

TOPIC OF THE MONTH

Wind Turbine Noise

More Than Just a Decibel Number

When wind-farm noise is discussed, the conversation often focuses on a single figure: the predicted sound level in decibels. But a decibel figure does not tell the whole story.

Noise can vary in character, frequency, duration and intensity. It can also be experienced differently depending on the surrounding environment, weather conditions, time of day and whether the sound is steady, intermittent, tonal or repetitive.

This is particularly important in quiet rural districts such as Furracabad, Matheson and the areas surrounding Glen Innes, where existing night-time background noise can be very low.

MAIN MESSAGE

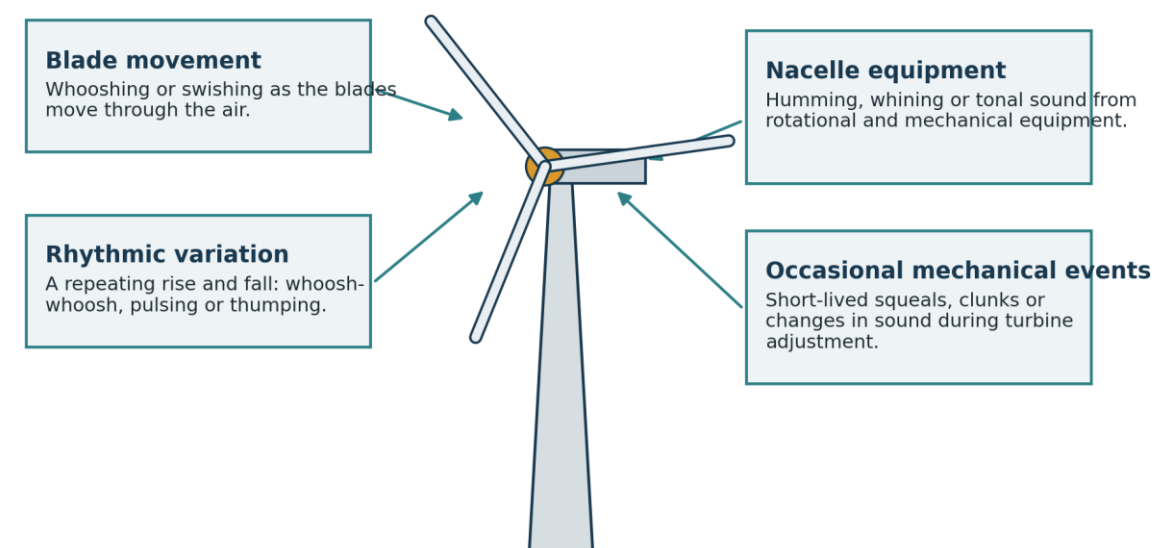
Noise assessment must consider more than an average decibel figure. It must examine the character of the sound, night-time conditions, background noise, weather, monitoring locations and the transparency of the data used.

1. What does wind-turbine noise sound like?

Wind turbines can produce several types of sound. Movement of the blades through the air creates aerodynamic noise, commonly described as whooshing or swishing. The regular passage of the blades may also create a rhythmic rise and fall in the sound.

The nacelle at the top of the tower contains rotational and mechanical equipment. Depending on turbine design, operation and maintenance, residents may perceive humming, whining or other tonal sounds, as well as occasional mechanical events.

Wind turbine noise can have different characteristics



The perceived impact depends on sound level, character, repetition, weather and the surrounding environment.

Figure 1. Wind-turbine sound may include aerodynamic, rhythmic, tonal and occasional mechanical characteristics. Original explanatory diagram based on concepts in the supplied Wind Farm Living material.

The NSW Wind Energy Noise Technical Supplement recognises that people may perceive wind-turbine noise differently from existing rural sources such as traffic and farm machinery. It also requires consideration of special characteristics including tonality and low-frequency noise.

Not every turbine will produce the same sound, and conditions will not be identical at every residence. The experience can change according to turbine model, blade speed, operating mode, wind speed and direction, terrain, vegetation and atmospheric conditions.

2. Why does a quiet rural environment matter?

The same sound can be experienced very differently in a busy town and in a quiet rural valley. During the day, traffic, machinery, livestock and normal farming activity may partly mask another sound. At night, many of those activities stop and the background environment becomes considerably quieter.

A sound that appears modest when expressed as a decibel reading may become prominent when it is different from the natural background, repetitive, tonal, intermittent, present for long periods or most noticeable during sleeping hours.

