Technical Note

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A REVIEW OF THE DRAFT NSW PLANNING GUIDELINES: WIND FARMS

Justin Adcock, Christophe Delaire and Dan Griffin
Marshall Day Acoustics, Collingwood, VIC 3066

The recently published NSW Planning Guidelines - Wind Farms (the draft Guideline) presents a planning and assessment framework for a range of issues including recommendations for the assessment of noise impacts. These recommendations build upon existing assessment methods used throughout Australia, and helpfully include prescriptive guidance for a number of issues that are not well defined in existing guidance documents. Conversely, the draft Guideline introduces significant new requirements which may add a high level of complexity to the planning process. This technical note presents a discussion of some of the important features of the noise assessment recommendations proposed in the draft Guideline, including proposed noise criteria, measurement techniques, prediction methods and assessment of specific noise characteristics.

INTRODUCTION

Noise assessment criteria for wind farms play a vital role in balancing the protection of amenity for neighbouring communities and supporting a planning framework which enables the development of commercial scale renewable energy projects. Importantly, unlike many other types of noise sources, wind farm noise criteria can have a direct impact on the viability and productivity of proposed wind energy developments. Seemingly small changes in noise criteria or assessment methods can impact significantly on the potential renewable energy yield of a site, despite equating to subjectively minimal changes in wind turbine noise levels at receptor locations.

Selecting the right balance between different wind farm noise policies should therefore consider the broader renewable development implications. For example, could a proposed noise policy create an inadvertent incentive for a smaller number of larger projects, or conversely, a larger number of smaller projects?

The *NSW Planning Guidelines - Wind Farms* (the draft Guideline) [1] were released by the Department of Planning and Infrastructure as a public consultation draft in December 2011. The stated purpose of the draft Guideline is to:

- *provide a clear and consistent regulatory framework for the assessment and determination of wind farm proposals across the state*
- *outline clear processes for community consultation for wind farm developments*
- *provide guidance on how to measure and assess potential environmental noise impacts from wind farms*

The draft Guideline presents a planning and assessment framework for a range of issues including recommendations for the assessment of environmental noise impacts. These recommendations build upon existing assessment methods used throughout Australia, and helpfully add prescriptive guidance for a number of issues that are not well defined in existing guidance documents. Conversely, the draft Guideline introduces significant new requirements including those relating to separating distances and low frequency noise which may add a high level of complexity to the planning process.

This technical note presents a discussion of some of the important features of the noise assessment recommendations proposed in the draft Guideline, having regard to their stated objectives. For ease of reference, the headings in this paper are titled and ordered as per the draft Guideline. All references to noise metrics in this paper adopt the international standard convention of designating frequency weightings and measurement metrics as subscripts (e.g. L_{Aeq} dB). All references to decibels are therefore presented as dB (e.g. not dBA or dBC) unless directly quoting from a reference which adopts an alternative standard.

KEY MATTERS IN THE ASSESSMENT PROCESS

One of the most important, and potentially most stringent, features of the draft Guideline is the introduction of requirements based on separating distances. Specifically, if a wind farm proposal seeks to place turbines within 2km of existing residences, and written consent for the proposal has not been obtained from the residences, an initial study focussed on noise and visual impact considerations is required, including the prediction of low frequency noise levels.

Whilst subsequent sections of the draft Guideline provide objective criteria to assess noise, there is no indication that these criteria would be used as the test of adequacy for residences within 2km of a proposed turbine location. Instead, the draft Guideline indicates that the Government may seek advice from independent experts considering the acceptability of noise. The absence of clearly defined criteria for this initial study appears to be inconsistent with the stated objective of providing a clear and consistent regulatory framework for the assessment and determination of wind farm proposals.

