Response to questions on notice

Peter Seligman **21 November 2012**

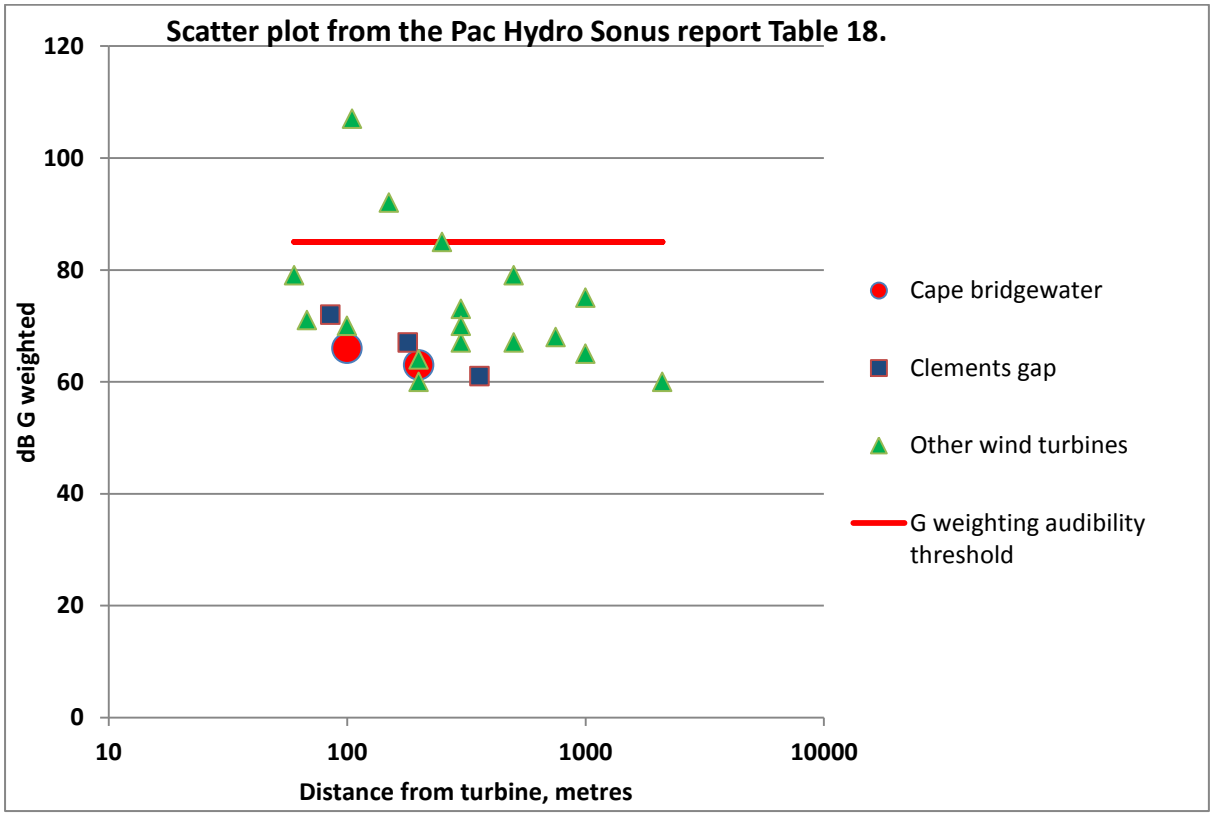
Questions:

1. When you are referring to modern equipment, to what model of turbine are you referring?
2. At what distance does turbine noise typically fall below background levels?
3. Do you have any references for this?
4. Do you have any references for the statement: "there is no mechanism for consistent health effects?"