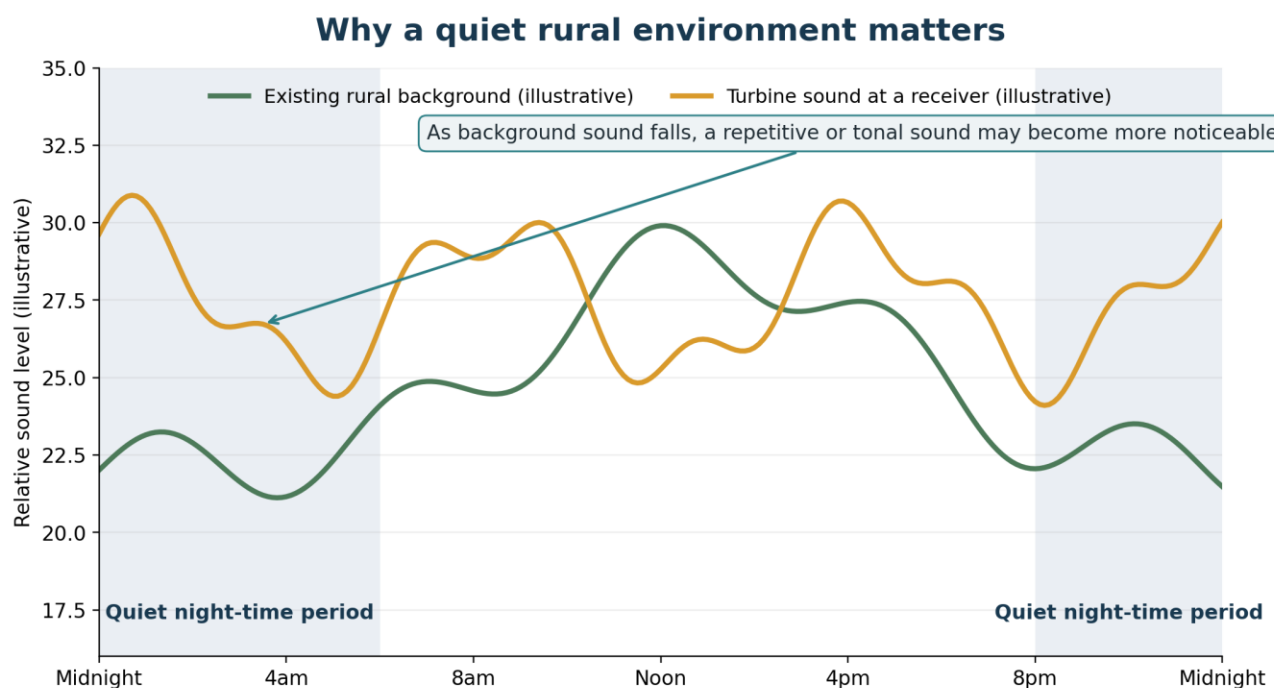


Figure 2. A quiet night-time background can make a repetitive or tonal sound more noticeable. This is a conceptual illustration, not measured data.

The NSW guidance notes that reliable wind resources are commonly found in quiet rural areas and that the relationship between wind speed and existing background noise is site-specific. This relationship must be determined through the assessment process.

