

Written Questions

Written questions were provided to Pacific Hydro

In view of the number of questions, Pacific Hydro have grouped them into different categories.

A number of the questions have been answered in full or in part in the first part of tonight's presentation.

Brief/Methodology

1. Did you ask Pacific Hydro to engage other residents in the study who were also living near the Cape Bridgewater wind farm and did not feel as affected by it? This may have allowed you to test infrasound levels at those other properties, so you could help decipher if the three properties experienced higher infrasound levels than other properties in the area, yes?
2. If this study was not a health study, why did you get participants to record symptoms they experience? And tell The Australian that there was something related to health effects in what you had found?
3. Was balance exercise testing within the scope of the work you were asked to do? Were you aware of any health impacts that may arise from carrying this out, and did you inform the participants of these? One participant wrote in their personal report on the study that they felt "intense sickness and headache" for 3 1/2 hours after carrying out the test. Did you consider what impact that "exercise" may have on the health of the subjects before you carried that out? If so, did you have any measures in place to mitigate that impact, such as a medical person available to treat them? – Do you consider that balance exercise to be audio testing?

On page 164 of the study it is stated:

As noted above the bending exercise is not part of the acoustic study but arose from observations and discussions with the residents during the course of the study when in one instance a resident bending over to open a gate experienced an immediate and noticeable increase in sensation in the head. **This information is provided at the request of the residents for the benefit of other researchers.**

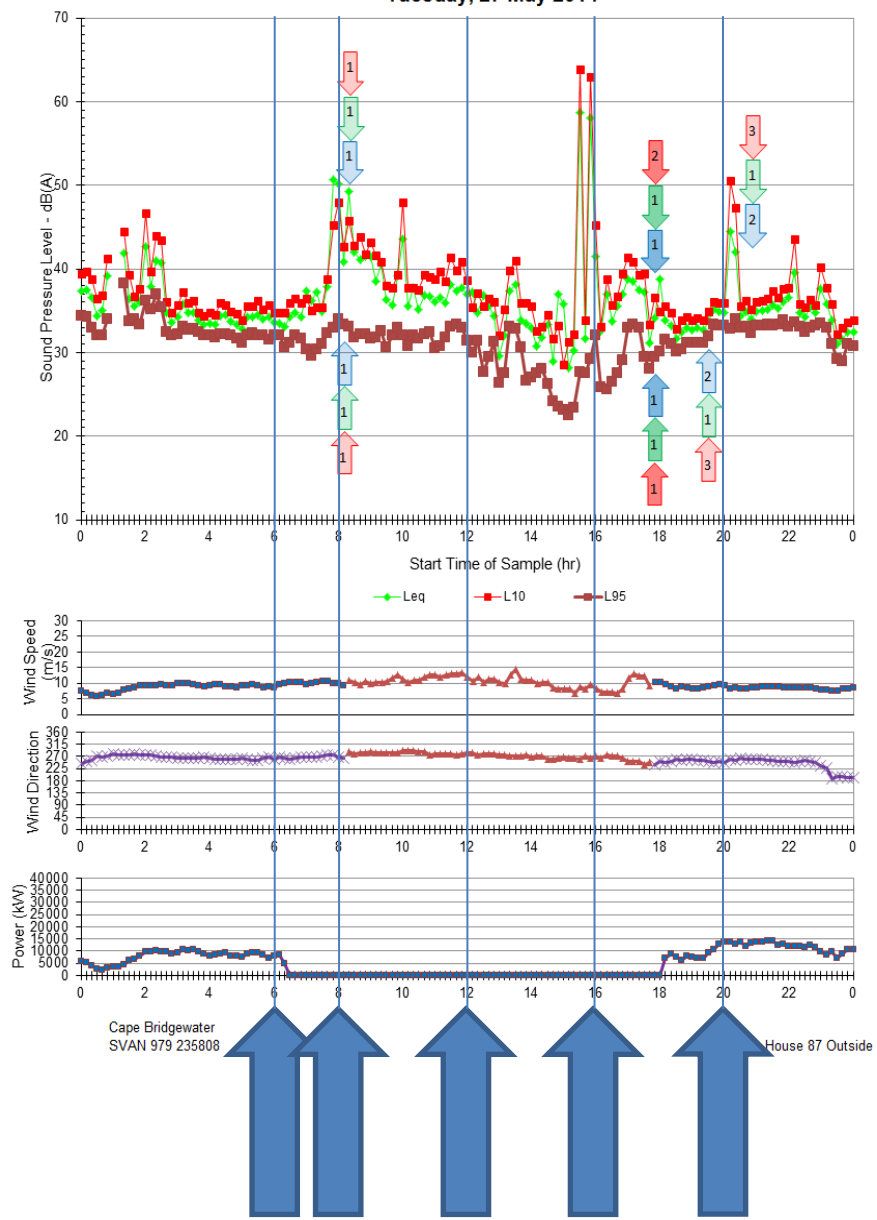
4. Did residents know when the wind farm was shut down?

A-weighted levels – noise testing

5. The Report says that dB(A) is of no value, and on that basis there is no difference between ON and OFF. Please provide examples of that and then discuss how the Permit conditions can accurately define Acoustic Compliance. Please explain why there is no assessment of the Compliance of the Wind Farm?

