



Lord Howe Island

Hybrid renewable energy project

Photo credits: @prodivelordhowe; @davidconnorphoto; @arajillaretreat; @james_lonergan; @trevortempleman

Fact sheet: Wind turbine sound

In brief:

- On Lord Howe Island, the closest wind turbine will be about 300 metres away from the nearest residential property and about 500 metres from the nearest tourist lodge
- An independent technical noise assessment was carried out by Jacobs, a recognised environmental and engineering consulting firm
- Sound from turbines increases as wind speed increases, but so does the background noise and often the wind itself can mask the sound of the wind turbine
- Findings from the assessment were positive. Background noise on the Island is high so sounds from the turbines will be effectively masked
- Predicted turbine generated sound levels are below standard thresholds set in the *Draft NSW Wind Farm Guidelines (2011)* for all properties on the Island
- For a closer look at the detailed results, see the full noise assessment report under the Publications tab on the Board website at www.lhib.nsw.gov.au.

Wind turbines create sound from the blades moving through the air or from the machinery that produces the electricity.

Mechanical sounds are created from the gearbox and generator. Modern technology has given us quieter gearboxes.



Aerodynamic sounds happen when turbine blades pass through the air as they rotate. This is the 'swish' sound that people most often hear. Aerodynamic sounds are affected by the speed of the turning blades and the design of the turbine.

Understanding sound levels

Sounds are hard to describe and perceptions are affected by topography, background noise, and vary from person to person.

The loudness of a sound is expressed in decibels (dB). A one decibel change in the sound level is just perceptible. A three decibel change is clearly noticeable while a ten decibel increase is heard as a doubling of the sound.

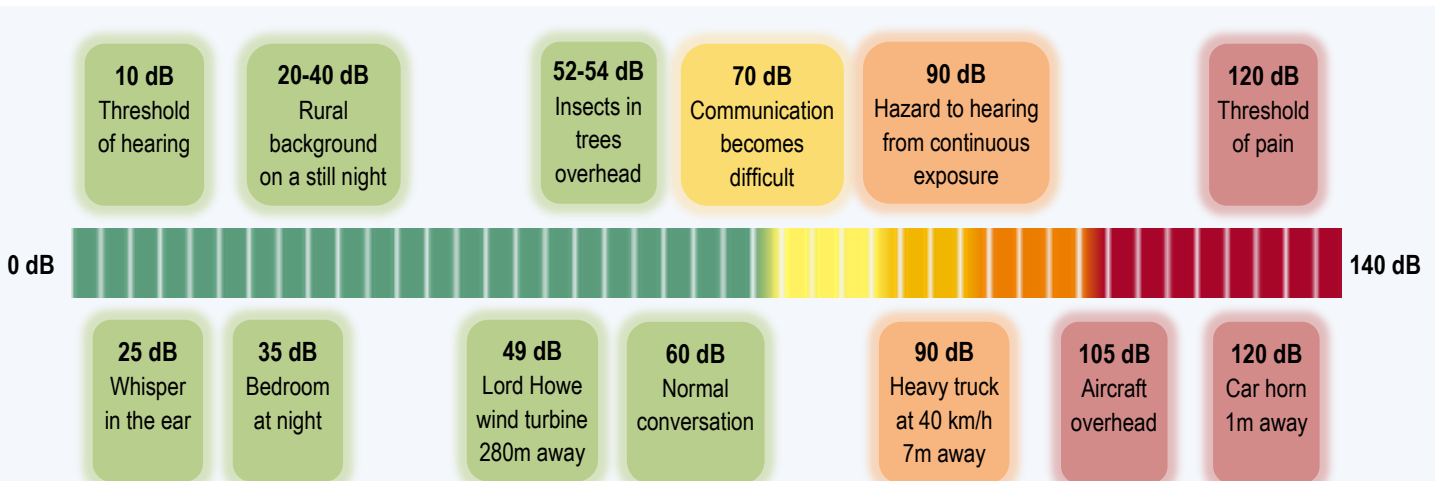


Diagram compiled from several sources including www.osha.gov/dts/osta/otm/noise, www.windfarmdevelopments.co.nz/faq/noise.html, results from the Jacobs noise assessment and other commonly quoted noise level comparisons.




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Assessment of sound impacts

An independent technical noise assessment was done in early 2015 as part of the overall environmental assessment for the project.

 Background noise was measured for the operating wind speeds of the turbines (between 4 and 13 metres per second).

 Monitoring took place over four weeks to make sure the worst-case weather scenario was measured. Southeast winds would impact the greatest proportion of the Island's population to the north and northwest of the turbines. Easterly winds could also cause sound impacts at properties to the west.

 An acoustic specialist visited each logger in person to note dominant sources of sound during the day and at night.