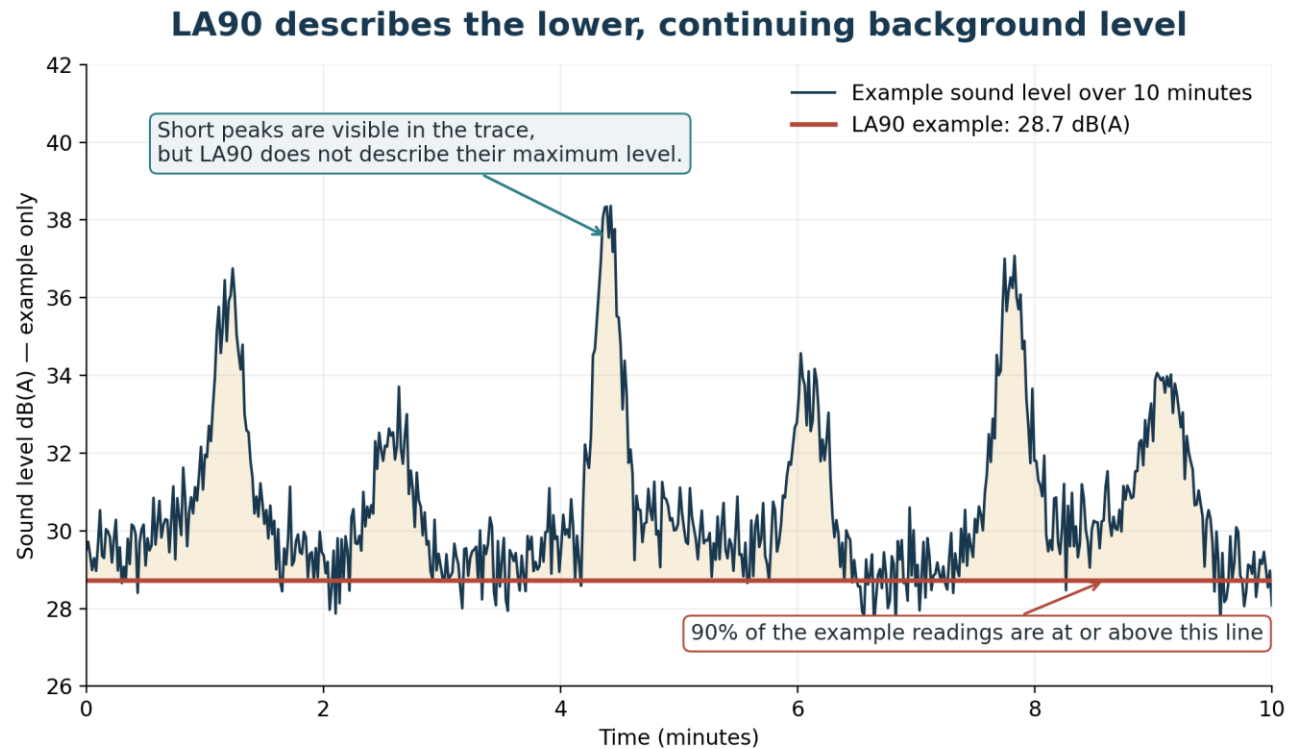
Protecting rural amenity does not mean demanding complete silence. It means recognising that residents currently live in an environment where continuous industrial noise is not an established part of everyday night-time life.

3. What is LA90?

LA90 is frequently mentioned in noise reports but is often poorly explained. In layman's terms, LA90 is a statistical measure used to describe the underlying background sound level.

For a ten-minute measurement period, LA90 is the sound level that was exceeded for 90 per cent of that period. In other words, the measured sound was at or above the LA90 figure for approximately nine of those ten minutes.

Because short, loud events may have less influence on the result, LA90 is commonly used to represent the quieter, continuing background.



Illustrative data created for explanation. In NSW, LA90 is used to establish background noise; turbine noise is assessed using LAeq,10.

Figure 3. LA90 is a background-noise statistic; it does not show every peak, the maximum level or the character of the sound. Illustrative data only.

LA90 does not tell residents the maximum sound level, how often noticeable peaks occur, whether the sound contains a hum or tone, whether it rises and falls rhythmically, or how it may be experienced inside a bedroom.

IMPORTANT NSW DISTINCTION

Under the current NSW framework, LA90 is used to determine existing background noise. Predicted or measured turbine noise is assessed using LAeq over ten minutes, with adjustments where repeated tonality or excessive low-frequency noise is identified.

NSW residential criterion

Predicted LAeq,10, adjusted for tonality and low-frequency noise, should not exceed

35 dB(A) OR background LA90,10 + 5 dB(A) — whichever is greater

LA90 should therefore not be described as permission for turbines to exceed the noise limit for 90 per cent of the time. Its importance is that the measured background level can influence the criterion ultimately applied to a residence. This makes the accuracy and transparency of background monitoring critical.

4. How will Reddestone noise be predicted and measured?

Following approval of the meteorological monitoring mast, Iberdrola is progressing early investigations into the suitability of the proposed Reddestone site. Its published next steps include wind monitoring, preliminary environmental and technical assessments, consultation and early design work. If the wind-farm proposal advances, noise should be examined at several stages.

