

# Crookwell 3 Wind Farm Health

## Purpose

Health concerns cited by the public in relation to wind farm developments relate to health and wellbeing of people in the immediate vicinity of the wind farms, due to potential noise pollution, vibrations, shadow flickering, electromagnetic interference, blade glint, blade throws, ice shedding, tower failure, and the risk of fire.

A literature review of Australian and international research was undertaken to establish the potential impacts on human health associated with the construction and operational phase of a wind farm.

In particular, the landmark study published by the National Health and Medical Research Council (NHMRC) in July 2010, 'Wind Turbines and Health' presents a current review of the evidence from literature on wind turbines and any impacts on human health.

## Key Findings and Impacts

Following a review of the current literature and scientific data, the National Health and Medical Research Council, Australia's preeminent medical research body, found that "there is currently no published scientific evidence to positively link wind turbines with adverse health effects". Based on current evidence, modern wind farms do not pose a threat to human health and safety as long as current planning guidelines are followed.

This contention is supported by the World Health Organisation, which states that "Wind energy is associated with fewer health effects than other forms of traditional energy generation and in fact would have positive health benefits" and "In relation to all sources of energy, the health effects associated with wind energy are negligible" (Energy, Sustainable Development and Health study, WHO 2004).

Wind energy is considered to have the lowest level of impacts (health and environmental) of all the fuel cycles considered.

### The Social and Economic Impacts of Rural Wind Farms Senate Inquiry

A Community Affairs References Committee (the 'Committee') was established for the Australian Senate to investigate any adverse health effects for people living in close proximity to wind farms.

The Committee conducted site visits, public hearing and received more than 1,000 submissions, many letters and other documents, and reviewed published information on the topic. A report, *The Social and Economic Impacts of Rural Wind Farms* was released in June 2011.

The Committee was unable to establish a direct link between the noise generated by wind farms and negative impacts on human health. However, the report recommends that the NHMRC should continue to review the research into wind farm health effects.

The Committee did not support a mandatory setback distance around wind farms, instead labelling it 'arbitrary' and would prefer to see setback distances applied using scientific measurements of sound effects.

### Noise impacts on health

A key issue raised amongst the health concerns associated with wind farm developments is noise. Wind turbines produce mechanical noise from the motor or gearbox, as well as aerodynamic noise, produced by wind passing over the blade of the wind turbine.

Noise produced by wind turbines has significantly decreased over the last decade as turbine technology has advanced.

The NHMRC study identified that noise levels from a modern 10-turbine wind farm falls in the 35-45 dB range at a close distance of 350 metres both day and night. This represents sound levels similar to a quiet bedroom (35 dB), and only slightly higher than night time background noise levels in the countryside (20-40 dB).

If functioning correctly, mechanical noise from modern wind turbines should not be an issue. Infrasound was a problem with older wind turbine technology and is now virtually undetectable at a range of 400 metres.

The NHMRC notes that, "there is no reliable evidence that sounds below the hearing threshold produce physiological or psychological effects".

It should also be noted that infrasound is constantly present in the environment, caused by various sources. Van den Berg (2003) acknowledged the level of infrasound produced by a wind farm was so far below the average human hearing threshold that it could not be a large scale problem.

The Public Health Association of Australia recently released a position statement, 'Human Health Effects of Wind Turbines', stating that:

- Renewable forms of energy, such as solar and wind, appear to be associated with relatively low adverse health effects.
- Reviews of the literature to date have failed to identify any adverse physiological effects attributed to exposure to wind turbines, with the exception of those mediated by noise in a small proportion of exposed people, in whom symptoms may be related to perception, annoyance and psychosociological factors.
- There is no evidence to date to suggest that infrasound has significant effects on human health via physiological mechanisms at the low pressure levels generated by wind turbines.

A recent Australian study, *Infrasound Measurements from Wind Farms and Other Sources* (Sonus Pty Ltd, 2010), was commissioned by Pacific Hydro to measure and compare infrasound levels from two wind farms (Clements Gap in South Australia and Cape Bridgewater in Victoria) and common environment infrasound sources – a beach, a cliff top along the coastline, in the Adelaide CBD, and close to a gas-fired power station in an Adelaide suburb.

