Laws have changed such that planning decisions have devolved to relevant council areas. The spotlight is now on the MMC to deal with the application process relating to the Trustpower Wind Farm with transparency, integrity and with some consideration as to how this will impact on those ratepayers living within close proximity to the Windfarm. We understand the process and that the decision is ultimately made by the DAP. We are also aware since the amendments were passed to the legislation that the DAP, on its face, can only give consideration to any such proposal based on very narrow parameters. In our view, the obligations upon the MMC are much more far reaching than that. The MMC and the DAP's decision in light of the Cooper study, now has significant implications relevant to the health and wellbeing of those directly impacted by the placement of the turbines.

If this proposed development gets approval and goes ahead it will irretrievably change our region forever. We are not talking about planning approval for a chicken processing plant or additions to a shack, we are talking about a massive industrial development which will profoundly alter our landscape and impact on ALL of us, particularly those nearest to the placement of the turbines.

There is a global appetite for councils, counties and municipalities to step up and take responsibility for what is truly their domain. There is also a responsibility on councils to acknowledge that planning decisions about Wind Farms will resonate well beyond their tenure and might have significant legal repercussions for all those involved in the decision making process.

In assessing Trustpower's application, the MMC may come under local, state and even global scrutiny for its approach to residents.

Two overseas Counties have very recently taken the extraordinary step of acknowledging the pending deleterious health impacts of Industrial Wind Turbines vis Infra and Low Frequency Noise.

[The Brown County Board of Health in Wisconsin voted to declare the Shirley Wind Project to be a human health hazard]. The approved motion stated:

"To declare the Industrial Wind Turbines at Shirley Wind Project in the Town of Glenmore, Brown County, WI, a Human Health Hazard for all peoples (residents, workers, visitor and sensitive passers-by) who are exposed to Infrasound/Low frequency Noise and other emissions potentially harmful to human health".

In a similar move the Mayor of Plympton Wyoming, Ontario made these public statements.

> *[degradation of precious landscapes, seriously divided communities, and added to that the possible devastation is in my full view, for my residents, something has to give.*
> *When I took an oath to protect my community, I took it very seriously.]*
>
> He goes on to say:
>
> *"People are suffering in other projects. My community is slated for multiple developers and several wind projects. The time for action, and protective measures, has been with us for some time now...we can't continue to bounce around the same arguments and with no noticeable gain in the community health rights.* ***The protection of health is first.***
>
> *It is not and never has been acceptable to say local government hands are tied. The health and well-being of a community rests in the hands of its local government. The role of municipal candidates in creating or championing health in their capacity couldn't be underestimated"*

It is our view that for salaried workers or elected official at the Mid Murray Council to ignore overseas decisions and trends and to reassure themselves that what happens in our tiny part of the world is somehow *"different"* is dangerously insular. With the burgeoning evidence that the continued operation of wind turbines near residences and communities is tantamount to a form of torture (vis sleep deprivation), and moreover with the most recent results from Mr Cooper's study, may have health implications, it is our view that the Mid Murray Council will ignore the increasing global action by like local council areas and municipalities at their own legal peril.

We the undersigned ratepayers of the Mid Murray Council ask that this letter be tabled at the next Council Meeting and also be provided to all sitting members of the Development Assessment Panel who will convene to review the Trustpower Planning Application for the Palmer and Sanderston Windfarm.

We respectfully ask that you confirm the above. If you deny this request we would also like that to be in writing.

Yours faithfully

Dr Gary Hopkins

Ms Tracey Hopkins

Ms Julie Ikaheimonen

ILT20155344

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«Assessment_No»

DEVELOPMENT ACT, 1993

REPRESENTATION ON APPLICATION

CATEGORY 3

Development Number 711/072/14

My Name SALLY GETHIN-JONES PAUL CLARKSON HARRY CLARKSON. Telephone Number 85652205

My Address PO BOX 107 CAMBRAI Postcode 5353

This representation is in relation to the application by:

Trustpower Australia Holdings Pty Ltd

For consent to:

Erect a wind farm

proposed to be located at:

Palmer, Tungkillo, Jutland and surrounding areas in the Hills Policy and Marne Watercourse areas of the Mid Murray Council.

The address of the property affected is are all those within close proximity

(your property address) 1743 PINE HUT ROAD, NR. CAMBRAI, S.A. 5353

The specific aspects of the application to which I make comments on are:

1. Fully endorsing all cited clauses that conflict with the mid murray Council ~~Development plan as highlighted by~~ the eastern mt. lofty Ranges Landscape Guardians.

2. Contesting council suggestion that properties in close proximity to the turbines will not be devalued.

3. please see attached sheet.

(see also attached comments)

My concerns would be overcome by: The mid murray Council revoking Minister Rau's exemption of windfarm construction on our eastern hill face, and therefore disallowing Trust Powers proposal.

(see also attached comments)

SIGNATURES

SALLY GETHIN-JONES S. Gethin-Jones 20/5/2015

PAUL CLARKSON P.A. Clarkson 20/5/2015

HARRY CLARKSON: Harry Clarkson 20/5/2015

ATTACHED SHEET from SALLY GETHIN-JONES and PAUL CLARKSON (1

1. We are members of the Eastern Mount Lofty Ranges Landscape Guardians and we are therefore expecting that you will fully address all cited clauses that conflict with your current planning laws as per their submission

2. We would like the D.A.P. to extend their horizons well beyond the Australian coastline and take heed of international developments that are increasingly restricting placements of windfarms. Norway is pro-active; endeavouring to choose its sites more wisely. Please broaden your horizons and find out more.

3. We now have a long history of opposing windfarm development in close proximity to people's homes If Pacific Hydro does get its project up and running then our family will live 1.8kms away from a cluster of 12 - 140 metre high turbines. This is not a comfortable feeling for us and we wish to show our solidarity to those local residents who will be placed in a similar position if Trust Power is given the go ahead by you.

4. Before 2011 strict rules were in place to prevent structures being allowed on the Eastern Hills Face that could be seen from the flatlands below. Constructions were required to be "not highly visually prominent". In other words tucked away in the hills unseen; and indeed this provision is evident today.
In 2011 Minister Rau made a fundamental adjustment to this. Same rules apply but now there is an exemption — windfarms. We are not allowed to "deface" the hills with a bungalow basking in winter sunshine and an open view to the flats; but if its a 140 metre plus turbine (thrice the size of the electricity pillons) — no problems - its exempt. This ruling is outrageous and should never been allowed to get past our councils gate

5. For 2½ years we refused to pay our rates. Following the approval of the Keyneton Windfarm we can to the conclusion that our 80 acre property was as good as worthless. Who could possibley want to buy our home with an approved industrial windfarm virtually on our doorstep. You'll understand that this was our way of protesting. Protesting against an unwanted development that we had no say in.
When querying the Councils valuation of our property in August 2014 we were informed by Robin Bourne at the Council that a report dated 26 June 2014 stated that the Valuer Generals office was confident there would be no detrimental impact on property values sited near a windfarm.
Well we reckon the Valuer Generals opinion is valueless - and we feel it is crass opinion. Why wouldn't it have an impact?

6. Beware the sound impact reports. In naive compliance we allowed Pacific Hydro to organise 3 weeks monitoring on our property. The sound pick-up microphones were placed within a foot of multiple shrubs. Strong southerly winds which are quite common around these parts as the "masts" will confirm, cause some excellent noise factors as they blast their way through the undergrowth. That "upped" the average noise benchmark nicely.
Inappropriately placed noise monitors is nothing new and guess what? - despite requesting a copy of the noise monitoring report from Pacific Hydro - we never got one.

P.S We nominate the Eastern Mt. Lofty Ranges Landscape Guardians to speak on our behalf.

«Assessment_No»

DEVELOPMENT ACT, 1993

REPRESENTATION ON APPLICATION

CATEGORY 3

Development Number 711/072/14

My Name DANNIELLE + ROBERT THOMAS My Telephone Number 0409 821 708

My Address 21 MEMORIAL DRIVE TUNGKILLO Postcode 5236

This representation is in relation to the application by:

Trustpower Australia Holdings Pty Ltd

For consent to:

Erect a wind farm

proposed to be located at:

Palmer, Tungkillo, Jutland and surrounding areas in the Hills Policy and Marne Watercourse areas of the Mid Murray Council.

The address of the property affected is 21 MEMORIAL DUE TUNGKILLO

(your property address)

The specific aspects of the application to which I make comments on are:

ENVIRONMENTAL DESTRUCTION

VISUAL IMPACT

NO LONGER A DECENT PLACE TO LIVE

(see also attached comments)

My concerns would be overcome by: COMPLETE REJECTION OF THIS APPLICATION.

(see also attached comments)

To:

Director, Development & Environmental Services, Mid Murray Council

PO Box 28, Mannum, 5238

Mr. Kelvin Goldstone

Re: Trust Power Palmer Wind Farm Development Application 711/072/14

Trust Power's application for a wind farm located near Palmer should be refused for the reasons laid out below, which are in conflict with the cited clauses of the Mid Murray Council Development Plan:

1. Environmental damage: land, watercourses and ground water, native vegetation, fauna and noise pollution. The impact of the proposal is in conflict with council wide objective 29 and Principles of Development Control (PDCs) 39, 42, 43, 87, 92, 93, 163, 164, 168, 169, 170, 175, 176, 180, 185, 190, 192, 196, 197, 199, 215, 398; rural zone objectives 6, 16, 17, 23 and rural zone PDCs 4, 6, 7, 12, 18; and hills policy area objectives 1, 2, 3 and hills policy area PDCs 1 and 4a.

   The proposal is not harmonious with existing land uses and district character. This is in conflict with council wide objectives 7, 15, 18, 19, 25, 26, 29, 30; council wide PDCs 5, 43, 55, 78, 79, 87, 88, 91, 97, 155, 160, 163, 165, 166, 167, 173, 188, 190, 398, 399; rural zone objectives 6 and 16; rural zone PDCs 4, 19, 43; and hills policy area objectives 1, 2, 3 and hills policy area PDCs 1, 3, 4a.

3. The proposal does not provide for care and wellbeing of the community. This is in conflict with council wide objectives 9, 15, 25, 26, 29; council wide PDCs 43, 88, 92, 166, 175, 188, 388, 397, 398, 399; rural zone objective 17; rural zone PDC 12; and hills policy area objective 2.

4. The proposal is not an efficient or effective use of land; wind turbines are neither efficient (<40%) nor effective (unreliable output) producers of electricity. Council wide PDC 396 requires that wind turbines should be located in areas that maximise efficient generation and supply of electricity. The proposed location does not maximise efficient generation and is too far from the major loads on the grid to maximise efficient supply of the generated electricity, so is in conflict with that PDC. Conflict also exists with rural zone objectives 6, 16, 22, 23 and rural zone PDC 18 and hills policy are objective 2 and PDC 1.

   Hazards: loss of aerial firefighting capability; this is in conflict with council wide objectives 26, 84, 85, 94, 95, 98 and council wide PDCs 46, 388, 398; rural zone objectives 6, 17, 23, hills policy area objective 2 and PDC 1.

6. Hazards: risk to traffic due to shadow, flicker and debris; these are in conflict with council wide objectives 14, 15, 16, 17, 26, 98 and council wide PDCs 34, 39, 87, 95, 396, 398; and hills policy area objective 2 and PDC 1.

7. The proposed renewable energy facility does not benefit the environment, evidenced by the conflicts cited above, does not benefit the community, as more residents lose financially and in terms of lifestyle than benefit as a result of lease payments or neighbour agreements, and does not benefit the state as the vast majority of money associated with the development flows either interstate or overseas, leaving only inflated power prices for South Australians. This is in conflict with council wide objectives 96, 97, 98; council wide PDCs 78, 92, 163, 168, 188, 396; rural zone objectives 6 and 17; rural zone PDCs 4, 6, 7 and hills policy area objective 2.

8. The damage and disruption during construction (dust, blasting, heavy vehicles) is in conflict with council wide objectives 16, 48, 50, 51, 53, 59, 64g; council wide PDCs 39, 43g, 95, 196, 197, 198, 388; hills policy area objectives 1 and 2 and PDCs 1 and 4a.

9. The proposed layout is inappropriate and is in conflict with council wide PDCs 78, 158, 388 and 397; rural zone objectives 6, 16, 17, 21 and rural zone PDCs 4 and 19; hills policy area objective 2 and PDCs 1, 3 and 4a.

10. The visual amenity of the region would be compromised. While the misguided ministerial "wind farm" development plan amendments (largely seen in a dim light by the Development Planning Advisory Committee) are lenient toward wind turbines, the following notable conflicts remain: council wide objectives 15, 25, 26, 50, 54; council wide PDCs 55, 78, 79, 155, 158, 159, 160, 170, 173, 190, 397; rural zone objective 6; rural zone PDCs 18, 19; hills policy area objectives 1, 2, 3; hills policy area PDCs 1, 3, 4a.

11. If approved, the proposal will have a negative impact on most of the property values in the area. It should be noted that only host properties have ongoing income; neighbour agreements are non-transferable. The effect on property values in the region is in conflict with council wide objectives 9, 25, 29, 98; council wide PDCs 55, 79, 88, 91, 160, 162, 163, 167, 188, 388, 398; rural zone objective 16 and PDC 19 and hills policy area objectives 1 and 2.

12. The proposal is very close to the edge of the Barossa Character Protection District, so close in fact that it will compromise the values the Protection Legislation seeks to preserve. This is in conflict with council wide objectives 50, 54, 98, council wide PDCs 55, 155, 158, 167; rural zone objectives 2, 6, 16, 21; rural zone PDCs 22, 43; hills policy area objectives 1 and 2 and hills policy area PDCs 1 and 3.

Further Comments

Conclusion

The Mid Murray Council DAP should refuse planning permission for the proposed wind farm Development Application 711/072/14 because it is in conflict with much of the Mid Murray Council Development Plan.

Please see the submission of the Eastern Mount Lofty Ranges Landscape Guardians for further elaboration of the above comments.

☐ I/We wish to be heard at the public hearing/meeting

☑ I /We nominate MARINA TEUSNER to speak on my behalf.

☐ I /We nominate the Eastern Mt Lofty Ranges Landscape Guardians to speak on my behalf.

I/We would like for my/our submissions to be made (public)/private.

Yours Sincerely,

DANNIELLE THOMAS.

ATTENTION: DEVELOPMENT ASSESSMENT PANEL

MID MURRAY COUNCIL

RE DEVELOPMENT NUMBER 711/072/14

We completely oppose and reject the development application by Trustpower for a 30 kilometre long wind energy factory, comprising 114 turbines standing 165m.

This foreign company seeks to destroy the futures of hundreds of South Australians and precious wildlife, to send all profits back overseas. I do not overstate this. Common sense and history tells us all what will happen.

I understand employees have bullied and intimidated too many local people. This element must never be welcomed here. It is up to you to stop them. If approved, this development will ultimately bring great shame upon the Mid Murray Council for decades to come.

My husband and I are new to the Tungkillo area, in the Mt Lofty Ranges. We were attracted to this area by the beauty of the rural land with plenty of room to move and the chance to be self-sufficient. The area represents extraordinary natural beauty yet is so close to Adelaide. It is a gem of South Australia and should be treated as such.

We purchased a 1 acre block in the township on February 5th 2014, through Country Estates, Balhannah. Throughout the entire process of purchasing our home, the agent failed to make any mention of a possible wind energy factory. We were completely unaware of this possibility until a month after our purchase. We feel angry and betrayed. We would never have chosen to live in your council area, had it been declared, as we see nothing but community and environmental destruction wherever these companies turn up. We would not knowingly choose to live within 50 kilometres of turbines – now we find ourselves just 3 kilometres from the biggest turbines proposed in Australia. It is untenable. We feel trapped.

The important considerations in planning are: social, environmental and economic impacts. This development represents a disaster on all levels. We are no longer ignorant or naïve to the impacts this development will have on these spectacular areas. We know we'll be nothing more than 'test dummies' for Trustpower's activities. We no longer feel safe or secure living in your council area. There are many more like us. The Mid Murray Council's DAP could very well preside over one of the State's worst decisions in history – leaving nothing enticing for future generations to want to reside in the eastern ranges. The Mid Murray Council's DAP could preside over the most destructive plan to hit the region. It's not much to be proud of is it? The Mid Murray Council's DAP could create one of the largest 'dead zones' in South Australia – a strange and eerie place devoid of people, significant birdlife and fauna – as can be seen and experienced further north at Waterloo. Is this your goal?

If you haven't already noticed, some local real estate agents are listing what they call an 'unprecedented number' of properties on the market, over the entire impacted area. People are trying to get out before it is too late. Are you happy with this? Are you happy to see more people go – if they can? Having driven around the area, many properties may not even get a bid. Those people are stuck, and Trustpower can deviously state that property prices are not affected.

The landholders can relocate when their homes and environment become unbearable, leaving others to suffer in their wake.

Is this what you call 'benefits to the community'?

Just twenty six landholders have brought the biggest social and environmental cancer to our hills and communities. Significant rifts between friends and families are already evident. Is this the type of area you wish to represent?

We thought it was the perfect base for our work. My husband is a shearer and I am a wool classer. Submissions to the Federal Senate clearly indicate declining lambing rates in flocks located in and around these wind factories. To date there is no full explanation, but farmers have clearly shown their problems began after the wind factory was commissioned. Dwindling sheep numbers could directly impact our employment opportunities in the area.

We are aware of the impacts on the people of Cape Bridgewater (Vic), Macarthur (Vic), Waterloo (SA) and Waubra (Vic) – and of the work by expert acoustician Steven Cooper and the University of Adelaide. We understand that Trustpower is allowed to harm us inside and outside our homes with low frequency noise and infrasound that has irrefutably been measured at other sites from much smaller turbines. Trustpower knows it can harm us, and it knows it can hide behind the inadequate EPA guidelines which ignore these sound spectrums. You have the chance to make Trustpower accountable by forcing restrictions on what can be emitted in these spectrums.

The DAP must never claim ignorance to the harm being done elsewhere. If DAP members choose to put the blinkers on, then they must personally take full responsibility for all consequences.

The Mid Murray Council's Development Plan in no way instructs you to approve a development that is so comprehensively incompatible to present land uses and so unsafe to others.

So are you going to protect the long term interests of Trustpower or the long term interests of your community people? It's one or the other. In your deliberations of this application, I ask you to consider the following:

1. The huge number of Development Plan objectives and Principles of Development Control that are in conflict with this proposal (attached).
2. The arrogance and disrespect shown by Trustpower to put turbines so close to the Barossa Protection District. It is disingenuous to say the character of the land is still protected.
3. Has Trustpower made it clear where all the broken, toxic blades will be stored? Will storage be in Mid Murray Council landfill? What are the risks?
4. Has Trustpower given a financial commitment to decommissioning, or will the DAP (approving authority) be responsible?
5. The Mid Murray Council will feel the full brunt of community condemnation for all the consequences of this development, and be made to answer for it. It cannot hide from its ratepayers.
6. Don't treat us like fools regarding aerial firefighting capabilities. Too many locals have lived through one of the State's worst fires.
7. Trustpower must provide post-bushfire background noise testing results. I understand the company has refused to take it into consideration.
8. **Trustpower must provide attenuation maps of the known low frequency and infrasound spectrums, so residents out to 10-15 kilometres can be informed. To not provide them is negligence.**

We will not tolerate becoming more statistics to this industry. It likes to call us 'road kill'. Is that how you see us too?

Dannielle and Robert Thomas

EMAIL 20155

51

DEVELOPMENT ACT, 1993

REPRESENTATION ON APPLICATION
CATEGORY 3

Development Number 711/072/14

My Name TIM KELLY My Telephone Number 0419 831 933

My Postal Address 8 AGNES ST

FORRESTON SA Postcode 5233

This representation is in relation to the application by: *Trustpower Australia Holdings Pty Ltd*

for consent to establish the *Palmer Wind Farm*

The address of my affected property is 674 ANGAS VALLEY ROAD MOUNT PLEASANT

The specific aspects of the application to which I make comments on are:

(1) SUPPORT FOR THE PROJECT

(2) OPPORTUNITIES FOR LOCAL EMPLOYMENT

(3) BENEFITS OF SUPPORTING RENEWABLES IN SA

(4) REDUCTION IN GREEN HOUSE EMISSIONS & THE OPPORTUNITY TO REDUCE/SHUT DOWN COAL PLANTS

(5) AN APPROPRIATE LOCATION GIVEN EXTENSIVE LAND CLEARENCE, HV TRANSMISSION & WIND ACCESS

(6) NEED FOR GOOD ANNUAL REPORTING (AS WITH ANY M PROJECT

My concerns would be overcome by:

I HAVE NO MAJOR CONCERNS & WOULD HOPE FOR CONTINUED GOOD ENGAGEMENT WITH TRUST POWER ON ANY ENVIRONMENTAL, SOCIAL, FINANCIAL ISSUES THEY ARISE.

☐ I do not wish to be heard by the Development Assessment Panel

☑ I do wish to be heard personally by the Development Assessment Panel

- ☑ I will represent myself
  or
- ☐ I will be represented by _____

Date 19-05-2015 Signed T. Kelly

Tim Kelly
8 Agnes Street
Forreston
SA 5233

20 May 2015

Mid Murray Council
Development & Environmental Services Department

PO Box 28
Mannum
SA 5238,

Email: postbox@mid-murray.sa.gov.au
gparsons@mid-murray.sa.gov.au.

RE: Palmer Wind Farm Development Application

Dear Mid Murray Council – Development Assessment Panel

Thank you for providing us with the opportunity to comment on the Palmer Wind Farm Development Application.

Our property is located at the highest point on Angas Valley Road adjacent to other properties where wind turbines would be installed. We would see many turbines from our location but do not feel that this would detract from landscape which is already substantially cleared, particularly along the wind swept ridges.

We wish to provide our support for the Palmer wind farm development on the eastern side of the Mount Lofty Ranges. Fundamentally, our support is based around renewable electricity from wind farms being an extremely cost efficient way of producing electricity without causing greenhouse gas emissions. The Intergovernmental Panel on Climate Change has provided numerous reports cautioning on the risks associated with climate change which would, if emissions continue at high rates (IPCC Representative Concentration Pathway 8.5 for example), increase global temperatures well beyond 2 degrees Celsius, creating unacceptable environmental, social and economic risks for future generations.

The electricity produced from wind farms are adequately predictable and able to be integrated with the South Australia's other electricity supplies and the National Electricity Market. Whilst some claim that the intermittency of wind is a significant problem, South Australia's grid now copes with periods of extremely high wind penetration above 85% in some overnight periods. Currently gas provides a rapid complementary electricity supply but it is likely that battery, thermal, PV and other types of electricity storage will increasingly reduce the reliance on fossil gas to fill in for quieter periods.

Over the past fifteen years, renewable electricity has meant that the emissions factor for electricity generation in South Australia has almost halved. Much of this has been from wind farm development as well as smaller contributions from household photo voltaic systems, mini hydro and using recovered methane electricity facilities. South Australia is now at a

I look forward to approval of this project and further engagement with the Trust Power Team in the near future.

Kind regards

Tim Kelly

For Tim & Janet Kelly

Geoff Parsons

From: Tim Kelly <timkellysa@gmail.com>
Sent: Wednesday, 20 May 2015 12:47 PM
To: PostBox; Geoff Parsons
Subject: Palmer Wind Farm Representation requests and submission
Attachments: Tim & Janet Kelly Plamer Wind Farm Submission.pdf; DAP Representation Pam Kelly.jpeg; Tim Kelly - DAP Representation.jpeg

.Dear Mid Murray Council - Development Assessment Team

Please find our requests for representation and submission on the Palmer Wind Farm proposal.

Please confirm that our submission and requests are received OK

Kind regards
Tim Kelly

Melissa Marschall

From: Geoff Parsons
Sent: Wednesday, 20 May 2015 1:41 PM
To: 'Tim Kelly'; PostBox
Cc: Melissa Marschall
Subject: RE: Palmer Wind Farm Representation requests and submission

Dear Tim,

I acknowledge receipt of your email and the attachments.

I have one representation from Pam Kelly (consisting of a representation form only) and another representation from Tim and Janet Kelly (consisting of a representation form and an attached letter).

If any of that is incorrect please let me know otherwise I confirm your representations have been received and will be considered.

Kind regards,

Geoff Parsons
Acting Director - Development and Environmental Services
Mid Murray Council
PO Box 28
Mannum SA 5238

P - (08) 8564 6020
F - (08) 8569 1931
M - 0429 998 177
E - gparsons@mid-murray.sa.gov.au
W - www.mid-murray.sa.gov.au

Mid Murray Council

From: Tim Kelly [mailto:timkellysa@gmail.com]
Sent: Wednesday, 20 May 2015 12:47 PM
To: PostBox; Geoff Parsons
Subject: Palmer Wind Farm Representation requests and submission

.Dear Mid Murray Council - Development Assessment Team

Please find our requests for representation and submission on the Palmer Wind Farm proposal.

Please confirm that our submission and requests are received OK

Kind regards
Tim Kelly

Melissa Marschall

From: Geoff Parsons
Sent: Thursday, 21 May 2015 7:56 AM
To: PostBox; Melissa Marschall
Subject: FW: Palmer Wind Farm Representation requests and submission

Kind regards,

Geoff Parsons
Acting Director - Development and Environmental Services
Mid Murray Council
PO Box 28
Mannum SA 5238

P - (08) 8564 6020
F - (08) 8569 1931
M - 0429 998 177
E - gparsons@mid-murray.sa.gov.au
W - www.mid-murray.sa.gov.au

Mid Murray Council

From: Tim Kelly [mailto:timkellysa@gmail.com]
Sent: Wednesday, 20 May 2015 6:29 PM
To: Geoff Parsons
Subject: Re: Palmer Wind Farm Representation requests and submission

Thanks Geoff
All good

Best regards
Tim Kelly

Sent from my iPhone

On 20 May 2015, at 1:40 pm, Geoff Parsons <gparsons@mid-murray.sa.gov.au> wrote:

> Dear Tim,
>
> I acknowledge receipt of your email and the attachments.

I have one representation from Pam Kelly (consisting of a representation form only) and another representation from Tim and Janet Kelly (consisting of a representation form and an attached letter).

If any of that is incorrect please let me know otherwise I confirm your representations have been received and will be considered.

Kind regards,

Geoff Parsons
Acting Director - Development and Environmental Services
Mid Murray Council
PO Box 28
Mannum SA 5238

P - (08) 8564 6020
F - (08) 8569 1931
M - 0429 998 177
E - gparsons@mid-murray.sa.gov.au
W - www.mid-murray.sa.gov.au

<image001.jpg>

From: Tim Kelly [mailto:timkellysa@gmail.com]
Sent: Wednesday, 20 May 2015 12:47 PM
To: PostBox; Geoff Parsons
Subject: Palmer Wind Farm Representation requests and submission

.Dear Mid Murray Council - Development Assessment Team

Please find our requests for representation and submission on the Palmer Wind Farm proposal.

Please confirm that our submission and requests are received OK

Kind regards
Tim Kelly

EMAIL 20155

52

DEVELOPMENT ACT, 1993

REPRESENTATION ON APPLICATION
CATEGORY 3

Development Number 711/072/14

My Name PAM KELLY My Telephone Number 8568276

My Postal Address P.O. BOX 25, TUNGKILLO,

SOUTH AUSTRALIA Postcode 5236

This representation is in relation to the application by: *Trustpower Australia Holdings Pty Ltd*

for consent to establish the *Palmer Wind Farm*

The address of my affected property is 674, ANGAS VALLEY RD,

MT. PLEASANT, S.A. 5236

The Specific Aspects of the Application to which I Make Comments are :-

1. I support this proposed wind farm development
2. Material widely circulated in the area by the Eastern Mt Lofty Ranges Landscape Guardians Inc. does not reflect my views on Wind Farms. I am also concerned that their organisation may include people from outside this Council area, who are not directly impacted by the proposed Wind Farm
3. There is no scientific proof from the consensus of agreement of reputable scientists about any harm from wind generators to people's health
4. There is no scientific proof of a significant harm to land, watercourses, groundwater, or native vegetation from well planed wind farms.
5. Fire fighting aircraft already navigate around the high voltage power line and other tall towers and local structures. The wind turbines will not therefore significantly hamper fire fighting effort. Additional local access roads would outweigh any aerial fire fighting constraints.
6. Overview of situation if we do nothing about Climate Change
7. Picture of our part of South Australia in 80 years time, should self-centred nimby attitudes blind us to warnings about climate change, and its impact on us, should we elect to do nothing

My concerns would be overcome by:
THE MID MURRAY DISTRICT COUNCIL CONSENTING TO TRUSTPOWER AUSTRALIA HOLDINGS PTY., LTD. ESTABLISH THE 'PALMER WIND FARM', WHICH WILL GREATLY CONTRIBUTE TO THE PRODUCTION OF FOSSIL FREE ELECTRICITY, & A REDUCTION OF THE PRODUCTION OF CLIMATE CHANGING CARBON

☐ I do not wish to be heard by the Development Assessment Panel

☑ I do wish to be heard personally by the Development Assessment Panel

- ☑ I will represent myself
  or
- ☐ I will be represented by _____

Date 18-5-15 Signed P. Kelly

Geoff Parsons

From: Tim Kelly <timkellysa@gmail.com>
Sent: Wednesday, 20 May 2015 12:47 PM
To: PostBox; Geoff Parsons
Subject: Palmer Wind Farm Representation requests and submission
Attachments: Tim & Janet Kelly Plamer Wind Farm Submission.pdf; DAP Representation Pam Kelly.jpeg; Tim Kelly - DAP Representation.jpeg

.Dear Mid Murray Council - Development Assessment Team

Please find our requests for representation and submission on the Palmer Wind Farm proposal.

Please confirm that our submission and requests are received OK

Kind regards
Tim Kelly

Melissa Marschall

From: Geoff Parsons
Sent: Wednesday, 20 May 2015 1:41 PM
To: 'Tim Kelly'; PostBox
Cc: Melissa Marschall
Subject: RE: Palmer Wind Farm Representation requests and submission

Dear Tim,

I acknowledge receipt of your email and the attachments.

I have one representation from Pam Kelly (consisting of a representation form only) and another representation from Tim and Janet Kelly (consisting of a representation form and an attached letter).

If any of that is incorrect please let me know otherwise I confirm your representations have been received and will be considered.

Kind regards,

Geoff Parsons
Acting Director - Development and Environmental Services
Mid Murray Council
PO Box 28
Mannum SA 5238

P - (08) 8564 6020
F - (08) 8569 1931
M - 0429 998 177
E - gparsons@mid-murray.sa.gov.au
W - www.mid-murray.sa.gov.au

Mid Murray Council

From: Tim Kelly [mailto:timkellysa@gmail.com]
Sent: Wednesday, 20 May 2015 12:47 PM
To: PostBox; Geoff Parsons
Subject: Palmer Wind Farm Representation requests and submission

.Dear Mid Murray Council - Development Assessment Team

Please find our requests for representation and submission on the Palmer Wind Farm proposal.

Please confirm that our submission and requests are received OK

Kind regards
Tim Kelly

ILT2015349

53

DEVELOPMENT ACT, 1993

REPRESENTATION ON APPLICATION
CATEGORY 3

Development Number 711/072/14

My Name Peter John ROYAL My Telephone Number 08 85694060

My Postal Address 504 Northern Boundary Rd.
Milendella Sth Aust Postcode 5237

This representation is in relation to the application by: *Trustpower Australia Holdings Pty Ltd*

for consent to establish the *Palmer Wind Farm*

The address of my affected property is mainly Milendella Rd., Angas Valley Rd., Three Chain Rd.

The specific aspects of the application to which I make comments on are:

Loss of property value and loss of enjoyment of use. Environmental impacts regarding my compliant dwelling and substantial lifestyle historic buildings. Noise, shading/flicker being in excess. Visual dominance of WGT B11 over my site. Unlawful site of WTG B11. Route of powerline via Milendella Rd. Glint of power poles and spans.

OTHER DETAILS & COMMENTS TO BE SUPPLEMENTED AT A FURTHER DATE

My concerns would be overcome by:
Complete removal of WTG B11 from the layout. Set back of 2 Km. to apply to WTG's nearby. The use of Angas Valley Rd route for transmission line. To strictly comply with all guidelines, regulations and obligations.

☐ I do not wish to be heard by the Development Assessment Panel
I would like my submission details to remain private

☑ I do wish to be heard personally by the Development Assessment Panel

☐ I will represent myself
or

☑ I will be represented by a spokesperson

Date 20th May 2015 Signed P.J. Royal

Peter Royal

From: Peter Royal [peter@royalheath.com.au]
Sent: Monday, 18 May 2015 11:14 AM
To: 'postbox@mid-murray.sa.gov.au'
Subject: Alternative transmission line route

Mr Russel Peate, Chief Executive Officer and Mr Geoff Parsons Acting Director/Mr Kelvin Goldstone, Director of Development & Environmental Services' Mid Murray Council.

Dear Sirs.

Please accept this as **formal notification.**

Regarding provision of infrastructure, including infrastructure in the Public Interest and with reference to Regulation 5(1)(d)(iv) as seen on page 7 of a guide to the *Native Vegetation Regulations 2003* as in force from 10 September 2009.
Please be advised that there is a practicable alternative to the proposed TrustPower transmission route via Milendella road. The alternative route, Angas Valley Road (Mt Pleasant- Walker Flat Road) and Old Cooke Hill Road would involve no clearance of vegetation.

Please be advised that the suggestion of this route was made to Mr Adrian Wortman, Commercial Manager, TrustPower. On or about Wednesday 6th November 2013, in the presence of a witness.

Also, please be advised; this alternative was agreed to as a practicable route by Mr Rontheo van Zyl, Wind Generation Development Manager, TrustPower on Thursday 27th February 2014. I agreed to facilitate an "overhang easement" on the north side (a licence to construct only, adjacent to this boundary but within my property, was offered). This agreement required no payment, **but for** the reasonable demand that all guidelines and the implications of their own documents pertaining to Palmer Wind Farm and ancillary matters would be complied with by TrustPower.

Subsequent to this Mr Michael Head met me for an onsite inspection and agreed it was a practicable route. A colour Google Earth image with the route clearly marked upon it was offered but declined.

Yours faithfully,
Peter Royal.

Melissa Marschall

From: Geoff Parsons
Sent: Monday, 18 May 2015 3:22 PM
To: 'peter@royalheath.com.au'
Cc: Russell Peate; Melissa Marschall; PostBox
Subject: RE: IEMAIL20155059 - 711/072/14 - Alternative transmission line route
Attachments: Palmer Wind Farm Representation Form.pdf

Dear Peter,

Thank you for your email.

I have not had an opportunity to look to see whether you have put in a representation as part of the public notification period or not, but if you haven't I suggest you do so and include the information you have provided below. The information you have provided, while it may be relevant, cannot be properly considered unless it is submitted to Council as part of a representation.

I have attached a copy of the cover sheet for a representation.

If you have already submitted a representation, you just need to reply asking that what you have submitted below be considered as an addendum to that representation.

Hope this is clear. If you have any questions you can reply to this email or call.

Kind regards,

Geoff Parsons
Acting Director - Development and Environmental Services
Mid Murray Council
PO Box 28
Mannum SA 5238

P - (08) 8564 6020
F - (08) 8569 1931
M - 0429 998 177
E - gparsons@mid-murray.sa.gov.au
W - www.mid-murray.sa.gov.au

Mid Murray Council

From: Chantelle Snart **On Behalf Of** PostBox
Sent: Monday, 18 May 2015 11:41 AM
To: Geoff Parsons; Russell Peate
Subject: FW: IEMAIL20155059 - 711/072/14 - Alternative transmission line route

From: Peter Royal [mailto:peter@royalheath.com.au]
Sent: Monday, 18 May 2015 11:14 AM
To: PostBox
Subject: IEMAIL20155059 - 711/072/14 - Alternative transmission line route

Mr Russel Peate, Chief Executive Officer and Mr Geoff Parsons Acting Director/Mr Kelvin Goldstone, Director of Development & Environmental Services' Mid Murray Council.

Dear Sirs.

Please accept this as **formal notification.**

Regarding provision of infrastructure, including infrastructure in the Public Interest and with reference to Regulation 5(1)(d)(iv) as seen on page 7 of a guide to the *Native Vegetation Regulations 2003* as in force from 10 September 2009.
Please be advised that there is a practicable alternative to the proposed TrustPower transmission route via Milendella road. The alternative route, Angas Valley Road (Mt Pleasant- Walker Flat Road) and Old Cooke Hill Road would involve no clearance of vegetation.

Please be advised that the suggestion of this route was made to Mr Adrian Wortman, Commercial Manager, TrustPower. On or about Wednesday 6th November 2013, in the presence of a witness.

Also, please be advised; this alternative was agreed to as a practicable route by Mr Rontheo van Zyl, Wind Generation Development Manager, TrustPower on Thursday 27th February 2014. I agreed to facilitate an "overhang easement" on the north side (a licence to construct only, adjacent to this boundary but within my property, was offered). This agreement required no payment, **but for** the reasonable demand that all guidelines and the implications of their own documents pertaining to Palmer Wind Farm and ancillary matters would be complied with by TrustPower.

Subsequent to this Mr Michael Head met me for an onsite inspection and agreed it was a practicable route. A colour Google Earth image with the route clearly marked upon it was offered but declined.

Yours faithfully,
Peter Royal.

IEMAIL20155880

Original ILT20155349

Melissa Marschall

From: Peter Royal <peter@royalheath.com.au>
Sent: Sunday, 31 May 2015 7:57 PM
To: PostBox
Subject: IEMAIL20155880 - 711/072/14 - Supplement to representation, Palmer Wind Farm.
Attachments: Attachment 1 - Neighbour Deed.pdf; Wind Farm Representation - P Royal.pdf

ATTN: Acting Director – Development & Environmental Services

Dear Mr Parsons,

Please kindly accept this supplementary documentation, including an attachment, in regards to my representation for development application 711/072/14 (Palmer Wind Farm).

Yours faithfully,
Peter Royal

Mr Geoff Parsons
Acting Director, Development & Environmental Services
Mid Murray Council

I wish to make representation regarding "Palmer Wind Farm Development", Mid Murray Council application development number 711/072/14 and the now released Trustpower Development Plan Assessment Report August 2014.

The report fails to note or show the approved dwelling development application 711/013/14 of P J Royal's with surveyed historic buildings. The report is critically deficient by omission of this site.

- My site, having prior and current planning approval, must have consideration as a **compliant dwelling**, and must be acknowledged as a receptor site for sound [EPA Wind farms environmental noise guidelines 3.1 (relevant receiver locations)]
- **WTG B11 is within one kilometre of this site** [Development Plan PDC 397 (a) (i)]
- The Environmental Noise Assessment (Sonus p 88) predicts my site will be subjected to **noise levels that exceed Environment Protection Authority guidelines**
- The Environmental shadow/flicker assessment predicts the layout impacts my site at a high level
- The overhead transmission line unnecessarily interferes with native vegetation and impacts the amenity of my entrance gateway

IMPACT ON DWELLING AND HISTORIC ASSETS

Wind turbines B14 and B12 are in relatively close proximity and in line behind B11. The approximate radial alignment with the receptor location may cause varying asynchronous beating sounds (PDC 398(b)). Turbines B6 and B9 are on the windward side, apparently also within two kilometre range and will contribute noise to this historic dwelling and historic site. Trustpower's Neighbour Deed (Finlaysons) page 15 clause 11.1(a) implies 2 km may be an acceptable setback when environmental impact modelling is not in place (see Appendix D).

The Visual Impact Assessment fails to show or consider this dwelling site (GL Garrad Hassan, pages 24 & 27). The dwelling site with its historic buildings is in the vicinity of greatest dynamic of shadow/flicker. Flicker is a matter of especial importance regarding a disabled person. This is not an acceptable impact as viewed from the kitchen window and laundry door (EPA Guidelines for Wind Farms Final Report 3(a), Comment, *"The effect is most noticeable inside buildings, where flicker cr glint appears through a window opening or doorway"*).

The Visual Impact Assessment report (WAX Design page 74), indicates that my dwelling is within the inner buffer zone that will have substantial visual effect. WTG B11 blade tip reaches to about 275 metres in height above the dwelling (PDC 188).

BLASTING AND OPERATIONS

The Trustpower Development Plan Assessment Report fails to note the position and existence of my fragile and susceptible historic gold mine or the impact the wind farm will have on it (PDC 187). On 6th February 2014 Trustpower's construction engineer appeared unaware of this asset. I then advised him of the mine's condition and existence, that it might be damaged by blasting and that it is occasionally occupied. He was unaware of my historic buildings also being a sensitive site (PDC 189(a), (b), (c), (d)). The engineer did not say damage to the mine would be avoided when construction blasting (PDC 187), nor would he comment regarding personal safety as a consequence of blasting or operational vibrations of turbines. Contra to wind farm construction guidelines for

blasting, he was also disinterested in my historic stone buildings without modern reinforced foundations that may be adversely impacted by blasting. These buildings like the mine need to be protected from such adverse impacts (PDC 188).

The property and this site, is of architectural, historical and educational value with the evident interpretation and narrative of agricultural and social development. The local district was founded from this property before the advent of rail introduced the name Sanderston (with the subsequent rail siding, so named). The buildings were the buildings of my pioneer forebears. The original stone cottage has been continually maintained with bedroom, beds and fireplace. The barn includes architecture of educational interest - blade shearing and bagged grain - it is now also used as a school campers' dormitory. I can recount its social use for barn dance fund raising endeavours for the Sanderston community. There is an educational narrative of cultural progression. The first motor vehicle at Sanderston was garaged in the 'buggy shed'. The attached 'black smith shop' still has evidence of a forge, bench and hitching post. The preserved stone stables complex has accommodation for sixteen draft horses serviced by the adjacent large 'chaff house' and attached stone 'engine room', with massive shafting still in place for a chaff cutter and elevator. The magnificent architecture elicits awe at the pioneers work and comments of how applicable it would be in the modern TV programme Grand Designs.

An excursion walking up the hillside and scree slope to the winze of the gold mine further enriches student and visitor understanding of the settler's work ethic. Entering the dark winze always elicits excitement, especially if they do not walk to one side to allow the occasional bat to pass, trip over a native pine trolly track sleeper or are surprised by the barking geckos living deep within the darkness (council wide objective 57).

The bedroom in the pioneer's cottage is used for school camp personnel, and as night shift sleeping quarters (see Appendix E). The buildings were officially confirmed suitable for occupation by Mt Pleasant Council (District Clerk Mr Brokate - about 1974, under introduction of building codes). They have been maintained continually ever since.

TRANSMISSION LINE

The report fails to note the impact of the power transmission line at the entrance gate to my (unacknowledged) compliant dwelling (site with historic buildings). Its size, corona, hum, crackle noise and radio interference may have a fearful impact on visitors, especially when alighting from a vehicle to open the gate. This would disenfranchise me of visitors and tourists and the esteemed use of my property in accord with the Australia ICOMOS Burra Charter, as a preserved site and Mid Murray Council objectives as noted above. This power line is not fitting *'development at the interface between industrial activities and sensitive uses which is compatible with surrounding activities, particularly those in adjoining zones'* (industry objective 29, page 12) and is not in accord with Mid Murray Council Development Plan (land uses, objective 25, page 12).

The nearby non compliant wind farm layout and transmission line would inhibit the correct and diverse use of this compliant dwelling and associated historic assets (objectives 57 & 78, PDC 187 & 188).

Note: Electricity Act 1996 Part 1 Item 6, does not derogate from the EPA & Mid Murray Council Development Plan provisions to protect and encourage this use.

Trustpower published plans of a transmission line across my property **before any contact was made with me** and subsequently, unauthorised by me, published other such similar plans (they failed to accept long standing statutory biosecurity protocols that are in place).

The power transmission line detail is only now revealed, in the Development Plan Assessment Report, shown as a zig-zag alongside and over the sealed Milendella Road that will impact native roadside vegetation (PDC 184) and particularly impact significant old growth Eucalyptus

Camaldulensis at Cooke Creek (Appendix A), contrary to Mid Murray Development Plan (PDC 181.1, 184). This transmission line is a fire risk being placed over native pines on the windward side of 'The Pines Reserve' (PDC 182). Such a native vegetation reserve should not be compromised by the power line (PDC171(e)). *"The Pines Reserve...the woodland formed by native pines is a rare remnant"* (Woodward Clyde report for Mid Murray Council, sections 3.2.1 & 3.22).

The proposed power line against the southern boundary of section 653, Hundred of Jutland would cause "interference with low altitude aircraft movements associated with agriculture" (PDC 398 (d)) that is my practice (see Appendix B).

As advised by email to council on 18/05/2015 (see Appendix C1), the use of this Milendella Road for the transmission line route is contrary to Native Vegetation Regulations 2003 5(1)(d)(iv) regarding its impact on native vegetation. The Milendella Road route should be disallowed as **an alternative route is available** by the north side of Angus Valley Road (Mt Pleasant- Walker Flat Road) which is **clear of native vegetation** and is along 500 metres of sealed road crossed once, rather than 2650 metres of sealed road crossed four times. In this regard, due to the outcome, I believe my involvement was probably misrepresented to Council's Development & Environmental Services. This alternative route has been made available and known to Trustpower since November 2013. (see Appendix C2, note Appendix C3 and C4).

The Trustpower Development Assessment Report does not interpret the fact that the proposed Milendella Road section of its transmission line route coincides with the existing walking/cycling scenic tourist trail. This is contra to Mid Murray Development Plan (PDC 398(e)), particularly so, due to visual impact of glint from very shiny poles and spars (398(a)) and by the impact of corona discharge, hum and crackle emitted from the line (398(b)). If using the Miledella Road route it should be undergrounded adjacent to the bitumen. If using the Angas Valley Road route glint should be overcome with non reflective grey paint, such as epoxy with zinc dust (like Galvit E 40).

The type, the extreme size and glint of the poles was not revealed when requested in final stage group workshop, nor later shown in the publicly displayed photo montage on 27th February 2014 – *'photomontages must, through best endeavours display a pictorial representation that accounts for a conception that is realistic and believable and not just a token effort in order to tick the box on a checklist'* (EPA Wind Farm Development Guidelines p21*)*. The electromagnetic radiation, corona and the noise from transmission loads, for example, were not publicly disclosed nor are true impacts of other suggestions (power poles are not the colour of spun concrete poles. Turbines are white not painted special non-reflective grey).

On the final display day, 27/02/2014, an environmental consultant found the terms given for the discovery of Peregrine Falcon nesting sites were not as broad as those set by the Environment Protection Authority. The visual montage did not include the large overhead transmission lines, poles or associated glint that would be visible at a distance.

Improper conduct of concerted non disclosure and repeated misinformation was also the hallmark of a community workshop that I attended. The Sonus sound consultant was directed how to not answer the question relating to increases in setback distances of various specific turbines. Some dismissive answers were presented by Trustpower as assertive statements based on their misleading summary and their interpretation of cited reports; that led to a conclusion being a significant aberration of the real relevant facts. Assurances given as answers to concerns are now belatedly revealed in the Development Plan Assessment Report as untrustworthy. Open forum questioning of one independent consultant, subsequent to his report on land sale prices, revealed that his given terms of reference were not at all conducive to discovery of wind farm impact on the property market. Subsequently the Neighbour Deed was promoted as the only recompense for neighbouring lifestyle property owners wanting to quit their property because of the wind farm proposal. This is particularly unconscionable when the Neighbour Deed participants are now still required to sign any letter or letters of support presented by Trustpower for matters regarding or

incidental to the wind farm (see appendix D, Neighbour Deed – *encumbrances' are transferred with land but not payments, while purchased obligation of silence , and support for Trustpower, remains*). Matters changed since, or newly introduced, and with impacts contrary to understandings given, may otherwise have produced negative representation to the Development Planning Assessment Panel. Such a deed is an incentive for abuse by deceit/manipulation/coercion and could be used to cover criminal indifference.

This Trustpower wind farm plan as seen in the 'Palmer Wind Farm Development Plan Assessment Report' has unlawful elements of commission and omission. In any regard this dereliction must not be overlooked. The land here is not suited to this development, as in this case the current plan is not a legitimate wind farm plan.

It is unfortunate that Trustpower have demonstrated a lack of good faith and/or a lack competence to plan a wind farm to suit the land. They have failed the primary question regarding their proposal – *is this proper use of the land?* I have serious doubt that this applicant wishes to create a wind farm to suit the land in accordance with law, and thus execute their promise to strictly comply with all EPA regulations and accept the authority of the Mid Murray Council Development Plan. In fact, there is a surfeit of conditions not met that demonstrates indifference to reasonable diligence in planning. That also gives serious doubt to their capacity for duty of care in executing a plan. This impacts the secondary question, *is it reasonable to progress this application with a plethora of conditions to be applied?*

Yours faithfully

Peter Royal
"Royal Heath"

APPENDICES

Appendix A. Eucalyptus camaldulensis to be protected at Cooke Creek

Figure 1: Old growth River Red Gums (foreground 6.5m circumference, background on left 8.0m circumference)

Appendix B. Craig John, Agronomist

To whom it may concern,

I have been providing Peter Royal Pasture Agronomy Advice for his Hills Sheep Grazing Pastures over the last 5 years...
This hills area, being section 653 & 654 – 100 of Jutland, requires ongoing seasonal Fertiliser, Weed and Insect Pest control to sustain maximum Pasture and Livestock productivity.
Due to this steep hilly terrain, Fertiliser, Weed and Insect Pest control is fully relied upon the use of a specific designed Aeroplane that uses an airstrip in Old House paddock that is within range of section 653 & 654 – 100 of Jutland, for the application of required Herbicides, Insecticides & Fertiliser for Peter's livestock grazing enterprise. This airstrip is also used by other neighbouring farmers. The Old House paddock has been required for the use of an Airstrip due to the relocation of the previous airstrip at Robbies #2 paddock as a result of new power lines being erected.

Regards
Craig John

Agronomy Services
COOPERS FARM SUPPLIES
PO Box 60
Mount Pleasant SA 5235

Appendix C1. Email to Council regarding transmission line route

Dear Sirs,

Please accept this as formal notification.

Regarding provision of infrastructure, including infrastructure in the Public Interest and with reference to Regulation 5(1)(d)(iv) as seen on page 7 of a guide to the Native Vegetation Regulations 2003 as in force from 10 September 2009.
Please be advised that there is a practicable alternative to the proposed TrustPower transmission route via Milendella road. The alternative route, Angas Valley Road (Mt Pleasant- Walker Flat Road) and Old Cooke Hill Road would involve no clearance of vegetation.

Please be advised that the suggestion of this route was made to Mr Adrian Wortman, Commercial Manager, TrustPower. On or about Wednesday 6th November 2013, in the presence of a witness.

Also, please be advised; this alternative was agreed to as a practicable route by Mr Rontheo van Zyl, Wind Generation Development Manager, TrustPower on Thursday 27th February 2014. I agreed to facilitate an "overhang easement" on the north side (a licence to construct only, adjacent to this boundary but within my property, was offered). This agreement required no payment, but for the reasonable demand that all guidelines and the implications of their own documents pertaining to Palmer Wind Farm and ancillary matters would be complied with by TrustPower.

Subsequent to this Mr Michael Head met me for an onsite inspection and agreed it was a practicable route. A colour Google Earth image with the route clearly marked upon it was offered but declined.

Yours faithfully,
Peter Royal

Appendix C2. Alternative Transmission Line Route

Appendix C3. Co-operation with biosecurity induction/escort

To Whom It May Concern, regarding Royal Heath farm. Peter Royal was contacted as required regarding tree trimming on property and biosecurity protocols and prompt cooperation was given.

Gene Milburn 11-May-2015
Active Tree Services (contractor for SA Power Networks)

Appendix C4. P Ward, charitable overhang easement granted

Peter,

I would like to acknowledge that, some years ago, you willingly created an overhang easement on your property so that ETSA could install a power line to my property. The easement was of some considerable length, and I recall that there was never any thought of payment from me. I greatly appreciated/appreciate your generosity.

Best regards,
Peter

Appendix D. Neighbour Deed

(See Attachment 1)

Appendix E. TVCS School Camp Program

http://www.tvcs.sa.edu.au/our-school/school-life/trips/erudina/

Figure 2: Pioneer cottage (left) and historic gold mine (right)

Neighbour Deed

Trustpower Australia Holdings Pty Ltd

and

The party set out at Item 1 of the Commercial Terms Schedule as the 'Landowner'

Palmer Wind Farm, South Australia

Our Ref 384252/141

COMMERCIAL TERMS SCHEDULE

1.	**Landowner**	*[Insert name of landowner and ABN if a company. If the landowner is the trustee of a trust, also include the name of the trust (e.g. 'in its capacity as trustee for [XXX]')]*
2.	**Trust**	*[If the Landowner is not the trustee of a trust, include: 'Not applicable']* *[If the Landowner is the trustee of the trust, include details of the trust in the following form: "[Insert name of trust] as constituted by the trust deed dated on or about [insert date of trust deed], as amended from time to time".]*
3.	**Landowner notice details** (clause 6)	*[Insert Landowner address details for the purpose of service of notices]*
4.	**Land**	The whole of the land comprised in: • Certificate of Title Volume [*XXXXX*] Folio [*XXXXX*] • Certificate of Title Volume [*XXXXX*] Folio [*XXXXX*]
5.	**Landowner GST Status**	[Registered [*include ABN*]] / [Not registered]
6.	**Landowner banking details**	Account name: [*insert*] Account number: [*insert*] Account BSB number: [*insert*]

Date	
Parties	
1.	**Trustpower Australia Holdings Pty Ltd** ABN 15 101 038 331 (the ***Developer***)
2.	**The party set out at Item 1 of the Commercial Terms Schedule as the 'Landowner'** (the ***Landowner***)

Background	
A	We are undertaking studies to identify areas with wind power generation potential. These studies are being undertaken with the intent of developing utility scale Wind Farms. The commercial viability of these projects is dependent not only on the wind resource but also the relevant landowner's and local council's resolve to support such developments.
B	The Wind Farm Land has been researched by Us and has been identified as worthy of further work and detailed wind measurement to gauge its potential for Wind Farm Development. To facilitate the Development by Us of a Wind Farm on the Wind Farm Land, You have agreed to restrict Your use of the Land on the terms set out in this Deed.

It is agreed as follows.

1. Preliminary

1.1 Definitions

In this Deed:

Business Day means a day other than a Saturday, Sunday or public holiday in Adelaide, South Australia.

Claim means prosecution, claim, writ, action, proceeding, right, entitlement, suit, proof of debt, demand, cost and expense or other like matter whether present, prospective or contingent whether held

individually, jointly or jointly and severally and includes the commencement or continuation of proceedings in any court.

Commercial Terms Schedule means the schedule of that name set out at the beginning of this Deed.

Compliant Dwelling means a Dwelling in relation to which all legally required development and planning consents have been obtained.

CPI Adjustment means the consumer price index adjustment mechanism set out in clause 2(b).

Develop, Developing and ***Development*** include the installation and maintenance of Wind Power Equipment necessary for the purpose of generating electricity from the wind flow over the Wind Farm Land and transmitting the generated electricity from the Wind Farm Land.

Dispose means assign, transfer, otherwise dispose of or grant or permit or suffer the grant of any legal or equitable interest (either in whole or in part) whether by sale, lease, declaration or creation of a trust or otherwise. ***Disposed*** has a similar meaning.

Dwelling means a building or part of a building used as a self-contained residence.

Land means the land described at Item 4 of the Commercial Terms Schedule.

Landowner Activities means:

(a) agricultural activities undertaken by You from time to time, including sheep farming, cattle farming, dairy farming, deer farming, horticulture, viticulture and any type of pastoral farming, annual rotation cropping in respect of crops to be harvested for the production of food and fodder products and other such products of the soil and all activities normally incidental thereto;

(b) the use of Compliant Dwellings on the Land that:

  (i) existed as at the date of this Deed; or

  (ii) in relation to which We have provided our written consent; and

(c) such other activities consented to by Us in writing,

but excluding the building, erecting or placing of, or permitting the building, erecting or placing of, any Dwelling within two (2) kilometres of a Wind Turbine or a Proposed Wind Turbine from the date of this Deed, other than where such Dwelling has been consented to by Us in writing (such consent not to be unreasonably withheld,

unless such Dwelling will adversely affect the operation or development of the Wind Farm).

Landowner Undertakings means each undertaking set out in Schedule 1.

Letter of No Objection means a letter in the form set out in Schedule 4 (or such other form reasonably required by Us).

Loss means any cost, expense, loss (including consequential loss), damage, claim, action, proceeding or other liability (whether in contract, tort or otherwise), however arising (whether or not presently ascertained, immediate, future or contingent) and includes legal costs on a full indemnity basis.

Neighbouring Turbine means a Wind Turbine that is constructed from time to time and is part of the Wind Farm, that is within:

(a) 1 kilometre of the Land; or

(b) 2 kilometres of a Compliant Dwelling constructed on the Land as at the date of this Deed.

Planning Approval means the planning approval in respect of the Wind Farm granted or to be granted under the *Development Act 1993* (SA), as that approval is amended from time to time.

Proposed Wind Turbine means each Wind Turbine proposed to be installed and constructed on the Wind Farm Land, the location of which is shown from time to time in the Planning Approval.

Related Body Corporate has the meaning provided by section 50 of the *Corporations Act 2001* (Cth).

Schedule means a schedule set out at the end of this Deed.

Term means the period commencing on the date of this Deed and ending on the earlier of:

(a) the termination of this Deed by You or Us; and

(b) the date that is 60 years after the date of this Deed.

We, Us or ***Our*** means the Developer and each of its Related Bodies Corporate from time to time (as applicable).

Wind Farm means the wind farm project developed or to be developed by Us, which incorporates various portions of land situated near Palmer 5237, South Australia, as described in the Planning Approval or any part of it.

Wind Farm Land means any part of the land delineated by an oval line on the Wind Farm Plan, which is:

(a) part of the Wind Farm; and

(b) owned, leased or licensed (or is proposed to be owned, leased or licensed) by Us from time to time or in relation to which an easement has been granted (or is proposed to be granted) to Us from time to time.

Wind Farm Operations means the establishment, operation, maintenance, use, repair and replacement of Windpower Facilities and all other related activities.

Wind Farm Plan means the plan set out in Schedule 3.

Wind Turbine means the equipment which converts wind energy into electricity, consisting (among other parts) of one or more piers or foundations, a tower, transformer, nacelle, electronic control equipment and a rotor with blades.

Windpower Equipment means all wind driven electricity generation equipment and facilities used in the exploitation of wind to produce electricity including but not limited to Wind Turbines, conductors, terminals, supply points, overhead and underground electrical transmission or distribution lines, transmission or distribution line towers, poles, pylons, electric transformers, power (including solar power) generation facilities to be operated in conjunction with Wind Turbine installations, meteorological towers and wind measurement equipment, meters and other monitoring and safety devices, maintenance yards, and all other ancillary facilities and equipment which We consider necessary or desirable for the wind driven generation transmission and distribution of electricity.

Windpower Facilities means all Windpower Equipment installed or placed on the Wind Farm Land from time to time or other land connected with the Wind Farm which may be used for production of wind generated electricity.

You or ***Your*** means the Landowner.

1.2 Interpretation

In this Deed, unless it is stated to the contrary:

(a) the singular includes the plural and conversely;

(b) a gender includes all genders;

(c) if a word or phrase is defined, its other grammatical forms have a corresponding meaning;

(d) a reference to a person, corporation, trust, partnership, unincorporated body or other entity includes any of them;

(e) a reference to a clause, schedule or annexure is a reference to a clause of, or a schedule or annexure to, this Deed;

(f) a reference to an agreement or document (including this Deed) is to the agreement or document as amended, varied, supplemented, novated or replaced, except to the extent prohibited by this Deed or that other agreement or document;

(g) a reference to ***writing*** includes any method of representing or reproducing words, figures, drawings, or symbols in a visible form but excludes any communication using electronic mail;

(h) a reference to a party to this Deed or another agreement or document includes the party's successors, permitted substitutes and permitted assigns (and, where applicable, the party's legal personal representatives);

(i) a reference to legislation or to a provision of legislation includes a modification or re-enactment of it, a legislative provision substituted for it and a regulation or statutory instrument issued under it;

(j) a reference to conduct includes, an omission, statement or undertaking, whether or not in writing;

(k) a reference to an ***agreement*** includes any undertaking, deed, agreement and legally enforceable arrangement, whether or not in writing;

(l) a reference to a document includes an agreement (as so defined) in writing and any certificate, notice, instrument and document of any kind;

(m) a reference to ***dollars*** and ***$*** is to Australian currency;

(n) a reference to a right or obligation of any two or more persons confers that right, or imposes that obligation, as the case may be, jointly and severally;

(o) the meaning of general words is not limited by specific examples introduced by ***including***, or ***for example***, or similar expressions;

(p) references to ***agree***, ***approve*** or ***consent*** are references to agreement, approval or consent (as the case may be) in writing;

(q) nothing in this Deed is to be interpreted against a party solely on the ground that the party put forward this Deed or any part of it;

(r) no amendment or variation of this Deed is valid or binding on a party unless made in writing executed by all parties; and

(s) if any provision of this Deed is illegal, invalid or unenforceable then:

(i) where the relevant provision can be read down so as to give it a valid and enforceable operation of a partial nature it must be read down to the extent necessary to achieve that result; and

(ii) in any other case the relevant provision must be severed from this Deed in which event the remaining provisions of this Deed operate as if the severed provision had not been included.

1.3 Headings

Headings do not affect the interpretation of this Deed.

1.4 Schedules and annexures

Schedules and annexures form part of this Deed.

2. Fees

(a) We will pay to You the fees and other amounts specified in Schedule 2 (each a *'Fee'*), at the times specified in Schedule 2 and to the bank account (if any) specified in Item 6 of the Commercial Terms Schedule (or such other bank account advised by You to Us in writing).

(b) If a Fee is stated in Schedule 2, to be subject to variation in accordance with the CPI Adjustment, that Fee will be reviewed immediately prior to the date on which We are required to pay to You the Fee. Such review will be made as follows:

(i) subject to clause 2(b)(ii), the Fee that is to be paid will be determined by multiplying the relevant Fee specified in Schedule 2 by the following fraction:

$$\frac{X}{Y}$$

where "X" is the Consumer Price Index for Adelaide (All Groups) (as defined below) in respect of the quarter ending immediately prior to the date on which We must pay the Fee and where "Y" is the Consumer Price Index

for Adelaide (All Groups) (as defined below) in respect of the quarter ending immediately prior to the date of this Deed.

(ii) If:

(A) the Commonwealth of Australia ceases to publish the Consumer Price Index; or

(B) the basis of calculating the Consumer Price Index is substantially changed,

THEN the parties will use the nearest equivalent index to the current Consumer Price Index.

(iii) In the case of each review of the Fee pursuant to clauses 2(b)(i) and 2(b)(ii) the stipulations herein contained relating to time, method and manner of payment of the Fee shall (with necessary changes) apply to the Fee so agreed or determined.

(iv) In this Deed a reference to the 'Consumer Price Index for Adelaide (All Groups)' shall mean and include the Consumer Price Index for Adelaide (All Groups) published from time to time by the Australian Bureau of Statistics.

3. Agreement

3.1 What You agree to do

You acknowledge and agree that during the Term:

(a) We will be conducting Wind Farm Operations on the Wind Farm Land; and

(b) You will comply with the Landowner Undertakings (as described in Schedule 1).

3.2 Our agreement

In designing or constructing the Wind Farm, We agree to not locate a Wind Turbine within 1 kilometre of any Compliant Dwelling on the Land as at the date of this Deed.

3.3 Damages not adequate

(a) You acknowledge and agree with Us that any derogation or impairment of Our right or ability to conduct Wind Farm Operations on the Wind Farm Land could affect the operation

of the Wind Farm with the consequence that either damages would not be an adequate remedy or that the quantum of damage would be so great as to be beyond Your capacity to pay and satisfy.

(b) You consent to an order made on application ex parte by Us restraining You from engaging in any conduct in breach of any covenant or undertaking contained in this Deed provided that We agree not to seek any orders for costs against You as regards any such ex parte application.

3.4 Remedying Your breach

If You default in the performance of any of Your obligations under this Deed:

(a) it shall be lawful for Us to do or procure the doing of all acts matters and things necessary to, make good such default or breach to Our satisfaction (but without any obligation upon Us to do so), without prejudice to any of Our other rights powers authorities or remedies; and

(b) any and all moneys which We shall pay sustain incur or become liable to pay to any third party pursuant to this clause together with all costs and expenses properly incurred by or on Our behalf in relation to the making good of such default or breach, shall be payable forthwith upon demand by Us to You.

4. Letter of No Objection

(a) You understand and acknowledge that:

(i) We have shown and explained to You the effect of the Letter of No Objection; and

(ii) the Letter of No Objection (if required), once executed by You will enable Us to lodge an application for the Planning Approval for the Wind Farm.

(b) You further agree to sign each Letter of No Objection and provide it to Us within 5 Business Days of receiving a written request to do so from Us.

(c) You acknowledge and agree that We can require You to sign the Letter of No Objection multiple times.

(d) You are not required to sign a Letter of No Objection pursuant to this clause 4 if, at the time that We require You to sign a Letter of No Objection, We propose to locate a Wind Turbine

within 1 kilometre of a Compliant Dwelling existing on the Land at that time.

5. Confidentiality

(a) You must treat as confidential all information made available to You pursuant to this Deed (including the existence of this Deed) and not disclose such information to any person other than:

(i) if You are required to do so by any law;

(ii) to a purchaser of the Land who undertakes to comply with the provisions of this clause 5;

(iii) to a member of Your immediate family who undertakes to treat all such information as confidential;

(iv) to Your legal advisers, accountants or auditors, provided that the person receiving the information undertakes to comply with the provisions of this clause 5;

(v) in regard to any information that is in the general public domain (other than through the breach by You of Your confidentiality obligations pursuant to this Deed);

(vi) to enable You to comply with Your obligations pursuant to clause 4 of this Deed;

(vii) where the information is of a type that the disclosure of which is not to be restricted pursuant to any formal policy published by the Clean Energy Council, to which We have endorsed Our support; or

(viii) with Our prior written approval.

(b) The obligations set out in this clause are continuing obligations.

6. Notices

6.1 Manner of giving notice

Any notice given under this Deed must be in writing and signed by or for the sender and notices must be delivered by post, hand, fax or email to the relevant address below:

(a)	to the Landowner:	The address set out in Item 3 of the Commercial Terms Schedule
(b)	to the Developer:	Trustpower Australia Holdings Pty Limited Address: GPO Box 1512, Adelaide, South Australia, 5001 Fax: 1300 888 282

6.2 When delivered

(a) Notices will be taken to be duly given:

(i) in the case of delivery in person, when delivered;

(ii) in the case of delivery by post, 2 Business Days after the date of posting (if posted to an address in the same country) or 7 Business Days after the date of posting (if posted to an address in another country);

(iii) in the case of fax, on receipt by the sender of a transmission control report from the despatching machine showing the relevant number of pages and the correct destination fax machine number or name of recipient and indicating that the transmission has been made without error; and

(iv) in the case of email, on receipt by the sender of an acknowledgement of receipt from the recipient (including an acknowledgement by way of an automated 'read receipt').

(b) If the result under clause 6.3(a) is that a notice would be taken to be given on a day that is not a Business Day in the place to which the notice is sent, then it will be taken to have been given on the next Business Day in that place.

7. GST

7.1 Interpretation

Unless the contrary intention appears, the terms and phrases used in this clause have the meanings given to them in the *A New Tax System (Goods and Services Tax) Act 1999* (Cth) (***GST Act***).

7.2 GST exclusive consideration

Unless otherwise specified in this Deed, the consideration expressed in this Deed for any taxable supply made under or in connection with this Deed does not include GST (***GST exclusive consideration***).

7.3 Payment of GST

The recipient of a taxable supply under or in connection with this Deed must, in addition to and at the same time as the GST exclusive consideration is payable, pay to the supplier an amount equal to the amount of GST imposed by the GST law from time to time on the taxable supply.

7.4 Reimbursement of costs and expenses

To the extent that the consideration for the taxable supply consists of the reimbursement of costs and expenses incurred by the supplier, those costs and expenses must be:

(a) reduced by the amount of any input tax credit available to the supplier; and

(b) grossed-up for GST under this clause.

7.5 Tax invoice

(a) If in Item 5 of the Commercial Terms Schedule, the 'Landowner GST Status' is 'Not registered', You:

(i) represent and warrant to Us that You are not registered for GST and are not required to be registered for GST purposes; and

(ii) undertake to notify Us as soon as possible after You are required to be registered for GST purposes.

(b) If in Item 5 of the Commercial Terms Schedule, the 'Landowner GST Status' is 'Registered' or You have otherwise notified Us that You are registered for GST or are required to be registered for GST:

(i) We (as recipient of any supply under this Deed) can and will issue recipient created tax invoices (***RCTIs***) in respect of supplies pursuant to this Deed;

(ii) You (as supplier) will not issue tax invoices in respect of supplies to Us made by You pursuant to this Deed;

(iii) We represent and warrant to You that the Developer is registered for GST as at the date of this Deed and We

undertake to notify You if the Developer ceases to be registered for GST;

(iv) You represent and warrant to Us that You are registered for GST:

(A) as at the date of this Deed, where the 'Landowner GST Status' is stated as 'Registered' in Item 5 of the Commercial Terms Schedule;

(B) as at the date that You are required to be registered for GST, where You have notified Us, after the date of this Deed, that You are required to be registered for GST,

and You undertake to notify Us if You cease to be registered for GST;

(v) the Developer will issue the original or a copy of the RCTI to You within 28 days of the making, or determining the value, of a supply made by You to Us pursuant to this Deed, and We will retain the original or a copy;

(vi) the Developer will issue the original or a copy of an adjustment note to You within 28 days of an adjustment and will retain the original or a copy; and

(vii) We will not issue a document that would otherwise be a RCTI, on or after a date when the Developer or You have failed to comply with any of the requirements of the *A New Tax System (Goods and Services Tax) Act 1999 Classes of Recipient Created Tax Invoices Determination (No. 1) 2000* or any modification, consolidation, amendment, re-enactment or replacement of that Determination.

(c) You indemnify Us against Loss which may be incurred or sustained by Us as a result of You providing any incorrect, false, misleading or otherwise inaccurate information whatsoever in relation to any supplies made by You to Us pursuant to this Deed or relating to Your GST status, including information relied upon by Us to issue a RCTI.

8. Charge and Caveat

(a) You hereby grant a charge in favour of Us over the Land to secure to Us:

(i) the performance by You of all of Your obligations under this Deed; and

(ii) Our right to receive any monies pursuant to this Deed, including but not limited to any monies or damages payable by You to Us on termination of this Deed for any reason whatsoever.

(b) You consent to Us registering at Our own cost a permissive caveat over the Land to secure the charge granted by You to Us in clause 8(a).

(c) We agree, at Our own cost to remove the caveat immediately following the earlier of:

(i) the expiry of the Term; or

(ii) termination of this Deed.

9. Assignment and other dealings

(a) Your rights and obligations under this Deed (***Subject Rights***) are personal.

(b) Subject to clause 9(c) the Subject Rights and Your interest in the Land cannot be Disposed of, Encumbered or otherwise dealt with without Our prior written consent.

(c) Notwithstanding any provision of this Deed, You may transfer, lease, sell or otherwise Dispose of the whole or any part of the Land or any interest in it or assign the Subject Rights to any other person, provided that such person covenants in favour of Us to observe and perform all Your relevant obligations under this Deed, on terms and conditions and in a form acceptable to Us (acting reasonably).

(d) You are solely responsible for and agree to pay the Our costs (including legal costs on a solicitor and own client basis) and expenses incurred in connection with the preparation, negotiation and execution of the document required by clause 9(c).

10. Trustee Provisions

(a) **(Not a trustee)** Where no trust is specified in Item 2 of the Commercial Terms Schedule, You represent and warrant to Us that You do not own the Land as the trustee of any trust.

(b) (**Trustee**) Where a trust is specified in Item 2 of the Commercial Terms Schedule (the ***Trust***):

(i) You represent and warrant to Us that:

(A) You are the sole trustee of the Trust;

(B) You are entitled to be indemnified out of the assets of the Trust in respect of Your obligations pursuant to this Deed and those assets are sufficient to meet those obligations;

(C) You have full power and authority to enter into this Deed as trustee of the Trust;

(D) You have complied with the terms of the trust deed constituting the Trust (***Trust Deed***) and are duly authorised under the terms of the Trust Deed to enter into this Deed; and

(E) You are liable personally and as trustee of the Trust in respect of all of Your liabilities and obligations under this Deed; and

(ii) You (both in Your own right and as trustee of the Trust) must:

(A) (**remain sole trustee**) not retire as trustee of the Trust, do anything which would cause or permit Your removal or permit any additional or substitute trustee to be appointed;

(B) (**comply with obligations**) comply with Your obligations as trustee of the Trust, whether under the Trust Deed or otherwise;

(C) (**property acquired**) ensure that all property that is acquired for the Trust is acquired in its name;

(D) (**powers**) ensure that Your powers under the Trust Deed are not revoked or modified;

(E) (**no resettlement**) ensure that no part of the Trust assets are resettled, set aside or transferred (other than a transfer for valuable consideration) to any person, whether as trustee or otherwise, or mixed with any other property;

(F) (**right of indemnity**) not release, dispose of or otherwise prejudice Your:

(1) rights of indemnity against the Trust assets; or

(2) equitable lien over the Trust assets,

and, at Our request, must exercise those rights and that lien and facilitate Our subrogation to them; and

(G) (**no amendment**) ensure that the Trust Deed is not amended without Our consent (such consent not to be unreasonably withheld).

(c) (**Reliance**) We have relied upon the warranties given by You in clauses 10(a) and 10(b)(i) of this Deed and have entered into this Deed on the basis of Our reliance on those warranties.

11. General Provisions

11.1 Term and Termination

(a) This Deed may be terminated at any time by Us on not less than three calendar months' notice in writing to You. However no monies paid in advance shall be repaid or demanded to be repaid. If this Deed is terminated by Us pursuant to this clause, We agree, for a period equivalent to the remainder of the Term, had We not terminated this Deed, to not construct a Wind Turbine within 1 kilometre of the boundary of the Land or within 2 kilometres of a Compliant Dwelling constructed on the Land as at the date of this Deed.

(b) This Deed may be terminated by You by providing written notice to Us:

(i) If the Development of the Wind Farm by Us has not commenced by the date that is 10 years after the date of this Deed; or

(ii) If We remove the Neighbouring Turbines for any reason and do not replace them with Neighbouring Turbines within a reasonable time.

(c) Notwithstanding any other provision of this Deed, clauses 1, 5, 6, 7, 10 and 11 survive the termination of this Deed.

11.2 Best endeavours

The parties agree to use their best endeavours at all times to ensure that each party observes and performs the respective duties and

obligations required of them under the terms and conditions of this Deed.

11.3 Entire agreement

This Deed contains the entire agreement between the parties with respect to its subject matter and supersedes all prior agreements and understandings between the parties in connection with it.

11.4 No waiver

(a) No failure to exercise nor any delay in exercising any right, power or remedy by a party operates as a waiver.

(b) A single or partial exercise of any right, power or remedy does not preclude any other or further exercise of that or any other right, power or remedy.

(c) A waiver is not valid or binding on the party granting that waiver unless made in writing.

11.5 Further assurances

Each party agrees to do all things and sign all documents necessary or desirable to give full effect to the provisions of this Deed and the transactions contemplated by it.

11.6 No merger

(a) The rights and obligations of the parties will not merge on the completion of any transaction contemplated by this Deed.

(b) They will survive the execution and delivery of any assignment or other document entered into for the purpose of implementing a transaction.

11.7 Costs

Each party must bear its own costs arising out of the negotiation, preparation and execution of this Deed.

11.8 Governing law and jurisdiction

(a) This Deed is governed by the laws of South Australia.

(b) Each party submits to the non-exclusive jurisdiction of courts exercising jurisdiction there in connection with matters concerning this Deed.

11.9 Counterparts

(a) This Deed may be executed in any number of counterparts.

(b) All counterparts when exchanged will be taken to constitute one document.

(a) Counterparts may be exchanged via facsimile, email or other electronic means.

Schedule 1

Landowner Undertakings

Part A – Non-Objection Undertakings

(a) The provisions of clause (b) of Part A of this Schedule do not apply:

(i) in relation to any breach of a relevant law (including, for the avoidance of doubt, a condition of the Planning Approval) by Us in respect of the Wind Farm; or

(ii) to the extent that there is any substantiated and significant interference (whether direct or indirect) with You engaging in the Landowner Activities.