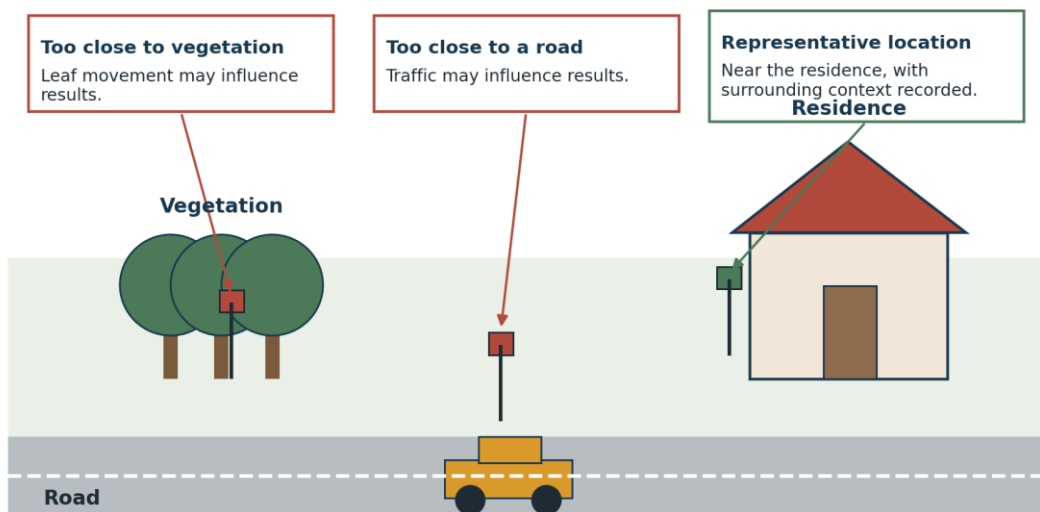
Early prediction

During project scoping, the applicant should provide an indicative assessment of expected noise at surrounding receivers. NSW guidance calls for early predictions using conservative assumptions, such as the maximum sound-power level of the likely turbines and worst-case noise-propagation conditions, with comparison against the base criterion of 35 dB(A).

Background-noise monitoring

Before a detailed assessment is prepared, background sound should be monitored at representative locations. The positioning of monitoring equipment matters. A monitor near a road, vegetation, running water, livestock, pumps or other sound sources may produce different results from a monitor positioned to represent conditions at a residence.

Background-noise monitoring must represent where people live and sleep



Record the exact location, nearby sound sources, season, weather and reasons for excluding any data.

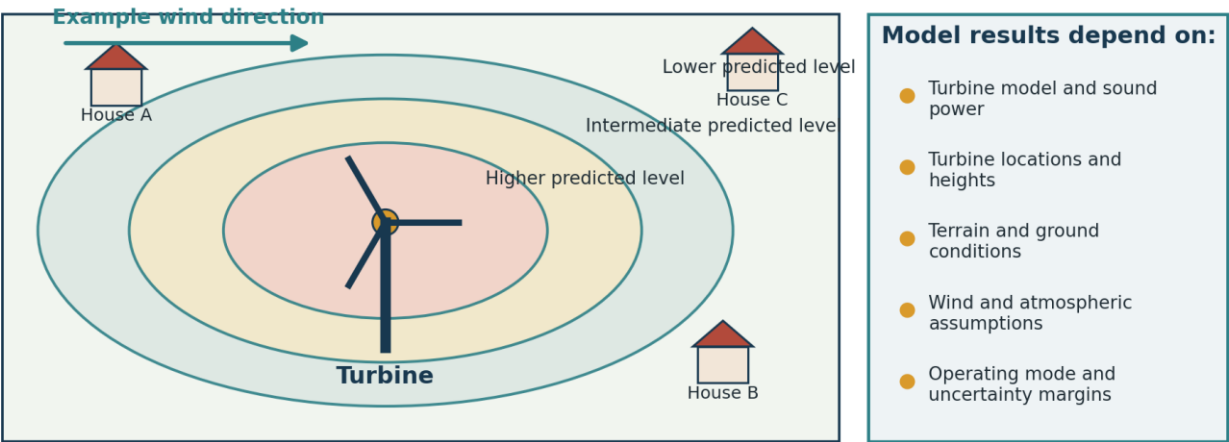
Figure 4. Monitor location, nearby sound sources, timing and weather must be documented so results can be properly interpreted.

The assessment should identify every monitoring location, the residence it is intended to represent, the distance from that residence, the time of year, monitoring duration, nearby sound sources, weather conditions and the method used to identify or remove extraneous noise.