The results determined that infrasound is not unique to wind farms. The study found that infrasound was recorded at higher levels on the beach and in the Adelaide CBD than near a wind turbine. Refer to Figures 1 and 2. The study's results reinforce several international studies that infrasound emissions from wind farms are well below the hearing threshold of 85 dB(G) and are therefore not detectable to humans. The G-weighting has been standardised to determine the human perception and annoyance due to noise that lies within the infrasound frequency range (ISO 7196, 1995). A common audibility threshold from a range of studies is an infrasound noise level of 85 dB(G) or greater.

The Senate Environment and Communications Legislation Committee concluded in their inquiry into the Excessive Noise from Wind Farms Bill (2012) that "while it is possible that the human body may detect infrasound in several ways, there is no evidence to suggest that inaudible infrasound (either from wind turbines or other sources) is creating health problems.

In contrast, there is an established literature confirming the existence of psychogenic, or nocebo, effects in general, and at least one study suggesting they may be responsible for symptoms in some wind turbine cases."

### Wind turbine syndrome

NSW Legislative Committee (2009) found that the existence of 'Wind Turbine Syndrome' is debatable and insufficient evidence has been presented to justify its existence as a health issue. While US paediatrician Dr Nina Pierpont's arguments for 'Wind Turbine Syndrome' have been heavily drawn upon, the credibility of her work is questioned by scientists, and particularly by acoustic specialists, particularly as:

- Dr Pierpont's reports were not published in peer-reviewed journals.
- The sample sizes used in the research are small
- The conclusions are largely drawn from anecdotal evidence.
- Many of the participants in Dr Pierpont's studies had pre-existing medical conditions that may have distorted her findings.

### Shadow flicker and electromagnetic impacts on health

No experience of unreasonable or dangerous shadow flicker occurring in NSW as a result of wind farms has been presented. As the timing of shadow flicker can be predicted, wind turbines may simply be switched off for the period it is expected to occur.

Epileptic seizures and the distraction of drivers as a

result of shadow flicker are considered 'negligible', as:

- Less than 0.5% of the population are subject to epilepsy at any one time, and of these, approximately 5% are susceptible to strobing light.
- Most commonly (96% of the time), those that are susceptible to strobe lighting are affected by frequencies in excess of 8 Hz. However, wind turbines cause shadow flicker at frequencies of around 1 Hz or less.

The electromagnetic fields produced by the wind farm also do not pose a threat to public health, as the closeness of the electrical cables between wind turbine generators to each other, and shielding with metal armour effectively eliminate electromagnetic fields.

### Impacts on psychological wellbeing

Unwanted proposals and the development approval processes can have impacts on stress levels and psychological wellbeing. It is almost impossible to propose a project of the scale of a wind farm, and not cause some polarisation of views and disruption in the affected community.

However, various panel hearings in Australia have concluded that the panel was not presented with any substantive evidence of a public health risk.

The impact of wind farms on the wellbeing of communities in NSW may be compounded by other issues raised, such as concerns associated with the planning process or the level of community consultation.

People who are opposed to wind farm projects in their local area may become anxious, causing stress related illnesses, which are genuine health effects arising from their worry. However, these are not direct impacts of the wind farm/turbines itself.

The NHMRC found that people who benefit economically from wind turbines were less likely to report annoyance, despite exposure to similar sound levels as people who were not economically benefiting.

Directly involving residents who live in close proximity to a wind turbine project is found to reduce the level of annoyance towards a wind farm.

## Response to Findings

Crookwell Development Pty Ltd is committed to undertaking community consultation, in order to appropriately inform and involve the public in the development of the project.

The following measures are recommended to mitigate any health related impacts of the proposed Crookwell 3 Wind Farm:

- Provide accessible information on wind farm impacts including the benefits, and project details, process and updates.
- Install warning signs to alert the public against unauthorised site entry.
- Restrict access to the wind turbines and associated infrastructure to reduce personal injury and public hazards, including locked access to towers and electrical equipment, warning signs with postings of 24-hour emergency numbers, and fenced storage yards for equipment and spare parts.
- Paint the wind generator blades, tower and nacelle with a non-reflective white or off white colour to reduce glare and minimise blade glint.
- Noise levels should comply with the applicable noise guidelines, unless an agreement is in place with the effected landowner(s), and in any case not more than the 45dB(A) noise limit (for indoors).
- Shadow flicker at any dwelling should not exceed 30 hours per year unless an agreement is in place with the effected landowner(s).
- Equip the wind turbines with sensors that can react to any imbalance in the rotor blades and shut down the turbine if necessary.
- Regularly maintain and service all wind turbines.

