



Wind Turbine Noise

Why Does it Annoy?

Not just the decibels

Week 1



Week 3



Week 6



Week 7



Week 8



Week 9



Week 10



Week 11



Week 12



Week 14



Week 16



Week 17



Week 18



Weeks 19 to 24



Week 25



Week 26



Week 32



Week 33

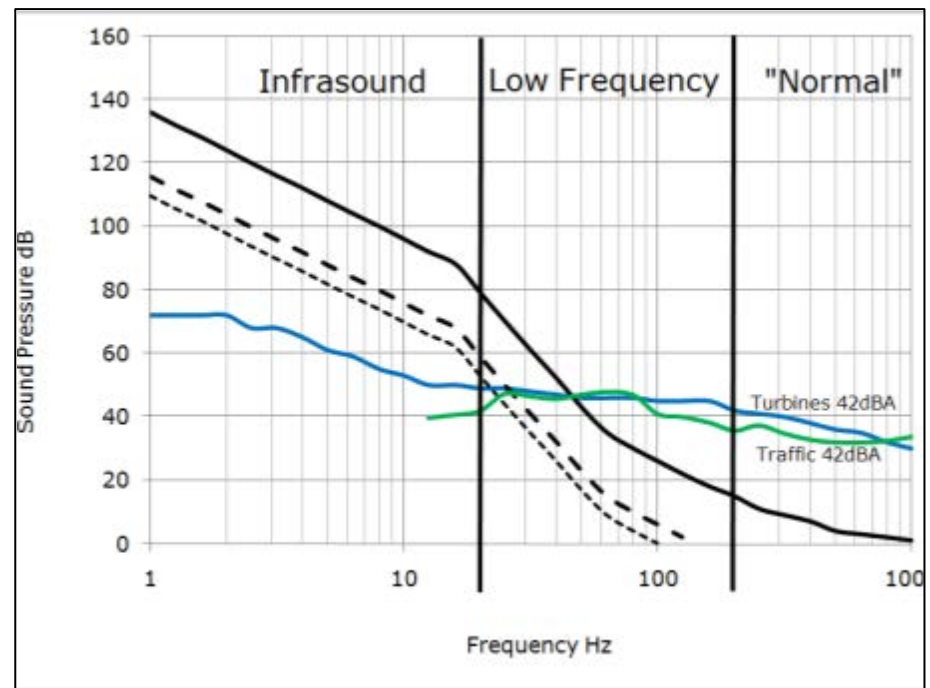


Why is this man ill?

Possibility 1 – He has Wind Turbine Syndrome brought about by excessive infrasound.

- Infrasound is well below the threshold of perception.
- Salt says infrasound affects people at levels below the threshold of perception. Work on tonal noise with animals.