Response

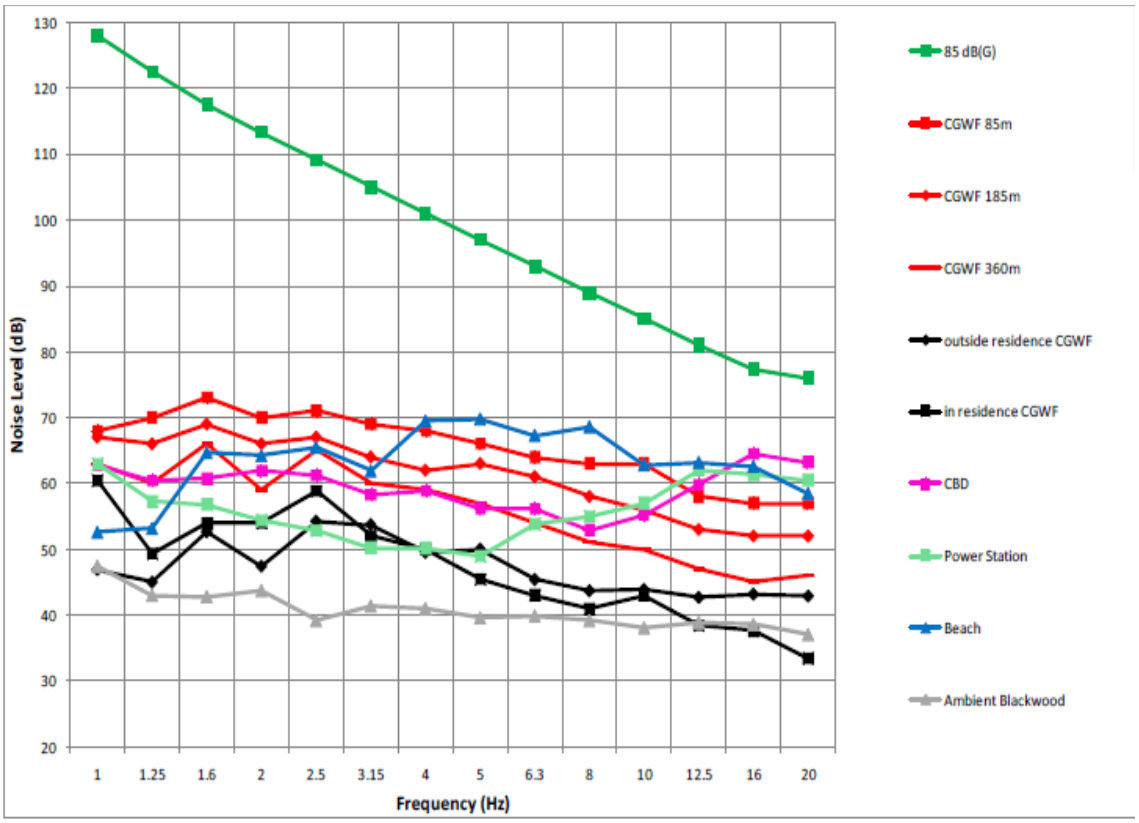
1. The "modern equipment" refers to upwind turbines, specifically at Clements Gap, 2.1 MW Suzlon and Cape Bridgewater 2M RePower

2. My statement on the drop in noise below background levels was specifically related to infrasound. It was based on the Pacific Hydro Report forwarded earlier. Table 18 of that report is attached as an appendix. It details the infrasound (G weighting) for 21 turbines at various distances. I plotted this data on a scatter diagram.



In the diagram it can be seen that there is no discernible effect of distance on the G weighted infrasound level for the instances plotted. This indicates that the measured levels are predominantly background level. Two outliers create the impression of a distance effect at 107 dB at 105 metres and 92 dB at 150 metres. However these are from older downwind turbines known to produce higher levels of infrasound.

3. I refer to fig 13 in the Pacific Hydro report which gives levels at frequencies between 1 and 20 Hz for a wind farm vs Beach, CBD and power station. At 360 metres it is below the levels in these situations – situations in which many people live with no health effects. It is important to note that it is infrasound that is being discussed here. The infrasound from beach, CBD and windfarm are equally inaudible although the higher frequency sound is audible.



Re audible noise

There is no doubt that wind turbines can exceed auditory threshold levels for sound in the frequency range 20 – 20,000 Hz to which the A weighting is generally applied. This frequency range is not the subject of my comments. I will agree that any sound which is above the background level, and audible, can be annoying.

4. The literature regarding the absence of health effect due to wind turbine noise is extensive and some references are listed in Appendix B.