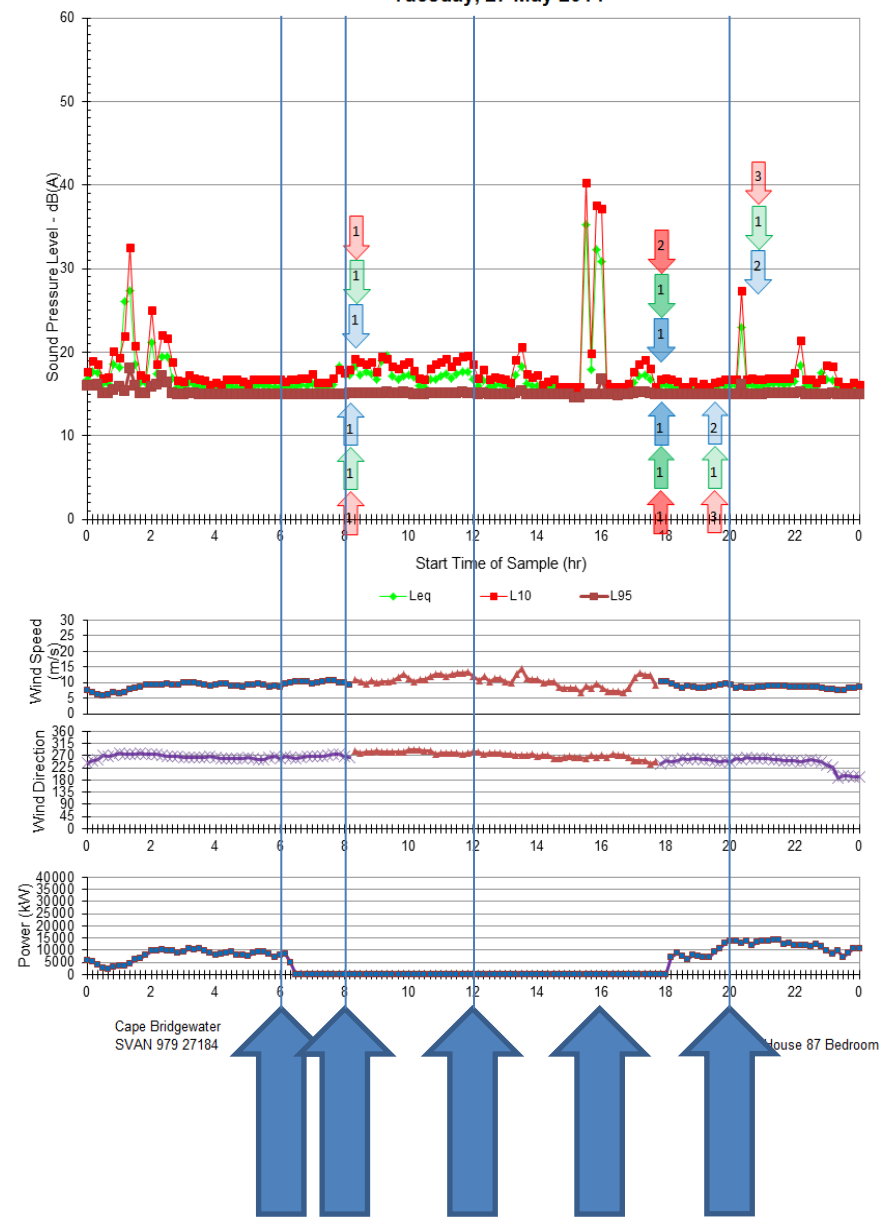
Ambient Measurements

Tuesday, 27 May 2014

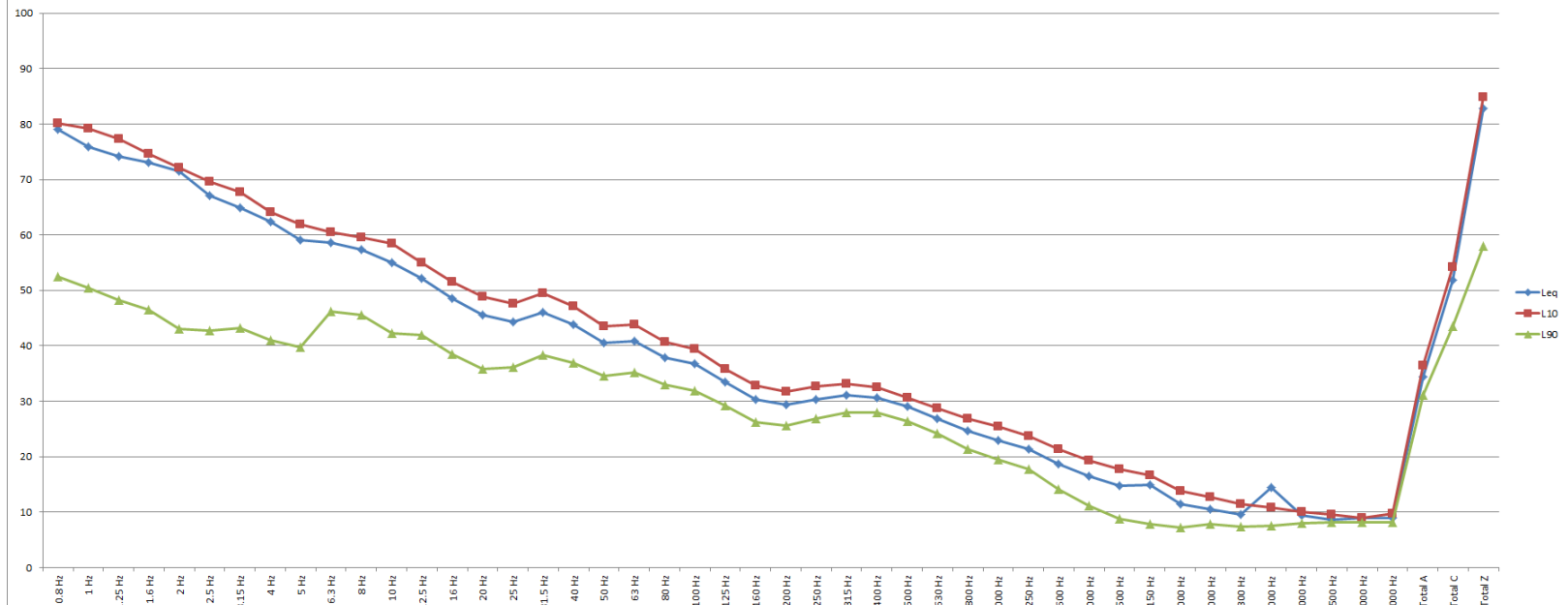


Ambient Measurements

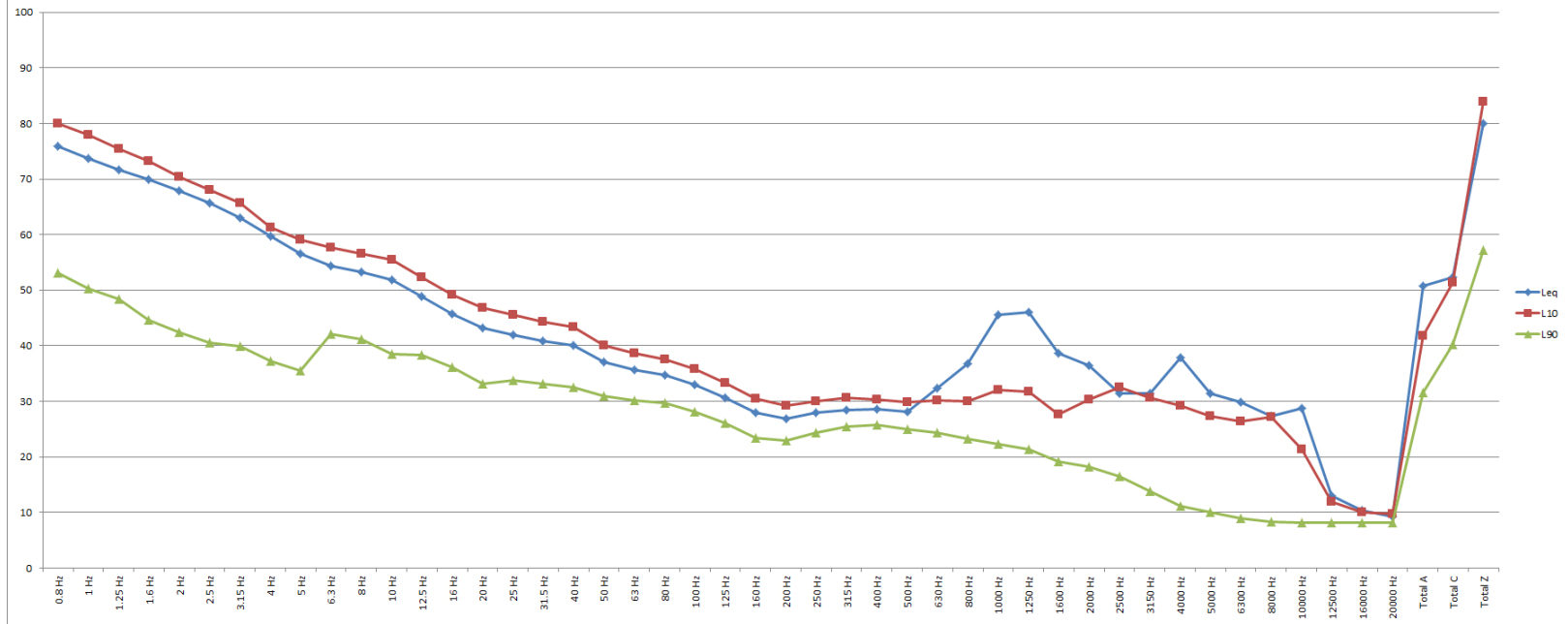
Tuesday, 27 May 2014



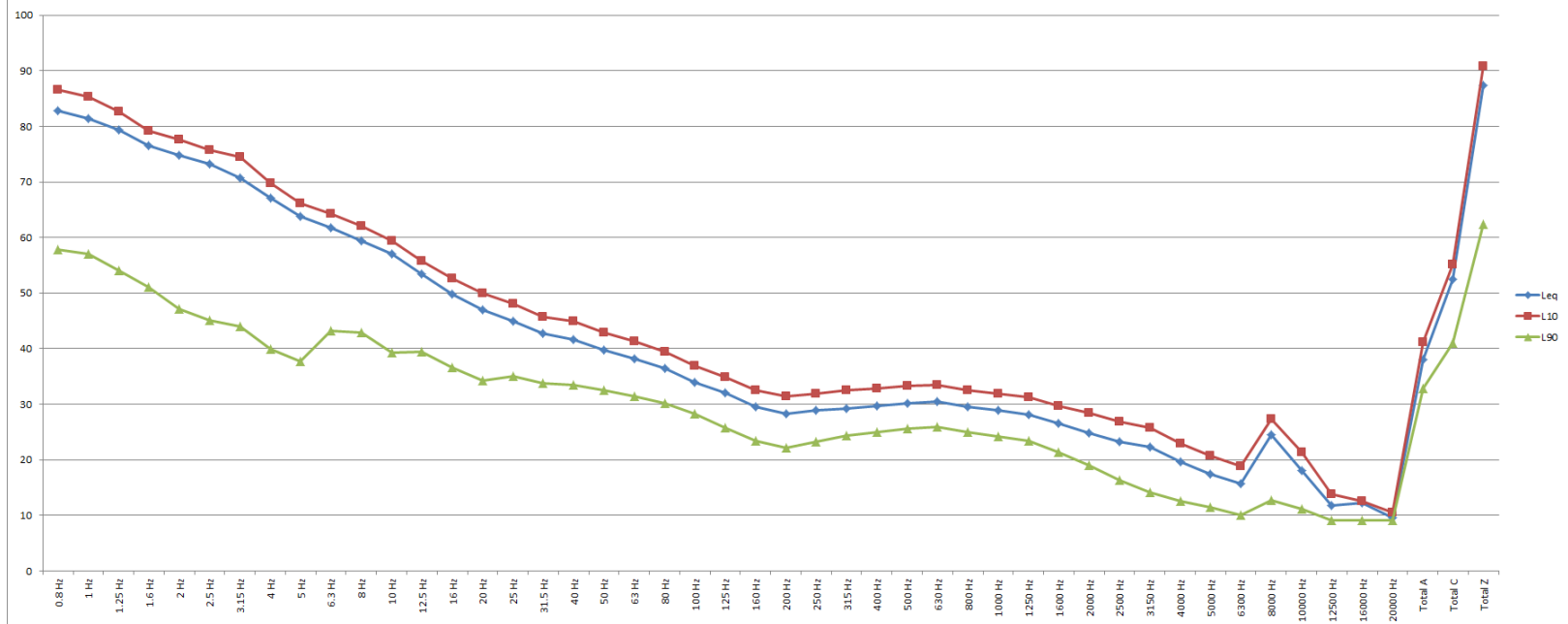
House 87 Outside, 27/05/14 6:00 AM



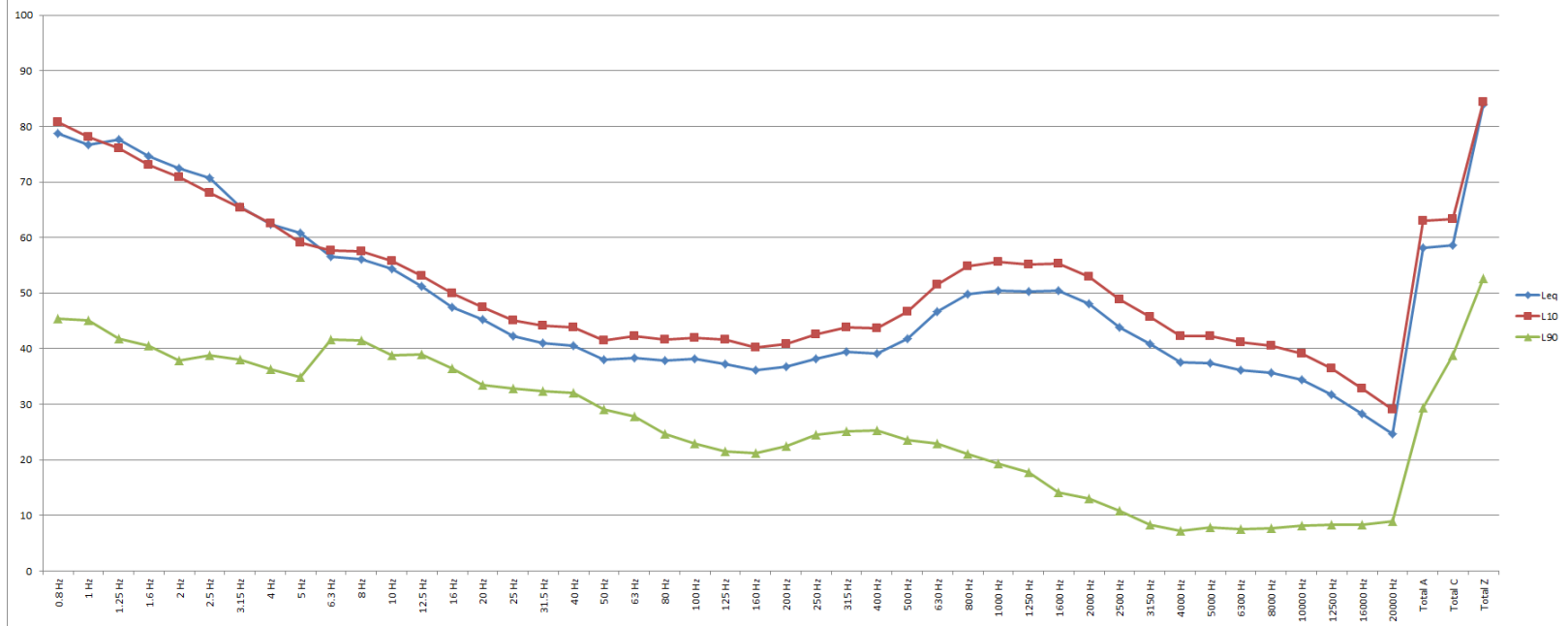
House 87 Outside, 27/05/14 8:00 AM