 Data was correlated to show how different wind speeds affected the background noise. Then sound thresholds were derived for 177 properties across the Island. An acoustic model predicted future sound impacts from the turbines based on the Island's topography and worst-case weather scenarios.






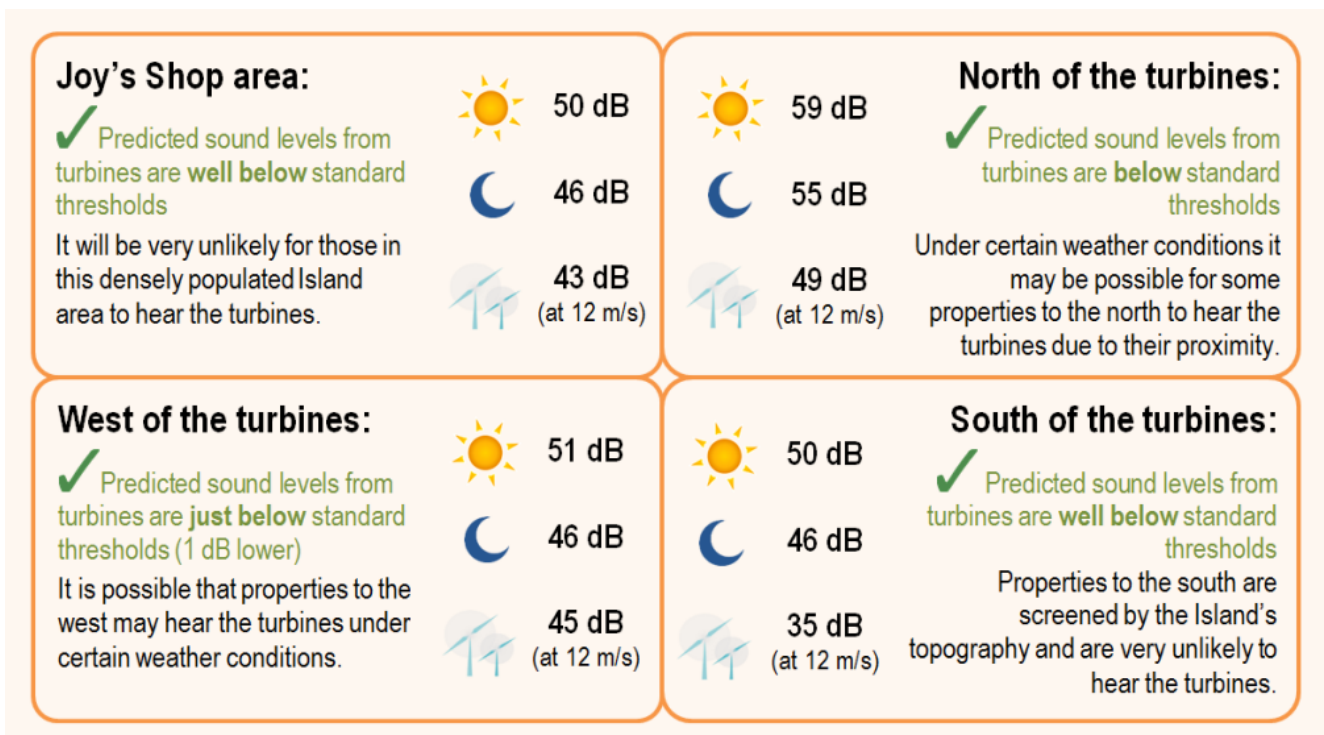
Four loggers were used to measure background noise

Background noise is the ambient noise environment, made up of sounds from ocean waves, wind in the trees, traffic, birds and insects, and devices such as refrigerators.

Intermittent noise events such as from aircraft or dogs barking would not be considered part of the background noise unless they were present for at least 90% of the time.

What can you expect to hear?

Current daytime  and night-time  background noise levels are shown below for areas across the Island, along with predicted sound levels from the wind turbines  in those locations. The greater the difference between the turbine sound level and the existing background noise, the less likely the turbine will be heard.