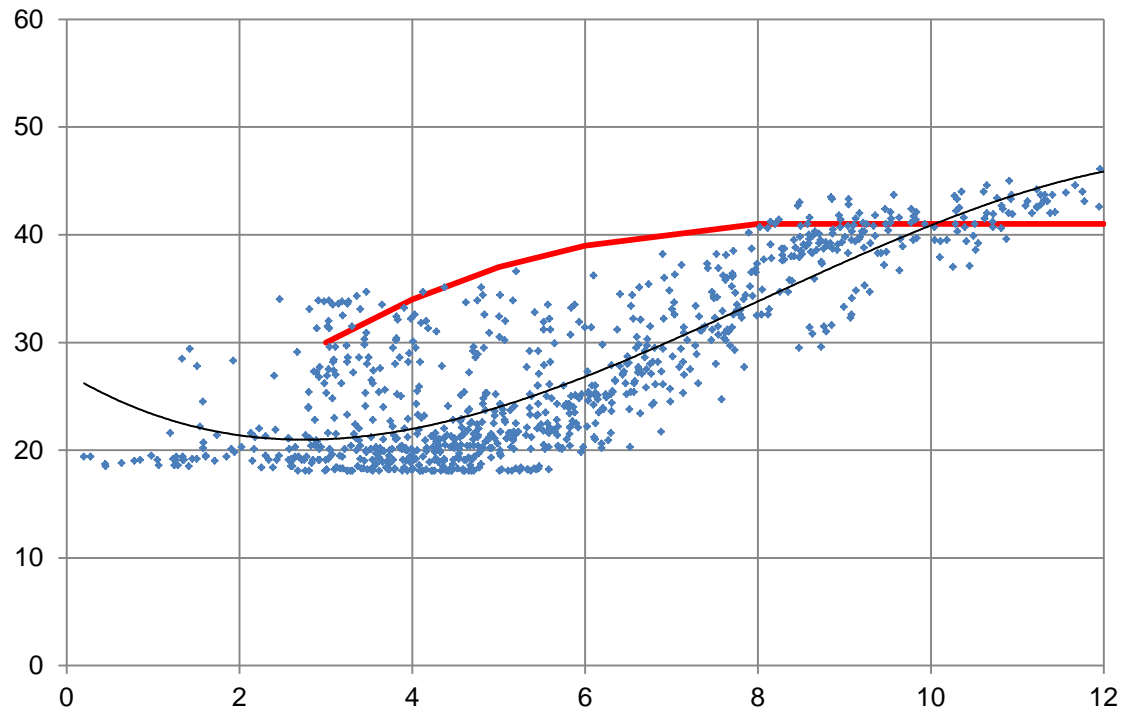
Not A-weighted



Why is this man ill?

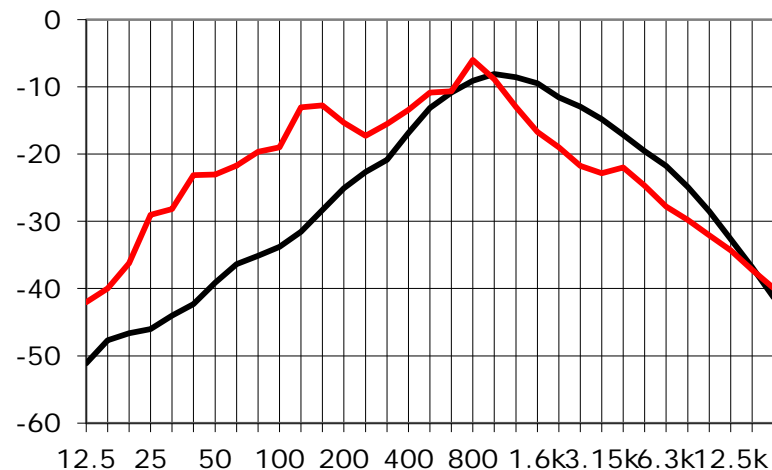
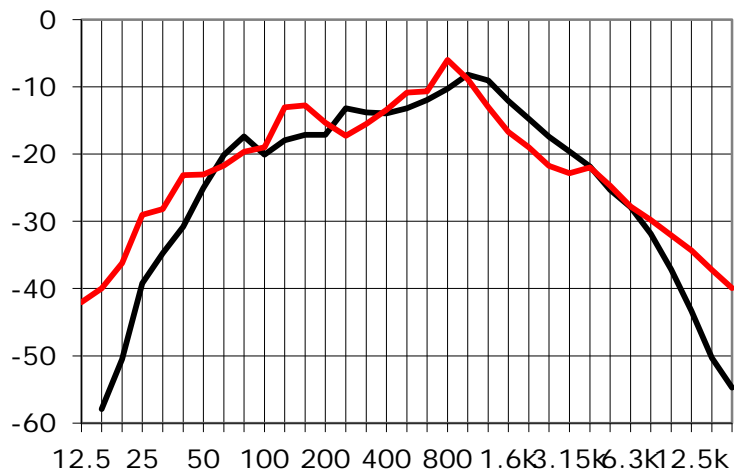
Possibility 2 – The noise is too loud

- Very quiet rural areas
- When house is downwind, turbines above background most of the time.
- Sometimes as much as 20dB above background.



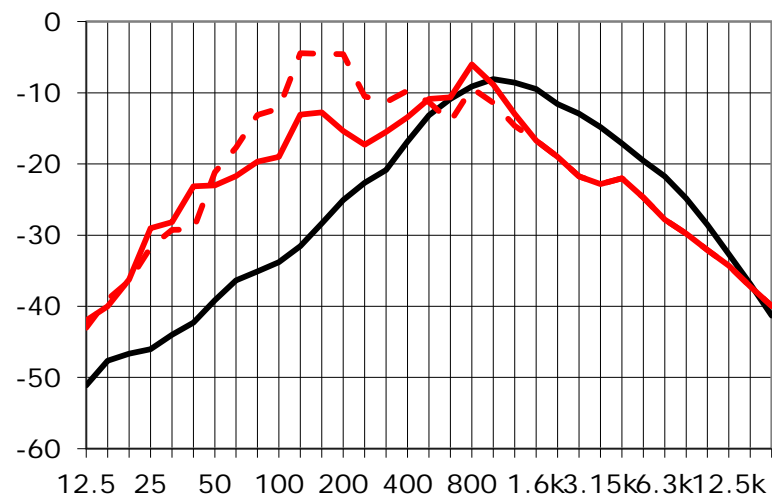
Why is this man ill?