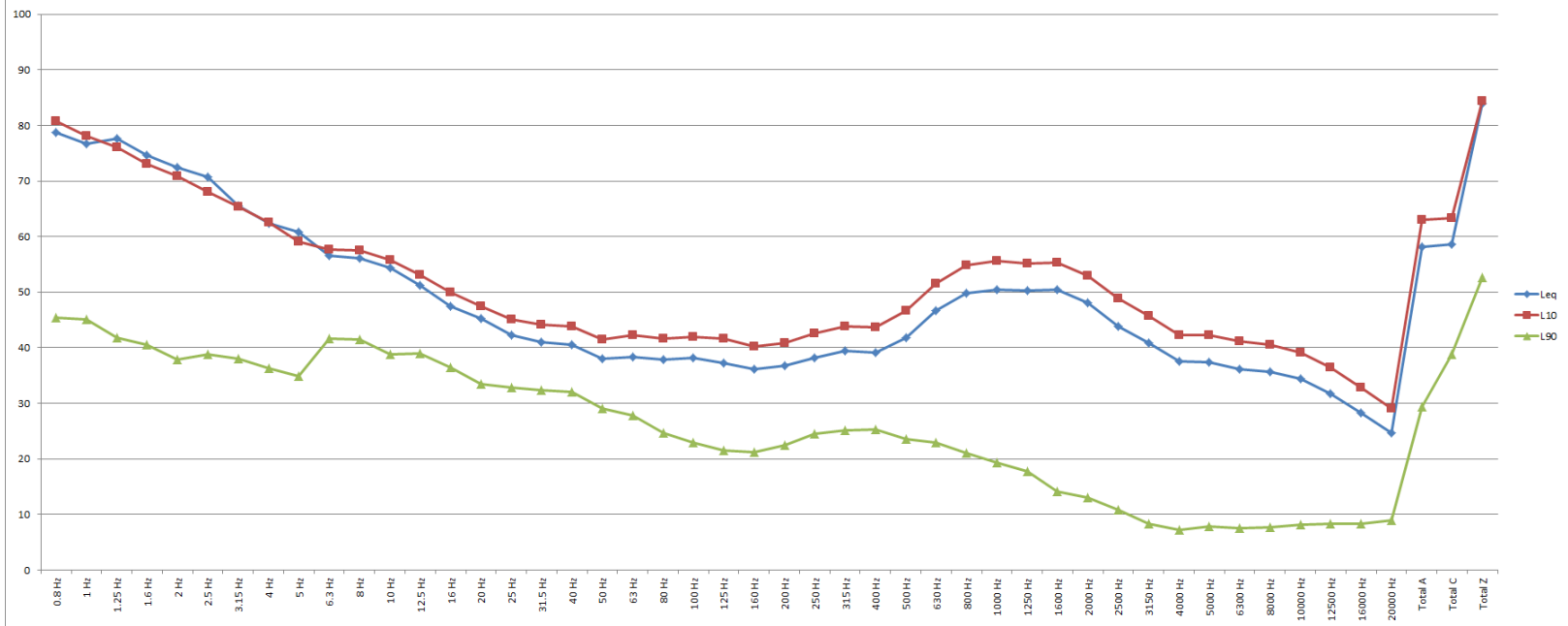
House 87 Outside, 27/05/14 12:00 PM



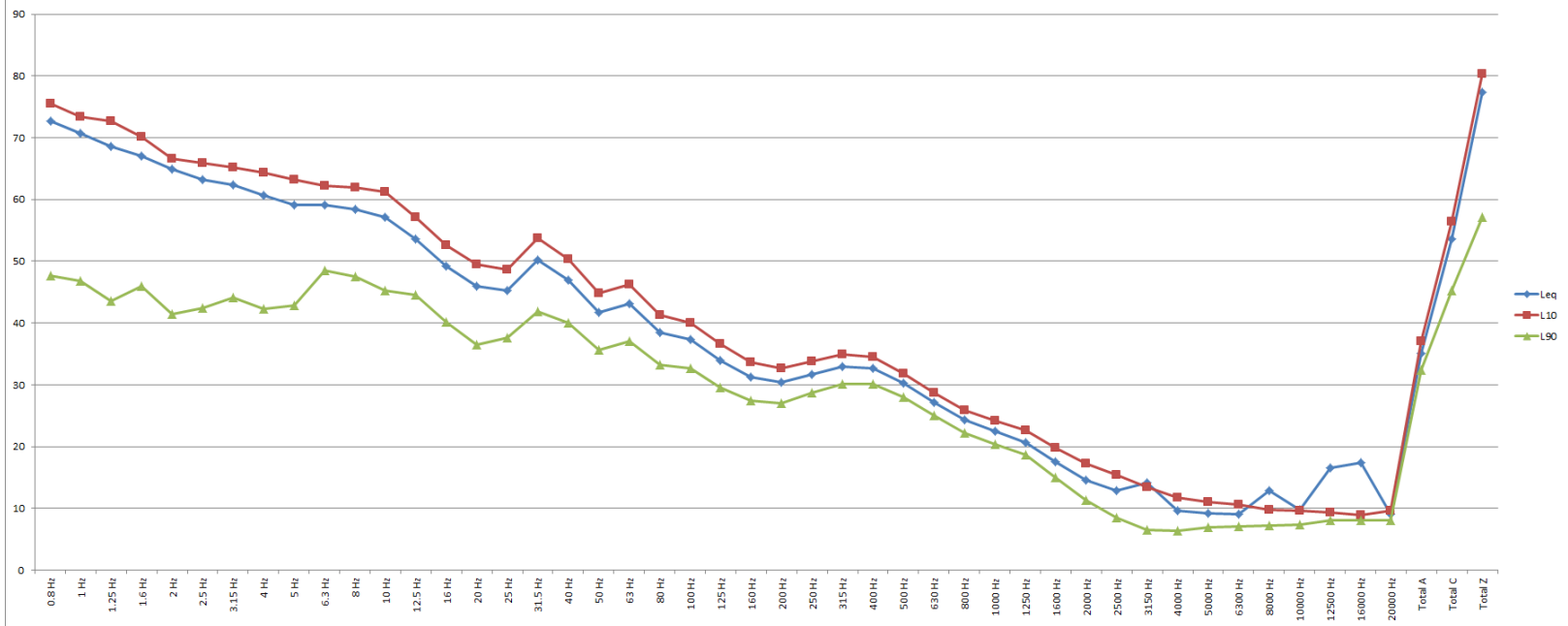
House 87 Outside, 27/05/14 4:00 PM

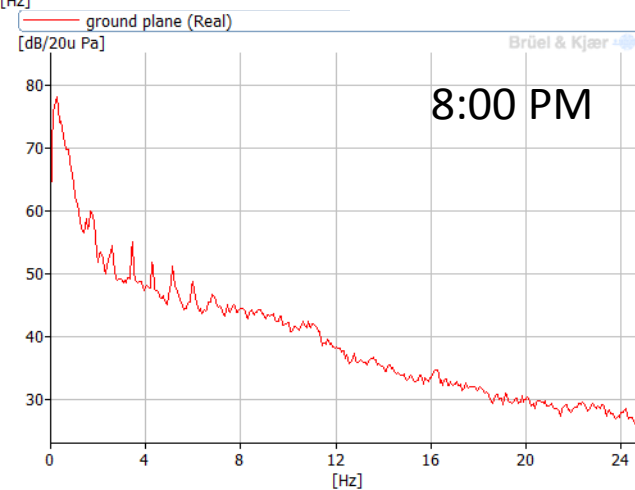
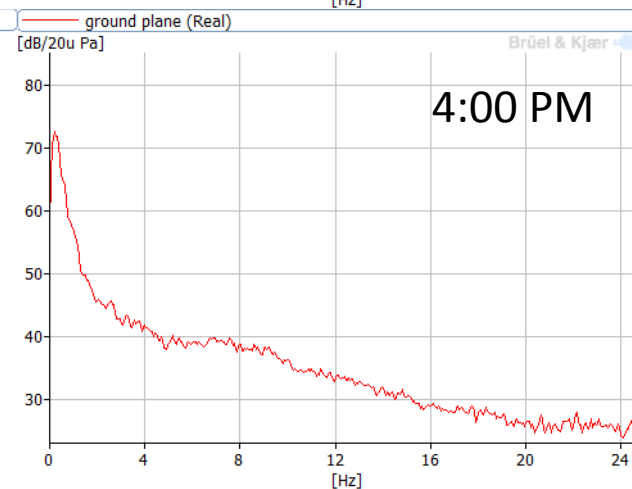
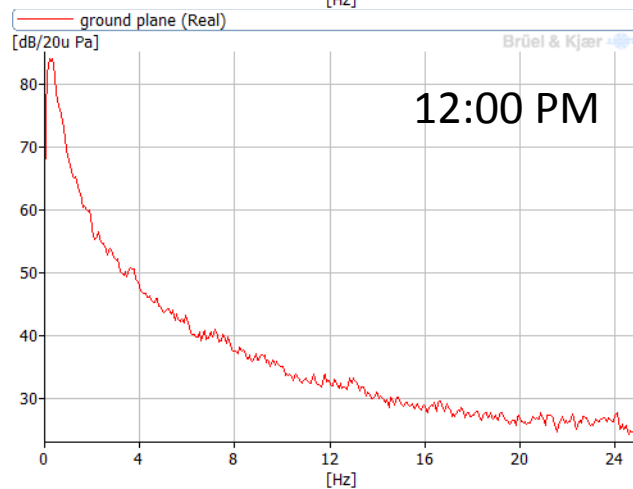
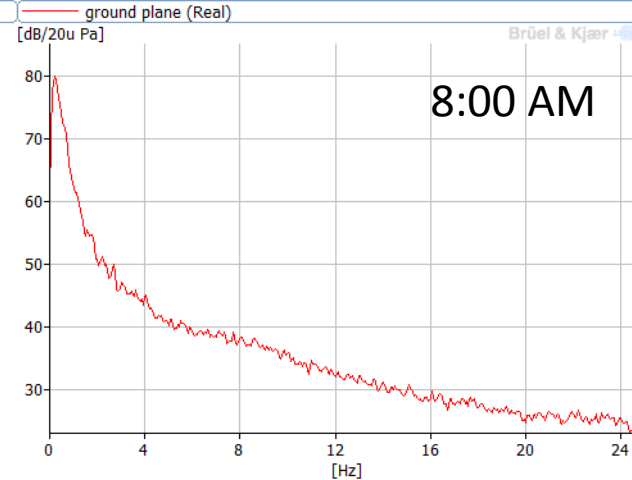
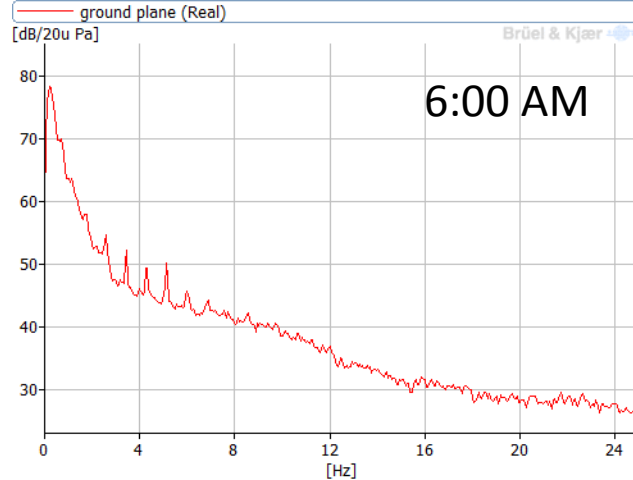