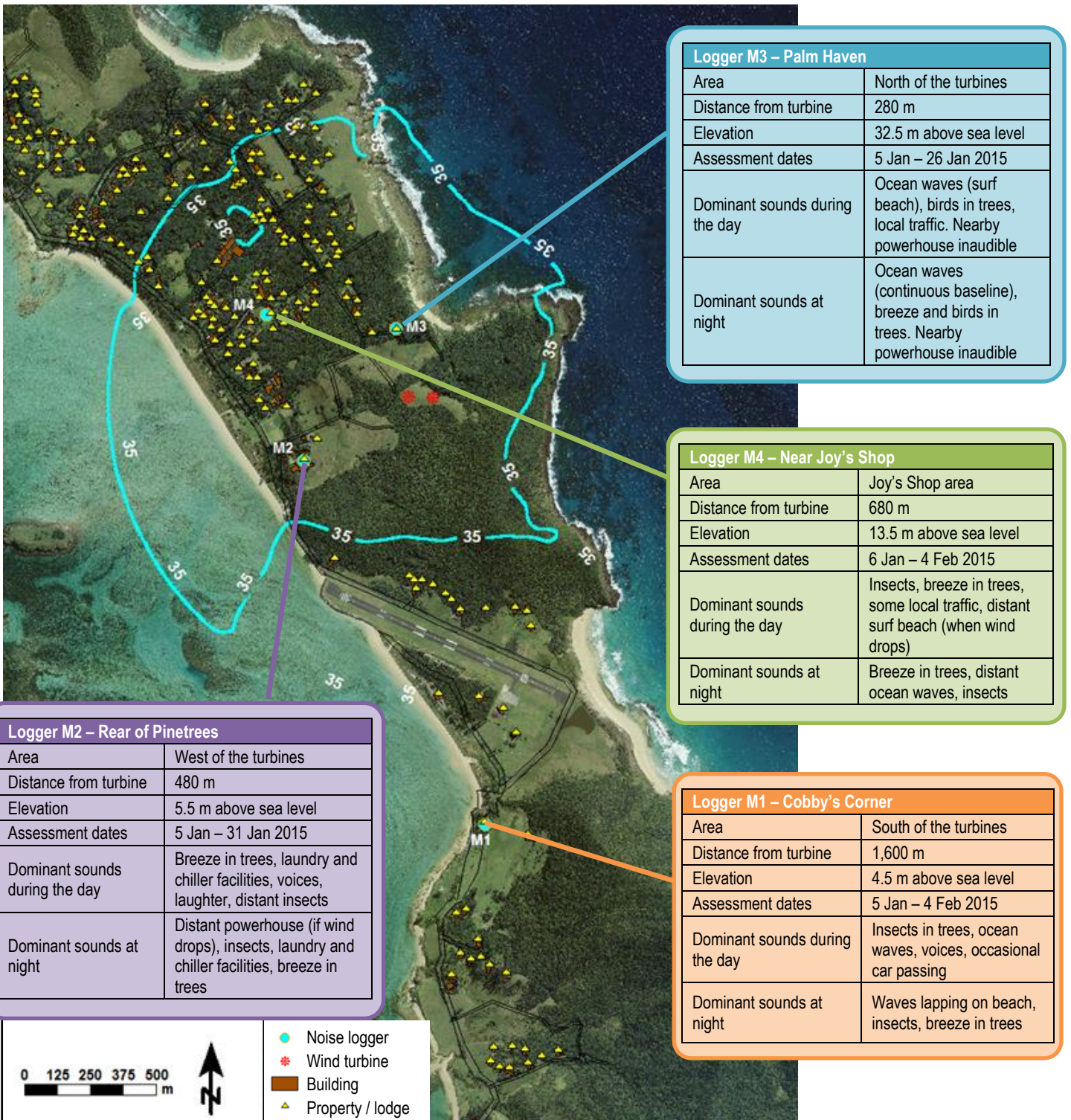
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The *Draft NSW Wind Farm Guidelines* (2011) state that sound levels outside buildings nearest to turbines should not exceed 35 dB or 5 dB above the background noise (whichever is greater).

Sound levels from the turbines for a wind speed of 12 m/s were predicted across the Island. The blue line on the map shows the area where sound just from the wind turbines would exceed 35 dB. Under some weather conditions the turbines are likely to be heard from properties within the blue contour line, whereas properties outside of the blue line are unlikely to hear the turbines regardless of the background noise. Although the turbines may be heard, they are not expected to exceed thresholds in the *Draft NSW Wind Farm Guidelines*.





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Lord Howe Island will only achieve the desired reduction in diesel fuel consumption with a combination of both wind turbines and solar power. In fact, the turbines provide the greatest contribution to fuel reduction.

However, installation of the wind turbines is dependent on community support. Community consultation undertaken in 2014 suggests that the majority of people support the wind turbines. However, the concerns of residents and business owners who might be worried about sound impacts of the turbines will not be overlooked.



Reducing sound impacts

As part of the design process the following management strategies will be considered to reduce sound impacts.

- 1 Identify general weather conditions that the turbines may be louder than predicted
- 2 Continue to consult the turbine manufacturer to identify technical options for sound control (e.g. variable speed, changes to the pitch regulation regime, vortex generators and/or trailing edge serrations)
- 3 Model the impact of turning off the turbines during wind speeds and wind directions most likely to cause louder than predicted sounds

More information

- For a closer look at the detailed results, see the full noise assessment report under the Publications tab on the Board website at www.lhib.nsw.gov.au.
- If you have any questions about the hybrid renewable energy project, please contact Andrew Logan (6563 2066 or Andrew.Logan@lhib.nsw.gov.au) or Mel Tadhunter at Jacobs (Mel.Tadhunter@jacobs.com).