(b) Except where the provisions of clause (a) of Part A of this Schedule provide that this clause (b) does not apply:

(i) You will not at any time make any objection or permit or assist any objection to be made by any occupier of the Land in relation to any Wind Farm Operations whatsoever conducted or to be conducted on the Wind Farm Land;

(ii) without limitation, neither You nor any occupier of the Land is to be party to or otherwise concerned or interested in any proceedings before any court, tribunal or registered agencies, public or governmental authority (including being party to a Claim against Us or any other person in respect of any Wind Farm Operations) if such proceedings or Claim are likely to have the effect of preventing Us from conducting Wind Farm Operations on the Wind Farm Land, limiting such operations or imposing any conditions on the conduct of such operations; and

(iii) without limiting the generality of clauses (b)(i) or (b)(ii) of Part A of this Schedule, You will not at any time make or permit or assist any Claim in relation to or objection against anything incidental to the Wind Farm Operations conducted on or from the Wind Farm Land.

Part B – Construction Undertakings

(a) You will not build, erect or place any object facility or material upon the Land being of a height greater than six (6) metres above natural ground level and greater in length than six (6) metres, within five

hundred (500) metres of any Wind Turbine or a Proposed Wind Turbine on the Wind Farm Land without Our prior written consent.

(b) You will not build, erect or place, or permit the building, erecting or placing of, any Dwellings upon the Land (and will not take any steps in relation to seeking planning or other approval for the construction of such buildings) within two (2) kilometres of any Wind Turbine or Proposed Wind Turbine erected or to be erected on the Wind Farm Land without Our prior written consent (which will not be unreasonably withheld, unless the building, erection or placing of such Dwelling will adversely affect the operation or development of the Wind Farm).

(c) Without limiting clauses (a) or (b) of Part B of this Schedule, You will not on the Land, undertake any activity which may interfere with or adversely affect the operation of the Windpower Facilities on the Wind Farm Land, without Our prior written consent.

(d) You will not plant or permit the planting of any trees, shrubs or other vegetation on the Land which now and/or with the passage of time will have a height in excess of six (6) metres (excepting trees that have a maximum height of twenty (20) metres and are no denser than ten (10) trees to the hectare at any time) and in Our reasonable opinion may interfere with the Wind Farm Operations on the Wind Farm Land.

(e) Your activities on the Land, must not interfere with the construction, installation, erection, maintenance, operation or replacement of the Windpower Equipment on the Wind Farm Land, or the conduct of the Wind Farm Operations on the Wind Farm Land.

(f) Without limiting the generality of clause (e) of Part B of this Schedule, You must not interfere or permit interference with the wind speed or wind direction over the Land, whether by placing wind turbines, planting trees or constructing buildings or other structures, or by engaging in or permitting any other activity on the Land that might cause a decrease in the output or efficiency of Our Windpower Facilities on the Wind Farm Land.

Schedule 2

Fees

Signing Fee

We will pay You within one month of the date of this Deed a one off fee of $1,000.

Pre-Construction Fee

During the period beginning on the date that is one year after the date of this Deed and ending on the earlier of the end of the Term and the date that there are one or more Neighbouring Turbines, We will pay You in advance and within one month of each 1 July, an annual fee of $500 (***Pre-Construction Fee***).

Neighbour Fee

We will pay You in advance and within one month of the start of each financial year (1 July to 30 June) for each financial year period during the Term (or part thereof) that there are one or more Neighbouring Turbines, a fee calculated in accordance with the following formula:

> Annual neighbour fee payment (***Neighbour Fee***) = $2,500 plus $100 per Neighbouring Turbine (without double counting Wind Turbines that satisfy multiple criteria of the definition of 'Neighbouring Turbine').

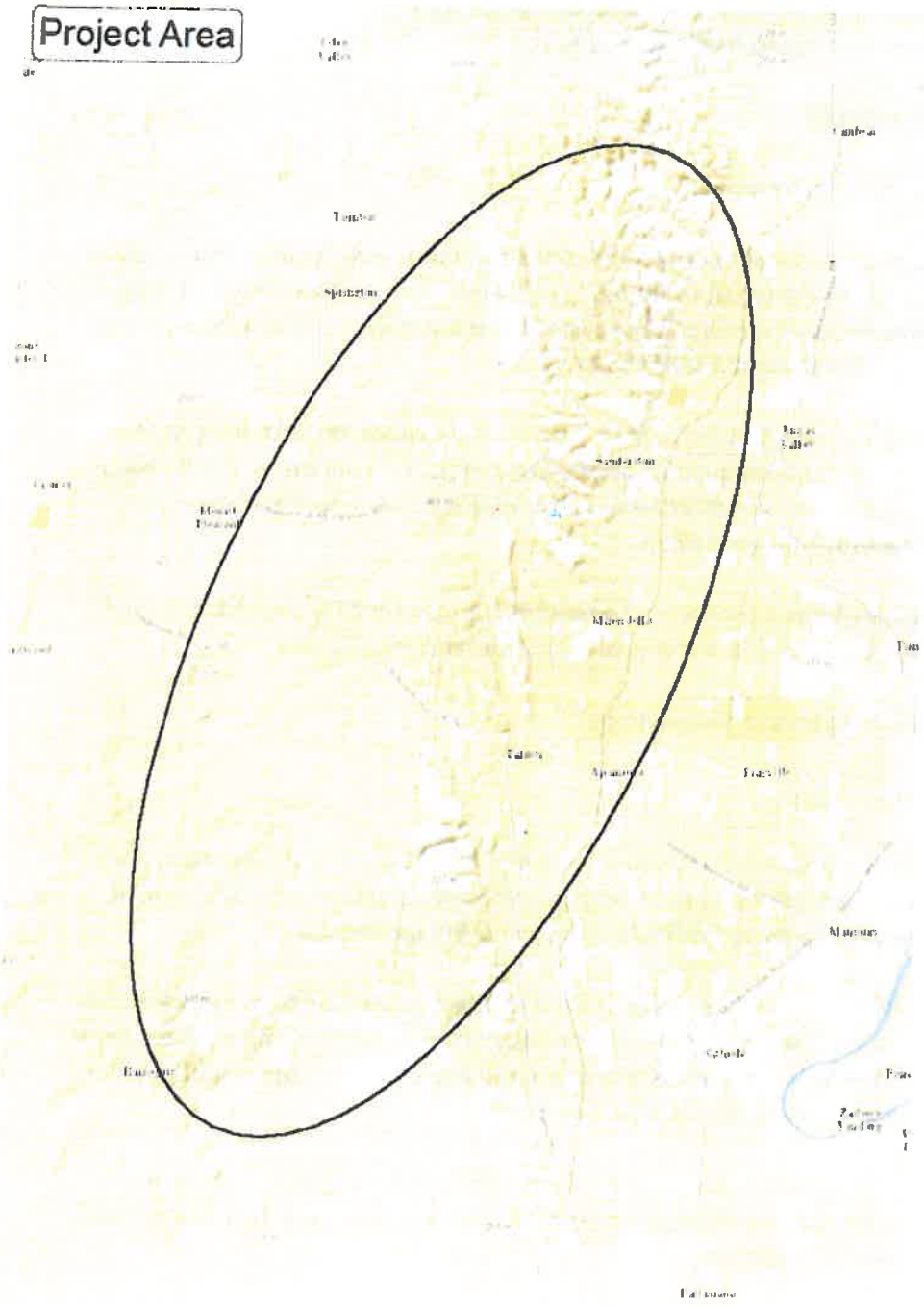
The Neighbour Fee will be subject to CPI Adjustment.

Note

For the avoidance of doubt, We will not pay You both the Pre-Construction Fee and the Neighbour Fee for the same period of time.

Schedule 3

Wind Farm Plan



Schedule 4

Letter of No Objection

[*Insert address of relevant planning authority/council*]
C/- Trustpower Australia Holdings Pty Ltd
GPO Box 1512
Adelaide SA 5001

To whom it may concern,

This Letter of No Objection relates to the wind farm proposed to be developed by Trustpower Australia Holdings Pty Ltd (or its related body corporate) (***Trustpower***), which will incorporate various portions of land situated near Palmer, South Australia 5237 (***Wind Farm***).

This Letter of No Objection may be used by Trustpower for the purpose of seeking any governmental, semi-governmental, regulatory or council approval or for any other process, now or in the future, relating to the development of the Wind Farm.

I am the registered proprietor of land that is in the vicinity of the Wind Farm and which is comprised in the following Certificate(s) of Title:

- Volume [*insert*] Folio [*insert*],

(the ***Land***).

Given the proximity of the Land to the Wind Farm, I was approached by Trustpower in relation to entering into a 'Neighbour Deed', which I subsequently entered into with Trustpower (***Neighbour Deed***).

Prior to the date of this Letter of No Objection, Trustpower outlined the location of the wind turbines comprising the Wind Farm, with respect to my Land. Trustpower explained the impact that those wind turbines would have on my use and enjoyment of my Land.

Subject to the wind turbines comprising the Wind Farm being more than 1 kilometre from any dwelling constructed on the Land (as at the date of this Letter of No Objection):

- I agree to not take any action that will cause detriment to the development, construction or operation of the Wind Farm; and

- I agree to not object to the establishment, operation, maintenance or use of the Wind Farm or activities related or incidental to the Wind Farm.

Yours sincerely,

[*insert signature clause for Landowner*]

Executed as a deed.

Executed by **Trustpower Australia Holdings Pty Ltd**
in accordance with section 127(1) of the Corporations Act 2001 (Cth)

_____	_____
Signature of Director	Signature of Director/Secretary
_____	_____
Name of Director	Name of Director/Secretary

[*Note: choose appropriate Landowner execution clause below and delete other clauses*]

[*Where the landowner is an individual*]

Signed by [XXXXXX]:

in the presence of:

_____
Signature of Landowner

_____
Signature of Witness

_____
Name of Witness

[*Where the landowner is an individual and holds the Land as trustee for a trust*]

Signed by [XXXXXX] in their personal capacity and as trustee for [*insert name of trust*]:

_____
Signature of Landowner

in the presence of:

_____
Signature of Witness

_____
Name of Witness

[Where the landowner is a company]

Executed by [XXXXXX] in
accordance with s127(1) of the
Corporations Act 2001 (Cth):

_____	_____
Director	Director/Secretary
_____	_____
Name of Director	Name of Director/Secretary

[Where the landowner is a company and holds the Land as trustee for a trust]

Executed by [XXXXXX] in
accordance with s127(1) of the
Corporations Act 2001 (Cth), in its
personal capacity and as trustee for
[***insert name of trust***]:

_____	_____
Director	Director/Secretary
_____	_____
Name of Director	Name of Director/Secretary

[*Where the landowner is executing by an attorney*]

Signed for and on behalf of
[XXXXXX] by their duly appointed
attorney, pursuant to a power of
attorney dated _____
in the presence of:

_____ _____
Signature of Witness Signature of Attorney

_____ _____
Name of Witness Name of Attorney

IEMAIL20155917

original IE720155349

Melissa Marschall

From: Peter Royal <peter@royalheath.com.au>
Sent: Monday, 1 June 2015 12:20 PM
To: PostBox
Subject: IEMAIL20155917 - 711/072/14 - addendum to Appendix E, P Royal-rep on dev app 711/013/14
Attachments: No Subject

The Acting Director Development & Environmental Services' Mid Murray Council.

Please accept this attachment as an addendum to Appendix E for my Representation to Development application 711/013/14.

Peter Royal.

Melissa Marschall

From: lorrlew@internode.on.net
Sent: Friday, 15 May 2015 2:03 PM
To: peter@royalheath.com.au
Subject: No Subject

Follow Up Flag: Follow up
Flag Status: Flagged

Mr. Peter Royal
Sanderston,
S.A.

We are pleased to confirm that we have used your property for an art camp, where we found the peaceful and quiet environment there very amenable to teaching a largish group of adult artists.
The hills escarpment is a magnificent scenic feature and we are glad you still have the gift of John Sprod's painting featuring it in your entrance hall and another small work by Terry in your dining room.
We presume Margaret's various works are still featured in your lounge and her large work of your grand heritage stone buildings in the bedroom where you can fondly remember your family's history.

Terry and Lorraine Lewitzka,
Lewitzka Art Studios,
Telegraph Station,
Victor Harbor, 5211
S.A.

DEVELOPMENT ACT, 1993

REPRESENTATION ON APPLICATION
CATEGORY 3

Development Number 711/072/14

My Name PETER GRAETZ My Telephone Number 0447 817 035

My Postal Address PO Box 27 CAMBRAI

Postcode 5353

This representation is in relation to the application by: *Trustpower Australia Holdings Pty Ltd*

for consent to establish the *Palmer Wind Farm*

The address of my affected property is 997 Three Chain Road CAMBRAI

The specific aspects of the application to which I make comments on are:

The windfarm will co exist very well with the local grazing operations.
The actual ground footprint is very small and thus no or very minimal environemental impact on the hills landscape.
The access tracks would greatly assist any ground fire fighting efforts.
The local area would benifit from the financial injection and it will help drought proof host properties.

My concerns would be overcome by:

Council approving PALMER WIND FARM Development.

☑ I do not wish to be heard by the Development Assessment Panel

☐ I do wish to be heard personally by the Development Assessment Panel

- ☐ I will represent myself
  or
- ☐ I will be represented by _____

Date 19th May 2015 Signed P P Graetz

ILT 2015 5398

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DEVELOPMENT ACT, 1993

REPRESENTATION ON APPLICATION
CATEGORY 3

Development Number 711/072/14

My Name Pam Graetz My Telephone Number 0408274803

My Postal Address P.O Box 27 CAMBRAI

Postcode 5353

This representation is in relation to the application by: *Trustpower Australia Holdings Pty Ltd*

for consent to establish the *Palmer Wind Farm*

The address of my affected property is 997 Three Chain Rd Cambrai

The specific aspects of the application to which I make comments on are:

Having Roads made in the hills will help fire fighting efforts. (access tracks)

The wind farm will coexist well with the local grazing operations.

The actual ground footprint is very minimal thus no enviromental impact on the hills landscape.

My concerns would be overcome by:

Council allowing Palmer Wind Farm Development.

☑ I do not wish to be heard by the Development Assessment Panel

☐ I do wish to be heard personally by the Development Assessment Panel

☐ I will represent myself
or
☐ I will be represented by ______

Date 19-5-2015 Signed [signature]

EMAIL 20155 20

56

DEVELOPMENT ACT, 1993

REPRESENTATION ON APPLICATION
CATEGORY 3

Development Number 711/072/14

My Name GILLON McLACHLAN My Telephone Number 0418104080

My Postal Address 18 WYNNSTAY RD, PRAHRAN

MELBOURNE, VIC Postcode 3181

This representation is in relation to the application by: *Trustpower Australia Holdings Pty Ltd*

for consent to establish the *Palmer Wind Farm*

The address of my affected property is ROSEBANK, MT. PLEASANT, 5235

The specific aspects of the application to which I make comments on are:

(1) I have substantial property interests adjacent to the proposed wind farm which will suffer significant capital decrease.
(2) It will cause significant environmental damage to the land, the vegetation, the fauna as well as create noise pollution.
(3). Desecration of the natural beauty of the district & region
(4). Destruction of potential tourism opportunities (and other development opp's)
(5) It will cause extreme division in the community.

My concerns would be overcome by:

Blocking the proposed wind farm.

☐ I do not wish to be heard by the Development Assessment Panel

☒ I do wish to be heard personally by the Development Assessment Panel

☒ I will represent myself
or

☐ I will be represented by _____

Date 19/5/2015 Signed _____

Geoff Parsons

From: Gillon.McLachlan@afl.com.au
Sent: Tuesday, 19 May 2015 4:28 PM
To: Geoff Parsons
Subject: Palmer Wind Farm Development Application information - Representation on Application Category 3
Attachments: img-519175103-0001.pdf

Dear Mr Parsons

Please find attached the signed document from Gillon McLachlan in relation to Development Number 711/072/14.

Can you please confirm you have received this.

Thank you

Donna

Gillon McLachlan
Chief Executive Officer
AFL HOUSE | 140 Harbour Esplanade | Docklands VIC 3008
GPO Box 1449 | Melbourne VIC 3001
Ph: (03) 9643 1903 | Fax: (03) 9643 1890 |
Please consider the environment before printing this email

Melissa Marschall

From: Geoff Parsons
Sent: Tuesday, 19 May 2015 4:44 PM
To: 'Gillon.McLachlan@afl.com.au'
Cc: Melissa Marschall
Subject: RE: Palmer Wind Farm Development Application information - Representation on Application Category 3

ATTN: Donna

Dear Mr McLachlan,

Thank you for your email.

I acknowledge receipt of your representation.

Council will be in contact in due course to advise you of the date, time and location of the Development Assessment Panel meeting.

Kind regards,

Geoff Parsons
Acting Director - Development and Environmental Services
Mid Murray Council
PO Box 28
Mannum SA 5238

P - (08) 8564 6020
F - (08) 8569 1931
M - 0429 998 177
E - gparsons@mid-murray.sa.gov.au
W - www.mid-murray.sa.gov.au

Mid Murray Council

From: Gillon.McLachlan@afl.com.au [mailto:Gillon.McLachlan@afl.com.au]
Sent: Tuesday, 19 May 2015 4:28 PM
To: Geoff Parsons
Subject: Palmer Wind Farm Development Application information - Representation on Application Category 3

Dear Mr Parsons

Please find attached the signed document from Gillon McLachlan in relation to Development Number 711/072/14.

Can you please confirm you have received this.

Thank you

Donna

Gillon McLachlan
Chief Executive Officer
AFL HOUSE | 140 Harbour Esplanade | Docklands VIC 3008
GPO Box 1449 | Melbourne VIC 3001
Ph: (03) 9643 1903 | Fax: (03) 9643 1890 |
Please consider the environment before printing this email

IEMAIL20155Z

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DEVELOPMENT ACT, 1993

REPRESENTATION ON APPLICATION
CATEGORY 3

Development Number 711/072/14

My Name: Dr Caroline Crawford My Telephone Number: 0438 520006

My Postal Address 27 Holborn Hill Road Aldgate SA

Postcode 5154

This representation is in relation to the application by: *Trustpower Australia Holdings Pty Ltd*

for consent to establish the *Palmer Wind Farm*

The address of my affected property is "Glen Angus" 1789 Harrogate Road Mt Torrens SA; we also own a shack at Walker Flat and have routinely traversed the eastern scarp of the Mt Lofty Ranges in the vicinity of the proposed windfarm since 1988, a period of 27 years

The specific aspects of the application to which I make comments on are:

The scale of the proposed windfarm; my concerns are outlined in the attached letter which I would like to be presented to the Development Assessment Panel in its entirety.

My concerns would be overcome by:

The attached letter discusses possible ways to reduce impacts, both on the landscape ascetics and on the natural environment; these are summarized at the conclusion of the letter. Again I would appreciate if the letter could be considered in its entirety by the Development Assessment Panel.

X I do not wish to be heard by the Development Assessment Panel** Please accept the attached letter as I may not be able to be present.

☐ I do wish to be heard personally by the Development Assessment Panel

☐ I will represent myself
or
☐ I will be represented by

Date 20th May 2015

Signed Dr Caroline Crawford

Glen Angus

1789 Harrogate Road

Mt Torrens SA

17th May 2015

Mid Murray Council

Development and Environmental Services

PO Box 28

Mannum SA 5238

RE: Palmer Wind Farm Development Application 711/072/14

Dear Planning Staff,

I write to express the following concerns re the scale of the proposed Trust Power Palmer Windfarm Development.

Landscape and Visual Impacts

The eastern Mount Lofty Ranges are dominated by scenic uplands bounded by steep fault-controlled escarpments forming powerful visual landscapes.

The current proposal extends along a significant section of the eastern flank, from 7 km south of Palmer northwards towards the Marne River, a total north- south distance of over 26 kms and impacting directly on 10,000 hectares by the TrustPower estimates.

The visual impact of the towers, currently proposed for most major ridge lines, and the associated infrastructure, would be significant and detrimental to landscape views from all directions.

I feel that the scale of the proposed development should be reduced. This could be achieved in two ways, firstly by creating buffer zones around environmentally sensitive areas (see below) and secondly, by utilizing the current transmission line (with the necessary modifications) to the Tungkillo switching station rather than building yet another unsightly 275kV line through the rural landscape.

Natural Environment Impacts

The Eastern Mount Lofty Ranges form a transition zone between the high rainfall Southern Lofty Region and the semi-arid Murray Mallee/Murray Plains Ecological Area. The escarpment is dissected by numerous creeks and rivers which drain into the Murray Darling Catchment. While the uplands have been extensively cleared for agriculture, many of the watercourses support remnant vegetation and provide important habitat for a wide range of indigenous species.

Fortunately there appears a substantial setback zone surrounding Saunders Creek. However a considerable number of turbines are proposed close to most of the creek lines south of the Walker Flat-Mount Pleasant Road.

The Harrison-Baker-Reedy Creek system, near Palmer, supports some valuable remnant vegetation and fauna habitat. This whole area requires careful management and I recommend a greater setback zone for the turbines.

Of particular concern is the bird fauna of the region, both the larger birds of prey which require large territories, as well as the smaller migratory species which traverse the regions seasonally.

TrustPower has created several buffer zones for located nests of wedge-tailed eagles (500m) and peregrine falcons (1000m).

According to studies by the Australian Museum, distances between wedge-tailed eagle nests in such semi- arid terrain is 2.5 – 4 kms; the eagles then range over a larger area for hunting. From this data it would seem that larger buffer zones would be required. Apparently the birds are particularly vulnerable during the construction phase.

TrustPower has identified several small areas of endangered *Lomandra* (Irongrass) communities which are protected by the Environment Protection and Biodiversity Conservation Act 1999. These are shown on the "Flora and Fauna Studies" map. However, from casual roadside observations, I have noticed irongrass occurring on the land either side of the Walker Flat-Mount Pleasant Road as it climbs Cooke Hill from the east. A number of turbines are proposed south of the road in this vicinity; I strongly advise that the locations are carefully surveyed to ensure that there is no threat to any *Lomandra* community.

Finally, the entire proposed development requires considerable clearance of groundcover, albeit introduced pasture grasses, for the construction of the windmills and access roads. Is there a requirement for a revegetation "offset" of native vegetation using local provenance.

In summary, I am concerned with the excessive scale of the proposal; I recommend that:

- TrustPower investigate further the proposal to modify the existing transmission line to Tungkillo Substation rather than constructing another unsightly power line
- TrustPower reduces the number of turbines in key conservation areas (e.g. to protect the Harrison-Baker- Reedy Creek environments and birds- of -prey territories as discussed above) thereby creating visual gateways as well as possible wildlife corridors
- TrustPower further investigate possible locations of endangered *Lomandra* grassland communities in the vicinity of Cooke Hill where some turbines are planned
- TrustPower undertakes appropriate revegetation to offset the environmental impacts of the proposal.

Yours sincerely,

Dr Caroline Crawford

Aaron Curtis

From: Aaron Curtis
Sent: Wednesday, 20 May 2015 8:37 AM
To: 'mjccac@icloud.com'
Cc: PostBox; Geoff Parsons
Subject: FW: Submission re TrustPowerPalmer Windfarm - DA 711/072/14
Attachments: Letter to Mid Murray re windfarm, 17-5-2015.docx

Thanks Caroline.

Regards

Aaron Curtis
Senior Development Officer - Planning
Environmental Services
Mid Murray Council
PO Box 28
Mannum SA 5238
Phone (08) 8564 6027
Fax (08) 8569 1931

Mobile 0428 813 452
acurtis@mid-murray.sa.gov.au

Mid Murray Council

From: Caroline Crawford [mailto:mjccac@icloud.com]
Sent: Tuesday, 19 May 2015 8:00 PM
To: Geoff Parsons; Aaron Curtis
Subject: Submission re TrustPowerPalmer Windfarm

Dear Development Assessment Staff, I have attached a letter re my concerns with the proposed windfarm
Yours sincerely, Dr Caroline Crawford

Melissa Marschall

From: Geoff Parsons
Sent: Wednesday, 20 May 2015 8:46 AM
To: 'Caroline Crawford'; Aaron Curtis
Cc: Melissa Marschall; PostBox
Subject: RE: Submission re TrustPowerPalmer Windfarm
Attachments: Palmer Wind Farm Representation Form.pdf

Thank you for your representation Caroline, but you haven't indicated whether or not you want to be heard by the Development Assessment Panel in support of your representation. I have attached a cover sheet we have asking people to fill in which will assist.

Where it asks you to specify your concerns and how they can be overcome, you can simply indicate to "see attached", and we will attached the cover sheet to your representation.

If you could please complete the attached and return by COB today if possible that would be appreciated. This will ensure all of your representation is valid and can be considered.

Any queries please contact me via the details below.

Kind regards,

Geoff Parsons
Acting Director - Development and Environmental Services
Mid Murray Council
PO Box 28
Mannum SA 5238

P - (08) 8564 6020
F - (08) 8569 1931
M - 0429 998 177
E - gparsons@mid-murray.sa.gov.au
W - www.mid-murray.sa.gov.au

Mid Murray Council

From: Caroline Crawford [mailto:mjccac@icloud.com]
Sent: Tuesday, 19 May 2015 8:00 PM
To: Geoff Parsons; Aaron Curtis
Subject: Submission re TrustPowerPalmer Windfarm

Dear Development Assessment Staff, I have attached a letter re my concerns with the proposed windfarm
Yours sincerely, Dr Caroline Crawford

Melissa Marschall

From: Geoff Parsons
Sent: Wednesday, 20 May 2015 10:42 AM
To: 'Caroline Crawford'
Cc: Melissa Marschall; PostBox
Subject: RE: submission re TrustPower Palmer Windfarm

Hi Caroline,

That will be sufficient. Thank you for completing the form so quickly.

Just wanted to make sure your representation would be valid and considered.

Thanks.

Kind regards,

Geoff Parsons
Acting Director - Development and Environmental Services
Mid Murray Council
PO Box 28
Mannum SA 5238

P - (08) 8564 6020
F - (08) 8569 1931
M - 0429 998 177
E - gparsons@mid-murray.sa.gov.au
W - www.mid-murray.sa.gov.au

Mid Murray Council

From: Caroline Crawford [mailto:mjccac@icloud.com]
Sent: Wednesday, 20 May 2015 10:13 AM
To: Geoff Parsons
Subject: submission re TrustPower Palmer Windfarm

Dear Geoff, Thank you for your response and advice. I have attached the completed Representation Form which I have "signed" electronically. Is this sufficient?
Again , Thank you for your prompt response.
Regards, Caroline

For more information please visit http://www.symanteccloud.com

IEMAIL 201552

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DEVELOPMENT ACT, 1993

REPRESENTATION ON APPLICATION
CATEGORY 3

Development Number 711/072/14

My Name Ken & Robin Prokopec My Telephone Number 85 682030

My Postal Address 'Rainbow Valley 148 Wodford Rd

R. Springton SA Postcode 5235

This representation is in relation to the application by: *Trustpower Australia Holdings Pty Ltd*

for consent to establish the *Palmer Wind Farm*

The address of my affected property is 148 Wodford Rd.

Springton SA.

The specific aspects of the application to which I make comments on are:

Environmental damage, Hazards caused, loss of fire fighting ability - Damage to the environment - Drop in property values - Turning a pristine rural environment into an industrial landsape Health issues.

My concerns would be overcome by: the Mid Murray Council refusing planning permission for the proposed Palmer wind farm

☐ I do not wish to be heard by the Development Assessment Panel

☐ I do wish to be heard personally by the Development Assessment Panel

☐ I will represent myself
or
☑ I will be represented by the Eastern Mount Lofty Rangers Landscape Guardians

Date May 19th 2015 Signed K & R Prokopec

7 pages.

For:

Director, Development & Environmental Services,
Mid Murray Council
P.O. Box 28,
Mannum 5238

Mr. Kelvin Goldstone

Re: Trust Power Palmer Wind Farm Development Application 711/072/14

Trust Power's application for a wind farm located near Palmer should be refused for the reasons laid out below, which are in conflict with the cited clauses of the Mid Murray Council Development Plan:

1. Environmental Damage: land, watercourses and ground water, native vegetation, fauna and noise pollution. The impact of the proposal is in conflict with council wide objective 29 and principles of Development Control: 39, 42, 43, 87, 92, 93, 163, 164, 168, 169, 170, 175, 176, 180, 185, 190, 192, 196, 197, 199, 215, 398; rural zone objectives 6, 16, 17, 23 and rural zone PDCs 4, 6, 7, 12, 18; and hills policy area objectives 1, 2, 3 and hills policy area PDCs 1 and 4a.

2. The proposal is not harmonious with existing land uses and district character. This is in conflict with council wide objectives 7, 15, 18, 19, 25, 26, 29, 30; council wide PDCs 5, 43, 55, 78, 79, 87, 88, 91, 97, 155, 160, 163, 165, 166, 167, 173, 188, 190, 398, 399; rural zone objectives 6 and 16; rural zone PDCs 4, 19, 43; and hills policy area objectives 1, 2, 3 and hills policy area PDCs 1, 3, 4a.

3. The proposal does not provide for care and well being of the community. This is in conflict with council wide objectives 9, 15, 25, 26, 29; council wide PDCs 43, 88, 92, 166, 175, 188, 388, 397, 398, 399; rural zone objective 17, rural zone PDC 12, and hills policy area objective 2.

4. The proposal is not an efficient or effective use of land; wind turbines are neither efficient (<40%) nor effective (unreliable output) producers of electricity. Council wide PDC 396 requires that wind turbines should be located in areas that maximise efficient generation and supply of electricity. The proposed location does not maximise efficient generation and is too far from the major loads on the grid to maximise efficient supply of the generated electricity, and so is in conflict with that PDC. Conflict also exists with rural zone objectives 6, 16, 22, 23 and rural zone PDC 18 and hills policy are objective 2 and PDC 1.

5. Hazards: loss of aerial fire-fighting capability; this is in conflict with council wide PDCs 46, 388, 398; rural zone objectives 6, 17, 23; and hills policy area objective 2 and PDC 1.

6. Hazards: risk to traffic due to shadow, flicker and debris; these are in conflict with council wide objectives 14, 15, 16, 17, 26, 98 and council wide PDCs 34, 39, 87, 95, 396, 398; and hills policy area objective 2 and PDC 1.

7. The proposed renewable energy facility does not benefit the environment evidenced by the conflicts cited above, does not benefit the community as more residents lose financially and in terms of lifestyle than benefit as a result of lease payments or neighbour agreements, and does not benefit

the state as the vast majority of money associated with the development flows either interstate or overseas, leaving only inflated power prices for South Australians This is in conflict with council wide objectives 96, 97, 98; council wide PDCs 78, 92, 163, 168, 188, 396; rural zone objectives 6 and 17; rural zone PDCs 4, 6, 7 and hills policy area objective 2.

8. The damage and disruption during construction (dust, blasting, heavy vehicles) is in conflict with council wide objectives 16, 48, 50, 51, 53, 59, 64g; council wide PDCs 39, 43g, 95, 196, 197, 198, 388; hills policy area objectives 1 and 2 and PDCs 1 and 4a.

9. The proposed layout is inappropriate and is in conflict with council wide PDCs 78, 158, 388 and 397; rural zone objectives 6, 16, 17, 21 and rural zone PDCs 4 and 19; hills policy area objectives 2 and PDCs 1, 3 and 4a

10 The visual amenity of the region would be compromised. While the misguided ministerial "Wind farm" development plan amendments (largely seen in a dim light by the Development Plan Advisory Committee) are lenient toward wind turbines, the following notable conflicts remain: council wide objectives 15, 25, 26, 50, 54; council wide PDCs 55, 78, 79, 155, 158, 159, 160, 170, 173, 190, 397; rural zone objective 6; rural zone PDCs 18, 19; hills policy area objectives 1, 2, 3; hills policy area PDCs 1, 3, 4a.

11 If approved, the proposal will have a negative impact on most of the property values in the area. It should be noted that only host properties have ongoing income; neighbourhood

agreements are non-transferable. The effect on property values in the region is in conflict with council wide objectives 9, 25, 29, 98; council wide PDCs 55, 79, 88, 91, 160, 162 163, 167, 188, 388, 398; rural zone objective 16 and PDC 19 and hills policy area objectives 1 and 2.

12. The proposal is very close to the edge of the Barossa Character Protection District, so close in fact that it will compromise the values the Protection legislation seeks to preserve. This is in conflict with council wide objectives 50, 54, 98, council wide PDCs 55, 155, 158, 167; rural zone objectives 2, 6, 16, 21; rural zone PDCs 22, 43; hills policy area objectives 1 and 2 and hills policy area PDCs 1 and 3

On a more personal note :-

Over the period from January 2014 to February 2015 we were subjected to the threat of three bushfires alongside our property, and a fourth which could have become a problem. Our home was under threat on numerous occasions. Houses were destroyed along our road, and the CFS did a tremendous job in defending our property, but without the aerial water bombers our home would have been lost, the bombers saving it from destruction a number of times.

While the CFS hierarchy deny wind turbines impacting aerial water bombing, the pilots themselves are quick to say they won't be flying anywhere near any turbines.

There is some very rugged and inaccessible country in the Jutland Rd area; country which can only be

protected from bushfire by the aerial water bombers. A track across the hills constructed by Trust Power will not help stop a bushfire in the steep inaccessable gullies and ravines.

When threatened personally by bushfire, seeing it rage closer and closer, and then hearing the approach of those aircraft; it is the most wonderful sound in the world.

At night, repeatedly checking the hot spots on the sides of the hills close by and seeing them flare up, its a terrible feeling knowing that the water bombers are out of action until morning.

This area is very fortunate to have numbers of Wedge-tail Eagles which breed here. They cover large distance and can often be seen soaring in skies where they would be under threat from the proposed turbines if this wind farm is approved. Eagles don't recognise a dotted line on a map indicating where they should or shouldn't fly.

The advent of hundreds of incredibly tall and invasive wind turbines in the area, would obviously cause land values to drop, as has happened elsewhere. When property values fall, will the council reduce council rates accordingly?

When we moved here almost seven and a half years ago we were attracted by the natural beauty and tranquility of the area which abounds with native fauna. All day

long, apart from an occasional aircraft flying over, all that can be heard is a chorus of birdsong.

We moved here, investing our life savings and superannuation in our property, and in the development of a small business: a small cattle stud. Having barely survived the downturn in the beef industry, and having had some great and consistent successes in the show ring, it is heartbreaking to think that this area could now be ruined by the ill-advised construction of wind turbines, which would destroy the wonderful lifestyle we all presently enjoy.

We are making a success of our endeavours in a truly beautiful pristine rural environment.

PLEASE DON'T turn it into an industrial landscape.

Conclusion

The Mid Murray Council DAP should refuse planning permission for the proposed wind farm Development Application 711/072/14 because it is in conflict with much of the Mid Murray Council Development Plan.

Please see the submission of the Eastern Mount Lofty Ranges Landscape Guardians for further elaboration of the above comments.

PTO.

We nominate the Eastern Mount Lofty Ranges Landscape Guardians to speak on our behalf.

Yours sincerely,

(Ken Prokopec),

Robin Prokopec

'Rainbow Valley' 148 Woolford Rd. Springton

PS SA has more wind turbines than any other state in Australia – we also pay more for our electricity. There is no economic advantage in having more turbines. Besides which, Trust Power is a New Zealand company with New Zealand Investors.

IL7201595212

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RECE
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CAMBRAI OFFICE

DEVELOPMENT ACT, 1993

REPRESENTATION ON APPLICATION CATEGORY 3

Development Number 711/072/14

My Name TANYA MARTIN My Telephone Number 0885645070

My Postal Address PO BOX 16

CAMBRAI SA Postcode 5353

This representation is in relation to the application by: *Trustpower Australia Holdings Pty Ltd*

for consent to establish the *Palmer Wind Farm*

The address of my affected property is Lot 978 Three Chain Road

CAMBRAI SA 5353.

The specific aspects of the application to which I make comments on are:

please see the Attached Concerns.

My concerns would be overcome by: Council denying/refusing this application from Trust Power.

- 10 Metre limit on Towers.

☐ I do not wish to be heard by the Development Assessment Panel

☑ I do wish to be heard personally by the Development Assessment Panel

☑ I will represent myself if unable to attend I nominate EMLRLG
or

☑ I will be represented by EASTERN MOUNT LOFTY RANGES LANDSCAPE GUARDIANS.

Date 18-5-15 Signed T. Martin

To the Development & Environmental Services of Mid Murray Council

It is hard to put into words the emotions that are stirred, when someone threatens your home and sanctity. I have lived across from the Marne Gorge for 18 years and have experienced floods, bushfires, tremors and scorching heat. My home does not have the services that others enjoy and expect for the rates they pay, like bitumen roads, post delivered to a letter box at the gate, rubbish picked up, TV, internet or mobile phone reception that reaches us, close high schools that go to year 12, regular bus services to the city/towns or even running water to my home. People ask why I stay here.

I love my home because of the view, the wildlife, the peace, the feeling of safety in an unsafe world, and the loving, caring community that surrounds it. These are the very things that a wind farm promises to destroy. As well as the commercial value of the only asset I have, my home. Our home was the last to be water bombed when the bush fires hit and they were the ones that saved my home that terrible day. Will they be able to next time?

Wind farms rip communities apart and they NEVER recover. Please do not forsake our small community for the benefit ~~of a few foreign commercial~~ investors, who do not want horrible turbines in their own countries. We are not for sale.

The view outside my kitchen window will now consist of a very huge fan, that could blow up and destroy my home and it could break down and not be fixed very quickly, like the poor residents of Cape Bridgewater. It will be close enough to make me sick according to reports worldwide. The construction process will mean explosions above me as I am at the base of the hill. This does not sound or feel very safe anymore.

The magnificent Marne Gorge that flows each year has a weir waterfall that comes after the rains and takes ones breathe ~~away~~. ~~The~~ hike up ~~the gorge~~ complete with aboriginal art, takes you all the way to Eden Valley. The gorge attracts bus loads of tourist each year. The campers, hikers and schools that will all be affected by the relentless years of construction are unjust. Then to have to see a fan on top of a natural cathedral as our gorge is sacrilege and the death of our town's only natural tourist attraction. Our gorge should be re-listed on the Heritage listings and protected, not desecrated by obsolete technology.

Research shows smaller 10metre towers can bring in the same if not better results and will not be an ugly eye sore to the environment or a danger to those that are close by. So why make South Australia the dumping ground for old and out dated technology, when Western Australia is going into wave energy and becoming a leader in new energy models. Big ugly dangerous towers are becoming obsolete and wreck a community, which is why most investors cannot get them built in their own countries.

So you may ask, if I do not like it sell up and move. As the value of my home has dropped due to the wind farm proposal, I would be forced to rent and be reliant on the government benefit system. Therefore become a burden to taxpayers. So this makes me feel very trapped, stressed and not safe at all.

I DO NOT support this proposal at all.

- It has & will destroy our peace, health and sanity.
- It will put my home and family in danger from construction explosions and possible equipment failure.
- It will be a danger to fire fighting services.
- It will be a danger to the wildlife & disrupt or destroy tourism for our town.
- It is outdated technology and brings no benefits to our local community or State.
- It has already lessened the value of my property and caused great stress.
- It has started to rip our community apart.

Tanya Martin 18-5-2015

To:

Director, Development & Environmental Services, Mid Murray Council

PO Box 28, Mannum, 5238

Mr. Kelvin Goldstone

Re: Trust Power Palmer Wind Farm Development Application 711/072/14

Trust Power's application for a wind farm located near Palmer should be refused for the reasons laid out below, which are in conflict with the cited clauses of the Mid Murray Council Development Plan:

1. Environmental damage: land, watercourses and ground water, native vegetation, fauna and noise pollution. The impact of the proposal is in conflict with council wide objective 29 and Principles of Development Control (PDCs) 39, 42, 43, 87, 92, 93, 163, 164, 168, 169, 170, 175, 176, 180, 185, 190, 192, 196, 197, 199, 215, 398; rural zone objectives 6, 16, 17, 23 and rural zone PDCs 4, 6, 7, 12, 18; and hills policy area objectives 1, 2, 3 and hills policy area PDCs 1 and 4a.

2. The proposal is not harmonious with existing land uses and district character. This is in conflict with council wide objectives 7, 15, 18, 19, 25, 26, 29, 30; council wide PDCs 5, 43, 55, 78, 79, 87, 88, 91, 97, 155, 160, 163, 165, 166, 167, 173, ~~188, 190, 398, 399;~~ rural zone objectives 6 and 16; rural zone PDCs 4, 19, 43; and hills policy area objectives 1, 2, 3 and hills policy area PDCs 1, 3, 4a.

3. The proposal does not provide for care and wellbeing of the community. This is in conflict with council wide objectives 9, 15, 25, 26, 29; council wide PDCs 43, 88, 92, 166, 175, 188, 388, 397, 398, 399; rural zone objective 17; rural zone PDC 12; and hills policy area objective 2.

4. The proposal is not an efficient or effective use of land; wind turbines are neither efficient (<40%) nor effective (unreliable output) producers of electricity. Council wide PDC 396 requires that wind turbines should be located in areas that maximise efficient generation and supply of electricity. The proposed location does not maximise efficient generation and is too far from the major loads on the grid to maximise efficient supply of the generated electricity, so is in conflict with that PDC. Conflict also exists with rural zone objectives 6, 16, 22, 23 and rural zone PDC 18 and hills policy are objective 2 and PDC 1.

5. Hazards: loss of aerial fire fighting capability; this is in conflict with council wide objectives 26, 84, 85, 94, 95, 98 and council wide PDCs 46, 388, 398; rural zone objectives 6, 17, 23, hills policy area objective 2 and PDC 1.

6. Hazards: risk to traffic due to shadow, flicker and debris; these are in conflict with council wide objectives 14, 15, 16, 17, 26, ~~98 and council wide~~ PDCs 34, 39, 87, 95, 396, 398; and hills policy area objective 2 and PDC 1.

7. The proposed renewable energy facility does not benefit the environment, evidenced by the conflicts cited above, does not benefit the community, as more residents lose financially and in terms of lifestyle than benefit as a result of lease payments or neighbour agreements, and does not benefit the state as the vast majority of money associated with the development flows either interstate or overseas, leaving only inflated power prices for South Australians. This is in conflict with council wide objectives 96, 97, 98; council wide PDCs 78, 92, 163, 168, 188, 396; rural zone objectives 6 and 17; rural zone PDCs 4, 6, 7 and hills policy area objective 2.

8. The damage and disruption during construction (dust, blasting, heavy vehicles) is in conflict with council wide objectives 16, 48, 50, 51, 53, 59, 64g; council wide PDCs 39, 43g, 95, 196, 197, 198, 388; hills policy area objectives 1 and 2 and PDCs 1 and 4a.

9. The proposed layout is inappropriate and is in conflict with council wide PDCs 78, 158, 388 and 397; rural zone objectives 6, 16, 17, 21 and rural zone PDCs 4 and 19; hills policy area objective 2 and PDCs 1, 3 and 4a.

10. The visual amenity of the region would be compromised. While the misguided ministerial "wind farm" development plan amendments (largely seen in a dim light by the Development Planning Advisory Committee) are lenient toward wind turbines, the following notable conflicts remain: council wide objectives 15, 25, 26, 50, 54; council wide PDCs 55, 78, 79, 155, 158, 159, 160, 170, 173, 190, 397; rural zone objective 6; rural zone PDCs 18, 19; hills policy area objectives 1, 2, 3; hills policy area PDCs 1, 3, 4a.

11. If approved, the proposal will have a negative impact on most of the property values in the area. It should be noted that only host properties have ongoing income; neighbour agreements are non-transferable. The effect on property values in the region is in conflict with council wide objectives 9, 25, 29, 98; council wide PDCs 55, 79, 88, 91, 160, 162, 163, 167, 188, 388, 398; rural zone objective 16 and PDC 19 and hills policy area objectives 1 and 2.

12. The proposal is very close to the edge of the Barossa Character Protection District, so close in fact that it will compromise the values the Protection Legislation seeks to preserve. This is in conflict with council wide objectives 50, 54, 98, council wide PDCs 55, 155, 158, 167; rural zone objectives 2, 6, 16, 21; rural zone PDCs 22, 43; hills policy area objectives 1 and 2 and hills policy area PDCs 1 and 3.

Further Comments

Conclusion

The Mid Murray Council DAP should refuse planning permission for the proposed wind farm Development Application 711/072/14 because it is in conflict with much of the Mid Murray Council Development Plan.

Please see the submission of the Eastern Mount Lofty Ranges Landscape Guardians for further elaboration of the above comments.

☑ I/We wish to be heard at the public hearing/meeting - If I cannot be present Then I nominate EMLRLG.

☐ I /We nominate _____ to speak on my behalf.

☑ I /We nominate the Eastern Mt Lofty Ranges Landscape Guardians to speak on my behalf.

I/We would like for my/our submissions to be made public.

Yours Sincerely,

Tanya Martin

The following pages are a small pick of the millions of resources that back up my fears.

Source: http://www.earthtechling.com/2011/07/vertical-turbines-packed-tight-boost-power/

Vertical Turbines, Packed Tight, Boost Power

The trend in turbine design has been toward taller and bigger, as the wind power industry tries to maximize generating capacity. But researchers from Caltech suggest the developers might be going about it all wrong – they say much shorter vertical-axis turbines, placed in a tight array with each turbine turning in an opposite direction to its neighbors, can be at least 10 times as efficient at capturing the wind power in a given area.

John Dabiri, a Caltech professor of aeronautics and bioengineering, and his colleagues base their theory on work done at the university's two-acre experimental wind farm in northern Los Angeles County, and describe their findings in detail in the July issue of the Journal of Renewable and Sustainable Energy.

image via Caltech

Dabiri began exploring the possibilities with vertical-axis wind turbines (VAWTs) after recognizing the inefficiency of the common horizontal-axis turbines (HAWTs) – not individually (they're actually quite efficient individually), but together in their typical positioning. HAWTs need to be spaced widely to avoid clipping each other, and they also lose efficiency when they create wakes that disturb the turbines around them. In these traditional wind farms, "much of the wind energy that enters a wind farm is never tapped," Dabiri says.

image via Caltech

The VAWTs Dabiri and his colleagues tested – described by Caltech as looking like upright eggbeaters – were just 10 meters tall and 1.2 meters wide. That's puny compared to the traditional industrial turbines, which have blades often more than 40 meters long and typically stand well over 100 meters tall. But Dabiri says there's more than enough energy available in the wind at the lower heights, and by using the much less expensive VAWTs – "smaller, cheaper and less environmentally intrusive," according to Caltech – we have a much better chance of capturing that available energy.

UPDATE (April 2013): This story was edited after its original publication in July 2011 to clarify the use of the term "efficiency." In addition, further testing in 2012 appears to suggest Dabiri and his colleagues are on to something with this concept. They report that 18 of their eggbeaters, operating over nine continuous months to April 2012, "produced more power per land area in 5.1 m/s mean wind than 100-meter tall HAWTs in 8 m/s wind." As the graphic below notes, the researchers believe their turbines could do even better with the addition of high-wind power controls that would allow the turbines to continue to produce power — instead of shutting down — at high wind speeds.

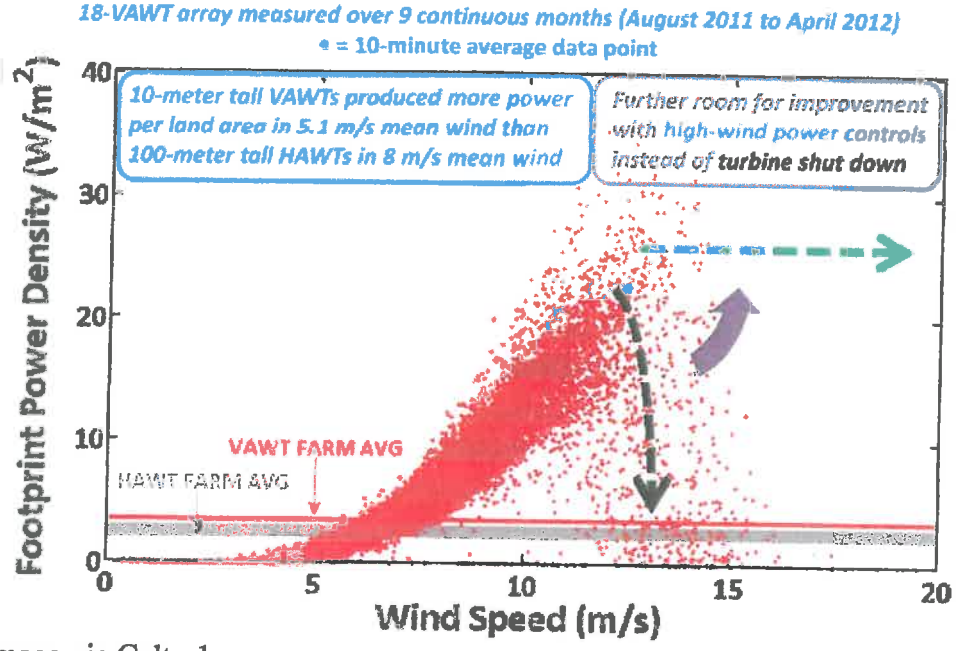

image via Caltech

Pac Hydro promises but fails to fix its screeching fans at Cape Bridgewater

April 13, 2014 by stopthesethings

Pacific Hydro – run by Union Heavy, Garry Weaven and funded by Union Super money handled by Members Equity Bank, controlled by his best mate Greg Combet – operates a non-compliant wind farm at Cape Bridgewater in Victoria – and has done since 2008.

The Victorian government is well aware that Pac Hydro does not and can not comply with the noise conditions of its planning consent, but does nothing to challenge it. This malign acquiescence means that Pac Hydro has been able to (unlawfully) pocket millions of RECs (at times worth up to $60 each) over the last 5 years when it should have never been accredited by the Clean Energy Regulator to receive RECs at all. But that's just the financial aspect of a far greater crime.

By aiding and abetting Pac Hydro to breach the noise conditions of its planning consent (the ones meant to protect neighbours from excessive noise) the Victorian government is also guilty of causing untold and unnecessary human suffering.

If you were to breach the conditions of a planning permit – by say, adding an extra metre or two to a boundary wall – the Vic Planning Department would have you tear it down in a jiffy. But, when it comes to enforcing the rules that are supposed to govern the operation of wind farms, these boys run strangely silent.

STT thinks the answer lays in the cracking speech delivered by Victorian Senator, John "Marshall" Madigan before Christmas, which lambasted the Planning Minister, Matthew Guy and the wind industry's "Mr Fix-it", Andrew Tongue for their role in helping outfits like Pac Hydro ride roughshod over the rules – and a lot of ordinary, hard-working rural people.

As if tolerating an endless barrage of turbine generated low-frequency noise and infra-sound wasn't bad enough, long-suffering neighbours have had to put up with an excruciating "screech" emitted by Pac Hydro's giant fans. The "screech" has been a periodic feature of daily life at Cape Bridgewater since 2011.

Pac Hydro has made a series of hollow promises to their victims about fixing the "screech" – which have, quite evidently, come to nothing.

http://www.telegraph.co.uk/news/worldnews/europe/denmark/7996606/An-ill-wind-blows-for-Denmarks-green-energy-revolution.html

Denmark has long been a role model for green activists, but now it has become one of the first countries to turn against the turbines.

Published: 8:00AM BST 12 Sep 2010

Even as parts of the British Government continue to blow hard for wind, other countries seem to be cooling on the idea.

To green campaigners, it is windfarm heaven, generating a claimed fifth of its power from wind and praised by British ministers as the model to follow. But amid a growing public backlash, Denmark, the world's most windfarm-intensive country, is turning against the turbines.

Last month, unnoticed in the UK, Denmark's giant state-owned power company, Dong Energy, announced that it would abandon future onshore wind farms in the country. "Every time we were building onshore, the public reacts in a negative way and we had a lot of criticism from neighbours," said a spokesman for the company. "Now we are putting all our efforts into offshore wind farms."

Even as parts of the British Government continue to blow hard for wind, other countries seem to be cooling on the idea. This summer, France brought in new restrictions on wind power which will, according to the French wind lobby, jeopardise more than a quarter of the country's planned windfarm projects.

According to the latest Wind Turbine Price Index, produced by Bloomberg New Energy Finance, world prices for new wind turbines are down by 15 per cent on their 2008 peak amid a sharp slump in European and global demand. William Young, manager of Bloomberg's Wind Insight Service, says: "Expectations for turbine prices have never been so low, and the current market oversupply will continue for quite a while longer."
But it is in Denmark, the great windfarm pioneer, where some of the most interesting changes are taking shape. In 1980, the Danish government was Europe's first to bring in large-scale subsidies - on which, just as in Britain, the wind industry depends.

The results have been dramatic. According to the Danish Wind Energy Association, there are more than four thousand onshore turbines – two-thirds more than Britain - in a country a fifth the size. Nowhere else has more turbines per head, and Denmark is also a global centre of wind turbine manufacturing – with Vestas, the world's leading turbine firm, based in the country.

Unfortunately, Danish electricity bills have been almost as dramatically affected as the Danish landscape. Thanks in part to the windfarm subsidies; Danes pay some of Europe's highest energy tariffs – on average, more than twice those in Britain. Under public pressure, Denmark's ruling Left Party is curbing the handouts to the wind industry.

"Since 2005 alone, 5.1 billion kroner [£621 million] has been paid to the wind turbine owners. That cost has been borne by businesses and private consumers," says the party's environment spokesman, Lars Christian Lilleholt. "It seems to have become a political fashion to say that there should be more support for wind. But we have to look at other renewables. We cannot go on with wind power only."

The subsidy cuts are almost certainly the main reason behind Dong's move out of onshore wind. But public anger is real enough, too. Until recently, there was relatively little opposition to the windmills. But now a threshold appears

to have been crossed. Earlier this year, a new national anti-wind body, Neighbours of Large Wind Turbines, was created. More than 40 civic groups have become members.

"People are fed up with having their property devalued and sleep ruined by noise from large wind turbines," says the association's president, Boye Jensen Odsherred. "We receive constant calls from civic groups that want to join."

In one typical battle, in the central city of Svendborg, the local council set height and number limits on turbines under heavy pressure from locals. "The violent protests and the uncertainty about low-frequency noise means that right now we will not expose our citizens to large windmills," said the deputy mayor, Lars Erik Hornemann.

There has also been growing scrutiny of the wind industry's macro claims. Though wind may indeed generate an amount of electricity equal to about a fifth of Danes' needs, most of that electricity cannot actually be used in Denmark.

Except with hydropower, electricity cannot be stored in large quantities. The power companies have to generate it at the moment you need to use it. But wind's key disadvantage – in Denmark, as elsewhere – is its unpredictability and uncontrollability. Most of the time, the wind does not blow at the right speeds to generate electricity. And even when it does, that is often at times when little electricity is needed – in the middle of the night, for instance.

So most of the wind electricity Denmark generates has to be exported, through interconnection cables - to Germany, to balance the fluctuations in that country's own wind carpet, or to Sweden and Norway, whose entire power system is hydroelectric, and where it can be stored. (The Swedes and Norwegians use it themselves - or sell it back, at a profit, to the Danes. If they use it themselves, there is, of course, no saving whatever of C02 – because all Norway and Sweden's domestically-generated hydropower is carbon-neutral anyway.)

"I would interpret the [export] data as showing that the Danes rely on their fossil-fuel plants for their everyday needs," says John Constable, research director for the London-based Renewable Energy Foundation, which has commissioned detailed research on the Danish experience. "They don't get 20 per cent of their electricity from wind. The truth is that a much larger unit, consisting of Denmark and Germany, has managed to get about 7 per cent – and that only because of a fortuitous link with Norwegian and Swedish hydropower."

Britain, meanwhile, almost certainly could not manage even that. "Our system is totally different," says Constable. "We are an island grid.

We have virtually no interconnectors with other countries, only a very limited amount of hydro, and the British Government simply doesn't know how to integrate the very large fleets of wind turbines that they are blithely introducing. It's a leap in the dark."

Britain will almost certainly, in fact, end up having to build as many new fossil-fuelled power stations as it would have done without wind farms, to provide covering power for the fluctuations of the wind.

Apparently oblivious to all this, the Government's climate change watchdog, the Committee on Climate Change, continues to praise Denmark's example and only last week demanded the building of 10,000 more onshore wind turbines to help meet a Whitehall target that 30 per cent of Britain's electricity should be generated from renewables by the end of the decade. This goal (the current figure is 4 per cent) is politely described as "optimistic" by the National Audit Office; privately, most observers view it as total fantasy.

Interestingly, however, Chris Huhne, the previously anti-nuclear, pro-wind Energy Secretary, appears to be

undergoing a mood shift.

There is still much government talk of offshore wind, but he has sounded a more emollient note on a new generation of nuclear stations.

"I think there's an outbreak of realism," says Constable. "Wind is not a bad technology. It's just a lot more limited than people thought in the past." Denmark, of course, was also the place where UN efforts to reach an overarching climate deal collapsed in acrimony last year. The country appears to be developing a habit of puncturing greens' wilder hopes.

Why the £250bn wind power industry could be the greatest scam of our age - and here are the three 'lies' that prove it

http://www.dailymail.co.uk/news/article-1361316/250bn-wind-power-industry-greatest-scam-age.html

By Christopher Booker
Last updated at 11:20 AM on 28th February 2011

Scarcely a day goes by without more evidence to show why the Government's obsession with wind turbines, now at the centre of our national energy policy, is one of the greatest political blunders of our time.

Under a target agreed with the EU, Britain is committed within ten years — at astronomic expense — to generating nearly a third of its electricity from renewable sources, mainly through building thousands more wind turbines.

But the penny is finally dropping for almost everyone — except our politicians — that to rely on windmills to keep our lights on is a colossal and very dangerous act of self-deception.

Take, for example, the 350ft monstrosity familiar to millions of motorists who drive past as it sluggishly revolves above the M4 outside Reading.

This wind turbine performed so poorly (working at only 15 per cent of its capacity) that the £130,000 government subsidy given to its owners was more than the £100,000 worth of electricity it produced last year.

Meanwhile, official figures have confirmed that during those freezing, windless weeks around Christmas, when electricity demand was at record levels, the contribution made by Britain's 3,500 turbines was minuscule.

To keep our homes warm we were having to import vast amounts of power from nuclear reactors in France.

Wind turbines are so expensive that Holland recently became the first country in Europe to abandon its EU renewable energy target, announcing that it is to slash its annual subsidy by billions of euros.

So unpopular are wind turbines that our own Government has just offered 'bribes' to local communities, in the form of lower council tax and electricity bills.

In Scotland, the 800 residents of the beautiful island of Tiree are desperately trying to resist Alex Salmond's plans to railroad through what will be the largest offshore windfarm in the world, covering 139 square miles off their coast, which they say will destroy their community by driving away the tourists who provide much of their living.

So riddled with environmental hypocrisy is the lobbying for wind energy that a recent newspaper report exposed the immense human and ecological catastrophe being inflicted on northern China by the extraction of the rare earth minerals needed to make the giant magnets that every turbine in the West uses to generate its power.

Here in a nutshell are some of the reasons why people are beginning to wake up to the horrific downside of the wind business. And since I began writing about wind turbines nine years ago, I have come to see how the case for them rests on three great lies.

The megawatts supplied by our 3,500 turbines is derisory: no more than the output of a single, medium-sized conventional power station

The first is the pretence that turbines are anything other than ludicrously inefficient.

The most glaring dishonesty peddled by the wind industry — and echoed by gullible politicians — is vastly to exaggerate the output of turbines by deliberately talking about them only in terms of their 'capacity', as if this was what they actually produce. Rather, it is the total amount of power they have the capability of producing.

The point about wind, of course, is that it is constantly varying in speed, so that the output of turbines averages out at barely a quarter of their capacity.

This means that the 1,000 megawatts all those 3,500 turbines sited around the country feed on average into the grid is derisory: no more than the output of a single, medium-sized conventional power station.

Furthermore, as they increase in number (the Government wants to see 10,000 more in the next few years) it will, quite farcically, become necessary to build a dozen or more gas-fired power stations, running all the time and emitting CO2, simply to provide instant back-up for when the wind drops.

The second great lie about wind power is the pretence that it is not a preposterously expensive way to produce electricity. No one would dream of building wind turbines unless they were guaranteed a huge government subsidy.

This comes in the form of the Renewables Obligation Certificate subsidy scheme, paid for through household bills, whereby owners of wind turbines earn an additional £49 for every 'megawatt hour' they produce, and twice that sum for offshore turbines.

This is why so many people are now realising that the wind bonanza — almost entirely dominated in Britain by French, German, Spanish and other foreign-owned firms — is one of the greatest scams of our age.

The third great lie is that this industry is somehow making a vital contribution to 'saving the planet' by cutting our emissions of CO2 - it is not

What other industry gets a public subsidy equivalent to 100 or even 200 per cent of the value of what it produces?

We may not be aware of just how much we are pouring into the pockets of the wind developers, because our bills hide this from us — but as ever more turbines are built, this could soon be adding hundreds of pounds a year to our bills.

When a Swedish firm recently opened what is now the world's largest offshore windfarm off the coast of Kent, at a cost of £800million, we were told that its 'capacity' was 300 megawatts, enough to provide 'green' power for tens of thousands of homes.

What we were not told was that its actual output will average only a mere 80 megawatts, a tenth of that supplied by a gas-fired power station — for which we will all be paying a subsidy of £60million a year, or £1.5billion over the 25-year lifespan of the turbines.

The third great lie of the wind propagandists is that this industry is somehow making a vital contribution to 'saving the planet' by cutting our emissions of CO2.

Even if you believe that curbing our use of fossil fuels could change the Earth's climate, the CO2 reduction achieved by wind turbines is so insignificant that one large windfarm saves considerably less in a year than is given off over the same period by a single jumbo jet flying daily between Britain and America.

Then, of course, the construction of the turbines generates enormous CO2 emissions as a result of the mining and smelting of the metals used, the carbon-intensive cement needed for their huge concrete foundations, the building of miles of road often needed to move them to the site, and the releasing of immense quantities of CO2 locked up in the peat bogs where many turbines are built.

When you consider, too, those gas-fired power stations wastefully running 24 hours a day just to provide back-up for the intermittency of the wind, any savings will vanish altogether.

Yet it is on the strength of these three massive self-deceptions that our Government has embarked on one of the most reckless gambles in our political history: the idea that we can look to the vagaries of the wind to provide nearly a third of the electricity we need to keep our economy running, well over 90 per cent of which is still currently supplied by coal, gas and nuclear power.

It is true that this target of raising the contribution made by wind by more than ten times in the next nine years was set by the EU.

But it is no good blaming Brussels for such an absurdly ambitious target, because no one was keener to adopt it than our own politicians, led first by Gordon Brown and Ed Miliband and now by David Cameron and the Energy Secretary Chris Huhne.

To meet this target, our Government wants to see us spend £100billion on building 10,000 more turbines, plus another £40billion on connecting them all up to the grid.

This country will soon be facing a colossal energy gap, and dependent on politically unreliable countries such as Russia and Algeria for gas supplies

According to the electricity industry, we will then need to spend another £100billion on those conventional power stations to provide back-up — all of which adds up to £240billion by 2020, or just over £1,000 a year for every household in the land.

And for this our politicians are quite happy to see our countryside and the seas around our coasts smothered in vast arrays of giant industrial machines, all to produce an amount of electricity that could be provided by conventional power stations at a tenth of the cost.

This flight from reality is truly one of the greatest follies.

But what turns it from a crazed fantasy to a potential catastrophe is that Britain will soon face a huge shortfall in its electricity supplies, when we see the shutdown of conventional power stations, which currently meet nearly 40 per cent of our electricity needs.

All but two of our ageing nuclear power stations are nearing the end of their useful life, with little chance of them being replaced for many years.

Six of our large coal-fired stations will be forced to close under an EU anti-pollution directive, and our Government is doing its best to ensure that we build no more.

There is no way we can hope to make up more than a fraction of the resulting energy gap solely with wind turbines, for the simple and obvious reason that wind is such an intermittent and unreliable energy source.

Meanwhile, this country will soon be facing a colossal energy gap, while relying on politically unreliable countries such as Russia and Algeria for gas supplies.

What we are seeing, in short, is the price we are beginning to pay for the past two decades, during which our energy policy has become hopelessly skewed by the siren calls of the environmentalists, first in persuading our politicians to switch from coal and not to build any more nuclear power stations, and then to fall for the quixotic dream that we could gamble our country's future on the 'free' and 'clean' power of wind and sun.

All over the EU, other politicians are waking up to the dead-end to which this madness has been leading us.

The Danes, who have built more wind turbines per head than anyone, have realised the idiocy of a policy that has given them the highest electricity prices in Europe, while they have to import much of their power from abroad.

In Spain, their rush for wind and solar power has proved a national disaster. In Germany, having built more turbines than any other country in the world, they are now building new coal-fired stations like crazy.

In Holland, meanwhile, they have now given two fingers to the EU by slashing all their renewables subsidies.

Only in Britain is our political class still so imprisoned in its infatuation with wind that it is prepared to court this dangerously misguided pipedream.

Read more: http://www.dailymail.co.uk/news/article-1361316/250bn-wind-power-industry-greatest-scam-age.html#ixzz1FX5TYtNu

What you can't hear can hurt you

- The Australian
- January 25, 2012 12:00AM

WHEN American noise expert Robert Rand turned up to work in Maine, in the US northeast, in April to investigate the impact of wind turbines on nearby residents he was literally blown away.

Not only did Rand's readings confirm many fears in the community, he claims to have become an unwitting victim himself.

A member of the Institute of Noise Control Engineering and a technician with 30 years' experience, Rand was working for a philanthropic donor wanting to investigate why wind turbines were causing so much concern.

Rand told The Australian yesterday his experience had been unexpected. He had measured the noise from wind turbines on many previous occasions without difficulty but, in testimony to the State of Maine Board of Environmental Protection in July, Rand said the turbines had delivered "a miserable and unnerving experience".

When indoors, Rand and long-time colleague Stephen Ambrose, also a Member of INCE, experienced "nausea, loss of appetite, headache, vertigo, dizziness, inability to concentrate, an overwhelming desire to get outside and anxiety, over a two-night period from Sunday, April 17 to Tuesday, April 19".

"I know personally and viscerally what people have been complaining about," he says. "Adverse health effects from wind turbines are real and can be debilitating.

"The fieldwork points directly to wind turbine low-frequency noise pulsations, especially indoors, as a causative factor."

Anti-wind farm campaigners across the world have jumped on Rand's testimony and his report as confirmation of a series of key issues of concern. They are:

That infrasound and low frequency noise from wind turbines is being measured inside the homes of affected people and correlates with wind turbine activity.

That turbine activity and measured infrasound correlate with the onset/occurrence of symptoms.

That decibel sound level does not correlate with people's symptoms and are therefore useless at predicting or identifying problems.

That infrasound energy is amplified inside the home.

Rand's testimony shows that, when it comes to wind turbines, what you can't hear can hurt you.

It puts the spotlight on whether governments and the wind industry are hiding behind the reality that you won't find what you don't look for.

It is difficult to reconcile Rand's experience with confidential briefings reportedly given by NSW Health to politicians who claim health impacts from wind turbines are "not scientifically valid".

The Clean Energy Council, an industry body representing wind companies, also rejects claims of health impacts.

"This whole infrasound stuff is completely out of the park," says CEC spokesman Mark Bretherton. "I don't think there is any sort of issues with infrasound whatsoever. I think they are barking up the wrong tree completely.

"If anything it boils down to standards and audible noise.

"It is a case of if you can hear something and it is disturbing your sleep then you will not be sleeping so well, which will lead to stress and pretty much all the reported symptoms," Bretherton says.

Danish wind industry heavyweight Vestas is certainly aware of the infrasound generated by its wind turbines and keen to ensure that any restrictions are minimal.

Last year, the company successfully lobbied the Danish government to weaken proposed infrasound restrictions, fearing they would hurt the company's business globally.

In a letter dated June 11, Vestas chief executive officer Ditlev Engel wrote to Danish environment minister Karen Ellemann claiming the proposed infrasound regulations would hit the company's three-megawatt turbines hardest.

Engel said it was "not technically possible" to meet the proposed infrasound limits of 20 decibels 24 hours a day.

What is missing is rigorous analysis of what impact, if any, infrasound from wind turbines has on human health. In the absence of proper research, testimony such as Rand's is dismissed by wind industry supporters and proponents as anecdotal.

The lack of evidence works in the wind industry's favour. A position paper issued by a national coalition of healthcare groups, the Climate and Health Alliance, yesterday rejected the claims of anti-wind groups that wind power poses a threat to health.

"There is no credible peer-reviewed scientific evidence that demonstrates a link between wind turbines and direct adverse health impacts in people living in proximity to them," CAHA convenor Fiona Armstrong said.

The alliance is made up of a range of organisations, including the Australian College of Rural and Remote Medicine, the Australian Council of Social Service, the Royal Australian College of Physicians, the Women's Health Network and World Vision.

To assess health impacts, most people have relied on a "rapid review" statement issued by the National Health and Medical Research Council published in 2010 that says "there is no published scientific evidence to support adverse effects of wind turbines on health". But in evidence to a federal senate inquiry into the impacts of wind farm developments on rural communities in March last year, NHMRC chief executive officer Warwick Anderson said: "We certainly do not believe that this question has been settled.

"The absence of evidence does not mean that there might not be evidence in the future; it is just that, at the stage when the review was done, it was not there," he said.

At a conference last June, the NHMRC agreed to "undertake a systematic approach to reviewing the literature and use the results to inform any update of the public statement".

Anderson said the review would focus on possible health impacts of audible noise and infrasound. "Depending on the result of this review, a targeted call for research in this area (would) be considered," he said.

For anti-wind campaigners the question is whether that review will come soon enough.

High-profile campaigner Sarah Laurie says the NHMRC's progress has been "glacial at best".

"They seem to have no concept of a public health disaster which is about to exponentially increase, and which they could help to prevent," she says.

"Professor Anderson clearly understands there is a problem from his comments in his oral evidence to the Senate inquiry, but has done little since to expedite either a better review of the literature or to actively encourage medical researchers."

Equally slow has been any practical response to the Senate inquiry recommendation that the commonwealth government initiate as a matter of priority "thorough, adequately resourced epidemiological and laboratory studies of the possible effects of wind farms on human health".

In stark contrast, there has been a steady stream of reports from industry and social groups rejecting concerns about wind turbines.

A CSIRO report released this month said there was stronger community support for developing wind farms than might be assumed from media coverage.

Another report, from wind developer Pacific Hydro, said 83 per cent of people support wind, with only 14 per cent opposed.

The onslaught of pro-wind surveys and literature is a happy coincidence for the wind industry, which considers itself to be one push away from rolling out billions of dollars of new wind farm investment to meet the government's 2020 renewable energy target.

Australia has 1188 wind turbines and 57 operating wind farms, including one located in the Australian Antarctic Territory.

The wind industry is expected to triple by 2020, with an additional 6.9GW of wind power and between 2000 and 2500 turbines.

The industry has faced a backlash from some state governments responding to community concerns about how close wind turbines are built to houses.

Victoria's Baillieu government last year gave landholders an effective right of veto over any wind turbine within 2km of their houses.

Proposed new laws for NSW, now out for public comment, are less strict. Under the proposed guidelines, if a wind farm developer is unable to get written permission from all landholders within 2km, it can apply for a site compatibility certificate.

The application should focus on visual amenity issues and noise, including low-frequency noise, at any houses within 2km.

Bretherton says the wind industry hopes the NSW proposals will be better than those in Victoria. "The gateway process could go either way," he says. "It could work well or it could be unworkable."

He says wind farm protests present a unique challenge for the industry. "The history of the protest movement is a typically left-wing thing with people agitating for change. Now you have got older people agitating for the status quo," Bretherton says.

But for former ABC chairman, Maurice Newman, it is a simple issue of individual rights and government arrogance.

"The harmful health effects, despite peer-reviewed and anecdotal evidence, are dismissed as being unconfirmed, psychosomatic or the politics of envy.

"It's true not everyone who lives near wind turbines experiences adverse health effects," Newman says. "But then, not everyone who smokes contracts lung cancer."

There is, he says, an imbalance when cash-poor residents face governments and corporations.

"Politicians are lending their support to oligopolistic insiders and, in so doing, are destroying the property rights of the very people they have pledged to protect."

Renewables hit headwind

THE ill wind blowing in renewable energy has also cast a cloud over the global solar industry.

The price of solar panel companies has plummeted in recent days after Germany announced plans to accelerate the wind-back of feed-in tariff subsidies.

High subsidies have made Germany the world's largest solar energy market but at an estimated cost to energy users and taxpayers of E100 billion. The cost blow-out is considered to be a threat to the German economy.

Despite the International Energy Agency's positive outlook for renewable energy, assuming the continuation of subsidies, the German decision was enough to crash the global solar market.

German manufacturers have already been struggling in the face of low-cost solar manufacturing in China. Chinese imports have prompted a bitter trade war initiated by German solar makers in the US. In a unanimous decision in November, the International Trade Commission ruled Chinese solar panel and cell imports were harming the US solar manufacturing industry. The US Department of Commerce will soon rule on preliminary tariffs and "critical circumstances" that may mean importers will have to pay retrospective duties on these products.

And in Britain, a new cross-party campaign group is demanding the government drop its support for thousands more wind farms.

Stress and Wind Turbines

"Even seemingly clean sources of energy can have implications on human health. Wind energy will undoubtedly create noise, which increases stress, which in turn increases the risk of cardiovascular disease and cancer." [1]

In an American Wind Energy Association and Canadian Wind Energy Association sponsored report it is acknowledged that wind turbine noise may cause annoyance, stress and sleep disturbance.[2]

One of the authors of the report Dr David Colby, M.D. reinforced this position regarding wind turbines by stating

> "We're not denying that there are people annoyed and that maybe some of them are getting stressed out enough about being annoyed that they're getting sick."[3]

The Ontario Ministry of Health and Long Term Care concur in that they acknowledge wind turbines may cause annoyance, stress and sleep disturbance. [4],[5]

Make no mistake stress is a serious risk to human health.

Health Canada states that

> "...stress is considered to be a risk factor in a great many diseases, including: heart disease, some types of bowel disease, herpes and mental illness.
>
> Stress also makes it hard for people with diabetes to control their blood sugar.
>
> Stress is also a risk factor in alcohol and substance abuse, as well as weight loss and gain. Stress has even been identified as a possible risk factor in Alzheimer's Disease.
>
> Severe stress can cause biochemical changes in the body, affecting the immune system, leaving your body vulnerable to disease."[6]

Other health effects associated with stress include becoming increasingly distressed, and irritable, unable to relax or concentrate, have difficulty thinking logically, and making decisions, depression, anxiety, sleep disorders, disorders of the digestive system and increases in blood pressure, headaches and muscular-skeletal disorders. [7],[8]

Prevention includes the ability to remove the stressor. In the case of stress from wind turbine noise and visual impacts (shadow flicker) there is little one can do. The affected individual usually has no control over the level of or the timing of these intrusions.

[1] The National Institutes of Health (NIH), Environmental Health Perspectives, volume 116, pg A237 – 238, 2008
[2] W. David Colby, M.D. et al.,Wind Turbine Sound and Health Effects, An Expert Panel Review 2009, Prepared for American Wind Energy Association and Canadian Wind Energy Association
[3] W. David Colby, M.D. , Sounding Board, 97.9 FM The Beach December 17, 2009
[4] Copes, R. and K. Rideout. Wind Turbines and Health: A Review of Evidence. Ontario Agency for Health Protection and Promotion 2009
[5] Arlene King, M.D., Chief Medical Officer of Health of Ontario Memorandum, October 21, 2009
[6] Health Canada http://www.hc-sc.gc.ca/hl-vs/iyh-vsv/life-vie/stress-eng.php
[7] ibid
[8] Work Organization & Stress, Stavroula Leka BA MSc PhD et al.,World Health Organization, http://www.who.int/occupational_health/publications/stress/en/index.html

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«Assessment_No»

DEVELOPMENT ACT, 1993

REPRESENTATION ON APPLICATION

CATEGORY 3

Development Number 711/072/14_____

My Name DAVID JANNAY My Telephone Number 0438289517

My Address 134 KINGS Rd. CAMBRAI Postcode 5353

This representation is in relation to the application by:

Trustpower Australia Holdings Pty Ltd

For consent to:

Erect a wind farm

proposed to be located at:

Palmer, Tungkillo, Jutland and surrounding areas in the Hills Policy and Marne Watercourse areas of the Mid Murray Council.

The address of the property affected is 134 KINGS ROAD

(your property address) CAMBRAI

The specific aspects of the application to which I make comments on are:

See attachment

(see also attached comments)_____

My concerns would be overcome by: See attachment

(see also attached comments)_____

Representation on Application Category 3 – Development Number 711/072/14

Attached comment... David Jaunay, 134 Kings Road, Cambrai, South Australia.

Dated 19/05/2015

The proposed erection of 114 wind turbines on the Mt Lofty eastern hill face will, in part be in line with the Mt Lofty Television transmission towers. Areas close to the eastern face of the hills are classified as 'marginal' reception areas. Current digital reception is limited and varies from no reception to 2-3 channels. This variation appears to be influenced by prevailing weather conditions and the time of the year, during summer the reception is weakest as it appears the heat affects the strength of the signal across the hills.