House 87 Outside, 27/05/14 4:00 PM

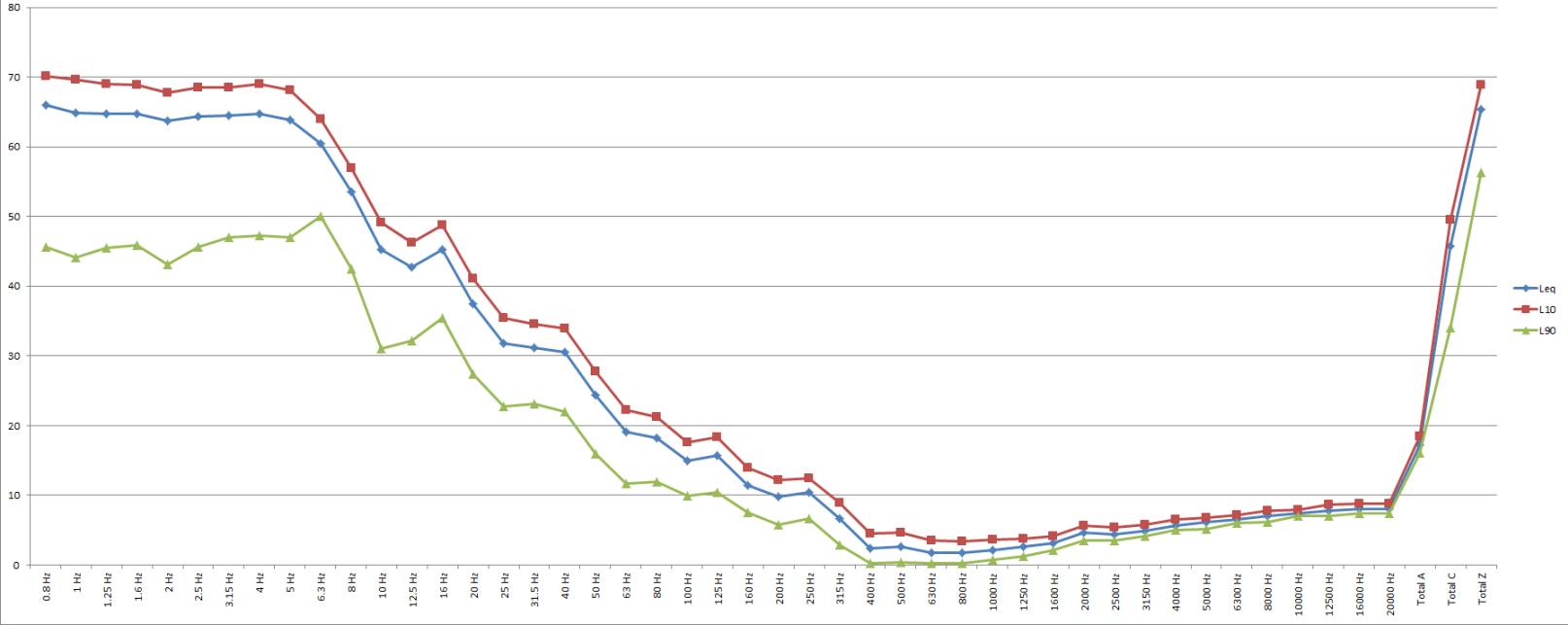


House 87 Outside, 27/05/14 8:00 PM

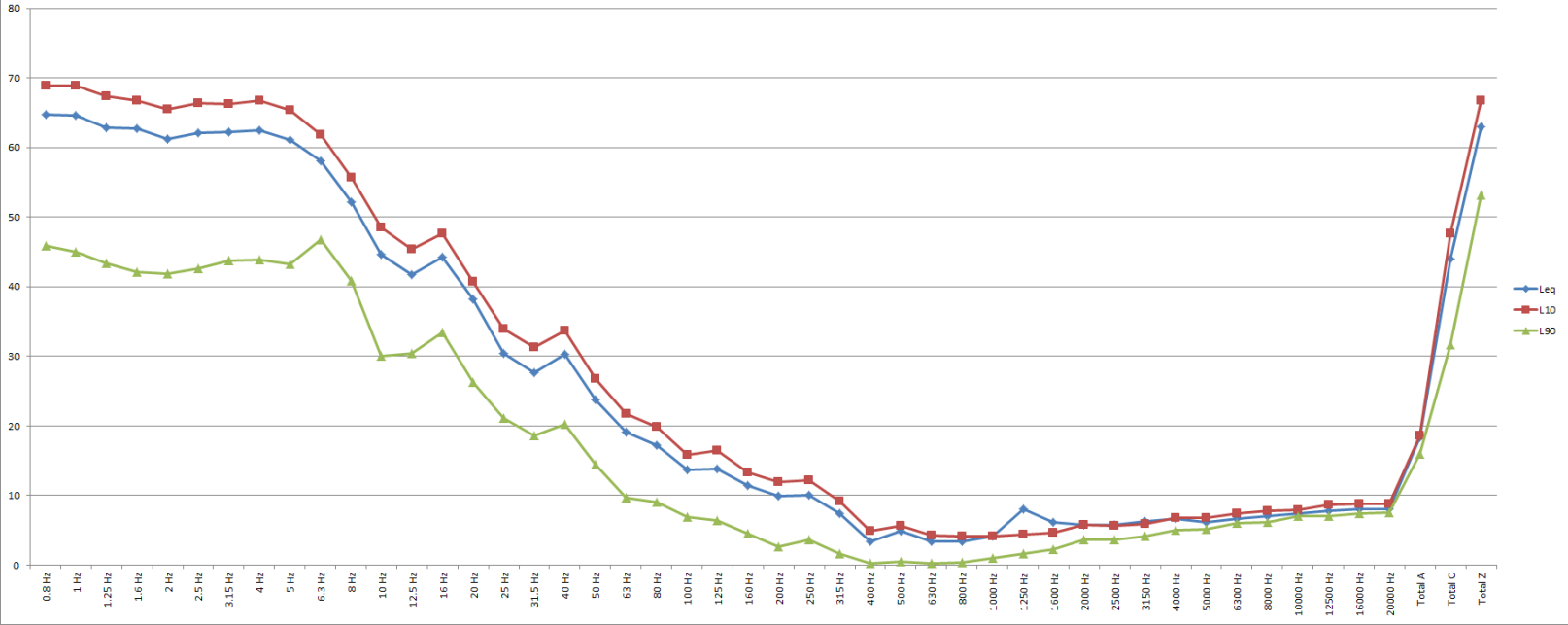




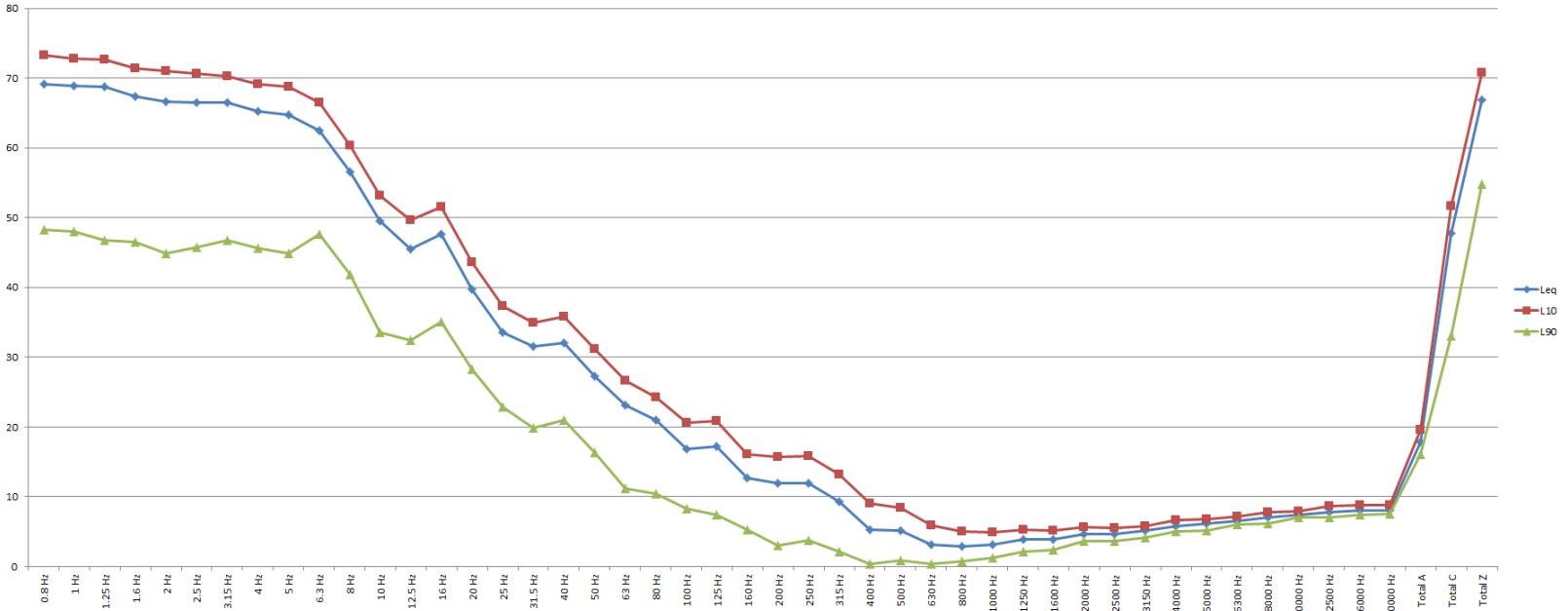
House 87 Bedroom, 27/05/14 6:00 AM



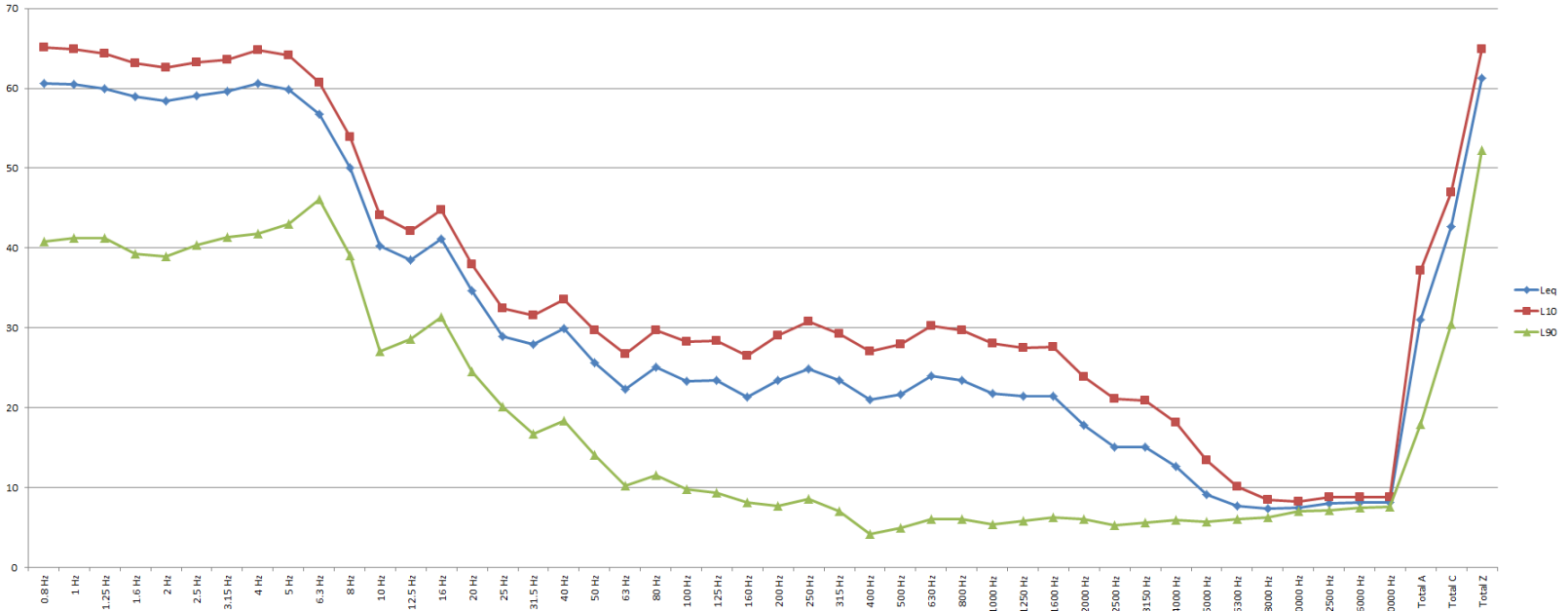
House 87 Bedroom, 27/05/14 8:00 AM



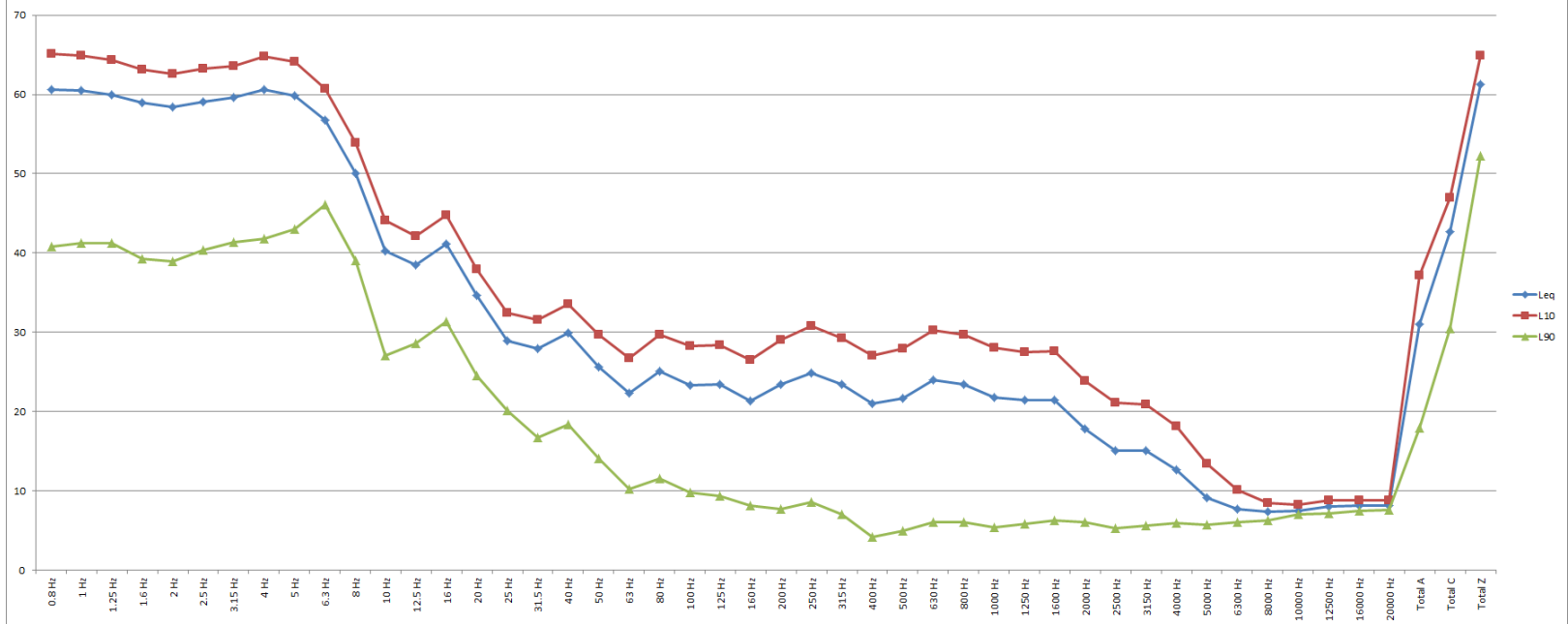
House 87 Bedroom, 27/05/14 12:00 PM



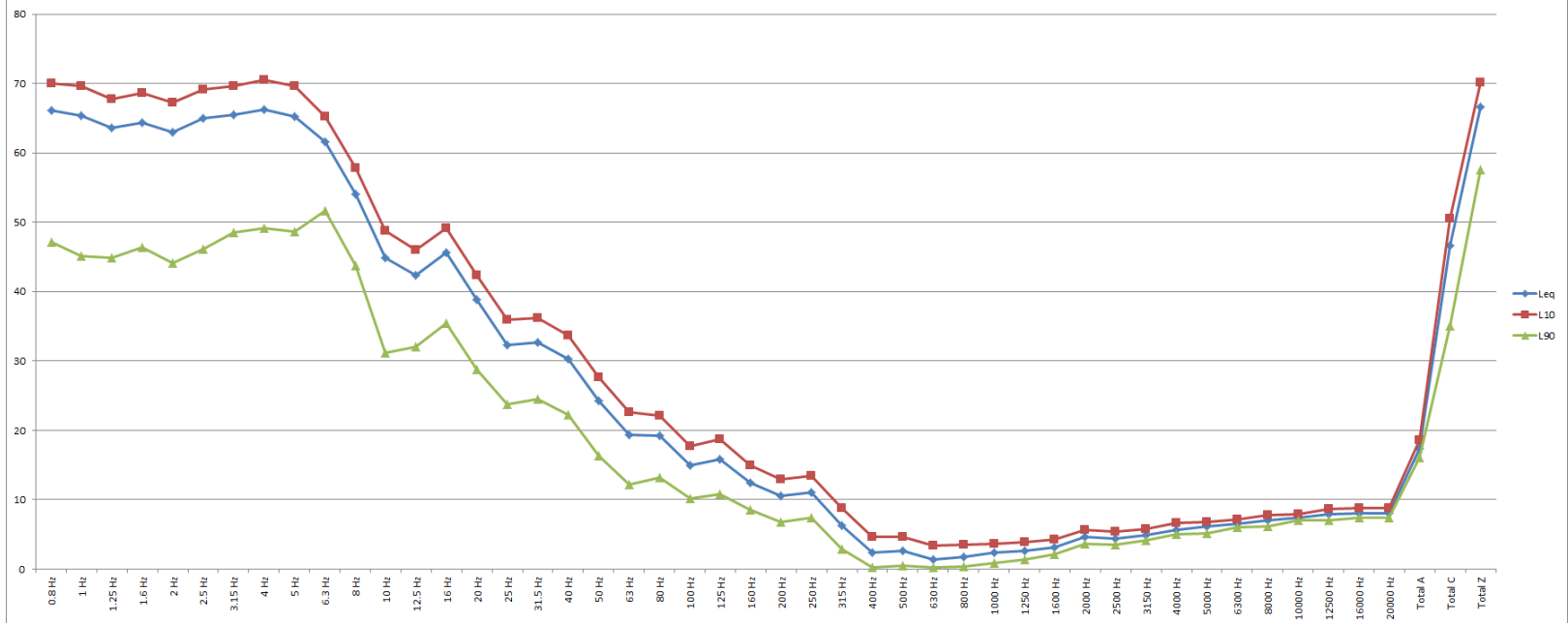