As a result, the adoption of the draft Guideline could arbitrarily prevent wind farm proposals which seek to place turbines within 2km of a proposed residence. Key

considerations in relation to the 2km separating distance include the following:

- In most instances it is likely that a 2km separating distance will be significantly more onerous than the objective noise criteria proposed in the draft Guideline. As a result, situations where a separating distance is enforced will render many aspects of the objective noise criteria redundant.
- The level of wind farm noise experienced at this distance will be dependent on the turbine noise emission characteristics, the proposed turbine layout, and the terrain of the surrounding environment. As a result, the level of noise at 2km will vary and therefore a separating distance cannot provide a consistent level of protection of amenity.

APPLICABILITY OF GUIDELINE

The draft Guideline appears to be primarily concerned with new wind farm proposals and their impact on existing residential dwellings. Their application to the following scenarios could benefit from further clarification. For example:

- Could the assessment criteria be potentially applied to existing wind farms, particularly in terms of the measurement methodologies and the assessment criteria proposed for the investigation of alleged low frequency noise or amplitude modulation?
- Could the draft Guideline be used to assess the acceptability of new residential development proposed near to approved or operational wind farms?

NOISE CRITERIA

The proposed criteria presented in Appendix B of the draft Guideline are similar to those presented in the SA EPA Guidelines 2003 [2], which have been previously used to assess wind farm noise in NSW, and recommend that:

For a new wind farm development the predicted equivalent noise level ($L_{eq,10\,minute}$), adjusted for any excessive levels of tonality, amplitude modulation, or low frequency, but including all other normal wind farm characteristics, should not exceed 35dB(A) or the background noise (L_{90}) by more than 5dB(A), whichever is the greater, at all relevant receivers not associated with the wind farm, for wind speed[s] from cut-in to rated power of the WTG [Wind Turbine Generator] and each integer wind speed in between. The noise criteria must be established on the basis of separate daytime (7am to 10pm) and night-time (10pm to 7am) periods.

The draft Guideline explains that the 35dB L_{Aeq} minimum limit value is derived from NSW noise amenity goals which provide distinct amenity levels for day, evening and night periods. The proposed minimum limit value of 35dB has been selected to satisfy the lowest, night amenity values but it is also applied to the day and evening periods. Given that the draft Guideline concurrently requires separate background analysis for day and night periods, there could be merit in considering different noise limits for day and night. This would be consistent with the NSW noise amenity goals which indicates higher noise levels are acceptable during the day and evening periods, and could potentially allow a greater renewable energy yield during the day.

In addition to the above, the draft Guideline explains that criteria were chosen to "*ensure that the amenity of an area is not compromised*". Whilst this may be a reasonable assertion in planning and policy terms, an individual's perception of amenity is highly subjective. Claims of this nature can therefore create unrealistic expectations of the level of protection provided by the criteria. Specifically, it would be helpful for the draft Guideline to clearly state that whilst wind farm noise are to be restricted to relatively low levels, the aim of the criteria is not inaudibility.

UNDERTAKING MEASUREMENTS

The draft Guideline requires that both prediction and measurement compliance be assessed in terms of L_{Aeq} noise levels. This is similar to the approach adopted by AS4959:2010 [3] and is a significant point of difference to the SA EPA Guidelines 2003, the more recent SA EPA Guidelines 2009 [4] as well as both of the relevant NZS6808:1998 [5] and NZS6808:2010 [6] where compliance measurements are predominantly based on statistical noise levels (L_{A90}, L_{A95}).

AS4959:2010 requires "*a minimum adjustment of +1.5 dB(A) to account for the difference between the L_{A90} and L_{Aeq}*". The draft Guideline is more prescriptive, requiring a fixed rather than minimum adjustment of +1.5dB rather. In practice, the difference between the L_{A90} and L_{Aeq} of wind turbine noise will vary. However, defining a single value offers the benefit of a prescriptive assessment methodology. To consider the proposed 1.5dB adjustment, the differences between L_{Aeq} and L_{A90} noise levels for several sets of data measured near wind turbines are presented in Table 1.