Possibility 2 – The noise is not masked and sometimes thumping.



Masking – Road Traffic
Wind in Trees
Turbines thumping

A-weighted



Amplitude Modulation

- Germany/Netherlands – Frits van den Berg 2003
 - Thumping impulsive sound increases annoyance
- Netherlands – Vos dose response
- Finland – di Napoli and Siponen research
- Ontario have 5dB penalty for AM from WTG
- NSW Guidelines refer to it
- Lee in South Korea – research into dose response

Why is this man ill?

Possibility 3 – Perception

- *the amount of annoyance was hardly related to the objective sound level*
- Wolsink et al in 1993 in their study of annoyance from wind turbines.
- *It is almost universally recognised that noise exposure level never accounts for more than a small proportion of the variance of any outcome variable considered.*
- Flindell and Stallen 1998
- *The results from the laboratory experiment confirm that the unfairness of the sound management procedure influences the evaluation of the sound.*
- Maris 2008



Perception

- People in rural communities perceive that
 - Their lives will be blighted by the development
 - They gain no benefit
 - They pay subsidies in the form of Tax
 - They pay more for electricity.
 - Developers make all the money
- People don't feel they are being treated fairly.
- Turbine noise has got a bad name
- Fields 1993 – Aircraft Noise
 - Perceived predictability;
 - Perceived control;
 - Trust and recognition;
 - Voice; (are you listened to)
 - Personal benefits;
 - Compensation;
 - Sensitivity to noise;
 - Home ownership;
 - Accessibility to information;
 - Understanding; Is information relevant and correct.

Why is the man ill?

- Perceived predictability;
 - Perceived control;
 - Trust and recognition;
 - Voice; (are you listened to)
 - Personal benefits;
 - Compensation;
 - Sensitivity to noise;
 - Home ownership;
 - Accessibility to information;
 - Understanding; Is information relevant and correct.
- In terms of Fields list:
 - He feels he has no control. He phones the Council but they can't do anything and the wind farm operator won't call back.
 - He doesn't trust the wind farm operator – why was everything done so secretively without contacting him? Why did they appear while he was out to put up equipment.
 - He has no voice. It just seems the Council think he is a nuisance because he pesters them.
 - He gets no benefit from this at all.
 - Nobody has given him any information. The Council don't know anything and the wind farm operator doesn't tell him anything.
 - He doesn't understand the report and nobody has explained it to him.

My conclusion is . .

- In many cases the noise is too loud – particularly if it is accompanied by modulation.
- But a major factor is that development noise is badly managed at the application stage and badly managed if there are complaints.
- Its not Wind Turbine Syndrome

Last time I did a paper saying that

- It's a howler! It made my day!
- I'm not certain (so please don't quote me, and don't get your hopes up), but it may have set a new benchmark in breathtaking incompetence coupled with boldly stated absurdity. In some places, it teeters on the knife-edge of slapstick. Brilliant! A tour de force!
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- Best wishes,
- Calvin Luther Martin, PhD

The Effect of Bad Noise Management in the Past

- What was a number of isolated problem cases in the early days has lead to even the most benign application for a turbine receiving multiple objections.
- Bad management doesn't just affect your project but future ones.
 - Objectors say it's a mysterious effect of infrasound
 - Developers say they are a load of cranks
 - Governments say we have strict noise limits in place so there can't be a problem
 - Objectors become incensed because they believe their concerns are treated with contempt
 - Developers say objectors are exaggerating

 - And so on and so on

 - *The fact that sound level is not predicting annoyance does not mean that people are “not really annoyed” when they are reporting it.* Wolsink et al 1993
 - It has to be accepted by industry and by governments that there is an issue here. Unless it is properly managed it will get worse. That does nobody any good.

Summary

- Governments and developers must accept that the level and character of wind farm noise is sometimes just not acceptable to reasonable people particularly in rural areas.
- More effort should be made to ensure a development really will have a low noise impact – not just tick boxes.
- More effort should be made to manage the issue properly. Involve communities from the beginning and genuinely listen to their concerns and act on them where possible.
- The fight against climate change is exactly the sort of thing that should bring communities together.
- Exactly the opposite is happening.