House 87 Bedroom, 27/05/14 4:00 PM

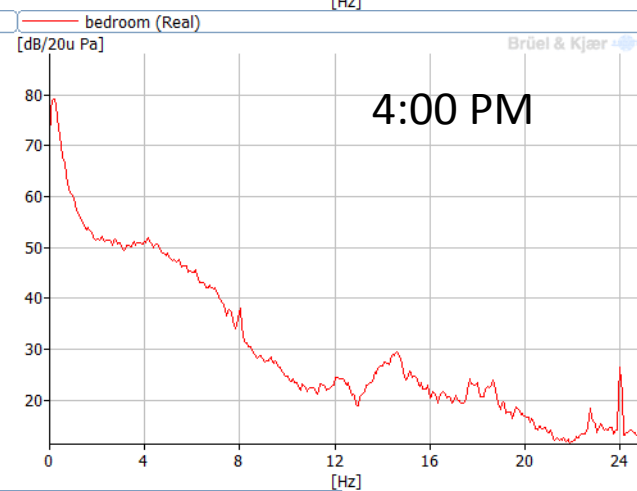
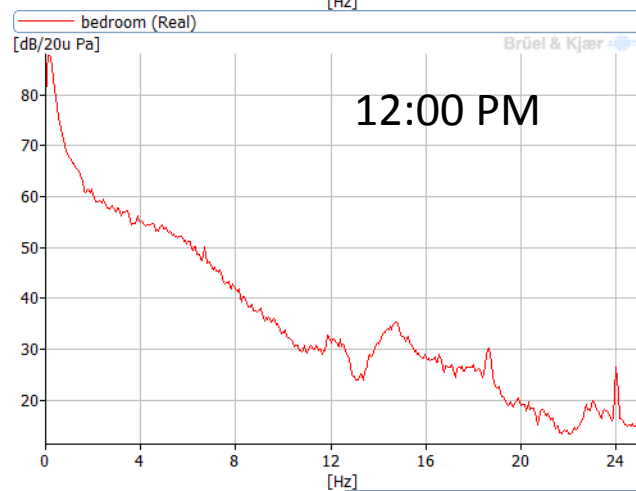
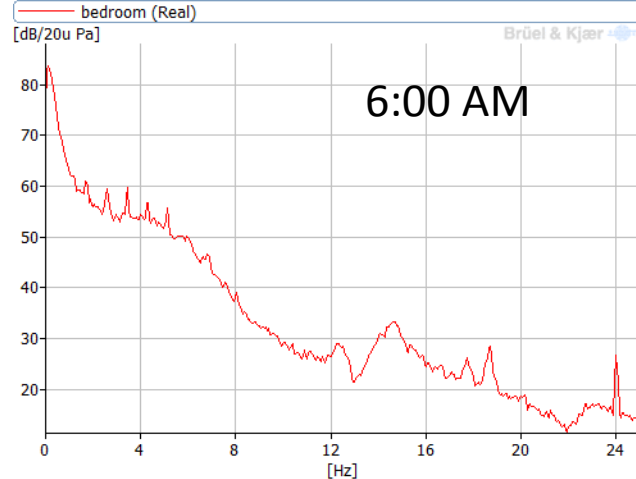


House 87 Bedroom, 27/05/14 4:00 PM



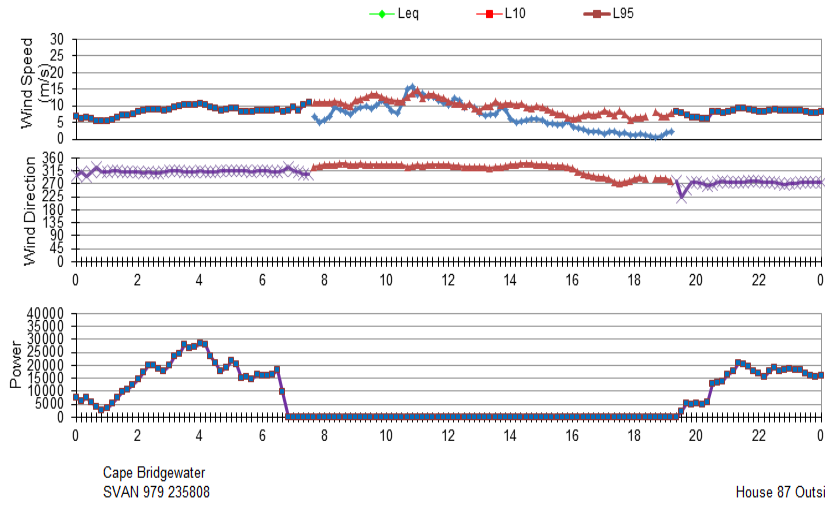
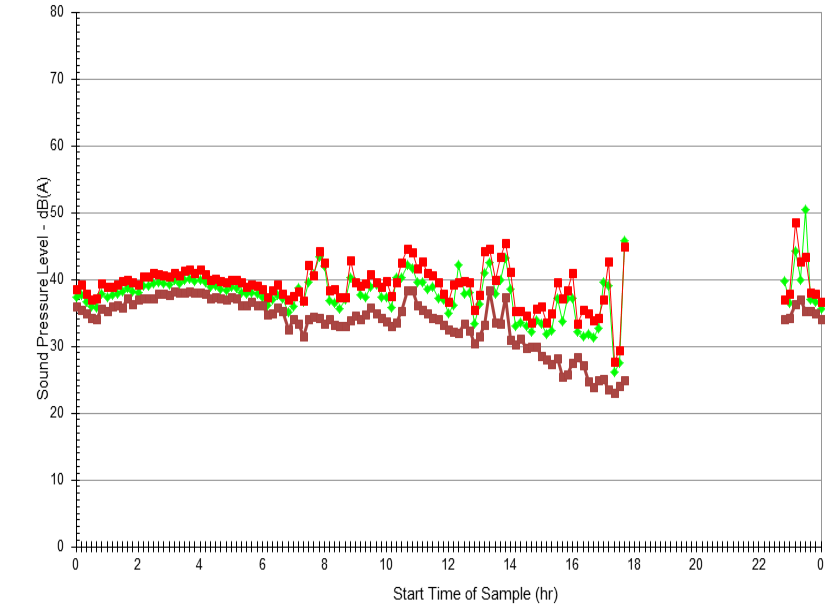
House 87 Bedroom, 27/05/14 8:00 PM





Ambient Measurements

Friday, 9 May 2014

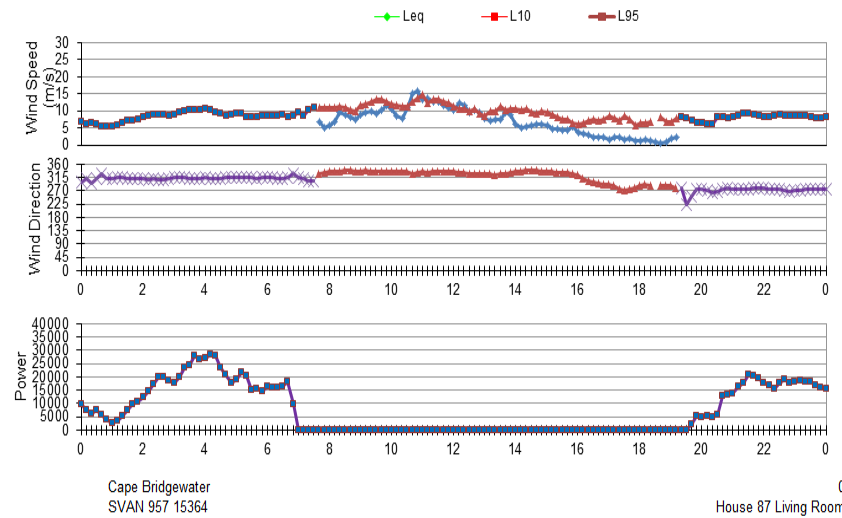
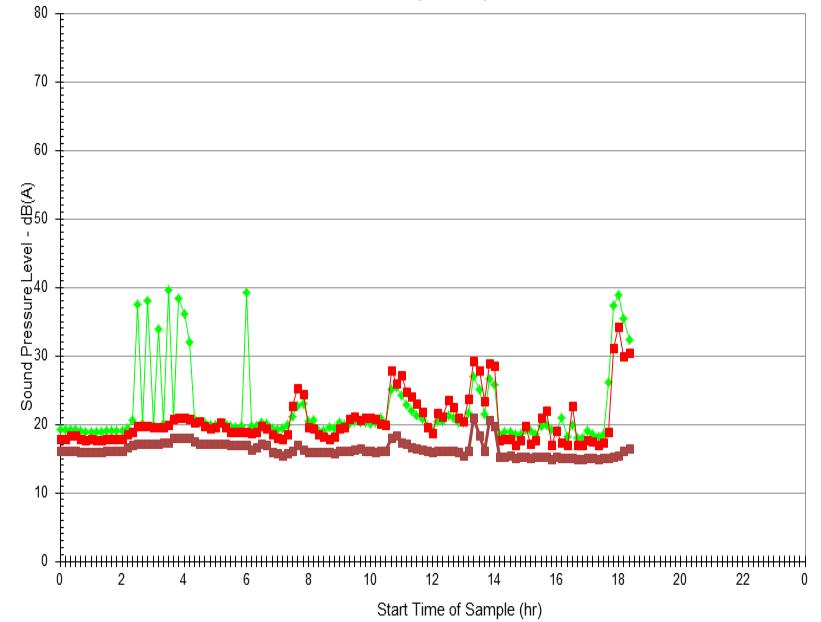


