

# WIND FARM NOISE – AN ETHICAL DILEMMA FOR THE AUSTRALIAN ACOUSTICAL SOCIETY?

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Not since the opening of the Third Runway at Sydney Airport has there been so much publicity in Australia concerning noise – in this case wind farms. Putting aside the issue of noise versus inaudible noise there is a question being raised as to Members of the Society breaching the Code of Ethics. This is not the old question of Professional versus Learned Society. Reliance upon criteria contained in Guidelines or Standards may be an excuse by consultants that in turn places the “fault” on the SA EPA and the New Zealand Standard. However, if people making complaints to no avail and leave their homes because of the wind farm “noise” what is the responsibility of Members of the AAS to the community?

## INTRODUCTION

The April 2012 edition of the Australian Acoustical Society’s journal (Acoustics Australia – Vol 40, No. 1) provided a series of papers and technical notes relating to wind farm noise [1]. However, the articles supporting wind farms did not discuss the acoustic impact of the wind farms. The articles referred to criteria and compliance with the criteria. The articles did not identify the basis of the criteria or the acoustic impact of wind farms even when they complied with the nominated criteria.

It is evident from the recent public forums conducted by Senators Madigan and Xenophon in South Australia, Victoria and New South Wales that wind farm “noise” is an issue in the community [2,3]. The degree of claims for and against wind farm noise is reminiscent of the aircraft noise debate (with the introduction of jet aircraft to Australia) [4] and the third runway at Sydney Airport [5].

Examination of the aircraft noise debate finds acoustic and socio-acoustic research undertaken in Australia by Members of the Society. Examination of the wind farm noise issue finds a different position.

Members of the Society had been at the forefront of preparing acoustic and vibration Guidelines and Standards in Australia [6] to protect the community from a wide range of noise sources and invariably rely upon overseas experience/standards that are then compared or evaluated with Australian situations.

For example with respect to road traffic noise, we had Standards/Guidelines that originally followed the UK Department of Environment [7] recommendations (rather than US Department of Transport criteria). Work undertaken by the ARRB and Dr Stephen Samuels (and others) lead to a modification of the British criteria to account for Australian road conditions.

## AIRCRAFT NOISE IMPACTS IN AUSTRALIA

In the initial stages for aircraft noise assessment Australia adopted the US NEF system [8]. As a result of community

concerns about aircraft noise, and a Commonwealth government inquiry (HORSCAN report) [4] led to the noise study by the National Acoustics Laboratory [9] to then result in the ANEF system used for aircraft noise assessments in Australia. Changes have been proposed to the aircraft noise standard, citing the community’s response to aircraft noise and the need for supplementary acoustic metrics. However the use of the N60, N70 or N80 descriptor [10] has not been presented in terms of any socio-acoustic surveys and therefore there is a fundamental problem of implementing N60/N80 criteria without any basis to support that criteria.

In the original NAL report on aircraft noise there is the dose response curve for ANEF versus affected people which is slightly different to the curve in Australian Standard AS 2021 [11]. Contained in the NAL report is a dose response for the N70 that can be placed in the context of the unacceptable/acceptable limits for the ANEF system and in turn the building site acceptability tables in AS 2021.

The NAL report does not provide any regression curves showing a basis for N60 or N80. Therefore, as presented previously [12-15], there are issues as to substantiating the number of events that may be applied to the N60 and N80 for an acceptable aircraft noise impact.

In undertaking research work with Fergus Fricke at Sydney University [16] most postgraduate students became aware that Fergus pulled/pushed you sideways to look into different aspects of your subject which required further investigation and a broadening of the material that was the subject of the research. It is such an approach that students of acoustics (of which all members of the Society can still said to be students) can benefit in their daily use of acoustics to have in the back of their mind when there is a problem the quote of Professor Julius Summer Miller “Why is it so?”.

This is the exact situation when faced with the challenge of measurements from helicopter operations not agreeing with the international computer modelling led to investigating the matter of lateral attenuation. Investigation found that the attenuation

algorithms in the computer model [8] were wrong, had been wrong for many years, and people were unaware of that fact. Investigations, including going back to the original reference documents [17,18] to uncover the problem, which was verified with additional testing leading to that material being presented to the US Aircraft Standards Committee in 2003 [19], accepted and two years later INM was amended to overcome that issue.

Similarly in seeking to validate military aircraft operations with the computer model we kept on getting incorrect results for high frequency noise which under the same investigative concept lead to querying the results. Testing over a number of years led to identification that the original model for determining atmospheric attenuation coefficient per hundred metres was not carried out in any vast chamber or airfields, ovals or similar. The attenuation coefficients were determined from a stainless steel sphere of 1.68 m diameter on a theoretical basis [20].