The 'Development Application Report Volume 3, Impact Assessment, August 2014, Section 6.7, Interference with Telecommunication and Electromagnetic Radiation' references, PDC 398.

Wind farms and ancillary development should avoid or minimise the following

impacts on nearby property owners/occupiers, road users and wildlife:

(c) interference with television and radio signals and geographic positioning systems; ...

While this requirement states 'minimise' my concern is that during and post construction, residents in marginal television reception areas will loose television reception. While alternative reception can be accessed through the Federal Governments VAST program, this program this facilitates access though a satellite system. Programs are limited to central Australian television and the last estimated cost of this service was $600 (without a government subsidy)

I therefore seek assurance from Trustpower that this development will not affect Television reception and if this cannot be assured, an alternative arrangement is agreed which may include compensation.

Yours sincerely, David Jaunay

ILT20155183

REC 19 M CAMBRA 61

DEVELOPMENT ACT, 1993

REPRESENTATION ON APPLICATION
CATEGORY 3

Development Number 711/072/14

My Name MALCOLM LINKE My Telephone Number 85642464

My Postal Address 1 CADD CT.

ANGASTON Postcode 5353

This representation is in relation to the application by: *Trustpower Australia Holdings Pty Ltd*

for consent to establish the *Palmer Wind Farm*

The address of my affected property is PINE HUT ROAD (EAST)

KEYNETON

The specific aspects of the application to which I make comments on are:

I AM IN TOTAL AGREEANCE WITH THE PROPOSED PROJECT AS THE BENIFITS OF "GREEN ENERGY" ARE ENDLESS. 1) CLEAN AIR GENERATED ELECTRICITY 2) THE EMPLOYMENT DURING CONSTRUCTION AND AFTER 3) BENIFITS TO BUSINESSES (FINANCIALLY) IN THE AREA 4) OFF FARM INCOME TO LANDOWNERS INVOLVED 5) ARREST CLIMATE CHANGE - AS A FARMER FOR 48 YRS. THIS IS VERY NOTICABLE EG. GROWING TIME FRAME HAS SHORTENED CONSIDERA IN MY TIME AS A FARMER FOR CERIAL CROPS

My concerns would be overcome by:

☑ I do not wish to be heard by the Development Assessment Panel

☐ I do wish to be heard personally by the Development Assessment Panel

- ☐ I will represent myself
  or
- ☐ I will be represented by _____

Date 17/5/15 Signed [signature]

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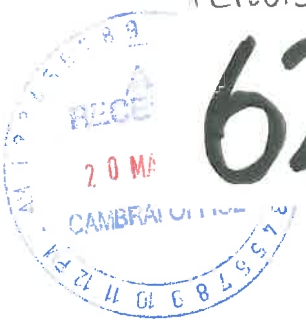

DEVELOPMENT ACT, 1993

REPRESENTATION ON APPLICATION
CATEGORY 3

Development Number 711/072/14

My Name ROBERT POLLITT My Telephone Number 85681911

My Postal Address SPRINGTON - PO BOX 102

Postcode 5235

This representation is in relation to the application by: *Trustpower Australia Holdings Pty Ltd*

for consent to establish the *Palmer Wind Farm*

The address of my affected property is LOT 102 JUTLAND RD, SPRINGTON.

The specific aspects of the application to which I make comments on are:

My Representative is

EASTERN MT. LOFTY RANGES LANDSCAPE GUARDIANS INC.

My concerns would be overcome by: NO WIND FARMS This is huge amounts of money for unreliable energy. These could be more effective by putting Solar on all homes in the state thereby also helping with huge rising electricity bills.

☐ I do not wish to be heard by the Development Assessment Panel

☐ I do wish to be heard personally by the Development Assessment Panel

☐ I will represent myself
or
☑ I will be represented by EASTERN MT LOFTY RANGES LANDSCAPE GUARDIANS INC

Date 19/5/2015 Signed

To:

Director, Development & Environmental Services, Mid Murray Council

PO Box 28, Mannum, 5238

Mr. Kelvin Goldstone

Re: Trust Power Palmer Wind Farm Development Application 711/072/14

Trust Power's application for a wind farm located near Palmer should be refused for the reasons laid out below, which are in conflict with the cited clauses of the Mid Murray Council Development Plan:

1. Environmental damage: land, watercourses and ground water, native vegetation, fauna and noise pollution. The impact of the proposal is in conflict with council wide objective 29 and Principles of Development Control (PDCs) 39, 42, 43, 87, 92, 93, 163, 164, 168, 169, 170, 175, 176, 180, 185, 190, 192, 196, 197, 199, 215, 398; rural zone objectives 6, 16, 17, 23 and rural zone PDCs 4, 6, 7, 12, 18; and hills policy area objectives 1, 2, 3 and hills policy area PDCs 1 and 4a.

2. The proposal is not harmonious with existing land uses and district character. This is in conflict with council wide objectives 7, 15, 18, 19, 25, 26, 29, 30; council wide PDCs 5, 43, 55, 78, 79, 87, 88, 91, 97, 155, 160, 163, 165, 166, 167, 173, 188, 190, 398, 399; rural zone objectives 6 and 16; rural zone PDCs 4, 19, 43; and hills policy area objectives 1, 2, 3 and hills policy area PDCs 1, 3, 4a.

3. The proposal does not provide for care and wellbeing of the community. This is in conflict with council wide objectives 9, 15, 25, 26, 29; council wide PDCs 43, 88, 92, 166, 175, 188, 388, 397, 398, 399; rural zone objective 17; rural zone PDC 12; and hills policy area objective 2.

4. The proposal is not an efficient or effective use of land; wind turbines are neither efficient (<40%) nor effective (unreliable output) producers of electricity. Council wide PDC 396 requires that wind turbines should be located in areas that maximise efficient generation and supply of electricity. The proposed location does not maximise efficient generation and is too far from the major loads on the grid to maximise efficient supply of the generated electricity, so is in conflict with that PDC. Conflict also exists with rural zone objectives 6, 16, 22, 23 and rural zone PDC 18 and hills policy are objective 2 and PDC 1.

5. Hazards: loss of aerial firefighting capability; this is in conflict with council wide objectives 26, 84, 85, 94, 95, 98 and council wide PDCs 46, 388, 398; rural zone objectives 6, 17, 23, hills policy area objective 2 and PDC 1.

6. Hazards: risk to traffic due to shadow, flicker and debris; these are in conflict with council wide objectives 14, 15, 16, 17, 26, 98 and council wide PDCs 34, 39, 87, 95, 396, 398; and hills policy area objective 2 and PDC 1.

7. The proposed renewable energy facility does not benefit the environment, evidenced by the conflicts cited above, does not benefit the community, as more residents lose financially and in terms of lifestyle than benefit as a result of lease payments or neighbour agreements, and does not benefit the state as the vast majority of money associated with the development flows either interstate or overseas, leaving only inflated power prices for South Australians. This is in conflict with council wide objectives 96, 97, 98; council wide PDCs 78, 92, 163, 168, 188, 396; rural zone objectives 6 and 17; rural zone PDCs 4, 6, 7 and hills policy area objective 2.

8. The damage and disruption during construction (dust, blasting, heavy vehicles) is in conflict with council wide objectives 16, 48, 50, 51, 53, 59, 64g; council wide PDCs 39, 43g, 95, 196, 197, 198, 388; hills policy area objectives 1 and 2 and PDCs 1 and 4a.

9. The proposed layout is inappropriate and is in conflict with council wide PDCs 78, 158, 388 and 397; rural zone objectives 6, 16, 17, 21 and rural zone PDCs 4 and 19; hills policy area objective 2 and PDCs 1, 3 and 4a.

10. The visual amenity of the region would be compromised. While the misguided ministerial "wind farm" development plan amendments (largely seen in a dim light by the Development Planning Advisory Committee) are lenient toward wind turbines, the following notable conflicts remain: council wide objectives 15, 25, 26, 50, 54; council wide PDCs 55, 78, 79, 155, 158, 159, 160, 170, 173, 190, 397; rural zone objective 6; rural zone PDCs 18, 19; hills policy area objectives 1, 2, 3; hills policy area PDCs 1, 3, 4a.

11. If approved, the proposal will have a negative impact on most of the property values in the area. It should be noted that only host properties have ongoing income; neighbour agreements are non-transferable. The effect on property values in the region is in conflict with council wide objectives 9, 25, 29, 98; council wide PDCs 55, 79, 88, 91, 160, 162, 163, 167, 188, 388, 398; rural zone objective 16 and PDC 19 and hills policy area objectives 1 and 2.

12. The proposal is very close to the edge of the Barossa Character Protection District, so close in fact that it will compromise the values the Protection Legislation seeks to preserve. This is in conflict with council wide objectives 50, 54, 98, council wide PDCs 55, 155, 158, 167; rural zone objectives 2, 6, 16, 21; rural zone PDCs 22, 43; hills policy area objectives 1 and 2 and hills policy area PDCs 1 and 3.

Further Comments

Conclusion

The Mid Murray Council DAP should refuse planning permission for the proposed wind farm Development Application 711/072/14 because it is in conflict with much of the Mid Murray Council Development Plan.

Please see the submission of the Eastern Mount Lofty Ranges Landscape Guardians for further elaboration of the above comments.

	earing/meeting
	peak on my behalf.
EASTERN MT. LOFTY	Ranges Landscape Guardians to speak on my behalf.
	ons to be made public/private.

11720155311

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DEVELOPMENT ACT, 1993

REPRESENTATION ON APPLICATION
CATEGORY 3

21 MAY 2015 CAMBRAI OFFICE

Development Number 711/072/14

My Name BARBARA GRAY My Telephone Number 0403 821 404

My Postal Address P.O. Box 102.

SPRINGTON Postcode 5235

This representation is in relation to the application by: *Trustpower Australia Holdings Pty Ltd*

for consent to establish the *Palmer Wind Farm*

The address of my affected property is 292 JUTLAND RD. SPRINGTON

The specific aspects of the application to which I make comments on are:

To be represented by
EASTERN MT. LOFTY RANGES LANDSCAPE
GUARDIAN INC.

My concerns would be overcome by:

NO INSTALATION OF WINDFARMS They are costly
unreliable sources of energy Putting Solar Panels on homes
and business would be more cost effecent for all.
Also no inconvience for people close by

☐ I do not wish to be heard by the Development Assessment Panel

☐ I do wish to be heard personally by the Development Assessment Panel

☐ I will represent myself
or
☑ I will be represented by EASTERN MT. LOFTY RANGES LANDSCAPE GUARDIANS INC

Date 19/5/2015 Signed [signature]

To:

Director, Development & Environmental Services, Mid Murray Council

PO Box 28, Mannum, 5238

Mr. Kelvin Goldstone

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2. The proposal is not harmonious with existing land uses and district character. This is in conflict with council wide objectives 7, 15, 18, 19, 25, 26, 29, 30; council wide PDCs 5, 43, 55, 78, 79, 87, 88, 91, 97, 155, 160, 163, 165, 166, 167, 173, 188, 190, 398, 399; rural zone objectives 6 and 16; rural zone PDCs 4, 19, 43; and hills policy area objectives 1, 2, 3 and hills policy area PDCs 1, 3, 4a.

3. The proposal does not provide for care and wellbeing of the community. This is in conflict with council wide objectives 9, 15, 25, 26, 29; council wide PDCs 43, 88, 92, 166, 175, 188, 388, 397, 398, 399; rural zone objective 17; rural zone PDC 12; and hills policy area objective 2.

4. The proposal is not an efficient or effective use of land; wind turbines are neither efficient (<40%) nor effective (unreliable output) producers of electricity. Council wide PDC 396 requires that wind turbines should be located in areas that maximise efficient generation and supply of electricity. The proposed location does not maximise efficient generation and is too far from the major loads on the grid to maximise efficient supply of the generated electricity, so is in conflict with that PDC. Conflict also exists with rural zone objectives 6, 16, 22, 23 and rural zone PDC 18 and hills policy are objective 2 and PDC 1.

5. Hazards: loss of aerial firefighting capability; this is in conflict with council wide objectives 26, 84, 85, 94, 95, 98 and council wide PDCs 46, 388, 398; rural zone objectives 6, 17, 23, hills policy area objective 2 and PDC 1.

6. Hazards: risk to traffic due to shadow, flicker and debris; these are in conflict with council wide objectives 14, 15, 16, 17, 26, 98 and council wide PDCs 34, 39, 87, 95, 396, 398; and hills policy area objective 2 and PDC 1.

7. The proposed renewable energy facility does not benefit the environment, evidenced by the conflicts cited above, does not benefit the community, as more residents lose financially and in terms of lifestyle than benefit as a result of lease payments or neighbour agreements, and does not benefit the state as the vast majority of money associated with the development flows either interstate or overseas, leaving only inflated power prices for South Australians. This is in conflict with council wide objectives 96, 97, 98; council wide PDCs 78, 92, 163, 168, 188, 396; rural zone objectives 6 and 17; rural zone PDCs 4, 6, 7 and hills policy area objective 2.

8. The damage and disruption during construction (dust, blasting, heavy vehicles) is in conflict with council wide objectives 16, 48, 50, 51, 53, 59, 64g; council wide PDCs 39, 43g, 95, 196, 197, 198, 388; hills policy area objectives 1 and 2 and PDCs 1 and 4a.

9. The proposed layout is inappropriate and is in conflict with council wide PDCs 78, 158, 388 and 397; rural zone objectives 6, 16, 17, 21 and rural zone PDCs 4 and 19; hills policy area objective 2 and PDCs 1, 3 and 4a.

10. The visual amenity of the region would be compromised. While the misguided ministerial "wind farm" development plan amendments (largely seen in a dim light by the Development Planning Advisory Committee) are lenient toward wind turbines, the following notable conflicts remain: council wide objectives 15, 25, 26, 50, 54; council wide PDCs 55, 78, 79, 155, 158, 159, 160, 170, 173, 190, 397; rural zone objective 6; rural zone PDCs 18, 19; hills policy area objectives 1, 2, 3; hills policy area PDCs 1, 3, 4a.

11. If approved, the proposal will have a negative impact on most of the property values in the area. It should be noted that only host properties have ongoing income; neighbour agreements are non-transferable. The effect on property values in the region is in conflict with council wide objectives 9, 25, 29, 98; council wide PDCs 55, 79, 88, 91, 160, 162, 163, 167, 188, 388, 398; rural zone objective 16 and PDC 19 and hills policy area objectives 1 and 2.

12. The proposal is very close to the edge of the Barossa Character Protection District, so close in fact that it will compromise the values the Protection Legislation seeks to preserve. This is in conflict with council wide objectives 50, 54, 98, council wide PDCs 55, 155, 158, 167; rural zone objectives 2, 6, 16, 21; rural zone PDCs 22, 43; hills policy area objectives 1 and 2 and hills policy area PDCs 1 and 3.

Further Comments

Conclusion

The Mid Murray Council DAP should refuse planning permission for the proposed wind farm Development Application 711/072/14 because it is in conflict with much of the Mid Murray Council Development Plan.

Please see the submission of the Eastern Mount Lofty Ranges Landscape Guardians for further elaboration of the above comments.

earing/meeting

peak on my behalf.

EASTERN MOUNT Ranges Landscape Guardians to speak on my behalf.

ons to be made public/private.

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DEVELOPMENT ACT, 1993

REPRESENTATION ON APPLICATION
CATEGORY 3

Development Number 711/072/14

My Name Josephine Henderson My Telephone Number 0428 400 144

My Postal Address PO Box 27, Palmer SA

Postcode 5237

This representation is in relation to the application by: *Trustpower Australia Holdings Pty Ltd*

for consent to establish the *Palmer Wind Farm*

The address of my affected property is 2919 Reedy Creek Road, Palmer SA 5237

The specific aspects of the application to which I make comments on are:

Please refer to attached document and appendix.

In summary - I do not support the approval of the Plamer Wind Farm.

My concerns would be overcome by:

CDAP refusing planning consent for the Palmer Wind Farm.

☑ I do not wish to be heard by the Development Assessment Panel

☐ I do wish to be heard personally by the Development Assessment Panel

- ☐ I will represent myself
  or
- ☐ I will be represented by _____

Date 19/5/2015 Signed J Henderson.

REPRESENTATION FOR DA711/072/14 – Palmer Wind Farm

Affected Property – 2919 Reedy Creek Road, Palmer, SA 5237 (a7363)

Representor – Josephine Henderson (0428 400 144)

Conflict of Interest – I currently am the Development Officer – Policy & Heritage at Mid Murray Council, and I work in the planning department of Mid Murray Council. I also happen to be a local resident that lives near Palmer, on the same site for 11 years now. Due to the potential conflict of interest between my formal role and personal situation, I have recused myself from involvement with this application, and have only accessed publicly available information to do with it. I have had no involvement with the assessment process of this application. Nor have I been privy to inside information, happenings or meetings associated with this project.

Therefore there is no conflict of interest in me providing this representation as an affected local community member. As a planner I do have the benefit of a working knowledge of the planning system and the development application process. The following comments are provided in the context of an independent local professional, not as a representative of Mid Murray Council, and are in no way representative of the views of Mid Murray Council.

Stance – I do not support the approval of this wind farm application. I do not believe this wind farm should be built in such close proximity to residential areas and dwellings. This is not to say that I do not support the general premise of constructing wind farms as an alternative source of renewable energy generation. I just do not believe such development should occur in such close proximity to habitable areas and along such high visibility points in the landscape. I do acknowledge that TrustPower have gone above and beyond their legislative requirements in consulting with the community on this project.

Irrespective of my personal belief, I am also aware that the legislation introduced by the State Wide Wind-farm Ministerial has provided very favourable provisions of assessment in supporting this form of development within the regional areas of the South Australia. An assessing officer can only assess against the provisions of the Development Plan, and when a Ministerial document (like the State Wide Wind-farm one) is introduced to limit the application of the Development Plan provisions, it really eliminates the potential for a planner to make a properly balanced assessment. Of key note here is the removal of "amenity" from being an assessable aspect. Effects on amenity constitute a very large proportion of the effects of any wind farm development.

The legislation has clearly been structured to play in the favour of the wind-farm developers. Therefore, as an individual planning professional, I accept that the merits of this application cannot be argued in this arena. In the context of the Ministerial document it does sufficiently meet the requirements of the Plan and "in principle" warrants approval. BUT, there are a number of aspects of this application that should be given further consideration or regard. Some of which, I'm sure other referral agencies will also raise concern with.

Therefore I simply provide a dot point list of the items I would like either changed, elaborated upon, given regard to, or conditioned as part of the approval. Note, they are in no particular order of importance, and are purely based on the information provided in the four volumes of information released as part of the public consultation process. I am more than happy to provide further advice or commentary and to elaborate on any of the following points if/where required:

Points of Consideration:

1. Will there be scope for the community to provide comment on the finalised layout plans of the turbines before all approvals are finalised and construction commences?

2. Please condition that the application shall have 5 years to substantially commence works and a maximum further 3 years to substantially complete said works. This is a long period of time to complete the work that is proposed. No extensions to this approval are to be granted. In the instance of these timeframes not being met, the lodgement of a new development application will be required. This is to ensure the proposed development still meets the provisions of the Development Plan; which is a constantly evolving document that is being updated and refined, and also that the project once started will have a definite completion date.

3. The wind-farm approval should be limited to a 25 year maximum lifespan. If after this time it is deemed viable to "upgrade/replace" the turbines, etc, a whole new application should be required. And if this current wind-farm is approved and built, this should not mean the developer then has "existing use rights" to then automatically replace the old wind-farm with a new one. It should be freshly assessed on its individual merits, and the impacts of the previous wind-farm on the surrounding community taken into regard.

4. The proposed development is not to exceed the "nature of development", ie – not more than 114 turbines of a maximum height of 165m and maximum 3.3 MW capacity (total maximum capacity up to and not exceeding 375 MW), etc. In the instance where there is deviations greater than approved from the nature of approved development, a completely new application will be required. Even in the instance of a very minor variation.

5. ANY variations or major works that deviate from the approved plans (if it is approved) will require a new application, assessment process and public consultation, and will not be assessed as a variation to the existing approval.

6. Will there be any form of public consultation on the final selection of turbine before all approvals are finalised? Clearly communicating the final details of the scheme before the application is approved is essential. This is to prevent "scope creep" that could potentially increase the impacts of the proposal.

7. Irrespective of technological advancement, the proposed selected turbine must conform to and not exceed the approved size and capacity ratios stated in the application. If technology arises that allows the same degree of energy to be harnessed from a smaller style of turbine, precedence should be given to utilising these.

8. Given the very long time-frame that is proposed for the construction of the wind farm, the impacts from the construction process on the surrounding areas will be considerable, particularly the ongoing noise of construction. To help mitigate some of these impacts Construction and Operation hours should be reconsidered from 7am - 7pm, Monday – Saturday, TO 7am - **5pm**, Monday - **Friday**.

   As an adult, it is an imposition to have works occur to the extent of the proposed hours over so many years. BUT, in relation to little children; of which I have a 4 and 5 year old; I am gravely concerned about the impact these proposed working times will have on their daily lives. Please understand, that children (mine anyway) are usually in bed and sleeping by 7pm. That it is highly intrusive in their little lives, based on what they are used to (having always lived in the quiet of the country), to have the WHOLE WAKING TIME of their day with that type of ramped up and noisy activity constantly occurring. It will be very upsetting and unsettling to them. They need time at the end of the day, before they go to bed, to wind down and relax. They will not have

this opportunity to effectively do this if the work runs through the proposed hours.

One key reason that I moved to the country in the first place was to escape the continuous noise of the city and raise children in a calm and peaceful natural environment. The construction of the wind-farm will significantly undermine this purpose and will be very intrusive in the major formative period of their lives.

If there is any one point that I consider of paramount importance, it is this one! Please understand that children are very sensitive to their environment and can easily pick up bad traits if not allowed to grow up in a stable consistent environment. Therefore, I feel it is critical that works desist at 5pm, not 7pm, and that the whole weekend be left as sacred relaxation time to wind down and recuperate after a long week of school/work and wind-farm construction.

Therefore, I would also strongly discourage ANY night time noise or work so whatever during the construction phase of the project.

9. No mention or consideration has been given to the rain shadow effect these turbines will have on the local area. In summary, the clustering of the proposed turbines (when turning) will result in the air temperature being warmer than elsewhere, such that it will reduce the amount of rain that falls in that area: by creating an artificial pocket of higher temperatures, hence less chance of rainfall occurring. This in effect, will reduce the rainfall of the Palmer area, which is already very marginal. It is generally suggested a 5% reduction in the total yearly rain fall. So Palmer would go from 425mm to about 397mm a year. This issue was raised repeatedly at the community consultation phase and no proper answer was ever provided. It is noted that nowhere in the four volumes is it given any regard either. I have attached in **Appendix A** further information regarding this matter.

   I request that specific rain-shadow information is provided as part of the application process as there is potential for this to severely affect the sustainability of the Palmer area.

   Would further spacing apart of the turbines assist in reducing this effect, so they are not all clustered together in lots of groups? Alternatively, further reducing the number of turbines in each cluster would be ultimately desirable.

10. I am in full agreeance with Geoff Parson's stance of using the "Statement Of Commitments" as one of the conditions of approval. TrustPower MUST at all times throughout the life of the project be held responsible and accountable to fully meeting these commitments AND keeping the community continually and actively involved in this process. Such as continuing routine surveys of the flora and fauna to ensure they are not being negatively impacted by the project over its lifetime, etc.

11. As raise by Geoff Parson's correspondence, due to the public consultation being carried out in concurrence with Agency consultation, if any changes are required by the Agencies, the application is to re-undergo the public notification process. The changes made should also be clearly highlighted or summarised for the benefit of the local community to better understand what has changed.

12. Why was a consultant's report not provided on the bushfire aspects of the proposal? I have grave concerns regarding the ramifications of having this wind-farm in such close proximity to my house and the limitations that could be experienced in the instance of a fire. Fire is a serious

and real concern out here EVERY YEAR, so to add layers of complexity (such as this wind-farm) to that already full cup is frankly scary. I do not want to see my house or my town burn in a bushfire because CFS were unable to access the head of the fire coming over the ranges in an easterly direction due to the wind-farms proximity. OR run the risk of the wind-farm itself being the cause of any possible fire starting! I find it unfortunately that the CFS have taken such a reactive response to this issue, where they will deal with the issues when they arise instead of mitigating or better managing them in the first place. More than access paths to the turbines is needed, but I do not have sufficient knowledge or expertise to provide appropriate advice on this matter. I can only raise and highlight that this is one of my greatest concerns and fears about this proposal!

13. Given that I have spent the last 20 years living with a civil engineer that works for DPTI, I have a unique insight into some of the likely traffic safety issues associated with a project of this nature. Of particular importance is **DRIVER DISTRACTION**. Very little regard has been given to this aspect in the various volumes provided for comment. The Traffic Report didn't even mention it! This is a critical issue that should not be swept to the side, and I only hope that DPTI have also highlighted this issue in their agency comments. Either way, I would like to provide the following information upon this issue:

    DPTI is in the process of implementing a road safety strategy known as "Safer Roads" which focuses on the four key areas of road safety, these being the "Safer Roads, Safer Vehicles, Safer Drivers and Safer Speeds". In essence this policy recognises that drivers are likely to make mistakes (fallible nature of humans and that error will occur), the frailty of the human body and the need for more forgiving roadsides. The ultimate goal of the strategy is for zero fatalities on the State's Roads.

    Rural Road Crashes account for a large proportion of the State's fatal and injury crashes. Nonetheless, over the last few decades the rates of crashes have been trending downward as various road safety enforcement, road infrastructure and vehicle safety have improved.

    Driver distraction / inattention is one of the SA Police "fatal five" causes of fatal crashes, and according to the Motor Accident Commission is a significant contributory factor in approximately 45% of serious injury crashes and up to 30% of fatal crashes.

    It is generally accepted in road safety circles that road crashes are generally "random" events where "latent conditions" and "driver error" scenarios culminate to contribute to a crash (for example in the case of a single vehicle off road crash: fatigued driver, narrow road, kangaroo on road, adjacent roadside hazard). This is commonly known as the "Swiss Cheese Model", where the holes in each slice of cheese represent a failure in the system. The Swiss Cheese Model also *"promotes a shift in focus from the role of the individual road user to the system wide failures involved in accident causation, removing the apportioning of blame to individual road users".*

    Minimising driver distraction has been a high priority for road safety groups (for example discouraging mobile phone use whilst driving). It is recognised in the Safer Roads Policy that driver distraction is a dangerous behaviour, where the driver is in control of that distraction. DPTI aims to limit driver "latent condition" distraction where possible by, for example, limiting advertising on arterial roads (governed by planning policy) and standardising road signage to legible and quickly read formats (governed by design guidelines). A consistent and measured approach to distraction issues allows motorists to better focus on the task of driving.

The Snowtown Project wind turbines, for instance, installed between 2008 to present are very large (up to 160m high on top of hilly ridges), prominent and dynamic structures that have the potential to distract the driver who is not fully focused on the road environment and driving task. This would be expected to be more for the case of the driver who is unfamiliar with his surrounds, however the human eye is naturally drawn to light and moving objects so even familiar users could also possibly be vulnerable to distraction. It is not beyond reason that distant wind turbines could actually become another "hole in the Swiss cheese" that has the potential to contribute to the road "latent conditions" group "environment and infrastructure" and ultimately linking to increased road trauma. There are a number of locations where abrupt driver distraction can be identified as being likely to occur with the Palmer Wind Farm, based on the proposed layout as it currently stands.

It would be remiss for authorities approving wind farm developments to discount the impact of visual distraction caused by wind turbines on road related crashes. This is particularly so where wind turbines are bought into the direct field of view of a driver within the immediate roadside environment. To ignore the potential is at complete odds with strategies to reduce road trauma and road fatalities in South Australia.

Furthermore, I have attached in **Appendix B** the UK document and link that also highlights these issues and actually tries to provide some guidance in overcoming them. Obviously some of the issues they face are different to here in Australia, but these general principles should still apply. Another key point of interest raised in this attachment is in the instance of a turbine failing and the amount of clearance space that should be provided around it to mitigate it becoming a further traffic hazard.

Has any regard been given to these aspects within the Palmer Wind Farm proposal? Is not driver safety and making the roads safer also important? It is unquestionable that due to the scale, size and location of the proposed wind farm, this will be an issue that needs to be appropriately addressed. Careful consideration and planning needs to be given to these connected issues of driver distraction + wind farms + crash rates = driver hazards that can result in fatalities.

It is also interesting to note that the consultancy reports did not deem shadow flicker as a driver distraction. Therefore gave no further consideration to it.

14. Consider the deletion of turbine C21 so it does not interfere with the EMI zone.

15. Non-reflective paint should be used on the ENTIRE turbine structure, not just the blades. And should be painted a colour that will blend in with the environment and sky, such as a **grey** colour. NOT WHITE or OFF-WHITE! The Photoshopped images in the reports are quite disingenuous in their representation of the visual effects of an array of bright shiny white turbines in this rural environment. It is worth noting that these images much more clearly represent the impact of the turbines as they would be if painted a mid-grey.

16. Given the significance of Harrisons Gorge, and the "substantial visual impact" that is likely to be experienced in this area, these proposed turbines (Group C) should be pushed even further away from this Gorge.

17. All turbines are to be constructed with the blades located upwind of their tower, to assist in noise reduction.

18. All turbines should be required to automatically shut down on extreme fire danger rated days to minimise any potential risk of fires occurring or being exacerbated by the wind farm. I raise particular concern about the isolated freak happenstance of when a turbine does spontaneously explode or catch fire and the installed internal fire response system is inadequate to deal with the situation. Though not common, they are known to occur and can be quite dangerous, creating an extreme fire risk situation.

19. Condition that the 10 dot point recommendations made in the EBS Ecology Report, pg vii, are to be committed to and faithfully carried out throughout the life of the project (if approved).

20. During the construction phase, who will be policing the contractors to use the designated heavy traffic routes only, and not deviate down roads not designated or designed for such capacity? It is well known that this is a common issue in the local area, where trucking contractors frequently do not stick to their designated routes because it is quicker for them to take the "short cut".

21. Are those turbines that are located near known active bird breeding nests going to be deactivated during the breeding season to ensure that the current bird mortality rate is not impacted? And why does the wedge-tail eagle only have a buffer of 500m? It was suggested as an absolute minimum. Please consider providing a minimum buffer of 1000m from all wedge-tail eagle nests, as they are a critically important and unique part of living in this area, to the community and tourists alike. Like Bear Rock is a mascot to Palmer, so are the wedge-tailed eagles to the Ranges located in Group C of the wind turbines, also where Harrisons Gorge is.

22. If Snowtown Wind Farm has an anticipated availability rate of 97%, what is the Palmer Wind Farm's anticipated availability rate?

23. Very clear timeframes are to be imposed on how long the applicants have to decommission the site at the end of the wind-farm's life . This should not be spread over years and years. Conditions for decommissioning must be very clearly spelled out. All infrastructure associated with the wind farm is to be removed from site and the landscape reinstated where possible to its original state. This should also occur within a fixed timeframe. The existing levels of amenity should also be fully recorded and documented BEFORE the wind-farm commences so this level of amenity can then be bench-marked as what is desirable to be reinstated once it is decommissioned.

24. In relation to temporary structures and areas, it should be conditioned that these items are removed within 3 months of completion of the works and the site to be completely rehabilitated to its former state or equivalent within 12 months.

25. No advertising is to occur on any of the turbines.

26. Please do not light the turbines at night. Given this is not a legal requirement, it is certainly preferable that they not be made to stand out at all at night. This should extend to include any access/flood lighting in and around any of the associated compounds/construction sites at night as well. Please confirm that flashing red hazard lights will also no be required?

27. I was disappointed that no regard was given to cats and dogs in relation to their sensitivity of hearing, only really livestock and horses. Given that dogs and cats have a significant higher capacity of hearing a wider range of sounds over humans, it is important that this issue is also

addressed. It can be very disruptive to the neighbourhood when a dog howls all night long because they can hear some sub-sound from the wind farm that humans cannot. And the same can be said with cats, which are sticklers for their routine. The increase in the range of sounds that is likely to be heard over the life of the wind farm should give regard to being within a safe range that will not cause adverse stress in our household pets or working animals.

28. It is critical that TrustPower absolutely adhere to, liaise with and ACTION IMMEDIATELY the requirements of the CFS and SES at all times.

29. If any easement is to be utilised during the life of the project, full consent by the land owner must be given before the said easement can be used. If the land owner does not consent to their easement being used, TrustPower much seek alternative options of access. No coercion of the land owner is to occur.

30. All CEMPs and OMPs should be made readily available to the community at all times. The community must be actively updated and notified as any changes to them occur. It is desirable these documents have full disclosure to the general public to ensure the project and its owners are being held accountable for the life of the project. The auditing process and findings on these plans and procedures should also be made readily and routinely available to the public, such as noise complaints, etc. Therefore notification of on-going monitoring of these records should not be limited to "authorised personnel" only, but should also be publically published.

31. In relation to the documentation that has been provided to the general community and the CDAP members, I would like to highlight that only certain dwellings were identified on all the maps. In no form or way do they actually represent ALL the dwellings located in the area! This is easily checked by reviewing current aerial photography against the maps in the application.

    This can be taken as a graphic misrepresentation as the maps in the application are given as being representative of all the dwellings located in the area. THIS IS NOT THE CASE! It is also important to note that the majority of the data used to make all the various assessments on, for the bulk of reports, factored in only the "affected" dwellings. To be more precise, predominantly only those land owners that are either hosting or have an agreement with TrustPower to not raise any problems are considered. Few non-hosting dwellings were considered beyond the immediate area of the identified corridors and the requisite 1km buffer zones.

32. Please clarify, is there a benefit to locating the electrical transformers within the turbines or outside? Does it make them quieter if located within the turbine? How much of a fire hazard are they likely to be? Clearly, the quietest and safest option should be pursued.

33. It is noted in the consultant reports that there will be a 5km radius that will be affected in relation to their TV reception, radio reception, WiFi reception, mobile coverage, and so on. Given that Palmer is already identified as a communications "Black Spot", I have grave concerns that the recent improvements we have gained with mobile coverage, etc – which have generally improved things to "barely acceptable" - will be completely undone by the introduction of the wind farm.

    Does that mean, for instance, TrustPower will provide all affected land owners with fixed land-line phones or satellite phones and internet service and pay the respective bills for using these type of phones? As a society, we are being rapidly forced to move towards a technologically based way of life. To lose or reduce mobile/TV/WiFi reception could be seriously detrimental to

how effectively we can maintain and achieve the technological level of integration now demanded. For instance – all tax returns are now expected to be lodged on line. The Government also insists that all people now utilise the MyGov website as a central point to access such services as the Taxation Office, Centerlink, Child Support, Medicare, etc. It is critical to sustaining life here in the country that these reception/coverage services NOT be further compromised than they already are! Any issues that arise in relation to this matter must be immediately and properly address and all associated costs covered by TrustPower for the entirety of the affected community.

34. Decibel testing should be routinely carried out throughout the life of the wind farm and the results made publically available from a range of locations, some of which should be nominated by the surrounding local community, to ensure the turbines maintain their desired minimal decibel rating. This is to ensure that as the turbines increases with age, wear and tear, they do not become louder. This needs to be constantly monitored! It is also good risk management practice to do this to minimise the amounts of complaints likely to be received over the life of the project.

35. TrustPower are to ensure all recommended activities and conditions are appropriately and professionally carried out prior to commencement of works and during the life of the project.

36. Where blasting can be avoided, that would be much appreciated – by residents over a very large area.

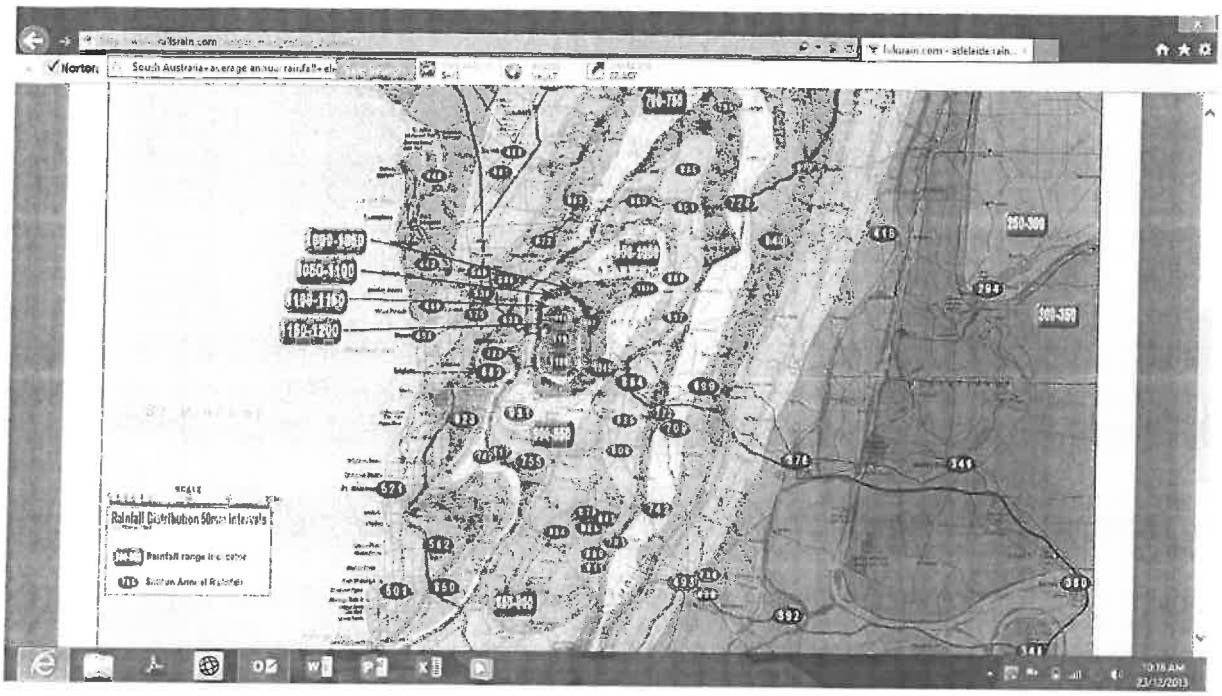
37. Rock crushing should also be kept to a minimum, as far away as possible from habitable areas, and only occur during normal weekday working hours.

I thank you for reading and taking on board my comments regarding the Palmer Wind Farm. I am more than happy to further elaborate or assist on any of the above points if/where required.

Josephine Henderson
B Int Arch (Hons - heritage), MPIA CPP, Post Grad Cert Planning & Building

APPENDIX A – Rain Shadow Effect

THE ENHANCED RAIN SHADOW EFFECT



The above map provides a representation of the well-known rain shadow effect for the Mount Lofty Ranges as the air stream moves predominantly in an easterly direction. This map is available, with other information, from the following web site:

http://www.hillsrain.com/Rainfall%20Maps.shtml

It must be appreciated that the volume of physical surface area that the proposed wind farm turbines will "take up" to drive the generators is immense, and their purpose is to create power by the wind's energy as effectively as possible. The scale of the mechanics involved can only be compared in a magnitude to the Eastern Mount Lofty Ranges themselves.

Each of the proposed wind turbines with a swept diameter of 108m, will effectively increase the height of the most eastern ranges (the ridges before the eastern flats where the wind farm is proposed). This additional altitude will create precipitation at or immediately surrounding the turbine, potential precipitation that is no longer "available" for downwind (generally eastern) sites.

This is because the wind turbines create slow-moving air on the down-wind size of the wind farm. The slow moving air will take up more space than the higher-speed wind would have before the wind farm was built, so this will cause the air-mass above to rise higher to pass over the obstruction.

From Wikipedia:

Coalescence occurs when water droplets fuse to create larger water droplets, or when water droplets freeze onto an ice crystal, which is known as the Bergeron process. The fall rate of very small droplets is negligible, hence clouds do not fall out of the sky; precipitation will only occur when these coalesce into larger drops. When air turbulence occurs, water droplets collide, producing larger droplets. As these larger water droplets descend, coalescence continues, so that drops become heavy enough to overcome air resistance and fall as rain.[21]...Orographic or relief rainfall is caused when masses of air pushed by wind are forced up the side of elevated land formations, such as large mountains.

^ Paul Sirvatka (2003). "Cloud Physics: Collision/Coalescence; The Bergeron Process". College of DuPage. Retrieved 2009-01-01

Wind farms on the tops of ridges will have the effect of making the ridges 'appear' to the air-flow to be higher; it would therefore be very reasonable to expect an enhanced orographic effect.

The amount of theoretical rainfall gained at the turbines (and the same potential rainfall lost downwind) can be determined through basic calculations.

One turbine has a total blade diameter of 108 m.

The swept area for one turbine is 9160 m^2 (pi X radius squared).

The total swept area is 120 (turbines) x 9160 = 1.1 X 10^6 m^2 (110 Hectares, vertically).

The 120 turbine wind farm proposed is spread over an approximate distance of 30km (by Trustpower's information). By dividing 1.1 X 10^6 m^2 by 30,000 m, we have a theoretical increase of the Eastern Mount Lofty Ranges (the ridges where turbines are located) of **37 m of additional elevation**, spread across the entire wind farm site (this includes the areas between the wind turbines, not just the wind turbine sites).

The rainfall gained by the additional artificial elevation (and assumed to be lost downwind as the moisture is effectively sapped from the given volume of air) is determined by comparing the theoretical increase in topography. This is averaged and assumes the saturated air only passes through one turbine site - as the sites where air must pass several turbines consecutively depending on the wind direction, the effects will be multiplied.

Town / Site	**Elevation (m)**	**Rainfall (mm/annum) (*within brackets is the rainfall predicted by formula below)**
Mt Torrens	441m	1032mm (*theoretical 666mm)
Mt Pleasant	430m	677mm (*theoretical 656mm)
Springton	396m	696mm (*theoretical 630mm)
Tungkillo	391m	687mm (*theoretical 626mm)
Birdwood	389m	756mm (*theoretical 625mm)
Woodside	368m	800mm (*theoretical 609mm)
Palmer	125m	425mm (*theoretical 426mm)
Cambrai	100m	395mm (*theoretical 408mm)
Mannum	32m	346mm (*theoretical 357mm)
Average Turbine Site (pre-turbine)	Say 300m	Theoretical 558mm
Average Turbine Site (post-turbine)	Say 337m	Theoretical 586mm

The above demonstrates the effect of topography on rainfall. The western high ranges, having uplift the air, tend to initiate the coalescence process which increases the rainfall at the higher peaks.

The linear function of "annual rainfall = 0.75 X elevation (m) + 333" can be used as a best fit to get a theoretical average annual rainfall for a given topography, however this basic model is more suited to predicting rainfall after it has passed the higher peaks and is moving into rain shadow country. 333 is where the function intersects the Y axis and gives the theoretical average rainfall (mm) at sea level for this general latitude.

An additional 37m elevation equates to 28mm/annum rainfall. That is 28mm/annum rainfall that will likely no longer fall on downwind sites. One inch / annum rainfall is significant and reduces Palmer's standing as a recognised moderate rainfall area into what is technically a low rainfall area.

The effects of a greatly increased rain shadow effect on the local environs will likely have impacts on native remnant vegetation and local fauna, which have evolved to depend on a given rainfall amount over thousands if not millions of years. For example one of the marginal species may become extinct, with knock on effects to species that depend on that marginal species for survival. Droughts will probably occur over longer periods of time.

For our own personal situation (Palmer Township / 2919 Reedy Creek Road) a reduction of our average annual rainfall from the current 425mm per year to 397mm per year will have the following repercussions:

- Rainfall currently collected from the combined roof/shed area (815m^2) is theoretically reduced by 22,800 L / annum – this rainwater is used for domestic purposes. Replacement water may need to be sourced from SA Water (however that is not suitable for our drinking supplies so the domestic house connection is not currently suited and would require re-plumbing to put toilets on mains water).

- To offset lost rainfall, additional SA Water for gardening purposes will be required. This comes at a financial cost and also draws on River Murray resources.
- Lost rainfall across our entire 36 Ha property (360,000m^2) will be reduced by 1 million L / annum. Potential impacts to or even loss of significant remnant native vegetation (including the EPBC nationally listed significant Lomandra Grasslands that cover approximately 20% of our land). Frogs and other species that live in the lower spring/marshy sections of our land could become reduced in numbers.
- Additional time and costs to maintain native vegetation (species that were originally remnant to the area before mass clearing) and have been chosen to compliment biodiversity for the currently available rainfall for the area (EG Pink Gums and Peppermint Box Trees which require moderate rainfall IE at least 425mm per year).

Our rainfall losses could be considered trivial compared to the many farmers whose livelihoods dependent on consistent rainfall in the "marginal" lands that form millions of hectares of cropping and grazing pastures to the east of the Eastern Mt Lofty Ranges. The knock on effects of reduced rainfall to the agricultural economy would be measurable and likely be felt locally.

Furthermore rainfall will be redistributed to the ranges (turbines) where farming activities are constrained to low intensity grazing (cropping activity is virtually non-existent).

Wind farm advocates preach about altruism (the greater good), but this redistribution of rainfall to unproductive country is not equitable to those who depend on it to farm productive country (only the flats can be efficiently cultivated for cropping). If climate warming predictions do actually eventuate over time, the wind turbines will have caused the downwind local environs to greatly accelerate into highly unproductive land for farming activities. It would be somewhat ironic that the area earmarked to make a difference to climate warming (albeit slight in the global perspective) will have to suffer a double whammy. It would make far greater sense to develop wind farms off shore where these types of effects are contained away from human habitation.

APPENDIX B – Road Safety & Driver Distraction

The following document was sourced from:
http://www.hugag.co.uk/attachments/File/Appendix07ammended.pdf

This spatial planning document is used in the UK for trunk roads (arterial roads/freeway). Please note, some document distortion has occurred converting it from pdf to a word document.

Safe roads, Reliable journeys, Informed travellers

HIGHWAYS AGENCY

NETWORK SERVICES

SPATIAL PLANNING ADVICE NOTE: SP 12/09

PLANNING APPLICATIONS FOR WIND TURBINES SITED NEAR TO TRUNK ROADS

Document Control

This document requires formal sign off by the Senior Policy Advisor in the Network Services Spatial Planning Team. Sign off implies that the guidance is relevant and accurate on the date it was published.

Please note that the latest version of this guidance will always be located on the Way we Work. If you print this document be aware that it may be subsequently updated.

Sign Off:

HA Staff Name	Position	*Date*	*Signature*
Ian Askew	Document Owner	31.01.09	Signature Blocked
Janice Allen	Senior Policy Advisor	31.01.09	Signature Blocked
Iain Reidy	Review Manager	31.01.09	Signature \blocked

Version Control:

Version	Date	Comments/Principal Changes
v0.1	19/12/2006	**Working draft**
v.1	7/3/2007	Published version
v.2	23/7/07	Revised version
V.3	31/01/2009	Revised Version

Introduction

1. *Micro Wind Turbines* are generally used for domestic purposes. They have a maximum output of up to 13.5 kilowatts (kW) per hour and a maximum rotor diameter of 4 metres. Micro wind turbines can be either erected in an open exposed location or, occasionally, mounted on a building.

2. *Small Wind Turbines* are slightly larger and generally are used in rural locations or for small industrial/commercial units. These turbines have a maximum output of up to 50kW per hour and a rotor diameter of up to 16 metres Small wind turbines are usually mounted on a mast in an open exposed location.

3. *Commercial Wind Turbines*, which are the ones usually grouped together to form wind farms tend to have a maximum output of at least 300 kW per hour and a rotor diameter of over 30 metres. Many large scale commercial developments have turbines with a maximum output of 1.8 megawatts per hour using rotor diameters of 70 metres or more.

General

4. All wind turbines require planning permission and applicants are advised by Planning Policy Statement 22 (PPS22): Planning for Renewable Energy that they should consult the Highways Agency at an early stage whenever it is proposed to site wind turbines close to the Strategic Road Network (SRN), which comprises the Agency's motorways and all-purpose trunk roads.

5. There is no policy against the siting of wind farms alongside our motorways and trunk roads. On the contrary, the Agency is most keen to support the Government's policy of encouraging sustainable sources of energy. However, we do need to ensure that the safety of road users and Agency operatives is not compromised.

6. The Agency's normal powers under Article 14 of the GDPO apply to wind farm developments. We should handle such applications as we do all others. There is also the potential for the Agency to become involved in technical approval of the turbine towers, which are sited closer to the trunk road than their own maximum height. However, this is unlikely to be the case in practice as a significant offset from the trunk road will be required for the reasons set out below. In all cases the structure should conform to European Union and The International Electrotechnical Commission (IEC) standards and have received appropriate certification.

Structural Collapse

7. Cases of wind turbines collapsing or blades coming off are very rare but not totally unknown. No formal advice exists within the UK to define where wind turbines can be located in relation to roads. PPS22 states that, "Although a

wind turbine erected in accordance with best engineering practice should be a stable structure, it may be advisable to achieve a set-back from roads and railways of at least fall over distance (height measured to blade tip) to achieve maximum safety."

8. However, given the potential consequences were debris to fall on a busy motorway or trunk road, an additional allowance for debris scatter is necessary in order to truly maximize safety.

'Icing'

9. A further factor that must be considered is the phenomenon of ice being thrown from the turbine blades ('icing'). In certain meteorological conditions, significant accretions of ice can build up on wind turbine blades. Surprisingly, moving blades are affected to a far greater extent than stationary blades.

10. Warming or fragmentation may then lead to ice being shed from the rotating blades. Large fragments may be thrown a considerable distance.

11. Again, this is a very rare event and the frequency of occurrence does decrease markedly with distance. Nevertheless, the consequences of an ice projectile hitting a moving vehicle could be severe. Not only would the occupants be at risk but a multi- vehicle accident could result.

12. Most modern wind turbines will have vibration and/or climate sensitive technology that will shut down the turbine if there is the potential for icing. Where this technology is present there should be no need to consider this issue further. Evidence of this technology on the proposed turbines should be provided.

Location

13. Consideration of the risks associated with structural failure and 'icing' identifies the clear need to incorporate a safety margin in the offset between the trunk road boundary and the siting of a wind turbine. Therefore, it is appropriate to achieve a set-back from the nearest highway boundary equal in distance to their height + 10% for micro and small turbines. Commercial turbines should be set back a distance equal to their height + 50 metres.

14. However, in certain circumstances relaxations to the above set-back may be be expected to demonstrate that any relaxation on the suggested set-back distance poses no unacceptable risk. The burden of proof will lie with the proposer.

Visual Distraction

15. Any potential for visual distraction should be minimised, not by screening but rather by the provision of a clear, continuous view of the wind farm that

develops over the maximum possible length of approach carriageway. The potential for distraction may be greater than with other roadside features – advertisements, etc., do not generally rotate – but a clear view from distance will considerably reduce the temptation for drivers to turn their heads when passing the towers.

16. Sites where the topography, vegetation or buildings might conceal the view of the turbines until the last minute should be avoided as drivers may be distracted suddenly and take their attention from the road and other traffic.

17. Wind farms should not be located where motorists need to pay particular attention to the driving task, such as the immediate vicinity of road junctions, sharp or unexpected bends and crossings for pedestrians and cyclists. Therefore, the associated road network should be reviewed with particular attention being paid to the complexity of junctions, traffic flows and the possible presence of short headways between vehicles.

18. The existing accident record and type of accidents occurring near the proposed wind turbine should be analysed. Locations with a history of rear end shunt accidents should be treated with particular caution.

Dazzle

19. As with icing, most modern turbines will be constructed with materials that eliminate Dazzle, and this should be easy to establish and eliminate as a concern. Evidence of this technology on the proposed turbines should be provided.

Access

20. The promoter of a wind farm should be asked to prepare a transport assessment covering the construction, operation and de-commissioning stages of the development for consideration at the pre-application stage. The transport assessment should demonstrate the likely impacts of the development on the highway network and on road users. From this, the acceptability of the proposal should be determined and any mitigating measures should be identified.

21. Access to the site for construction, maintenance and de-commissioning should be derived via the local road network and, normally, there should be no direct connection to the SRN.

22. Access to a wind farm is required at all times for maintenance. However, this will generally be infrequent and will not generate a large amount of traffic on the surrounding road network. Usually maintenance will be carried out using light vehicles.

23. Therefore, the main period of disruption to the highway network usually will

occur during the construction and decommissioning stages of a wind farm development, although account should be taken of the need to replace major components in the event of failure. A commercial wind farm will have a life span of approximately 20 to 25 years (10 years for a micro wind turbine) and a plan should be put in place for its decommissioning or replacement.

24. The construction period for a wind farm development will be several months. The single largest components that must be transported to the site are likely to be the rotor blades as they are normally prefabricated in one piece, whereas the towers are built in sections. Swept path analyses should be provided by the developer for the abnormal load deliveries to the site.

25. It is possible that tourists may wish to visit the site during construction and once it has become operational. Some sites have been provided with visitor centres in anticipation of this. Therefore, any likely tourist trips should be incorporated into the transport assessment, which should also identify the facilities (e.g. parking area) required to accommodate them.

Use of Agency Land

26. There may be some areas of 'surplus land' owned by the Agency that could be sold for use as wind farms but these are likely to be quite small in size as we try to limit our acquisitions to land directly required for highway construction plus essential landscaping. Surplus land is only acquired where there is a legal obligation imposed.

23. Land within 'the Highway' (which includes all the land encompassed by the highway boundaries plus the landscape areas) cannot be used for other development purpose, even the erection of wind turbines. The sole exception to this general rule is in the case of micro and small turbines used for the generation of power for highway equipment.

Spacing of Turbines

24. The Highways Agency has no particular views on the spacing of turbines. That is an issue for the Local Planning Authorities.

ILT20155345

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«Assessment_No»

DEVELOPMENT ACT, 1993

REPRESENTATION ON APPLICATION

CATEGORY 3

Development Number 711/072/14_____

My Name DAVIDSTN ROCHOW My Telephone Number 08 85 708051
My Address R.S.D. 23 – 1545 BLACK HILL RD. VIA ANGASTON STH AUST. Postcode 5353

This representation is in relation to the application by:

Trustpower Australia Holdings Pty Ltd

For consent to:

Erect a wind farm

proposed to be located at:

Palmer, Tungkillo, Jutland and surrounding areas in the Hills Policy and Marne Watercourse areas of the Mid Murray Council.

The address of the property affected is Hundred of Ridley 238 Visual BLACK HILL ELEVATED SLOPE
(your property address) R.S.D. 23 – 1545 BLACK HILL RD. STH AUST. VIA ANGASTON S.A 5353

The specific aspects of the application to which I make comments on are:

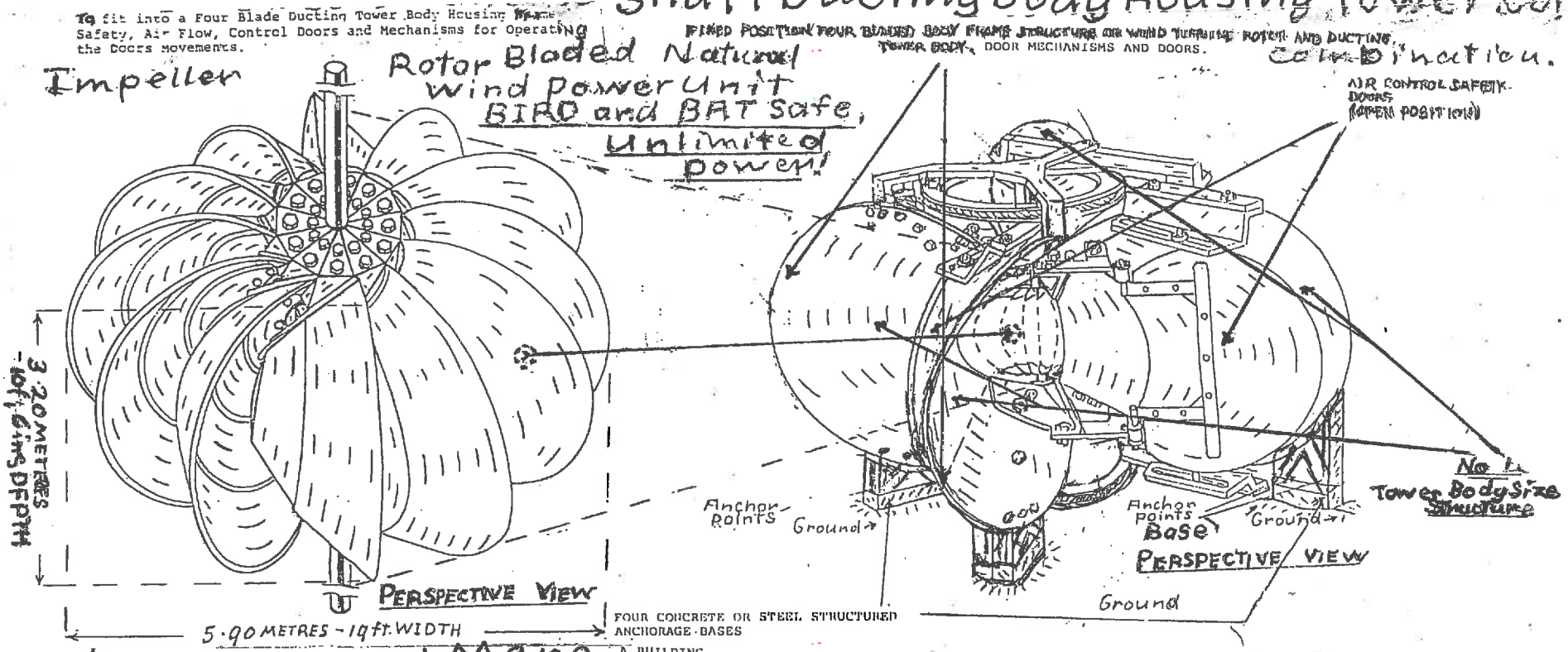
The Needless Gigantic Monolithic Stark Type Tower Structurings. Being Wrongly Forewarded. No Ful Effective let Alone Guarantee of Correct Alternative Favourable Multiple Bladed Unit Inclusion for Environment Safeguard. A Correct Ducted Side Deliver ertical Axis Wind Power Extracting Unit can Comprise Ground Based Electrical Generating or Water Delivering Useage Equipement. Current Proposed Design to Conside is Inappropriate. Further Details on Additional Sheets Provided herewith. With Photograph Copy of Alternativ Bulk Air Cupping Design Makeup. Silent Motions afe land Based or on Pontoon Mounted From Seashore Tether Positions Eleric Power Cables or Water Delivery to Stor tion For Further Power Usage Requisate From Edge Requirement of Elevated Posi

(see also attached comments)

My concerns would be overcome by: Not Having Closing Date as Abrupt as done! Fully Correct Detail Materials Not able to be Fu Provided. Research Poor to Never be closed Premature I would like to present My Request for Rightful Lawful Being Involved in Applications of this one Type of Wind Transfer Power Delivery Makeup Unit Where An Alternative Multiple Blade Design as My Type Unit Makeup is able To be Included correctly. And Fully able To be Applicable for Safe purpose Required

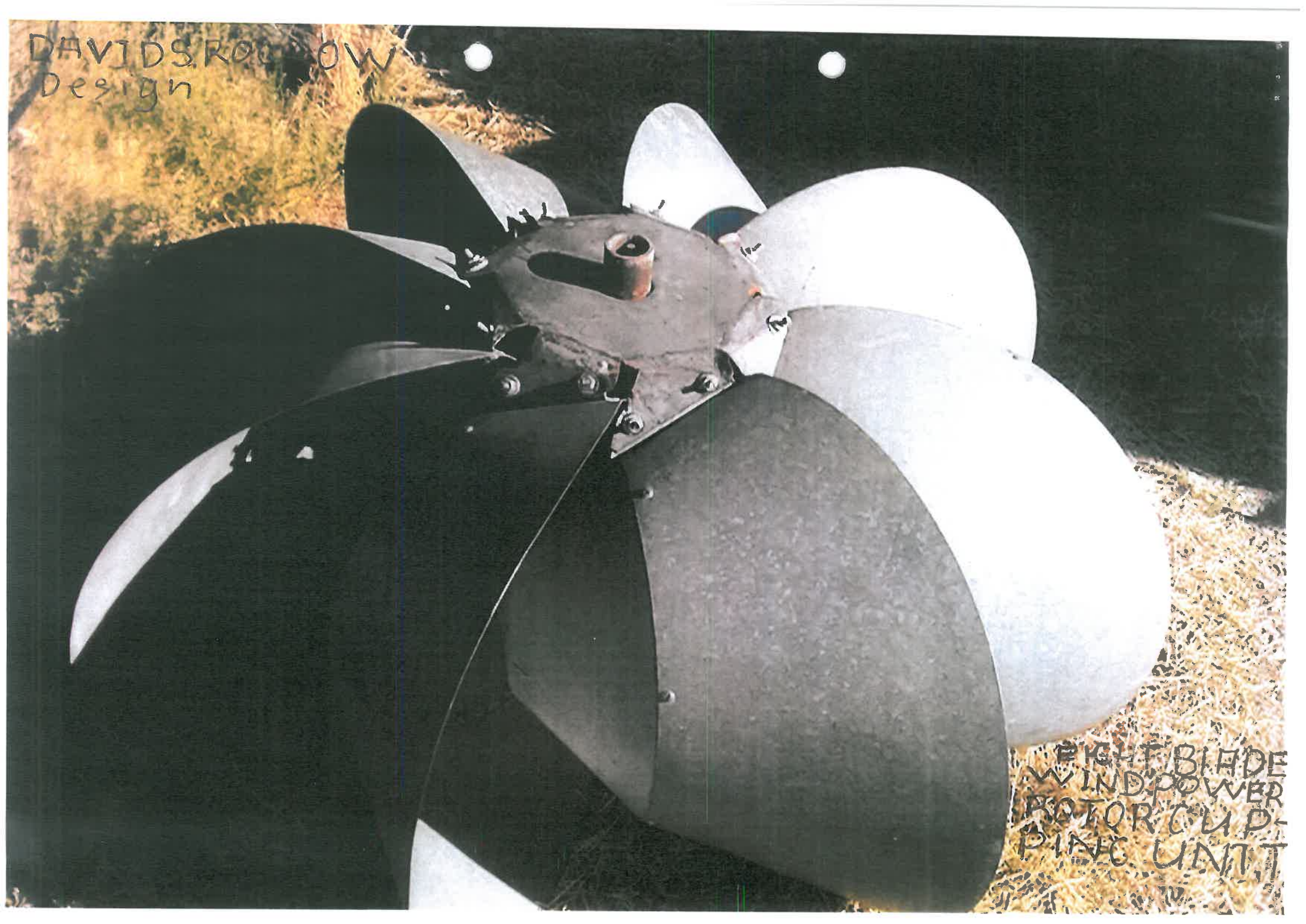
(see also attached comments) Review on ALL Participating Parties

Please Find Here with My Illustrated coverage Diagram for consideration of inplace Inclusion for Safe Environmental placing and what Wind Fanms can be claimed to be a Wind Farm by that Tithe. Under. Below is Diagram Drawing of a Multiple Cup Bladed Radially Mounted to power Transfer Drive Shaft Ducting Body Housing Tower Consideration.



Greater Size and More Numbered Blades For Power Transfer in Extracting Wind Power Delivery Benfit For Required Need of Natural Clean Energy. Usage.

David S. Rochow


DAVIDSROTOR
Design
WEIGHT BLADE
WINDPOWER
ROTOR CUP-
PING UNIT

11120193343

RECEIVED 20.. CAMBRAI OFFICE

66

DEVELOPMENT ACT, 1993

REPRESENTATION ON APPLICATION CATEGORY 3

Development Number 711/072/14

My Name Michael + Teresa Saegenschnitter My Telephone Number 8564 8211

My Postal Address PO Box 11, KEYNETON

Postcode 5353

This representation is in relation to the application by: *Trustpower Australia Holdings Pty Ltd*

for consent to establish the *Palmer Wind Farm*

The address of my affected property is Jutland Rd, Keyneton (CT5361/26); 73 Stengert Rd, Keyn (CT 6124/177); Sawmill Rd, Keyneton (CT 6124/181); LoT 2 Jutland Rd, Eden Valley (CT 6121/802); 75 Stengert Rd, Keyneton (CT5437/160).

The specific aspects of the application to which I make comments on are:

Infrasound - health aspect

Property Valuations will be reduced due to people not wishing to take up residency next to windfarms. The reason is the perception that is out there in regard to infrasound and the overbearing aspect of a wind farm.

My concerns would be overcome by:

The panel taking into account the huge amount of people against the project vs the small amount of people for it. Windfarms need to be placed at least 10kms away from residences.

☐ I do not wish to be heard by the Development Assessment Panel

☑ I do wish to be heard personally by the Development Assessment Panel

☐ I will represent myself

or

☑ I will be represented by EMLRLG

Date 19-5-15 Signed MJ Saegenschnitter, T Saegenschnitter

ILT2015 5329

67

«Assessment_No»

DEVELOPMENT ACT, 1993

REPRESENTATION ON APPLICATION

CATEGORY 3

Development Number 711/072/14

My Name Rachel Kuhn My Telephone Number 85652045

My Address 23 Blanchetown Rd, Sedan Postcode 5353.

This representation is in relation to the application by:

Trustpower Australia Holdings Pty Ltd

For consent to:

Erect a wind farm

proposed to be located at:

Palmer, Tungkillo, Jutland and surrounding areas in the Hills Policy and Marne Watercourse areas of the Mid Murray Council.

The address of the property affected is Cambrai Area School

(your property address) 23 Blanchetown Rd, Sedan SA 5353.

The specific aspects of the application to which I make comments on are:

In relation to objective 39 of Mid Murray Development Plan which states safe, convenient, pleasant, and healthy living environments that meet the needs & preferences of the community. All of this will actually be taken from us and our children if consent is given to allow turbines to be built on the hills face.

(see also attached comments)

My concerns would be overcome by: consent been rejected for any Wind Farm to be erected by any Company in our area.

(see also attached comments)

To:

Director, Development & Environmental Services, Mid Murray Council

PO Box 28, Mannum, 5238

Mr. Kelvin Goldstone

Re: Trust Power Palmer Wind Farm Development Application 711/072/14

Trust Power's application for a wind farm located near Palmer should be refused for the reasons laid out below, which are in conflict with the cited clauses of the Mid Murray Council Development Plan:

1. Environmental damage: land, watercourses and ground water, native vegetation, fauna and noise pollution. The impact of the proposal is in conflict with council wide objective 29 and Principles of Development Control (PDCs) 39, 42, 43, 87, 92, 93, 163, 164, 168, 169, 170, 175, 176, 180, 185, 190, 192, 196, 197, 199, 215, 398; rural zone objectives 6, 16, 17, 23 and rural zone PDCs 4, 6, 7, 12, 18; and hills policy area objectives 1, 2, 3 and hills policy area PDCs 1 and 4a.

2. The proposal is not harmonious with existing land uses and district character. This is in conflict with council wide objectives 7, 15, 18, 19, 25, 26, 29, 30; council wide PDCs 5, 43, 55, 78, 79, 87, 88, 91, 97, 155, 160, 163, 165, 166, 167, 173, 188, 190, 398, 399; rural zone objectives 6 and 16; rural zone PDCs 4, 19, 43; and hills policy area objectives 1, 2, 3 and hills policy area PDCs 1, 3, 4a.

3. The proposal does not provide for care and wellbeing of the community. This is in conflict with council wide objectives 9, 15, 25, 26, 29; council wide PDCs 43, 88, 92, 166, 175, 188, 388, 397, 398, 399; rural zone objective 17; rural zone PDC 12; and hills policy area objective 2.

4. The proposal is not an efficient or effective use of land; wind turbines are neither efficient (<40%) nor effective (unreliable output) producers of electricity. Council wide PDC 396 requires that wind turbines should be located in areas that maximise efficient generation and supply of electricity. The proposed location does not maximise efficient generation and is too far from the major loads on the grid to maximise efficient supply of the generated electricity, so is in conflict with that PDC. Conflict also exists with rural zone objectives 6, 16, 22, 23 and rural zone PDC 18 and hills policy are objective 2 and PDC 1.

5. Hazards: loss of aerial firefighting capability; this is in conflict with council wide objectives 26, 84, 85, 94, 95, 98 and council wide PDCs 46, 388, 398; rural zone objectives 6, 17, 23, hills policy area objective 2 and PDC 1.

6. Hazards: risk to traffic due to shadow, flicker and debris; these are in conflict with council wide objectives 14, 15, 16, 17, 26, 98 and council wide PDCs 34, 39, 87, 95, 396, 398; and hills policy area objective 2 and PDC 1.

7. The proposed renewable energy facility does not benefit the environment, evidenced by the conflicts cited above, does not benefit the community, as more residents lose financially and in terms of lifestyle than benefit as a result of lease payments or neighbour agreements, and does not benefit the state as the vast majority of money associated with the development flows either interstate or overseas, leaving only inflated power prices for South Australians. This is in conflict with council wide objectives 96, 97, 98; council wide PDCs 78, 92, 163, 168, 188, 396; rural zone objectives 6 and 17; rural zone PDCs 4, 6, 7 and hills policy area objective 2.

8. The damage and disruption during construction (dust, blasting, heavy vehicles) is in conflict with council wide objectives 16, 48, 50, 51, 53, 59, 64g; council wide PDCs 39, 43g, 95, 196, 197, 198, 388; hills policy area objectives 1 and 2 and PDCs 1 and 4a.

9. The proposed layout is inappropriate and is in conflict with council wide PDCs 78, 158, 388 and 397; rural zone objectives 6, 16, 17, 21 and rural zone PDCs 4 and 19; hills policy area objective 2 and PDCs 1, 3 and 4a.

10. The visual amenity of the region would be compromised. While the misguided ministerial "wind farm" development plan amendments (largely seen in a dim light by the Development Planning Advisory Committee) are lenient toward wind turbines, the following notable conflicts remain: council wide objectives 15, 25, 26, 50, 54; council wide PDCs 55, 78, 79, 155, 158, 159, 160, 170, 173, 190, 397; rural zone objective 6; rural zone PDCs 18, 19; hills policy area objectives 1, 2, 3; hills policy area PDCs 1, 3, 4a.

11. If approved, the proposal will have a negative impact on most of the property values in the area. It should be noted that only host properties have ongoing income; neighbour agreements are non-transferable. The effect on property values in the region is in conflict with council wide objectives 9, 25, 29, 98; council wide PDCs 55, 79, 88, 91, 160, 162, 163, 167, 188, 388, 398; rural zone objective 16 and PDC 19 and hills policy area objectives 1 and 2.

12. The proposal is very close to the edge of the Barossa Character Protection District, so close in fact that it will compromise the values the Protection Legislation seeks to preserve. This is in conflict with council wide objectives 50, 54, 98, council wide PDCs 55, 155, 158, 167; rural zone objectives 2, 6, 16, 21; rural zone PDCs 22, 43; hills policy area objectives 1 and 2 and hills policy area PDCs 1 and 3.

Further Comments

We have foster children living with us. We are foster parents so that we can make a positive difference to our most vunerable peoples lives.
We strive to help them overcome all their traumas that they have experienced in their short lives and the last thing any of these children need is to be subjected to is the health concerns that are associated with Wind Farms.
If society is to help & protect these children then why would a wind farm application be granted? What does the Minister for Children say in relation to the Wind Farm & the potential that it may have on the children.

Conclusion

The Mid Murray Council DAP should refuse planning permission for the proposed wind farm Development Application 711/072/14 because it is in conflict with much of the Mid Murray Council Development Plan.

Please see the submission of the Eastern Mount Lofty Ranges Landscape Guardians for further elaboration of the above comments.

☐ I/We wish to be heard at the public hearing/meeting

☐ I /We nominate _____ to speak on my behalf.

☒ I /We nominate the Eastern Mt Lofty Ranges Landscape Guardians to speak on my behalf.

I/We would like for my/our submissions to be made public/~~private~~.

Yours Sincerely,

RKL

1LT2015 5327

68

«Assessment No»

DEVELOPMENT ACT, 1993

REPRESENTATION ON APPLICATION

CATEGORY 3

Development Number 711/072/14

My Name Shane Zakelj My Telephone Number _____

My Address Lot 1 Main Road Postcode 5353
Cambrai

This representation is in relation to the application by:

Trustpower Australia Holdings Pty Ltd

For consent to:

Erect a wind farm

proposed to be located at:

Palmer, Tungkillo, Jutland and surrounding areas in the Hills Policy and Marne Watercourse areas of the Mid Murray Council.

The address of the property affected is Lot 1 main Road

(your property address) Cambrai

The specific aspects of the application to which I make comments on are:

There is increasing evidence that chronic sleep deprivation and cardio vascular disease are associated. Undisturbed sleep is essential for physiological and psychological health Children have a special need for uninterrupted sleep for growth and cognitive development. (Per Accoustical Soc of America)

(see also attached comments)

My concerns would be overcome by: Refusing Trust Power application to build a wind farm.

(see also attached comments) _____

To:

Director, Development & Environmental Services, Mid Murray Council

PO Box 28, Mannum, 5238

Mr. Kelvin Goldstone

Re: Trust Power Palmer Wind Farm Development Application 711/072/14

Trust Power's application for a wind farm located near Palmer should be refused for the reasons laid out below, which are in conflict with the cited clauses of the Mid Murray Council Development Plan:

1. Environmental damage: land, watercourses and ground water, native vegetation, fauna and noise pollution. The impact of the proposal is in conflict with council wide objective 29 and Principles of Development Control (PDCs) 39, 42, 43, 87, 92, 93, 163, 164, 168, 169, 170, 175, 176, 180, 185, 190, 192, 196, 197, 199, 215, 398; rural zone objectives 6, 16, 17, 23 and rural zone PDCs 4, 6, 7, 12, 18; and hills policy area objectives 1, 2, 3 and hills policy area PDCs 1 and 4a.

2. The proposal is not harmonious with existing land uses and district character. This is in conflict with council wide objectives 7, 15, 18, 19, 25, 26, 29, 30; council wide PDCs 5, 43, 55, 78, 79, 87, 88, 91, 97, 155, 160, 163, 165, 166, 167, 173, 188, 190, 398, 399; rural zone objectives 6 and 16; rural zone PDCs 4, 19, 43; and hills policy area objectives 1, 2, 3 and hills policy area PDCs 1, 3, 4a.

3. The proposal does not provide for care and wellbeing of the community. This is in conflict with council wide objectives 9, 15, 25, 26, 29; council wide PDCs 43, 88, 92, 166, 175, 188, 388, 397, 398, 399; rural zone objective 17; rural zone PDC 12; and hills policy area objective 2.

4. The proposal is not an efficient or effective use of land; wind turbines are neither efficient (<40%) nor effective (unreliable output) producers of electricity. Council wide PDC 396 requires that wind turbines should be located in areas that maximise efficient generation and supply of electricity. The proposed location does not maximise efficient generation and is too far from the major loads on the grid to maximise efficient supply of the generated electricity, so is in conflict with that PDC. Conflict also exists with rural zone objectives 6, 16, 22, 23 and rural zone PDC 18 and hills policy are objective 2 and PDC 1.

5. Hazards: loss of aerial firefighting capability; this is in conflict with council wide objectives 26, 84, 85, 94, 95, 98 and council wide PDCs 46, 388, 398; rural zone objectives 6, 17, 23, hills policy area objective 2 and PDC 1.

6. Hazards: risk to traffic due to shadow, flicker and debris; these are in conflict with council wide objectives 14, 15, 16, 17, 26, 98 and council wide PDCs 34, 39, 87, 95, 396, 398; and hills policy area objective 2 and PDC 1.

7. The proposed renewable energy facility does not benefit the environment, evidenced by the conflicts cited above, does not benefit the community, as more residents lose financially and in terms of lifestyle than benefit as a result of lease payments or neighbour agreements, and does not benefit the state as the vast majority of money associated with the development flows either interstate or overseas, leaving only inflated power prices for South Australians. This is in conflict with council wide objectives 96, 97, 98; council wide PDCs 78, 92, 163, 168, 188, 396; rural zone objectives 6 and 17; rural zone PDCs 4, 6, 7 and hills policy area objective 2.

8. The damage and disruption during construction (dust, blasting, heavy vehicles) is in conflict with council wide objectives 16, 48, 50, 51, 53, 59, 64g; council wide PDCs 39, 43g, 95, 196, 197, 198, 388; hills policy area objectives 1 and 2 and PDCs 1 and 4a.

9. The proposed layout is inappropriate and is in conflict with council wide PDCs 78, 158, 388 and 397; rural zone objectives 6, 16, 17, 21 and rural zone PDCs 4 and 19; hills policy area objective 2 and PDCs 1, 3 and 4a.