Cape Bridgewater
SVAN 979 235808

House 87 Outside

Ambient Measurements

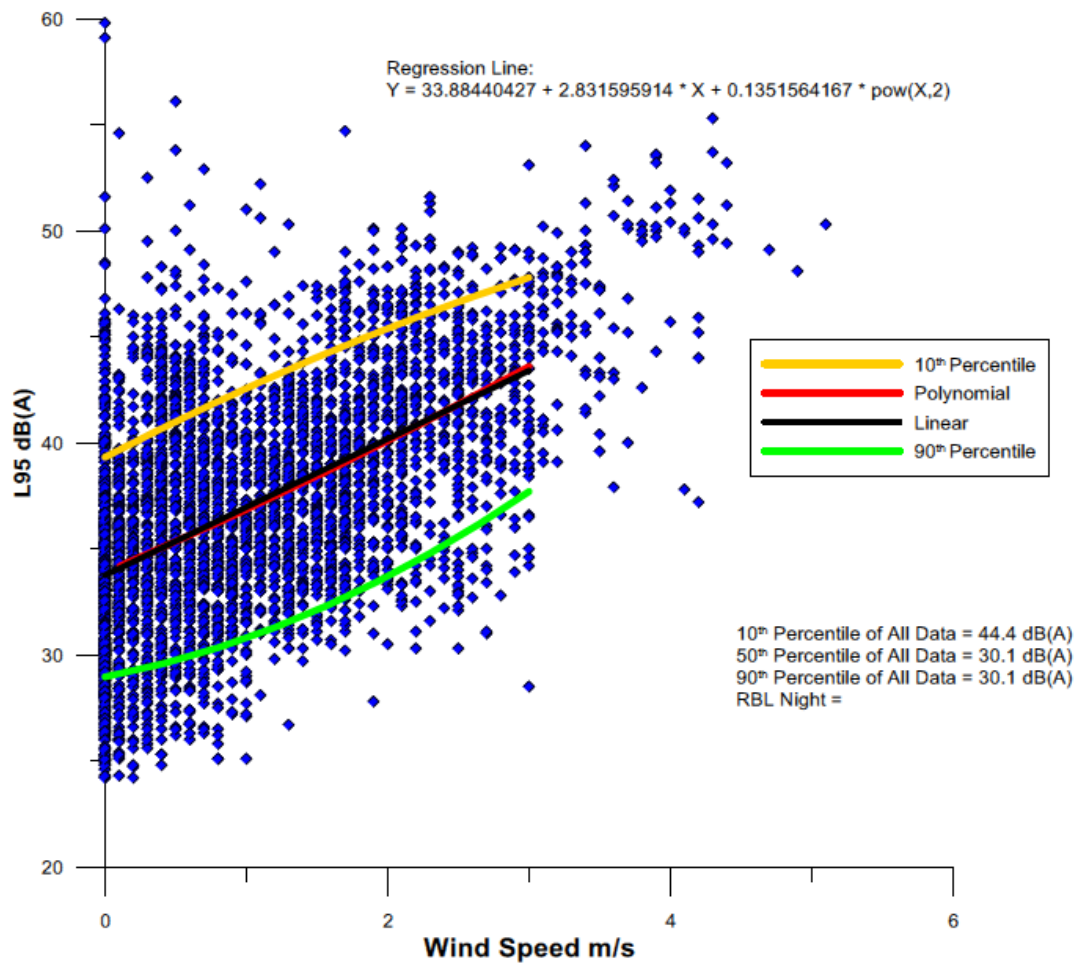
Friday, 9 May 2014



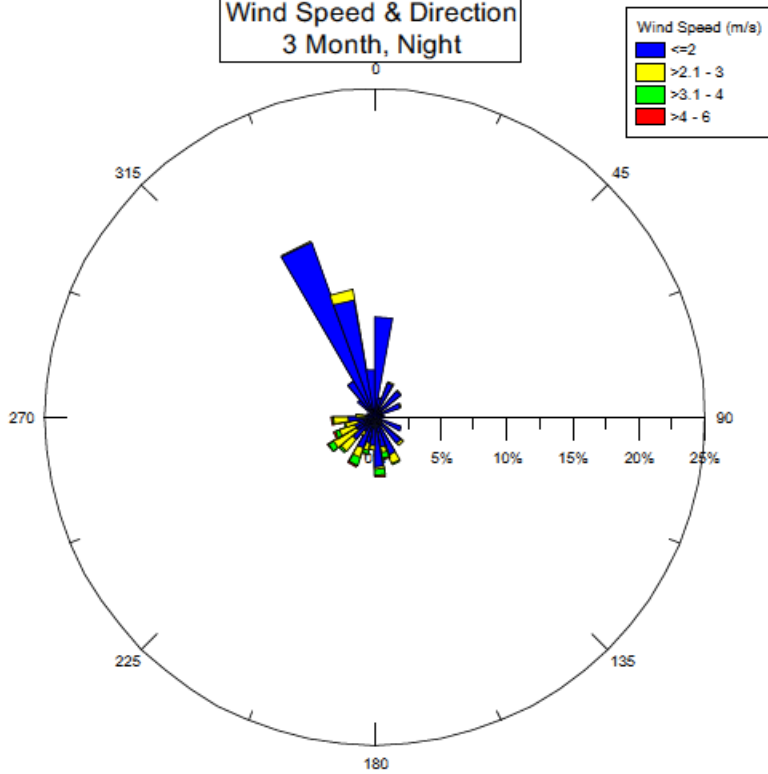
Cape Bridgewater
SVAN 957 15364

House 87 Living Room

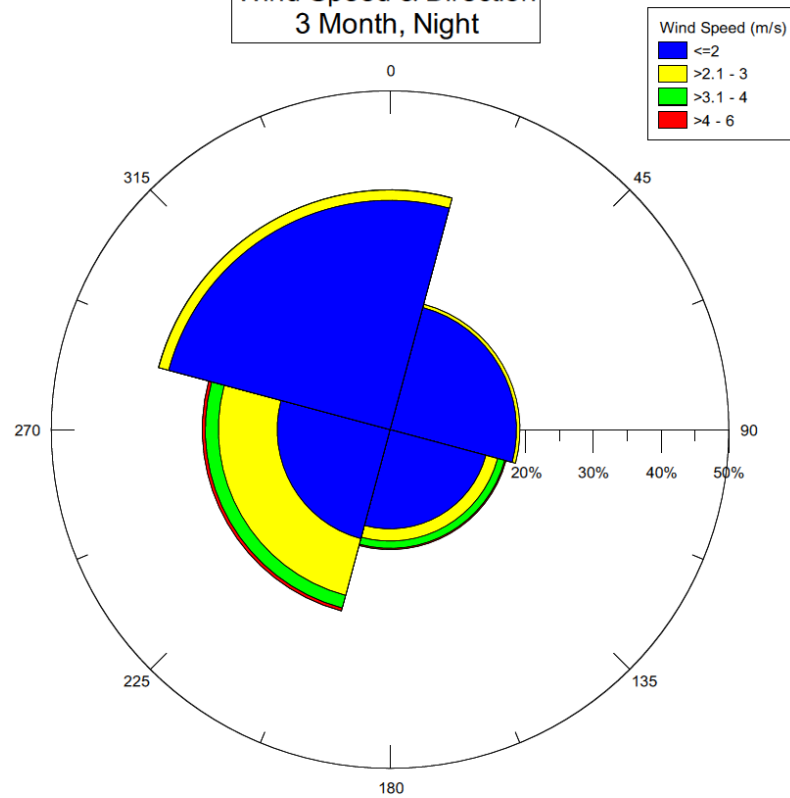
Background Noise at the Receiver vs. Wind Speed - Night - 3 Month Combined



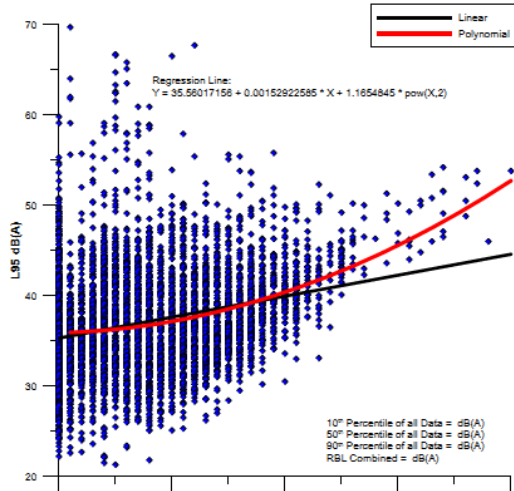
Wind Speed & Direction
3 Month, Night



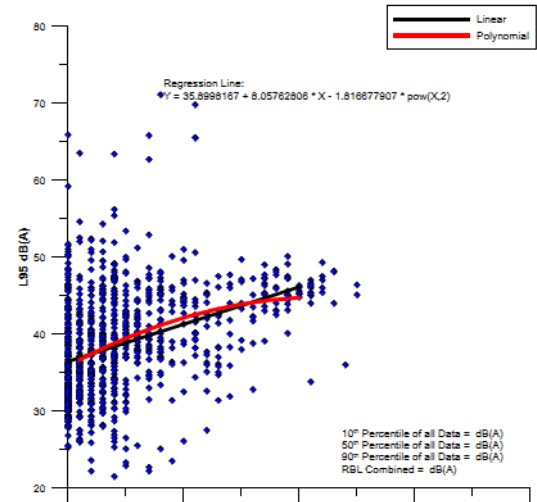
Wind Speed & Direction
3 Month, Night



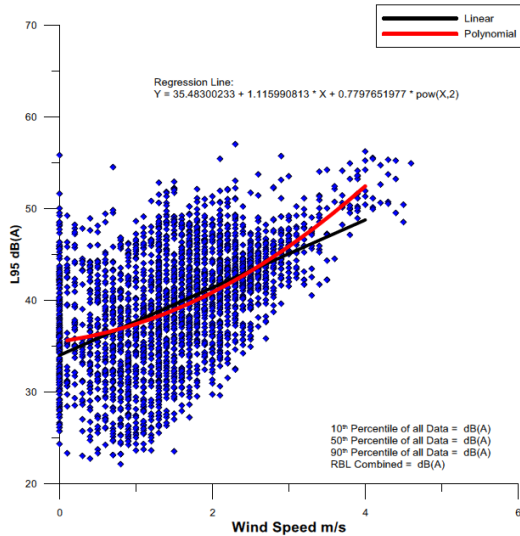
Background Noise at the Receiver vs. Wind Speed 3 Month North Northwest Quadrant



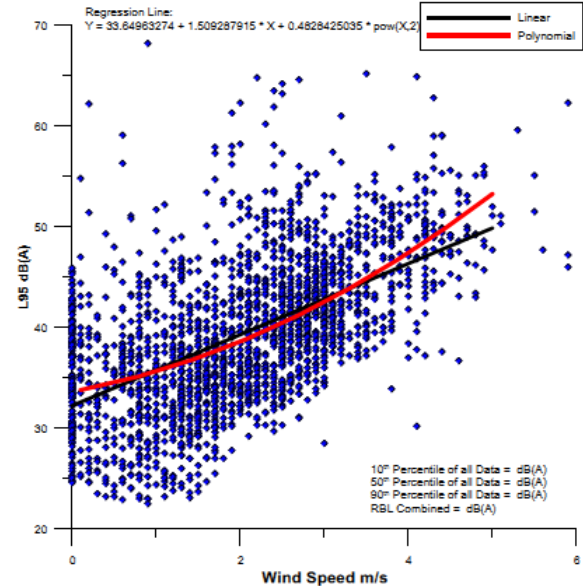
Background Noise at the Receiver vs. Wind Speed 3 Month North East Quadrant