Appendix A

Table 18 - Summary of Infrasound Levels

Noise source	Distance (m)	Infrasound level dB(G)	Comments
General Electric MOD-1	105	107	Downwind turbines, known to generate higher levels of infrasound compared to a modern upwind turbine
General Electric MOD-1	1000	75	Downwind turbine
Hamilton Standard WTS-4	150	92	Downwind turbine
Hamilton Standard WTS-4	250	85	Downwind turbine
Boeing MOD-5B	68	71	Upwind two bladed turbine at a limited separation distance – this shows the significant reduction between downwind and upwind turbines
US Wind Power USWP-50	500	67-79	14 downwind turbines influencing the results
WTS-3	750	68	Downwind turbine
WTS-3	2100	60	Downwind turbine
Enercon E-40	200	64	Modern upwind turbine
Vestas V66	100	70	Modern upwind turbine
Vestas V80	60	79	Influenced by wave action from the Atlantic Ocean (HGC Engineering, 2006)
GE 1.5MW	300	67	Modern upwind turbine
Nordex N-80	200	60 (7m/s)	Measurements were made downwind from 5m/s to 12m/s. The level increases by approximately 1 dB(G) for each 1m/s increase in wind speed from 5m/s
DTI Wind Farm	1000	65	Details of the turbine type were not provided in the DTI study. The wind farm included seven turbines (DTI, Hayes McKenzie, 2006)
Siemens SWT 2.3-93	300	73	Measured as part of the "Epsilon" study (O'Neal, 2009)
GE 1.5sle	300	70	Measured as part of the "Epsilon" study (O'Neal, 2009)
Clements Gap	85	72	Modern upwind turbine
Clements Gap	180	67	Modern upwind turbine
Clements Gap	360	61	Modern upwind turbine
Cape Bridgewater	100	66	Modern upwind turbine, influenced by the ambient noise environment
Cape Bridgewater	200	63	Modern upwind turbine, influenced by the ambient noise environment

Appendix B

Extracts from survey compiled by Prof Simon Chapman, School of Public Health and Teresa Simonetti, Sydney University Medical School

- 2012: Massachusetts Department of Environmental Protection. **Independent Expert Science Panel Releases Report on Potential Health Effects of Wind Turbines** http://www.mass.gov/dep/public/press/0112wind.htm
- 2010: Knopper LD, Ollsen CA. Health effects and wind turbines: a review of the literature. Environmental Health 2010; 10:78 http://www.ehjournal.net/content/10/1/78

- 2010: NHMRC Rapid Review of the evidence http://www.nhmrc.gov.au/_files_nhmrc/publications/attachments/new0048_evidence_review_wind_turbines_and_health.pdf
- 2009: Colby et al. Wind Turbine Sound and Health Effects: An Expert Panel Review. http://199.88.77.35/EFiles/docs/CD/PlanCom/10_0426_IT_100416160206.pdf

Reviews of the evidence - extracted highlights

- "There are no direct pathological effects from wind farms and that any potential impact on humans can be minimised by following existing planning guidelines." *Source: NHMRC 2010* http://www.nhmrc.gov.au/_files_nhmrc/publications/attachments/new0048_evidence_review_wind_turbines_and_health.pdf

- "There is no evidence that the audible or sub-audible sounds emitted by wind turbines have any direct adverse physiological effects." *Source: Colby 2009 review* http://199.88.77.35/EFiles/docs/CD/PlanCom/10_0426_IT_100416160206.pdf

- "... surveys of peer-reviewed scientific literature have consistently found no evidence linking wind turbines to human health concerns." *Source: CanWEA* http://www.canwea.ca/pdf/CanWEA%20-%20Addressing%20concerns%20with%20wind%20turbines%20and%20human%20health.pdf

- "Claims that infrasound from wind turbines directly impacts the vestibular system have not been demonstrated scientifically... evidence shows that the infrasound levels near wind turbines cannot impact the vestibular system." http://www.mass.gov/dep/public/press/0112wind.htm

- "There is no consistent evidence of any physiological or behavioural effect of acute exposure to infrasound in humans." *Source: UK HPA Report* http://www.hpa.org.uk/webc/HPAwebFile/HPAweb_C/1265028759369