Table 1. Difference between measured L_{Aeq} and L_{A90}

Set	Distance from turbine (m)	Number of data points	Measurement time period (min)	L_{Aeq} - L_{A90}	
				Average	Standard deviation
1	100-150*	215	1	1.0dB	0.3dB
2	100-150*	327	1	1.6dB	0.6dB
3	100-150*	366	1	1.4dB	0.4dB
4	250	161	10	3.4dB	1.7dB
5	500	161	10	4.1dB	2.1dB

* Measured in accordance with IEC 61400-11:2006 [6]

It can be seen from Table 1 that at distances up to 150m where the noise of the turbine is dominant, the $L_{Aeq} - L_{A90}$ difference is comparable to the 1.5dB draft Guideline value. At measurement positions located further away the difference increases significantly, likely due to the increasing contribution of fluctuating ambient noise with increasing distance, rather than changes in the character of the noise from the wind turbines.

From this type of analysis, it is not possible to directly determine the $L_{Aeq} - L_{A90}$ difference for wind turbine noise at typical separating distances from residential dwellings. In practice, this difference is likely to be similar to 1.5dB in many instances, particularly where the received noise is the combination of multiple turbines producing similar noise levels. However, instances may also arise where wind turbine noise gives rise to $L_{Aeq} - L_{A90}$ differences greater than 1.5dB, due to factors such as atmospheric effects or occasional variations in the nature of the noise emission from the wind turbines.

Notwithstanding the above, the example results presented in Table 1 illustrate the difficulty associated with the direct measurement of L_{Aeq} wind turbine noise levels at increased separating distances where dwellings are located. Accordingly, it would seem likely that compliance measurements will inevitably rely on L_{A90} measurements.

In light of this, a more practical and transparent approach may be for the draft Guideline to apply the '$L_{Aeq} - L_{A90}$' correction to the noise limit rather than the measured noise levels, such that the limit is re-expressed in terms of the L_{A90}. Alternatively, additional clarification on how the 1.5dB correction should be applied solely to the contribution of wind turbine noise may assist in avoiding potential confusion regarding this matter.

NOISE DATA COLLECTION

Extraneous Noise

The draft Guideline recommends that data "*affected by extraneous noise should be excluded from the final data set*", proposing that identifying data where the L_{Aeq} exceeds the L_{A90} by 5dB or more can be a suitable screening method. Such a method may be reasonable to filter extraneous noise when measuring a constant noise source which is higher than the background noise level at the measurement location. However, it may be less successful when considering wind farm noise at typical residential separation distances, particularly using a 10 minute measurement interval, where the ambient noise level can often be higher than the wind farm noise level.

Listening to audio recordings is also a proposed screening method in the draft Guideline. Whilst audio records are a useful reference, the volume of data involved in assessing compliance at multiple locations around a wind farm is large, and therefore listening tests can only ever be practically adopted for a very small component of the datasets.

Measuring noise levels in one-third octave bands may prove helpful in filtering certain types of extraneous noise. For the particular case of insect noise, a one-third octave band filtering method has recently been proposed by Terlich [8] which involves removing all one-third octave bands in the range 3.15-8kHz during periods affected by insect noise. An assumption of such a method is that noise levels in the range 3.15-8kHz have little influence on the A-weighted background noise when insects are not present. However, applying this method to an example set of rural ambient noise level data, which has not been affected by insect noise, causes the A-weighted noise levels to drop by an average of 3dB indicating that the method may require some further refinement. Nonetheless, one-third octave band analysis may prove helpful in some cases.

Number of Data Points

The Guideline is helpful in its specification of a minimum number of data points to be collected during the monitoring period:

Sufficient data is considered to be approximately 2,000 valid measurement intervals [...] where at least 500 of these points should be from the worst-case wind direction.

The Guideline defines a "*wind direction spread of 45° either side of the direct line between the nearest actual or proposed wind turbine and the relevant receiver*" as acceptable for assessing worst-case wind directions.

While it is considered sensible for compliance assessment measurements to include reasonable worst case conditions, the choice of a minimum 500 down wind points seems arbitrary. Beyond satisfying the minimum 500 and 2,000 data point requirements, it would seem that one could influence the outcome of monitoring by manipulating the ratio of worst case downwind directions to other directions.