10. The visual amenity of the region would be compromised. While the misguided ministerial "wind farm" development plan amendments (largely seen in a dim light by the Development Planning Advisory Committee) are lenient toward wind turbines, the following notable conflicts remain: council wide objectives 15, 25, 26, 50, 54; council wide PDCs 55, 78, 79, 155, 158, 159, 160, 170, 173, 190, 397; rural zone objective 6; rural zone PDCs 18, 19; hills policy area objectives 1, 2, 3; hills policy area PDCs 1, 3, 4a.

11. If approved, the proposal will have a negative impact on most of the property values in the area. It should be noted that only host properties have ongoing income; neighbour agreements are non-transferable. The effect on property values in the region is in conflict with council wide objectives 9, 25, 29, 98; council wide PDCs 55, 79, 88, 91, 160, 162, 163, 167, 188, 388, 398; rural zone objective 16 and PDC 19 and hills policy area objectives 1 and 2.

12. The proposal is very close to the edge of the Barossa Character Protection District, so close in fact that it will compromise the values the Protection Legislation seeks to preserve. This is in conflict with council wide objectives 50, 54, 98, council wide PDCs 55, 155, 158, 167; rural zone objectives 2, 6, 16, 21; rural zone PDCs 22, 43; hills policy area objectives 1 and 2 and hills policy area PDCs 1 and 3.

Further Comments

There is too much conflict between the Mid murray development Plan and the application of Trusts Power to build a wind farm.

Conclusion

The Mid Murray Council DAP should refuse planning permission for the proposed wind farm Development Application 711/072/14 because it is in conflict with much of the Mid Murray Council Development Plan.

Please see the submission of the Eastern Mount Lofty Ranges Landscape Guardians for further elaboration of the above comments.

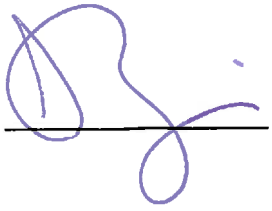
☐ I/We wish to be heard at the public hearing/meeting

☐ I /We nominate _____ to speak on my behalf.

☑ I /We nominate the Eastern Mt Lofty Ranges Landscape Guardians to speak on my behalf.

I/We would like for my/our submissions to be made public/private.

Yours Sincerely,



LTR0155331

69

«Assessment_No»

DEVELOPMENT ACT, 1993

REPRESENTATION ON APPLICATION

CATEGORY 3

Development Number 711/072/14

My Name Merle Clarke. My Telephone Number 0439648111

My Address PO Box 31 CAMBRAI Postcode 5353.

This representation is in relation to the application by:

Trustpower Australia Holdings Pty Ltd

For consent to:

Erect a wind farm

proposed to be located at:

Palmer, Tungkillo, Jutland and surrounding areas in the Hills Policy and Marne Watercourse areas of the Mid Murray Council.

The address of the property affected is 26 Sportsground Rd.

(your property address) Cambrai 5353

The specific aspects of the application to which I make comments on are:

Please see attached pages for this submission

(see also attached comments)

My concerns would be overcome by: Soundly refusing permission to erect any wind turbines proposed by Trust Power.

(see also attached comments)

DAMAGING HEALTH ASPECTS OF WIND TURBINES

The applicant states that they will comply with the relevant SA EPA noise criteria. However the problem with this is that their criteria is outdated!

The applicant implies that they will conform to the findings of the National Health and Medical Research Council which stated in 2010 "there is no published scientific evidence to positively link wind turbines with adverse health effects" Sadly this information has been superceded , even by their own findings, as they recently stated that they "only reviewed publications up until October 2012" (but conveniently neglected to include a 1985 report *prepared for the US Department of Energy, from N D Kelley (*principal scientist, National Renewable Energy Laboratories Wind Technology Centre) which unequivocally linked low frequency turbine noise to health impacts suffered by nearby residents.

Having read the Mid Murray Council's Development Plan 31.7.2014, there are a number of points which seem to be in conflict with the application made by Trust Power to build a large wind "farm" in our area.

M M C "Objectives"

1) Creation of "a safe, convenient and pleasant environment in which to live"

Not one of these M M C MAIN OBJECTIVES could be construed as compatible with T P's application!

Four acoustical consulting firms , Channel Island Acoustics, Hessler and Associates, Rand Acoustics, Schomer and Associates state that "Turbine ILFN (infra low frequency noise) affects vestibular organs and cochlea" The four investigating firms are of the opinion that enough evidence and a hypotheses have been given in their report to classify LFN and infrasound as a serious issue, possibly affecting the future of the industry. The wind industry and its supporters can no longer say that wind turbines do not produce significant levels of infra and low frequency sound just because the sound pressure levels do not rise to the Threshold of Perception of audible sound.

Not SAFE. Not PLEASANT.

MMC Objective

5) Re-development of localities which have a bad or unsatisfactory layout, or unhealthy or <u>obsolete development.</u>

The Hills Face does not need to be redeveloped!

If MMC was truly concerned about the <u>health</u> of their ratepayers, they might take note that a professor in Ireland , Professor Emeritus Alun Evans, Visiting Senior Research Fellow, Centre for Public Health, The Queen's University of Belfast, Institute of Clinical Science B, Belfast, was so "alarmed" at the Position Statement from the AMA on the health effects of wind farms that he was compelled to write "I find it unacceptable that a respected, prestigious medical association like your own appears to take its advice on health from the wind industry , rather than promoting good

quality conducted research in which all aspects of the putative associations between wind farms and health are evaluated"

"To dismiss any adverse effects is absurd in view of the mounting evidence. Even the wind industry seems to accept that wind farm noise causes annoyance and sleep disturbance and sleep deprivation. The emerging evidence of inadequate sleep as a major risk factor, particularly for Cardio Vascular disease, is overwhelming. If there is any chance of these associations being causal, your association should be taking them very seriously. I write this as someone with many years experience in CVD, epidemiology "

Objective 7) Development safe from natural or man- made hazards and to be compatible with land capability.

The risk to life and property is truly under threat if these man made hazards are allowed by MMC to proceed.

Objective 9) Satisfaction of the social, economic and cultural needs of the community.

Residents in our community will become fragmented in our social interactions, particularly when our children begin to suffer from sleep deprivation due to infrasound effects. Adults participation in local community events and activities will be impaired when they too have to deal with sleep deprivation and associated health issues.

"There is increasing evidence that chronic sleep deprivation and Cardio Vascular Disease are associated. Undisturbed sleep is essential for physiological and psychological health. Children have a special need for uninterrupted sleep for growth and cognitive development." (Van Kamp, Irene. Acoustical Society of America. June 2013)

Objective 14) Safe and efficient movement of people and goods by road.

If residents are suffering from interrupted sleep due to wind turbine noise, it will be even more difficult to avoid accidents if "turbine glint" distracts them further. "Insomnia is a major contributor to both unintentional fatal injuries in general as well as fatal motor vehicle injuries" (Dept. Of Public Health, Faculty of Medicine, Norwegian University of Science and Technology, Norway. Vol 37/Issue 11. SLEEP)

Volunteers in our community, who are local people, will be further traumatised by having to attend an increase in the numbers of accidents, both in the home and on our roads.

Objective 26) Protect community health and amenity and support the operation of all desired land uses

Dr Bob Thorne has some extremely relevant information regarding protection of community health, made in his submission to the Senate Select Committee on Wind Turbines in2015.

Dr Bob Thorne,

PhD in health science ("Assessing intrusive noise and low amplitude sound", Massey University, 2007) , New Zealand Diploma in science, (noise management 1985) Diploma in Acoustics and Noise

Control (UK Institute of Acoustics 1985; specialist subjects Architectural Acoustics, Law and Administration.) Royal Society for the Promotion of Health Diploma in Health Engineering (1981) and the Royal Society of Health Diploma in Air Pollution Control (1978).

"People are being affected by noise (including vibration) from operation of wind farms. The people do not know what is causing their distress, simply that it is happening and people affected are being ignored by wind farm operators, Councils and /or planning ministers. Consequently the Clean Energy Regulator has failed in its duty of care to the affected residents and community and must be held accountable of that failure."

"The NHMRC gives an appearance of being biased towards dismissal of adverse health effects raised by ordinary people. The NHMRC has commissioned / prepared wind farm reports that do not stand 'commonsense' scrutiny and show technical bias; The NHMRC has wasted scarce resources pursuing academic purity in investigating wind farm studies that a first-year university student would know did not deal with adverse health effects. To this end the NHMRC has commissioned two major studies that reviewed some 4000 papers and only found some thirteen (13) studies to be pure enough for their purposes. The above figures show that the NHMRC failed to understand the concerns of ordinary people affected by wind farm noise and commissioned studies to emphatically "show" that few health effect studies exist. That is, they prejudged the outcome.

Given the reported experiences and the limited reliable evidence, NHMRC considers that further, higher quality research is warranted. NHMRC will issue a Targeted Call for Research into wind farms and human health to encourage Australia's best researchers to undertake independent, high quality research, investigating possible health effects and their causes. In my view the NHMRC has clearly failed in its duty of care to the Australian people by failing to allow for, and consider, the very REAL effects and HARM presented to Australian residents living near turbines."

Objective 29) Development at the interface between industrial activities and sensitive uses which is compatible with surrounding activities, particularly those in adjoining zones.

People have chosen to reside in our "diverse and picturesque landscape" (MMC web page) – for the peace and tranquillity, and the opportunity to relax in a quiet environment , not to suffer the sonic misery of the "interface" between their chosen lifestyles and the insensitive industrial wind turbines nearby.

Objective 39) Safe, convenient, pleasant and healthy-living environments that meet the needs and PREFERENCES of the community.

"Healthy – living" will be savagely compromised if MMC takes away this pleasant, safe, convenient and healthy living environment we all enjoy now and allows industrial wind turbines to destroy it all.

Objective 84) Maintenance of the natural environment and systems by limiting development in areas susceptible to natural hazard risk.

As everybody in our area is now well aware, after the recent "Eden Valley" fires and Sanderston fire, some residents and many residences were saved from destruction by water bombing aircraft. If turbines are built, these aircraft will not be able to enter what would then become a "no fly zone" , putting lives and properties at risk.

Objective 96) Development of renewable energy facilities that benefit the environment, the community and the State.

Industrial Wind Turbine developments do nothing to benefit anyone but the developers, who then in turn are forced to try to recoup their outrageous spending by increasing to impossible amounts, the charges to each electricity user. Many people have had their power disconnected and are forced to live with no heating or cooling, or refrigeration and cooking and washing facilities, and hence many are suffering health issues, especially the aged, fragile and infirm in our community. Many businesses have not been able to continue, due to the exorbitant prices of electricity, which they can not pass on to their customers (especially when ironically the country which manufactures and imports these turbines, is able to make a cheaper product!) The state then misses out on business tax inputs , the Federal Government has to pay more benefits to the newly unemployed, and hospitals and associated health services have an added burden dealing with people suffering from depression, distress and illness.

PRINCIPLES OF DEVELOPMENT CONTROL

PDC 5) Development which is incompatible with other uses within the locality of the proposed development should not be undertaken.

The Australian Criminal Code Act 1995, Division 274 (prohibition against torture) – prohibits inflicting "severe physical or mental pain or suffering" on a person when done with the acquiescence of public officials. There are certainly people around the world, including Australia, who are having "severe physical or mental pain or suffering" inflicted on them by industrial wind farms. This does not happen to everyone in the vicinity of a wind farm but it certainly happens to a number of people. We are sure you understand that under the Criminal Code, every instance of torture is actionable. The fact that some other people have not been tortured is not an excuse at law. It is incompatible to place a wind turbine development near to residents who have chosen to live in a safe, convenient and pleasant environment.

PDC 43) Infrastructure required for development should:-

e) Not increase the level of risk to public health.

Christopher D Hanning, honorary consultant in sleep medicine together with Professor emeritus Alun Evans state "The evidence for adequate sleep as a prerequisite for human health, particularly child health, is overwhelming. Governments have recently paid much attention to the effects of environmental noise on sleep duration and quality and how to reduce such noise. (WHO) However, governments have also imposed noise from industrial wind turbines on large swathes of peaceful countryside. " "Shortly after wind turbines began to be erected close to housing, complaints emerged on adverse effects on health. Sleep disturbance was the main complaint."

A laboratory study has shown that low frequency noise is considerably more annoying than higher frequency noise and **is harmful to health.** It can cause nausea, headaches, disturbed sleep and cognitive and psychological impairment (Moller M. Pederson C. Low frequency noise from wind turbines. J Acoust Soc Am 2010 ;129-3727-44) A cochlear mechanism has been proposed that outlines how infrasound, previously disregarded because it is below the auditory threshold, could

affect humans and contribute to adverse effects.(Salt A. Kaltenbach J. Infrasound from wind turbines could affect humans. Bull Sci Tech Soc 2011;31:296-303)

PDC 87) Development should not detrimentally affect the amenity of the locality or cause unreasonable interference through any of the following.

b) Noise c) Vibration.

A review of the recent (February 2015) Steven Cooper Report – Cape Bridgewater Wind Farm by Paul D Schomer, Ph.D.,P.E; Schomer and Associates, Inc.;Standards Director, Acoustical Society of America.

George Hessler, Hessler Associates, Inc. 10 February 2015

"Recently Cooper has completed a first of its kind test regarding the acoustical emissions of wind turbines. His is the first study of effects on people that includes a cooperating wind farm operator in conjunction with a researcher that does not work exclusively for wind farms. This study makes three very simple points:

1) There is at least one non-visual, non-audible pathway for wind turbine emissions to reach, enter and affect some people.
2) This is a longitudinal study wherein the subjects record in a diary regularly as a function of time the level of the effects they are experiencing at that time.
3) This periodic recording allows for responses as the wind-turbine power changes up and down, changes not known by the subject.

The results are presented in a 218 page report augmented by 22 appendices spread over 6 volumes so that every single detail in the study has been documented for all to see and examine. The methods and results are totally transparent. The 22 appendices and the main text exhaustively document everything involved with this study."

"something is coming from the wind turbines to affect these people and that something increases or decreases as the power output of the turbine increases or decreases. Denying infra-sound as the agent accomplishes nothing. It really does not matter what the pathway is, whether it is infra-sound or some new form of rays or electromagnetic field coming off the turbine blades. If the turbines are the cause, then the wind farm is responsible and needs to fix it"

"up until now wind farm operators have said there are no known cause and effect relations between wind farm emissions and the response of people living in the vicinity of the wind farm other than those related to visual and/or audible stimuli, and these lead to some flicker which is treated, and "some annoyance with noise" This study proves that there are other pathways that affect some people" " The wind farm operator simply cannot say there are no known effects and no known people affected" "It only takes one example to prove that a broad assertion is not true, and that is the case here. Wind farms will be in the position where they must say: "We may affect some people." And regulators charged with protecting the health and welfare of the citizenry will not be able to say they know of no adverse effects. Rather, if they choose to support the wind farm, they will do so knowing that they may not be protecting the health and welfare of all the citizenry"

PDC 92) Development should be designed, constructed and sighted to minimise negative impacts of noise and to avoid unreasonable interference.

Turbines 165 metres tall (highest in the southern hemisphere!) do not minimise the negative noise impacts – in fact, the bigger the turbine, the louder the noise, both audible and inaudible.

PDC 93) Development should be consistent with the relevant provisions in the current Environment Protection (Noise) Policy.

According to Steven E Cooper (The Acoustic Group Pty Ltd) "the EPA policy is flawed" as they limited a study to only one third octave bands and were not really looking at Narrow Band analysis. He also stated "as you move to quieter environments then the criteria that apply should also drop down"

PDC 173) Development that proposes the clearance of native vegetation should address or consider the implications that removing the native vegetation will have on the following.

(c) the amenity of the locality.

When native vegetation is a part of your daily vision, either at home or on your drive to and from work, or entertaining bird watching visitors, it IS the AMENITY of the locality! To remove any more would not be pleasing, agreeable or enjoyable, (a major portion of healthy living)

PDC 398) Wind farms and ancillary development should AVOID or minimise the following impacts on nearby property owners/occupiers, road users and wildlife.

a) Shadowing, flickering, reflection or glint

b) Excessive noise;

c) Interference with television and radio signals and geographic positioning systems.

d) Interference with low altitude aircraft movements associated with agriculture.

e) Modification of vegetation, soils, and habitats.

f) Striking of birds and bats.

It is IMPOSSIBLE for wind farms and ancillary developments to <u>avoid or minimise</u> impacts of nearby property owners/occupiers, or road users and wildlife! (What would be a minimised number of killings for animals, birds or bats?)

To:

Director, Development & Environmental Services, Mid Murray Council

PO Box 28, Mannum, 5238

Mr. Kelvin Goldstone

Re: Trust Power Palmer Wind Farm Development Application 711/072/14

Trust Power's application for a wind farm located near Palmer should be refused for the reasons laid out below, which are in conflict with the cited clauses of the Mid Murray Council Development Plan:

1. Environmental damage: land, watercourses and ground water, native vegetation, fauna and noise pollution. The impact of the proposal is in conflict with council wide objective 29 and Principles of Development Control (PDCs) 39, 42, 43, 87, 92, 93, 163, 164, 168, 169, 170, 175, 176, 180, 185, 190, 192, 196, 197, 199, 215, 398; rural zone objectives 6, 16, 17, 23 and rural zone PDCs 4, 6, 7, 12, 18; and hills policy area objectives 1, 2, 3 and hills policy area PDCs 1 and 4a.

2. The proposal is not harmonious with existing land uses and district character. This is in conflict with council wide objectives 7, 15, 18, 19, 25, 26, 29, 30; council wide PDCs 5, 43, 55, 78, 79, 87, 88, 91, 97, 155, 160, 163, 165, 166, 167, 173, 188, 190, 398, 399; rural zone objectives 6 and 16; rural zone PDCs 4, 19, 43; and hills policy area objectives 1, 2, 3 and hills policy area PDCs 1, 3, 4a.

3. The proposal does not provide for care and wellbeing of the community. This is in conflict with council wide objectives 9, 15, 25, 26, 29; council wide PDCs 43, 88, 92, 166, 175, 188, 388, 397, 398, 399; rural zone objective 17; rural zone PDC 12; and hills policy area objective 2.

4. The proposal is not an efficient or effective use of land; wind turbines are neither efficient (<40%) nor effective (unreliable output) producers of electricity. Council wide PDC 396 requires that wind turbines should be located in areas that maximise efficient generation and supply of electricity. The proposed location does not maximise efficient generation and is too far from the major loads on the grid to maximise efficient supply of the generated electricity, so is in conflict with that PDC. Conflict also exists with rural zone objectives 6, 16, 22, 23 and rural zone PDC 18 and hills policy are objective 2 and PDC 1.

5. Hazards: loss of aerial firefighting capability; this is in conflict with council wide objectives 26, 84, 85, 94, 95, 98 and council wide PDCs 46, 388, 398; rural zone objectives 6, 17, 23, hills policy area objective 2 and PDC 1.

6. Hazards: risk to traffic due to shadow, flicker and debris; these are in conflict with council wide objectives 14, 15, 16, 17, 26, 98 and council wide PDCs 34, 39, 87, 95, 396, 398; and hills policy area objective 2 and PDC 1.

7. The proposed renewable energy facility does not benefit the environment, evidenced by the conflicts cited above, does not benefit the community, as more residents lose financially and in terms of lifestyle than benefit as a result of lease payments or neighbour agreements, and does not benefit the state as the vast majority of money associated with the development flows either interstate or overseas, leaving only inflated power prices for South Australians. This is in conflict with council wide objectives 96, 97, 98; council wide PDCs 78, 92, 163, 168, 188, 396; rural zone objectives 6 and 17; rural zone PDCs 4, 6, 7 and hills policy area objective 2.

8. The damage and disruption during construction (dust, blasting, heavy vehicles) is in conflict with council wide objectives 16, 48, 50, 51, 53, 59, 64g; council wide PDCs 39, 43g, 95, 196, 197, 198, 388; hills policy area objectives 1 and 2 and PDCs 1 and 4a.

9. The proposed layout is inappropriate and is in conflict with council wide PDCs 78, 158, 388 and 397; rural zone objectives 6, 16, 17, 21 and rural zone PDCs 4 and 19; hills policy area objective 2 and PDCs 1, 3 and 4a.

10. The visual amenity of the region would be compromised. While the misguided ministerial "wind farm" development plan amendments (largely seen in a dim light by the Development Planning Advisory Committee) are lenient toward wind turbines, the following notable conflicts remain: council wide objectives 15, 25, 26, 50, 54; council wide PDCs 55, 78, 79, 155, 158, 159, 160, 170, 173, 190, 397; rural zone objective 6; rural zone PDCs 18, 19; hills policy area objectives 1, 2, 3; hills policy area PDCs 1, 3, 4a.

11. If approved, the proposal will have a negative impact on most of the property values in the area. It should be noted that only host properties have ongoing income; neighbour agreements are non-transferable. The effect on property values in the region is in conflict with council wide objectives 9, 25, 29, 98; council wide PDCs 55, 79, 88, 91, 160, 162, 163, 167, 188, 388, 398; rural zone objective 16 and PDC 19 and hills policy area objectives 1 and 2.

12. The proposal is very close to the edge of the Barossa Character Protection District, so close in fact that it will compromise the values the Protection Legislation seeks to preserve. This is in conflict with council wide objectives 50, 54, 98, council wide PDCs 55, 155, 158, 167; rural zone objectives 2, 6, 16, 21; rural zone PDCs 22, 43; hills policy area objectives 1 and 2 and hills policy area PDCs 1 and 3.

Further Comments

TRUST POWER tell MID MURRAY COUNCIL that they will tell MID MURRAY COUNCIL "before the development starts" what size, height and type of wind turbine model they choose to erect!
Trust Power tell Council this is because "New turbine models with different technical standards are regularly developed"
By that same standard they very conveniently make NO mention of the mounting tsunami of scientific evidence that infrasound causes MAJOR HEALTH problems for some people.

Conclusion

The Mid Murray Council DAP should refuse planning permission for the proposed wind farm Development Application 711/072/14 because it is in conflict with much of the Mid Murray Council Development Plan.

Please see the submission of the Eastern Mount Lofty Ranges Landscape Guardians for further elaboration of the above comments.

☐ I/We wish to be heard at the public hearing/meeting

☐ I /We nominate _____ to speak on my behalf.

☑ I /We nominate the Eastern Mt Lofty Ranges Landscape Guardians to speak on my behalf.

I/We would like for my/our submissions to be made public/~~private~~.

Yours Sincerely,

M. Lokan

LL72015 5332

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«Assessment_No»

DEVELOPMENT ACT, 1993

REPRESENTATION ON APPLICATION

CATEGORY 3

Development Number 711/072/14

My Name Steven Kuhn My Telephone Number 0385652045

My Address Lot 23 Blanchtown Rd Sedan Postcode 5353

This representation is in relation to the application by:

Trustpower Australia Holdings Pty Ltd

For consent to:

Erect a wind farm

proposed to be located at:

Palmer, Tungkillo, Jutland and surrounding areas in the Hills Policy and Marne Watercourse areas of the Mid Murray Council.

The address of the property affected is Cambrai Area School

(your property address) Lot 23 Blanchtown Rd Sedan

The specific aspects of the application to which I make comments on are:

Mid Murry Council's objective "39"

States "convenient, pleasant and healthy-living environments that meet the needs and preferences of the community"

I am greatly concerned that the Proven infrasound pollution generated by the wind turbines will affect the long term health of my child attending Cambrai Area School.

(see also attached comments)

My concerns would be overcome by: The Mid Murry Council refusing the application of Trust Powers to build turbines on the hills face.

(see also attached comments)

To:

Director, Development & Environmental Services, Mid Murray Council

PO Box 28, Mannum, 5238

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7. The proposed renewable energy facility does not benefit the environment, evidenced by the conflicts cited above, does not benefit the community, as more residents lose financially and in terms of lifestyle than benefit as a result of lease payments or neighbour agreements, and does not benefit the state as the vast majority of money associated with the development flows either interstate or overseas, leaving only inflated power prices for South Australians. This is in conflict with council wide objectives 96, 97, 98; council wide PDCs 78, 92, 163, 168, 188, 396; rural zone objectives 6 and 17; rural zone PDCs 4, 6, 7 and hills policy area objective 2.

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Yours Sincerely,

Steven Kuhn

ILT2015 5335

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«Assessment_No»

DEVELOPMENT ACT, 1993

REPRESENTATION ON APPLICATION

CATEGORY 3

Development Number 711/072/14

My Name CATHERINE JOHNS My Telephone Number 85-696008

My Address "ARTEMIS" 2619 ANGAS VALLEY RD ANGAS VALLEY Postcode 5328

This representation is in relation to the application by:

Trustpower Australia Holdings Pty Ltd

For consent to:

Erect a wind farm

proposed to be located at:

Palmer, Tungkillo, Jutland and surrounding areas in the Hills Policy and Marne Watercourse areas of the Mid Murray Council.

The address of the property affected is IN ANGAS VALLEY

(your property address) 2619 ANGAS VALLEY RD ANGAS VALLEY

The specific aspects of the application to which I make comments on are:

ON THE RELATION TO HEALTH.

(see also attached comments)

My concerns would be overcome by: NOT HAVING WIND FARMS

(see also attached comments)

To:

Director, Development & Environmental Services, Mid Murray Council

PO Box 28, Mannum, 5238

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9. The proposed layout is inappropriate and is in conflict with council wide PDCs 78, 158, 388 and 397; rural zone objectives 6, 16, 17, 21 and rural zone PDCs 4 and 19; hills policy area objective 2 and PDCs 1, 3 and 4a.

10. The visual amenity of the region would be compromised. While the misguided ministerial "wind farm" development plan amendments (largely seen in a dim light by the Development Planning Advisory Committee) are lenient toward wind turbines, the following notable conflicts remain: council wide objectives 15, 25, 26, 50, 54; council wide PDCs 55, 78, 79, 155, 158, 159, 160, 170, 173, 190, 397; rural zone objective 6; rural zone PDCs 18, 19; hills policy area objectives 1, 2, 3; hills policy area PDCs 1, 3, 4a.

11. If approved, the proposal will have a negative impact on most of the property values in the area. It should be noted that only host properties have ongoing income; neighbour agreements are non-transferable. The effect on property values in the region is in conflict with council wide objectives 9, 25, 29, 98; council wide PDCs 55, 79, 88, 91, 160, 162, 163, 167, 188, 388, 398; rural zone objective 16 and PDC 19 and hills policy area objectives 1 and 2.

12. The proposal is very close to the edge of the Barossa Character Protection District, so close in fact that it will compromise the values the Protection Legislation seeks to preserve. This is in conflict with council wide objectives 50, 54, 98, council wide PDCs 55, 155, 158, 167; rural zone objectives 2, 6, 16, 21; rural zone PDCs 22, 43; hills policy area objectives 1 and 2 and hills policy area PDCs 1 and 3.

Further Comments

I TOTALLY AGREE WITH ALL THE ABOVE.

Conclusion

The Mid Murray Council DAP should refuse planning permission for the proposed wind farm Development Application 711/072/14 because it is in conflict with much of the Mid Murray Council Development Plan.

Please see the submission of the Eastern Mount Lofty Ranges Landscape Guardians for further elaboration of the above comments.

☒ ~~I/We wish to be heard at the public hearing/meeting~~

☐ I /We nominate _____ to speak on my behalf.

☑ I /We nominate the Eastern Mt Lofty Ranges Landscape Guardians to speak on my behalf.

I/We would like for my/our submissions to be made public/~~private~~.

Yours Sincerely,

Catherine Johns MA. BED. DIP GD. S.E. RMIT.

I LT2015 5373

72

«Assessment_No»

DEVELOPMENT ACT, 1993

REPRESENTATION ON APPLICATION

CATEGORY 3

Development Number 711/072/14

My Name Gianna Pau My Telephone Number 85321608

My Address 19 Swan Rd, Murray Bridge Postcode 5253

This representation is in relation to the application by:

Trustpower Australia Holdings Pty Ltd

For consent to:

Erect a wind farm

proposed to be located at:

Palmer, Tungkillo, Jutland and surrounding areas in the Hills Policy and Marne Watercourse areas of the Mid Murray Council.

The address of the property affected is Angas Valley.

(your property address) 2619 Angas Valley Rd Angus Valley.

The specific aspects of the application to which I make comments on are:

Health and well being of both humans and animals being the native ones plus the ~~commercial~~ farming animal's.

(see also attached comments)

My concerns would be overcome by: stopping wind farms

(see also attached comments)

To:

Director, Development & Environmental Services, Mid Murray Council

PO Box 28, Mannum, 5238

Mr. Kelvin Goldstone

Re: Trust Power Palmer Wind Farm Development Application 711/072/14

Trust Power's application for a wind farm located near Palmer should be refused for the reasons laid out below, which are in conflict with the cited clauses of the Mid Murray Council Development Plan:

1. Environmental damage: land, watercourses and ground water, native vegetation, fauna and noise pollution. The impact of the proposal is in conflict with council wide objective 29 and Principles of Development Control (PDCs) 39, 42, 43, 87, 92, 93, 163, 164, 168, 169, 170, 175, 176, 180, 185, 190, 192, 196, 197, 199, 215, 398; rural zone objectives 6, 16, 17, 23 and rural zone PDCs 4, 6, 7, 12, 18; and hills policy area objectives 1, 2, 3 and hills policy area PDCs 1 and 4a.

2. The proposal is not harmonious with existing land uses and district character. This is in conflict with council wide objectives 7, 15, 18, 19, 25, 26, 29, 30; council wide PDCs 5, 43, 55, 78, 79, 87, 88, 91, 97, 155, 160, 163, 165, 166, 167, 173, 188, 190, 398, 399; rural zone objectives 6 and 16; rural zone PDCs 4, 19, 43; and hills policy area objectives 1, 2, 3 and hills policy area PDCs 1, 3, 4a.

3. The proposal does not provide for care and wellbeing of the community. This is in conflict with council wide objectives 9, 15, 25, 26, 29; council wide PDCs 43, 88, 92, 166, 175, 188, 388, 397, 398, 399; rural zone objective 17; rural zone PDC 12; and hills policy area objective 2.

4. The proposal is not an efficient or effective use of land; wind turbines are neither efficient (<40%) nor effective (unreliable output) producers of electricity. Council wide PDC 396 requires that wind turbines should be located in areas that maximise efficient generation and supply of electricity. The proposed location does not maximise efficient generation and is too far from the major loads on the grid to maximise efficient supply of the generated electricity, so is in conflict with that PDC. Conflict also exists with rural zone objectives 6, 16, 22, 23 and rural zone PDC 18 and hills policy are objective 2 and PDC 1.

5. Hazards: loss of aerial firefighting capability; this is in conflict with council wide objectives 26, 84, 85, 94, 95, 98 and council wide PDCs 46, 388, 398; rural zone objectives 6, 17, 23, hills policy area objective 2 and PDC 1.

6. Hazards: risk to traffic due to shadow, flicker and debris; these are in conflict with council wide objectives 14, 15, 16, 17, 26, 98 and council wide PDCs 34, 39, 87, 95, 396, 398; and hills policy area objective 2 and PDC 1.

7. The proposed renewable energy facility does not benefit the environment, evidenced by the conflicts cited above, does not benefit the community, as more residents lose financially and in terms of lifestyle than benefit as a result of lease payments or neighbour agreements, and does not benefit the state as the vast majority of money associated with the development flows either interstate or overseas, leaving only inflated power prices for South Australians. This is in conflict with council wide objectives 96, 97, 98; council wide PDCs 78, 92, 163, 168, 188, 396; rural zone objectives 6 and 17; rural zone PDCs 4, 6, 7 and hills policy area objective 2.

8. The damage and disruption during construction (dust, blasting, heavy vehicles) is in conflict with council wide objectives 16, 48, 50, 51, 53, 59, 64g; council wide PDCs 39, 43g, 95, 196, 197, 198, 388; hills policy area objectives 1 and 2 and PDCs 1 and 4a.

9. The proposed layout is inappropriate and is in conflict with council wide PDCs 78, 158, 388 and 397; rural zone objectives 6, 16, 17, 21 and rural zone PDCs 4 and 19; hills policy area objective 2 and PDCs 1, 3 and 4a.

10. The visual amenity of the region would be compromised. While the misguided ministerial "wind farm" development plan amendments (largely seen in a dim light by the Development Planning Advisory Committee) are lenient toward wind turbines, the following notable conflicts remain: council wide objectives 15, 25, 26, 50, 54; council wide PDCs 55, 78, 79, 155, 158, 159, 160, 170, 173, 190, 397; rural zone objective 6; rural zone PDCs 18, 19; hills policy area objectives 1, 2, 3; hills policy area PDCs 1, 3, 4a.

11. If approved, the proposal will have a negative impact on most of the property values in the area. It should be noted that only host properties have ongoing income; neighbour agreements are non-transferable. The effect on property values in the region is in conflict with council wide objectives 9, 25, 29, 98; council wide PDCs 55, 79, 88, 91, 160, 162, 163, 167, 188, 388, 398; rural zone objective 16 and PDC 19 and hills policy area objectives 1 and 2.

12. The proposal is very close to the edge of the Barossa Character Protection District, so close in fact that it will compromise the values the Protection Legislation seeks to preserve. This is in conflict with council wide objectives 50, 54, 98, council wide PDCs 55, 155, 158, 167; rural zone objectives 2, 6, 16, 21; rural zone PDCs 22, 43; hills policy area objectives 1 and 2 and hills policy area PDCs 1 and 3.

Further Comments

Fingers crossed that small voices can make loud sounds !!!
and protest !!!

Conclusion

The Mid Murray Council DAP should refuse planning permission for the proposed wind farm Development Application 711/072/14 because it is in conflict with much of the Mid Murray Council Development Plan.

Please see the submission of the Eastern Mount Lofty Ranges Landscape Guardians for further elaboration of the above comments.

☐ I/We wish to be heard at the public hearing/meeting

☐ I /We nominate _____ to speak on my behalf.

☑ I/We nominate the Eastern Mt Lofty Ranges Landscape Guardians to speak on my behalf.

I/We would like for my/our submissions to be made public/private.

Yours Sincerely,

1LT2015 3337

73

20 MAY 2015
CAMBRAI OFFICE

«Assessment_No»

DEVELOPMENT ACT, 1993

REPRESENTATION ON APPLICATION

CATEGORY 3

Development Number 711/072/14

My Name LORNA GILLIES My Telephone Number 85645018

My Address LOT 3 CAMBRAI CURIO RD Postcode 5353
POST OFFICE BOX 21 CAMBRAI 5353

This representation is in relation to the application by:

Trustpower Australia Holdings Pty Ltd

For consent to:

Erect a wind farm

proposed to be located at:

Palmer, Tungkillo, Jutland and surrounding areas in the Hills Policy and Marne Watercourse areas of the Mid Murray Council.

The address of the property affected is LOT 3 CURIO RD CAMBRAI 5353

(your property address)

The specific aspects of the application to which I make comments on are:

There are many, many examples of conflict between Mid Murray Development Plan and the proposal put to them by Trust Power. One of many concern is in relation to MMC OBJECTIVES(26) "Protect community health & amenity" What a travesty! Alec N Salt PhD, Cochlear Fluids Research laboratories Washington University in St Louis states MOST CLEARLY — see over —

(see also attached comments)

My concerns would be overcome by: Council refusing any company putting wind farms on our lovely hills.

(see also attached comments)

Lorna Gillies 19.5.15

I would like the Mt Lofty Ranges Landscape Guardians to speak on my behalf at the DAP hearing

WIND TURBINES CAN BE HAZARDOUS TO HUMAN HEALTH.
"you can not hear the infrasound at the level
Generated by wind turbines, but your ears certainly detect
and respond to it" The low frequency part of the ear is
EXTREMELY sensative to infrasound
Symptoms - Pulsation, annoyance, stress.
Lack of sleep is damaging, especially to young children
and the unborn. I am worried this will affect
children, and their chance to reach their full potential
through healthy development, particularly in their education
I implore the DAP to reject Lunar Power's application.

74

DEVELOPMENT ACT, 1993

REPRESENTATION ON APPLICATION
CATEGORY 3

Development Number 711/072/14

My Name JEFFERY GILLIES My Telephone Number [redacted] 85645018

My Postal Address PO BOX 21. CAMBRAI

Postcode 5353

This representation is in relation to the application by: *Trustpower Australia Holdings Pty Ltd*

for consent to establish the *Palmer Wind Farm*

The address of my affected property is LOT 3 CURIO ROAD CAMBRAI

The specific aspects of the application to which I make comments on are:

I strongly object to the "visual amenity being compromised so savagely. This is in direct contrast to the Mid Murr Development Plan (as listed on attachment)

My concerns would be overcome by:

Please do everything you can to refuse consent for TRUSTPOWER to build a wind generating "farm" on our beautiful Eastern Hills

☐ I do not wish to be heard by the Development Assessment Panel

☐ I do wish to be heard personally by the Development Assessment Panel

☐ I will represent myself
or
☑ I will be represented by Mt Lofty Ranges Landscape Guardians

Date 19/5/2015. Signed [signature]

ILT20155322

75

DEVELOPMENT ACT, 1993

REPRESENTATION ON APPLICATION
CATEGORY 3

Development Number 711/072/14

My Name C.K. Johnson My Telephone Number 85693001

My Postal Address Box 183

Mt Pleasant Postcode 5235

This representation is in relation to the application by: *Trustpower Australia Holdings Pty Ltd*

for consent to establish the *Palmer Wind Farm*

The address of my affected property is 448 Three Chain Rd

Sandergton

The specific aspects of the application to which I make comments on are:

I bought my property for the lack of noise and traffic this development will increase horrendously both as well as increasing the fire risk (2014 was pretty awful for me) lower the value and/or saleability of my property The council did a brilliant job with the motor bikes being curtailed and that was bad enough with the horses this will be many times worse.

My concerns would be overcome by:

NO WIND FARM

☑ I do not wish to be heard by the Development Assessment Panel

☐ I do wish to be heard personally by the Development Assessment Panel

- ☐ I will represent myself
  or
- ☐ I will be represented by _____

Date 20/5/15 Signed C.K. Johnson

ILT20155319

76

DEVELOPMENT ACT, 1993

REPRESENTATION ON APPLICATION
CATEGORY 3

Development Number 711/072/14

My Name JM McGorman & McGorman Family Pty Ltd My Telephone Number 85693011

My Postal Address RSD 72 Sanderston via Palmer SA

Postcode 5237

This representation is in relation to the application by: *Trustpower Australia Holdings Pty Ltd*

for consent to establish the *Palmer Wind Farm*

The address of my affected property is Sect 91, 204, 205 & 240 hundred of Angas

The specific aspects of the application to which I make comments on are:

We do not want to have the constant noise that the turbines generate & we are very concerned about the visual impact. our concern is what this proposal will do to our land values as any depreciation as a result will impact negatively on our business operation, potentially putting the employment of 5 permanent employees at risk.

My concerns would be overcome by:

donot put up any turbines

☑ I do not wish to be heard by the Development Assessment Panel

☐ I do wish to be heard personally by the Development Assessment Panel

- ☐ I will represent myself
  or
- ☐ I will be represented by _____

Date 19/5/15 Signed [signature]

DEVELOPMENT ACT, 1993

REPRESENTATION ON APPLICATION
CATEGORY 3

Development Number 711/072/14

My Name McGorman Holding Pty Ltd My Telephone Number 0885693011

My Postal Address RSD 72 Sanderston

via Palmer SA 5237 Postcode 5237

This representation is in relation to the application by: *Trustpower Australia Holdings Pty Ltd*

for consent to establish the *Palmer Wind Farm*

The address of my affected property is Allotment 1800 & 1801 deposited plan 65629, hundred of Angas (25 Puthan Road)

The specific aspects of the application to which I make comments on are:

There will be a significant visual impact of seeing the large wind turbines as well as the constant noise issues. This will more than certainly impact on our quality of life & financially impact negatively on land values.

My concerns would be overcome by:

Not having any wind turbines

☑ I do not wish to be heard by the Development Assessment Panel

☐ I do wish to be heard personally by the Development Assessment Panel

☐ I will represent myself
or
☐ I will be represented by _____

Date 19/5/15 Signed [signature]

ILT20155341

78

«Assessment_No»

DEVELOPMENT ACT, 1993

REPRESENTATION ON APPLICATION

CATEGORY 3

Development Number 711/072/14

My Name Hiedi Smith My Telephone Number 0409706921

My Address 8 Davey Cres. Penrice SA Postcode 5353

This representation is in relation to the application by:

Trustpower Australia Holdings Pty Ltd

For consent to:

Erect a wind farm

proposed to be located at:

Palmer, Tungkillo, Jutland and surrounding areas in the Hills Policy and Marne Watercourse areas of the Mid Murray Council.

The address of the property affected is 76 Sportsground Rd Cambrai 5353

(your property address) Recently sold - 480/100 Angas Three Chain Rd Cambrai 5353

The specific aspects of the application to which I make comments on are:

Entire submission, specifically to "Infrasound"

(see also attached comments) As attached documents

My concerns would be overcome by: The rejection of Trustpower's application in its entirety

(see also attached comments)

To:
Acting
Director, Development & Environmental Services, Mid Murray Council

PO Box 28, Mannum, 5238

~~Mr. Kelvin Goldstone~~ Mr Geoff Parsons

Re: Trust Power Palmer Wind Farm Development Application 711/072/14

Trust Power's application for a wind farm located near Palmer should be refused for the reasons laid out below, which are in conflict with the cited clauses of the Mid Murray Council Development Plan:

1. Environmental damage: land, watercourses and ground water, native vegetation, fauna and noise pollution. The impact of the proposal is in conflict with council wide objective 29 and Principles of Development Control (PDCs) 39, 42, 43, 87, 92, 93, 163, 164, 168, 169, 170, 175, 176, 180, 185, 190, 192, 196, 197, 199, 215, 398; rural zone objectives 6, 16, 17, 23 and rural zone PDCs 4, 6, 7, 12, 18; and hills policy area objectives 1, 2, 3 and hills policy area PDCs 1 and 4a.

2. The proposal is not harmonious with existing land uses and district character. This is in conflict with council wide objectives 7, 15, 18, 19, 25, 26, 29, 30; council wide PDCs 5, 43, 55, 78, 79, 87, 88, 91, 97, 155, 160, 163, 165, 166, 167, 173, 188, 190, 398, 399; rural zone objectives 6 and 16; rural zone PDCs 4, 19, 43; and hills policy area objectives 1, 2, 3 and hills policy area PDCs 1, 3, 4a.

3. The proposal does not provide for care and wellbeing of the community. This is in conflict with council wide objectives 9, 15, 25, 26, 29; council wide PDCs 43, 88, 92, 166, 175, 188, 388, 397, 398, 399; rural zone objective 17; rural zone PDC 12; and hills policy area objective 2.

4. The proposal is not an efficient or effective use of land; wind turbines are neither efficient (<40%) nor effective (unreliable output) producers of electricity. Council wide PDC 396 requires that wind turbines should be located in areas that maximise efficient generation and supply of electricity. The proposed location does not maximise efficient generation and is too far from the major loads on the grid to maximise efficient supply of the generated electricity, so is in conflict with that PDC. Conflict also exists with rural zone objectives 6, 16, 22, 23 and rural zone PDC 18 and hills policy are objective 2 and PDC 1.

5. Hazards: loss of aerial firefighting capability; this is in conflict with council wide objectives 26, 84, 85, 94, 95, 98 and council wide PDCs 46, 388, 398; rural zone objectives 6, 17, 23, hills policy area objective 2 and PDC 1.

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12. The proposal is very close to the edge of the Barossa Character Protection District, so close in fact that it will compromise the values the Protection Legislation seeks to preserve. This is in conflict with council wide objectives 50, 54, 98, council wide PDCs 55, 155, 158, 167; rural zone objectives 2, 6, 16, 21; rural zone PDCs 22, 43; hills policy area objectives 1 and 2 and hills policy area PDCs 1 and 3.

Further Comments

Refer to attached document and references.

Conclusion

The Mid Murray Council DAP should refuse planning permission for the proposed wind farm Development Application 711/072/14 because it is in conflict with much of the Mid Murray Council Development Plan.

Please see the submission of the Eastern Mount Lofty Ranges Landscape Guardians for further elaboration of the above comments.

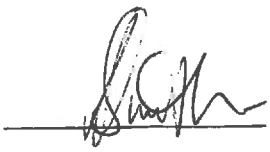
☐ I/We wish to be heard at the public hearing/meeting

☐ I /We nominate _____ to speak on my behalf.

☑ I /We nominate the Eastern Mt Lofty Ranges Landscape Guardians to speak on my behalf.

I/We would like for my/our submissions to be made public/private.

Yours Sincerely,



Further comments: H Smith submission to MMC DAP

Re: Trustpower P/L Palmer Wind Farm DA 711/072/14

In addition to the previous pages and related to the corresponding number points please consider these further comments.

1, 2 and 3

MMC states in its objective number 26 it will "protect community health and amenity and support the operation of all desired land uses".

MMC **PDC 87** states "Development should not detrimentally affect the amenity of the locality or cause unreasonable interference through any of the following; (b) Noise and **(c) Vibration.**

MMC PDC 92 states "Development should be designed, constructed and sited to minimise negative impacts of noise and to avoid unreasonable interference".

MMC PDC 398 states "Wind farms and ancillary development should avoid or minimise the following impacts on nearby property owners/occupiers, road users and wildlife".

(b) excessive noise

As a supporter of renewable energy production it is my hope that the MMC supports appropriate, efficient and affordable development and it will be in harmony and in character with the local environment and in accordance with its own development plan, particularly related to the above objective and PDC's. Trustpower's development proposal cannot achieve this in any way and is nothing less than environmental vandalism. MMC must reject Trustpower's proposed development application in its entirety.

If MMC is sincere in its objective to protect community health and amenity it will reject Trustpower's application to develop its proposed 114 turbine wind farm in the beautiful Eastern Hills of the Mt Lofty Ranges. Community health will be severely negatively impacted by infrasound emitted from these turbines. There is increasing scientific evidence to show turbine development such as Trustpower propose in its application will produce damaging infrasound vibration.

Young developing children and the elderly are particularly vulnerable to, but most certainly not exclusively, the impacts of infrasound. Prolonged exposure exacerbates the problem.

For further detail of the effects of infrasound see attached references:

- "The Bruce McPherson Infrasound and Low Frequency Noise Study" *Adverse Health Effects Produced by Large Industrial Wind Turbines Confirmed,* Stephen E Ambrose, INCE (Brd. Cert.) Robert W. Rand, INCE Member
- "Wind Turbines can be Hazardous to Human Health" Alec N Salt, Ph.D.
- "Deadly Silence", Fergus Day

The Lancet in volume 383 number 9925 p1325-1332, 12th April 2014 "Evidence of the non-auditory effects of environmental noise exposure on public health is growing. Observational and experimental studies have shown that noise exposure leads to annoyance, disturbs sleep and causes day time sleepiness, affects patient outcomes and staff performance in hospitals, increases the occurrence of hypertension and cardiovascular disease and impairs cognitive performance in school children. In this review, we stress the importance of adequate noise prevention and mitigation strategies for public health"

Acoustical Society of America, Irene Van Kamp, Kerstin Persson Way, Anita Gdlof-Gunnarsson state "Undisturbed sleep is essential for physiological and psychological health. Children have a special need for uninterrupted sleep for growth and cognitive development".

In the night noise guidelines of World Health Organisation (2009) it was concluded that children with disturbed sleep present cognitive dysfunction and behavioural disturbances, abnormal growth hormone release, increase of diastolic BP and an increased risk of accidents and use of sleeping pills.

Infrasound has been developed as a weapon and a no touch torture tactic.

The Environmental Protection Agency (EPA), in my opinion negligently, excludes infrasound from its guidelines. The EPA has a duty of care to examine thoroughly and completely, commissioning an independent study, the connection of infrasound caused by wind turbine development to the abundant anecdotal and scientific evidence of the impacts experience by those living in risk zones surrounding such development.

- Refer to attached review/report in the EMLRLG submission, as included in this submission, The Acoustic Group, S E Cooper, for further information.
- "Development and Instillation of an Infrasonic Wake Vortex", Qamar Shams, NASA, with particular reference to pg.5 illustrating "Infrasound propagates over long distances with little attenuation" and further information.

To knowingly impose infrasound on community, including fauna, domestic and livestock animals, will be a gross act of negligence by the MMC DAP.

The MMC and its DAP must give serious consideration as to its ability to manage the immeasurable costs to its community's wellbeing and to itself financially, should it unjustly and unwisely approve Trustpower's proposed development. How would MMC financially manage such substantial compensations as would be necessary were community members required to seek compensation for detrimental health impacts caused by the turbine development if its DAP approve Trustpower's development? Indeed how would the EPA manage the same?

4

I suggest revegetation of the land would be a more efficient and effective use of land, making a greater contribution to reducing CO2 in the atmosphere than developing a near useless wind turbine development of which Trustpower neglect to specify the amount of carbon emissions it expects to "reduce", along with the exact type of turbine it proposes to use in its vain attempt to do so.

5

It would be a great injustice and endangerment of people's lives, homes, the flora, fauna and livestock in the region should aerial fire fighter's be unable or unwilling to operate in the case of a significant fire. As a community which has in recent time experienced such a fire, thankfully with the assistance of aerial fire- fighting, it is not difficult to imagine, and is horrific to consider, what a far more seriously negative outcome could have occurred had aerial fire-fighting been restricted or unable to operate due to a wind turbine development in the area.

Turbines pose a fire risk in themselves. Access tracks are unlikely to be used by fire-fighting units as they are mostly "dead ends" (no pun intended) and unsafe to access during a significant fire. Turbine developers claim access roads act as a fire break, however it is more likely fire will jump access tracks, as was the case with the Eden Valley fire where the fire jumped main roads. Who wants to take the risk? It's just not worth it.

6

The roads amongst the proposed development demand particular concentration for safe driving, for both locals and tourists alike. The region attracts many tourists, often less familiar travelling the roads in the area and because of this may be at a higher risk of danger to themselves and others. Adding the risk of glint, shadow, flicker or debris is dangerous and unnecessary, thus increasing the dangers for everyone on the roads.

7

In mid of 2014 I sold my property in the foothills of Cambrai. This was a challenging and heartbreaking decision to have to be forced to make. Having my choice of lifestyle taken from me and letting go a lifetime's work toward my dream of building a sustainable home on land not connected to the grid was not done easily or lightly. I felt forced to sell my property because I did not want to build a home in a danger zone (infrasound) within 3km's of Pacific Hydro's planning approved turbine development, or near Trustpower's proposed turbine development, risking the health and wellbeing of my young son and myself or other visiting family or friends.

On top of this the character and amenity of the region I chose to live in would be changed dramatically forever if turbine development is allowed. I consider the "unreasonable interference" of an approved or proposed turbine development at conflict with the above mentioned MMC objective and PDC's.

8

If Trustpower's proposal is approved lifestyles and landscapes will not merely be disturbed or damaged but will be destroyed from the construction phase onward for generations to come. This has already proven to be the case from the proposal stage of Trustpower's development and others like it.

9

MMC would be aware of the inappropriate turbine layout proposed by Trustpower. It could be said to be "experimental" and I would not wish for myself, my family, friends or community members to be the proverbial guinea pigs!

10

If approved, visual amenity of the region will be destroyed and forever changed in my opinion for the worse by Trustpower's proposal. I do not have the resources to demonstrate further, however it will be obvious to anyone who lives, works or visits the region for a great many kilometres surrounding the proposed turbine development as it will dominate the landscape.

I note in Trustpower's development application the Landscape Character and Probable Visual Effect Assessment by WAX Design's Warick Keates in association Dr Brett Grimm of Brett Grimm Landscape Architect and Convergen, display what seem to me to be a number of deceptive images and completely neglect some of the most probable visual impacts altogether. I suggest MMC seek follow up images and reports from the other turbine development projects, 15 listed by Warick Keates and 10 by Dr Brett Grimm, which they have worked on. I expect this will provide a more realistic understanding of the actual visual impacts of such developments than the methodology, much of which is desktop, used in

otherwise probable assessments. If MMC were to do this it would demonstrate its commitment to its residents in supporting them where they are unable to resource such works.

This is based on my humble and inexperienced opinion as a local resident of the region, which however, I think has merit. I see and experience the region on a daily basis and do not wish to see it changed for the worse due to any turbine development littering the landscape for no good reason, contrary to that which developers would like the public to believe.

11

I recently sold my property in the foothills of Cambrai for less than rated value, in my opinion due to the planning approval of the Keyneton wind farm. I am aware of a number of other residents whom have done the same and others who have sold property well before planning approval because they were anxious about the negative impacts of such developments on their property value. Others are already unable to sell property if seeking to do so due to the planning approved Keyneton and/or the proposed Trustpower turbine development. Some folks stay and live in hope that, or are not able or willing to change their current situation, either of these projects will never get up and built, hats off to them. Others live in ignorance of the detrimental impacts industrial turbine development can have on themselves, family, friends, community, flora and fauna, the landscape, the environment, energy cost and property value.

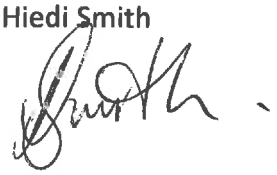
12

The hypocrisy in placing such a development alongside the Barossa Character Protection District shows Trustpower's complete disregard for the region and its residents. Many of us love and choose to live in this region to protect and beautify our local environment. Trustpower's application is in complete contradiction to and conflict with this and to the MMC objectives and PDC's as listed in this submission.

I implore the MMC DAP to reject Trustpower's development application for planning, or any further application by Trustpower, in its entirety for the sake of itself, its residents and community and the protection of the environment and character of the region which we choose to live.

I support entirely the EMLRLG submission to MMC DAP.

Hiedi Smith



* Attachment - H. Smith

The Bruce McPherson Infrasound and Low Frequency Noise Study

Adverse Health Effects Produced By Large Industrial Wind Turbines Confirmed

December 14, 2011

Stephen E. Ambrose, INCE (Brd. Cert.)
Robert W. Rand, INCE Member

"The idea that infrasound doesn't or can't affect the ear is just flat-out wrong."

– Dr. Alec Salt
Department of Otolaryngology
Washington University School of Medicine
St. Louis, Missouri, 63110, USA

Executive Summary

This study was commissioned through a private philanthropic grant created to determine why there were so many strong complaints about the loss of well-being and hardships experienced by people living near large industrial wind turbines operating in Falmouth, Massachusetts. The purpose of this study was to investigate and confirm or deny the presence of infrasonic and low frequency noise emissions (ILFN) from the "WIND 1", a municipally-owned Vestas V82 industrial wind turbine. In March of 2011, after many months of vigorous neighborhood complaints and strong appeals to the town, selectmen voluntarily decided to curtail WIND 1 operations when hub height wind speed exceeded 10 m/s. This required that this study focus on noise emissions from the nearby "NOTUS" wind turbine, an identical make and model.

Acoustics

This study was conducted at a representative neighbor's home in Falmouth and confirmed that there are dynamically modulated low frequency acoustic amplitudes and tones produced by the nearby wind turbine. Dynamic amplitude modulations occurred at 1.4 second intervals that were consistent with the blades rotating past the wind turbine tower (the blade pass rate). Dynamic amplitude modulations below 10 Hz were stronger indoors than outdoors. Modulations measured indoors were 0.2 Pascal peak to peak consisting mostly of energy below 20 Hz. Two tones were detected from both the NOTUS and the WIND 1 turbines, at 22.9 Hz and 129 Hz, and are considered signatures of the wind turbines' acoustic profile. Outdoors, the A-weighted sound level decreased at a predictable rate of 6 dB per doubling of distance from the nearest turbine. The linear unweighted sound level decreased according to cylindrical spreading at 3 dB per doubling of distance and was controlled by acoustic energy below 20 Hertz. A-weighting does not reveal this low-frequency information. Sound-level averaging with Leq for any time length hides the low-frequency dynamic amplitude modulations.

Health effects

The investigators were surprised to experience the same adverse health symptoms described by neighbors living at this house and near other large industrial wind turbine sites. The onset of adverse health effects was swift, within twenty minutes, and persisted for some time after leaving the study area. The dBA and dBC levels and modulations did not correlate to the health effects

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Acknowledgements

This study was initiated by the concerns of a private citizen, Bruce McPherson who enjoyed the many quality of life benefits of living on Cape Cod. He was disappointed that there were no efforts being made by developers or government agencies, to determine the real cause for the many complaints from Falmouth residents living near three new industrial wind turbines. He knew that neighbors were constantly complaining to town officials about receiving excessive noise, adverse health effects and the loss of well-being. Thanks are given by so many for the generosity of Mr. McPherson, who initiated and funded this independent investigation.

To the residents of Falmouth who welcomed us into their homes and lives, extended us their hospitality, told us their stories, and gave us their time and assistance, our deepest appreciation.

Sincere appreciation is given to Dr. Alec Salt, Dr. Timothy Hullar, Mr. Richard James, and Mr. Charles Ebbing for their insightful correspondence, professional reviews and comments.

experienced. However, the strength and modulation of the un-weighted and dBG-weighted levels increased indoors consistent with worsened health effects experienced indoors. The dBG-weighted level appeared to be controlled by in-flow turbulence and exceeded physiological thresholds for response to low-frequency and infrasonic acoustic energy as theorized by Salt. The wind turbine tone at 22.9 Hz was not audible yet the modulated amplitudes regularly exceeded vestibular detection thresholds. The 22.9 Hz tone lies in the brain's "high Beta" wave range (associated with alert state, anxiety, and "fight or flight" stress reactions). The brain's frequency following response (FFR) could be involved in maintaining an alert state during sleeping hours, which could lead to health effects. Sleep was disturbed during the study when the wind turbine operated with hub height wind speeds above 10 m/s. It took about a week to recover from the adverse health effects experienced during the study, with lingering recurring nausea and vertigo for almost seven weeks for one of the investigators.

Further epidemiological and laboratory research needed

The research is more than just suggestive. Our experiencing of the adverse health effects reported by others confirms that industrial wind turbines can produce real discomfort and adverse health impacts. Further research could confirm that these ill effects are caused by pressure pulsations exceeding vestibular thresholds, unrelated to the audible frequency spectrum but are instead related to the response of the vestibular system to the low frequency noise emissions. The vestibular system appears to be stimulated by responding to these pressure pulsations rather than by motion or disease, especially at low ambient sound levels. Dysfunctions in the vestibular system can cause disequilibrium, nausea, vertigo, anxiety, and panic attacks, which have been reported near a number of industrial wind turbine facilities. The study emphasizes the need for epidemiological and laboratory research conducted by medical health professionals and acousticians working together who are concerned with public health and well-being. This study underscores the need for more effective and precautionary setback distances for industrial wind turbines. It is especially important to include a margin of safety sufficient to prevent inaudible low-frequency wind turbine noise from being detected by the human vestibular system.

wind extending from ground level to tree top (about 60 feet). Within twenty minutes of being inside their house, while setting up our instruments, each of us started to lose our initial enthusiasm and actually started to feel less well. As time went on, we got progressively worse. We each experienced unpleasant symptoms of motion sickness, including ear pressure, headache, nausea, dizziness, vertigo, especially when moving about. We had a sense that the room was moving or slightly displaced from where it appeared. We experienced a loss of appetite, cloudy thinking, fatigue, some anxiety and an inexplicable desire to get outside; similar to motion sickness we have experienced on a boat or plane. We felt slightly better when we did go outside.

> According to the conflict hypothesis (Brandt, 2003) motion sickness is the consequence of discordant (not in agreement or harmony) inputs to the brain information about the position and motion of the body from the vestibular and the visual systems, and from other sensory sources [1].

On the morning of the second day we left the house to go out for breakfast. About 30 minutes later and a few miles away we shared a light conversation about the night before... We talked about the difficulties we had staying motivated and the challenges we encountered performing our usual work. As time went we started to feel better, and then by the contrast in our state of mind, it hit us. We realized and understood the true extent of the debilitating symptoms expressed by neighbors; we had experienced many of them the previous evening.

[1] BRANDT T. (2003) Vertigo: its multisensory syndromes. London, New York: Springer, 2003.

Prologue

Falmouth is one of many communities having learned the unfortunate outcome for locating industrial wind turbines too close to residences in a quiet rural environment. The responses to wind turbines by neighbors close by are very similar to those experienced in other communities that have wind turbines improperly sited too close to homes; complaints that are vigorous and very vocal. Wind turbine complaints can be divided into two distinct categories; excessive noise and physiological symptoms. This study was launched with the mission of identifying for the presence or lack of low-frequency and infrasonic sound. Due to the direct exposure to adverse health symptoms experienced during the field measurements, this study was inspired to investigate further for the potential causes for these physiological symptoms. This involved looking for significant changes in the low and very low frequencies related to acoustic and atmospheric pressure fluctuations produced by wind turbines. It was not the intent of this study to determine the direct cause of the physiological symptoms. Yet there were strong correlations established.

Authors Comments:

This study is written in a format to assist the average reader. We need to understand why so many neighbors are having such a hard time living near industrial wind turbines located in quiet areas. We would like to start this report by sharing our experiences, which we ourselves did not fully acknowledge or even understand until the morning of the second day of our investigation.

Our study began with our arrival at a nearby home. These neighbors had experienced and reported their many months of adverse health symptoms. Shortly after our first meeting and polite conversation, the homeowners invited us to use their home as the base of operations for our acoustical investigation. We respectfully accepted and were allowed to use their dining room for our field office.

As is our custom on field surveys, we were enthusiastic and ready to begin our work. It was a beautiful spring afternoon, warm with a strong westerly wind aloft at the wind turbine blade height. We observed that there was a soft southeasterly

1.2 Falmouth Wind Turbines

Over months of town meetings in 2009 and 2010, Falmouth approved the installation of two municipal wind turbines and one privately owned. These approvals required the town to receive sufficient information from the wind turbine applicants to make their decisions. We understand that during numerous presentations, town officials and neighbors were assured by the applicants, environmental engineers and scientists, that the proposed wind turbines would not cause an adverse public reaction or generate excessive noise impacts. Acoustic professionals concluded that any changes in the acoustic environment would not be sufficient to be found either objectionable or disruptive. These statements were based on assessments of the A-weighted sound level predicted for the wind turbines. (We have not seen community reaction assessments or discussions of low-frequency or sound quality comparisons to the existing environment.)

Strong appeals to stop the noise and complaints of health problems were voiced by neighbors after the municipal and privately-owned wind turbines started operating.

There are currently three industrial wind turbines (Vestas, Model V82, 1.65 MW each) installed in Falmouth with two, municipally-owned and operated, near the wastewater treatment facility. Figure 1 shows the locations for the two municipal wind turbines; WIND 1, WIND 2, and further east, the private NOTUS wind turbine owned by Daniel H. Webb and operated by NOTUS Clean Energy LLC, in the Falmouth Technology Park. All of the turbines are located east of Route 28, north of Blacksmith Shop Road and south of Thomas B Landers Road as shown on Figure 1. Commercial operation of the Town of Falmouth's Wind 1 turbine began on March 23, 2010, while WIND 2 is still waiting for start-up. The NOTUS turbine also started operation in 2010. For reference, the study measurement locations were at two residential homes, shown as ML1 (indoors and outdoors) and ML2 (outdoors).

1 INTRODUCTION

This study was commissioned through a private philanthropic grant created out of concern for strong complaints of hardships experienced at residences near large industrial wind turbines operating in Falmouth, Massachusetts. Our investigation grew in scope as we were performing our analysis. One lead led to another, and we found ourselves immersed in technical research bridging acoustics, otolaryngology, and neuroscience. Our ears do more than just listen; they play an integral part in sensing environmental conditions. The ear performs many interrelated functions that condition and inform our personal state of well-being.

1.1 Background

Low frequency sound may play an important part in the cause for adverse community reaction to large industrial wind turbines installed close to residences in quiet areas. However, this has been proven to be very difficult to determine based on only A-weighted sound level measurements, which is often the only quantifier used for compliance by local and state regulations. The A-weighting filter severely attenuates low frequency signals (the primary frequency range of most community noise complaints) and essentially eliminates acoustic signals below 20 Hertz where "infrasound" is located in the acoustic frequency spectrum. Wind turbine noise standards and most regulations require A-weighting which suppresses the amplitude of low frequency noise predictions in modeling and application submittals.

Research (detailed in Section 4) has established that infrasonic thresholds for human hearing are well below those previously assumed from traditional sinusoidal hearing tests.

It has been noted that other noise sources can generate infrasonic energy, such as surf and thunderstorms. However wind turbine low frequency energy presents a recurring and/or unpredictable pressure signature, with audibility or detectability occurring over a much longer period of time than other environmental sources of low frequency energy. When an audible or detectable acoustic or pressure signature is found, this is very valuable for subsequent monitoring system design and correlating with complaints.

practice to predict the public response to a new noise source. At the beginning of an environmental noise assessment, it is appropriate to first develop a noise level design criteria to avoid producing an adverse community response. The documented community response to wind turbine noise expressed by nearby neighbors in Falmouth varies from "highly annoyed" to "strong pleas to stop the noise". This community reaction typically indicates at least a 10 to 20 dB increase over the background ambient sound level (without wind turbine).

Unfortunately, Falmouth officials were not made aware of these studies and the wind turbine project teams chose not include this information in their presentations.

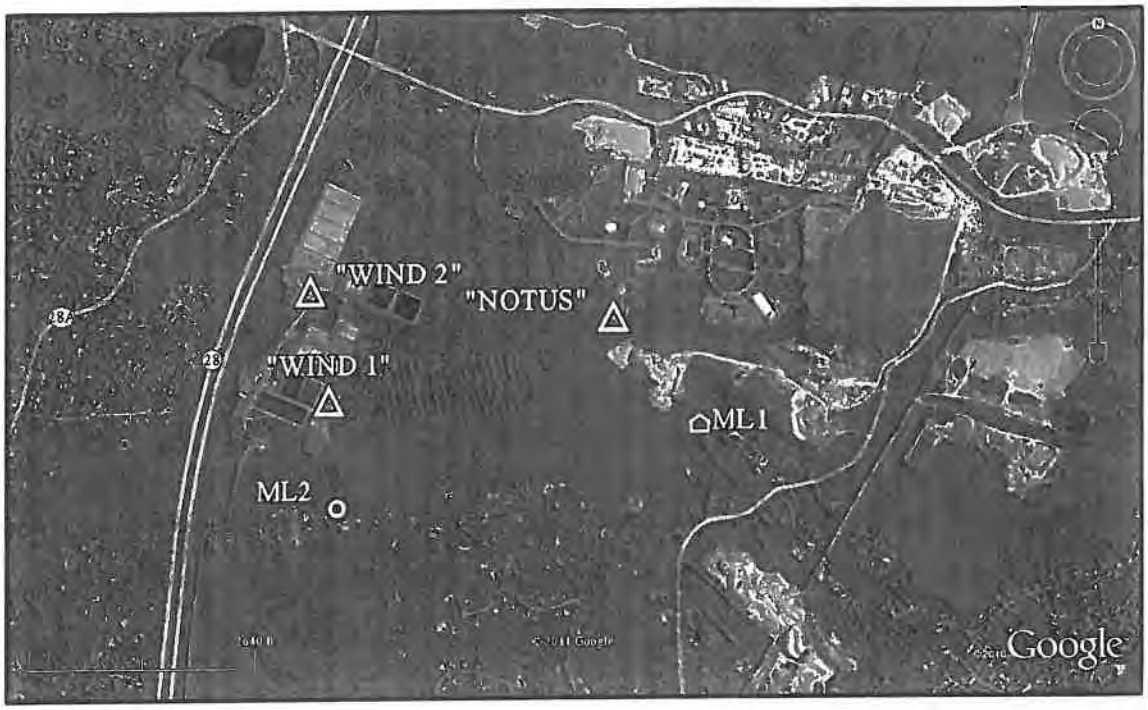
Fortunately, the Town did respond to the numerous public complaints by requiring post-operational noise surveys. Noise measurements were also performed for and by adversely affected neighbors. Most measurements were performed by qualified acousticians near the impacted neighbors. The primary acoustical descriptor measured was the A-weighted sound level (dBA). The sound levels generally ranged from the mid-30s to mid-40s dBA. Some noise level variations were due to differences for time of day, wind speed and wind direction (upwind or downwind). The measured sound levels were fairly consistent from survey to survey. However, the interpretations of the measured noise levels were different for assessing neighbors' complaints. We understand that while complaints were logged by the Town, the complaints were not correlated by distance or noise level and the health complaints remained unaddressed.

Similar adverse health symptoms have been associated with noise complaints such as "sick building syndrome", correlated by field study to low-frequency pulsations emanating from ventilation systems [2,3]. That is, adverse health effects from low frequency noise exposure in buildings have been studied and confirmed by the acoustics profession. However: As of the date of this report we have not observed any substantive effort by the wind turbine industry and their acoustical consultants to acknowledge and investigate the mechanisms including

[2] Burt, T., Sick Building Syndrome: Acoustical Aspects, Indoor and Built Environment January 1996 vol. 5 no. 1 44-59. "Symptoms resulting from exposure to infrasound can include fatigue, headache, nausea, concentration difficulties, disorientation, seasickness, digestive disorders, cough, vision problems and dizziness."

[3] Shwartz, S., Linking Noise and Vibration to Sick Building Syndrome in Office Buildings, EM Magazine, awma.org, March 2008.

Figure 1 - Wind turbine and measurement locations



1.3 Noise Complaints

We understand that shortly after WIND 1 became operational in 2010 several neighbors began to complain about excessive noise produced by the new wind turbine. The same reactions surfaced for homeowners living near the new NOTUS wind turbine when it started operating in 2010. Neighbors continued to complain for many months and they just could not adjust their lives to this new sound. The noise was reported to be constantly fluctuating with "swishing" or "thumping" sounds. Neighbors found this noise to be very annoying, intrusive and disruptive. During moderate wind speeds the noise was clearly audible outdoors and for some even indoors. At times the noise had an audible low-frequency tone that came and went. Neighbors commented that it was more annoying indoors and that it interfered with relaxation and sleep.

> *We believe that these complaints could have been predicted by using the results of studies funded by the United States Environmental Protection Administration (USEPA). These studies have a long history having been used as standard*

We understand that as of the date of this report, there been no substantive health investigations, medical evaluations, or epidemiological studies by public health officials of the health effects experienced by folks living near the wind turbines in Falmouth, Massachusetts[4]. In October 2011 the Falmouth Board of Health conditionally supported the intent of an article "to ease negative health effects" apparently only after repeated, strong pleas to stop the noise, while noting "wind turbines have to be studied before the causes can be known for sure"[5]. In November 2011, the Town decided to shut down WIND 1 for a period of six months, and start up WIND 2 with a complaint monitoring process.

2 STUDY OBJECTIVES

We understood prior to the study's launch that people were complaining more about discomfort indoors than outdoors. Typically, indoors the A-weighted sound level is *lower* than outdoors when human activity is at a minimum. This strongly suggested that the A-weighted sound level might not correlate very well the wind turbine complaints. This may be indicative of another cause such as low- or very-low-frequency energy being involved.

The attenuation and band-pass filters used for dBA and dBC weighting exclude the very low frequency energy below 20 Hz even when the background is quiet.

The purpose of this study therefore was to investigate for the presence of infrasonic pressure pulsations (acoustic amplitudes lower in frequency than 20 Hz) and low-frequency sound emissions (20-200 Hz) from the large industrial wind turbines; and, assess if they 1) are greater than or uniquely distinguishable from the ambient background levels, and 2) exceed human detection thresholds.

To date, wind turbine noise studies have focused on the A-weighted sound level and are set by international standards (IEC 61400) to use A-weighting for overall and octave and one-third octave band data. We have noticed that infrasonic emissions by wind turbines have been dismissed by the wind industry and their acoustical consultants as too weak to be of any consequence. Simultaneously,

[4] Todd Drummey, Falmouth, MA; personal communications, 2011.
[5] The Enterprise, Cape News, 18 October 2011.

possible low frequency noise underlying the numerous documented complaints of similar adverse physiological symptoms by people living near large industrial wind turbines. We have not yet observed wind facilities designed with noise criteria selected by the wind acoustic consultant to prevent adverse health effects and complaints. With respect to the adverse impacts to indoors locations in homes near wind turbines, we have not yet observed the wind industry following the best practices of the HVAC industry as published in the ASHRAE journals. We have seen suggestions, from wind facility developers to learned acoustical scholars to state commissioners of health, to the effect that it is a "psychological" issue and that wind turbines do not emit excessive low frequency noise. Having experienced adverse physical health effects ourselves directly as a result of being indoors in a home near a large industrial wind turbine, as presented in this report, with dramatically increased low-frequency and infrasonic sound levels that exceed vestibular thresholds for detection and processing by the inner ear, we must emphatically reject any such dismissive notions.

1.4 Physiological Complaints

We understand that Falmouth neighbors reported having difficulties living in their home for a variety of unpleasant health-related experiences. They were no longer able to feel comfortable, at peace while at home, unable to relax; felt tense for unknown reasons, and had a strong desire to go outside or leave the area entirely. They were unable to concentrate or stay focused on normal, at-home activities.

Some complained about headaches, ear pressure, dizziness, nausea, apprehension, confusion, mental fatigue, lassitude (inability to concentrate, lethargy). These feelings occurred when WIND 1 and/or NOTUS were operating during moderate to strong winds.

Some neighbors experienced extreme discomfort. They moved their bedrooms into the basement in an attempt to get a good night's sleep. Others left home altogether to sleep farther away with family or friends.

These complaints are clearly indicative of a serious adverse public health impact and the personal loss of well-being for those affected.

3 METHODOLOGY

Acoustic measurements were made with precision sound measurement instruments and dual-channel computer-based signal analyzer software. These instruments were capable of measuring very low frequency energy, as low as 1 Hz. Frequency response was flat (within 1 dB) to 2 Hz and 6 Hz for the two primary measurement channels. During computer analysis, response was compensated flat between 1 and 6 Hz using manufacturer specifications for microphones and preamplifiers and dual-channel end-to-end system response checks.

Outdoor measurements were conducted consistent with ANSI 12.9 [6] and ANSI 12.18 [7]. Simultaneous measurements were made using two microphones, one outdoors and one indoors, to determine the outside-to-inside level reduction (OILR) for the exterior walls and roof. The OILR measurements were performed in accordance with ASTM E966-02. The indoor microphone was fitted with a 4-inch windscreen and mounted on a microphone stand in the master bedroom at a location where the reported adverse symptoms were more pronounced. The outdoor microphone was fitted with a 4-inch windscreen and placed inside a RODE Blimp for improved wind and shock mount protection. The entire system was mounted on a tripod, positioned 5 feet above the ground, and located away from house and trees. Wind speeds were light at the outdoor microphone position.

3.1 Instrumentation

Instrumentation configurations are itemized in Table 1.

[6] ANSI/ASA S12.9-1993/Part 3 (R2008) - American National Standard Quantities and Procedures for Description and Measurement of Environmental Sound, Part 3: Short-Term Measurements with an Observer Present.

[7] ANSI S12.18-1994 (R2004) American National Standard Procedures for Outdoor Measurement of Sound Pressure Level.

many wind industry acousticians, by saying that it is everywhere in the natural environment, may have overstated the presence of naturally occurring infrasonic energy and missed the fact that wind turbine acoustic signatures are both tonal and regularly modulated. We have not seen evidence that naturally occurring infrasound is comparable to the strong dynamic amplitude modulations created by industrial wind turbines operating in quiet environments.

The scope of this study was conducted at one home that is representative of the many neighbors that have complained about noise and adverse health effects. We assessed differences between the outdoors and the indoors environment, where neighbors have said the wind turbines bother them the most and the discomfort is worst.

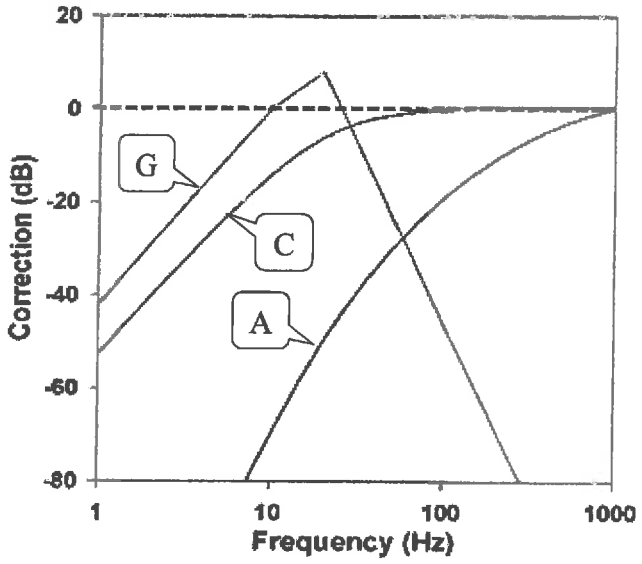
a faster response signal analyzer to observe the time history. This method revealed large modulations for the wind turbine tone at 22.9 Hz (see section 4.1.3).