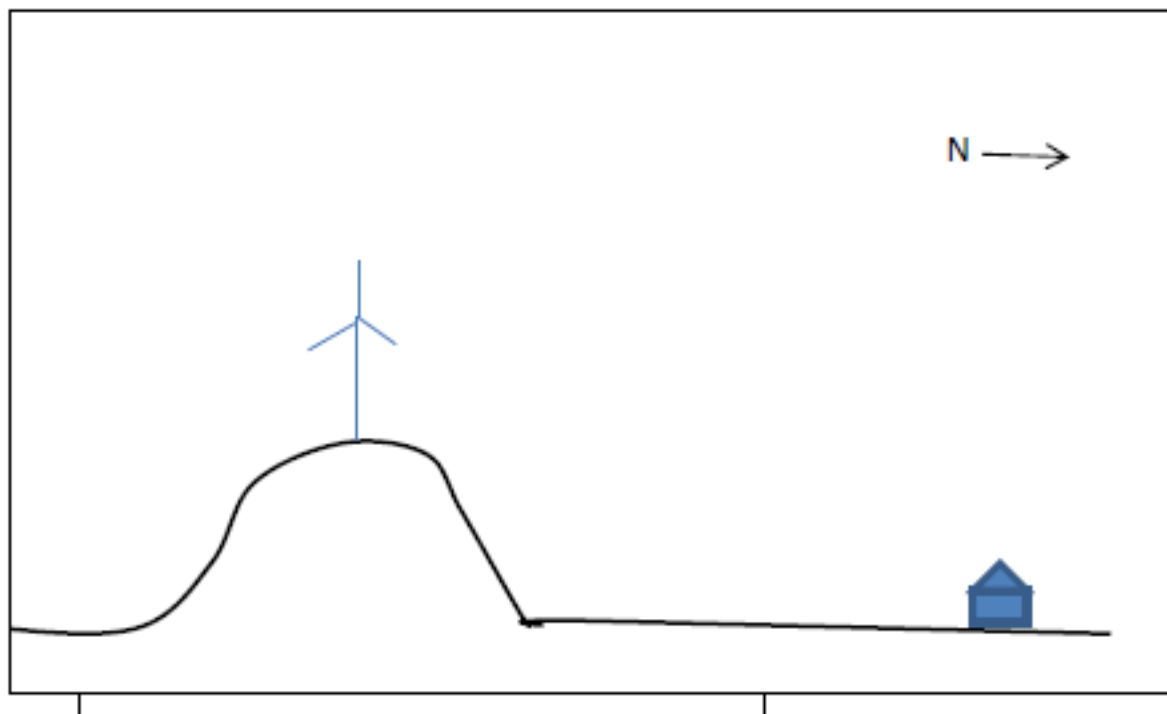


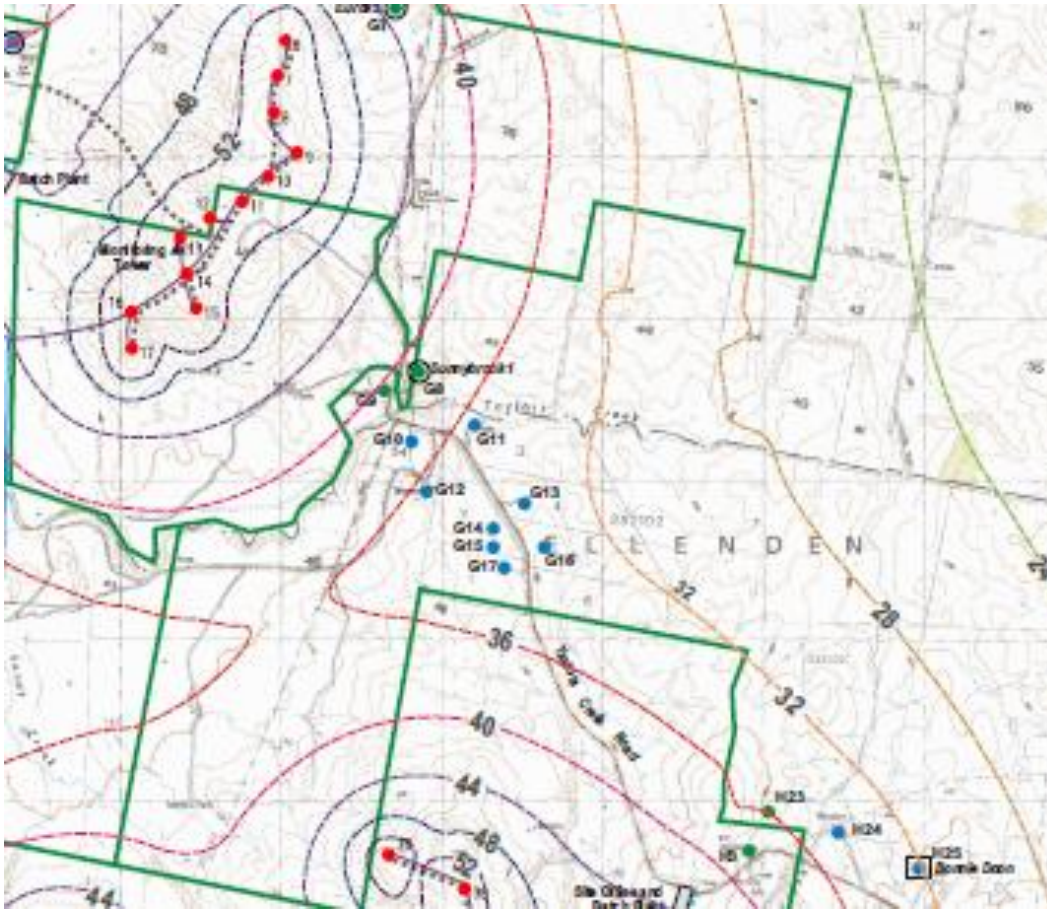
Background Noise at the Receiver vs. Wind Speed 3 Month South East Quadrant



Background Noise at the Receiver vs. Wind Speed 3 Month South West Quadrant





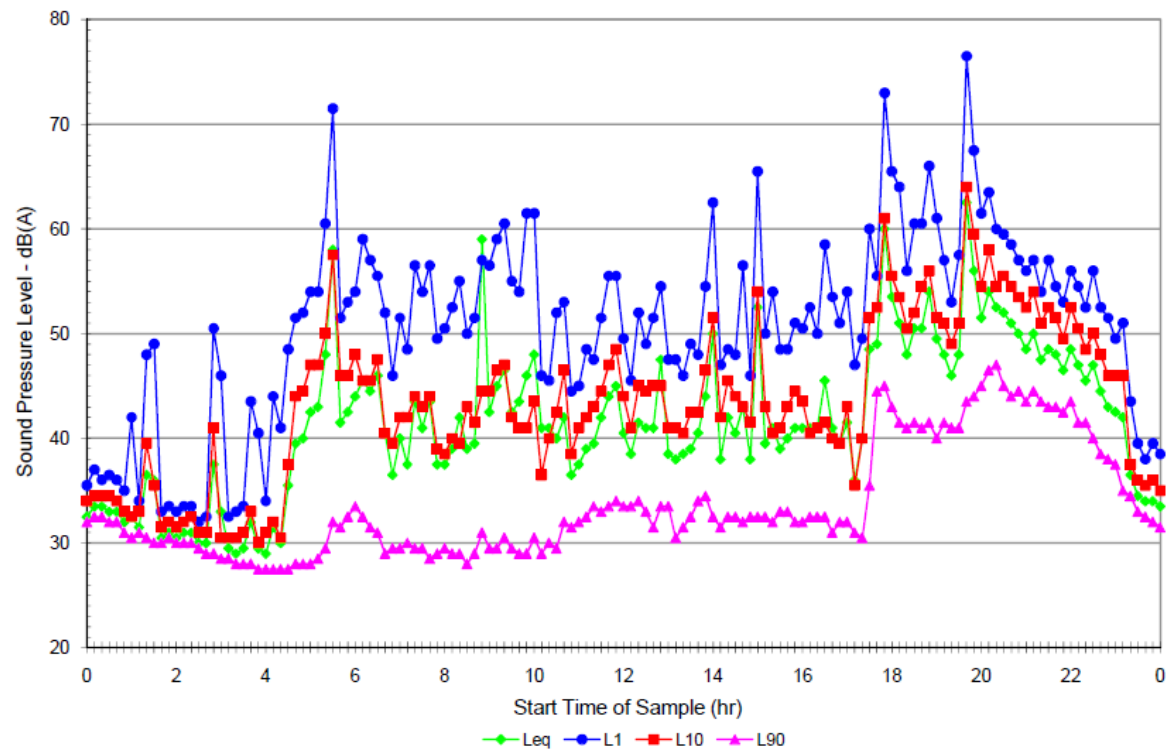


The consolidated consent identifies in condition 53 that the noise level at receiver location G10 is not to exceed 37 dB(A) at any time.

Relevant Receiver	Wind speed ms ⁻¹								
	4	5	6	7	8	9	10	11	12
Criterion : Sunnybrook1 (G8)									
<i>Criterion</i>	35	35	35	36	37	39	40	42	43
G10 LaGranja	34	34.5	36	36	36.5	36.5	37	37	36.5
G11	32	33	34	34.5	35	35	35	35	35
G12 Narine Green	32	33	34	34.5	35	35	35	35	35
G13	29.5	30.5	31.5	31.5	32	32	32	32	32

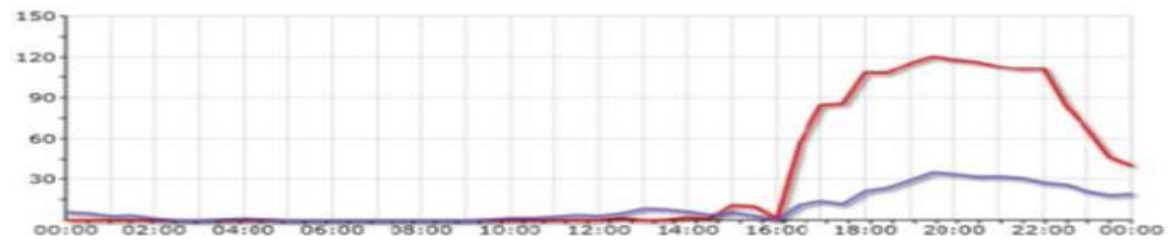
Ambient Measurements

Saturday, 12 November 2011



Capital Wind Farm House 1
ARL Logger

4963
10metres in front of residence

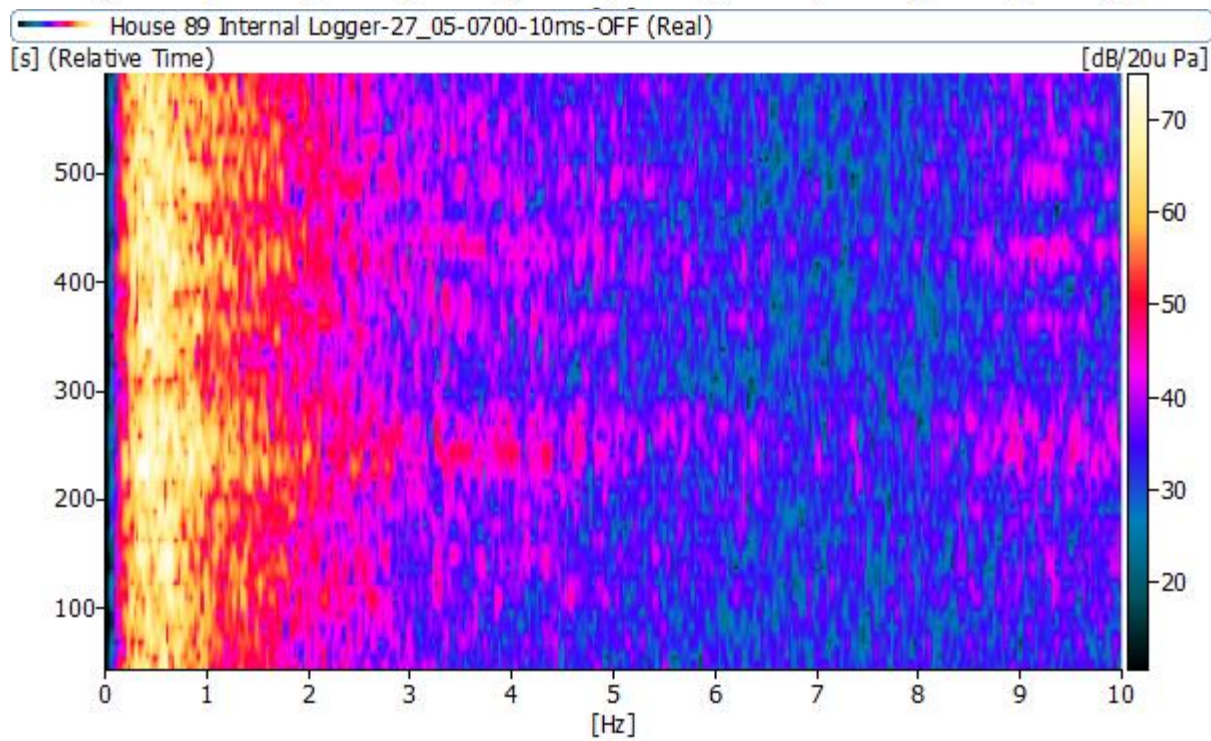
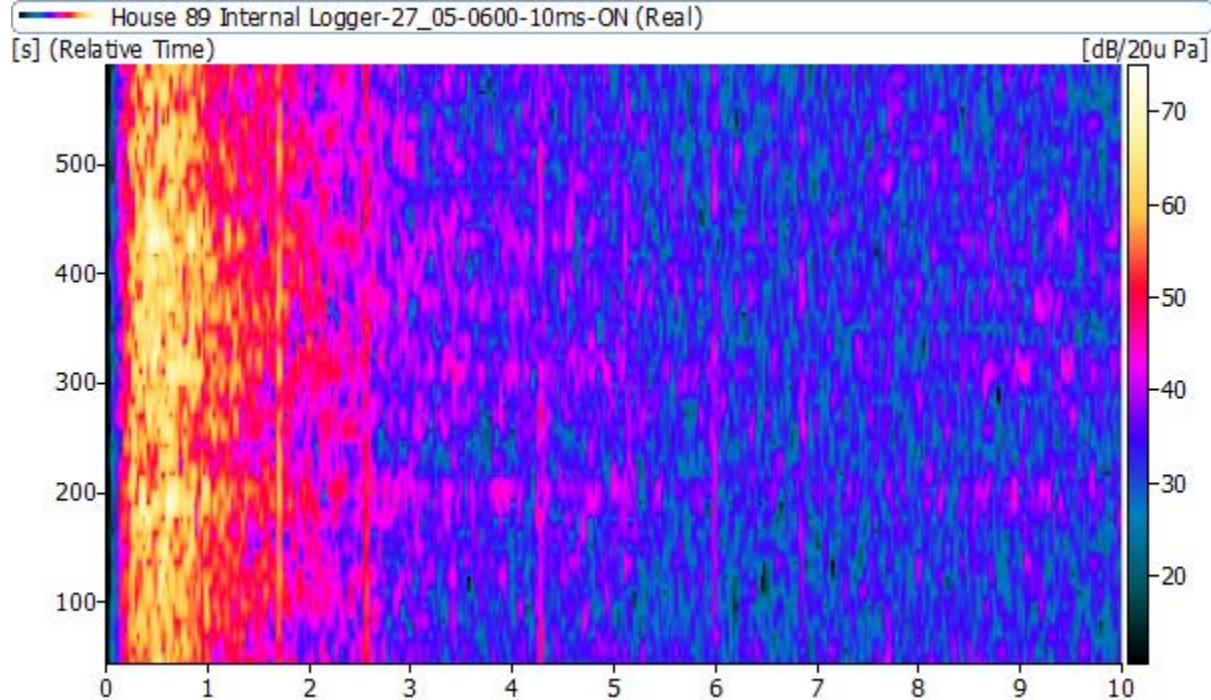