WIND DATA COLLECTION

This draft Guideline describes wind monitoring requirements for microphone locations and for the wind farm site at hub height. Whilst the wind farm site data is stated to be the reference for producing correlations between background noise levels and wind speed, the purpose of wind speed measurements at the microphone is not explicitly defined and may lead to confusion. Table 2 summarises the interpreted purpose of the draft Guideline requirements.

Table 2. Wind speed monitoring locations

Location	Interpreted purpose
Near the microphone	Solely to determine the potential influence of wind induced noise over the microphone. Note that the requirement for a measurement accuracy of +/-0.5ms^{-1} or better may infer a requirement to monitor wind speed at every microphone location, rather than a single candidate location as is common practice.
Hub height, at the wind farm site	The sole reference for correlating background noise levels and wind speeds.

The draft Guideline notes that wind speeds "*should be measured at the proposed wind turbine hub and relevant intermediate heights for the range of meteorological conditions expected*". This suggests that monitoring at hub height is mandatory and that it may not be acceptable to measure wind speeds at intermediate heights and extrapolate these up to hub height. However, the final paragraph in this section states:

Final wind turbine design may result in different heights to those originally proposed. In these cases the measured data can be extrapolated to the final design hub height using the equation below. In all cases atmospheric stability conditions should be taken into account to ensure accurate conversion of the data.

It may be helpful for the draft Guideline to clarify when extrapolation of wind speed data is considered appropriate. In addition, it is unclear how atmospheric stability conditions should be specifically accounted for. Various options for wind shear factors include real-time, short-term average, long-term average, filtering by wind sector, etc. Further guidance on selecting suitable factors would be helpful.

DATA ANALYSIS

The draft Guideline presents a discussion of data analysis and refers to three specific noise characteristics: Tonality, Amplitude Modulation and Low Frequency Noise. The draft Guideline provides relatively prescriptive advice with respect to when and how penalties should be applied for the presence of specific noise characteristics. Comments of this nature are often lacking in guidance documents and their inclusion in the draft Guideline may provide greater certainty during the various assessment stages of a project.

The methods proposed by the draft Guideline for assessing specific noise characteristics do not involve any subjective assessment of the character of the noise, implying that the proposed methods:

- have a very strong correlation with peoples subjective impressions of the noise, and;
- do not result in a specific noise characteristic penalty being incorrectly applied, for example, as a false positive.

As highlighted by the discussions which follow, the available objective assessment methods possess inherent limitations and therefore the observations of an experienced practitioner should still be required to determine the need for objective assessment.

Amplitude Modulation

The draft Guideline recommends the following assessment method for amplitude modulation:

An excessive level of modulation is taken to be a variation of greater than 4dB(A) at the blade passing frequency.

It is not clear whether the 4dB variation refers to the peak-to-trough difference in sound level, or the variation from the average. The requirement may also be misinterpreted as relating to modulation of sound frequencies equal to the blade passing frequency, rather than higher frequencies of sound being modulated at a rate equivalent to the blade passing frequency. Further clarification would be helpful.

No comment is provided to indicate the reliability of this assessment method. Indeed, the absence of such a discussion would suggest that the method is robust. A recent article by Bass [9] investigates the use of a comparable assessment methodology for amplitude modulation, with a 3dB peak-to-trough trigger. The paper identifies an 'unacceptably high rate of false positives' for the test method. It is plausible that a similar return on false positives is possible for the method proposed by the draft Guideline. However it should be noted that the Bass paper investigates amplitude modulation within rural ambient noise and the results may or may not translate to a sound environment where wind turbine noise dominates.

The draft Guideline also notes that the absence "*of excessive modulation in noise emissions measured at an intermediate location is sufficient proof that the modulation is not a feature of the wind farm*". The certainty that this comment can offer during a wind farm assessment is advantageous. However, the comment suggests that the mechanism(s) for amplitude modulation is sufficiently understood and, by inference, is not unduly influenced by propagation effects. By contrast, a recent presentation by Smith [10] suggests that propagation effects may be significant in the occurrence of amplitude modulation in some cases.