Noise modelling

A computer model is used to predict turbine sound at surrounding homes. A noise contour map is not an actual recording of future sound. It is a prediction based on inputs and assumptions, including turbine specifications, turbine locations, terrain, ground characteristics, wind and atmospheric conditions, operating modes and modelling uncertainty.

A noise contour map is a model – not a guarantee



Illustrative only – not measured data and not a Reddestone prediction.

Figure 5. Noise maps are modelled predictions. Their assumptions, inputs and uncertainty margins must be disclosed. This diagram is illustrative only.

The NSW framework requires the environmental impact statement to disclose the model, input assumptions, background-monitoring locations, turbine specifications, predicted levels at affected residences and comparisons against the applicable criteria.

Special noise characteristics

The assessment must also consider whether turbine noise contains repeated special characteristics. Tonality is noise with a prominent frequency and definite pitch. Under the NSW guidance, a repeated audible tone can result in a 5 dB(A) adjustment to the measured project-noise level.

Low-frequency noise must also be assessed. The NSW guidance acknowledges that low-frequency measurements can be difficult in windy conditions because wind across the microphone may influence readings. Equipment, windscreens, data treatment and reasons for excluding measurements must therefore be clearly explained.

Operational compliance

If a project is approved and constructed, operational monitoring would be required to determine whether it complies with its consent conditions. Where an exceedance is identified, the applicant must propose feasible and reasonable mitigation and management measures and a timetable for implementation.

Possible measures may include reduced-noise operating modes or shutting down selected turbines during specified wind directions or weather conditions. Where these strategies are relied upon, the trigger conditions and compliance process should be auditable and independently verifiable.

5. What should the community demand?

RWFAG believes the community should not be expected to accept only a brief summary, a coloured contour map or an assurance that the project will “meet the guidelines”. Residents should receive enough information to understand and independently review the assessment.

✓ The proposed turbine make and model, with complete sound specifications	✓ Modelling inputs, assumptions and uncertainty margins
✓ The coordinates and height of every proposed turbine	✓ Predictions under conservative and worst-case conditions
✓ Maps showing all associated and non-associated residences	✓ Separate consideration of night-time conditions

✓ The exact locations of every background-noise monitor	✓ Assessment of tonality and low-frequency noise
✓ Photographs and descriptions of monitoring sites	✓ Predicted results at individual residences
✓ The dates, seasons and duration of monitoring	✓ Any proposed reduced-noise or turbine-shutdown strategies
✓ Relevant weather and wind records	✓ A clear complaint-investigation procedure
✓ Raw and processed acoustic data	✓ Enforceable mitigation requirements
✓ Details of every excluded data period and the reason for exclusion	✓ An independent acoustic peer review

Monitoring locations should be representative of where people actually live and sleep. Data removal should be transparent and justified. Modelling should not rely on optimistic assumptions, and uncertainty should favour the protection of residents rather than maximising turbine output.

THE RWFAG POSITION

RWFAG is asking for a rigorous, transparent and independently reviewable assessment that reflects the quiet rural character of the area and the actual conditions experienced by neighbouring residents.

Noise is not simply a number. It is the sound people may hear at their homes, on their properties and in their bedrooms. It is affected by the landscape, the weather, the time of day and the character of the sound itself.

Before any decision is made about the proposed Reddestone Wind Farm, the community deserves to know not only the predicted decibel level, but exactly how that figure was produced, what it includes, what it leaves out and how compliance would be independently verified.

Sources and explanatory notes

The technical statements about the NSW assessment framework and noise criteria in this document are based on the NSW Department of Planning, Housing and Infrastructure's Wind Energy Guideline – Technical Supplement for Noise Assessment, November 2024, current version 1.0 at the time this document was prepared.

NSW Department of Planning, Housing and Infrastructure: [Wind Energy Guideline – Technical Supplement for Noise Assessment](#)

Iberdrola Australia: [Reddestone Wind Farm project page](#)

Wind Farm Living: Concepts reviewed from the supplied "Educating the Lawyers" extracts, including Lessons 2, 9, 10, 11, 12, 14, 16 and 20. The diagrams in this document are original explanatory redraws rather than reproductions of the supplied artwork.

IMPORTANT NOTE ABOUT THE VISUALS

All graphs and diagrams in this document are explanatory illustrations. They are not measured data, an acoustic assessment or a prediction of noise levels for the proposed Reddestone Wind Farm.