



## Plain English Guide

to

## Wind Energy: Noise Assessment Bulletin December 2016

### Introduction

The NSW Wind Energy Guideline together with the Visual Assessment Bulletin and the Noise Assessment Bulletin guide the process of developing a wind farm from siting and design through to evaluation, measurement and assessment of impacts and final determination by the Department of Planning or the Independent Planning Commission.

This is a plain English guide to the Noise Assessment Bulletin for communities and explains how wind turbine noise is measured and assessed, mitigated and managed. We have been faithful in our attempts to summarise the Bulletin. Any issues we think warrant further consideration are summarised at the end of this document.

Wind turbine noise is unique in that 1) the noise level rises with wind speed, as does the background noise which in turn masks turbine noise, 2) the noise comes from the top of the tower and is difficult to shield or mitigate and 3) is different from other noise in a rural setting.

Indications are that turbines closer than 1500m will most likely not be noise compliant in NSW.

However, the expected noise levels at all receiver locations including host properties should be assessed to ensure that affected persons are appropriately informed about impacts.

### Noise Assessment

During the scoping phase, indicative noise assessments should be factored into the wind farm design to minimise noise. The proponent should conduct an indicative noise impact assessment of noise levels expected at all of the closest dwellings (referred to as receivers) using the maximum sound levels of the proposed turbines under the worst circumstances (referred to as a conservative approach).

During the EIS phase, the proponent is expected to assess the noise levels at **all** residences (including schools, and places of worship) and hosts within a certain distance of wind turbines (the noise assessment zone is not stipulated<sup>1</sup>) so that everyone can be properly informed of the impacts.

The EIS should report on 1) background noise monitoring, 2) the model used to anticipate noise at different wind speeds when the wind farm is operational, 3) results of the actual wind monitoring undertaken, 4) provide the make and model and positional information of wind turbines, 5) predicted noise levels at the closest non-associated residences and 6) strategies to bring noise levels down to acceptable levels, including negotiated agreements with landowners to accept the noise in return for a payment, shutting turbines down under certain wind conditions<sup>2</sup> and operating in low noise mode.

The Department and the Environment Protection Authority will assess the noise assessment report to determine whether it has been done to the requirements of SA 2009 (SA Noise Guidelines) and the Noise Bulletin, and whether the predicted noise levels comply.

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- 1 Advice from the Department suggests a noise assessment zone of 2km to 2.5km is sufficient.
  - 2 Advice from the Department suggests wind speeds of 7-9m/sec is the pivotal point for noise compliance.

## Determination

Following assessment, the consent authority (the Department or IPC) will determine whether the project should be approved on its merits by considering the noise impacts of the project alongside the other environmental, social and economic considerations, including the public interest.

Approved wind farms will be noise monitored when operating and the proponent must have a plan for rectifying issues as they arise.

## Allowable Noise Levels

NSW has adopted the SA Noise Guidelines (SA 2009) in part. Noise levels, adjusted for tonality and low frequency noise in accordance with these guidelines, should not exceed 35 dB(A)<sup>3</sup> or should not exceed the background noise by more than 5 dB(A) if the background noise is higher as the wind speed increases.

Noise levels are measured at the closest residences by monitoring noise over a 24-hour period and readings are taken at 10-minute intervals.

## Special Noise Characteristics of Turbines

Tonality is the pitch of the sound, and wind turbines can give off an annoying screeching sound usually caused by maintenance issues. The chosen turbine model should be checked for tonality at the closest residences during the EIS and if tonality is found to be a repeated characteristic of the wind turbine noise, 5 dB(A) should be added to measured noise levels for compliance.

Low frequency (inaudible) noise is difficult to measure and is typically not a significant feature of modern wind turbines. Nevertheless, if low frequency noise is found to be a repeated characteristic of the wind turbine noise, 5 dB(A) should be added to the predicted or measured noise level for compliance.

## Penalties for Non-Compliance

Tonal and/or low frequency noise is excessive if it occurs more than 10% of the time during assessment, that is 144 minutes in a 24-hour period. If tonal or low frequency noise or both is excessive, the noise threshold for compliance is raised by 5 dB(A).

Monitoring for compliance should continue until enough valid samples are obtained to demonstrate that the operating wind farm complies with the applicable noise criteria and the conditions of the consent.

Shutting down turbines and operating in low noise mode is an option for the wind farm operator to comply with the noise criteria.

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3 This means that the noise generated by wind turbines is deemed acceptable at 35 dB(A) even if the background noise is less. A quiet rural area has a background noise of ~30 dB(A) and a rise of 5 dB(A) is a clearly noticeable change, so expect to hear the turbines, particularly at night if the actual background noise is less than 35 dB(A).

The absolute measurement of sound is in decibels (dB). The dB(A) (the A weighted measurement of noise) focuses on what the human ear can hear, and in doing so filters out high and low frequency sound which may also be generated by wind turbines. Hence the need to also measure high and low frequency sound separately and adjust the dB(A) measurements (upwards) for tonality and low frequency sound if they occur.