Amplitude modulation is the subject of a considerable UK research effort which is nearing completion. This research has highlighted a number of complexities to the causes (see Smith [10]), identification and assessment of amplitude modulation. In advance of this study being completed, it would be prudent for any future guideline to allow the flexibility to accommodate new approaches and findings when available.

Low Frequency Noise

The draft Guideline acknowledges low frequency noise is present in all types of environmental noise and that measurement data supports that low frequency noise is typically not a significant feature of modern wind turbines. However, community concerns about proposed wind farm developments frequently include questions about potential low frequency noise and how the planning process can be used to control it.

The draft Guideline attempt to address these concerns by introducing objective criteria. The first element of the proposed criteria is an external screening test based on the following:

If it is shown that the C-weighted noise (measured from 20Hz upwards) from a wind farm (excluding any wind induced or extraneous C-weighted noise) is repeatedly greater than 65dB(C) during the daytime or 60dB(C) during the night-time a more detailed low frequency noise assessment should be undertaken.

Introducing this screening test offers the benefit of communicating a clear test of adequacy for low frequency noise, and is consistent with the stated aim of promoting a clear regulatory framework. However, the introduction of low frequency noise criteria presents several issues:

- The chosen thresholds appear to have been derived from work largely related to combustion power stations. Evidence to support these values as suitable thresholds for wind farms appears to be limited. A paper by Hessler [11] indirectly referred to by the draft Guideline specifically indicates design limits or regulatory goals are not warranted for low

frequency noise from wind farms. Hessler further notes "*a maximum regulatory limit of 70dBC is recommended if one must have a low frequency limit*".

- The draft Guideline acknowledges that low frequency noise is particularly difficult to measure in windy environments. This point is emphasised by Hessler who states "*it must be strongly cautioned that C-weighted sound levels do not mix well with wind turbine applications because it is extremely difficult to accurately measure C-weighted noise levels in the presence of any kind of wind*". Hessler further notes the likelihood of measured levels in excess of 60-65dB L_{Ceq} as a result of extraneous influences in windy conditions. These observations have been confirmed by our own analysis of ambient noise level data collected in rural locations as summarised in Table 3. The data was collected at locations away from wind turbines using a conventional monitoring set-up including a 90mm wind shield around the microphone. Whilst the draft Guideline' proposed criteria are based on L_{Aeq} levels, Table 3 also presents an analysis in terms of L_{A90} levels for information.

Table 3. Application of draft Guideline proposed low frequency noise external screening criteria to measured data (rural site – no wind turbines)

Dataset	**Monitoring duration**	**Percentage of noise levels exceeding the proposed Low Frequency Noise external screening criteria**	
		$L_{Ceq, 10min}$	**$L_{C90, 10min}$**
A	20 days	38.4%	0.2%
B	28 days	9.1%	0.0.6%

This sample analysis indicates equivalent noise levels regularly exceed the proposed threshold of the draft Guideline, demonstrating potential limitations and practical challenges to the measurement of outdoor equivalent C-weighted noise levels (L_{Ceq}) in windy conditions. Detailed statistics on wind noise at each microphone and/or enhanced microphone shielding systems could reduce false positives if further related advice was provided in the draft Guideline. However, the draft Guideline states that if these values are exceeded, a more detailed low frequency noise assessment should be undertaken based on a procedure which requires measurements inside non-associated residences. Whilst it is generally agreed that the most appropriate way to investigate low frequency noise is to measure internal noise levels, this type of requirement in a noise policy presents several considerations:

- Enforcement of a low frequency noise permit condition based on the draft Guideline would require the cooperation of a resident to provide access to their home for extensive and potentially intrusive surveys. Unlike external measurements, if permission is not granted there is not the same option to measure noise levels at an alternative representative location.
- Low frequency noise levels within dwellings are highly prone to the influence of domestic equipment and activity inside the home. Identifying this type of influence often requires the use of audio recordings to examine the source of noise, however this may be seen as an intrusion on privacy.
- An increased low frequency noise level inside a dwelling may be a consequence of the specific sound insulation characteristics of the dwelling under investigation; a factor which is beyond the control of a wind farm developer, and which may not be able to be reliably accounted for in the design and planning of a wind farm.