Utilising measurement data for aircraft operations under different atmospheric conditions found the universal attenuation coefficients [8,21] did not agree with field measurement for aircraft [22] and monitoring at industrial sites.

These results revealed that if one utilises the atmospheric attenuation contained in various International and American standards in computer models there can be errors. And in particular there can be significant errors if one is dealing with high frequency noise, particularly with respect to the discharge of high velocity steam where there is a significant component of the noise source occurring above 2000 Hz.

It is in light of the above background material and the fact that throughout Australia there are hundreds of residents in proximity to wind farms who claim to be adversely affected, and in some cases so affected that they leave their properties, that must be of concern to members of the Society where there are repeated responses that these people are imagining the problem.

It would appear that the reaction of the community to wind farms is not that dissimilar to communities that were subject to the aircraft noise following the introduction of the jet engine that ultimately led to the famous NAL study. The number of people affected by wind farms is not as great as that affected by airports simply because wind farms are not located in suburban areas. However, in taking into account the percentage of people affected in the area covered by the nominated noise level criteria it would seem to be more than 10% of the population are seriously affected.

## **MEASUREMENT OF WIND FARM NOISE FOR THE COMMUNITY**

I and a number of acousticians in Australia have been requested to undertake reviews of wind farm applications and/or conduct measurements of wind farms. This is not dissimilar to requests for peer reviews of acoustic reports for Development Applications or Compliance Tests for a range of typical noise sources, domestic, road, rail, air traffic, and industrial developments.

These reviews and testing have raised a number of issues as to the adequacy of the original assessments, the accuracy of the measurements and question the acceptability of noise limits which are simply matters that an appropriately qualified and experienced acoustic engineer/consultant

would undertake.

Such investigations and assessments have raised concerns as to the adequacy of the guidelines and also the results of compliance testing undertaken by various organisations that include Members of the Australian Acoustical Society.

As a result of undertaking the assessments and providing those reports in the public domain I and other consultants have been labelled by wind farm power entities as being “anti-wind farm” or having close ties to “anti-wind farm lobby groups”.

Having discussed this very fact with other Members of the Society who have been so labelled and do not accept such accusations, I have stated a number of times that I am not anti-wind farm but have been simply presenting the facts as to what has been generated by such installations that requires further investigation.

If one is to be labelled as anti-wind farm when simply presenting the facts of what is occurring as a result of undertaking work for the community, then it must be the case that the acoustic consultant/engineer who undertakes work for wind farm applicants should equally be labelled by the wind farm industry as “pro-wind farm”.

Both the “anti-wind farm” and “pro-wind farm” acousticians who are Members of the Society would undoubtedly disagree with such labelling and should identify the fact that they are truly independent in carrying out such assessments. Furthermore, if those persons are Members of the Society then they could bring to their defence that there is an obligation to abide by the Code of Ethics of the Australian Acoustical Society [23].

So how can persons undertaking assessments “for or against” wind farms of the noise impact of wind farms be a dilemma for the Australian Acoustical Society you may ask.

## **CODE OF ETHICS**

From the Code of Ethics, that appears on the Society’s website, one can see there is the Responsibility for the members of the Society:

*The welfare, health and safety of the community shall at all times take precedence over sectional, professional and private interests.*

The explanatory notes in the Code of Ethics in referring to Responsibility requires members of the Society to:

- conform to acceptable professional standard and procedures, and not act in any manner that may knowingly jeopardise the public welfare, health, or safety.
- endeavour to promote the well-being of the community, and, if over-ruled in their judgement on this, inform their clients or employers of the possible consequences.
- contribute to public discussion on matters within their competence when by so doing the well-being of the community can be advanced.

The explanatory notes in the Code of Ethics in referring to Work within Areas of Competence requires members of the Society to:

- report, make statements, give evidence or advice in an objective and truthful manner and only on the basis of adequate knowledge

- reveal the existence of any interest, pecuniary or otherwise, that could be taken to affect their judgement in technical matters.

## NOISE IMPACT

A significant number of wind farm assessments follow a generic format. Whether there is identification of primarily the South Australian EPA Wind Farm Guidelines [24,25] or the New Zealand Wind Farm Standard [26,27], the assessment in terms of those guidelines uses the ambient noise level to provide regression line curves, use of a criterion of 35, or 40 dBA and background +5 dB, whichever is the greater value.

The acoustic assessment generally provides the results of computer predictions using the A-weighted value to then indicate compliance with the criteria contained in Guidelines/Standard.