The A- and C-weighting as well as octave band and FFT analysis were performed with Spectraplus software in real-time and recording mode on site. Later the recorded data was analyzed off-site using the post-processing features. G-weighted sound levels were computed using fast FFT settings for octave band analysis of the G-filtered 4, 8, 16 and 31.5 Hz octave bands using the following constants [9] which are the average value for the one-third octave bands comprising each octave band. While coarse in approach, the method was determined to be a usable trade-off between analysis time, accuracy, and computational requirements.

Octave Band, Hz:	**4**	**8**	**16**	**31.5**
dBG correction, dB:	-16	-4	7.7	-4

The A-, C-, G-weighting and un-weighted (dashed) functions are shown in **Figure 2** below [10].

Figure 2 – Weighting functions



The A-weighting filter cuts out most low frequency sound and gives the lowest reading. C-weighting includes more low frequency sound contributions and gives a higher reading than A-weighting. G-weighting measures infrasound frequencies centered in the 10-20 Hz range.

[9] ISO 7196:1995, Acoustics – Frequency weighting characteristic for infrasound measurements.
[10] Adapted from figure at http://oto2.wustl.edu/cochlea/wt4.html.

Table 1 - Instrumentation List.

Description	Manufacturer	Model	Serial No.
Microphone	Bruel & Kjaer	4165	844497
Preamplifier	Larson Davis	2221	0107
Microphone	GRAS	40AN	27538
Preamplifier	Larson Davis	902	0235
Sound Meter	Larson Davis	824	0914
Calibrator	Bruel & Kjaer	4230	1103065
Audio Interface	Sound Devices	USBPre2	HB0411005004
Recorder	M-Audio	Microtrack II	139ADC8107245
Microphone	Svantek	SV22	4012682
Preamplifier	Svantek	SV12L	5552
Sound Meter	Svantek	949	6028
Calibrator	Larson Davis	CAL200	2425
Audio Interface	ROGA	DAQ2	06pnd0097
Recorder	TEAC	DR100	0030486

Each sound level measurement system was independently field-calibrated (end-to-end) prior to and verified after the survey measurements. Each system had its own acoustic sound level calibrator (Brüel and Kjær Type 4230 or Larson Davis CAL200), generating a 1-kHz tone of 1 Pa [94 dB sound pressure level (SPL) re 20 μPa root mean square (RMS)]. Sound level meters and acoustic calibrators had current laboratory calibration certificates traceable to NIST.

It is worth noting that Type 1 instrumentation's ANSI filter characteristics have a long impulse response time at low frequencies. At 1 Hz, the ANSI 1/3 octave band impulse response is close to 5 seconds! Thus, unfortunately, **ANSI filters do not capture the fast peak pressure changes occurring in the low and infrasonic frequencies** [8]. The RMS levels reported in this study are understating the true range and modulation of the levels obtained compared to *the time response of the human ear*. The octave-band and FFT results in this study should be considered suggestive of the possible range of pressure changes and detectability for the human ear, thereby prompting the need for more extensive field and laboratory research.

We were able to improve our ability to perform fast signal analysis by using an external digital filter in series with the digital recording playback output, and then analyzing the digital data with

[8] Bray, W., James, R., Dynamic measurements of wind turbine acoustic signals, employing sound quality engineering methods considering the time and frequency sensitivities of human perception, Noise-Con 2011.

noise levels and mitigate the adverse responses from neighbors. Wind 1's operational control software was modified to stop power generation whenever the hub-height wind speeds exceeded 10 m/s (22 miles per hour).

There was no noise reduction requirement imposed on the Webb-owned NOTUS wind turbine, even though NOTUS is as close to homes as WIND 1. The manufacturer's operational program includes a trip setting for a maximum hub-height wind speed at 32 m/s (70 miles per hour).

Thus when winds exceed 10 m/s at wind turbine hub height for any length of time, WIND 1 is shut down and NOTUS can continue to operate.

During this survey, the authors noted that the NOTUS wind turbine was clearly audible outdoors at ML1 and audible indoors at ML1 during the stronger winds. WIND 1 was not operating for most of the survey period. However, during the last day with very light wind conditions, NOTUS was seen as not turning, and WIND 1 blades were visibly rotating. This was a good opportunity for obtaining digital recordings at ML1 with only WIND 1 operating.

Wind turbine power outputs were obtained from the WIND 1 and NOTUS websites. Wind speed data was obtained from the nearest weather station tower at the Otis Air National Guard Base a few miles away. This data was then graphed by date showing the wind speed and correlating power output, as shown on **Figure 3**.

The wind turbines rotated at a nominal blade pass rate of 0.7 Hz or 1.4 seconds between blades passing by the turbine mast.

The NOTUS wind turbine dominated the acoustic environment the first and second day while operating. The third day, in the morning, with winds too light for NOTUS to turn, audible sounds included intermittent loading operations in a nearby sandpit, very distant traffic, and occasional cars passing by on the neighborhood roads several hundred feet distant.

Un-weighted (dBL) measures include the entire sound signal and give the highest peak readings.

3.2 Weather Conditions

Outdoor measurements were made when weather conditions were favorable for measurements (ground level winds ≤ 9 mph and no precipitation) Publicly accessible long-term weather observation data was obtained from the nearest met tower at the Otis Air National Guard Base located a few miles away, as shown in Appendix A, B, and C.

The survey period commenced in the late afternoon of April 17, 2011 and concluded during the morning of April 19, 2011. The weather generally showed an early summer pattern with wind speeds at the hub of 20 to 25 m/s by midmorning. Low-level surface winds at the home were light and *southeasterly*, contrary to upper level *westerly* winds. At night, hub-height wind speed was light, with ground wind speed about zero. Wind speeds continuously exceeded 18 m/s during the evening of April 17 and the daytime hours of April 18. Wind gusts exceeded 30 m/s (66 miles per hour) on April 17, meaning that the NOTUS wind turbine was operating in "gale force" wind speeds at hub height, while ground level winds were generally light. This indicates "high wind shear", which is present in most of New England including the Falmouth area of Cape Cod. The conditions are summarized as follows:

> *Day 1: Changeable with wind speeds 25 to 30 meters per second at the hub, gusting to more than 35 meters/ second. Wind direction west–southwest. Barometer "low" and variable. Sunny and partly cloudy. Temperature 45 to 50 degrees Fahrenheit*
>
> *Day 2: Sunny with wind speeds 15 to 20 meters per second at the hub, gusting to 25 to 30 meters/second. Wind direction west–southwest. Barometer "low" and rising during the day. Temperature 45 to 50 degrees Fahrenheit*
>
> *Day 3: Winds stopped in morning and the field study concluded.*

3.3 Wind Turbine Operations

WIND 1 and NOTUS turbines were installed with nearest two residences having separation distances as close as 1300 feet and 1700 feet, respectively. In the spring of 2011, Falmouth imposed a maximum wind speed restriction on the WIND 1 turbine in an effort to reduce the

residence (ML1). It is worth noting that noise from the wind turbine was always dominant at all measurement locations.

Figure 4 – Stepped Distance Measurement Locations

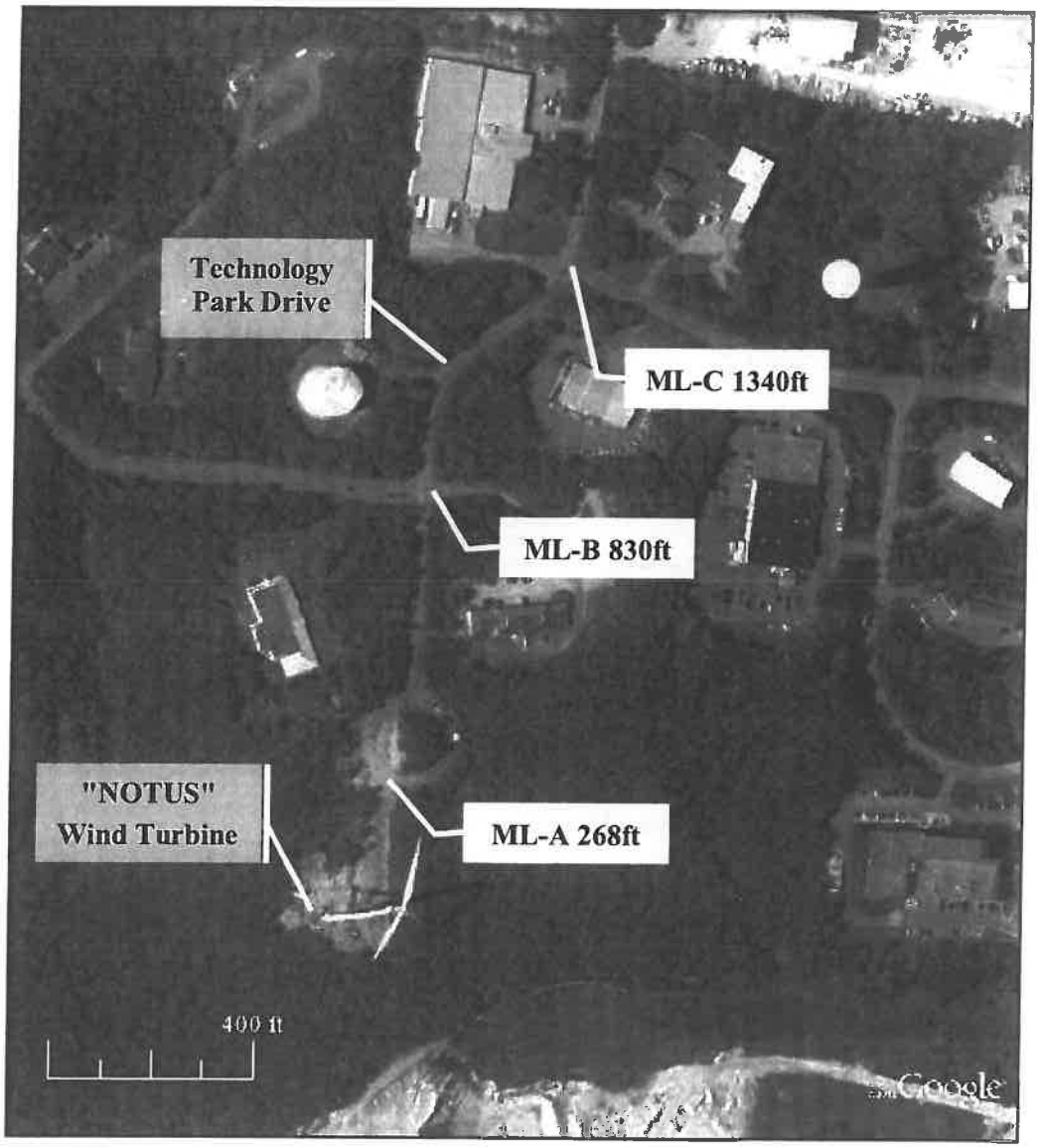
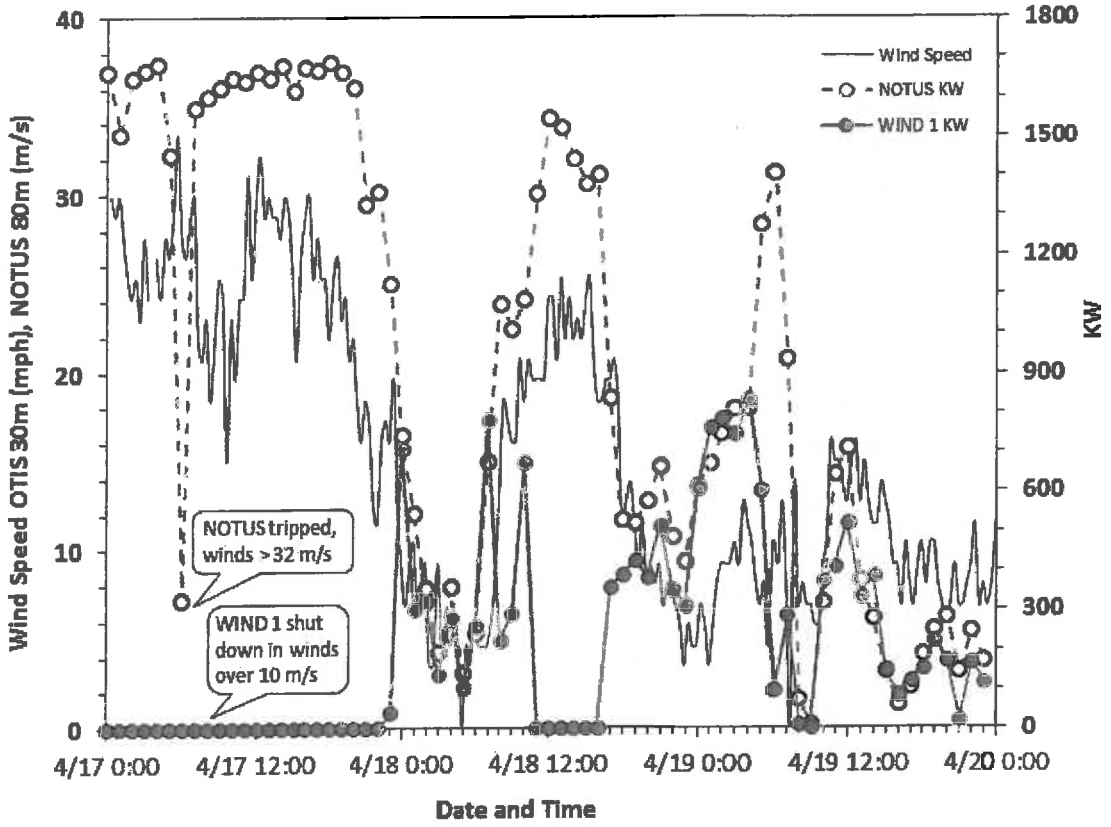


Figure 3 - Wind Turbine Operations

(Showing dates, power output and wind speed)



3.4 Sound Level versus Distance

Sound level measurements were made at different distances from the noise source to depict the noise level decrease with distance. This is a very useful method to use especially in quiet environments where the noise source under investigation is prominent at great distance. This measurement technique is referred to as; "level versus distance", "walk-away", or "stepped distance".

"Stepped distance" measurements were made at four locations; three in the Falmouth Technology Park (at 260, 830, 1340 feet) and one at 1700 feet at the residence under investigation (ML1) as shown in **Figure 4**. Distances from the wind turbine for the three closest locations were obtained with a laser range finder aimed at the tower base. A Google Earth satellite image was used to determine the separation distance between the wind turbine and

During the start of the survey, we were attempting to perform normal activities associated with our investigation; setting up instruments, observing measurements, concentrating, using computers, leaving the house for late night, stepped-distance measurements and, returning to retire for the night. Within twenty minutes, we found ourselves having difficulties performing our ordinary tasks. For example, we had difficulty determining which wires to use and what components to connect together in what sequence. We were unsure about our calibrations, and checked them repeatedly. Within an hour, we were debilitated and had to work much harder mentally. As hours passed, the severity of the symptoms increased. We were unable to acquire meaningful data at ML1 during the first evening when winds were strongest. However, we believe that the levels not acquired on April 17 were probably similar to or several dB higher than those acquired on April 18.

Later that night after 11 PM, the winds dropped below 10 m/s. We were able to confirm calibration on our instruments and collect outdoor data after midnight at the NOTUS stepped-distance locations before it started to rain. We then retired for the night in the home under study; the winds remained under 10 m/s.

However, the adverse health symptoms at the house continued through the second day with wind speeds over 10 m/s, especially when indoors. We obtained partial relief when working outdoors.

We felt improvement in health on the morning of the third day when NOTUS was OFF and felt better over time when we left the area influenced by wind turbines. It took a week to recover, with recurring symptoms of nausea and vertigo over the next seven weeks for one of us.

We annotated Figure 2 data (NOTUS power output) with the physiological-symptoms and activities listed in Table 2, with the combined information presented on **Figure 5**.

4 ANALYSIS AND RESULTS

4.1 Operations and adverse health effects felt

The survey took place over a three day period. We experienced adverse health symptoms within twenty minutes of starting the survey. Our health symptoms were tabulated with the measured data for wind speed, NOTUS output, locations, dBA, dBG & dBL levels as shown on Table 1.

Table 1 - NOTUS data and adverse health effects (ML1 at 1700 feet away from NOTUS)

Hub wind speed, m/s	NOTUS output, kw	Study	dBA	dBG	dBL	Symptoms Experienced
Day 1: 25 with gusts to 35	1600-1700	Indoors	n/a	n/a	n/a	Nausea, dizziness, irritability, headache, loss of appetite, inability to concentrate, need to leave, anxiety.
		Outdoors	n/a	n/a	n/a	Felt miserable, performed tasks at a reduced pace.
Night 1: 0-9	150-350	Indoors	18-20	n/a	n/a	*Slept with little difficulty*
Day 2: 20 with gusts to 30	1350-1500	Indoors	18-24	51-64 pulsations	62-74 pulsations	Dizzy, no appetite, headache, felt miserable; performed tasks at a reduced pace. Desire to leave.
		Outdoors	41-46	54-65 pulsations	60-69 pulsations	Dizzy, headache, no appetite. Slow. Preferred being outdoors **or** away.
Night 2: 4-12	150-350	Indoors	18-20	n/a	n/a	*Slept fitfully, woke up*
Day 3: 6 calm	OFF	Indoors	18-20	39-44 random	50-61 random	Improvement in health. Fatigue and desire to leave.
		Outdoors	32-38	49-54 random	57-61 random	Improvement in health. Fatigue and desire to leave.

sleeping during the *second* night when the average hub-height wind speeds *increased to above 10 m/s several times* during the early morning hours.

4.1.1 Physiological Symptoms

During moderate to high wind speeds, we experienced adverse physiological symptoms very similar to those described by neighbors. We arrived fresh and ready to work, without the ill effects of missing a good night's sleep. We had no personal attachment to place, no concerns about shadow flicker or diminished real estate value. Instead we found ourselves encountering a very *visceral* discomfort (proceeding from instinct, not intellect), unexpected in this peaceful rural environment. The severity was directly related to the strength of the dBG-weighted and the un-weighted amplitude-modulated infrasonic acoustic pressure level that was proportional to wind speed.

> *We found that individuals prone to motion sickness (as both researchers are) can experience unpleasant physiological symptoms, especially indoors near a wind turbine. We also acknowledge the large body of medical evidence of vestibular medical conditions that can cause problems with balance and orientation, nausea, dizziness, anxiety, and other health effects, that that can be worsened by adverse environmental conditions.*

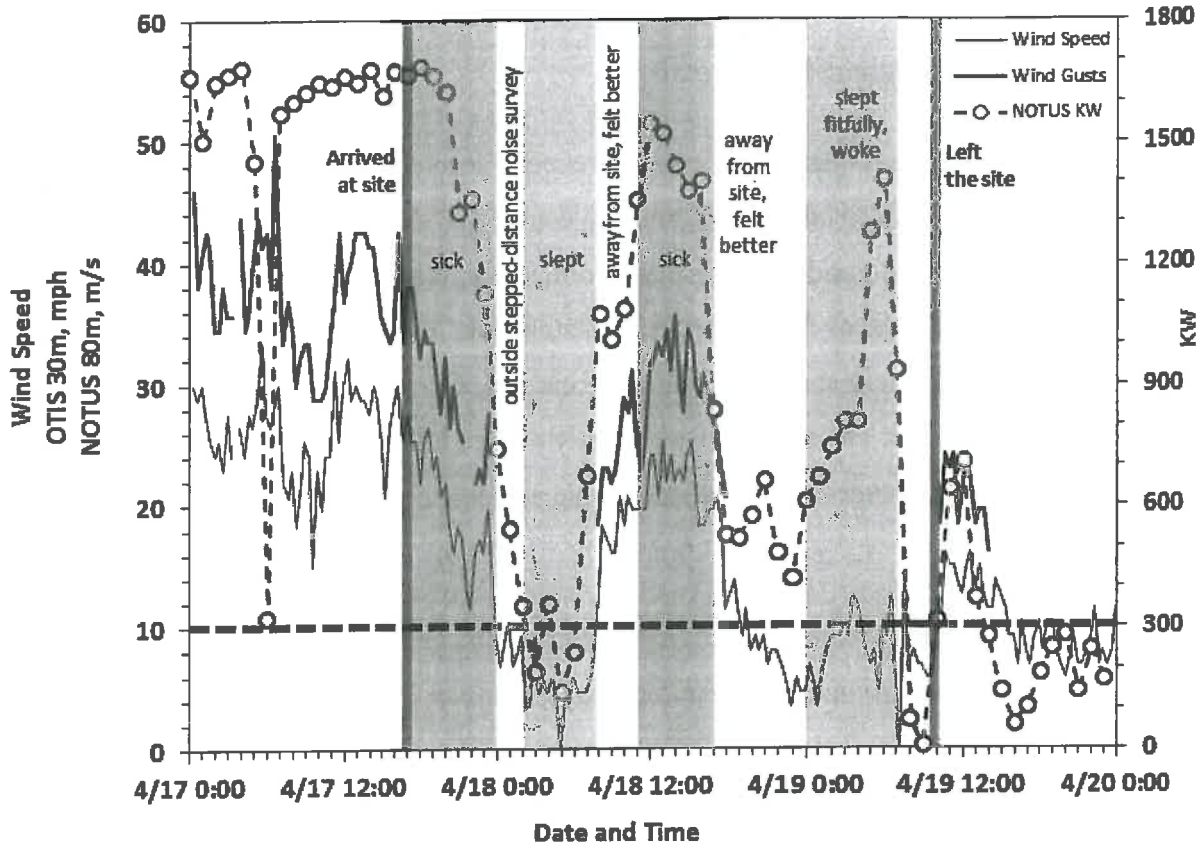
4.1.2 Current Research

From our experience in April, we know now that understanding the adverse health effects reported by neighbors living near large industrial wind turbines requires coordinated research involving several branches of science, including neuroscience, otolaryngology, and acoustics. We will not attempt here to present the vast areas of knowledge represented by the disciplines just listed. We will cover a very small portion in order to lay the basic framework for presentation of Dr. Salt's work on the response of the ear to infrasound.

Sound pressure is the small alternating deviation above and below atmospheric pressure due to the propagated wave of compression and rarefaction. The unit for sound pressure is the Pascal (symbol: Pa). Sound pressure level (SPL) or sound level is a logarithmic measure of the effective sound pressure of a sound relative to a reference value. It is measured in decibels (dB) above a standard reference level. The commonly used "zero" reference sound pressure in air is

Figure 5 - Survey Operations at ML1

(Average and gusty wind speeds)



We found that there is an *unexpected* correlation between our symptoms occurrences with the hub-height wind speed. It is worth noting that Falmouth had elected to set an operational cap on the WIND 1 at 10 m/s, *shown for reference* as a horizontal dashed line in Figure 5. *We were noticeably affected when the wind speeds were over 10m/s at hub height for NOTUS, 1700 feet from our study location.*

We found a strong correlation between the symptoms experienced by us with versus the wind speed and the NOTUS power output. The graph in Figure 5 shows that the most severe symptoms (labeled as "sick") occurred when the winds were the strongest (well above 10 m/s), as confirmed by power output. To our best knowledge, there have been no such physiological complaints made by neighbors in Falmouth *prior to* the installation of NOTUS (and WIND 1).

Further, the graph in Figure 5 shows when we were not severely affected. When the wind speeds dropped below 10 m/s the first night, we recovered enough to be able to go out and measure the stepped distance data. We also did not complain about sleeping difficulties during the first night with winds remaining below 10 m/s. However, we *both* experienced difficulty

The vestibular system in the brain does more than just allow us to stand upright, maintain balance and move through space [11]. It coordinates information from the vestibular organs in the inner ear, the eyes, muscles and joints, fingertips and palms of the hands, pressors on the soles of the feet, jaw, and gravity receptors on the skin and adjusts heart rate and blood pressure, muscle tone, limb position, immune responses, arousal and balance. The auditory system is also highly involved in vestibular functions. The vestibular and auditory nerves join in the auditory canal and become the eighth cranial nerve of the brain. Anything that disrupts auditory information can also affect vestibular functioning.

> *Our symptoms (ear pressure, dizziness, vertigo, anxiety) suggested that there was atmospherically transmitted energy that directly affected our vestibular systems. Yet we were puzzled by the fact that we were most severely affected when sitting relatively still indoors, not moving about. What were our vestibular systems responding to? Were the vestibular canals being moved? Were the otolithic crystals being displaced [12]? Was the endolymphatic fluid volume being affected? Was a vestibulosympathetic reflex involved? Was the ear triggering fight or flight reactions in response to low frequency sound?*

Dr. Alec Salt [13] has conducted extensive research into vestibular response to sound pressure pulsations. His research shows that ***the ear responds to sound we cannot hear***.

There are two types of hair cells in the cochlea, the inner hair cells (IHCs) and the outer hair cells (OHCs). The IHCs are fluid-connected and *velocity*-sensitive, responding to minute changes in the acoustic pressure variations based on frequency, with sensitivity decreasing at a rate of -6 dB per downward octave. ***IHCs detect audible sounds and they are insensitive to low frequency and infrasonic acoustic energy.*** In contrast, the OHCs are motor as well as sensory cells. OHCs are found only in mammals. OHCs are mechanically connected, responding to small changes in *displacement*, with a more uniform sensitivity across the acoustic frequency spectrum. ***OHCs respond to and contract with infrasonic stimulus*** and then act to reduce vibration stimulus at the IHCs. Thus there are actually *two* specialized receptors, or transducers, in each ear, as outlined in Dr. Salt's slide in **Figure 7**.

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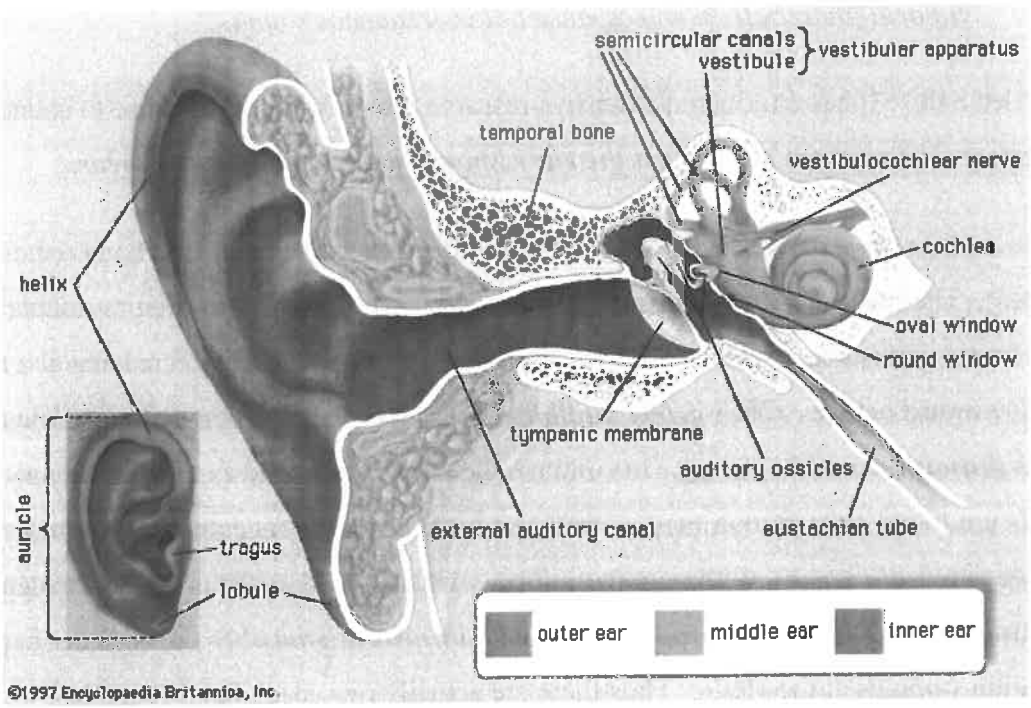
[11] http://www.braintraining.com/vestibular.htm.
[12] "...small crystals of calcium carbonate (also referred to as "otoliths" or "canaliths") that are normally attached to the otolithic membrane in the utricle of the inner ear.", http://www.vestibular.org.
[13] Department of Otolaryngology, Washington University School of Medicine, St. Louis, Missouri, USA.

20 μPa RMS, which is usually considered the median threshold of human hearing (at 1 kHz). Some 16 percent of the population is about 6 dB more sensitive than the median. Frequency is measured by the number of waves per second or Hertz (Hz). The average range of hearing is 20-20,000 Hz with the greatest sensitivity in 1000-4000 Hz. At the most sensitive frequency around 4 kHz, the amplitude of motion of the eardrum is about 10^{-9} cm, which is only about 1/10 the diameter of a hydrogen atom. Thus, the ear is very sensitive, detecting signals in the range of atomic motion.

The term "infrasound", which refers to acoustic energy at frequencies below 20 Hz, is misleading for most, not being "sound" at all as we know it but either felt or inaudible. However as determined by Dr. Salt, the ear detects and responds to infrasound.

We present for reference a diagram of the ear in **Figure 6**. Note that the inner ear's vestibule and semicircular balance canals are as close to the eardrum as the cochlea which processes sound.

Figure 6 – Diagram of the ear



- The outer hair cells of the ear are directly attached (DC-coupled) to movements of the sensory structure and respond to infrasound stimuli at moderate levels.

- Low frequency stimulation of the outer hair cells (OHC) may be used in the brain to eliminate infrasound from hearing (improving and optimizing the signal to noise ratio of the audible-range ear mechanism in most acoustic environments, except the very quiet.) Low frequency stimulation of the OHCs is also linked to the attention state and arousal, so stimulation could disturb sleep.

- Outer hair cell responses to infrasound are the most sensitive when ambient sound levels are low.

In summary, Dr. Salt indicates very simply,

> *"The idea that infrasound doesn't or can't affect the ear is just flat-out wrong."* [15]

Our field experience in Falmouth in April 2011 is consistent with Dr. Salt's research findings. As detailed in the following sections, we experienced the most adverse health symptoms indoors where the acoustic energy was 0.2 Pascal peak-to-peak, modulated at 0.7 Hz, with portions of the low-frequency energy modulated above the OHC threshold, while occurring in a very low background sound level of around 20 dBA. Our symptoms lessened somewhat outdoors, where the pressure pulsations at 0.7 Hz were slightly lower than indoors, and the background level was in the low 40s dBA.

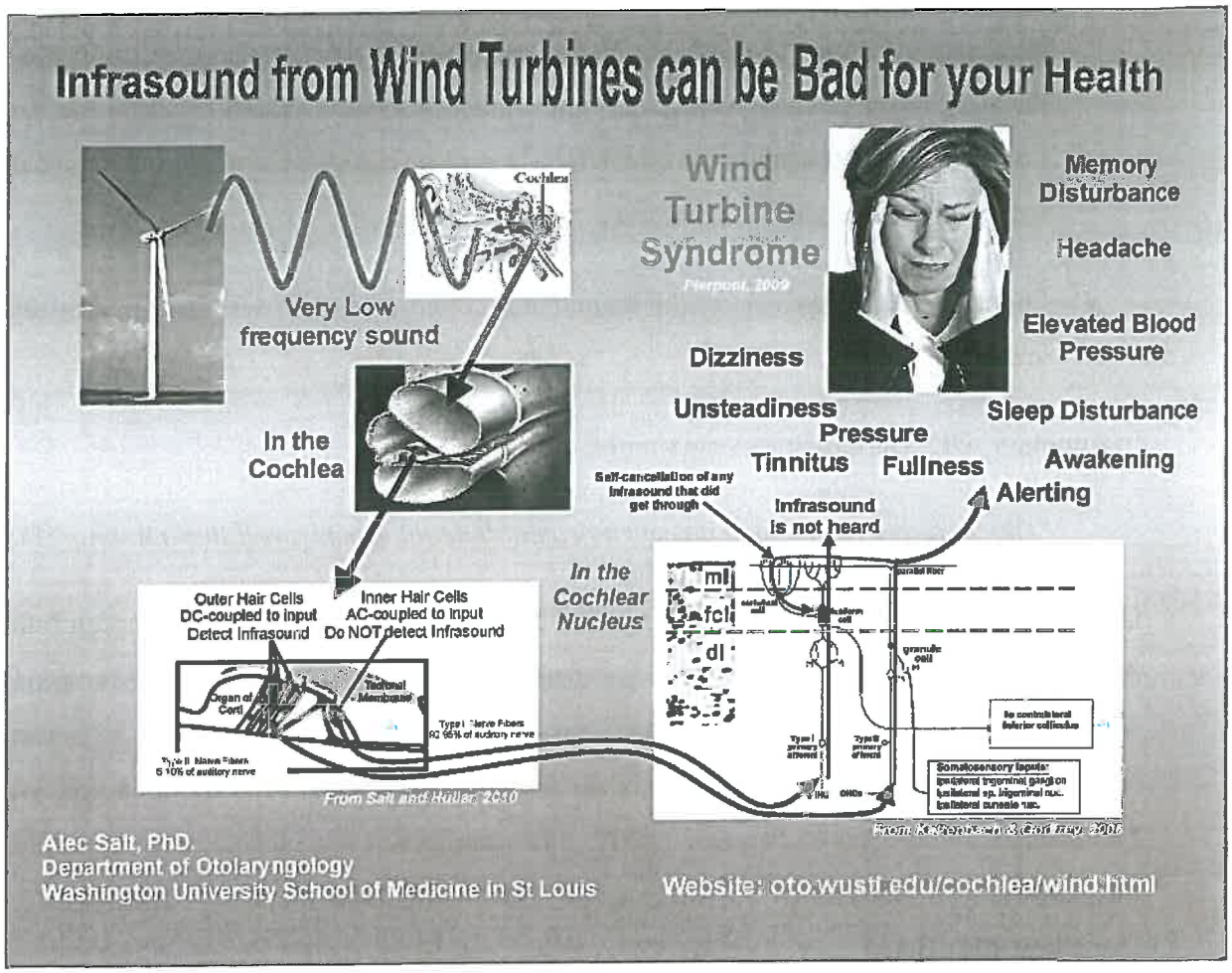
We understand that some families living near wind turbines and experiencing similar effects indoors, yet not ready to abandon their homes, have resorted to sleeping outside in tents. This lessening of effects outdoors (compared to indoors) is consistent with findings of low-frequency noise effects documented in [2].

Dr. Salt formally identified in 2011 a number of areas requiring more research:

Stimulation of vestibular hair cells (saccule, utricle).
Vestibular hair cells are "tuned" to infrasonic frequencies.
No-one has ever measured sensitivity to acoustic infrasound.
Symptoms: unsteadiness, queasiness

[15] Salt, A., http://oto2.wustl.edu/cochlea/wt7.html.

Figure 7 – Ear response to very low frequency sound



Dr. Salt's research reported the following [14]:

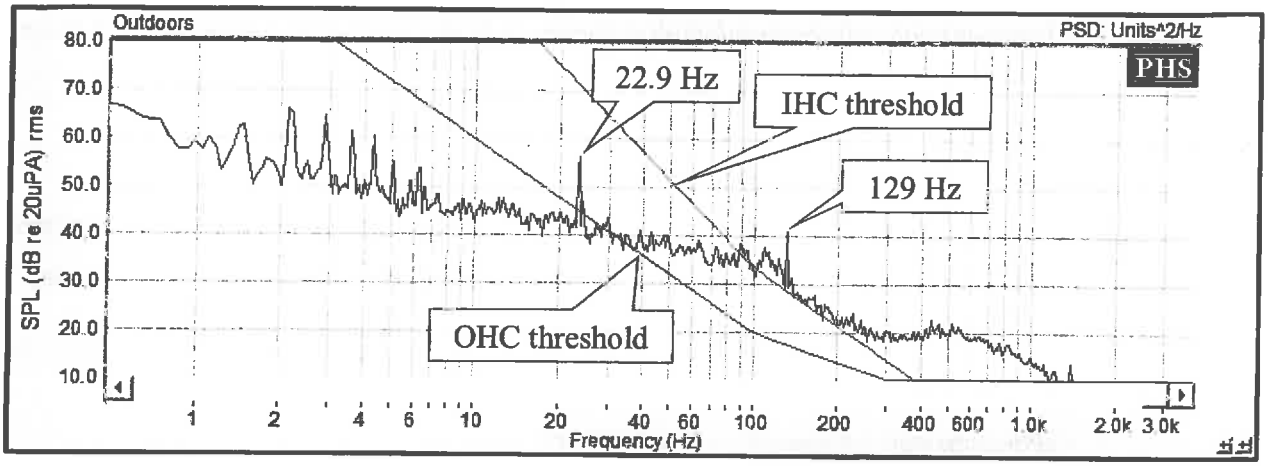
- The ear is sensitive and responds to low frequency and infrasonic pressure modulations at levels that are not heard (sub-audible).

- Low frequency pressure modulations produce a *biological* amplitude modulation of nerve fiber responses to higher frequency stimuli. This biological amplitude modulation cannot currently be detected by even the most sophisticated sound level meter.

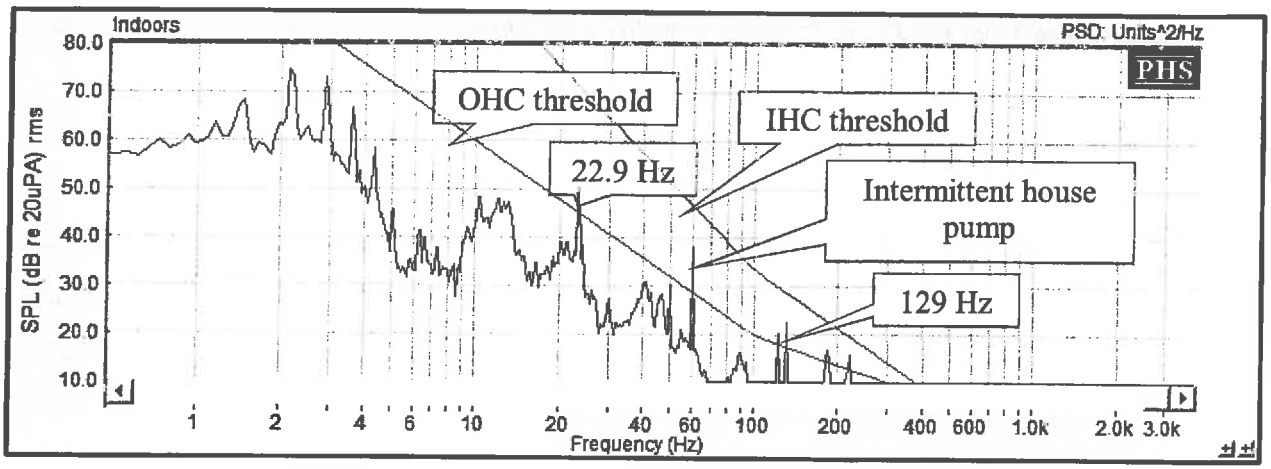
[14] Salt, A., "Responses of the Inner Ear to Infrasound" - presentation to the Wind Turbine Noise Conference, Rome, April 11-14, 2011.

Figure 8 – OHC & IHC Thresholds vs. RMS Wind Turbine Spectrum (4/18/2011)

8a – Outdoors (RMS)



8b – Indoors (RMS)



We were drawn to evaluating the potential significance of the 22.9 Hz tone. The amplitude modulation of the 22.9 Hz tone was evaluated using an external 10th-order digital bandpass filter (20 to 24 Hz) applied to the digital recording output and then analyzed with SpectraPlus software at 23 millisecond intervals using Hamming weighting. The time history presented in **Figure 9** shows that the indoors 22.9 Hertz tone modulates significantly above and below the OHC threshold of 45 dB SPL at 22.9 Hz.

Disturbance of inner ear fluids (e.g. endolymph volume).

Low-frequency sound at non-damaging levels induces endolymphatic hydrops (a swelling of one of the fluid spaces).

Infrasound does affect endolymph volume – it is the basis of a treatment for hydrops (Meniere's disease).

No one has ever measured what level of infrasound causes hydrops.

Symptoms: ear fullness, unsteadiness, tinnitus

Infrasound – affected structures and long-term exposure effects, ranked by sensitivity:

Outer hair cells — "Overworked, tired, irritated" OHC, type II fiber stimulation

Inner ear fluid homeostasis — Volume disturbance, endolymphatic hydrops

Saccular hair cells — Stimulation

Other, non-ear, receptors — Stimulation

Inner hair cells/hearing — None

Sensitivity and sensations remain to be quantified: ear pressure or fullness, discomfort, arousal from sleep; ear fullness, tinnitus, unsteadiness; unsteadiness; stress, anxiety.

4.1.3 OHC & IHC Sensitivity Analysis

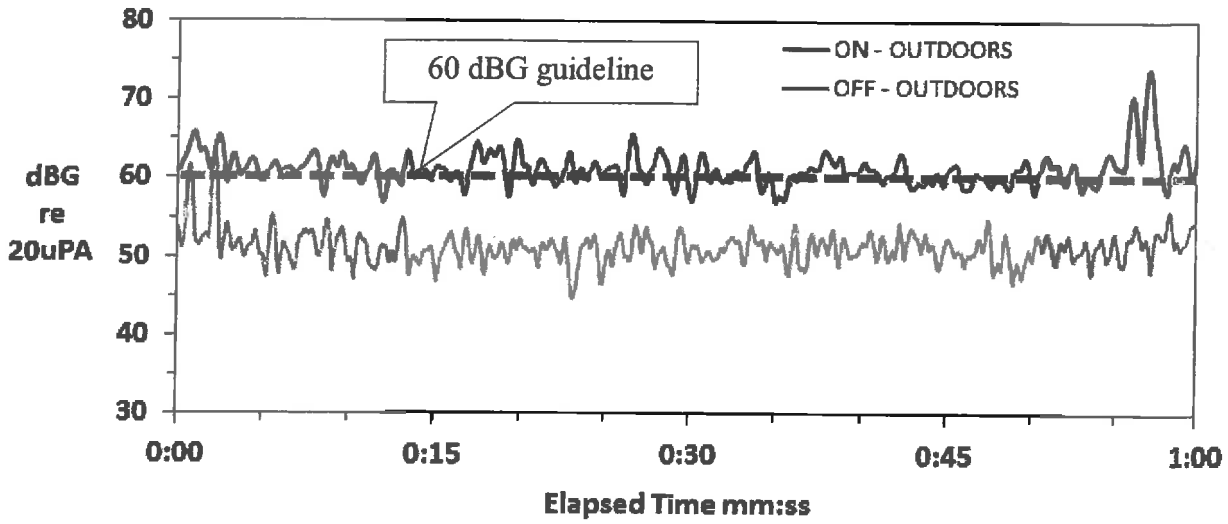
A representative average (not peak) wind turbine noise spectrum, obtained during the second day (April 18, hub-height winds 20 m/s and gusting) when the researchers were experiencing moderate-to-severe adverse health effects, was compared with Dr. Salt's OHC and IHC threshold data [16]. When the wind turbine noise was dominating, the sound level was in the low 40s dBA outdoors and about 20 dBA indoors.

The outdoor RMS spectrum presented in **Figure 8a** shows that both the 22.9 & 129 Hz wind turbine tones exceed the OHC threshold levels along with all frequencies above 30 Hz. The 22.9 Hz tone was not audible outdoors. However, the 129 Hz tone was clearly audible outdoors since it exceeded the IHC audibility threshold.

The indoor RMS spectrum presented in **Figure 8b** shows that both the 22.9 & 129 Hz wind turbine tones exceed the OHC threshold levels. Again, the 22.9 Hz tone was inaudible indoors and the 129 Hz tone was frequently audible, more so than reflected in the averaged RMS level.

[16] Curves furnished by Dr. Salt via private communication, 2011.

Figure 10b – dBG levels, outdoors



These figures (10a & 10b) clearly show the dBG-weighted levels exceeding Dr. Salt's 60 dBG guideline when the NOTUS wind turbine is operating. Again, based on Dr. Salt's research, these low-frequency pressure events are undetected by the IHC circuitry, yet strong enough to trigger the OHC circuitry which then drops gain on the IHC circuitry.

Indoors, the dBG level was modulated above 60 dBG with turbine ON and was down in the high 30s to low 40s (dBG) with turbine OFF. Indoors, we observed a 20 dB increase in dBG due to the wind turbine operation.

Outdoors, the dBG level was modulated above 60 dBG with NOTUS ON and was down in the low 50s (dBG) with NOTUS OFF. There we observed a 10 dB increase in dBG due to the wind turbine operation.

As a point of reference, relief started to set in for us when NOTUS was off with resulting dBG levels generally not exceeding 55 dBG outdoors and below 45 dBG indoors.

4.1.4 Discussion: Effects on Sleep and Wake States

Sleep Disturbance

We found that sleep was disturbed during the second night with hub-height winds above 10 m/s. However the background sound levels were low indoors, around 20 dBA. What could have been disturbing our sleep? This experience demands further study. We offer here a possible link.

> *From our direct experience that night, we hypothesize that sleep was disturbed when the wind turbine's principal modulation frequencies including the 0.7 Hz*

Figure 9 – 22.9 Hz tone and its OHC threshold

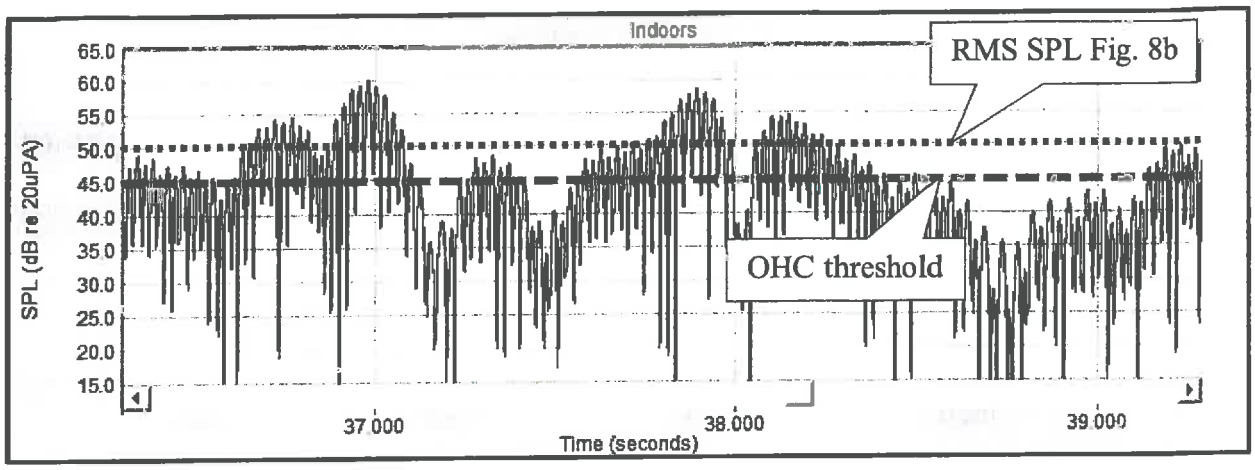
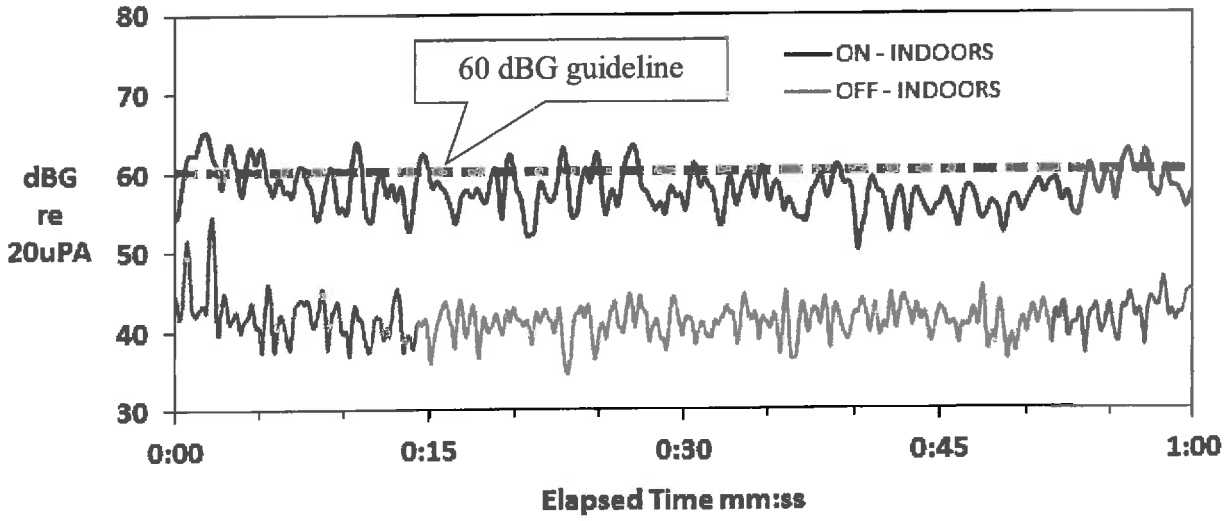


Figure 9 reveals a remarkable range of modulation in the 22.9 Hz tone, which peaks in this example time record as high as 60 dB SPL, 10 dB higher than the 50 dB SPL mean established by the FFT averaging. Nulls between peaks drop down several tens of decibels below the OHC threshold. The figure suggests that the inner ear OHC circuitry is receiving individual low-frequency pressure events 43 milliseconds apart at the 22.9 Hz driving frequency. The tone does not reach the IHC threshold (about 72 dB SPL at 22.9 Hz) and in fact we did not find the 22.9 Hz tone to be distinctly audible. Based on Dr. Salt's research, these 22.9 Hz pressure events are undetected by the IHC circuitry, yet strong enough to trigger the OHC circuitry which then drops gain on the IHC circuitry.

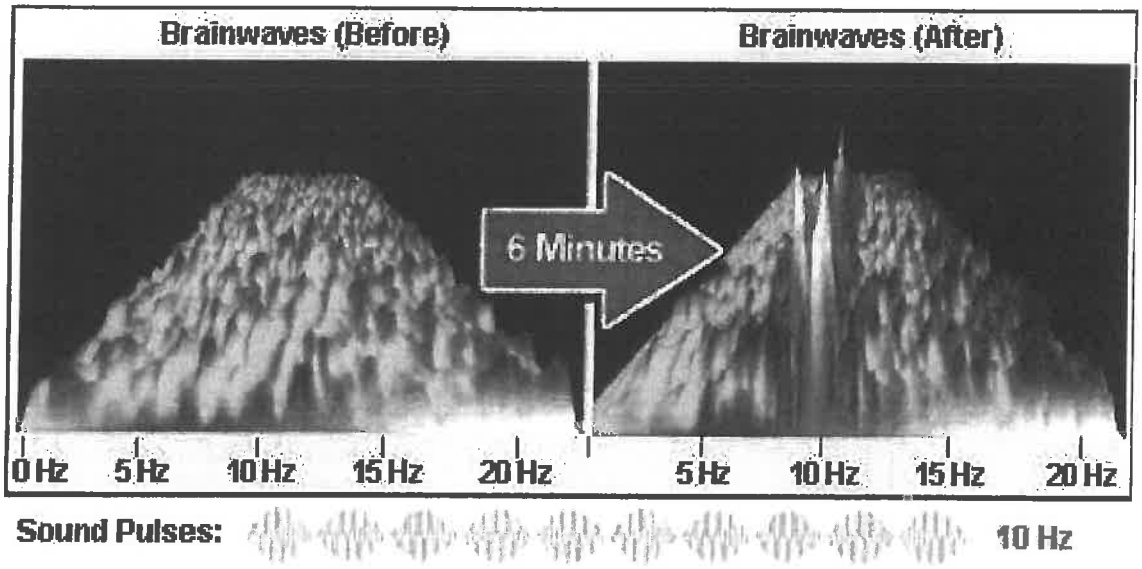
Example dBG-weighted time histories for the second day (4/18/2011) can be reviewed in **Figures 10a & 10b** with the 60 dBG guideline shown as a dashed line.

Figure 10a – dBG levels, indoors



experienced. The brain entrains through FFR to external acoustic stimulus [19], example shown in **Figure 12**.

Figure 12 – Brain Response to 10 Hz Entrainment



This line of reasoning suggests that we may have experienced FFR with wind turbine acoustic emissions. We were unprepared to acquire brain wave (EEG) states during the field work to confirm FFR. If the medical protocols can be established, would EEG field testing be useful? It appears so.

Wake State

We experienced cloudy thinking, lethargy and difficulty with activities especially indoors during the daytime hours when wind speeds were strong at hub height. The wind turbine's 22.9 Hz tone increased in strength with increasing hub-height wind speed. Again, the 22.9 Hz tone is in the "High Beta" frequency band. There is clinical evidence that "synchronizing cortical activity in the beta frequency band slows voluntary movement" [20]. Other researchers [21,22] have investigated the abnormally high amounts of beta wave oscillatory brain activity in Parkinson's' Disease. Their research "demonstrated abnormally synchronized oscillatory activity at multiple levels of the basal ganglia-cortical loop. This excessive synchronization correlates with motor deficit".

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[19] Original source reference being sought.

[20] Pogosyan A, Gaynor LD, Eusebio A, Brown P., Boosting Cortical Activity at Beta-Band Frequencies Slows Movement in Humans. Curr Biol. 2009 Oct 13;19(19):1637-41. Epub 2009 Oct 1.

[21] Hammond, C., et al, Pathological synchronization in Parkinson's disease: networks, models and treatments. Trends Neurosci. 2007 Jul;30(7):357-64. Epub 2007 May 25.

[22] Eusebio, A., Brown, P., Synchronisation in the beta frequency-band — The bad boy of parkinsonism or an innocent bystander? Exp Neurol. 2009 May; 217(1): 1–3. doi: 10.1016/j.expneurol.2009.02.003.

blade pass modulated in-flow turbulence pressure pulsations and 22.9 Hz tone became sufficiently detectable to the ear's vestibular system to engage the brain centers through the auditory frequency following response, or FFR [17,18]), and may have created conflict with the brain's sleep operations which would have its own sequences and frequency states during the night.

In sleep the brain is normally in Theta (4-7 Hz) or Delta (up to 4 Hz) states, as seen in **Figure 11**.

Figure 11 – Brain Waves

Type	Frequency (Hz)	Behavior
Delta	up to 4	• Slow wave sleep in adults, and some continuous attention tasks.
Theta	4 – 7 Hz	• Drowsiness or arousal in older children and adults, idling.
Alpha	8 – 12 Hz	• Relaxed/reflecting, closing the eyes.
Beta	12 – 30 Hz	• Alert/working, active, busy or anxious thinking, active concentration.
Gamma	30 – 100 +	• Perception which combines two different senses, such as sound and sight and short term memory matching of recognized objects, sounds, or tactile sensations.

The wind turbine's 22.9 Hz tone lies in the "high Beta" range of brain wave frequencies (understood to be 23-30 Hz). Beta brain wave activity is understood to be associated with alert brain state, anxiety, and stress. Conversely, the wind turbine's blade pass frequency of 0.7 Hz, with which the wind turbine turbulence and tonal energy is amplitude-modulated, lies in the deep Delta brain wave range. We understand that medical researchers have established that entrainment to an external frequency when the brain would normally be operating at its own frequency requirements may result in brain activity conflict. That is certainly what we

[17] Frequency-following responses (FFRs), sustained evoked potentials based on precisely phase-locked responses of neuron populations to low-to-middle-frequency periodical acoustical stimuli.

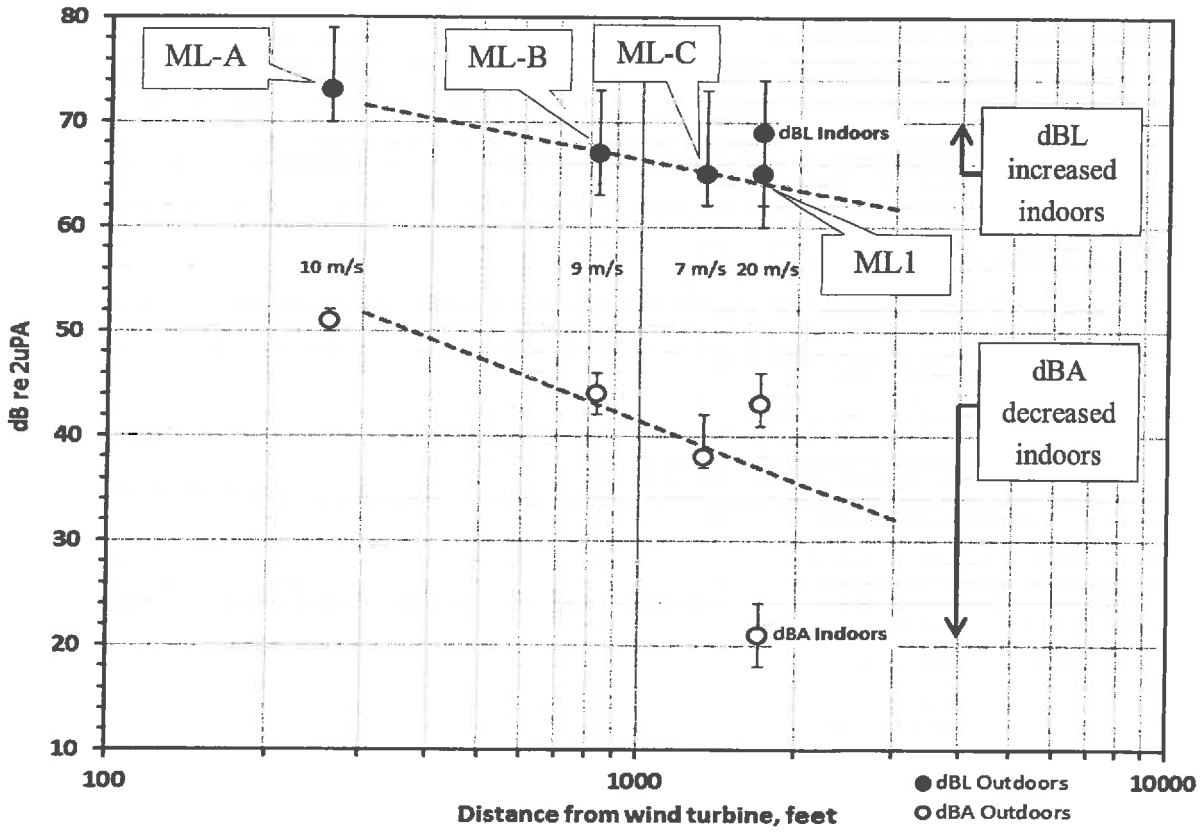
[18] Du, Y. et al, Auditory frequency-following response: a neurophysiological measure for studying the "cocktail-party problem". Neurosci Biobehav Rev. 2011 Nov;35(10):2046-57. Epub 2011 May 27.

4.2 Sound Level versus Distance

Outdoor dBA sound levels decrease at 6 dB per doubling of distance (6 dB/dd) as depicted by the inverse square law for acoustic frequencies. Sound level versus distance measurements were plotted *using a semi-log scale for distance.* This graphing method typically shows the drop of sound level as a straight line as the distance increases.

The "stepped distance" data combined with the data at ML1 clearly show that the NOTUS noise level decreases with distance uniformly, as shown on **Figure 13.**

Figure 13 - NOTUS RMS Sound Level vs. Distance
(Showing wind speeds, and average noise levels with max-min ranges)



There are two trend lines; the lower dashed one showing the dBA decreasing at a predictable 6 dB/dd. The dBA trend line is faired through a wind speed of 8 m/s which is the wind turbine specification wind speed. The upper line is for the unweighted sound level, which is controlled

We understand a number of people worldwide have experienced cardiovascular upset near wind turbines; pains in chest, heart racing, palpitations. Were our cardiovascular systems being influenced through entrainment during the Falmouth study?

> *According to the principle of entrainment [23], two systems will entrain or align their rhythms if exposed to each other for a sufficient length of time. At 42 modulations per minute, the 0.7 Hz blade pass frequency falls in the range of resting heart rates for athletes. Our heart rates are normally closer to 65-70 bpm. Could our heart rates have slowed? Could entrainment have spurred adaptive vestibular attention to signals from vascular baroreceptors for confirmation of the incoming pressure pulsations? We do not know. We were unprepared to monitor heart rate variability or cardiovascular condition during the study.*

What do these lines of thinking suggest?

First, they suggest that brain oscillations may synchronize to the wind turbine. Our experience told us that our mental functions shifted dramatically within a short period of exposure to the wind turbine noise. The effect may be more pronounced or occur more quickly when winds are strong, and from our own experience, can affect sleep and waking states. Anxiety could have emerged for the very reason that the incoming energy processed and reported by the vestibular system was inaudible.

Second, they suggest that a complex of physiological conditions may be triggered by the vestibular processing of the incoming low-frequency energy that is inaudible yet exceeds the vestibular threshold. These human responses strongly suggest that this is in fact *a medical problem*. Medical doctors and researchers should evaluate the health effects reported by neighbors living near wind turbines in Falmouth through epidemiological and laboratory work.

[23] "a synchronization of two or more rhythmic cycles," a scientific phenomenon discovered by Dutch scientist Christian Huygens in 1665. Following the law of the conservation of energy, when two closely related rhythmic cycles interact they synchronize with each other.

Figure 14a - Outside-to-Inside Level Reduction (OILR), FFT

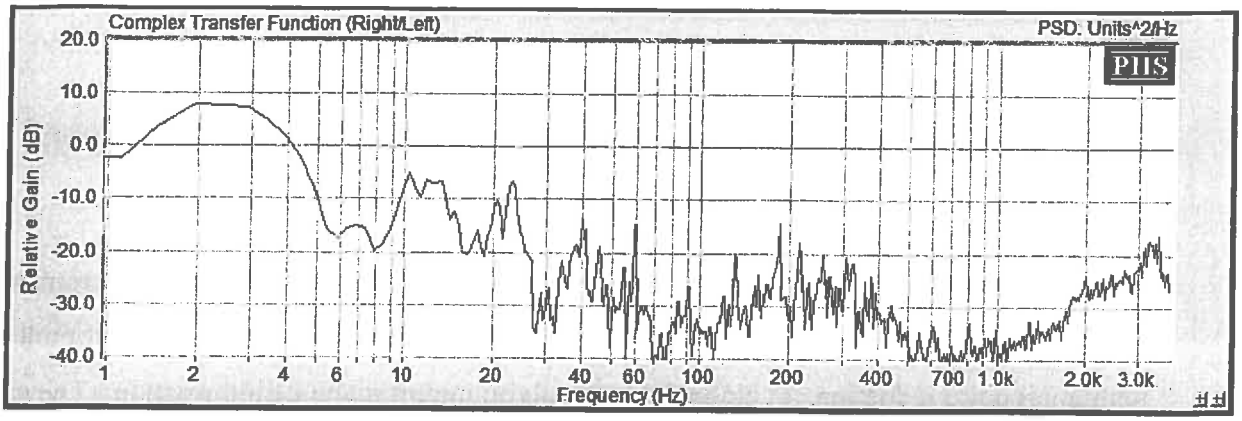
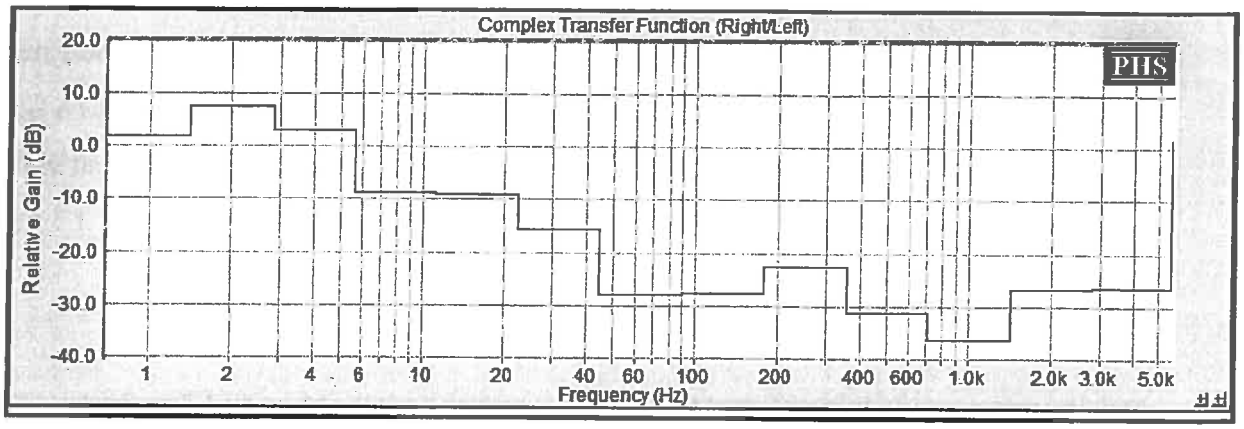


Figure 14b - Outside-to-Inside Level Reduction (OILR), Octave Band



The graphs in Figures 14a & 14b present a preliminary assessment of the outside-to-inside-level-reduction (OILR), or "noise reduction" (NR) provided by the house exterior walls and roof.

Negative values indicate attenuation or NR, while positive values indicate amplification. There is on average more than 20 dB of NR for frequencies greater than 31.5 Hz, and about 15 dB in the 31.5 Hz band. From 16 to 8 Hz the NR is reduced to 10 dB. However, below 8 Hz there is no NR, but rather there appears to be amplification for the very lowest frequencies. This is evident in a review of the octave-band sound pressure in Pascal shown in **Figures 15a & 15b**.

in these measurements by energy at frequencies less than 20 Hz. The data indicate a decrease with distance consistent with cylindrical spreading; about 3 dB/dd.

> *Outdoor sound wave propagation generally occurs in one of three ways; spherical or hemispherical, represented by a decrease of 6 dB per doubling of distance, or cylindrical, with a decrease of 3 dB per doubling of distance.*

Measurements at the house were measured indoors and outdoors. The dBA measurements show that the indoor levels were more than 20 dB quieter than outdoors, depicting a well-built house with good noise reduction. A closer look reveals an important bit of information. The un-weighted linear (dBL) levels *indoors* were actually several dB *higher* than those *outdoors*. This indicates that the house is reinforcing and amplifying the very low frequency energy.

Analysis of the WIND 1 digitally recorded data using signal analyzer software shows that there are series of repetitive low-level infrasonic pulses with energy in the range of 0.7 to 6 Hz at multiples of the blade pass rate of 0.7 Hz. These are unique to the wind turbine, and we have not located similar data for environmental sources. They are presented in the sections 4.3 to 4.5.

4.3 House Noise Reduction

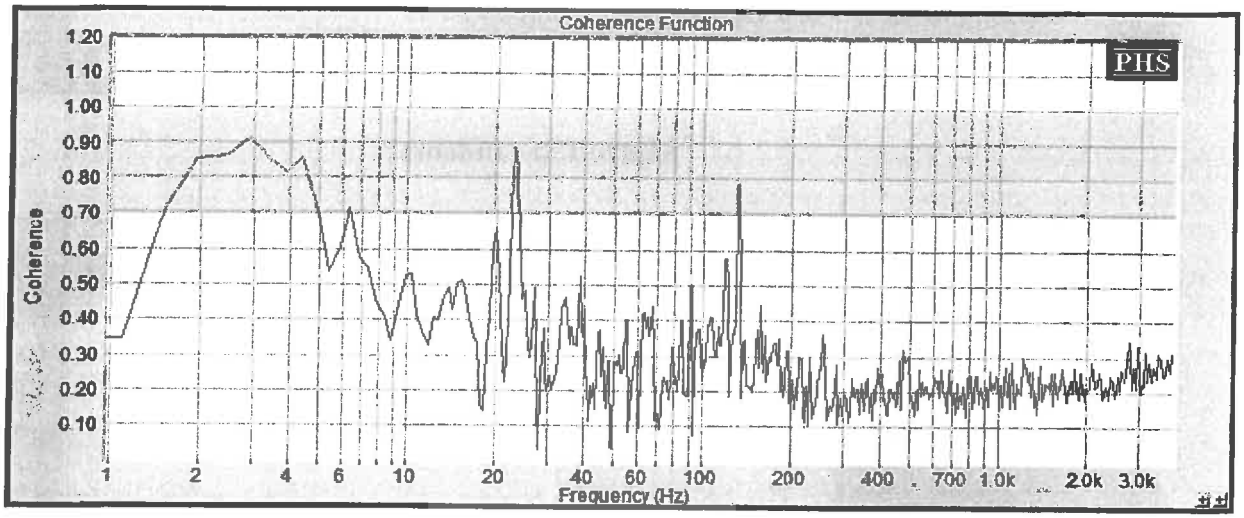
Field testing was conducted general accordance with the applicable ANSI Standards; ANSI Standards S12.18-1994 (Procedures for Outdoor Measurement of Sound Pressure Level, Method 1) and S12.9-1993/Part 3 (Procedures for Short-Term Measurements with an Observer Present) and ASTM E996-02 [24]. Measurements were made with the NOTUS wind turbine operating with hub height wind speeds averaging about 20 m/s. A simultaneous dual-channel analysis was performed using two precision condenser microphones; one located inside (master bedroom) and another outside (lawn well clear of house and trees). The one-minute time-averaged transfer function analyses are shown on **Figures 14a and 14b**, FFT and octave band, respectively.

[24] "Standard Guide for Field Measurements of Airborne Sound Insulation of Building Facades and Facade Elements", ASTM Designation: E 966 – 02. Definition: outdoor-indoor level reduction, OILR—in a specified frequency band, the difference between the time-averaged exterior sound pressure and the space-time average sound pressure in a room of a building.

signals (**Figure 16**). Coherence is the ratio of the squared magnitude of the cross-spectrum and the product of the auto-spectrum of both channels. It measures the *degree of linearity* between the channels and is analogous to the squared correlation coefficient used in statistics. Two perfectly coherent signals have a coherence value of 1.0. A coherence value of 0.7 or more (highlighted below) was considered for this analysis as indicative of strong acoustic coupling, the acoustic energy *indoors* highly correlated to the acoustic energy *outdoors*.

Figure 16- Coherence, Outdoors to Indoors

(April 18, 2011, 3:22 pm)



The coherence values indicate that the very-low-frequency energy found below 10 Hz was very-strongly coupled into the house interior, consistent with the indoors pressure amplification noted in section 4.3. This suggests a "whole-house" *cavity response* of the interior house volume. The 22.9 Hz and 129 Hz tones were also strongly coupled outdoors to indoors.

4.5 Dynamic Amplitude Modulation

Wind turbine noise presents a characteristic that distinguishes it from ambient noise; dynamic amplitude modulation. The process of amplitude modulation is familiar to those who understand the fundamentals of AM radio broadcasts. In amplitude modulation (AM), a carrier wave's amplitude is modulated by a lower-frequency signal (**Figure 17**). The frequency of the carrier wave remains unaltered but its amplitude is caused to vary by an amount proportional to the amplitude of low frequency signal and at the rate proportional to the frequency of the signal and the modulated wave obtained.

Figure 15 – Sound pressure, NOTUS ON (4/18/11)

Figure 15a - Outdoors

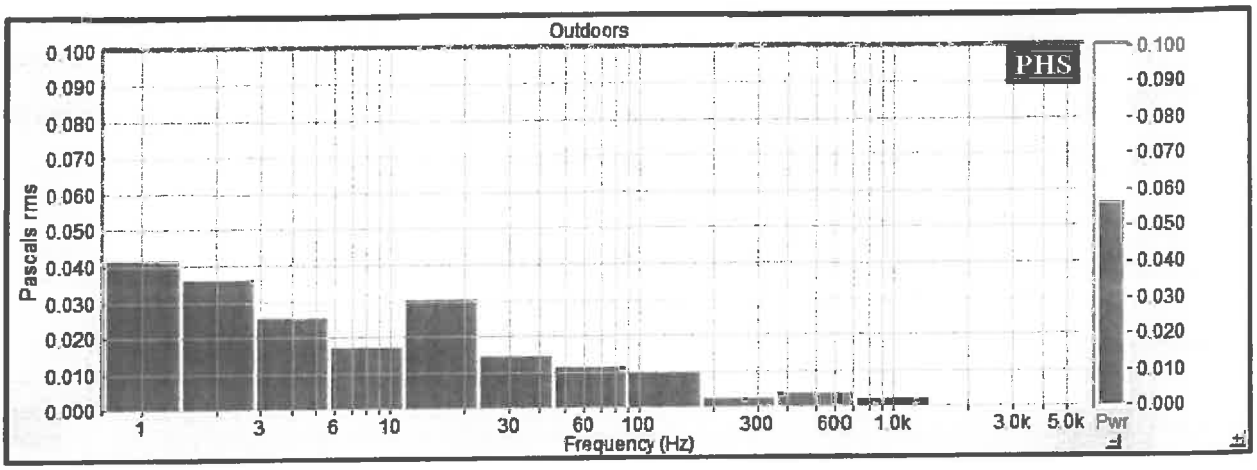
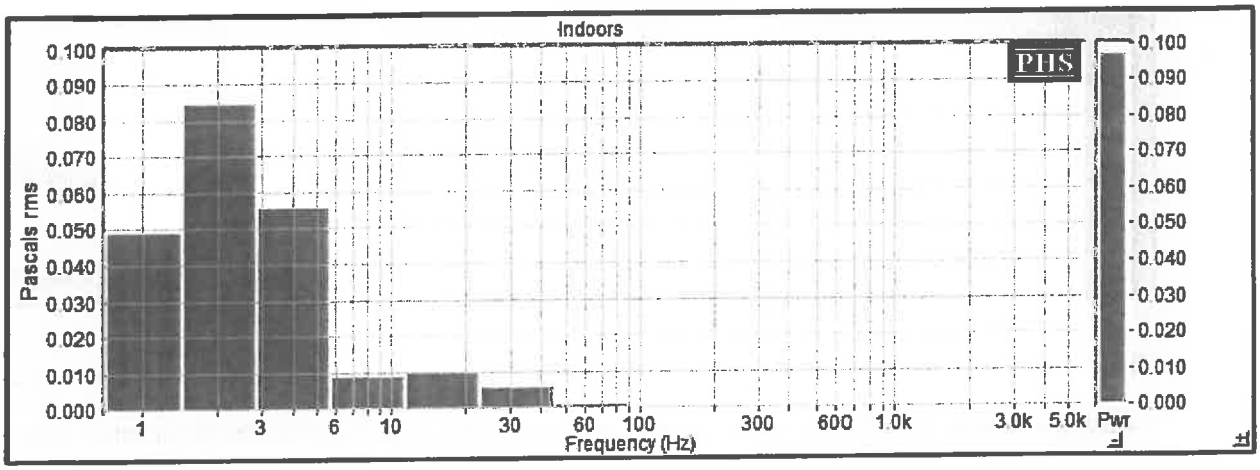


Figure 15b - Indoors



4.4 Acoustic Coupling to Home Interior

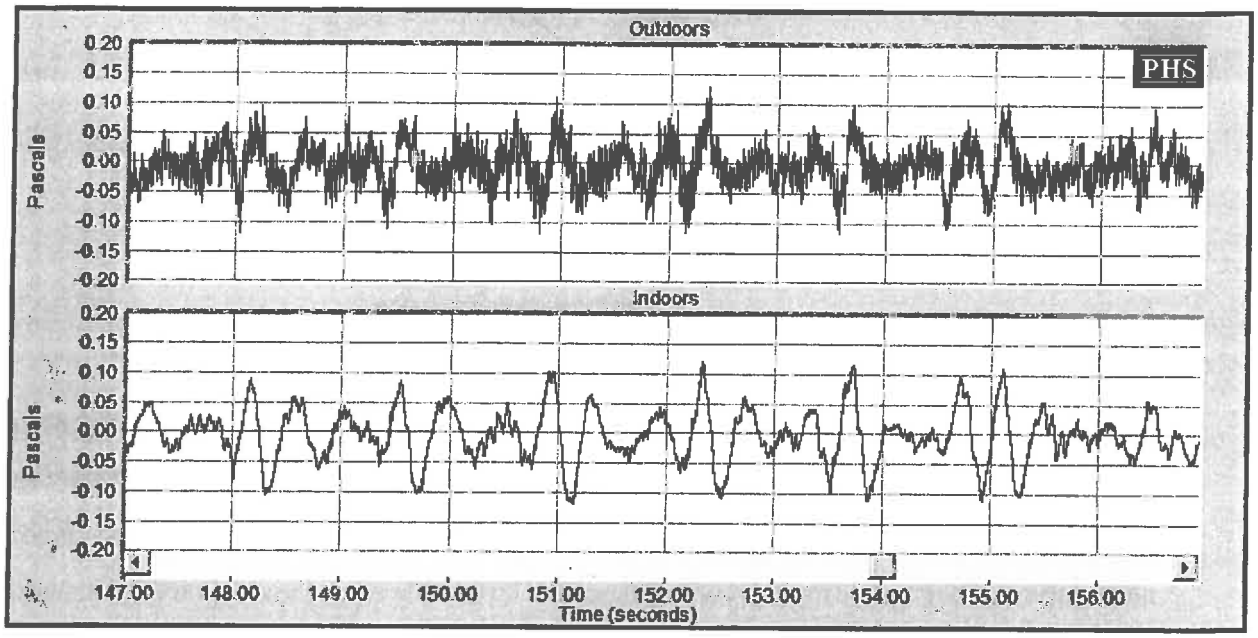
"It's like living inside a drum".