Notwithstanding the above, the draft Guideline recommend the UK Department of Environment Food and Rural Affairs (DEFRA) document *Proposed criteria for the assessment of low frequency noise disturbanc*e [12] as the relevant reference to assess internal low frequency noise levels. The DEFRA document is well researched and includes a recommended methodology and proposed criterion which are valuable references for the assessment of low frequency noise levels inside residential dwellings.

Subsequently, the draft Guideline propose that the DEFRA criterion be used to determine if the noise levels are excessive, and where found to be excessive, to apply a 5dB penalty to the measured or predicted L_{Aeq} noise level. However, applying the DEFRA criterion in this manner, as a definitive test for excessive noise levels, extends beyond its intended application. Specifically, the DEFRA document states:

"*It is suggested the proposed criterion be used not as a prescriptive indicator of nuisance, but rather in the sense of guidance to help determine whether a sound exists that might be expected to cause disturbance. Some degree of judgement is required by the EHO [Environmental Health Officer] is both desirable and necessary in deciding whether to class the situation as a nuisance, and is likely to remain so. One of the main reasons is that, from the control cases, it is clear that problems do not necessarily arise when the criteria are exceeded. Indeed, we can conjecture that genuine LFN complaints occur only in a few such cases. Therefore, factors like local knowledge and understanding of the broader situation are likely to remain important aspects of the assessment. […]*"

Therefore, whilst the DEFRA document is a helpful reference for low frequency noise investigations, the adoption of their criterion as a definitive test of acceptability, as proposed in the draft Guideline, is not advocated by the authors of the DEFRA document.

NOISE PREDICTIONS

The draft Guideline require noise predictions to be determined for 'worst-case' conditions at all relevant receivers and proposed intermediate points, but does not endorse any specific approved method. Instead, they note that ISO 9613-2

[13] and the CONCAWE noise propagation model [14] are commonly used. It is correct that both of these methods are in common use in Australia for wind farm noise assessments. However, for a given assessment condition, these methods can often produce different prediction outcomes. The issue of sound propagation from wind farms has been the subject of considerable investigation. In 1998, a comprehensive study [15], part funded by the European Commission, considered the merits of alternative modelling methods. This study found that the ISO 9613-2 model provided a robust representation of upper noise levels which may occur in practice. Conversely, the study demonstrated that alternative methods such as CONCAWE and ENM tended to significantly over predict the measured noise levels in practice. The study also demonstrated CONCAWE and ENM to be overly sensitive to the selected input parameters, resulting in a range of predicted noise levels vastly greater than the measured variation observed in practice. Since this time, other publications have lent support to the use of the ISO 9613-2 as a preferred methodology for predicting noise levels from wind farms:

- In 2009, the UK Institute of Acoustics journal [16] published a joint agreement between practitioners in the field of wind farm noise assessment, including consultants routinely employed on behalf of both developers and community opposition groups. This agreement advocated ISO9613-2 as the appropriate calculation method, accompanied by recommendations on the selection of suitable input parameter for factors such as ground and atmospheric conditions.
- New Zealand Standard NZS6808:2010, which is currently used in Victoria, designates ISO 96132 as the appropriate prediction method
- Australian Standard AS 4959-2010 provides general advice on predictions and notes that a number of complex methods are available for the prediction of noise from wind turbines. Of the more detailed available methods, ISO 9613-2 is the only calculation standard referred to directly.

The available evidence, including studies carried out with the involvement of the authors of this paper [17, 18], provide support for the ISO 9613-2 standard as a preferred method for the prediction of A-weighted noise levels. The selection of a preferred method in any future NSW guidelines, along with relevant input parameters, would provide helpful clarity on the subject and enable more consistent assessment outcomes.