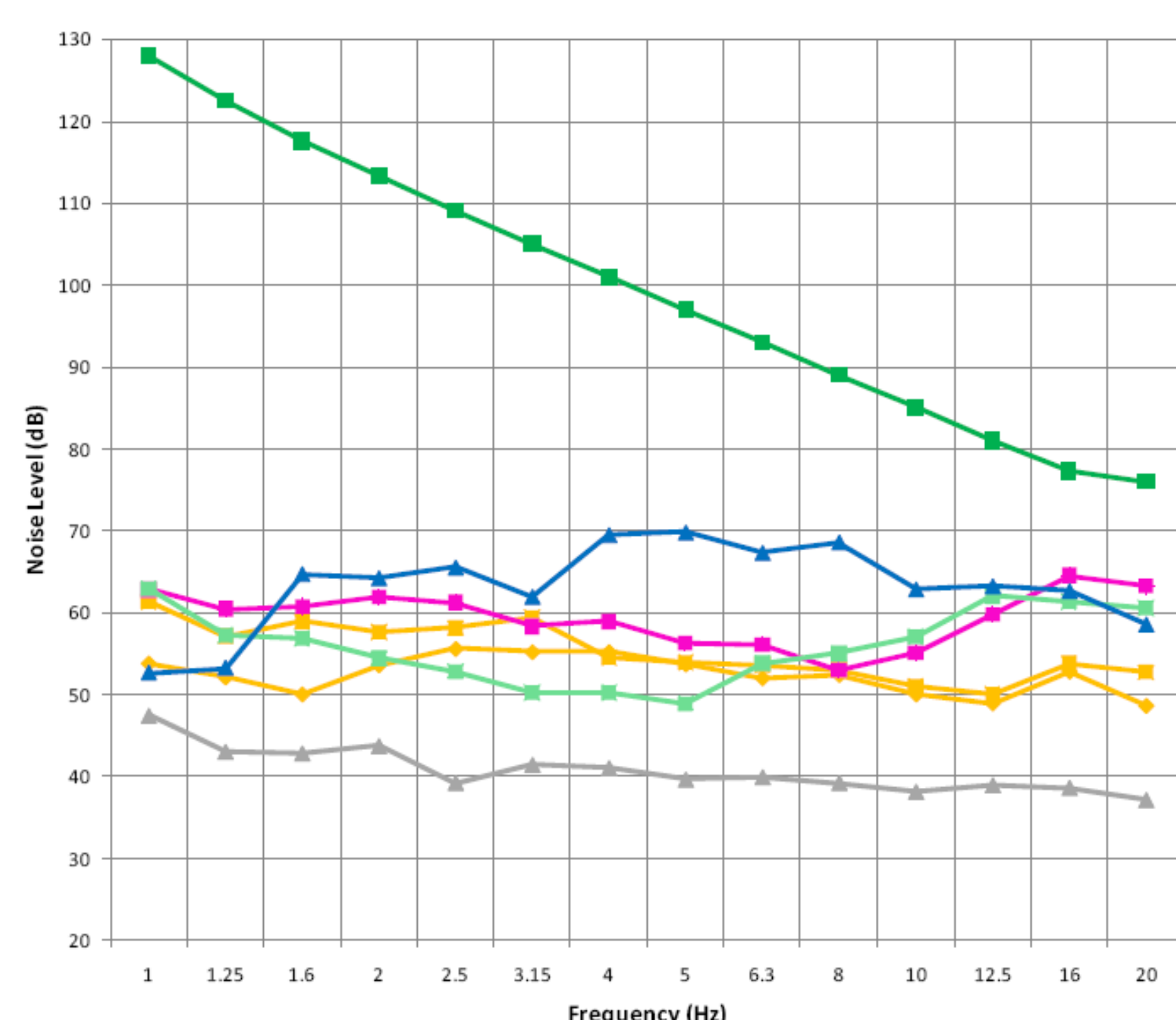


Figure 1: Summary of Measurements Cape Bridgewater Wind Farm  
Source: Extract from *Infrasound measurements from Wind Farms and other sources*, Sonus Pty Ltd 2010