This comment has surfaced several times during wind turbine facility investigations. Is the wind turbine acoustic signature acting like a drum stick striking on the house-as-drum? Is the acoustic energy outside coupled into the interior space? To evaluate what acoustic energy emitted by the wind turbine was coupled into the house interior, a coherence analysis was conducted from a series of averaged frequency-amplitude measurements of the outdoor and indoor microphone

characteristic "swish" sounds. The "Indoors" graph shows the house-envelope-filtered-and-amplified very-low frequency content of the wind turbine sound. What is apparent is that the negative pressure swings (vacuum) are more pronounced indoors compared to outdoors.

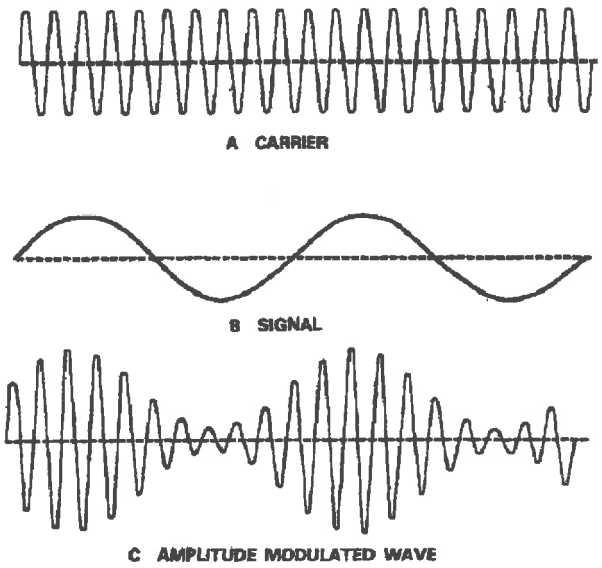
Figure 18 -Acoustic pressure fluctuation time-history

(Outdoors and indoors; April 18, 2011, 3:22 pm)



Despite the apparent increase in energy indoors, the wind turbine was almost inaudible indoors. The house envelope blocked most of the frequency content above 10 Hz, and amplified the remaining low frequency pulsations, *much like a drum*. The acoustic pressure swung from positive (compressed) to negative (rarified) 0.2 Pa peak-to-peak. As shown in the composite dual time history in **Figure 19**, the infrasonic AM signature was absent when the NOTUS was OFF.

Figure 17 - AM modulation



In AM radio, we do not hear the modulated broadcast carrier. For example, a medium-wave AM radio transmission uses a carrier frequency in the 520-1610 kHz radio frequency band which is beyond the range of human hearing. In contrast, the carrier signal for wind turbines is for the most part audible; and complex, consisting of the collective modal and aerodynamic acoustic emissions radiated by the wind turbine; *some in the infrasonic range, some in the audible acoustic range.* The "signal" consists of the dynamic sound pressure modulations recurring at the blade pass rate.

There are several acoustic components experiencing dynamic modulation at the blade pass rate; among these, very-low-frequency blade bending and twisting modes interacting with turbulence; vortex shedding off the end of the blades (interrupted or slapping against the wind turbine mast); dynamic stall along the blades (influenced by cyclical and abrupt variations of wind vectors along the blades); the in-flow turbulence (below 20 Hz for the large units- peak frequency dependent on blade length, affected by blade position during rotation through turbulent layers); gear and generator tones rising and falling with wind load and radiated by the mast and blades.

A sample time history "strip chart" in **Figure 18** shows the primary dynamic modulation at the blade pass frequency is clearly visible every 1.4 seconds. The modulation repeats but is not sinusoidal. Peaks and dips occur suddenly with rise and fall times exceeding 10 dB per second. The "Outdoors" graph shows the higher frequency details associated with the wind turbine's

Figure 20 –Outdoors sound levels, NOTUS ON (4/18/11)

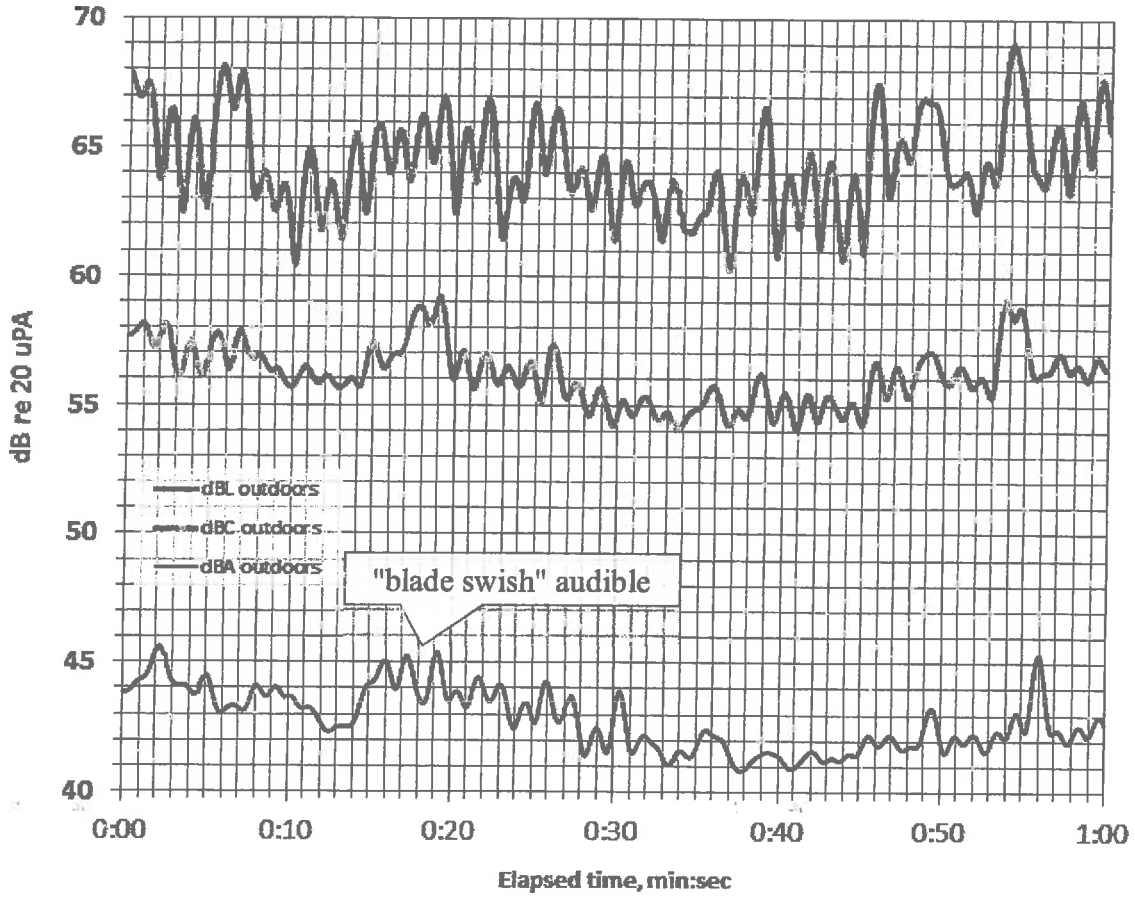


Figure 21 - Acoustic pressure fluctuation time-history

(Indoors versus outdoors; April 18, 2011, 3:22 pm)

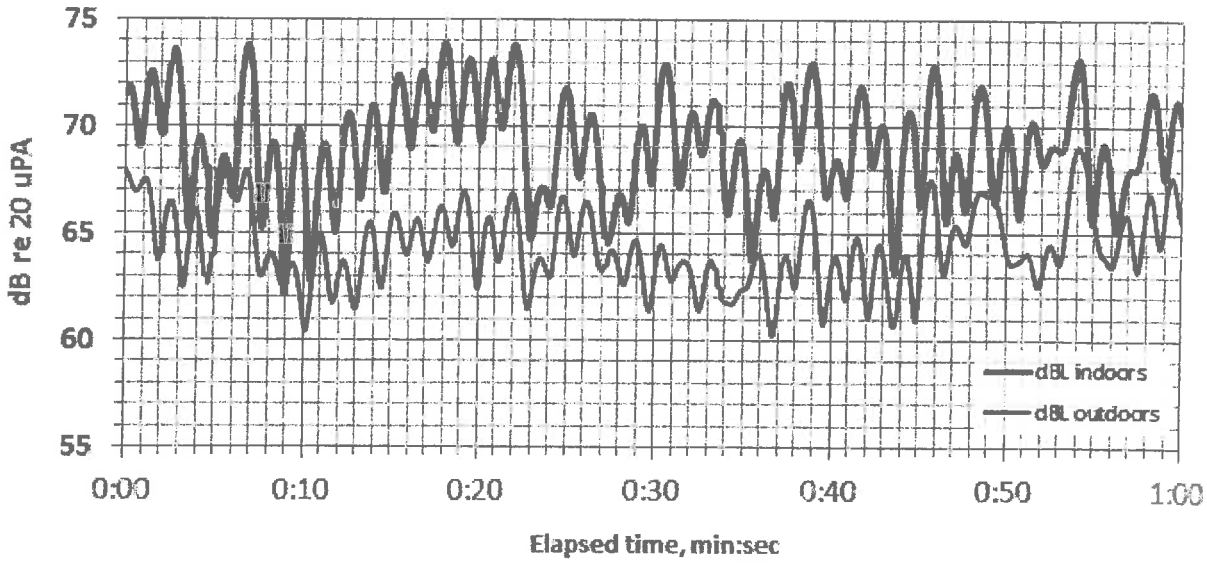
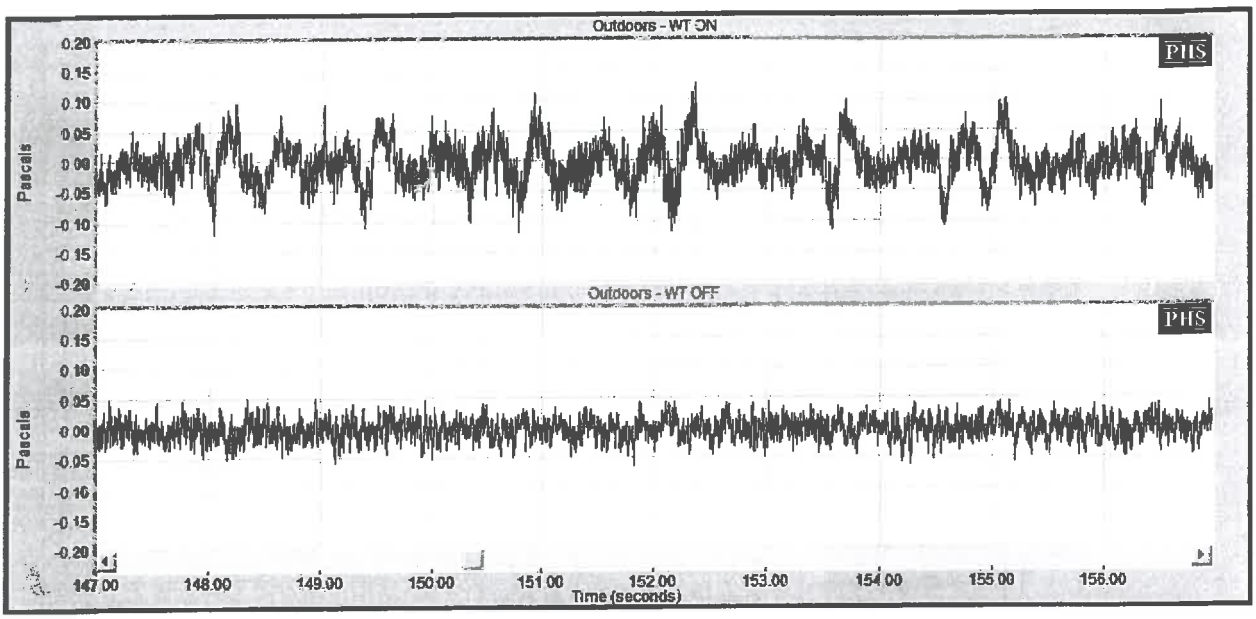


Figure 19 – Outdoors, linear sound pressure, NOTUS ON (4/18/11) and OFF (4/19/11)



The infrasonic and low-frequency pulsations are *hidden* by the A-weighting filtering normally used by noise consultants to assess noise *levels*; yet, these pulsations are clearly visible in the linear, un-weighted time history in Pascal (Figures 18, 19). Pressure pulsations are even more evident in the *indoors* record in Figure 10, which is almost entirely composed of the "signal" dynamic amplitude modulation of the "carrier" wind turbine acoustic emissions below 10 Hz. A-weighting, then, serves to hide a large portion of the wind turbine acoustic emissions; the dynamically modulated sound pressures below 100 Hz.

Our instrumentation reported the Crest Factor at 11-12 dB outdoors and indoors. This suggests that **the RMS measurements reported on our graphs are well below the peak levels detectable by the human ear.**

The C- and A-weighted levels were compared to the un-weighted linear (dBL) sound level and shown in **Figure 20** below. Occasionally in this record, we heard the audible modulation of the upper-frequency "swish" sounds, which show up in the dBA record. However those were relatively small compared to the repetitive amplitude modulations in the linear sound pressure record which occur below 20 Hz. While the dBA and even the dBC filtered levels reveal little of the underlying "signal" from the NOTUS wind turbine, the linear sound level (dBL) contains the entire sound pressure signature, and clearly shows the extent of the variations in sound pressure. This is even more evident indoors, as shown in **Figure 21** below.

5 CONCLUSIONS

5.1 Noise and Pressure Pulsations

The acoustic energy from the wind turbine was found to be:

1) Greater than or uniquely distinguishable from the ambient background levels, and
2) Capable of exceeding human detection thresholds.

This research revealed dynamically modulated low frequency and infrasonic energy from the nearby wind turbine occurring at the blade pass rate; energy which was found to be amplified indoors below 10 Hz. These dynamic infrasonic modulations were absent when the wind turbine was off. The wind turbine has tonal energy at 22.9 and 129 Hz. The wind turbine acoustic emissions were strongly coupled to the indoor environment at very low infrasonic pulsations and at the 22.9 and 129 Hz tones.

The dBA levels were inversely correlated to adverse health effects experienced; effects were more severe indoors where dBA levels were much lower (around 20 dBA). However the dBL (un-weighted) and dBG (infrasonic-weighting) levels were more strongly modulated indoors. This increase in modulation indoors was consistent with the stronger adverse health effects indoors. The increase in total sound pressure indoors appears related to a "whole-house" cavity response; the outside pressure pulsations exciting the interior acoustic pressure much like a stick hitting a drum. Especially, the degree of negative pressure increased significantly indoors compared to outdoors.

5.2 Adverse Health Effects

This research revealed that persons without a pre-existing sleep deprivation condition, not tied to the location nor invested in the property, can experience within a few minutes the same debilitating health effects described and testified to by neighbors living near the wind turbines.

The debilitating health effects were judged to be visceral (proceeding from instinct, not intellect) and related to as yet unidentified discordant physical inputs or stimulation to the vestibular system.

The dBG levels indoors were dynamically modulated at the blade pass rate and tonal frequencies and exceeded the vestibular physiological threshold guideline of 60 dBG provided by Dr. Salt.

The house amplification (the inaudible yet pervasive sound pressure "drum-beat") is clearly evident again in Figure 13, with increases of 2 to 6 dB, outdoors to indoors.

4.6 Pressure Pulsation Exposure and Dose-Response

It is generally accepted that human response and cumulative effects increase with the quantity and the peak level of intrusive noises. Peak noise events are additive. The relative impact of noise level and number on human reactions is measured by the decibel equivalent number effect (k) expressed as the number of decibels which have an effect equivalent to that of a tenfold increase in number of events [25]; 10log(n), where n is the number of events.

We experienced onset of adverse health effects shortly after starting our work indoors. Over the first fifteen minutes at 1.4 seconds blade pass rate, we estimate that we were subjected to a repetitive exposure of 642 peak pressure events. Over each hour we were exposed to an estimated 2571 pressure events. Over a period of five hours on the first day during the highest winds when we were most severely affected, we estimate that we were exposed to over 12,800 blade pass peak pressure events. Of those pressure pulsations, we estimate that well over fifty percent exceeded the 60 dBG threshold (from Salt).

The occurrence of pressure events at 22.9 Hz is much greater. Over a five-hour period, some 412,200 pressure events would have occurred 43 milliseconds apart, and we estimate that 1/2, or some 200,000 of those would have entered the ear (inaudibly to the IHC circuitry), then they would have been detected and processed by the OHC circuitry, repeatedly and rapidly changing gain on the IHC circuitry.

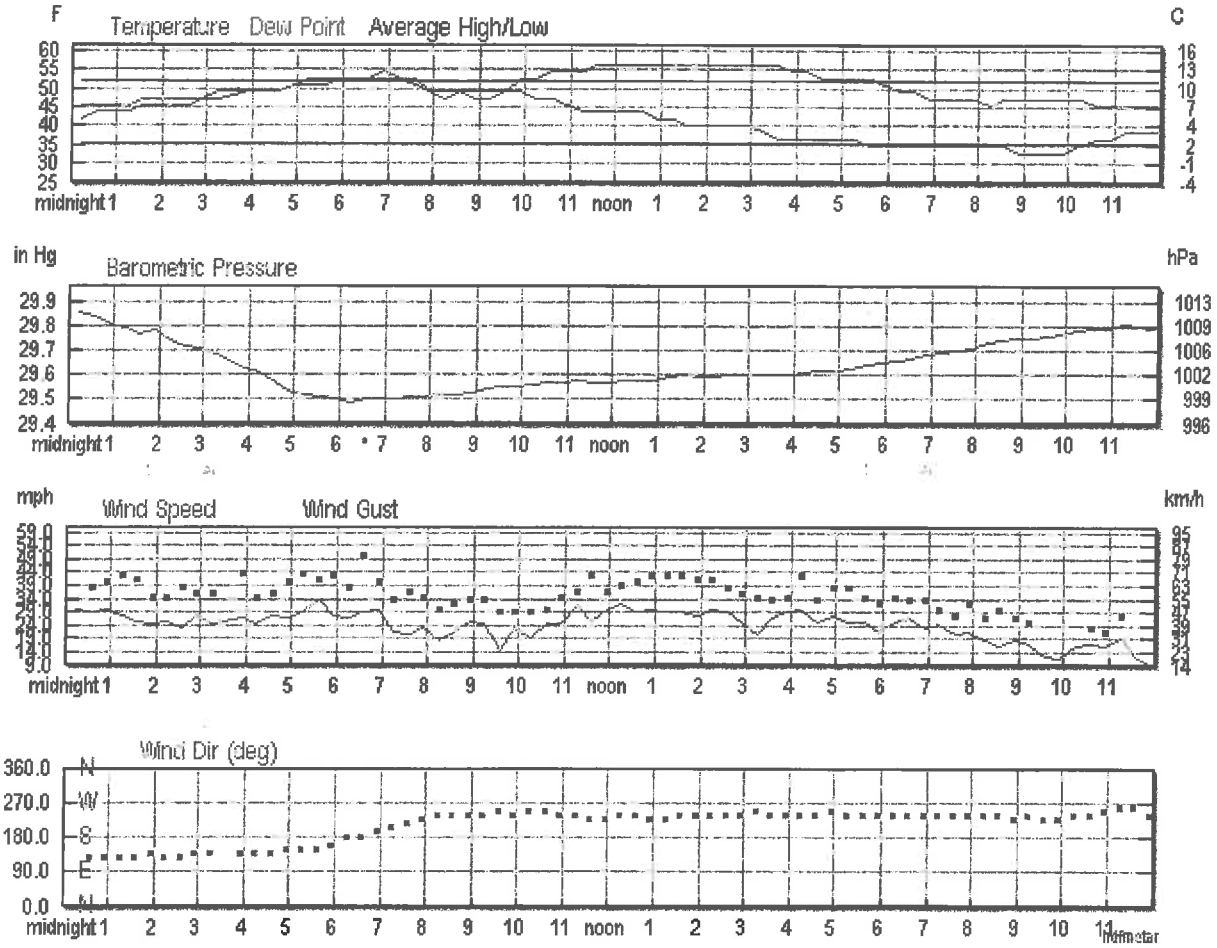
We would not automatically assign a conventional dose-response relationship to these low frequency inaudible pressure events compared with the health effects from nuisance and annoyance as commonly associated with *audible* sound events. However, we experienced vestibular impact or conflict which ramped up over time (within twenty minutes) and took time to dissipate (hours to days or more). The time to onset and recovery suggest that dose-response is involved with these pressure events.

[25] Fields, J., The effect of numbers of noise events on people's reactions to noise: An analysis of existing survey data. J. Acoust. Soc. Am. Volume 75, Issue 2, pp. 447-467 (1984).

Attachment A

Weather Conditions
April 17, 2011

Otis Air National Guard Base
Falmouth, Massachusetts



Health effects moderated when dBG levels fell well below the 60 dBG guideline when the wind turbine was OFF.

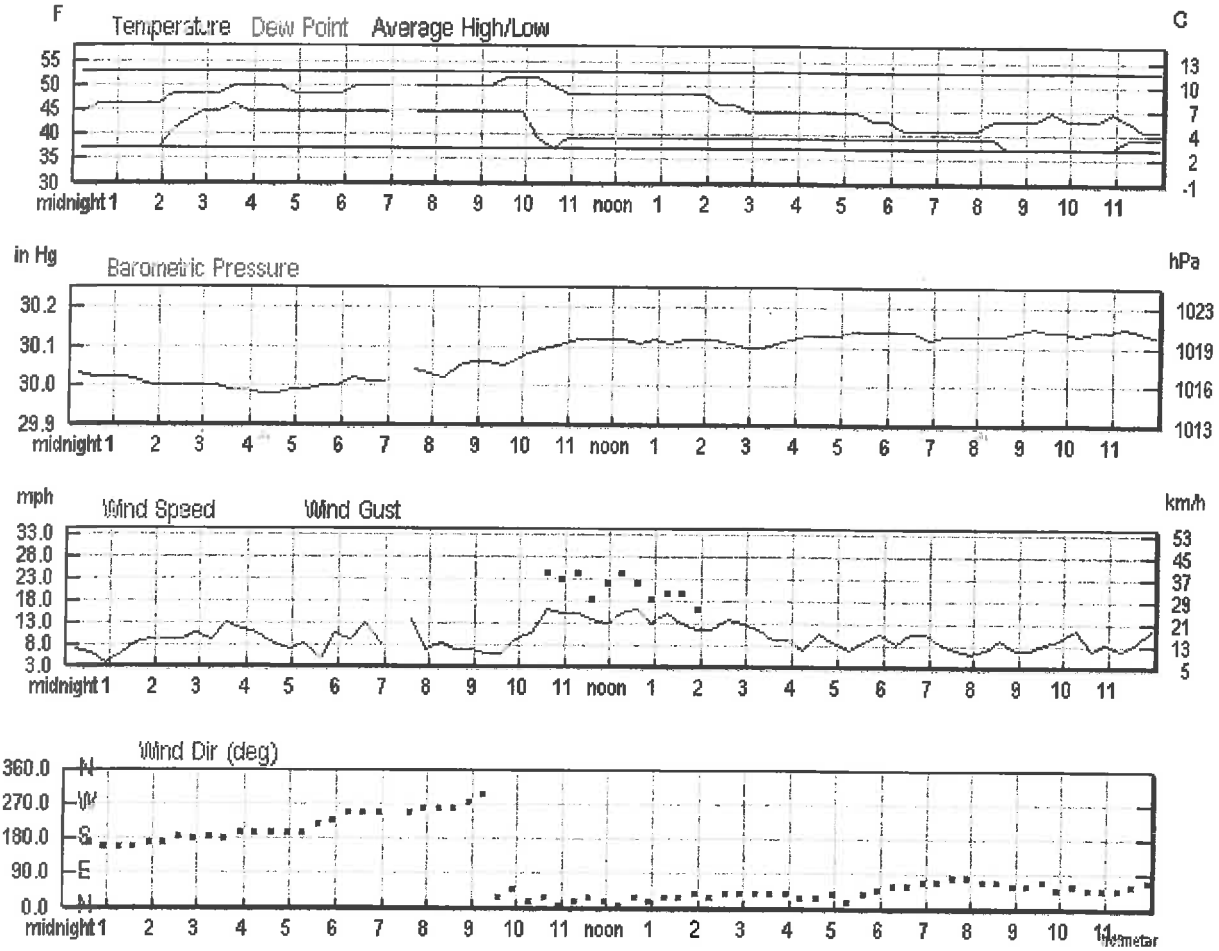
Wind turbine tonal energy at 22.9 Hz lies in the brain's "Beta" range which is associated with alert mental activity and anxiety; antithetical to sleep. The dynamic 0.7 Hz modulations of in-flow turbulence and tonal energy lie in the deep Delta range associated with deep sleep. Clinical evidence of frequency following response (FFR) in the brain suggests that entrainment with wind turbine modulations, pulsations and tones may pose conflict for the brain's natural rhythms, leading to stress when the conflicting signals (the wind turbine) cannot be turned off. Other physiological mechanisms may be in play. Medical epidemiological field and laboratory investigation is needed.

The study confirms that large industrial wind turbines can produce real and adverse health impacts and suggests that this is due to acoustic pressure pulsations, not related to the audible frequency spectrum, by affecting the vestibular system especially at low ambient sound levels. The study results emphasize the need for epidemiological and laboratory research by medical health professionals and acousticians concerned with public health and well-being. This study underscores the need for more effective and precautionary setback distances for industrial wind turbines. It is especially important to include a margin of safety sufficient to prevent inaudible low-frequency wind turbine noise from being detected by the human vestibular system.

Attachment C

Weather Conditions
April 19, 2011

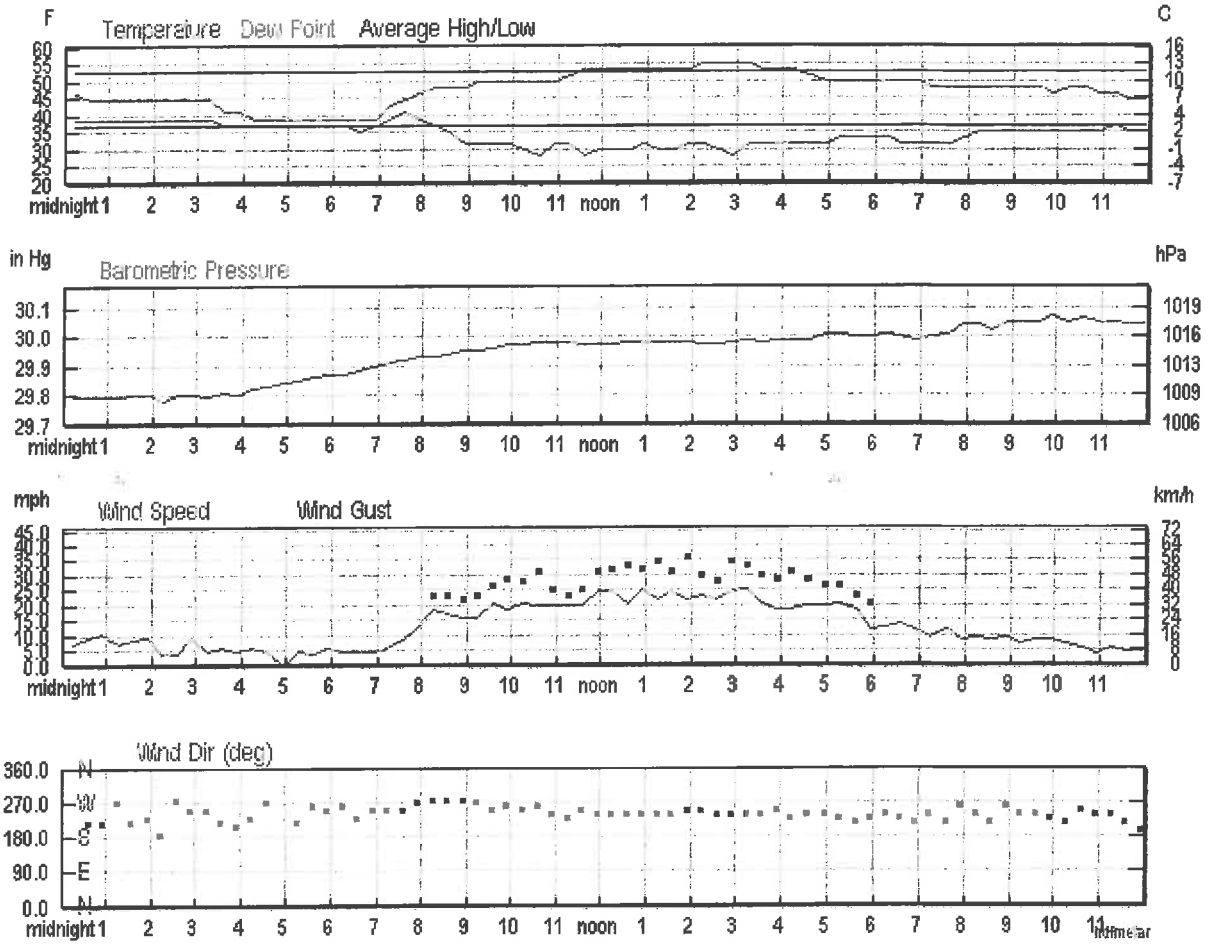
Otis Air National Guard Base
Falmouth, Massachusetts



Attachment B

Weather Conditions
April 18, 2011

Otis Air National Guard Base
Falmouth, Massachusetts

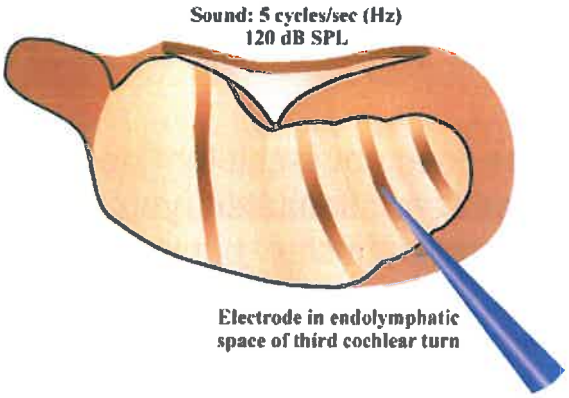


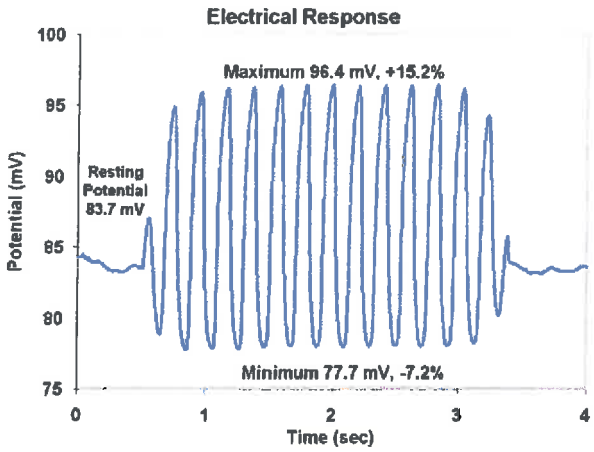
Wind Turbines can be Hazardous to Human Health

Alec N. Salt, Ph.D., Cochlear Fluids Research Laboratory, Washington University in St. Louis.

Updated 4/2/2014. To keep this as readable as possible I have not included reference citations. They are typically available in our publications.

Large wind turbines generate very low frequency sounds and infrasound (below 20 Hz) when the wind driving them is turbulent. The amount of infrasound depends on many factors, including the turbine manufacturer, wind speed, power output, local topography, and the presence of nearby turbines (increasing when the wake from one turbine enters the blades of another). **The infrasound cannot be heard and is unrelated to the loudness of the sound that you hear.** Infrasound can only be measured with a sound level meter capable of detecting it (and not using the A-weighted scale). Video cameras and other recording devices are not sensitive to infrasound and do not reproduce it.





You cannot hear the infrasound at the levels generated by wind turbines, but your ears certainly detect and respond to it. The picture shows the **enormous** electrical potentials that infrasounds generate in the ear. The potentials (18.7 mV pk/pk amplitude in this case) are about 4 times the amplitude of sounds in the normal frequency range that are heard. **These measurements show that the low frequency part of the ear is extremely sensitive to infrasound.**

Our measurements show the ear is most sensitive to infrasound when other, audible sounds are at low levels or absent. That is why **homes** and **pillows** probably contribute to the problem. To clarify, maximum stimulation of the ear with infrasound will occur inside your home, because the audible sound of the turbines is blocked by the walls of the house, but infrasound readily passes through any tiny openings. Similarly, sleeping with one ear on a pillow will block audible sound to that ear but will not block the infrasound. In either case, the infrasound will be strongly stimulating the ear even though you will not be able to hear it. The presence of sounds at higher frequencies, in the 150 Hz – 1500 Hz range at levels above 60 dB SPL, suppresses the ear's response to infrasound. It may be possible to mask the influence of infrasound with other noises but the frequency properties of the masking noise must be considered. Frequencies above about 1500 Hz will not do

anything to help.

We know that the ear is being stimulated by this sound, but why would that matter if you cannot hear it?

There are several ways that infrasound could affect you even though you cannot hear it. They are:

1. **Causing Amplitude Modulation (pulsation) of heard sounds.**
   We know that infrasound affects the sensory cells of the ear in a way that changes their sensitivity (like turning the volume control of the stereo up and down repeatedly). This is a biological form of amplitude modulation that **cannot be measured with a sound level meter.** The people who are measuring amplitude modulation of heard sounds with sound meters are looking at something completely different. Biological amplitude modulation can be much more powerful, with the volume cycling from going from "off" to "full", rather than just changing a few dB. So, to investigate amplitude modulation without considering the infrasound-induced component is probably not going to explain the true nature of the problem.
   Symptoms: Pulsation, annoyance, stress

2. **Stimulating "subconscious" pathways.**
   We know that activity in many nerves of the ear does not result in "hearing". If the nerves from the utricle or semi-circular canals are stimulated, you may get eye movements and changes in tension of neck muscles, but you don't hear it. The pathway of conscious hearing is very well established. It goes from the inner hair cells of the cochlea, through type I auditory nerve fibers, to the fusiform cells of the cochlear nucleus in the brain, and so on. This pathway has been well-studied. The outer hair cells of the ear (the ones that are sensitive to infrasound) do not connect to this conscious pathway. They connect to the type II nerves (which make up 5% of the nerve fibers), then to granule cells in the brain, then to cartwheel cells and to a host of other pathways in the brain. The cartwheel cells are known to be inhibitory to hearing which may explain why the stimulation is not heard. It is known that granule cells are connected into circuits related to attention and alerting. It is not unreasonable to think that stimulation of this pathway could wake you up, and you wouldn't even hear what had actually woken you.
   Symptoms: Sleep disturbance, panic, with chronic sleep deprivation leading to blood pressure elevation, memory dysfunction and more.

3. **Causing Endolymphatic Hydrops.**
   The endolymph is a fluid filled compartment in the ear, like a balloon, surrounded by delicate membranes. In some conditions, such as in people with Meniere's disease, a swelling of this compartment occurs. These patients suffer from repeated vertigo spells, fluctuating low frequency hearing loss, tinnitus and a sensation of fullness or pressure in the ear. Low frequency sounds, at levels that are not damaging and do not affect hearing,

have been shown to cause endolymphatic hydrops. This can occur quickly, but also recovers quickly so there are minimal consequences. This effect has been demonstrated with tones as low as 50 Hz, but has never been studied with lower sound frequencies or with infrasound. There is no reason to believe that lower frequency sounds will not generate hydrops, as we know that endolymphatic responses to infrasound are larger than those to heard sounds. As hydrops develops, endolymph moves and expands the weakest part of the balloon, which is the saccule. The saccule is the body's gravity receptor, so if it is disturbed you will feel "off balance", dizzy (subjective vertigo) and nauseaous, especially if only one ear is affected (maybe the one you had on the pillow?- see above). Studies so far have only studied this for brief exposures of a few minutes. Effects are likely to increase with prolonged exposure to the sound. Furthermore, when the endolymphatic hydrops reaches a degree where the helicotrema of the cochlea is occluded, this makes the ear about 20 dB more sensitive to the low frequency sound and will undoubtedly exacerbate the problem.
Symptoms: Unsteadiness, dysequilibrium, vertigo, nausea, "seasickness", tinnitus, sensation of pressure or fullness in the ear

4. **Possibly Potentiating Noise-Induced Hearing Loss**
Animals were exposed to damaging noise, with and without low frequency sound present. When very low frequency sound was present, animals had greater hearing losses and larger areas of hair cell loss. So, if you are doing anything noisy (mowing the yard, using a chainsaw) the damage to your ears could be greater if low frequency or infrasound levels are high. It is therefore important to wear hearing protection when pursuing noisy pastimes near sources of infrasound (that you can't even hear). As a side-note, hearing protectors, especially the over-the-ear cup type, will not protect against infrasound even though they do reduce the audible, damaging sounds you can hear.

Each of the above mechanisms is based on published data showing the phenomenon exists, thus making it a scientifically plausible process. No one has shown that any of these four mechanisms cannot occur. However, the degree to which each phenomenon occurs in humans following prolonged exposure to the infrasound from wind turbines has not yet been demonstrated. But each now needs to be studied in more detail. The potential symptoms they could generate in people seem quite familiar though.

The Wind Turbine Industry is generally dismissive of claims that wind turbines can affect human health. For example, Scott Smith, vice president of policy for CanWEA (the Canadian Wind Energy Association), referring to the report of the Chatham-Kent Tribunal (Spring 2011) stated "The wind energy industry welcomes the tribunal's decision, as it is consistent with the balance of expert scientific and medical information which clearly **indicates there is no direct link between wind turbines and effects on human health**" *(my emphasis added)*.

This dismissive statement fails to recognize a conclusion of the Chatham-Kent tribunal, specifically "*This case has successfully shown that the debate should not be simplified to one about whether wind turbines can cause harm to humans. The evidence presented to the Tribunal demonstrates that they can, if facilities are placed too close to residents. The debate has now evolved to one of degree.*"

We agree that the effects of wind turbine noise on humans are largely unexplored and more research is needed. We are convinced that infrasound levels generated by some large wind turbines are unusual in the environment and that there have been no systematic long-term studies of prolonged exposure to such sounds on humans or other animals.

The wind industry has taken the position that if you cannot hear the infrasound, then it cannot affect you. As you can see above, we disagree strongly based on our understanding of how the ear works. These web pages consider in more detail some of the areas that we have expertise.

Publications:

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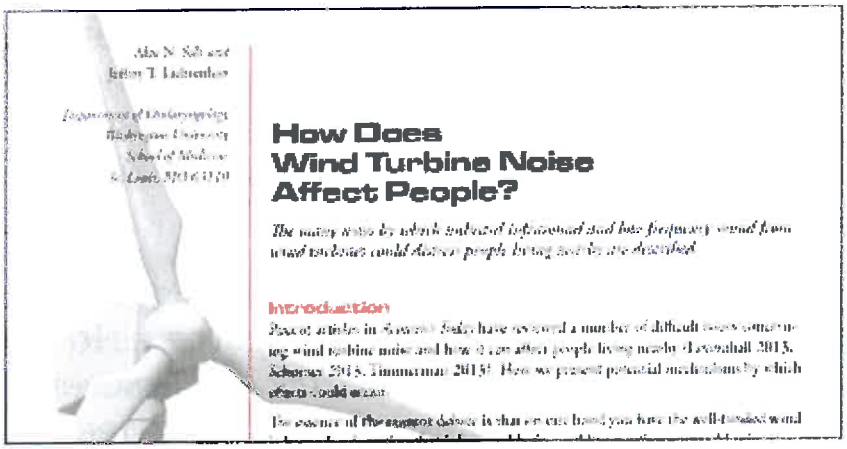
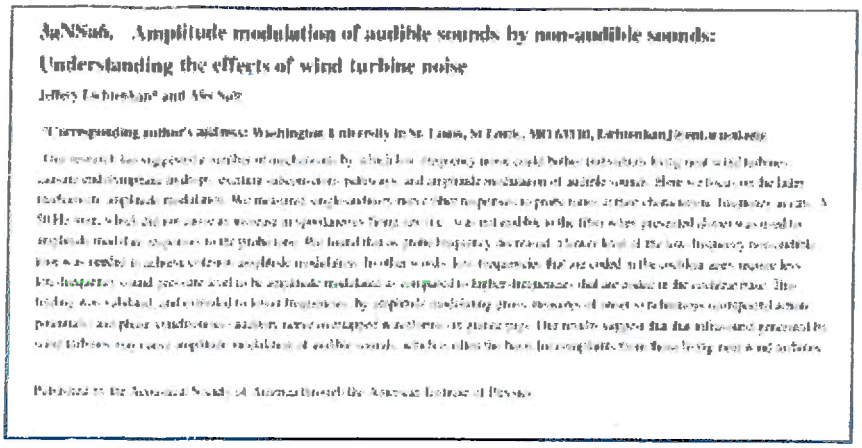


How Does Wind Turbine Noise Affect People?

Introduction

Acoustics Today 2014: The Magazine made many typographical errors in our paper Click for the complete manuscript



3aNSa6. Amplitude modulation of audible sounds by non-audible sounds: Understanding the effects of wind turbine noise

Jeffery Lichtenhan* and Alec Salt*

*Corresponding author's address: Washington University in St. Louis, St Louis, MO 63110, lichtenhanj@ent.wustl.edu

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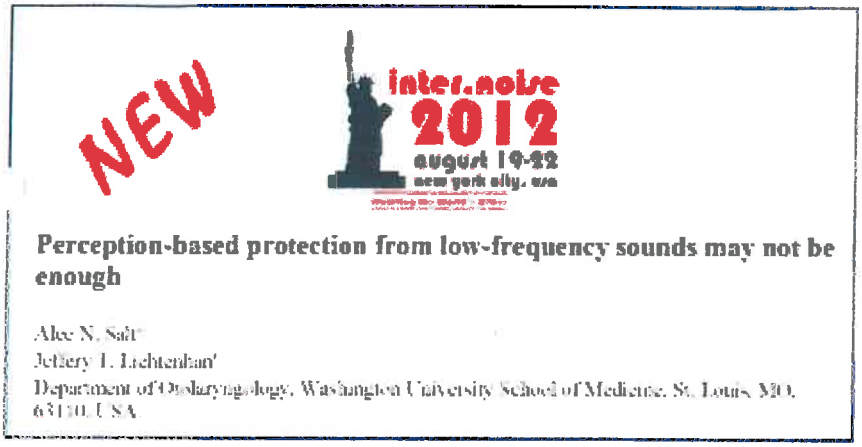

NEW

inter.noise 2012 august 19-22 new york city, usa

Perception-based protection from low-frequency sounds may not be enough

Alec N. Salt[1]
Jeffery T. Lichtenhan[1]
Department of Otolaryngology, Washington University School of Medicine, St. Louis, MO, 63130, USA

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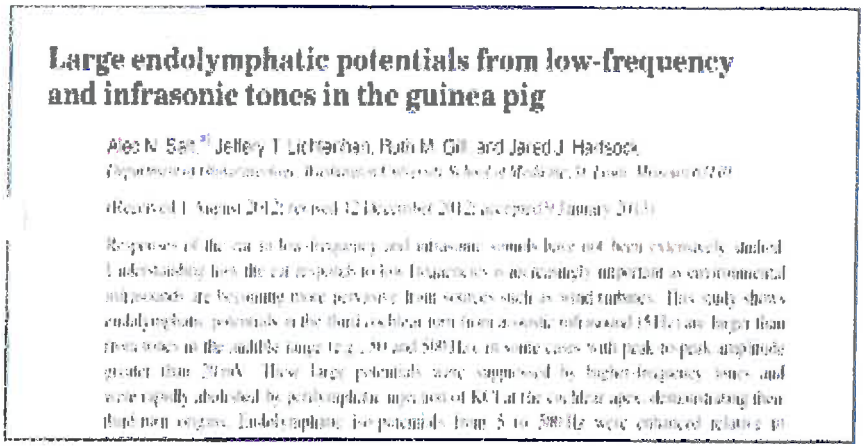
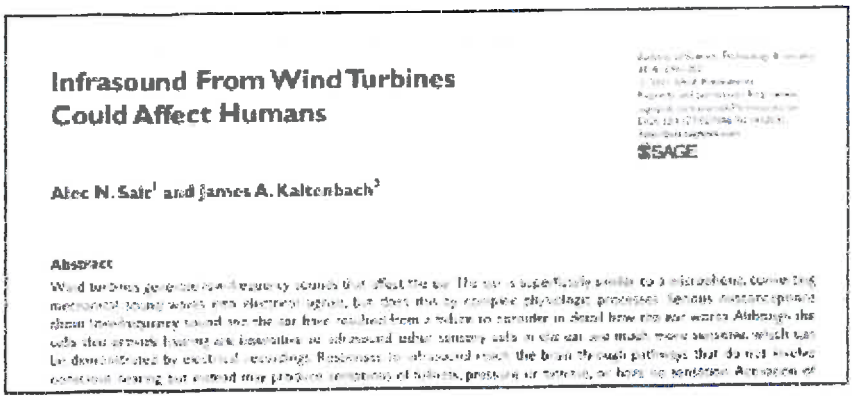


Large endolymphatic potentials from low-frequency and infrasonic tones in the guinea pig

Alec N. Salt,[a] Jeffery T. Lichtenhan, Ruth M. Gill, and Jared J. Hartsock

(Received 11 August 2012; revised 12 December 2012; accepted 9 January 2013)

Journal of the Acoustical Society of America



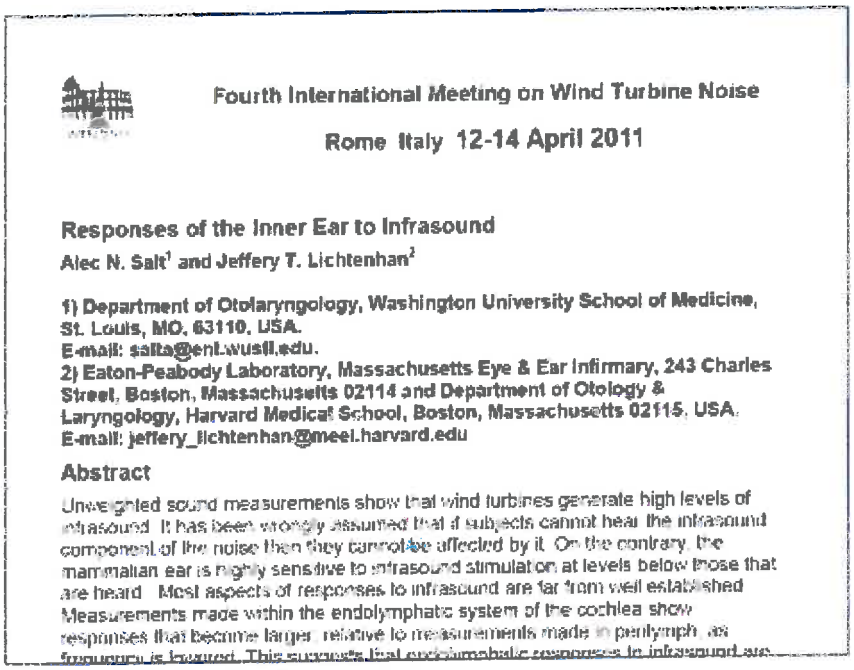
Infrasound From Wind Turbines Could Affect Humans

SAGE

Alec N. Salt[1] and James A. Kaltenbach[2]

Abstract

Click for full paper



Fourth International Meeting on Wind Turbine Noise

Rome Italy 12-14 April 2011

Responses of the Inner Ear to Infrasound

Alec N. Salt[1] and Jeffery T. Lichtenhan[2]

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Abstract

Unweighted sound measurements show that wind turbines generate high levels of infrasound. It has been wrongly assumed that if subjects cannot hear the infrasound component of the noise then they cannot be affected by it. On the contrary, the mammalian ear is highly sensitive to infrasound stimulation at levels below those that are heard. Most aspects of responses to infrasound are far from well established. Measurements made within the endolymphatic system of the cochlea show responses that become larger, relative to measurements made in perilymph, as frequency is lowered. This suggests that endolymphatic responses to infrasound are

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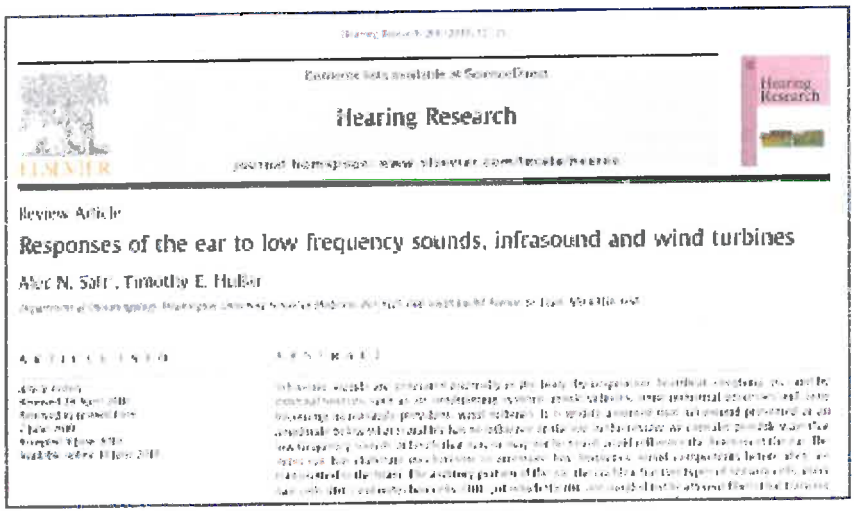


Hearing Research

Review Article

Responses of the ear to low frequency sounds, infrasound and wind turbines

Alec N. Salt, Timothy E. Hullar

Specific Issues Considered:

- Industrial Wind Turbines Generate

Infrasound.

- The Ear Detects Infrasound at Levels that are not Heard

Infrasounds you Cannot Hear **Can** Affect you.

- Why A-weighted Wind Turbine Sound Measurements are Misleading.

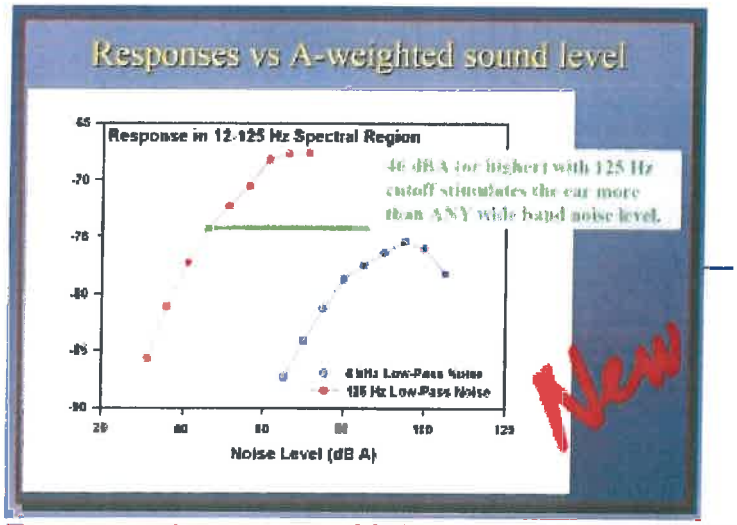
- Why it is Difficult to Demonstrate the Infrasound Generated by Wind Turbines

- 550 Meter (or lower) Setbacks are Insane !

Links to presentations and other articles

- Interview (30 mins) on Goldhawk Fights Back, Zoomer Radio AM 740 Toronto, Canada, Sept 18th, 2012

- Interview (~ 20 mins) on Wind Wise Radio (www.windwiseradio.org), August 26th, 2012



Presentation to InterNoise 2012, August 20th, 2012

- Presentation to Washington University Department of Otolaryngology, May 6th, 2011

- "Infrasound, the Inner Ear and Wind Turbines" - presentation to the Arkansas Academy of Audiology (ARAA), Eureka Springs AK, April 29th, 2011

- "Can Wind Turbines be Bad for you? " - presentation to Boston University Hearing Research Center, April 22nd, 2011

- "Responses of the Inner Ear to Infrasound" - presentation to the Wind Turbine Noise Conference, Rome, April 11-14, 2011

- Abstract of presentation for Wind Turbine Noise Conference, Rome, April 11-14, 2011

- Abstract of Association for Research In Otolaryngology Presentation, Feb 20, 2011

- View the poster presented at the ARO meeting

- Radio Interview about Wind Turbines and Infrasound with Dale Goldhawk, Zoomer Radio AM 740 Toronto, Nov 3, 2010

- First International Symposium, THE GLOBAL WIND INDUSTRY AND ADVERSE HEALTH EFFECTS, Picton Ontario, October 29-31, 2010

- NIDCD Website: Scientist Challenges the Conventional Wisdom That What You Can't Hear Won't Hurt You

- Overview of our original paper "Responses of the Ear to Infrasound and Wind Turbines"

- Radio Health Journal: Wind Farms: Is there a Health hazard? Interview with Reed Pence, August 1, 2010

- Alec Salt - Conflict of Interest Statement

Buy your own infrasound detection system - $295 from Infiltec

* Attachment - H.Omitu

Project Freedom Network

DEADLY SILENCE

Have ultra-low frequency infrasound weapons been used on you?

by Fergus Day

From an article in the X Factor Issue 76 .

What if there was a weapon whose effects you couldn't see or hear, but could kill you from a distance of hundreds of metres?

Fergus Day assesses the disturbing potential of infrasound.

Picture the scenario. You're walking through a busy city street when a disturbance breaks out. Suddenly, you're engulfed by a mass of heaving bodies. You struggle to escape, but find your way blocked at every turn. Amid the chaos, you hear the sound of approaching police sirens. When the officers arrive, however, they are not carrying the usual riot shields and batons; they have only what look like large speakers, held out at arms length Suddenly, you feel as if you cannot breathe; your head is pounding as you stumble to your knees. Overcome by nausea, you try to get up, but are engulfed by a feeling of intense anxiety and cannot move. As you lie there, vomiting uncontrollably, those around you are dropping like flies. In the end, the entire crowd is writhing in agony as the police wade in to make arrests. In the aftermath of your ordeal, you recover completely, but one question remains: what caused the devastating physical effects you experienced? You were not hit by a rubber bullet, you saw no tear gas or other noxious substance in the air. So why did so many people fall to the floor as if overtaken by some crippling disease? The answer is simple. You and those around you had fallen victim to a new and terrifying weapon - infrasound.

Sound Logic

For decades, police forces and military authorities throughout the world have been increasingly keen to find methods of containing civil unrest without the risks to their own officers that are associated with current methods of riot control. And, according

to a number of researchers, in infrasound, military scientists may now have found the ideal solution to this problem. But what exactly is infrasound and how is it capable of inducing such profound physical effects? Infrasound is a powerful, ultra-low frequency acoustic wave. All the sound that we hear, from the lowest bass to the highest treble, is between 16 and 20,000 Hertz, or cycles per second. Sound waves above or below these levels cannot be heard by the human ear. Because infrasound is, by definition, sound waves of a level below 16 Hertz, it bypasses our ears but can be felt by our bodies in the form of pure vibrations. And it is these vibrations, dependent upon their intensity, that some researchers say can induce a range of symptoms, from nausea, headaches and vomiting, to the rupturing of internal organs and even death. .

Surround Sound

But infrasound is no new invention. In nature, it is produced by powerful and destructive events, such as earthquakes, thunder and erupting volcanoes. The sound waves can travel many kilometres and are not blocked by stone, buildings or other sounds. Infrasound also features strongly in the technology that dominates urban life in towns and cities. Rapidly moving objects such as car engines, fans and air conditioners are responsible for low levels of infrasound that surround us on a daily basis. The fact that certain sound frequencies have definite effects on the human body has long been acknowledged by science. But while ultrasound (frequencies above 20,000 Hertz) has been openly harnessed by science to such mundane ends as repelling vermin or dislodging tartar from dentures, the study and application of infrasound has been far more secretive. Although infrasound research dates back as far as World War I, studies of its effects on human beings did not begin until the early 1960s. At this time, NASA sponsored studies into the potential effects on astronauts of infrasound produced by spacecraft at launchtime. At the Wright-Patterson Air Force Base in Dayton, Ohio, subjects were placed in pressure chambers and subjected to infrasound. Among the resulting effects were 'chest wall vibrations, gag sensations, and respiratory rhythm changes'. Just a few years later, in 1965, the sinister potential of infrasound was fully uncovered. From extensive studies, Vladimir Gavreau, a scientist from the French National Centre for Scientific Research in Marseilles, found that a variety of physical effects were produced when human beings were exposed to ultra-low sound frequencies. He experimented with a series of tubes and organ pipes that produced notes of about 7 Hertz, and found that, by extending the tubes, the sound waves could be directed with some precision. .

Acoustic Lasers

In producing these devices, Gavreau had, in effect, invented 'acoustic lasers'. These narrow beams of infrasound could apparently be aimed accurately, producing nausea, disorientation and headaches in those at whom they were directed. When the infrasound levels were intensified, test subjects also reported feelings of fright, panic and blurred vision. Gavreau believed that a powerful enough infrasound device could knock down walls, break windows and kill everyone within an 8km radius. The device would not be difficult to make, he argued, yet would have a devastating effect. Some researchers have even claimed that, during the late 1960's, the French

military became interested in Gavreau's research and used his findings in the development of a growing list of 'secret weapons'. .

Military Appeal

Despite Gavreau's claims, however, many believe that the development of lethal infrasound weapons is highly impractical. Although relatively easy to build, such weapons would have to be extremely large and powerful to kill outright. Nevertheless, research into non-lethal infrasound weapons has continued unabated. The potential of such weapons to break down resistance to interrogation, to induce stress, confusion and disorientation in an enemy has made them particularly appealing to military scientists. If infrasound frequencies could be directed extremely accurately, as reportedly achieved by Gavreau, an individual or a group could suddenly faint, vomit or suffer an epileptic fit, while those nearby would be unaffected. Such devices could also be small and easily carried in an armoured vehicle. .

To many, evidence that such weapons have been under development for decades is provided by a United Nations draft agreement, drawn up in 1976, that prohibited the development of new weapons of mass destruction. Even at that time, infrasound was deemed deserving of special monitoring, owing to the fact that the progress made in the area of acoustics had made infrasonic weapons a viable and attractive possibility. .

Infrasound Tests?

Despite such regulations, many researchers believe that infrasound weapons have already been used on an unsuspecting public. It is claimed, for example, that, during the 1970s, the UK army tested infrasound devices in incidents of rioting and civil unrest in Northern Ireland. And, with ever-increasing levels of investment in non-lethal technology, it would seem that such incidents can only become more common. .

Today, infrasonic devices are among a growing list of 'non-lethal' weapons - including stun guns, electromagnetic mind-control devices, and chemical irritants - that are readily available. Indeed, a number of infrasound technologies are currently registered with the US Patents Office. These include noise generators and transmitters, consciousness-altering machines and nervous system excitation devices - the list is growing all the time. .

In 1995, $41 million was spent on non-lethal weaponry in the US and there is growing interest in the technology. Many US police forces, concerned with the control of civil unrest, believe that infrasound has an advantage over tear gas as it can be controlled much more easily. The effectiveness of infrasound has even received the backing of the Pentagon, who in a recent document, claimed that high-power infrasound could leave an enemy incapacitated by nausea. New advances in infrasound weaponry suggest that military scientists are becoming more and more adept at harnessing ultra-low frequencies. A device currently under development is said to combine an infrasound device with a strobe light, and is capable of inducing extreme epileptic fits and complete sensory disorientation. Yet despite all the

evidence, military authorities continue to deny any involvement with infrasound, and the actual nature of research remains shrouded in secrecy. Some have even claimed that the alleged properties of infrasound are far from proven. Recently, German physicist Jurgen Altmann claimed that, having studied the properties of infrasound, he found no evidence that it has any of the adverse effects reported. This view has been echoed by Lieutenant Colonel Martin N. Stanton of the US Army, who apparently found infrasound weapons of little use while based in war-torn Somalia as part of the US peacekeeping force. Stanton questions the effectiveness of such weapons, claiming that riot-control troops are just as susceptible to the effects of infrasound as rioters. Nevertheless, such scepticism does not appear to have affected those engaged in the production of infrasound weapons. In 1999, Maxwell Technologies of San Diego applied to patent a new potentially lethal infrasound weapon. The device, designed to control hostile crowds or disable hostage takers, is said to work a cross a wide range of frequencies and is highly directional. The company says it is capable of affecting people up to 100 metres away and can allegedly cause eardrum rupture at 185 decibels (dB), pulmonary (lung) injury at 200dB and death at 220dB.

Deadly Potential

These and other developments suggest that infrasound weapons are far from a pipe dream. With the need to control an ever growing population, it seems likely that, even if it hasn't been used already, the potential power of infrasound will be utilized in some form or other in the future. And with more devices being patented all the time, that day may be sooner than we think. .

Case: Wired by Sound

Aside from the threat of infrasound weaponry, a subtler danger may lie in the low levels of infrasound that surround us on a daily basis. Within the everyday items of urban technological living are numerous devices that are known to produce infrasound. Machinery such as cars, heating systems and trains all produce ultra-low frequencies, and often city-dwellers complain of illnesses that may be triggered by such 'infrasonic pollution'. The effects can vary from sleep disturbance and irritation to suicidal tendencies, but could this, as some have suggested, be a deliberate oppression of the masses? Whilst this is unlikely, in the mid-1970s, concerns over the effect of infrasound (above) under the alarmist headline: The Low Pitched Killer: Can Sounds of Silence be Driving Us All Silly? Public worries were duly intensified and, during this period, one in-depth newspaper report apparently received 800 responses from people claiming to have suffered as a result of low levels of infrasound.

Attachment - H. Smith

The Acoustic Group
CONSULTING ACOUSTICAL & VIBRATION ENGINEERING

45.5165.R1:MSC

10 May 2015

The Chair
Eastern Mt Lofty Ranges Landscape Guardians Inc
PO Box 176
TANUNDA SA 5352

Attention: Mr B Reynolds

Dear Sirs,

REVIEW OF ENVIRONMENTAL NOISE ASSESSMENT

PROPOSED PALMER WIND FARM

DEVELOPMENT NUMBER 711/072/14

Further to your request I have reviewed the noise impact assessment report for the Palmer Wind Farm that appears in volume 4 of the Development Application and is identified as a report from Sonus Pty Ltd (their reference S4171C 12 – dated 2014).

It is noted that the covering page in the DA report volume 4 is headed "Noise Impact Assessment Report" yet the Sonus report is identified as an "Environmental Noise Assessment".

There is a difference between the two forms of report described above. It would appear the Development Application is suggesting the acoustic assessment is describing the impact when in fact the acoustic assessment is just providing a series of predicted levels and does not identify the impact that will occur as a result of the proposed wind farm.

The assessment is basically a standard wind farm assessment report issued by Sonus Pty Ltd that is similar to reports they have issued in relation to other wind farms. It is noted that the subject report adds additional material not seen in previous Sonus wind farm assessments where there is some interesting language in relation to the application of the South Australian guidelines as interpreted by Sonus.

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If one deals with the generic Sonus report in relation to wind farms it has a standard procedure of using a noise propagation model to predict noise levels from the wind farm were such levels are expressed in terms of the A-weighted value.

Section 1.3 identifies that the predictions are downwind for a worst-case meteorological condition utilising a Vestas V117 – 3.3 MW turbine, but then suggests that the selection is for a contemporary turbine selection having a tower height and blade width combination to be within a 165 m height.

Section 1.4 identifies the procedure adopted in terms of the guidelines of determining ambient background levels at representative residential locations upon which the predicted levels are compared with the background levels.

Consistent with the requirements of the guidelines the report includes in Appendix C location of the loggers that were used to obtain the ambient background level. It is refreshing to note that in this application Sonus have provided different views of the logger to indicate the relationship of the logger to the dwelling and also the influence of trees that may affect the measurement results.

Logger Locations

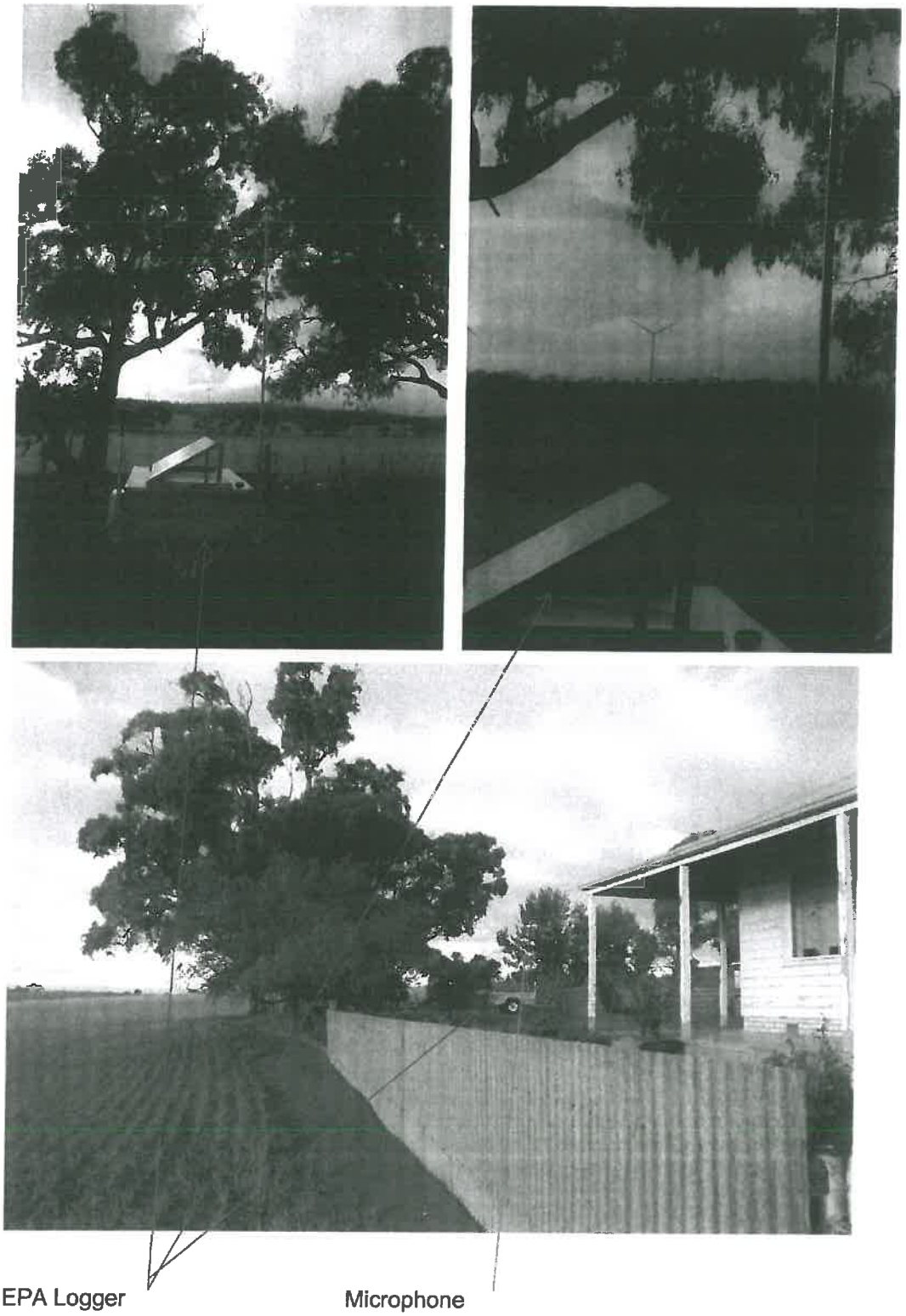
The presence of large trees and bushes near logger microphones has the potential to significantly alter the "background level" upon which compliance is assessed.

A classic case of the significant difference that can occur is where the SA EPA in their Waterloo wind farm study located monitoring equipment under a set of large trees for one residential monitoring location. The location of the SA EPA logger at this location did not comply with their own guidelines.

Monitoring equipment for Adelaide University and The Acoustic Group used an exposed location (with no large trees present) some 150metres from the EPA logger and by direct comparison of the data for the same time periods found a significantly lower "background level" than that published by the SA EPA.

The following photos show the incorrect positioning of the SA EPA logger and the Adelaide University and the TAG microphones for the same house.


Adelaide Uni ground plane
Mics
Position of TAG logger


EPA Logger
Microphone

Pages 41 and 42 of the report refer to noise logging at location ML14 that in the elevation views look north-west and south-west towards the wind farm. The plan view on page 42 identifies a large tree or group of trees north of the logger for which the extent of the trees are not shown in the upper figure on page 41. The ambient levels at logger position ML14 can be influenced by the rustling of leaves when wind occurs at the subject site.

Similarly for location ML22 the elevation views of the logger indicate there are large trees in the immediate vicinity, whereas the plan view places the presence of those trees in the correct perspective of relatively close proximity whereas the elevation views do not show that perspective.

It may be appropriate that location ML22 is a dwelling that is subject on the wind farm side of the dwelling to a higher ambient background level when wind occurs at that location and therefore cannot be taken as being representative of other locations.

For location ML24, that appears on pages 45 and 46 it would appear that equipment location is satisfactory and similar for the logger at ML28 shown on pages 47 and 48 which in effect is somewhat removed from the dwelling.

With respect to location ML32 it is only that with the elevation views that indicate the presence of trees, can one consider the suitability of the location. Page 50 shows a supplementary logger location identified as ML32A with the plan on page 51 indicating the relationship of the logger.

The logging equipment for location ML34 in the elevation views provides a different perspective of the relationship of trees, whereas the plan view in on page 53 identifies the logger was removed from the trees.

With respect to logger ML42, that is shown on page 54, the logger is located in a group of bushes and as such may be subject to wind interference.

The photo shown for Logger ML43 indicates the location is removed from trees and representative of the background level for that property.

Location for ML45 indicates that it is in proximity to large trees and therefore the background levels are questionable.

The plan view for ML51 identifies the trees have been removed and therefore the position is satisfactory.

The photos for Logger ML55 indicate the logger was removed from trees and is satisfactory.

The photos for ML 90 indicate that the logger may be influenced by noise from bushes and as such could be questionable.

The view for Logger ML91 indicates that is satisfactory with respect to trees, whereas the view facing east for ML94 indicates large bushes to the right of the photo that could be an issue in terms of ambient noise levels.

The view for ML100 indicates that the results should not be influenced by wind in trees, whereas the photos for ML116 indicate there could be some influence.

The photos for ML119 indicates a satisfactory position.

Following the locations of the photos of the logger locations are series of regression line curves that plot the ambient background noise levels at the logger locations over the monitoring period versus wind speed obtained at a hub height position of 91.5m above ground.

The logger graphs reveal different noise floors for the instruments that are used to obtain the ambient background data. In some cases the lower limit of the logger is 15 dBA where at other locations the noise floor (lower limit of that obtainable from the data is 18 dBA.

The regression lines indicate quite clearly that for some locations there is a spread of results in terms of the ambient measurements for a wind speed which are not discussed in the report and could simply be the difference between day and night. The background levels occur for different wind speeds and difference direction, not just the downwind situation related to the "worst case" scenario.

The description of the noise monitoring locations, results and equipment are set out in Section 4 of the report and indicate that a number of the locations also had wind loggers to determine the periods when wind directly on the microphone may have influenced the measured background levels.

There is no material in the report to indicate whether ambient data was affected by the wind at the site or any comparison/correlation between the hub height wind speed versus the wind speed and wind direction at the receiver locations.

Predictions

The prediction of noise levels from the wind farm go through the standard Sonus method for determining noise levels on an A-weighted basis for comparison with the EPA guideline criteria.

Other than the inclusion of additional photos in terms of the logger locations, that identify the majority of the locations were satisfactory and some are either questionable or not acceptable, the report follows the standard method of assessment used by that organisation.

If one accepts the predictions that have been determined by Sonus then the conclusion obtained from the report is that noise emitted from the proposed wind farm will comply with the EPA guidelines.

However compliance with the EPA guidelines does not provide any certainty or guarantee that there will be no adverse impact for residents that will be subject to noise emission from the wind farm.

It is in relation to the aspect of the actual impact and the absence of any guarantee by Sonus that there will be no impact that raises matters of concern for the community knowing that Sonus are well aware of the impacts that have been identified by communities arising from the operation of wind farms.

It is in relation to criteria that have been derived, and inferences contained in the Sonus report as to the guidelines being satisfactory, that become questionable in ascertaining whether the guidelines are appropriate in light of research that has been undertaken around the world, including measurements of wind farms in Australia.

On examining the Sonus report and bearing in mind evidence that the principal of the firm Mr Turnbull has provided in hearings and public meetings is a matter that should be of concern to the approval authorities, particularly when a number of statements set out in the report would appear to be misleading.

Development Plan

Section 2 of the Sonus report refers to the Mid-Murray Council Development Plan where under Principles of Development Control Sonus has identified conditions 92 & 93 state:

> *92 Development should be designed, constructed and sited to minimise negative impacts of noise and to avoid unreasonable interference.*
>
> *93 Development should be consistent with the relevant provisions in the current Environment Protection (Noise) Policy.*

Under the Rural Zone Provisions in relation to Noise Pollution the reference to the Principle of Development Control provides principle 12:

> *Development designed to minimise adverse acoustic impacts on adjoining uses which would be sensitive to acoustic interference.*

There is no material provided in the Sonus report to identify what constitutes negative impacts of noise, unreasonable interference or adverse acoustic impacts.

The Sonus report identifies that the Development Plan issued by Mid Murray Council must by definition require identification what impact the development will generate, so as to ensure the application minimises negative impacts and avoids unreasonable interference.

The Sonus report identifies predicted noise levels but has not provided any description in the report to identify whether there are positive or negative impacts, simply because the report does not identify any impacts.

The Council's Development Plan does not (at least in the Sonus report) provide a definition of adverse acoustic impact, negative impacts of noise and unreasonable interference.

Without the assessment report identifying any impacts that would occur from the wind farm, then Sonus have not demonstrated that the Council's Development Plan has been satisfied or addressed.

There is a similar finding in terms of the EPA's guidelines. The matter of the impacts (with respect to the EPA Guidelines) will be discussed below.

Section 3 of the Sonus report under a heading of "LEGISLATIVE REQUIREMENTS" identifies in Section 3.1 the "current" noise policy is the *Environment Protection (Noise) Policy 2007.*

By citing a reference in the *Environment Protection (Noise) Policy* to EPA guidelines for wind farms leads Sonus to consider the South Australian EPA wind farm guidelines as a Legislative Requirement under the Development Plan.

Section 3.2 refers to the 2009 version of the EPA wind farm guidelines identifying noise criteria for residents but fails to mention the objectives of the guideline which brings the effectiveness of the criteria into question.

Section 3.3 refers to WHO guidelines but fails to identify the WHO guidelines that recommend a noise target to protect against sleep disturbance are based upon a European environment and the criteria were based upon road traffic noise in urban environments.

The outside to inside attenuation used in the WHO guidelines is nominated as 15 dBA whereas Australian Standards typically use an outside to inside attenuation for an open window of 10 dBA. If one considers the difference between the Australian and European climates then under the WHO guidelines the external limit should be lower.

Sonus are aware that the WHO guidelines do not provide any guidance in terms of wind turbines, nor any criteria against sleep disturbance in relation to turbines.

The WHO guidelines indicate that where a noise retains low-frequency components/characteristics that the recommended internal noise level should be reduced to take account of the audible characteristic of the intruding noise.

Section 6 of the report has a heading of "Other Noise Considerations" and refers to comments (by others) that suggest the criteria in the South Australian EPA wind farm guidelines are inadequate.

The second paragraph in Section 6.1 is a new development in Sonus reports where they are identifying the criteria in the guidelines "*are established to ensure any audible wind farm noise is low enough in level so that it does not adversely impact on health or amenity of the community*".

On going to the introduction of the EPA guidelines the first three paragraphs of the introduction state:

> *This document aims to help developers, planning and enforcement authorities, government agencies, acoustic engineers and the broader community assess environmental noise impact from wind farms.*
>
> *Wind farms need specific guidelines because wind turbines have unique noise generating characteristics and the environments surrounding wind farms usually have low ambient noise.*
>
> *The core objective of the guidelines is to balance the advantage of developing wind energy project in South Australia with protecting the amenity of the surrounding community from adverse noise impacts.*

The guidelines do not say "*audible wind farm noise*", nor provide information that the levels are low enough so that it does not adversely impact on health or amenity of the community. That is an interpretation by Sonus in the Palmer wind farm report that is disputed by residents in proximity to existing wind farms and certainly is not a position identified in the SA Guidelines.

The third paragraph of the above extract from the guidelines identifies the core objective is to protect the amenity surrounding community from adverse noise impacts. There is no qualification in the Guidelines that the noise impacts are related to audible wind farm noise, as stated by Sonus.

Sonus are aware that there is infrasound generated by the turbines and that work undertaken by TAG and Adelaide University at Waterloo has identified the narrow band infrasound signature from the turbines.