The noise assessment in relation to the application provides predicted levels in terms of the substation and construction activities that are related to relevant guidelines, and may include an assessment of noise from power lines to indicate significant separation distance to residence to not present at an issue. In some cases there is identification of the acoustic impact of the substation, construction activities, and power lines [28-31].

However in the generic wind farm assessments there is no actual noise assessment of the wind farm, i.e. the assessment simply states compliance with the relevant guidelines and that is it.

The generic wind farm “noise assessment” considers the noise outside residences and does not identify to the community the audibility of the wind farm, the relationship of the guideline criteria with respect to the acoustic environment of the area, the percentage of time in which there will be audible noise as a result of weather conditions, or conversely a reduction in noise as a result of weather conditions.

The generic wind farm “noise assessment” does not report the situation of residents hearing the noise inside their homes or having sleep being disturbed or that some residents experience disturbance even when there is compliance with the guidelines noise limit. The “noise assessment” does not indicate situations in Australia where residents (host and non-hosts) leave their homes to live elsewhere.

The question is now being asked in the community, and invariably will be asked in courts of law, whether the absence of that material in the “noise assessment” is a Breach of Code of Ethics.

The Association of Australian Acoustical Consultants (AAAC), of which firms become members of that Association, have a Code of Professional Conduct [32] which goes one step further than the AAS in the section on Professional Standards:

- To maintain the standards of business and personal conduct reasonably expected of a professional
- To act with professional responsibility and integrity in my dealings with the community and clients, employers, employees and students
- To provide professional opinions in an objective and truthful manner, avoiding statements that may be demeaning, misleading or unethical
- Not to misrepresent one's skills and experience
- To undertake work only in areas of competence, unless the client is informed of the member's limitations

- To maintain a proper sense of responsibility to the client, broader community, employees, the profession and the environment.

In attending various rural dwellings to undertake wind farm noise measurements questions have been raised by the occupants as to the conduct of members of the AAAC and the AAS in relation to monitoring and reporting of the results/impact.

## RURAL NOISE ENVIRONMENTS

Acousticians in Australia that are aware of the origins of Australian Standard AS 1055 [33,34] will be well aware that it follows that the general scenario outlined for other standards and its primary function as per its original title was “Noise Assessment in Residential Areas”.

Accordingly AS 1055 is not really a document that is appropriate for rural areas and the background levels that were suggested for various categories may be appropriate in suburban areas. However for areas removed from traffic the lowest background level in AS 1055 would not necessarily apply in such areas.

Rural areas removed from main roads and the like, and being areas nominated for wind farm developments can experience background levels less than 20 dBA in the day and night, and can also experience ambient  $L_{eq}$  levels less than 30 dBA during the day and less than 25 dBA at night.

A fundamental question that communities exposed to wind farms raise is how can the guidelines substantiate 35, or 40 dBA as an acceptable base level at night in rural areas?

The SA EPA Guidelines refer to an indoor sleep disturbance level of 30 dBA by reference to a WHO Guideline [35]. However there is a failure to correctly identify that the WHO guidelines were referring to suburban areas impacted by traffic noise and did not provide criteria for rural areas or consider wind farm noise. The draft New South Wales Wind Farm Guidelines [36] specifically clarified the WHO guideline sleep arousal related to noise in suburban areas from traffic [37].

The situation of background levels in residential bedrooms which are between 10 dBA and 20 dBA, even with turbines operating, must be a fundamental issue of concern for the Members of the Society for a guideline that suggests 40 dBA is an acceptable level at night (as an external level) or 30 dBA as an internal level.

If the “pro-wind farm” acoustician's defence to inadequate reporting assessment or consideration of the community's health relies upon Guidelines or Standards that have been issued for wind farms, then apparently blame may be to the authors of the Guidelines or the Standards committees which include Members of the Society.

It could well be argued that when the first version of the guidelines were prepared by the South Australian EPA they did not have the benefit of an existing wind farm to undertake measurements and determine the appropriateness of the draft guideline and then the guideline.

It would appear historically that the original SA EPA guidelines were based upon overseas material in part. However, there does not appear to be any reference in the document to identify where the base criteria have been substantiated for use in Australian rural communities, i.e. socio-acoustic study to support the limits.



## OUTCOMES

The current public debate as to noise impact from wind farms would appear to be more complex than just the “Learned Society of Professional Institution” question raised by Fergus Fricke [38] in the same 1982 AAS Bulletin that reported on the NAL 1982 Aircraft Noise Report.

If further work finds there is a health issue as a result of “noise” generated by wind farms and there are “acoustic assessments” that state there are no health impact no sleep impacts, and no infrasound, then what happens?

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