The above matters solely relate to the prediction of A-weighted noise levels from the operation of a wind farm. However, the draft Guideline also requires the prediction of low frequency noise levels at dwellings within 2km where consent has not been obtained. To be able to present this information requires:

- Turbine manufacturers' noise emission data at frequencies below the minimum range that may be available. Specifically, the international test standard IEC 61400-11:2006 which is widely used for rating turbine noise emissions, requires the determination of one-third octave band sound levels in the range from 50Hz to 10kHz. The standard does include provision for determining sound levels at lower frequencies, however, the extended measurement range is not mandatory and, as such, the additional data may not be available in many cases. In cases where data is available, the test uncertainty associated with the emissions will considerably greater than that of overall A-weighted sound power levels.
- Prediction of noise levels at frequencies below the validated range of the methodologies referred to in the draft Guideline, ISO 9613 and CONCAWE. Alternative methods are available for predicting noise at lower frequencies, most notably the Danish method NORD 2000. However, to our knowledge, such methods are not routinely applied in Australasia, either for wind farm or other general applications.

Accordingly, whilst it is possible to provide predicted C-weighted noise levels, the resulting values will be subject to greater uncertainty as a result of both the input information and the prediction methodologies employed. The draft Guideline does not provide any advice to address these complexities and therefore places the onus on industry to develop new procedures and methodologies specific to the assessment of wind farm noise in NSW.

CONCLUSIONS

The draft Guideline presents a comprehensive and stringent set of criteria to control the design, planning and commissioning of commercial scale wind farm developments. The draft Guideline offers useful prescriptive advice on certain aspects of wind farm noise assessment, and in turn offers the benefit of increased certainty. However, in relation to matters such as the assessment of noise characteristics, the advice is prescriptive beyond the present state of understanding of wind turbine noise. This has the potential to result in unnecessary penalties and operational curtailments to completed wind farm developments. Noise compliance assessments during commissioning also have the potential to become protracted and costly as a result of default requirements to assess noise characteristics at each site. In its present form, the draft Guideline will be significantly more stringent than noise policies previously used to date in NSW. The potential amenity protection benefits this could translate to, must be balanced against the corresponding loss in energy yield from each new development (see reference [18]), and the subsequent impact this could have on the NSW government's broader objectives with respect to renewable energy.

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ACOUSTICS 2012
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The 2012 conference of the Australian Acoustical Society will be held in Fremantle, Western Australia, from 21 to 23 November 2012. Acoustics 2012 Fremantle will be another great opportunity for Australian and International guests to get together to discuss all aspects of acoustics. Below are some updates on key presentations, workshops and dates.

Plenary and keynote presentations

The conference will include many interesting plenary and keynote presentations. Guest speakers include:

- Dr Irene van Kamp of the National Institute of Public Health and the Environment (Netherlands).
- Dr Ross Chapman of the School of Earth and Ocean Sciences, University of Victoria, Canada.

Pre-conference workshops

A variety of specialist workshops/short courses will take place prior to the event, including:

- *Active Noise Control*, University of Western Australia
- *Underwater Passive Acoustic Monitoring*
- *Advanced Machine Diagnostics and Condition Monitoring*, (2 day course), the course will be given by Em. Prof. Bob Randall from UNSW and will be held at Curtin University.

The key dates for the Acoustics 2012 Fremantle conference are:

Papers		**Registrations**	
Abstract acceptances	28 April	Registration begins	1 July
Full papers due	11 June	Late registration fees apply	1 September
Reviews released	27 August	Conference begins	21 November
Final papers due	19 September		

Please refer to the conference website for all the up-to-date information regarding the conference:
http://www.acoustics.asn.au/joomla/acoustics-2012.html

If the conference website does not answer any of your queries, please contact the WA Division AAS secretary via e-mail (wa-secretary@acoustics.asn.au)