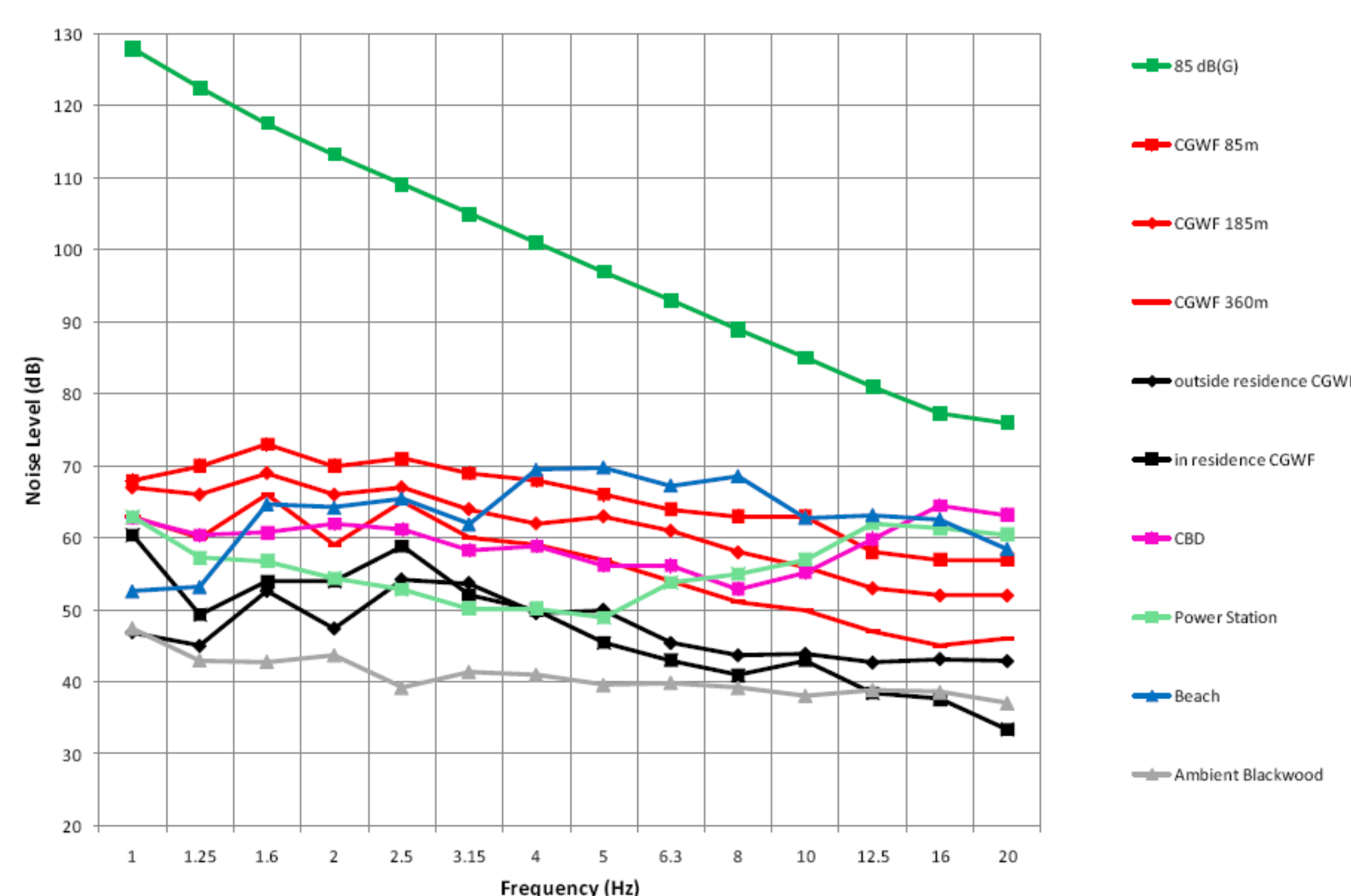


Figure 2: Summary of Measurements Clements Gap Wind Farm  
Source: Extract from *Infrasound measurements from Wind Farms and other sources*, Sonus Pty Ltd 2010