It may well be the case that on realising the EPA guidelines state infrasound is not generated from a well maintained wind farm, but infrasound is generated by wind turbines and that infrasound has been linked to reported disturbances then, the EPA's stated core objective is not met by the use of dB(A). If the infrasound components are the source of the disturbance for residents and the SA EPA guidelines do not include infrasound then the core objective cannot be met on the basis of the dB(A) levels.

Hence Sonus are presenting a new interpretation of just "audible" noise without providing clarification of what the guidelines actually states.

Furthermore, Sonus are aware that there is no material in the SA EPA guidelines that identifies what is an adverse impact on the community in terms of either noise or health.

Upon what basis can Sonus (or even the EPA) guarantee that the levels of noise/low frequency/infrasound generated by the proposed wind farm not create an adverse impact on the community in either noise or health if the thresholds of any impact (whether moderate or adverse) have not been established?

In Section 2.3 of the guidelines there is identification that where there are agreements with wind farm developers there will not be unreasonable interference if for those persons the likely impact of the exposure will not result in adverse health impacts (e.g. level does not result in sleep disturbance). If one takes out the double negatives the text identified if sleep disturbance occurs for hosts as a result of the wind farm then it can create an adverse health impact (whether it is audible or inaudible noise).

However there is no material in the SA guideline to indicate or advise what an adverse health impact is for the community (not hosts) or what is an adverse noise impact on the amenity of the community.

The third paragraph in Section 6.1 of the Sonus report states:

> *'The SA Guidelines have been tested and accepted in the South Australian Environment, Resources and Development Court as the appropriate tool for the assessment of wind farm noise, in order to protect the acoustic amenity of the community'.*

The decision provided by the South Australian ERD Court in relation to the Stony Gap matter (Tru Energy Renewerable Developments Pty Ltd v Regional Council of Goyder & Ors [2014] SAERDC 48) presents a different position to that provided by Sonus.

In the matter of the Stony Gap wind farm application and evidence was provided by Mr Turnbull of Sonus and Mr Cooper of The Acoustic Group. The decision of the ERD Court does not present a position that the Guidelines have been tested and accepted by the ERD Court.

The Court identified in paragraph 41 what the guidelines state and that "usually, compliance with an applicable EPA noise policy would be sufficient to satisfy a planning authority that the health and amenity of people with the locality of the noise source or proposed noise source would be protected".

The decision of the ERD Court identified the work being done at Cape Bridgewater wind farm (at that time) by Mr Cooper may very well provide the evidence that there needs to be adjustment for the guidelines but the position of the court was at the time of hearing they were required to utilise the existing guidelines. In paragraph 50 "Our task is not, as Mr Cooper seemed to think, to assess the adequacy or the integrity of the 2009 noise guidelines".

As such the ERD Court has provided the exact qualification on the use of the SA EPA Guidelines in relying upon the SA EPA. They have not tested the guidelines to confirm the criteria protect the acoustic amenity of the community, nor did they examine the significant errors in the EPA's infrasound report or the fact that the Waterloo study did not address infrasound.

Communities in proximity to wind farms in South Australia do not accept that the guidelines protect against adverse noise impact or protect against adverse health impacts.

If one goes back to the first paragraph in the introduction of the guidelines then the immediate question is raised is how do the EPA guidelines result in an assessment of environmental noise impact from wind farms when impacts are not identified and there are no criteria to determine what is an acceptable impact or what is an adverse impact?

The approval authority in relation to the Palmer wind farm needs to ascertain for itself that the approval in relation to noise and operation of the wind farm will not create an adverse impact on the amenity of the community, nor an adverse impact on the health. If such impact occur then the approval authority will be responsible (in relation to any Class Action) for generating those impacts.

In a VCAT hearing in Victoria in relation to the Cherry Tree wind farm Mr Turnbull of Sonus gave evidence and was presented with the situation that he was aware of operational wind farms did result in complaints from the community citing sleep disturbance, headaches, nausea and in extreme cases people having to abandon their homes.

Mr Turnbull confirmed that he was aware of the situation and when asked why the Sonus report in relation to the Cherry Tree wind farm did not identify that situation, in accordance with his professional code of conduct, or code of ethics to which he is required to abide, identified that instructions from his client was to only look at the New Zealand Standard, being the acoustic standard that is used in Victoria.

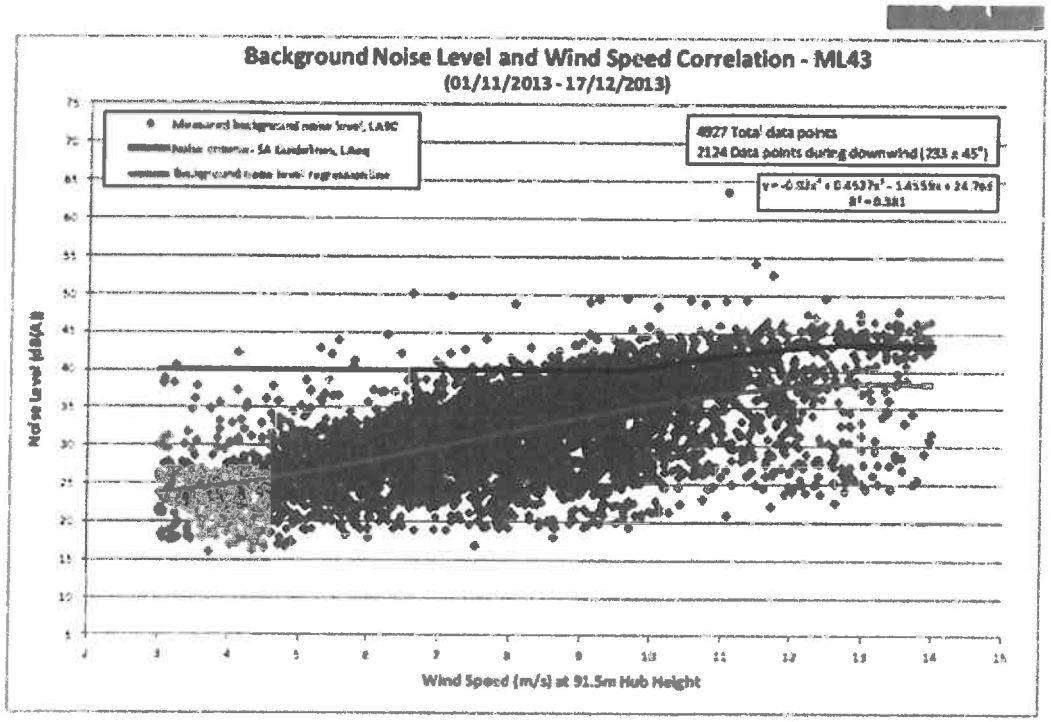
In the Stony Gap wind farm application before the ERD Court (proceedings 227 of 2012) the Statement of Evidence from Mr Turnbull identified the operation of the wind farm will not create any adverse health impacts or adverse noise impacts.

The conclusion of the report was queried in that the report did not identify what constitutes an adverse impact or health impacts resulting in the position provided by Mr Turnbull in the ERD Court that compliance with the EPA guidelines would ensure that there were no adverse noise impacts to the community or adverse health impacts where Mr Turnbull placed the full responsibility of protection for the community on the South Australian EPA .

Attached is the final joint noise expert statement that was submitted to the court to identify that that was the position of Mr Turnbull.

What constitutes an adverse noise impact or health impact is not found in the SA EPA Guidelines upon which Mr Turnbull places the full responsibility to the EPA?

If one looks at the regression lines in the background data contained in the Sonus report, there is use of a background levels which are not separated into day and night but grouped together on a 24-hour basis. The following graph is from page 80 of the report for ML43.



The red line passing through the graphs indicates the average noise level which therefore indicates that the background levels are both higher and lower than the average level.

If one views the black line in the regression graph it indicates the EPA criterion which is set at a constant level until such time as the regression line approaches the average background where the extension of the black line is then set at 5 dB above the regression line.

The above graph indicates that compliance with the EPA guideline for hub height wind speeds below 7 m/s permits the wind farm noise level external to dwelling to be 10dB or more above the regression line. In terms of the regression line for a wind farm generating such a level to that that is permitted, the noise will be audible.

It must be acknowledged that at lower wind speeds there is an expectation that the audible noise emitted from the wind farm will be less than at maximum power, but the EPA criterion in the above graph is at a constant level until the wind speeds are above 10m/s.

However in terms of the real background level, which is below the noise floor shown in the graph, indicates that in terms of the EPA guidelines the EPA permit external noise levels in the order of 25 dBA above the background.

If the noise at residential receivers from the wind farm is audible and contains low frequency components, as commonly identified by residents in proximity to Hallett and Waterloo wind farms, then on a subjective assessment the adjusted noise from the turbines can represent a level more in the order of 30 dB above the background.

That means that the noise can be clearly audible.

There is no material in the guidelines to indicate what is an acceptable level of sleep disturbance, either in terms of noise levels or frequency of such noise events to occur.

As the noise criteria are expressed in 10 minute LAeq levels then the average (regression line) concept presented in the guidelines can give rise to a significant level of noise that can vary above and below the energy average level.

But if the impact on residents is associated with infrasound (not covered by dBA) then one has the situation of the wind farm being audible, just audible or inaudible, and giving rise to adverse impacts.

Section 6.2 relates to impact on animals but fails to identify that the acoustic environment in terms of the spectral characteristics is different to that with and without the turbines operating. There are reports from farmers of problems associated with stock subject to wind farm operations that did not exist prior to wind farm come into operation.

In relation to finding stock in close proximity to the turbines that can in some respects be seen to be obtaining shade from the towers but also the fact that under the turbines there is an absence of infrasound as a result of the radiation pattern off the blades.

Infrasound

Section 6.3 is headed "Infrasound" with the concept being presented that there is no difference between the natural environment and the environment in proximity to a wind farm. This position is incorrect and clearly misleading.

If one undertakes measurements in proximity to wind farms and restricts the results to just the A-weighted level there will be no difference between the wind farm and the natural environment.

One of the infrasound studies identified by Sonus was conducted at Cape Bridgewater with a conclusion that the infrasound level from a turbine that was measured was no greater than the naturally occurring levels of infrasound from sources such as waves breaking.

However Sonus has failed to identify that the measurements they have undertaken, at least the ones that are published, restricted the measurements to 1/3 octaves and as such did not identify the discrete narrowband infrasound components associated with the blade pass frequency of the turbine and multiple harmonics of that frequency.

With respect to the Sonus Cape Bridgewater windfarm infrasound report the documentation showed only one turbine, whereas in actual fact there are other turbines in existence that could influence the measurement results. The report failed to identify the operation of the turbines, the power output, or the wind conditions (speed and direction) at the time of the measurements.

Attendance in July 2014 to the very turbine used by Sonus in their Cape Bridgewater infrasound report found that the noise emitted from the turbine is not restricted to just 1/3 octave bands but did produce infrasound components as found on other wind farms.

Furthermore on-off testing of that turbine (CBW 27) and other nearby turbines revealed a difference in the acoustic signatures when assessed in narrow bands.

On the bottom of page 25 of the Palmer wind farm report is reference to a study by the South Australian EPA into infrasound being a report identified as January 2013. That report had the same flaws as the Sonus infrasound report for Cape Bridgewater by restricting the analysis to dB(A), dB(G) and 1/3 octaves where there was no apparent difference between the natural environment and the wind farm affected environment.

In February 2013 the author identified anomalies in that study which is supported some 18 months later in a technical note from Andrew Bell of the John Curtin School of Medical Research of the Australian National University that appeared in Acoustics Australia, volume 42, No 3,, December 2014.

As identified to the ERD Court in the Stony Gap wind farm case measurements undertaken by the author at Cape Bridgewater had again found that restriction of data in terms of 1/3 octave bands did not find any difference between a wind farm affected and a natural environment.

The report on the Cape Bridgewater study undertaken by the author was released by Pacific Hydo in January 2015 and is available at http://www.pacifichydro.com.au/english/our-communities/communities/cape-bridgewater-acoustic-study-report/. Pacific Hydo have not granted permission to use the report in the public domain and have issued instructions specifically prohibiting the author from publishing any part of the report.

However, Chapter 9 of the Cape Bridgewater study concentrates on the difference between 1/3 octave bands and narrowband results obtained in proximity to the Cape Bridgewater wind farm. The report includes measurements prior to a complete shutdown of the wind farm and after a wind farm shutdown that shows the unique and distinct characteristic of the turbines in the infrasound region to exist when the turbines are operating and not exist when the turbines are off.

In Chapter 9 of the Cape Bridgewater study report it is identified that if one restricts the measurements to 1/3 octaves, as an intentional way of restricting or processing the data, then the conclusion would be that there is no difference between the natural environment of the wind farm affected environment.

If however one considers the measurements in terms of narrowband spectra then the conclusion presented by Sonus in their Cape Bridgewater infrasound report, their Palmer wind farm report, and the South Australian EPA report "Infrasound levels near wind farms and other environments" is incorrect.

The presence of discrete characteristics in the infrasound region are not just restricted to measurements undertaken by the author. There is documentation from a major study in Canada (by Canada Health) that shows the discrete pattern with confirmation in their report that one can regularly acquire the infrasound pattern out to 10 km from a wind farm.

Similar narrow band work undertaken by Adelaide University at Waterloo has identified between operation and a complete shutdown of the Waterloo turbines a very distinct and clearly apparent difference between the natural environment and the turbine affected environment. During the course of the shutdown measurements the university researchers identified infrasound from the Hallett wind farm, which is significantly removed from Waterloo.

It is impossible for Sonus to not be aware of the presence of narrow band infrasound levels. The reason as to why such information has been omitted is up to others to investigate.

The Cape Bridgewater study report issued this year was undertaken to a different brief to normal acoustic investigations in that there was a specific requirement to undertake **sound and vibration measurements to determine certain sound levels and certain wind speeds related to disturbance reported by specific local residents.**

Certain operations of the wind farm that have been suggested as being an instability of airflow across the blades give rise to enhanced sensations that correspond as the major disturbance factor reported by the residents in that study.

There is no correlation in terms the A-weighted levels, dB(C), dB(G) or one 1/3 octave bands with respect to the reported disturbances, whereas there was correlation of some of those indices with respect to the wind speed.

What was found was that under the different levels of severity of sensation reported by the residents there was an increase in the infrasound components resulting in the derivation of a line of best fit for a worst-case scenario being when residents were seeking to leave (or left) their homes as a result of disturbance, leading to an acoustic descriptor of the wind turbine signature.

The slope of those individual infrasound peaks is similar to results obtained by Adelaide University, Health Canada and the Shirley wind farm study.

Infrasound is emitted from wind turbines and is not covered by the SA EPA guideline.

Conclusion

Section 7 of the Sonus report for the Palmer wind farm states:

> ***The SA Guidelines were established to ensure a wind farm does not unreasonably interfere with the acoustic amenity of the surrounding community and therefore provides an objective assessment method to determine compliance with the relevant provision of the Mid Murray Council Development Plan.***
>
> *The assessment indicates the predicted noise levels achieve the requirements of the SA Guidelines at all relevant locations.*

If one accepts the current proposal will satisfy the SA Guidelines then the assessment has fulfilled the brief for Sonus, as they clearly place the responsibility for there being no adverse impact on the SA EPA.

There is no material to identify the SA EPA Guidelines protect the community from having their acoustic amenity affected. Residents in proximity to "complying wind farms in South Australia" can provide ample proof of the failure of the guidelines to satisfy the core objective stated in the Guidelines.

There does not appear to be any material cited by the SA EPA to identify what is the acoustic amenity of rural residents in South Australia, let alone what would be an unreasonable interference.

The SA EPA guidelines do not identify what is an unacceptable noise or health impact for non-host residents.

Therefore without providing the basis of disturbance (moderate or adverse) it is impossible for the emission of the wind farm to be assessed in terms of the core objective of the guideline.

Page 6 of the Sonus report sets out the relevant requirements of the Development Plan. Objective 98 is specific to renewable energy and requires the facility to avoid or minimise adverse impacts on the natural environment and other land uses. Under the Rural Zone Provision set out on page 7 of the Sonus report principle 12 requires the development designed to minimise adverse acoustic impacts on adjoining uses which would be sensitive to acoustic interference.

Contrary to the conclusion by Sonus that the Development Plan has been satisfied there is no material in the Sonus report to identify what acoustic interference will occur, what adverse impacts will occur or what health impacts will occur. As such the specific requirements of the Development Plan in relation to the adverse and health impacts that may occur from the proposed wind farm have not been identified by Sonus.

Yours faithfully

THE ACOUSTIC GROUP PTY LTD

STEVEN E. COOPER

SOUTH AUSTRALIA

IN THE ENVIRONMENT, RESOURCES AND DEVELOPMENT COURT

No 227 of 2012

BETWEEN

TRU ENERGY RENEWABLE DEVELOPMENT PTY LTD
Appellant

and

REGIONAL COUNCIL OF GOYDER
First Respondent

and

ANDREW WILLIAM COFFEY
Second Respondent

and

HAMISH DUNN
Third Respondent

JOINT STATEMENT OF STEVEN COOPER AND CHRISTOPHER TURNBULL

~~13 FEBRUARY 2014~~

The experts engaged by telephone conference and email correspondence to prepare and finalise this joint listing of agreement and disagreements.

The following table summarises the areas of agreement and disagreement in opinions relating to the environmental noise assessment and the basis of any disagreement:

Item	Steven Cooper	Christopher Turnbull
Current objective method of environmental noise assessment for wind farms in South Australia	EPA "Wind farms Environmental Noise Guidelines" 2009	"Wind farms environmental noise guidelines 2009" published by the SA Environment Protection Authority (EPA) (the 2009 Guidelines)
Most appropriate objective method of environmental noise assessment for Stony Gap Wind Farm	At present there are no Guidelines /criteria issued by the Authority that protect the community from adverse noise impacts	Relevant provisions of the Development Plan objectively assessed using the 2009 Guidelines
Base noise level of 2009 Guidelines for non-stakeholders	40 dB(A)	40 dB(A)
Base noise level of 2003 Guidelines for non-stakeholders	35 dB(A)	35 dB(A)
Assessment described in Chris Turnbull Statement conducted in accordance with 2009 Guidelines	Apparently so	Yes
Highest predicted noise level at non-stakeholder houses for Vestas V90 3MW with 80m hub height		
House 11		30 dB(A)
House 20		34 dB(A)
House 21		33 dB(A)
House 30		32 dB(A)
Highest predicted noise level at non-stakeholder houses for Vestas V112 3.3MW with 84m hub height		
House 11		31 dB(A)
House 20		35 dB(A)
House 21		34 dB(A)
House 30		33 dB(A)
2009 Guidelines Achieved		Yes
2003 Guidelines Achieved		Yes

Item	Steven Cooper	Christopher Turnbull
Tolerance of predicted levels	Not provided	The conservative assessment over-predicts the level of noise because the guaranteed (rather than measured) sound power level is used and the assumed meteorological conditions of wind blowing from every turbine to every receiver concurrently, will never occur in practice. With actual (rather than guaranteed) sound power levels and wind blowing in other directions, levels will be lower than predicted.
Frequency of occurrence of the predicted levels	Not provided	Given the conservative nature of the assessment, the measured contribution of noise from the wind farm is likely to be lower than the predicted level at all times.
Verification of accuracy of predicted levels	Not provided. Predicted levels have been found to not agree with actual measured levels.	Noise verification measurements are typically required as a condition of Development Plan consent.
Use of dB(A) to protect amenity	Inadequate	In accordance with 2009 Guidelines and WHO Guidelines.
Internal noise levels	Not provided	Highest level of approximately 20 dB(A).
Low frequency noise	Not identified or assessed	The 2009 Guidelines are based on the specific characteristics of wind turbine noise and inherently take into account the low frequency component of the noise.
Averaging of regression data for compliance	Inadequate to protect community	Averaging is common practice for most forms of environmental noise and the regression analysis is specifically required by the 2009 Guidelines.

Item	Steven Cooper	Christopher Turnbull
Protection of community health	Not protected by guidelines	Achievement of the 2009 Guidelines results in achievement of the WHO Guidelines, which are designed to protect community health.
Sleep disturbance	Not identified or assessed	Achievement of 2009 Guidelines results in achievement of the WHO Guidelines, which are designed to protect against sleep disturbance.
WHO Guidelines	Not identified or assessed	Achievement of 2009 Guidelines results in achievement of WHO Guidelines.
Adverse noise impacts	Not identified or assessed	The 2009 Guidelines protect against adverse impacts on the amenity of the locality and the WHO Guidelines are designed to protect community health.
Infrasound	Not identified or assessed. EPA have not assessed all infrasound impacts. EPA (or others – not actually stated who) have measured infrasound and confirmed (contrary to the Guidelines) that infrasound is generated by wind farms and detected inside and outside residences.	The level of infrasound from wind turbines at the proposed setback distances is less than the level encountered in everyday life. The EPA has conducted a number of recent investigations and concluded that the 2009 Guidelines adequately address all potential impacts, including levels of infrasound.
Physical effects of turbines on residents, headaches, nausea and sleep disturbance	Not identified or assessed. EPA Guidelines identify sleep disturbance for hosts as an adverse impact.	Outside of my specific area of expertise. I rely on advice from the WHO and NHMRC and on achieving the requirements of the 2009 Guidelines.
Guarantees as there not being any adverse noise impacts	Not provided	The 2009 Guidelines and WHO Guidelines will be achieved based on a conservative assessment.

Technical Note

CONSTRUCTIVE INTERFERENCE OF TONAL INFRASOUND FROM SYNCHRONISED WIND FARM TURBINES: EVIDENCE AND IMPLICATIONS

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SUMMARY

Noise from wind farms is contentious: people who live nearby complain of annoyance, and yet broadband measurements of infrasound seem to indicate the noise is generally not above audibility criteria. The paradox can be resolved by supposing that wind farms generate a strong tonal signal at the blade passing frequency, 0.8 Hz, and that this infrasound, with a wavelength of 400 m, can constructively interfere if two or more wind turbines operate in synchrony and the path lengths differ by a multiple of 400 m. Coherent infrasound at 0.8 Hz could propagate many kilometres, would tend to carry many harmonics due to the rapid changes within its waveform, and the high harmonics in the 20–30 Hz band have the potential to be heard by human ears. The existence of coherent infrasound from wind turbines has not been specifically recognised, but evidence of the phenomenon can be discerned in two anomalies contained in data from recent infrasound monitoring of wind farms in South Australia. This paper interprets the anomalies in terms of a model which suggests that wind farms produce enhanced sound pressure levels when the blades of multiple machines become mutually entrained and the sound from them becomes coherent. The inference is that acoustic measures, which assume wind turbine signals are stationary, may not be accurate indicators of peak noise levels.

BACKGROUND

There has been much debate about the impact of wind turbine noise on people living next to wind farms. In Australia, some of that debate has been conducted in the pages of this journal (e.g. [1]). While there have been many complaints of annoyance from neighbouring residents, the complaints have often been dismissed because acoustic measurements indicate the levels of infrasound should be inaudible since they do not rise above background noise levels [2]. The National Health and Medical Research Council recently commissioned a systematic review of the problem [3], and it issued for comment a Draft Information Paper summarising its findings [4]. The paper states that "Evidence suggests that levels of infrasound are no higher in environments near wind turbines than in a range of other environments. For example, a South Australian study [Evans et al. 2013] observed similar levels of infrasound at rural locations close to wind turbines, rural locations away from wind turbines, and at a number of urban locations" ([4], p.12).

This paper assesses the Evans et al. measurements, along with some related findings, and finds there are certain limitations which may put a question mark over such a conclusion. The synthesis here highlights the relevant measurements, describes possible limitations in interpretation, and recasts the findings in terms of coherent infrasound. It is pointed out that the waveform generated by blade–tower interaction (BTI) carries many harmonics that can reach into the audible range, and it is suggested that these high harmonics, when emitted by synchronised wind turbines, could be a major cause of the problem. A recent proposal [5] for minimising the infrasound problem by desynchronising the blades is endorsed.

INFRASOUND

As stated by the NHMRC, "infrasound is considered by some to be an important component of noise from wind farms" (p.12 of [4]). In this context the recent work of Thorne [6, 7] is particularly relevant, for he points out how constructive interference from synchronised wind turbines can lead to "heightened noise zones", a term developed by him in conjunction with Bakker and Rapley [8]. Thorne considers the synchronous rotation of wind turbines (p.42), although he appears to be more concerned with amplitude modulation of blade swish than with direct propagation of 1 Hz infrasound and its harmonics. His simulations were done with emission frequencies of 20, 48, and 66 Hz (p.51). The work of Doolan et al. (2012) [5] is also of interest, for they theoretically consider BTI, and derive a curve (shown here as Figure 1) for how the amplitude of the generated pressure varies over time. This theoretical waveform indicates that the signal has a large and sudden variation in pressure at the blade passing frequency (1 Hz). A spectrum of this waveform (their Fig. 5) shows the expected sequence of multiple harmonics.

Doolan and colleagues note that there is currently no methodology to accurately quantify BTI noise, but they say it could be important. They draw a diagram of how two BTI sources, which they describe as "temporally coherent", may constructively interfere (their Fig. 6), perhaps at a residence, and suggest that actively desynchronising the turbine blades may be a way to avoid the heightened pressure pulse.

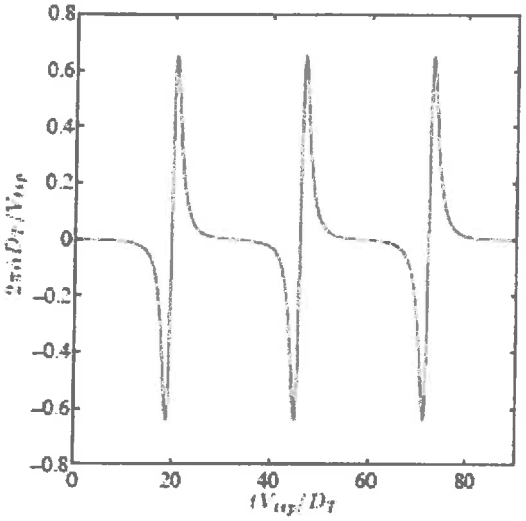

Figure 1. The acoustic waveform generated by a wind turbine as its blades pass the supporting tower (theoretical calculation of blade–turbine interaction from Doolan et al. (2012) [5], with permission). The frequency of the waveform is about 1 Hz and is tightly controlled, creating the possibility of the pressure pulse from one set of turbine blades to entrain another set. The steeply rising portion of the waveform makes it well suited for synchronisation with other such waveforms; it also produces many harmonics.

This paper validates the idea that strong 1 Hz infrasound can arise by constructive interference of many wind turbines emitting signals such as in Figure 1. It also adds the idea that synchronization of wind turbines may be promoted by the tendency of oscillators of closely matching frequencies to become physically entrained. The possibility that the blades of multiple wind turbines become locked together is a hypothesis that this technical note puts forward for further discussion.

Below, the implications for audibility of multiple entrained turbine blades are set out, and a mechanism is described whereby the BTI harmonics may be sensed by the ear. The paper emphasises that the control circuits used in South Australian wind turbines to regulate power output act to bring many turbines to almost the same rotational frequency, and hence are liable to produce entrainment and increase infrasound energy levels. Supporting evidence from recent South Australian monitoring data [9, 10] is discussed.

Signature of the blade pass frequency

Evans et al. (2013) [9] measured infrasound emitted from two wind farms, Bluff and Clements Gap, and the former showed particularly interesting results. The researchers found that at Bluff the infrasound contained clear peaks at the blade pass frequency of 0.8 Hz and at its harmonics of 1.6 Hz and 2.5 Hz, and the authors describe how these spectral peaks are a characteristic signature of a wind turbine's revolving blades. The peaks can be clearly seen in Figure 29 of their work, and are shown here in Figure 2. They are also visible in their Figures C3–C8, and in one figure for Clements Gap (the lower trace of Figure C9).

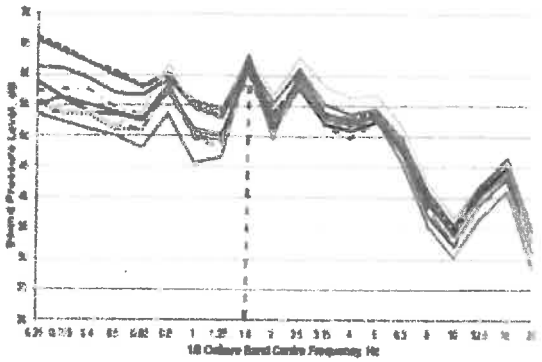

Figure 2. Absolute sound pressure levels in 1/3-octave bands from 0.25 Hz to 20 Hz measured by Evans et al. at Bluff Wind Farm, South Australia. Note the distinct peaks at 0.8 Hz, 1.6 Hz, and 2.5 Hz. The different traces are for different times, 4 with the wind farm operating (coloured lines), and 6 with it switched off (black and grey). Note the apparent anomaly that at 1.6 Hz (added vertical line) there is less than 3 dB difference between all measurements, *including between on and off*. Modified from [9], with permission.

There are two important properties of these peaks which should be emphasised. First, these infrasonic signals have very long wavelengths – a frequency of 0.8 Hz, for example, has a wavelength of about 400 metres.

Second, these signals have a narrow bandwidth because the turbine blades in a wind farm are, for reasons of generation efficiency, regulated to maintain a constant rotational speed. The Suzlon S88 turbines installed at the wind farm measured by Evans and colleagues maintain a relatively constant rotational speed of 15–17 rpm, largely independent of wind speed variations (16 rpm = 3.75 sec/rev = 1.25 sec/blade for 3 blades = 0.8 Hz blade pass frequency). This factor deserves greater emphasis. For the Suzlon S88 the set speed at rated power is particularly precise, 15.79 rpm (p.36 of [11]), a speed which is electronically controlled and equivalent to a blade pass frequency of 0.7895 Hz. Therefore, if operating conditions permit, the rotation rate is fixed to a potential accuracy of 1 part in 1500 (a stability of 0.07%). Even if the windspeed fluctuates a little, the electronic controller will attempt to keep the rotational speed fixed at that optimum value. In other words, for windspeeds at and above the rated wind speed (12 m/s for the Suzlon turbine), the unit operates on a nearly *vertical portion* of the rotational speed–torque space, virtually independent of wind speed. The design of the Suzlon S88 allows a degree of slip between the blades and the generator, a factor which smooths out speed fluctuations but also has the side-effect of leaving the turbine (and its neighbours) open to mutual entrainment in which blade rotations become locked together.

Of course, there are a range of turbine types, each with its own operating characteristics set by a controller circuit. However, in South Australia the Suzlon S88 predominates [12]. The controller sets the operating characteristic, essentially a plot of torque against rotational speed, with the

aim of optimising the power output as windspeed changes [13]. The controller and its algorithms are proprietary and are kept confidential by manufacturers. Nevertheless, once the wind speed reaches a point at which the turbine has reached its rated output, the general operating strategy is to actively adjust the torque to keep the rotational speed of the blades constant (Ch. 7 of [14]). Most turbines, including so-called 'variable speed' designs, have characteristics with vertical, or steep, portions along which the rotational speed is dynamically regulated for optimum power extraction (e.g., Fig. 4.9 of [13]; Fig. 7.12 of [14]; [15]).

A potential outcome of this tight, but slightly accommodating, regulation is that, for moderate windspeeds and above, all the blades in a wind farm might turn at almost exactly the same speed, making it highly likely, as explained in more detail below, that at least some will become synchronised. It is not uncommon to see the blades of a wind farm passing the tower at the same time (see Figure 3), and the likelihood that this occurs merely by chance are minute. Informal observation of a wind farm near Canberra, where Suzlon S88s are installed, showed that when two neighbouring 3-blade turbines were visually aligned so that one was in front of the other (producing a 6-pointed star), this configuration would sometimes stay perfectly fixed for more than a minute.

Figure 3. Monitoring wind turbine noise at an operating wind farm, Waterloo, South Australia. Notice that the blades of the four turbines have closely matched phase. Considered as a random event, the chance of 4 turbines having all phases equal to within 5° of each other are $(5/360)^3$ = about 1 in 2 million. Photo. EPA South Australia, with permission.

Such synchronisation implies that the blades will act as *coherent sources* of infrasound energy as they pass the towers. Whenever the generators come into synchrony, because of control circuits and physical entrainment, a wind farm could become a strong infrasound source. In this circumstance, it is inevitable that the waves will constructively interfere at various points (and destructively interfere at others). Doolan and colleagues discuss this theoretical possibility [5], and suggest a remedy in terms of adjusting each turbine so that the blades are never synchronous; however, at that time the data was not available to prove their point. This paper brings together findings which give the idea added plausibility. In fact, recent data from the same group [10] points directly to synchronisation at work, and this is evaluated in a later section.

Entrainment produces coherence

The key factor promoting a synchronous state is the universal phenomenon of mutual entrainment. It was first documented by Huygens when he noticed that two small pendulum clocks attached to the same wall became synchronous. Synchronisation of oscillators of closely matched frequency is now widely recognised in many branches of physics. It is therefore to be expected that physical coupling between turbine blades will occur aerodynamically, perhaps giving rise to the synchronicity seen in Figure 3. Interactions via electrical loading of the generators might also contribute to synchrony, and this idea has been explored for fixed-speed generators [16-18]. These studies, together with informal observations and the clear evidence of Figure 3, strengthen the possibilities outlined by Thorne [6, 7] and Doolan and colleagues [5].

Entrainment of a collection of oscillators is relatively simple to grasp intuitively (see the synchronisation of 32 metronomes at http://www.youtube.com/watch?v=kqFc4wriBvE), but in practice it is difficult to predict. It depends on multiple mutual interactions which are essentially chaotic [19]. If a number of wind turbine blades become synchronized and the sources become coherent, sound pressure levels will increase. For example, two wind turbines would have an intensity 6 dB louder than a single turbine, and four might have an intensity 12 dB louder. When one considers that a wind farm may have dozens of wind generators, the chances that some of them will become synchronised increases.

Unlike a set of metronomes, it is not suggested that all the turbines will become synchronous because their spacing may not support it, but the possibility is enhanced by the wavelength of infrasound (0.8 Hz = 400 m) being about the same as the spacing between wind generators, which are often placed in a line along a ridgetop (e.g., Fig. 3 of [20]). Allowance will need to be made for the propagation times between towers and for the distances from the towers to points of constructive interference. Such analysis is beyond the scope of this technical note. Although the analogy is imperfect, a simple comparison that conveys the concept is a swarm of cicadas. Each cicada emits its own regular chirping; however, because of mutual sensing and interaction, at some point the whole swarm can synchronise its sound and sing in chorus. At this point, the sound pressure becomes appreciably louder.

Another relevant factor is that a line of wind generators may be considered a line source rather than a point source. This means that, at right angles to the line, the intensity will fall off much more slowly with distance ($1/r$ rather than $1/r^2$); moreover, in directions along the line, the intensity might reach levels much greater than with a single generator and propagation could extend in a beam for tens of kilometres, especially since atmospheric attenuation of infrasound is small.

Coherence leads to nodes and antinodes

Constructive interference from coherent sources means that infrasound pressure at the blade passing frequency (and its harmonics) could be high, even at locations far away. It is also the case that coherent sources could interfere destructively, but given the generally equi-spaced arrangement of wind turbines in a farm (see for example Fig. 9 of [21]), the actual situation is likely to be an alternating pattern of constructive and destructive points (nodes and antinodes). Thorne [7] illustrates this for low frequency sound (his Figs 21–25), although his analysis does not extend to infrasonic frequencies where the effects will be even more marked. In terms of impact on local residents, the pattern of nodes and antinodes will depend on location and the wavelength of each harmonic, and will shift with wind, temperature, and atmospheric stability. Importantly, there will also be fluctuations in phase on the scale of tens of seconds due to the blades slipping in and out of synchrony – an entrainment effect which will lead to sudden phase jumps.

Broadband infrasound measurements can miss tonal components

If the coherent infrasound hypothesis is true, then the method of measuring the broadband sound pressure level as a single G-weighted measure encompassing energy over 0.15–315 Hz (as done by Evans and coworkers) may not be the most appropriate in terms of infrasound audibility. The authors measured the broadband sound as about 50–60 dB SPL and then compared it to natural sources over the same band. Their conclusion, endorsed by both the Systematic Review [3] and the Information Paper [4], is that there were "similar levels of [broadband] infrasound at rural locations close to wind turbines, rural locations away from wind turbines, and at a number of urban locations" (Section 6.1, paragraph 7). This creates a puzzle, for why is it that people living near wind farms complain of rumbling sounds, often with 1 Hz periodicity, while people in the city do not, and why are the annoyance levels so variable over time? [22]. Adding to the puzzle are some of the authors' one-third octave measurements below 20 Hz: on some occasions there was no difference in recorded level at 1.6 Hz between when the turbines were operating and when they were switched off (see Fig. 2).

There is a possible explanation for both these puzzles, and it is that the G-weighted measures over 0.15–315 Hz are not capturing the audibility of fluctuating narrow-band infrasound that slips in and out of phase. Although G-weighting is a general measure intended to reflect the audibility of low frequency sound, it may not accurately represent the audibility of sounds which incorporate many harmonics that reach into the audible range (20 Hz and above). There is work to show that the perception of tones and broadband noise is similar [23], but this is for single tones only, not sets of harmonics. In the latter case, if all harmonics are in phase, the *peak pressure* will be greater, and ref. 23 suggests that infrasound may be detected via a peak detection mechanism, so that the peak pressure is more important than the RMS pressure. In addition, since the loudness range of infrasound is very compressed, a small rise in pressure can lead to a substantial increase in loudness, and this applies both to constructive interference of multiple coherent infrasound and to the in-phase superposition of its harmonics. Moreover, ref. 23 describes how infrasound may be easily sensed by modulation of low frequency sounds, and so any harmonic content above 20 Hz could promote turbine audibility. More research is needed in this area. A related issue is whether the 1 Hz periodicity people hear derives directly from the infrasound or from modulation of the constant aerodynamic noise emitted by the moving blades (see Fig. 6 of [5] and [24]).

An additional factor that may make low-frequency sound more audible than a single measurement indicates is the use of long averaging times (several minutes). This means that instants when the infrasound is at its loudest (when the sources lock together) are averaged along with the quietest times (when the sources are out of phase). There is therefore the possibility that the measured signal is not stationary, as standard analyses assume, but a fluctuating sequence of in-phase and out-of-phase conditions. The question of the enhanced audibility of such a signal will be considered later, but at this point it is informative to look closer at the evidence that coherent infrasound exists.

DIRECT EVIDENCE FOR INFRASOUND COHERENCE

Two intriguing anomalies have recently been reported. The first, by Evans et al. (2013), is contained in a major report on infrasound measurements from windfarms and other locations in South Australia [9]; the second, by Zajamsek and colleagues [10], was presented to a 2013 conference on wind turbine noise and again concerns infrasound measurements at a South Australian wind farm. It is suggested that both anomalies can be explained by the presence of coherent infrasound.

No difference between 'on' and 'off'

The anomaly found by Evans and colleagues is reproduced here as Figure 2 and is indeed curious. In order to determine whether the Bluff Wind Farm was generating infrasound, it was arranged for the wind turbines to be switched off. As a result, the report found that "At Location 8 near the Bluff Wind Farm (Figure 29), the [0.8 Hz, 1.6 Hz, and 2.5 Hz] peaks were detected *at a similar level* during both operational and shutdown periods" (emphasis added). As shown here in Figure 2, the spectrum at 1.6 Hz shows less than a 3 dB variation between all measurements, which is strange given that the peaks are distinctive signatures of wind turbines. The interpretation suggested by the synthesis here is that the convergence of all the 1.6 Hz measurements must have been due to another wind farm (probably North Brown Hill, 8 km away) and that L8 happened to be at an infrasound antinode at the time.

Evans et al. also conclude that "there is a possibility that the peaks in the spectrum during the shutdown resulted from operation of North Brown Hill Wind Farm", a source which was "very faintly audible" during the shutdown (p.37). However, because the sources were below background levels and therefore not a problem, they did not attempt to resolve the paradox of why infrasound levels from a source 8 km away could be higher than from a source 1.5 km away. However, the coherent infrasound model makes it possible to appreciate how, if the antinodes are aligned correctly, this might happen. The situation has as much to do with the phases of the sources as with the distances.

Similarly, Figures C3–C10 of Evans et al. show the same signature peaks at 0.8, 1.6, and 2.5 Hz at two locations, Bluff and Clements Gap, and more comparisons are presented between when the wind farms were operating and when they were shutdown (pp. 61–65). Again, there was little difference for Bluff, although there was for Clements Gap where there is no adjacent wind farm. Once more, the Bluff anomaly was not considered important because recorded infrasound levels were below background (in a one-third octave band), especially for higher wind speeds. Nevertheless, it is significant that in Figure C3, which includes measurements at Bluff for low wind speeds (0 to 3 m/s, when wind turbines do not rotate – p.58), the distinctive peaks at 0.8, 1.6, and 2.5 Hz are still present, again indicating that infrasound from Brown Hill 8 km away (where the wind must have been above 3 m/s) was still contributing. These measurements point to the presence of coherent infrasound that can propagate considerable distances. The question it raises is whether the elevated infrasound levels could have led to troublesome audible sensations at higher frequencies, and this is now addressed.

High harmonics of the blade pass frequency

Another anomaly that can be interpreted as evidence for the presence of highly coherent infrasound comes from the acoustic monitoring of Zajamsek and colleagues [10]. These workers made continuous sound recordings in homes near the Waterloo wind farm in South Australia and matched the level and spectral content of the sound with occasions when the residents noted its degree of annoyance. Of particular interest, they found using narrow-band (0.1 Hz) analysis that in one 'slightly annoyed' case (their Fig. 11) multiple harmonics of the blade pass frequency were present. The harmonics occurred not only at 0.8, 1.6, 2.4, 3.2, 4.0, 4.8, and 5.6 Hz (corresponding to the 1st–7th harmonics, which have been seen in other work), but also at frequencies corresponding to harmonics in the 20–30 Hz band at 29, 33, 34, 35, 36, 37, and 38 times the fundamental.

Such high harmonics are unusual, although they have been seen in musical acoustics (clarinets, for example, see http://newt.phys.unsw.edu.au/music/clarinet/E3.html). Of more relevance, a recent detailed report on the same wind farm [25] records that, when using a spectral resolution of 0.0017 Hz, "each peak [up to 69 Hz] is an exact multiple of the blade-pass frequency" (p. 71). A theoretical explanation for such high harmonics comes from noting that at least the 14th harmonic is present (at about the –40 dB level re the peak) in Fig. 5 of [5], and that, if the plot were extended logarithmically to –60 dB, further harmonics would become visible. Although perhaps 1000 times smaller than the largest BTI harmonic, it is possible that such high harmonics are selectively amplified by room modes in the same way as a Helmholtz resonator can pick out high partials from a musical sound.

Consider that if the 38th harmonic is evident in a 0.1 Hz analysis, then the associated fundamental must have a bandwidth of 0.1/38 or 0.003 Hz. More explicitly, if the 38th harmonic appears at 30.2 ± 0.1 Hz, which it does in Figure 11 of [10], then the fundamental can be accurately specified as 0.795 ± 0.003 Hz. Curiously, this value, which here derives from Vestas V90 turbines, comes close to the specified 0.790 Hz at rated power for the Suzlon S88 controller (set out above). The similarity in BTI frequency suggests that both machines use a similar, tightly specified rotational frequency, and it is this condition which promotes turbine entrainment.

The conclusion is that the high harmonics are sensitive indicators of a narrow-band synchronised condition, and it is a short step to the hypothesis that these high harmonics may be the cause, or at least contribute significantly to, audible annoyance. It is notable that the levels measured in the 20–30 Hz band are within 10–20 dB of audibility (Fig. 8 of [10]; Fig. 3 of [26]), so it requires only a relatively small increase in sound pressure levels in this band for the sound to become audible. In comparison, the levels at 0.8 or 1.6 Hz are about 50 dB below audibility, so these infrasonic frequencies, in themselves, may be less troublesome than the harmonics they give rise to. However, since Zajamsek and colleagues observe that "the 23.3, 28, and 28.8 Hz frequencies are well below the perception threshold" of ISO:226–2003, could there be any other additional factor – over and above constructive interference – responsible for making the sounds audible?

Short-term amplitude fluctuations

The answer could lie in the particular signal processing used. As Zajamsek et al. note, the recorded signal may include "important characteristics that can be averaged out during normal statistical processing methods" (p.2 of [10]). Indeed, it is suggested here that short-term levels, perhaps over 10–15 seconds, might be higher at certain epochs within the 2-minute averaging window. If the period of in-phase synchronisation occurred for say just 10 seconds during a 10 minute sampling period, and if 5 turbines became coherent, then the peak recorded level would be about 7 dB above the average level. An additional 7 dB would place the identified harmonics close to the average threshold of audibility, especially if the ear uses a peak pressure detection scheme [23] and sensitively hears modulation of higher frequency sounds.

It is worth noting that high harmonics also appear at other occasions when the same resident reported 'high annoyance' (Figure 7) and when another resident in another household also did so. However, one anomaly is that the fundamental and its high harmonics do not always appear (Figures 6, 7, 11) every time a resident reports annoyance. It is possible the lack of correspondence might relate to timing uncertainties: intermittent coherence means the analysis windows may not always neatly correspond with the 'annoyance' windows.

A technique to successfully detect intermittently coherent infrasound might involve a refinement of a method used by Doolan and colleagues [10, 22, 26]. These workers analysed wind turbine noise and correlated it with resident annoyance, finding some weak trends. Circumstantially, their work points to acoustic energy below 10 Hz as a possible cause of objectionable thumping at a repetition rate of about 1 Hz. Significantly, when short-term (0.125 ms) fluctuations were investigated using a peak-detection algorithm, variations in unweighted SPLs of up to 10 dB were found. Such variations are consistent with the presence of coherent infrasound that is fluctuating in and out of phase (and may have been larger if the

measurements had been made in the 20–30 Hz band instead of the selected 10–1000 Hz band).

Other wind farm studies have also reported short-term fluctuations, and an analysis by Cummings [27] has highlighted a pronounced low-frequency variability. In a separate English case study, a particular 60-second recording shows a clear 0.8 Hz infrasonic component in the waveform until two-thirds of the way through, at which point the infrasound suddenly fades away (reproduced as Fig. 8 of [7]). At the Macarthur wind farm in Victoria [21], Evans observed a sudden increase in infrasound levels which generally affected scores of 10-minute monitoring windows before suddenly disappearing (p. 33 and Figs 17, 18 of [21]). In this case, because the elevated levels (as high as 75 dB-G over 10 minutes) were not associated with changes in wind speed or direction, he believed they were due to 'extraneous' sources and hence they were systematically removed. The concern raised by the coherent infrasound hypothesis is that these instances of extraneous sources, and multiple other similar occasions (e.g., pp. 2, 30, 35, 40, 43, 45, 50, 51, 52, 58 of [21]), may represent an entrained condition of the wind turbines. It is therefore difficult to decide whether the Macarthur report's conclusion – that wind farms contribute little to infrasound and low frequency noise – is robust. This is especially the case when, curiously, not even the fundamental or harmonics of the blade pass frequency appear in any of the displayed spectral plots.

The major limitation of the analysis methods used so far is that they assume the signal is stationary – an almost universal assumption which tends to obscure infrasound that becomes coherent only intermittently. For example, some Canadian work [28] found that average sound levels increased by about 5–10 dB in the 20–30 Hz band after a wind farm was installed in Ontario; however the data was plotted as long-term averages, not peak readings. There could have been many short periods when sound levels were above the threshold of hearing. In some subsequent Australian monitoring work by Doolan and colleagues [26], the frequency resolution was limited to 2 Hz, which misses narrow harmonics; however, in a later undertaking [22] the frequency resolution was higher (0.1 Hz) but an averaging time of 2 minutes was used as standard. Perhaps because of this, narrow band analysis did not reveal harmonics beyond the 7th, and the harmonics were not always seen. Broad correlations with annoyance were found, but there were inconsistencies as well.

It therefore seems crucial that the selected bandwidth settings and signal processing routines are designed to detect nonstationary infrasonic signals. The analysis needs to be narrow band (so that all the BTI harmonics can be detected) and use little averaging, and this combination will involve some compromises in time and frequency resolution as well as with signal-to-noise ratio.

CONCLUSION

The long-standing puzzle has been that standard acoustic measures do not correlate well with reported wind farm annoyance [26] and that the average detected levels appear to be below the threshold of audibility [9, 22]. To resolve this paradox, the concept developed here has been that wind turbine infrasound can be narrow band, have multiple sources, and occur intermittently as the sources drift in (and out of) phase. When two or more sources become entrained, interference at the fundamental of the BTI frequency (0.8 Hz) will give a pattern of nodes and antinodes, and there will also be a different (but related) pattern of nodes and antinodes for each harmonic. If a particular harmonic in the 20–30 Hz band happens to have two or more sources in phase at the measuring point [5, 7], the increased sound pressure level produced has the potential to be audible, and the proposal here is that the intermittency of the in-phase and out-of-phase conditions might underlie wind turbine annoyance. Whenever the blades become synchronized (perhaps for many tens of seconds) the intensity of the fundamental and some of its harmonics could, at nodes, be at least 6 dB larger, but the levels will revert to baseline when the sources fall out of synchrony (Fig. 8 of [7]).

A lingering puzzle is why some people complain of effects from wind farms which persist for hours, not effects which come and go. Such long-lasting symptoms such as headaches and pressure in the ears might be the outcome of pressure effects within the middle ear [29], a possibility only more research can decide.

Taken together, the evaluations made here provide indications that intermittent coherence could be the physical basis for the annoyance of wind farm noise. One key factor is the precise frequency setting of the wind turbine control circuit, and the other is the universal tendency for coupled oscillators to synchronise. The work builds on the 'heightened noise zone' idea of Thorne and colleagues and gives it added weight by regarding the BTI signal as the primary contributor to the problem – this signal carries most of the acoustic energy and has the power to force entrainment of neighbouring blades that are turning at close to the same frequency. The impulse and its many harmonics generated by BTI could also set off resonant room modes in the 20–30 Hz band. The electronic controllers built into wind turbines are identified as exacerbating the noise problem by increasing the chances of entrainment.

If the human ear can hear wind turbine noise, while the measurements say the noise is inaudible, then the remedy is better measurement techniques. The Information Paper's position – that because instruments do not measure anything above ambient background levels then the sound cannot be a problem – may be giving precedence to measurements that could be inappropriate or incorrectly interpreted. If people living close to wind farms report troublesome noise then the preferred response is to find the source of the problem, not question the validity of the reports.

This paper suggests that the apparent paradox between what is heard and what is measured might be resolved by recognising the tonal nature of infrasound at the blade passing frequency (0.8 Hz) and of its harmonics, which may extend to 20–30 Hz. More measurements need to be made at these frequencies and at distances up to tens of kilometres. Measurements at multiple points are needed so that a map of infrasound nodes and antinodes under various conditions can be established. Theoretical studies of the interference patterns caused by regular arrangements of wind turbines would also provide insight.

A relatively simple solution to the problem of wind farm noise may be the one proposed by Doolan and colleagues:

ensure the blades never operate in synchrony. Synchronisation is inherent in the Suzlon turbines with their fixed speed–variable pitch design, although it is not the case with more modern variable speed designs [12]. Even with modern machines, however, the tendency for any set of physical oscillators to synchronise needs to be recognised.

Hopefully this paper will prompt a re-evaluation of wind farm infrasound and how it might lead to audible disturbances. Some of the statements in the NHMRC Draft Information Paper appear to be questionable and may be better reframed. For example, the NHMRC's statement that infrasound from wind turbines does not differ from other natural sources seems inconsistent with the observation that such infrasound has strong tonal components. Its reported effects, including annoyance and disturbed sleep, might be studied by simulated wind turbine noise generated by a speaker, as the draft report recommends (p.20), although reproducing sound with a flat frequency response down to 1 Hz and with accurate phase would no doubt be challenging.

Similarly, there is mounting evidence that wind farm noise can be heard at much more than the 500–1500 m specified by the NHMRC, particularly at night. The review recommends more research into "wind turbine signature" and for field measurements "ranging from 500 m to 3 km and beyond" (p.20). From the issues raised here of the behaviour of coherent infrasound, distances of 8 km and more may be more appropriate. Although measuring down to 0.8 Hz is possible, an easier approach technically may be to use narrow band analysis to detect high harmonics in the 20–30 Hz band, measurements which might relate directly to reported annoyance.

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REFERENCES

[1] (various authors), "Special issue on windfarm noise", *Acoustics Australia*, 40(1), 1-96 (2012)

[2] Doolan, C., "A review of wind turbine noise perception, annoyance and low frequency emission", *Wind Engineering*, 37, 97-104 (2013)

[3] Merlin, T., et al., *Systematic Review of the Human Health Effects of Wind Farms*. Canberra: National Health and Medical Research Council (2013)

[4] NHMRC, *NHMRC Draft Information Paper: Evidence on wind farms and human health*. Consultation draft, February 2014. Canberra: NHMRC (2014)

[5] Doolan, C., D.J. Moreau, and L.A. Brooks, "Wind turbine noise mechanisms and some concepts for its control", *Acoustics Australia*, 40(1), 7-13 (2012)

[6] Thorne, R., "The problems with 'noise numbers' for wind farm noise assessment", *Bulletin of Science, Technology & Society*, 31, 262-290 (2011)

[7] Thorne, R., Wind Farm Noise and Human Perception. *Enoggera: Noise Measurement Services* (2013)

[8] Bakker, H.H.C. and B.I. Rapley, *Sound, Noise, Flicker and the Human Perception of Wind Farm Activity*. Palmerston North: Atkinson & Rapley Consulting (2010)

[9] Evans, T., J. Cooper, and V. Lenchine, *Infrasound Levels Near Windfarms and in Other Environments*. Adelaide: Environment Protection Authority of South Australia (2013)

[10] Zajamsek, B., et al., Simultaneous indoor low-frequency noise, annoyance and direction of arrival monitoring, in *Proceedings, Fifth International Meeting on Wind Turbine Noise*, Denver CO, 28-30 August 2013

[11] Harper-Somers-O'Sullivan, *Environmental Assessment for Black Springs Wind Farm*. Sydney, Wind Corporation Australia (2006)

[12] AEMO, *Wind Turbine Plant Capabilities Report*. Melbourne: Australian Energy Market Operator (2013).

[13] Bianchi, F.D., H. de Battista, and R.J. Mantz, *Wind Turbine Control Systems: Principles, Modelling and Design*. New York: Springer (2007)

[14] Hansen, M.O.L., *Aerodynamics of Wind Turbines*. London, Earthscan (2008)

[15] Leithead, W.E. and B. Connor, "Control of variable speed wind turbines: design task", *International Journal of Control*, 73, 1189-1212 (2000)

[16] McSwiggan, D., et al., "A study of tower shadow effect on fixed-speed wind turbines", Universities Power Engineering Conference, Padova (2008)

[17] Cidras, J., "Synchronization of asynchronous wind turbines", *IEEE Transactions on Power Systems*, 17, 1162-1169 (2002)

[18] Katayama, N., et al., "Theoretical study on synchronization phenomena of wind turbines in a wind farm", *Electrical Engineering in Japan*, 155, 9-18 (2006)

[19] Pikovsky, A., M. Rosenblum, and J. Kurths, *Synchronization: A Universal Concept in Nonlinear Sciences*. Cambridge: CUP (2001)

[20] EPA South Australia, *Waterloo Wind Farm Environmental Noise Study*. Adelaide (2013)

[21] Evans, T., *Macarthur Wind Farm Infrasound and Low Frequency Noise: Operational monitoring results*. Adelaide: Resonate Acoustics (2013)

[22] Zajamsek, B., D.J. Moreau, and C. Doolan, "Characterising noise and annoyance in homes near a wind farm", *Acoustics Australia*, 42(1), 14-19 (2014)

[23] Moller, H. and C.S. Pedersen, "Hearing at low and infrasonic frequencies", *Noise and Health*, 6(23), 37-57 (2004)

[24] Cooper, J., T. Evans, and D. Petersen, "Tonality assessment at a residence near a wind farm", in *Proceedings, 5th International Conference on Wind Turbine Noise*, Denver CO, August 2013

[25] Hansen, K., B. Zajamsek, and C. Hansen, *Noise Monitoring in the Vicinity of the Waterloo Wind Farm*. Independent report to M. Morris (2014). Available at http://waubrafoundation.org.au/wp-content/uploads/2014/08/Hansen-Zajamsek-Hansen-Noise-Monitoring-at-Waterloo1.pdf

[26] Doolan, C.J. and D.J. Moreau, "An on-demand simultaneous annoyance and indoor noise recording technique", *Acoustics Australia*, 41(2), 141-145 (2013)

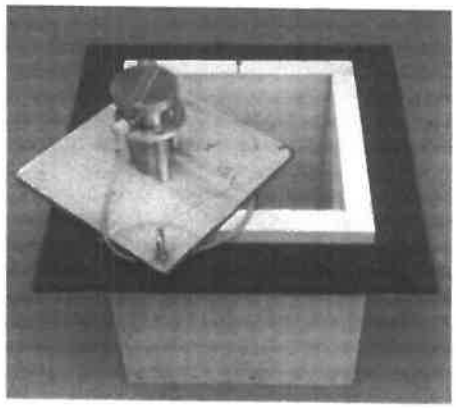
[27] Cummings, J., "The variability factor in wind turbine noise", *Fifth International Conference on Wind Turbine Noise*, Denver, August 2013

[28] Howe, B., N. McCabe, and S. Ferguson, "Infrasonic measurements, pre- and post-commissioning, Ontario wind farm", in *Proceedings, Fifteenth International Meeting on Low Frequency Noise and Vibration and its Control*, Stratford-upon-Avon, U.K., May 2012

[29] Bell, A., "Annoyance from wind turbines: role of the middle ear muscles [letter]", *Acoustics Australia*, 42(1), 57 (2014)

* Attachment - H. Smith

Development and installation of an infrasonic wake vortex detection system at Newport News International Airport



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WakeNet-Europe 2014, Bretigny, France
May 13-14, 2014

Outline

- Background of Infrasonic Work
- Development of an Infrasonic Detection System.
- All-weather Wake Vortex Operational System.
- Field installation at PHF Airport
- Conclusions

Background

Technologies evaluated over last 40 years for mitigation/ avoidance

- Millimeter wave radar
- Sodar (sonic detection and ranging)
- Anemometer-based ground wind lines
- Pulsed and continuous-wave LIDAR
- Electromagnetic radar (NEXARD)
- Opto-acoustic sensors
- Phased-microphone Array

Wake Vortices and Infrasonic Emissions

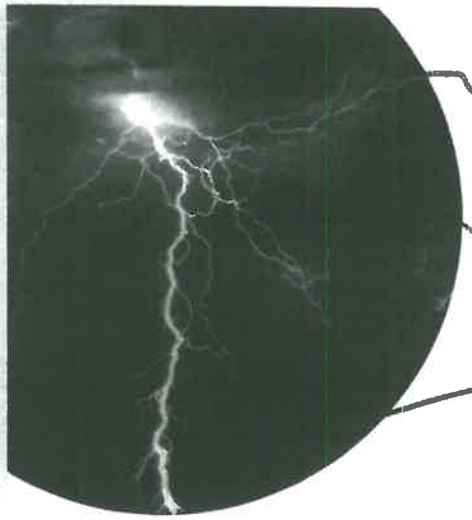
- A vortex-warning detector using infrasonic sensor was first proposed by Bedard (NOAA) in early 1970s for altitude estimate, strength, and spatial extent.

- Later T. M. Georges (NOAA) suggested that as infrasound from aircraft wake vortices travels over relatively long distances and could be useful for wake vortex detection (June 1971).

- Hardin-Wang-Wassaf (2004) suggested that wake vortex detection might be accomplished utilizing infrasonic transducers such as those employed in nuclear test monitoring.

Infrasound

(sound at frequencies below 20 Hz)



1000 Hz → 90% energy of 1000 Hz is absorbed after traveling just 7 km

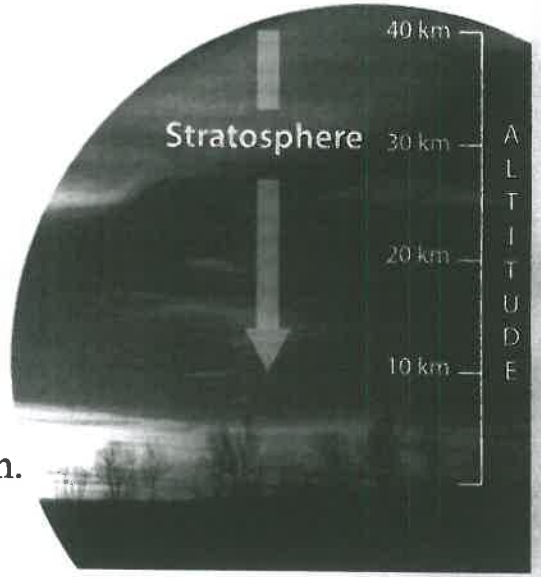
1 Hz → Same energy at 1 Hz is absorbed after traveling 3000 km

0.01 Hz → Same energy at 0.01 Hz is absorbed after traveling around the Earth's circumference

"Infrasound" *propagates over long distances with little attenuation due to two reasons;*

First, atmospheric absorption is practically negligible at infrasonic frequencies, and

Secondly, there is an acoustic ceiling in the stratosphere, where a positive gradient of the sound pressure with altitude causes reflections of infrasonic rays back to Earth.



Wind Noise Problem

- The atmosphere is inherently noisy.
- Infrasound signals are typically contaminated with wind noise
- Effective wind screening is vital.
- Past methods of screening a microphone from the wind (A low-frequency mechanical filter) used are:
  1) Piped array, 2) Enclosure, 3) A barrier, and 4) An open mesh
- The conventional systems becomes ineffective if wind speed exceeds few meters/sec.

Conventional Infrasonic Detection System

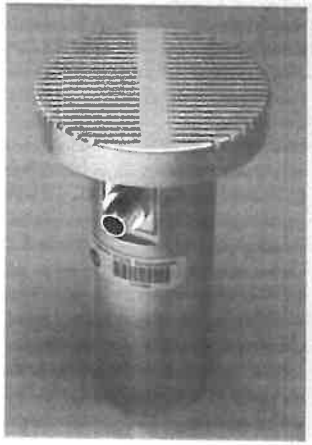
- Need of large "soccer field" type area.
- The soaker hoses require replacement every few months.
- The system become ineffective when wind speed exceeds a few meters per second.

Difficulties to detect Infrasound at Airports

- Airports have noisy environment.
- Due to open field the signals are contaminated with wind noise.
- No compact infrasonic detection systems (suitable for airport environment) were available until recently.
- Non-availability of all-weather system until recently.

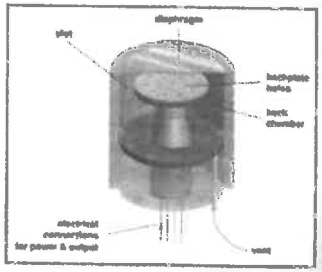
Design and Development of an Infrasonic Microphone

- The performance of any microphone depends upon an electrical and mechanical system of the microphone.



- The function of the mechanical system is to provide damping of the membrane motion.

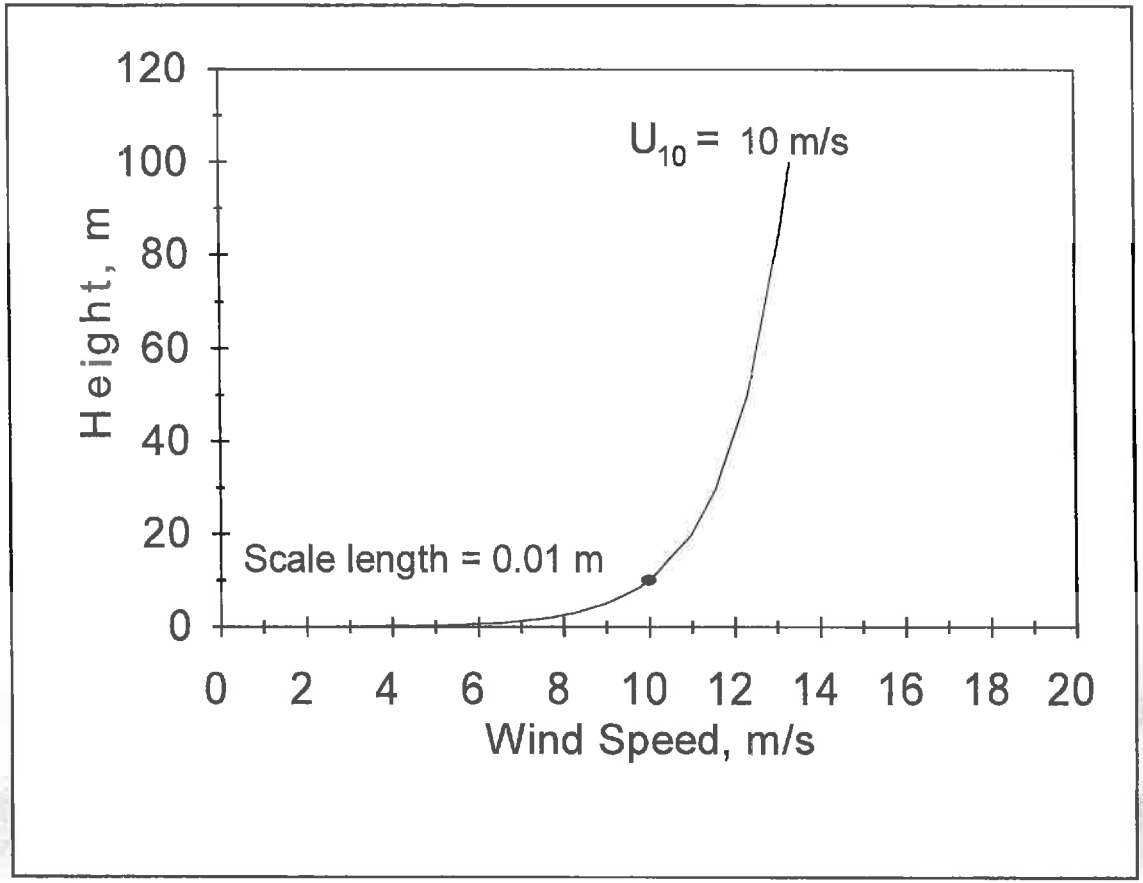
- The back chamber serves as a reservoir for the air flow through the openings in the back-plate.



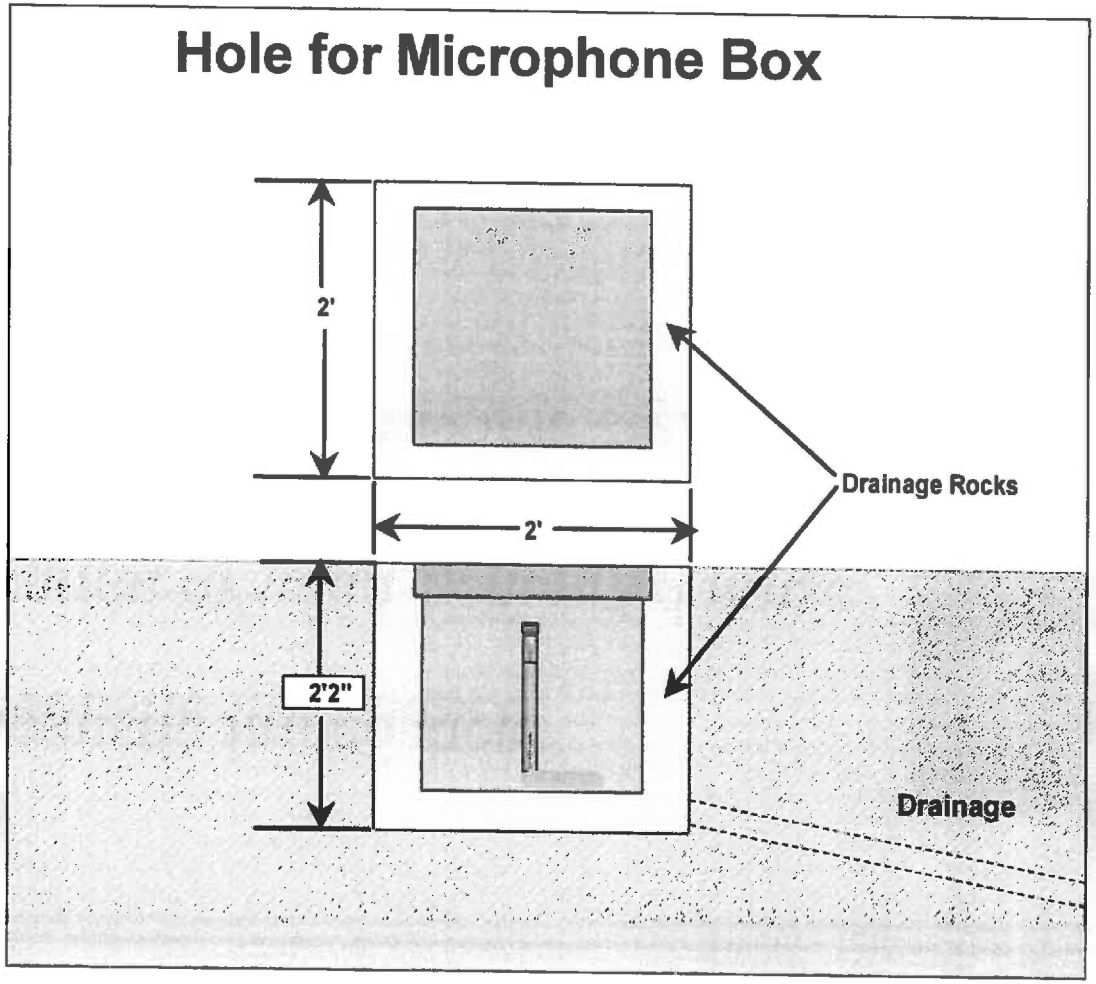
- Electret-based technology offers the lowest possible background noise, as Johnson noise generated is minimized.

- The microphone was built by PCB Piezotronics under contract to NASA Langley Research Center.

Vertical profile of horizontal wind

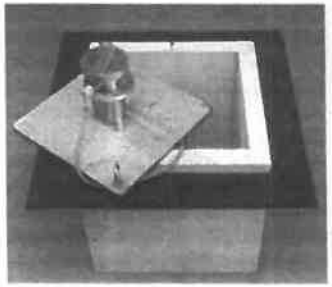


Sub-surface Infrasonic Windscreen



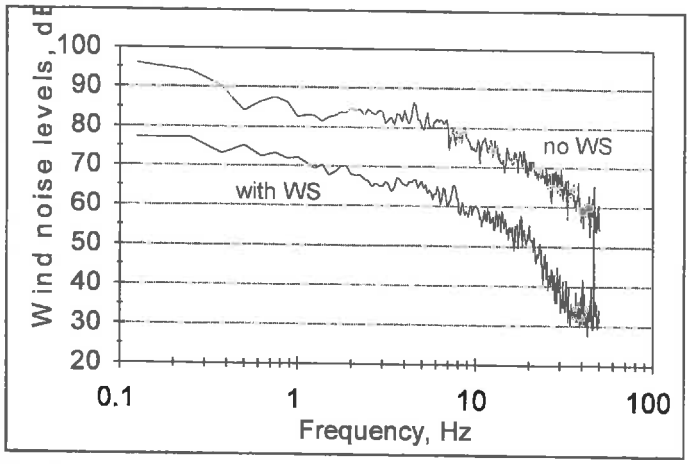
Design and Development of Compact Windscreen

- Low acoustic impedance
- Attenuation of wind-generated noise
- Transmission of infrasonic signal
- No water retention

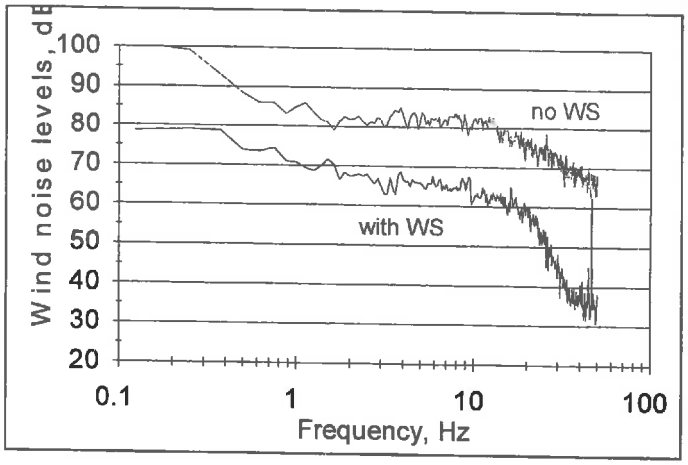


Wind Noise Reduction

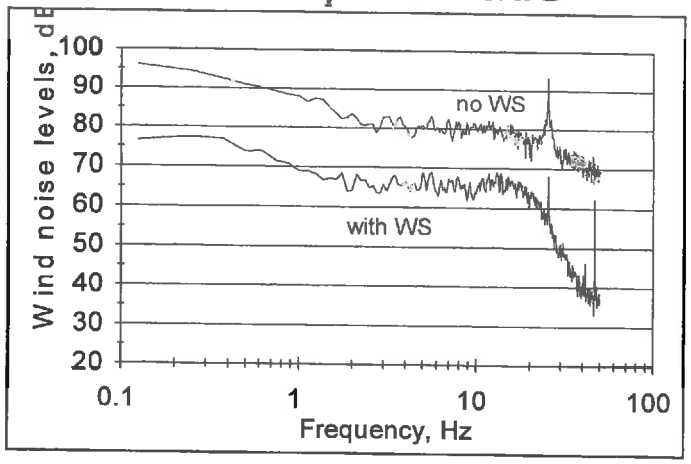
Wind speed 3 m/s



Wind speed 5 m/s

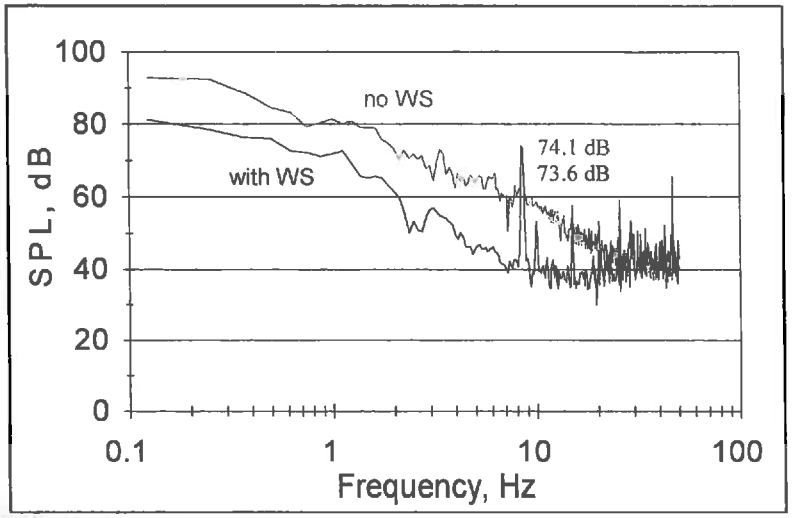


Wind speed 7 m/s



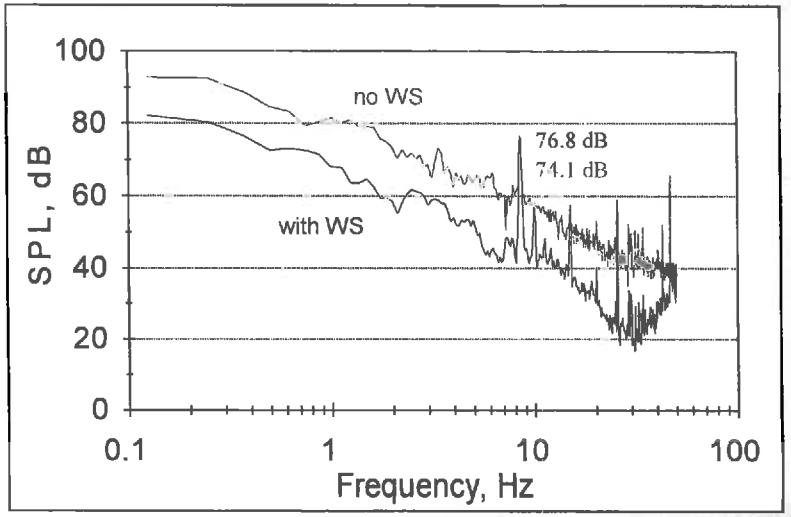
Signal Transmission

4 lb foam



Net gain -0.5 dB

15 lb foam



Net gain 2.7 dB

Field Testing

- Simulated Point Source Output

  104 ± 0.2 dB @ 8.75 Hz

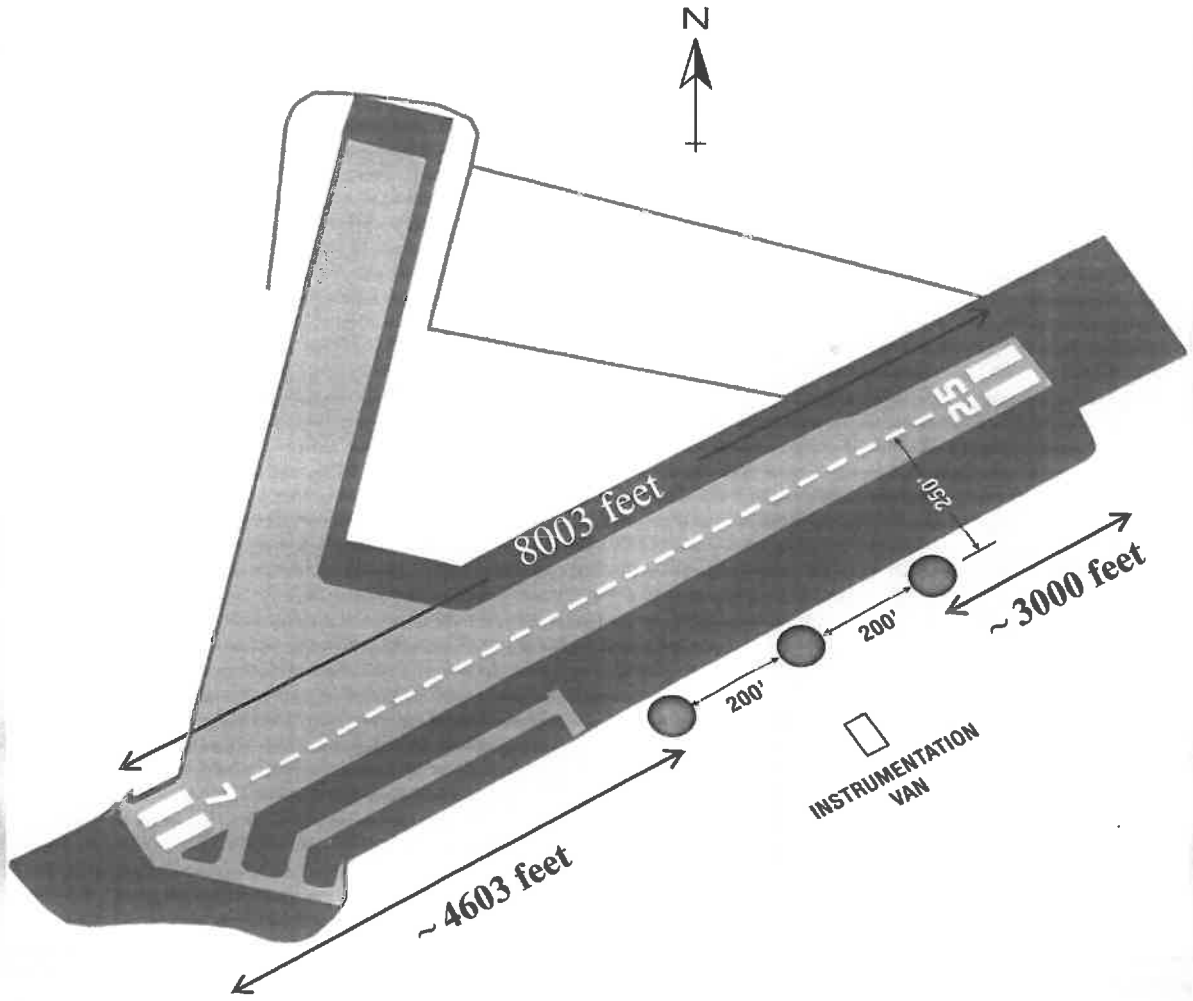
- The acoustical response of each microphone can be recorded, and compared for 6 dB per doubling of distance.