In any case, details of the noise management and potentially impacted residences and weather conditions must be provided so that compliance can be independently confirmed.

Noise from ancillary operation sources such as electrical substations should be assessed against the NSW Industrial Noise Policy.

### Noise and Health

Currently, there is no direct evidence that exposure to wind farm noise affects physical or mental health and there is currently no consistent evidence supporting a link between wind energy projects and adverse health outcomes in humans relating to infrasound.

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3 In past assessments, the Department has misrepresented the NHMRC stance on wind farms and human health which says there is no consistent evidence, but that the research is poor quality and further investigation within the 1500m buffer is warranted. In that context, it is difficult to understand how a strategy of prudent avoidance will be applied to wind farms other than to apply a buffer zone of 1500m to all residences including hosts.

## Attachment 1 Observations

- 1 The Noise Assessment Bulletin lacks the clarity and rigour of the Visual Assessment Bulletin, even though noise assessment, as a scientific measurement, is less subjective than visual impact assessment. This gives the proponent considerable leeway in choosing how to noise assess the wind farm.
- 2 The Bulletin states that an indicative noise assessment should form part of the Preliminary Environmental Assessment (PEA), but no further details as to methodology are provided.
- 3 Noise assessments are complex and there are many variables which can skew the results, even the measurement of background noise. Therefore, it is important that 1) a conservative approach to noise assessment be adopted and 2) any noise predictions close to the noise threshold be scrutinised.

We note the following issues in the Noise Assessment Bulletin:

- There is no suggestion that noise compliance levels at host residences should be different from non-associated landowners. However, the Department expects the host agreement to stipulate a higher noise threshold for compliance and will exclude hosts from noise assessment even though it would be prudent to avoid placing turbines any closer than 1500m to a residence for health reasons.
- No distinction is made between background noise and intermittent noise eg traffic, aircraft, pumps, rain etc. Intermittent noise should be excluded so the background noise is not measured higher than it ought to be. Advice from the Department suggests that this is done by sampling the noise in such a way as to eliminate intermittent noise. Expect to see this explained in the noise assessment methodology.
- No advice is given on suitable locations for noise logging equipment to measure background noise during the EIS and to measure noise compliance during operation. However, advice from the Department recommends equipment be located near the living area of a dwelling on the wind farm side of the dwelling and not close to trees.
- There is no distinction between day-time and night-time background noise and how that should be factored into the assessment.
- The background noise at residences in sheltered locations may not rise with wind speed and therefore warrants special consideration.
- The closest residences may not be the most noise affected because of weather patterns, topography\altitude. These residences should be identified and included in noise monitoring eg residences at the approximate hub height or on the opposite side of a body of water from a wind turbine.
- There is no discussion of a suitable location for wind monitoring equipment for compliance eg close to dwellings in the direction of the wind farm and not sheltered by structures or vegetation. A conservative approach should be adopted by choosing a quiet location.
- There is no requirement to photograph noise monitoring equipment in position and its surrounds so that changes to the physical environment that may affect background noise can be addressed in the future.
- There should be a requirement to provide the wind turbine manufacturer's published noise level data for their machines so that noise modelling can be assessed against this data at different wind speeds and sound characteristics. Advice from the Department suggests that the modelling software uses a 'generic' turbine which will likely be noisier than the chosen model. Expect this to be explained in the EIS.
- For consistency, the same locations should be used for measuring wind speed and direction for background noise measurements, noise predictions, and compliance checking.
- It is not clear whether the noise compliance threshold is to be raised by 5 dB(A) or 10 dB(A) if both tonal and low frequency sound occurs more than 10% of the time. Advice from the Department is that the compliance threshold will be raised by 5dB(A) if both high and low frequency noise applies.

- There is no mention of how the noise from two or more turbines at similar distances to a residence should be modelled or measured. Advice from the Department suggests that multiple turbines will have little effect on noise levels. This seems to contradict current Australian research published by Acoustics Australia which discusses multiple turbine noise effects.
- There is no mention of how noise for modified wind farm developments, where more turbines are added, should be assessed. The baseline data from the original EIS pre-dating any wind farm development should be the benchmark for noise assessment at all the closest receivers as if it was an entirely new proposal. Advice from the Department suggests that the baseline for noise assessment should be the background noise prior to any wind farm development. Expect that a noise assessment of any modifications which add to the number of turbines be conducted.
- There is no mention of how the cumulative noise impact of several nearby wind farms should be assessed.
- Negotiated agreements with individual landowners are commonly used to achieve noise compliance. These contracts should state the absolute noise level being agreed to, provide suitable on-going noise compliance monitoring and agreed consequences of noise exceedances. The Noise Assessment Bulletin is clear on this point - that the EIS should clearly identify the expected noise levels at all receiver locations including host properties to ensure that affected persons are appropriately informed regarding the development proposal.

Many of the above points refer to the methodology which should be used and should be included in the Noise Assessment Bulletin and/or explained in the EIS documentation. Others should be specified as mandatory requirements and therefore included in the SEARs.