- For a distance of 145 feet, # of doubling will be 5.466 and ΔdB = 32.796 hence the signal received at the system should be 71.204 dB

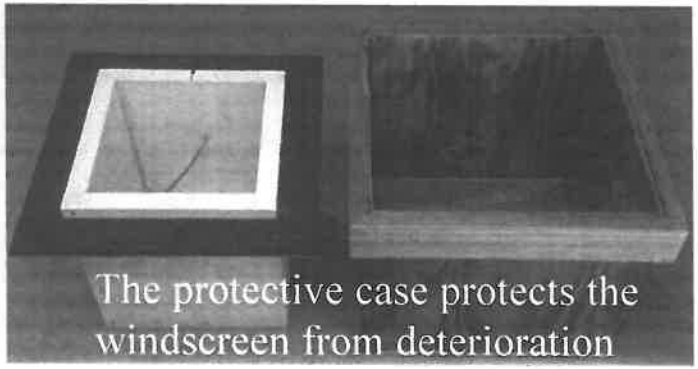
Sensor Performance as a Field Array

Performance Criteria	Infrasonic Microphone
Power (mW)	35 mW
Self-Noise (dB at 1 Hz)	-105
Self-Noise (rms 0.1 – 10 Hz)	20 μPa
Dynamic Range	Approximate 120 dB
Location Limitations	None
Custom Modification	Easily Tailored
Field Calibration	Yes

Microphone Array Installation at the PHF Airport



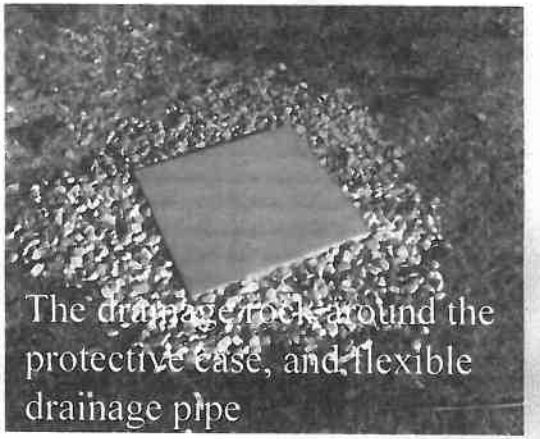
Microphone Array Installation at the PHF Airport



The protective case protects the windscreen from deterioration

Windscreen inside the protective case

Infrasonic Microphone and windscreen



The drainage rock around the protective case, and flexible drainage pipe

Microphone Array Installation at the PHF Airport

- The spacing between microphone systems exceed the outer scale of turbulence of the inertial subrange ~ 30 feet
- The convected (non-propagating) pressure fluctuations are prevented from reaching the microphone by windscreens.
- The drainage rock around the protective case remove rain water from the immediate vicinity of the windscreen assembly.
- The system is a truly all-weather system.

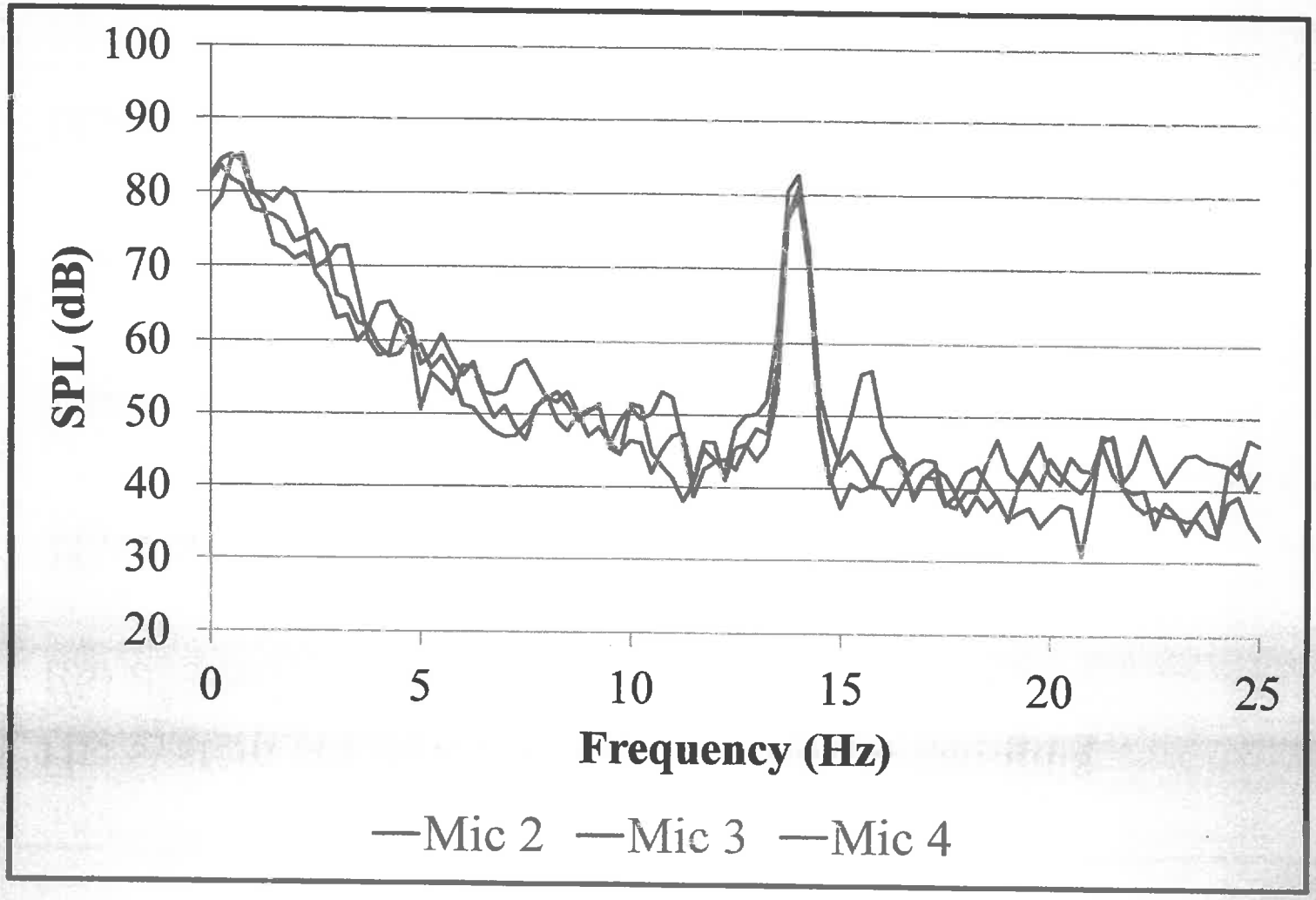
Field Calibration

- Long-term service requires continual monitoring of the health of the system.
  - Calibration
  - Characterization

- The removable lid permits access to the microphone for calibration by a recognized method, e.g. a pistonphone.

- The calibration of pistonphone is referenceable to a standard.

Field Calibration

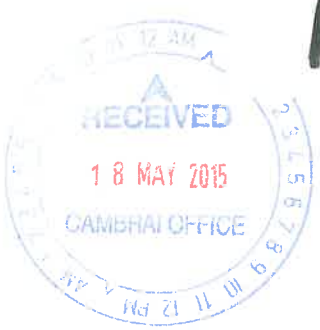


Conclusions

- The system conforms to airport safety constraints
  (no obstacles near the runway or flight path)
- Have all-weather service capability.
- Have field calibration capability.
- Have site proximity to avoid intervening effects.
- Have fail-safe operation.
- Provide service for take-off, approach, and landing.

79

«Assessment_No»



DEVELOPMENT ACT, 1993

REPRESENTATION ON APPLICATION

CATEGORY 3

Development Number 711/072/14

My Name Amanda Vance My Telephone Number 0400 330 987

My Address 331 Sunnyview Rd, CAMBRAI Postcode 5353.

This representation is in relation to the application by:

Trustpower Australia Holdings Pty Ltd

For consent to:

Erect a wind farm

proposed to be located at:

Palmer, Tungkillo, Jutland and surrounding areas in the Hills Policy and Marne Watercourse areas of the Mid Murray Council.

The address of the property affected is 331 Sunnyview Rd,

(your property address) CAMBRAI

The specific aspects of the application to which I make comments on are:

Please see attached documents.

(see also attached comments)

My concerns would be overcome by: MMC rejecting any application for Industrial Wind Turbines to be built on the Eastern Mt Lofty Ranges.

(see also attached comments)

To:

Director, Development & Environmental Services, Mid Murray Council

PO Box 28, Mannum, 5238

Mr. Kelvin Goldstone

Re: Trust Power Palmer Wind Farm Development Application 711/072/14

Trust Power's application for a wind farm located near Palmer should be refused for the reasons laid out below, which are in conflict with the cited clauses of the Mid Murray Council Development Plan:

1. Environmental damage: land, watercourses and ground water, native vegetation, fauna and noise pollution. The impact of the proposal is in conflict with council wide objective 29 and Principles of Development Control (PDCs) 39, 42, 43, 87, 92, 93, 163, 164, 168, 169, 170, 175, 176, 180, 185, 190, 192, 196, 197, 199, 215, 398; rural zone objectives 6, 16, 17, 23 and rural zone PDCs 4, 6, 7, 12, 18; and hills policy area objectives 1, 2, 3 and hills policy area PDCs 1 and 4a.

   The proposal is not harmonious with existing land uses and district character. This is in conflict with council wide objectives 7, 15, 18, 19, 25, 26, 29, 30; council wide PDCs 5, 43, 55, 78, 79, 87, 88, 91, 97, 155, 160, 163, 165, 166, 167, 173, 188, 190, 398, 399; rural zone objectives 6 and 16; rural zone PDCs 4, 19, 43; and hills policy area objectives 1, 2, 3 and hills policy area PDCs 1, 3, 4a.

3. The proposal does not provide for care and wellbeing of the community. This is in conflict with council wide objectives 9, 15, 25, 26, 29; council wide PDCs 43, 88, 92, 166, 175, 188, 388, 397, 398, 399; rural zone objective 17; rural zone PDC 12; and hills policy area objective 2.

4. The proposal is not an efficient or effective use of land; wind turbines are neither efficient (<40%) nor effective (unreliable output) producers of electricity. Council wide PDC 396 requires that wind turbines should be located in areas that maximise efficient generation and supply of electricity. The proposed location does not maximise efficient generation and is too far from the major loads on the grid to maximise efficient supply of the generated electricity, so is in conflict with that PDC. Conflict also exists with rural zone objectives 6, 16, 22, 23 and rural zone PDC 18 and hills policy are objective 2 and PDC 1.

   Hazards: loss of aerial firefighting capability; this is in conflict with council wide objectives 26, 84, 85, 94, 95, 98 and council wide PDCs 46, 388, 398; rural zone objectives 6, 17, 23, hills policy area objective 2 and PDC 1.

6. Hazards: risk to traffic due to shadow, flicker and debris; these are in conflict with council wide objectives 14, 15, 16, 17, 26, 98 and council wide PDCs 34, 39, 87, 95, 396, 398; and hills policy area objective 2 and PDC 1.

7. The proposed renewable energy facility does not benefit the environment, evidenced by the conflicts cited above, does not benefit the community, as more residents lose financially and in terms of lifestyle than benefit as a result of lease payments or neighbour agreements, and does not benefit the state as the vast majority of money associated with the development flows either interstate or overseas, leaving only inflated power prices for South Australians. This is in conflict with council wide objectives 96, 97, 98; council wide PDCs 78, 92, 163, 168, 188, 396; rural zone objectives 6 and 17; rural zone PDCs 4, 6, 7 and hills policy area objective 2.

8. The damage and disruption during construction (dust, blasting, heavy vehicles) is in conflict with council wide objectives 16, 48, 50, 51, 53, 59, 64g; council wide PDCs 39, 43g, 95, 196, 197, 198, 388; hills policy area objectives 1 and 2 and PDCs 1 and 4a.

9. The proposed layout is inappropriate and is in conflict with council wide PDCs 78, 158, 388 and 397; rural zone objectives 6, 16, 17, 21 and rural zone PDCs 4 and 19; hills policy area objective 2 and PDCs 1, 3 and 4a.

10. The visual amenity of the region would be compromised. While the misguided ministerial "wind farm" development plan amendments (largely seen in a dim light by the Development Planning Advisory Committee) are lenient toward wind turbines, the following notable conflicts remain: council wide objectives 15, 25, 26, 50, 54; council wide PDCs 55, 78, 79, 155, 158, 159, 160, 170, 173, 190, 397; rural zone objective 6; rural zone PDCs 18, 19; hills policy area objectives 1, 2, 3; hills policy area PDCs 1, 3, 4a.

11. If approved, the proposal will have a negative impact on most of the property values in the area. It should be noted that only host properties have ongoing income; neighbour agreements are non-transferable. The effect on property values in the region is in conflict with council wide objectives 9, 25, 29, 98; council wide PDCs 55, 79, 88, 91, 160, 162, 163, 167, 188, 388, 398; rural zone objective 16 and PDC 19 and hills policy area objectives 1 and 2.

12. The proposal is very close to the edge of the Barossa Character Protection District, so close in fact that it will compromise the values the Protection Legislation seeks to preserve. This is in conflict with council wide objectives 50, 54, 98, council wide PDCs 55, 155, 158, 167; rural zone objectives 2, 6, 16, 21; rural zone PDCs 22, 43; hills policy area objectives 1 and 2 and hills policy area PDCs 1 and 3.

Further Comments

(1) an extra 4,000 odd truck trips - conflicts council wide PDC 34, 87(h). (Better have a grader on standby for Bundilla Rd.

(2) CFS Fact sheet, - conflicts council wide obj 85, 94,

(3) Conflicts council wide obj 50, 51, 54.

(4) Conflicts Hills Policy obj 2, PDC 3. It seems the scenic in yellow 4a looking to the natural in blue is the most affected on maps 4b and 4c. When did Giant Industrial Wind Turbines become scenic!!?

Conclusion

The Mid Murray Council DAP should refuse planning permission for the proposed wind farm Development Application 711/072/14 because it is in conflict with much of the Mid Murray Council Development Plan.

Please see the submission of the Eastern Mount Lofty Ranges Landscape Guardians for further elaboration of the above comments.

☑ I/~~We~~ wish to be heard at the public hearing/meeting

☐ I /We nominate _____ to speak on my behalf.

☐ I /We nominate the Eastern Mt Lofty Ranges Landscape Guardians to speak on my behalf.

I/We would like for my/our submissions to be made public/~~private~~.

Yours Sincerely,

17/05/2015

17th May 2015

Dear Panel,

Whats the difference between upwind and downwind turbines? What is dBA and dBG? Whats the difference between minimise and maximise? What is a nacelle? If you cant not answer just one of these questions, how can you be qualified to make such a massive decision as to whether or not to litter our beautiful hills with Giant Industrial Turbines.

After many, many hours, days, months and years of seeking information of these monsters (since the inception of the Keyneton proposal), I have been astanded by the assumption (still) that Industrial Wind Turbines pose no harm and are safe. Starting from the construction of the components (steel, fibreglass, rare earths etc) in foreign countries, with less stringent emmission rules through to the construction, desecration of what vegetation remains after years of abuse from farmers and previously wood cutters for steam engines. And once they are up it has been proven that infrasound, a by product produced by these monsters, can cause multiple health problems to humans. I wonder what health problems, other than slaughter of birds and bats, do they pose for animals. Anectdotal evidence of yokeless eggs, deformed sheep and minks kept in captivity killing each other etc.

Our homes and community are at a real risk if there are more fires in the hills. Wind turbines do catch fire. Once accessible to fight from the air now a no go zone.

As a cancil it is stated in your Development Plan Objectives - Introduction page "Orderly development conducive to the creation of the safe, convenient and pleasant environment, in which to live. The retention of rural land for the purposes of primary production, recreation, and water and nature conservation. What part of that dont you get?

Denmark (as of the 4th May 2015 has refused to issue any further permits for wind farms due to "health concerns from infrasound. A landslide victory in the UK Election just last week was partly due to David Cameron pledging to stop future government funding to wind farm projects.

Infrasound is a very real thing. The NHMRC concluded in their statement on the 11th Feb 2015 that further high quality research on the possible health effects of wind farms is required. Further research is required to characterise wind turbine noise (including audible noise, low frequency noise and infra-sound) at distances ranging from 500 metres to 3 kilometres and beyond in different terrains and under varying weather conditions. Meldanda is my neighbour and I love all the work that has been done there, but I think you will have trouble with the sleepovers. As the turbines get bigger the noise travels further. How much further nobody knows. (or is prepared to say).

Today is a beautiful, calm, sunny autumn day. I just picked up 500 trees from TFL and I'd rather be outside getting started on planting (my way of helping climate change, change) adding to the 1,000's I've already planted. I seriously implore you to REJECT Trustpower's application.

Thank you for your time.

Signed

A Vance.

Amanda Vance

P.S. On the plus side I have met many like-minded new friends.

2. Construction period has been assumed to be about 18 months.

3. Assumed an average of 22 working days per month

4. It has been assumed that concrete materials are to be provided by an outside source (e.g. quarry) and then are to be processed by the on-site concrete batching plant. If materials were able to be sourced on site or nearby than the trip generation would be significantly less

5. It has been assumed that road base materials are to be provided by an outside source. If materials were able to be sourced on site or at a nearby quarry than the trip generation would be significantly less

6. It has been assumed that the wind turbine towers and wind monitoring masts will be 100 m tall

7. It has been assumed that there are a total of six wind monitoring stations (two per site)

8. Based on an estimated maximum workforce at any one time of 200, and assuming a vehicle occupancy rate of 1.5 persons per vehicle.

9. The traffic movements do not include those required for the transmission line and any works at Tungkillo as this is unknown at the time of preparation of this report.

The total one-way vehicle trips estimated for the construction phase of the proposed wind farm are shown to be reasonably significant, comprising of approximately:

- 2 282 over mass and over dimensional trips;
- 45 318 truck trips; and
- 105 600 car trips.

The above listed trips however, will occur over a minimum 18 month period. When broken down to average trips per month and per day the impacts on the road network are shown to be more reasonable. The average daily trips are:

- 6 over mass and over dimensional trips. If these trips are carried out during off-peak hours and are delivered to Palmer from Port Adelaide, the impacts on the road network would be minimised. It should be noted that this number accounts for loaded vehicles accessing the site and unloaded vehicles leaving the site. It is likely that the over mass vehicles will be within mass limits once unloaded and a number of the over dimensional vehicles will be within legal size requirements once unloaded, hence this figure is very conservative;
- 114 truck trips. The average number of daily truck trips on the surrounding road network could be further reduced if materials for concrete and pavement could be sourced on site or from a nearby location. The implementation of a temporary storage area for equipment and vehicles within the temporary construction compound would also further assist in reducing the number of heavy vehicle trips generated; and
- 267 car trips. These trips will primarily be associated with employees arriving to/from work. Carpooling should be encouraged amongst employees.

6.2.2 Trip Distribution

The vehicle trips associated with the construction phase will access the site via three key transport routes as discussed in Section 5 and highlighted in Figure 36.

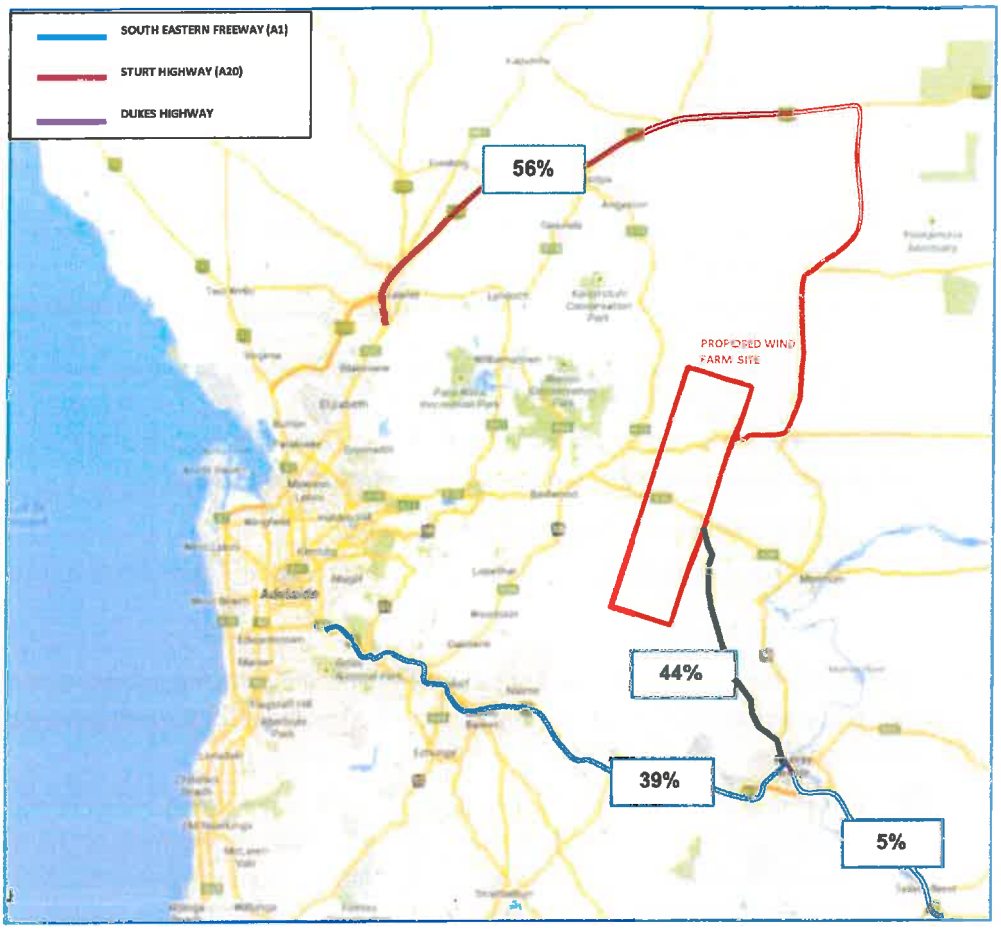


Figure 36 Estimated Trip Distribution for traffic generated by proposed Wind Farm in construction phase

These include:

- Dukes Highway. It is currently assumed that about 10% of over dimensional/mass vehicles and 20% of truck trips would access the site from areas in the south east via this route, such as Melbourne. This results in 6% of total vehicles accessing the site from the Dukes Highway.
- Sturt Highway. It is recommended that all remaining dimensional/mass vehicles (90%) utilise the Sturt Highway Route to avoid height restrictions on the South Eastern Freeway. It is also assumed that 70% of truck trips and 50% of employee trips will also utilise this route. This results in 56% of total vehicles accessing the site from the Sturt Highway.
- South Eastern Freeway. It is assumed that the remaining 10% of truck trips and 50% of employee trips will utilise the South Eastern Freeway Route, resulting in 38% of all trips utilising the South Eastern Freeway to access the sites.

As both the Princes Highway/Dukes Highway and the South Eastern Freeway traffic will access the sites from Murray Bridge, 44% of the total construction traffic will be accessing the sites using the routes specified in Section 5.3 Port Adelaide to Palmer (via South Eastern Freeway).

The use of all three transport routes for construction vehicles would alleviate the overall traffic impacts on the surrounding road network. The majority of the delivery of over dimensional and over mass loads however, will be via the same transport route via Sturt Highway. Consistency with the travel route for over dimensional and over mass vehicles would assist the permit approval process, as well as improve safety for the local community and road users due to familiarity.

- Highways / Major Roads – Including the South Eastern Freeway, Sturt Highway and Dukes Highway. All are currently designated as a key B Double freight routes, as well as a principal routes for over mass and over dimensional loads. These highways and major roads are primarily single carriageway, but with frequent overtaking lanes along the route.

Site Access Routes

All road routes from Adelaide and / or Melbourne are primarily either National Highways or State Roads and, subject to statutory permit conditions, can accommodate the proposed wind farm related over dimensional and over mass vehicles.

While this study has given consideration to feasible road transport routes, the final choice of route is dependent upon the final delivery location of the wind turbine equipment, the transport contractor selected, the availability and type of vehicles at the contractor's disposal and the route that is acceptable to authorities. Trustpower, together with the transport contractor(s) will develop alternate transport strategies dependent on the item being delivered and where it is being sourced.

Access to the proposed wind farm site may be via three main transportation routes:

- Port Adelaide to Palmer (via Sturt Highway);
- Port Adelaide to Palmer (via South Eastern Freeway); and
- Melbourne to Palmer (via Dukes Highway)

In identifying the preferred site access route(s) the following road constraints associated with transporting over dimensional and / or over mass loads were considered:

- Structural constraints such as bridges and drainage culverts;
- Sharp bends, curved sections and steep grades; and
- Height constraints such as tunnels and bridges.

Current approved B Double and Over Dimensional Routes are to be utilised where possible.

Traffic Impact Assessment

The primary impact, in terms of road network performance and safety, will be during the 18 to 24 month construction period where a large number of vehicle movements will be generated over a short period of time.

The total one-way vehicle trips estimated for the construction phase of the proposed wind farm are shown to be reasonably significant, comprising of approximately:

- 2 554 over mass and over dimensional trips;
- 49 293 truck trips; and
- 105 600 car trips. .

The above listed trips however, will occur over a minimum 18 month period. When broken down to average trips per month and per day the impacts on the road network are shown to be more reasonable. The average daily trips are:

- 6 over mass and over dimensional trips. If these trips are carried out during off-peak hours and are delivered to Palmer from Port Adelaide, the impacts on the road network would be minimised. It should be noted that this number accounts for loaded vehicles accessing the site and unloaded vehicles leaving the site. It is likely that the over mass vehicles will be within mass limits once unloaded and a number of the over dimensional vehicles will be within legal size requirements once unloaded, hence this figure is very conservative;

Executive Summary

Project Overview

Trustpower Australia is investigating the potential for a wind farm development in the Mid Murray Council area located on the ranges between the settlements of Palmer, Tungkillo and Sanderston.

This site is approximately 30 km long along the ridgelines on roughly 10,000 hectares and has been selected due to the excellent wind energy potential and its close proximity to the Tungkillo substation.

The proposed project will include up to 114 turbines. Each turbine will be up to a tip height of 165 m, with an approximate installed capacity of up to 375 MW. The turbines will be connected by underground and overhead electrical cables to an on-site substation.

The current layout has three distinct clusters (Northern, Central and Southern) of turbines.

This Traffic Impact Assessment is one of several key technical studies that have been carried out in preparation of the development application and details the principal impacts of the transport related activities associated with the development.

The key issue with regard to traffic and transport relate to the impacts likely to arise from the additional vehicles accessing the proposed wind farm site both during its construction and operation. Particular consideration has been given to the transportation of the proposed wind farm components (including nacelles, hubs, blades, modularised tower sections and substation transformers) on account of the size and weight of these components during the 18 to 24 month construction period. A large proportion of equipment associated with the proposed wind farm will exceed South Australia's (and the majority of states throughout Australia) over mass and over dimensional vehicle limits and will therefore require special permits for transport.

Surrounding Road Network

The key roads surrounding the proposed wind farm site include the following:

- Minor Roads / Access Tracks –There are a number of minor roads surrounding each proposed cluster of turbines. These roads are generally unsealed gravel roads with a cross-section width that varies between 4 m to 6 m. The majority of these local access roads are not suitable for two-way heavy vehicle traffic, however roads accessing the proposed turbine locations will be upgraded where required to improve safety and accessibility.
- Regional / Local Collector Roads – Including Birdwood Road, Mount Pleasant-Kyneton Road, Angas Valley Road Road, Milendella Road, Ridley Road, Randell Road; and Adelaide-Mannum Road. These roads are two-lane two way sealed roads with a typical speed limit of 100 km/h., with the exception of townships where speed limits are generally reduced to 50 km/hr. Mount Pleasant-Kyneton Road, Birdwood Road, Walker Flat-Mount Pleasant Road and Adelaide-Mannum Road/Randell Road all have significant bends or grades along these roads that may cause difficulties for the transport of the proposed wind farm equipment during construction. Randell Road, Ridley Road, Milendella Road and a section of Walker Flat-Mount Pleasant Road are currently designated as general B Double freight routes making them the most suitable roads for accessing the proposed wind farm site during construction.

CFS FACT SHEET - UNDERSTANDING AERIAL FIREFIGHTING

The CFS combats bush, grass, scrub and forest fires primarily through the deployment of fire appliances and firefighters for the protection of life, property and the environment. These resources are complimented in a number of areas of the State with farm fire units, as they are a valuable resource in the overall control strategy when available.

At times, firefighting operations may be supported by firefighting aircraft and/or earth moving plant and equipment. Firefighting aircraft are a limited resource and therefore CFS places these aircraft in locations where life and assets are at the highest risk. There is no guarantee that every fire in the State will be serviced by aircraft, and the primary form of fire suppression has, and will always be, firefighters on the ground.

Community expectations

The popular perception amongst much of the community is that aircraft alone can put out bushfires. This is not true. CFS firefighters and fire appliances for the vast majority of instances are the primary and only method of controlling bushfires.

In many cases smoke from the fire ahead of the fire front makes it very difficult, if not impossible, for aircraft to identify and bomb specific targets. Aircraft cannot fly through heavy smoke, as there is a real danger that dense smoke will cause a 'flameout' of the jet turbine engine which is used to power each rotary or fixed wing aircraft in the firefighting fleet.

Deployment of aircraft to fires

The deployment of aircraft to any fire is made after consideration of many variables, risks, aircraft suitability and aircraft availability. Once committed, the decision to attack a fire is made by the air attack supervisor and the CFS Officer on the ground, based on firefighting tactics and a dynamic risk assessment. This will include an assessment of localised weather conditions, the fire's behaviour, obstructions to aircraft in the area, smoke and its effect on visibility, assets at risk, and aircraft performance parameters.

The final decision to fly or not fly the mission remains with the pilot-in-command of the firefighting aircraft.

In some circumstances aircraft cannot be deployed due to other higher priority fires, unfavourable wind and weather conditions, adverse terrain or obstructions that prevent safe flying environments.

Where vertical obstructions exist in the airspace around a fire, such as powerlines, weather masts, radio and television transmission towers, tall trees and wind turbines, a dynamic risk assessment is undertaken prior to the aircraft being committed to fire bombing operations. In some circumstances aircraft will not be utilised because risks caused by vertical obstructions exceed safe operating conditions.

For other information on the CFS Aerial Firefighting fleet, go to:

http://www.cfs.sa.gov.au/site/about_us/what_we_do/aerial_firefighting.jsp

Government of South Australia

PREPARE. ACT. SURVIVE. BUSHFIRE READY

Figure 4.1 CFS Fact Sheet

The turbines will also be shut down in the event of an on-site fire or as instructed by the CFS to assist with fighting any nearby fires.

Wind farm access roads provide benefits to firefighting through increased access on-site(in often previously inaccessible areas), create natural fire breaks and staging areas for firefighting.

In addition, having people in elevated positions with good visibility of the countryside during construction, commissioning and maintenance provide a vantage point to support the early detection and reporting of fires.

A good example of the detection of a lightning induced fire and the use of wind farm access roads to fight fire occurred in early 2013 at the Snowtown Wind Farm. The CFS was able to use new and old wind farm access tracks to control a number of recent lightning induced bush fires.

Snowtown CFS captain Pat Coffey stated that the wind farm made it far easier and far safer to defend farms from the new lines of access and defence. Previously the fire would have been fought from Council and public roads.

Wind farms also help reduce the likelihood of natural fires as wind turbines and associated power lines act as lightning rods to conduct lighting strikes safely to the ground.

The following CFS Fact Sheet provides more background on the relationship between on ground firefighting activity and the value of aerial bombers.

4.2.3 Of the natural and scenic locations, particular attention was given to the following:

- Marne River and surrounding creek
- Sanderston Gorge and creek
- Harrison Gorge and Reedy Creek
- The Gap (Rathjen Gap)
- Camel Hump Road and surrounding landscape areas

4.2.4 In many cases, the respondents expressed a strong correlation between the natural qualities and scenic value, signifying that the presence of natural landscape feature within the rural landscape increases the scenic value of a particular area.

4.2.5 Other more general areas were also identified by the community as having scenic qualities. These included the escarpment of the Eastern Mount Lofty Ranges, the foothills which provide viewpoints from which to appreciate views of the escarpment and Brinkworth Road.

4.2.6 A few locations were identified for their recreation and value. These included walking along the Marne River, undertaking activities around Sanderston Gorge and using the Lavender Federation Walking Trail loops including Hardings road and Borthwick Brae Road, Tungkillo and Rushlea Road and Murray Road, Eden Valley, as well as other long distance trails connection including the Kidman Trail.

4.2.7 The historic and cultural value of the landscape was confined to ruins and other artefacts in the landscape. The information provided by the community was limited as to what the artefacts are and their context.

4.3 Key Survey Findings and Potential Landscape Values

4.3.1 The Landscape Character Values Survey asked a series of question that gave members of the community with the opportunity to provide greater detail on the specific features, locations and characters of the landscape. The questions considered the following:

- Key features that have specific importance
- Roads where views are appreciated
- Comments on the visual amenity of the area

4.3.2 The key features identified by the community, reflected the cognitive mapping and included the Marne River, the escarpment, the various creeks lines and gorges across the area as well as the Lavender Trail, old ruins and mine sites.

4.3.3 Numerous roads were identified as locations from which the landscape is viewed. These included:

- Reedy Road
- G Ayers Road
- Camel Hump Road
- Brinkworth Road
- Sanderston Road

4.3.4 A number of other roads were also identified, highlighting the importance of views from roads within the location.

4.3.5 In terms of other comments that related to the visual amenity of the area, many respondents described the landscape as one of natural beauty, rural and untouched, unspoilt with open views. In some cases, parallels to the Flinders Ranges were made in relation to the rugged condition of the landscape.

4.3.6 While many respondents recognised that the land was rural and had been subject to clearing, this did not negate their appreciation of the landscape.

05 Wind Farm Design Review and Management of Visual Effect

5.1 Introduction

5.1.1 Following the landscape character assessment and having consideration to the findings of the community consultation; a preliminary visual assessment was undertaken to develop an understanding of the probable degree of visual change that may result from the proposed wind farm development. This preliminary assessment was used by WAX Design, BGLA and Trustpower to identity opportunities to manage and in some instances mitigate the potential visual effect of the proposed development.

5.1.2 The design review considered the visual effect of the entire wind farm as well as focussing on the impact of certain wind turbines that had more significant visual effects on areas of higher sensitivity to landscape amenity. The potential relocation or removal of certain turbines was evaluated using wireframes, photomontages, 3D model of the wind farm and on-site assessment to ascertain what design modification would assist in providing a design proposal which responds to landscape sensitivities to visual change. Ultimately the degree of visual management and visual change will be assessed against GrimKe Matrix. .

5.1.3 The initial 130 turbine development proposal was presented by WAX Design & BGLA at three community consultation sessions and two workshops. The preliminary assessment and design review identified a number of wind turbines that produced a noticeable or increased visual impact when compared with the overall visual effect created by the entire wind farm.

5.1.4 The review considered individual wind turbines assessing whether certain turbines increased the visual prominence of the wind farm, whether the location of turbines increased the perceived visual complexity of the development and/or wind turbines impacted on more sensitive landscape areas as identified by the landscape character assessment and the community consultations.

6.4 Viewpoint 3: Gerschwitz Road, Cambrai (north – sub-regional)

6.4.1 Viewpoint 3 is located on Gerschwitz Road. The viewpoint is typical of the visual effect that will be experienced from sub-regional locations to the northeast of the proposed wind farm at a distance of 5.5 kilometres. Located outside the township of Cambrai, the viewpoint provides an indication of the potential visual effect that will occur in and around the township and from properties on the western edge of the town.

6.4.2 From the viewpoint the landscape character is defined by the lower-lying topography of the Murray Plain that transitions from the foothills of the escarpment to the inclined landform of the Eastern Mount Lofty Ranges.

6.4.3 A number of defined ridge lines extend across the Murray Plain marking local features such as the Marne River and Angas Valley. The topography of the escarpment appears relatively low-lying from the outskirts of Cambrai with the relief of the escarpment appearing as a series of rounded topographic variations.

6.4.4 The escarpment has a uniform land cover of grazed grassland with isolated pockets of vegetation and rocky outcrops occurring sporadically across the escarpment.

Visual Assessment

6.4.5 The degree of visual change resulting from the development of the wind farm will be noticeable. While the underlying topographic form of the landscape character will remain unchanged, the size and number of the turbines within the landscape will have a moderate effect on the locality.

While the panoramic qualities of the landscape will remain in relation to open views, the introduction of the wind turbines will create a visual contrast to the existing panoramic quality of the landscape. The turbines will appear as distinct visual elements, either as new infrastructure elements or as new development forms that will frame and interrupt panoramic views.

The potential visual effect resulting from the turbines will be seen as a continuous visual element appearing large within the view point and extending north south. The vertical scale of the turbines on top of the escarpment will be pronounced due to the horizontal contrast in topography within the foreground.

The vertical relief of the escarpment is likely to be impacted by the vertical height of the turbines at 165 metres, creating a comparable vertical form in the landscape.

Within the foothills of the escarpment there is a series of defined visual characters where the escarpment provides a back drop to the west with a steep visual transition along the edge of the escarpment. This reduces the ability for other areas within the locality to be visible further to the west. This relationship between visibility and topography is important to understand in relation to the amount of turbines that are visible from any particular viewpoint or area. From locations at the foothill of the escarpment the leading edge of the turbines will be visible however more distant and westerly located turbines are effectively screened due to the rolling landscape character and set back from the escarpment edge. Conversely as you move further east across the Murray Plains the ability to view the turbines obliquely across the escarpment edge and the plateau behind increases as such increasing the potential visual affect and complexity of the turbines within the landscape.

Figure 33 Viewpoint 3

Figure 34 Wire line Viewpoint 3

Figure 35 Absorption capacity calculations

Assessment	Value	Description
Relief	3	The topography is negligible to the foreground and limited to the mid ground of the view with more substantial variation associated to the escarpment located to the regional area.
Vegetation Coverage	2	Within the field of view there are isolated linear belts of vegetation however the landscape is typically agricultural pastoral
Infrastructure and Built Form	5	Within the field of view there is limited presence of bult form structures isolated small farming outbuildings and machinery
Cultural and Landscape Value	2	From the outskirts of Cambrai there is limited cultural reference to historical or community sensitivities
Landscape Character	**12**	
Landscape Absorption	3	The landscape provides moderate levels of absorption due to the foreground and mid ground vegetation screening and local ridgelines to the mid ground. The absorption capacity is equated to be 44%. Total development is 211041 pixels and screening comprises of 92763 pixels from this viewpoint.
Horizontal	3	The horizontal visual effect is created by turbine A9 and B27 which equates to 50 degrees within the field of view. Hence the percent of visual presents is 42%
Vertical	3	The vertical visual effect is created by turbine A03 which has the greatest elevation from this perspective. The existing landscape topographic variation is recorded as 211m at a distance of 6000m. The variance in elevation created by turbine A03 is 356m at a distance of 6000m. Hence the turbines create a proportionally moderate vertical visual effect of 48% increase and will be seen as prominent elements.

6.2 Viewpoint 1: Summit of Mount Pleasant (west – sub-regional)

6.2.1 Viewpoint 1 is located adjacent to the summit of Mount Pleasant. This viewpoint is located at approximately 8 kilometres from the nearest turbine and demonstrates the probable visual effect that will be experienced from elevated locations within the Barossa, Adelaide Hills and Mount Crawford Forest landscape areas to the west of the proposed wind farm.

6.2.2 The landscape surrounding the viewpoint is typical of the undulating wooded landscape character to the Mount Pleasant and Eden Valley Ridgeline and from locations across the Barossa and Adelaide Hills.

6.2.3 The viewpoint and surrounding locality has a high degree of scenic value as a result of the extensive vegetation cover, undulating relief and the numerous water bodies that exist within the landscape.

Visual Assessment

6.2.4 From the viewpoint the proposed wind farm forms a distant group of infrastructure elements layered across the horizon edge of the wooded landscape. The introduction of the turbines represents development in the landscape with each piece of infrastructure three times the height of the existing 275 kV transmission line pylons.

6.2.5 The probable visual effect produced by the Palmer wind farm is created by the visibility of all of the wind farm which forms a continuous array of turbines across the landscape. The separation of the wind turbine groups is pronounced and legible within the landscape, creating pauses in the linear array.

6.2.6 The visual effect is largely uniform and responds to the position and layout of individual turbines. The denser clustering of turbines B15 to B57 increases the visual intensity and complexity of the wind farm within the landscape and turbines are seen as layered elements with a more animated character due to the rotation of the turbine blades.

6.2.7 While the turbines are located at some distance from the viewpoint, their height (165 metres) results in a visual prominent within the landscape which contrasts the wooded landscape character that defines the viewpoint and locality. A significant degree of visual amenity is provided by the Barossa Valley and Adelaide Hills landscape character zone. The introduction of the wind farm will potentially create an continuous infrastructure corridor across the horizon line formed by the Eastern Mount Lofty Ranges escarpment forming a screen to views west of the viewpoint and the surrounding Adelaide Hills, Barossa and Mount Crawford landscape character zone.

6.2.8 Currently, the visual character is defined by the foreground and mid-ground of the wooded landscape amenity of the Barossa Valley and Adelaide Hills, with a background of the eastern Mouth Lofty Ranges ridgeline and the sky beyond. The introduction of the proposed wind farm will result in an infrastructure layer sitting within the background. While not continuous or expansive, this veil of infrastructure will affect the perceived context of the landscape amenity, particularly in relation to natural landscape elements such as trees, areas of open water and the underlying topography of the locality.

Figure 27 Viewpoint 1

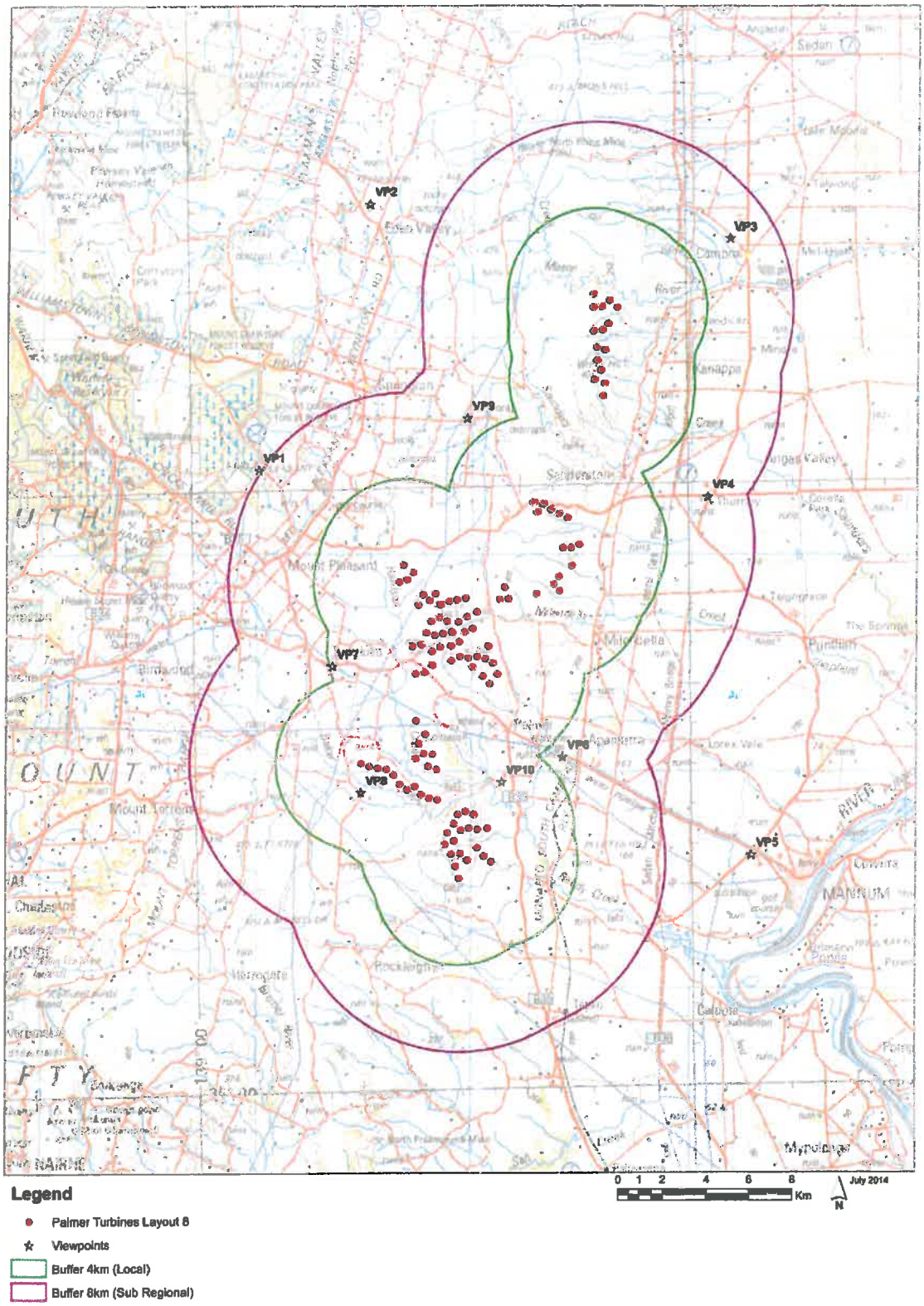


Figure 26 Viewpoint location (based on Layout 8 - 114 turbine layout)

Assessment	Value	Description
		the turbines create only a small proportion of the existing landscape vertical scale approximately 14% of the existing landscape scale, hence will not be seen as a disproportionate element.
Distance	3	The closest turbine is B15 which is approximately 8km at a bearing of 116 degrees
Visual Assessment	**10**	Landscape visual change coefficient 0.5
Degree of Visual Change	**38%**	Landscape Visual Character 15 x (0.5 coefficient) The visual effect is equates to be 7.5/20 = 0.38x100 = 38% visual change

Visual Effect: *The visual effect of the proposed development from this viewpoint is described as moderate. The landscape character of this area provides increased levels of amenity and sensitivity to change. While the natural and vegetated qualities of the landscape increase the potential for visual effect the increased levels of vegetation, topographic form and distance to the proposed development enhance the landscapes capacity to absorb the development limiting the degree of visual change.*

6.3 Viewpoint 2: Eden Valley Lookout (northwest – regional)

6.3.1 This viewpoint represents an important community location with panoramic views across Keynes Gap and Eden Valley with views extending through almost 270 degrees towards the Barossa Valley and Adelaide Hills.

6.3.2 The viewpoint provides views of the surrounding landscape character and opportunities to view the context of the regional character in relation to a rolling rural and vegetated landscape to the west, Eden Valley to the south and the rugged and denuded landscape character of Keynes Gap and the Eastern Mount Lofty Ranges escarpment to the east and south.

6.3.3 To the north views are more enclosed due to local topographic variations however this visual character rapidly changes as the topography decreases in height, providing panoramic views to the south and east.

6.3.4 The panoramic qualities of the viewpoint provide numerous opportunities from which to see a diverse range of landscapes ranging from well-vegetated areas of remnant vegetation, across vineyards, grazed pastures and distant ridgelines. The landscape is punctuated by settlements, church spires and buildings. This combination of elements creates an attractive landscape amenity which reinforces the significance of the viewpoint.

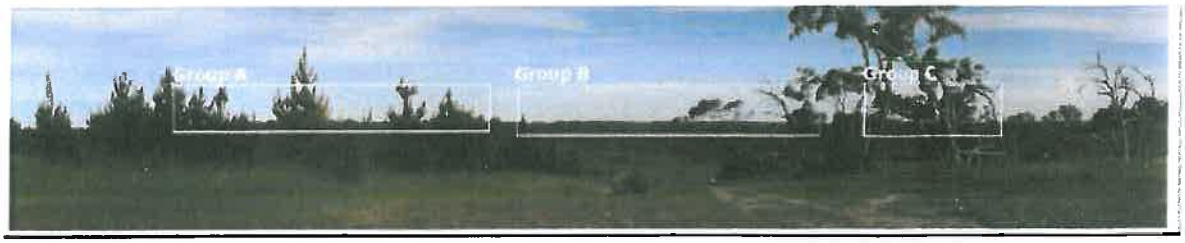
Visual Assessment

6.3.5 The proposed wind farm development will result in a series of notable development features within the landscape extending across the field of view with the nearest turbine located at 11.4 kilometres and the most distant 29.7 kilometres to the southeast.

6.3.6 This distant spread of turbines has the potential to form a string of large infrastructure elements that will form the background to the viewpoint and the locality. The scale, complexity and animated visual quality of the wind farm will alter the character of the landscape from one defined by rural land uses, punctuated with large areas trees, vineyards and townships to a rural landscape featuring clusters of turbines set distantly within the landscape.

6.3.7 From the viewpoint the majority of turbines are visible but as distant elements. These turbines form a continuous visual element within the landscape extending across the Eastern Mount Lofty Ranges tablelands to the south

6.3.8 The introduction of the turbines has the potential to alter the perceived natural qualities of the Keynes Gap rocky outcrops to the east. While the topography and geology expressed by Keynes Gap remains a



● ● *Figure 28 Wire line Viewpoint 1*

● *Figure 28 Wire line Viewpoint 1*

Figure 28 Wire line Viewpoint 1

Figure 29 Absorption capacity calculations

Assessment	Value	Description
Relief	3	The local topography is undulating and layered associated to Mt Pleasant, the River Torrens and the transitional landscape that connects the Barossa Valley and Adelaide Hills character areas
Vegetation Coverage	4	Densely vegetated foreground to mid ground, comprising of native Eucalypt woodland and pine forestation
Infrastructure and Built Form	5	Limited infrastructure with some residential farm dwellings and linear transmission lines evident to the distant background
Cultural and Landscape Value	3	Mount Pleasant summit trail and Kidman tral provide local cultural recreational values to this area
Landscape Character	**15**	
Landscape Absorption	1	The landscape provides increasing levels of absorption due to the foreground and mid ground vegetation screening and local ridgelines to the mid ground. The absorption capacity is equated to be 81%. Total development is 247438 pixels and screening comprises of 201014 pixels from this viewpoint.
Horizontal	5	The horizontal visual effect is created by turbine A9 and C9 which equates to 97 degrees within the field of view. Hence the horizontal visual effect is 81%
Vertical	1	The vertical visual effect is created by turbine B15 which has the greatest elevation from this perspective. The existing landscape topographic variation is recorded as 140m at a distance of 3200m. The variance in elevation created by turbine B15 is 49m at a distance of 8000m. Hence

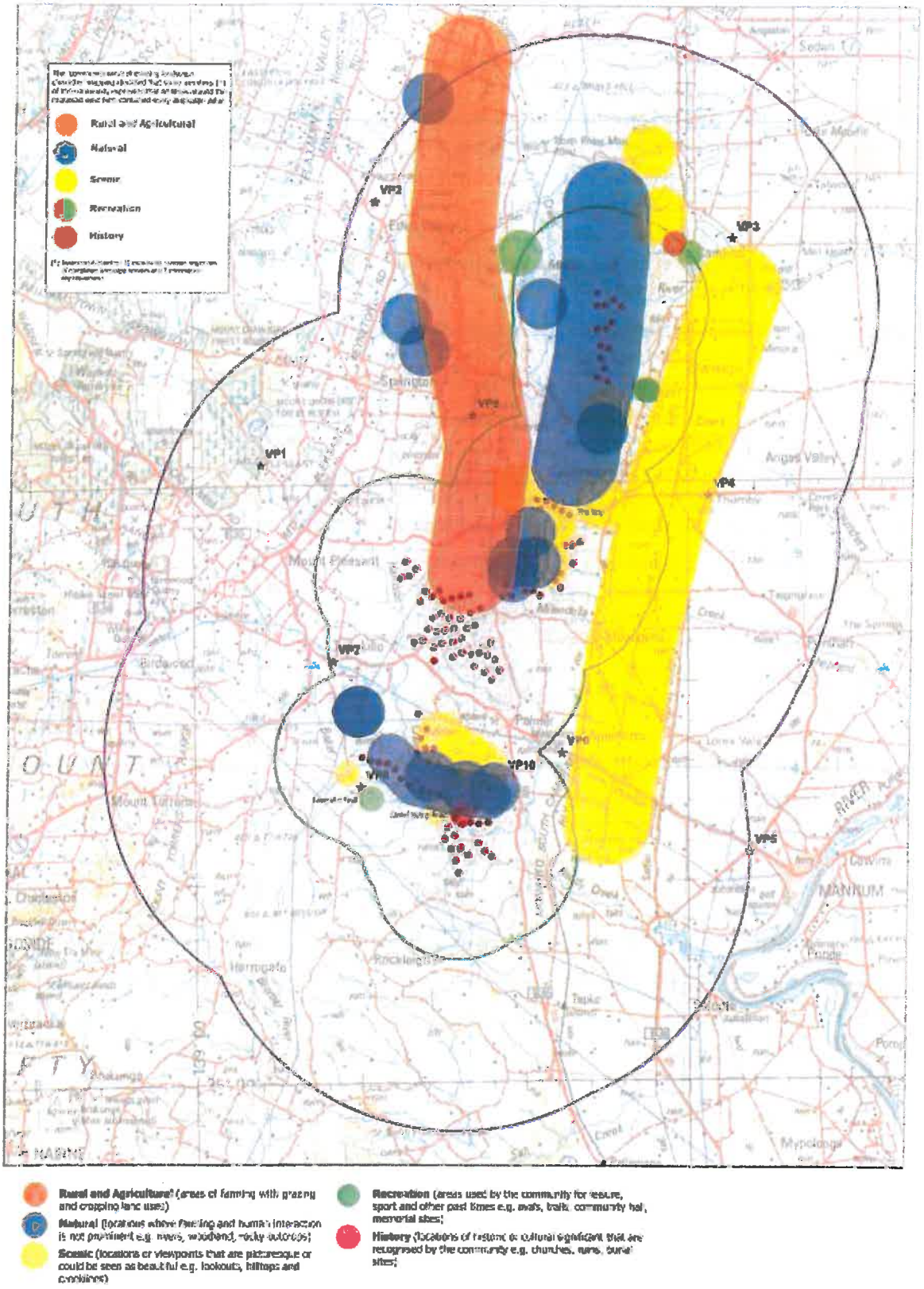


Figure 22: Cognitive Mapping based on original 130 wind turbine layout

04 Community Consultation and Landscape Values

4.1 Introduction

4.1.1 As part of the planning process for the Palmer Wind Farm, a number of community information sessions and workshops were held to ensure that community understood the scope of the proposed wind farm development as well as enabling individuals to highlight concerns or opportunities associated the Palmer Wind Farm. Over the course of four information sessions and two community workshops the community was provided with information in relation to the wind farm proposal, including the anticipated visual effect of the wind turbines in the landscape.

4.1.2 During the information sessions and workshops the community were also given the opportunities to express their opinion in relation to the landscape value and scenic qualities of the regional landscape context surrounding the wind farm.

4.1.3 The initial consultation sessions where based on a 130 wind turbine development which lead to a revised 122 turbine development. Members of the community were asked to provide information on the landscape character of the area and discuss the potential visual effect of the proposed wind farm.

4.1.4 As part of the information sessions an assessment of the landscape value was undertaken through a cognitive mapping exercise and the completion of a designated landscape survey (see Appendix D). While the number completed surveys was relatively low (9 completed surveys), the comments received provided a clear insight into the value that the some members of the community place on the existing landscape character and potential area of sensitivity to visual change.

4.1.5 Similarly, the cognitive mapping exercise involved the analysis of a series of qualitative values relating to the landscape surrounding the Palmer Wind Farm. The locations of these values were then identified by members of the community on a reference map. This process allowed the community's perceived value of the landscape to be included in the landscape assessment methodology. In doing so, the responses provided by members of the community were directly fed into the landscape assessment undertaken in Section 6 and are represented in the Cultural and Landscape Values of the Landscape Character assessment.

4.2 Cognitive Mapping Process

4.2.1 The cognitive mapping process invited members of the community to locate landscape values within the locality of the proposed wind farm. These values consisted of the following:

- Rural and Agricultural (areas of farming with grazing and cropping land uses)
- Natural (locations where farming and human interaction is not prominent e.g. rivers, woodland, rocky outcrops)
- Scenic (locations or viewpoints that are picturesque or could be seen as beautiful e.g. lookouts, hilltops and creeklines)
- Recreation (areas used by the community for leisure, sport and other past times e.g. ovals, trails, community hall, memorial sites)
- History (locations of historic significant that are recognised by the community e.g. churches, ruins, burial sites)

4.2.2 Significant focus was given to the mapping of natural and scenic values, with none of the respondents commenting on the rural character of the landscape and only a few identifying areas of historical significance in relation to early settlement heritage or recreational value.

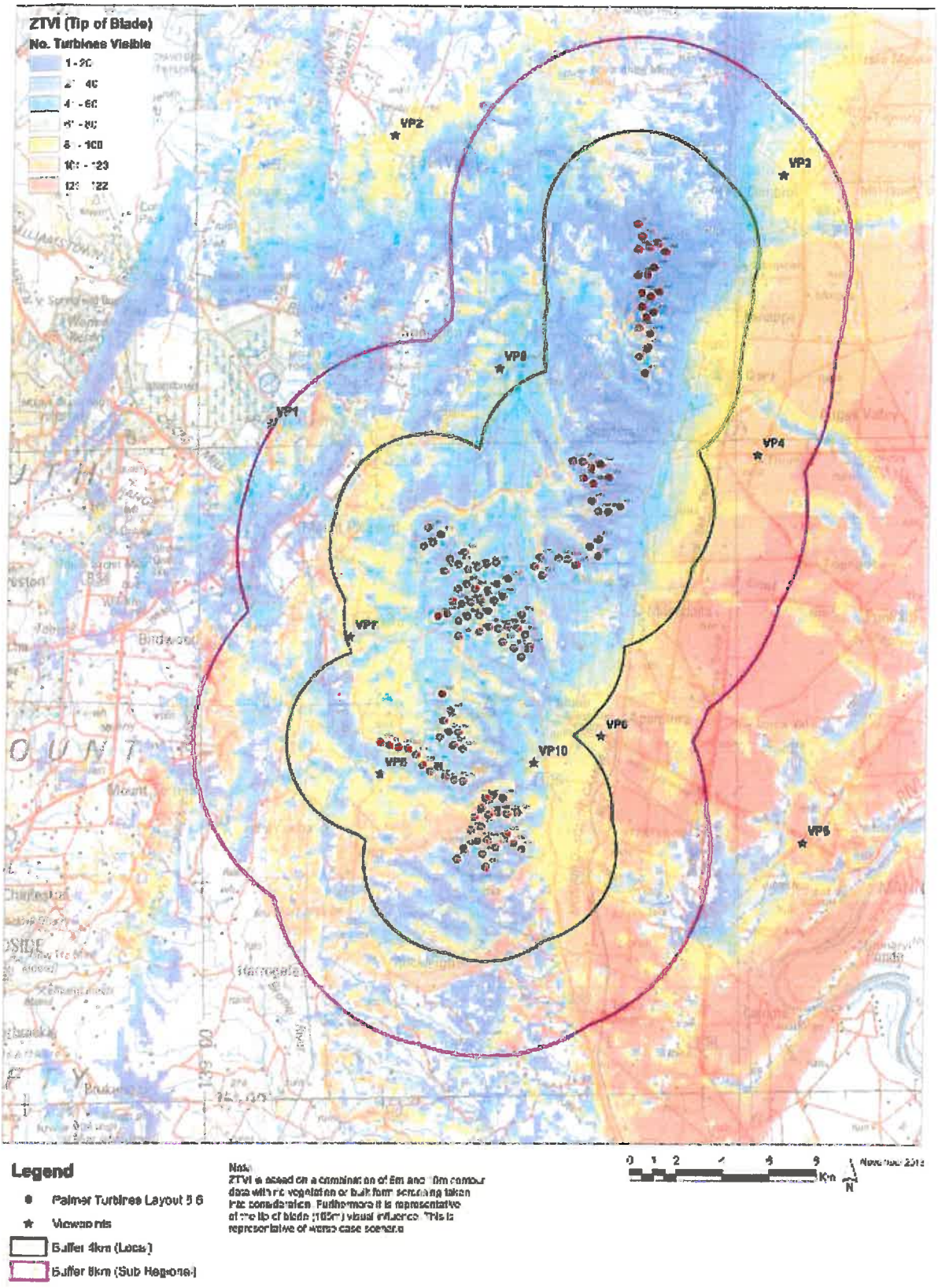


Figure 24: ZTVI development proposal 122 turbine layout

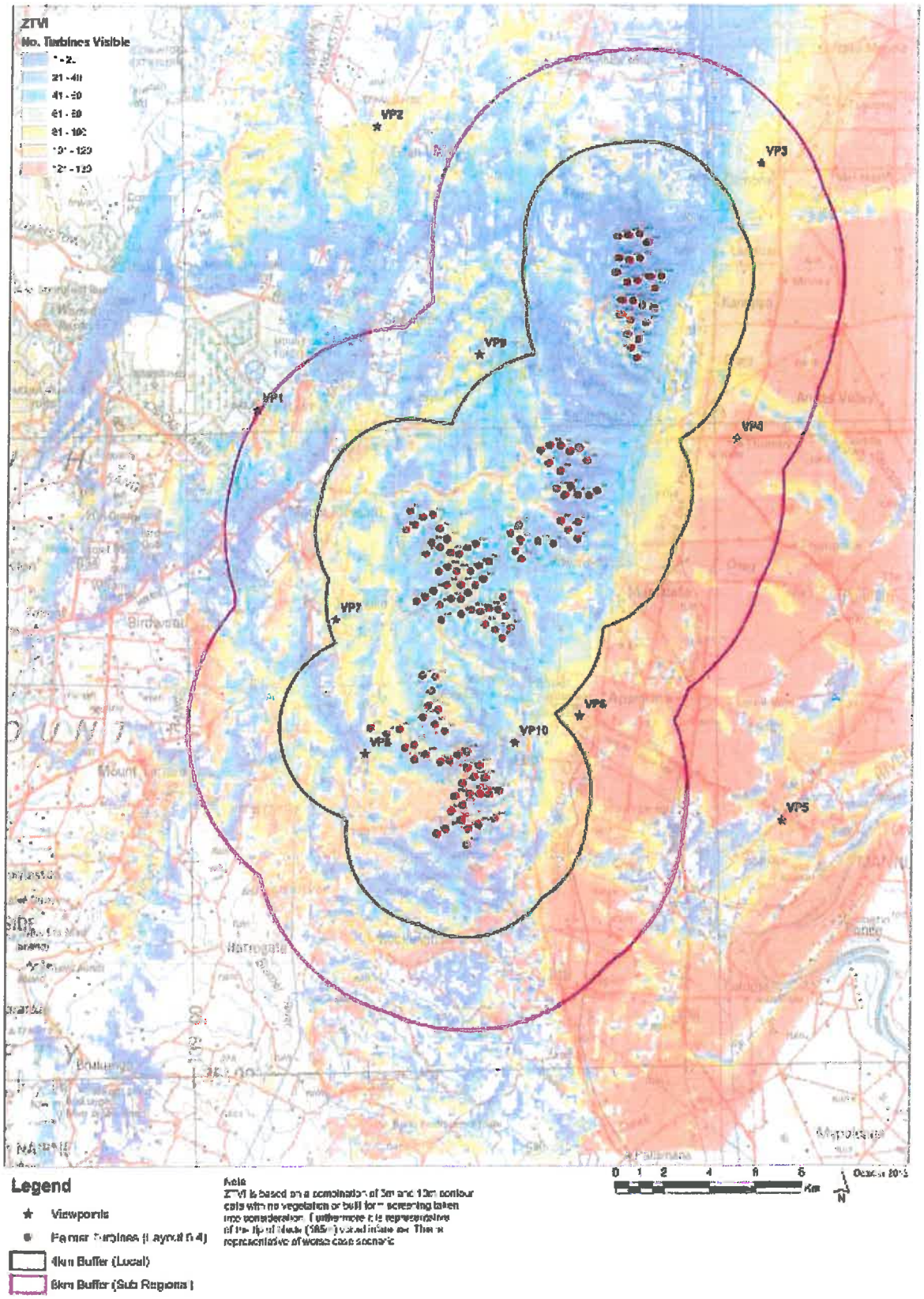


Figure 23: ZTVI development proposal 130 turbine layout

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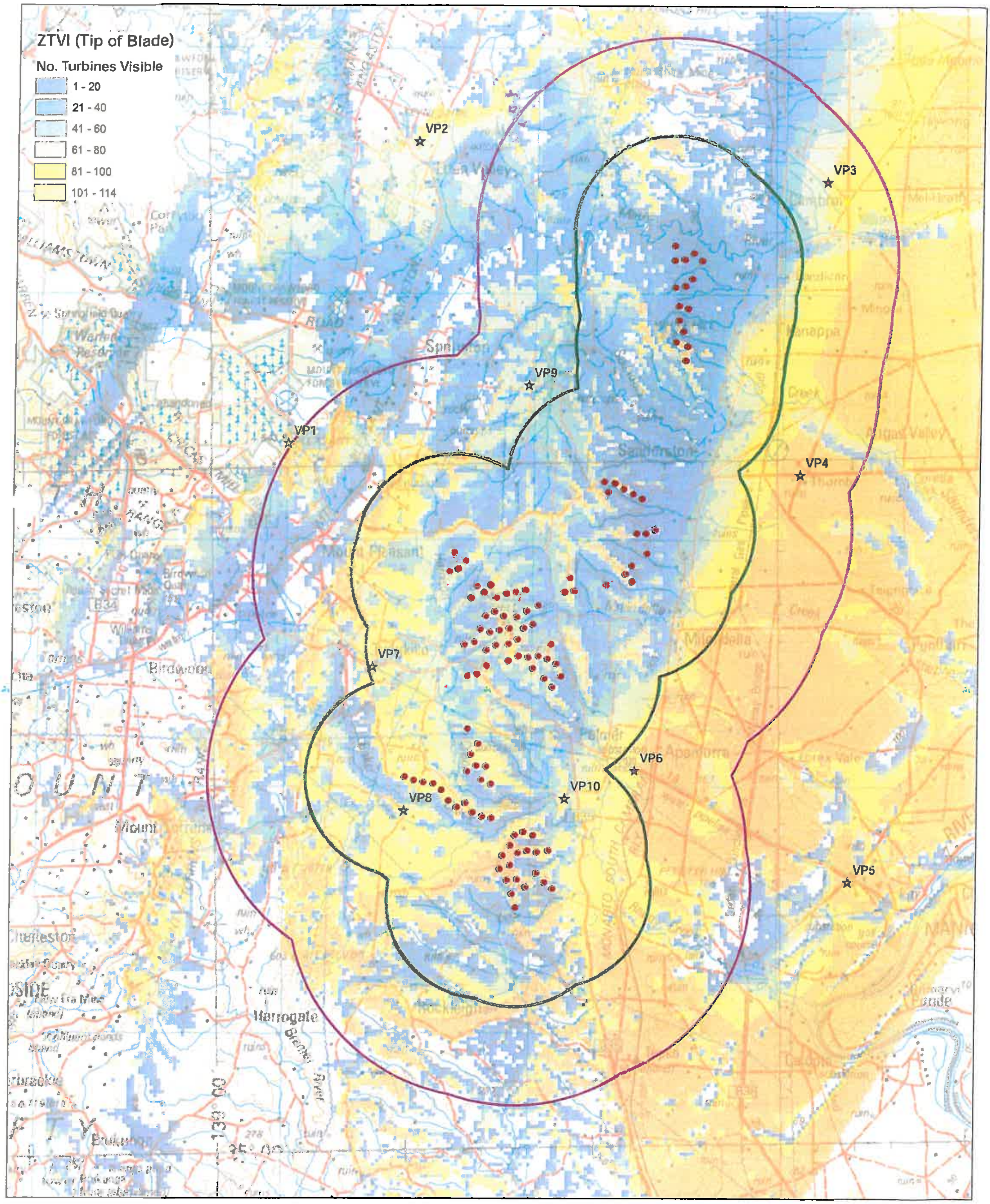
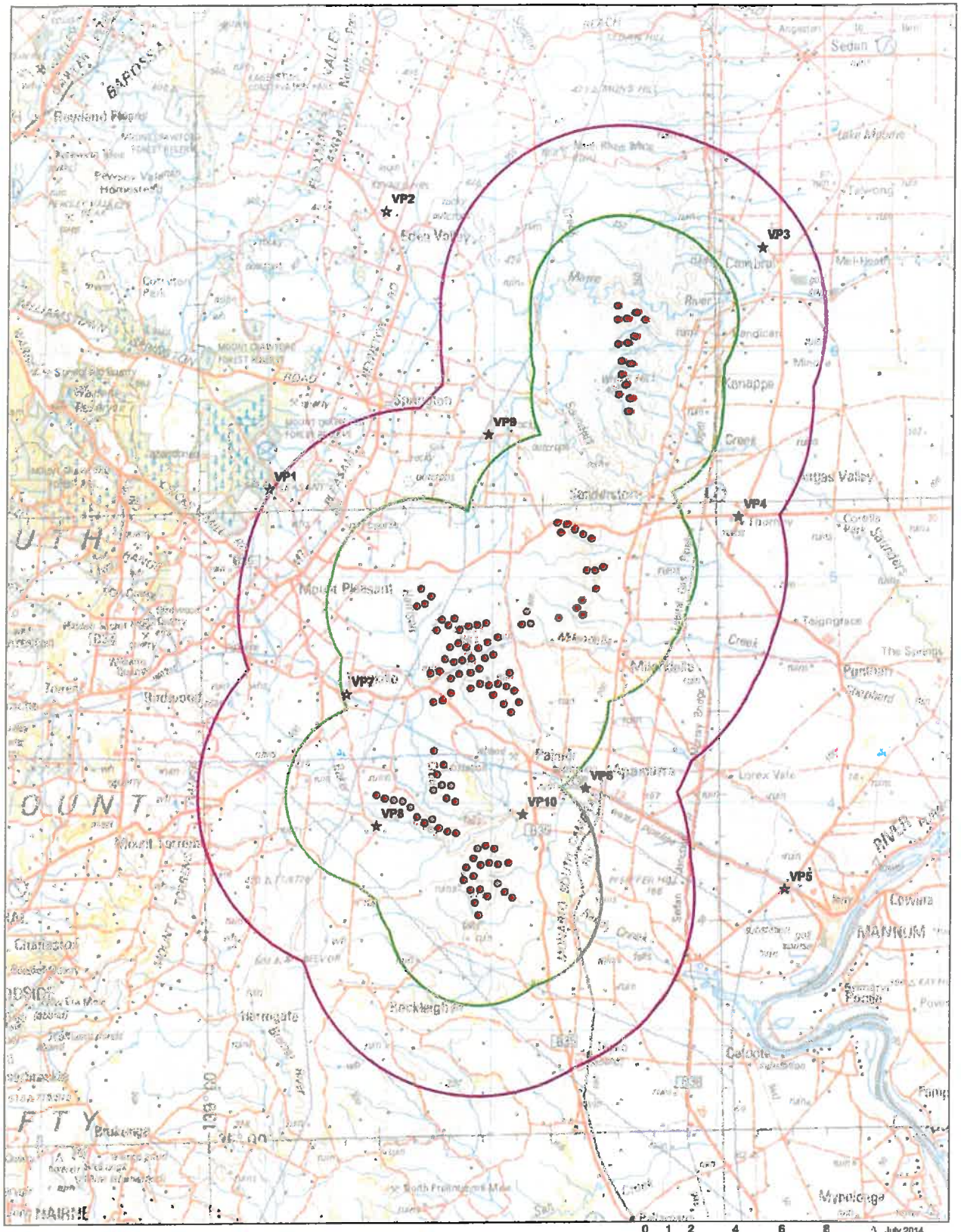


Legend

- Palmer Turbines Layout 8
- Viewpoints
- Buffer 4km (Local)
- Buffer 8km (Sub Regional)

Note:
ZTVI is based on a combination of 5m and 10m contour data with no vegetation or built form screening taken into consideration. Furthermore it is representative of the tip of blade (165m) visual influence. This is representative of worse case scenario



Legend

- Palmer Turbines Layout 6
- Viewpoints
- Buffer 4km (Local)
- Buffer 8km (Sub Regional)

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DEVELOPMENT ACT, 1993

REPRESENTATION ON APPLICATION CATEGORY 3

Development Number 711/072/14

My Name Ian Fox My Telephone Number 0409 723463

My Postal Address P.O. Box 130
Cambrai SA Postcode 5353

This representation is in relation to the application by: *Trustpower Australia Holdings Pty Ltd*

for consent to establish the *Palmer Wind Farm*

The address of my affected property is Lot 17 Skinner Street, Cambrai SA 5353

The specific aspects of the application to which I make comments on are:

1. Beneficial aspects include reducing pollution from conventional power generation (eg coal) which I support.
2. I welcome the association of our district and Council in projects that are visionary and innovative and help shape transition to diversification of economy.
3. The position selected on the eastern side of the ranges has low population, has wind at all times of the year and spreads visual impact - not that I find these generators visually offensive at all.

My concerns would be overcome by:

☑ I do not wish to be heard by the Development Assessment Panel

☐ I do wish to be heard personally by the Development Assessment Panel

☐ I will represent myself
or
☐ I will be represented by

Date 18/5/15 Signed [signature]