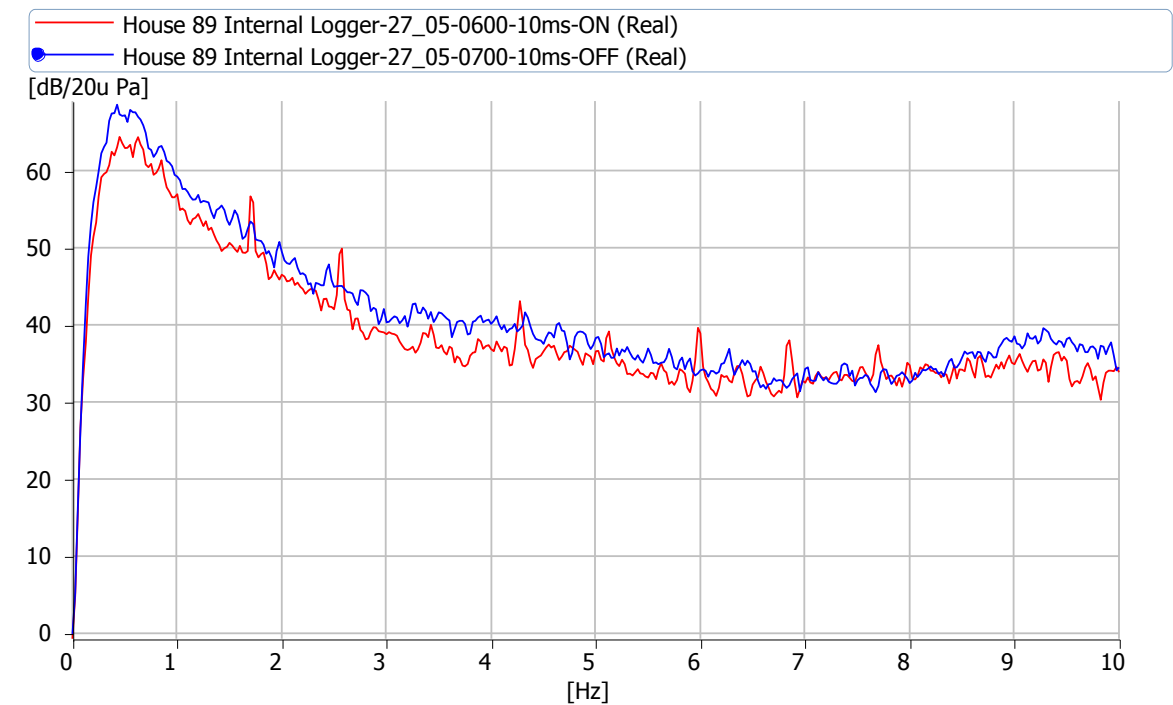
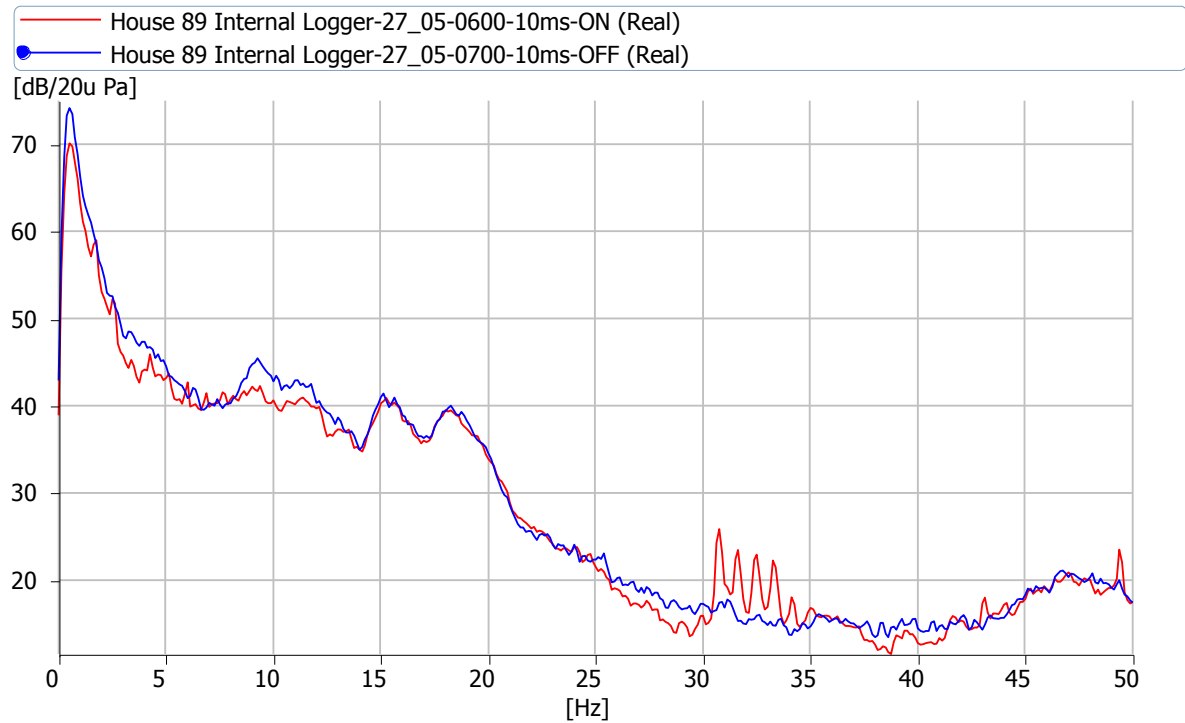
A-weighted levels – noise testing

6. How do you determine acoustic compliance of a wind farm? If as your Report indicates, you cannot determine the A weighted value? I understand there is a difference between contribution and measured level. By reference to your Report, please explain the differences?

On-Off testing – Wind turbine signature concept

7. I have seen the differences in the Infrasound levels when the turbines are operating and when they are off. Could Mr Cooper please show those differences in relation to House 89?



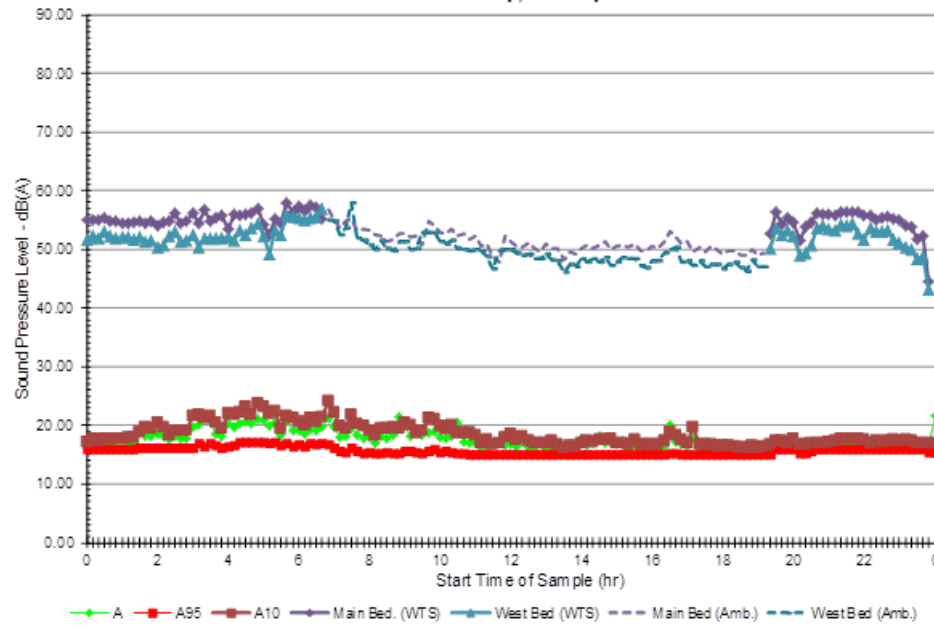


On-Off testing – Wind turbine signature concept

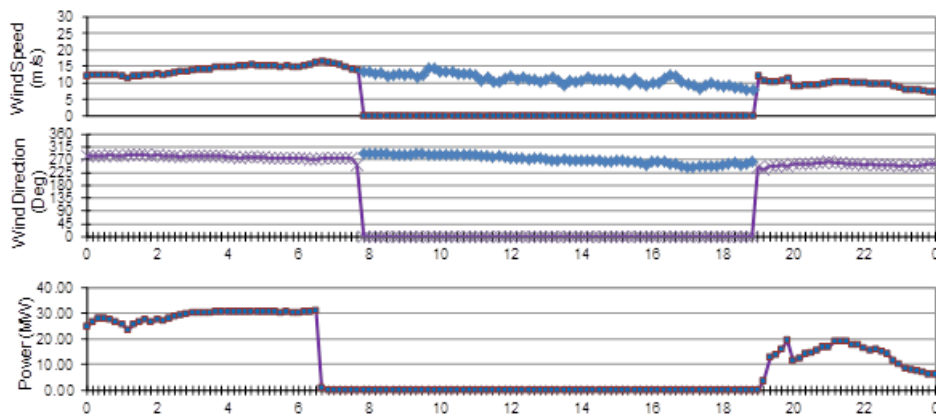
8. After considering all different acoustic perimeters that simply did not work, you utilised the narrowband analysis and developed a concept dB(WTS). Could you provide for one of the SHUTDOWNS a graph of the dB(WTS) ?

Ambient Measurements

Thursday, 15 May 2014



Raw Data

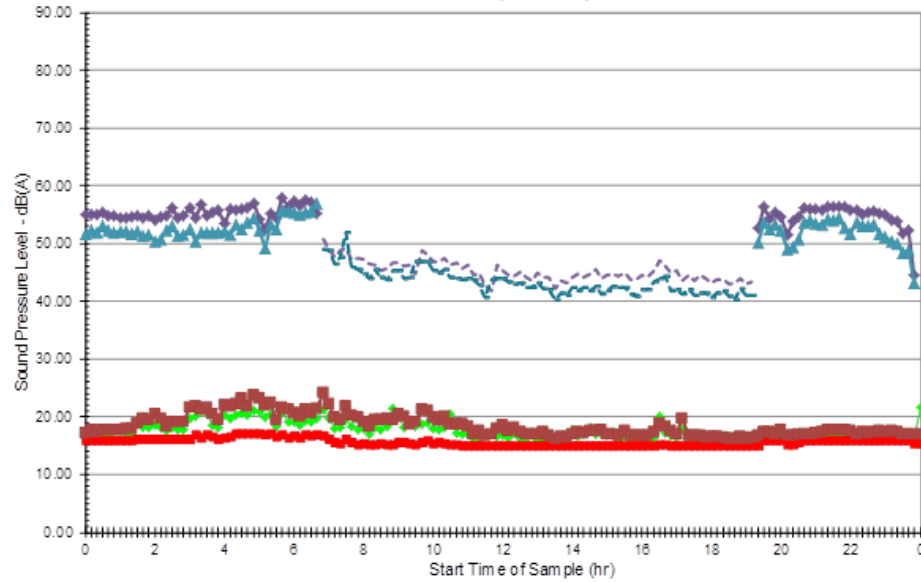


Cape Bridgewater
SVAN 979 27184

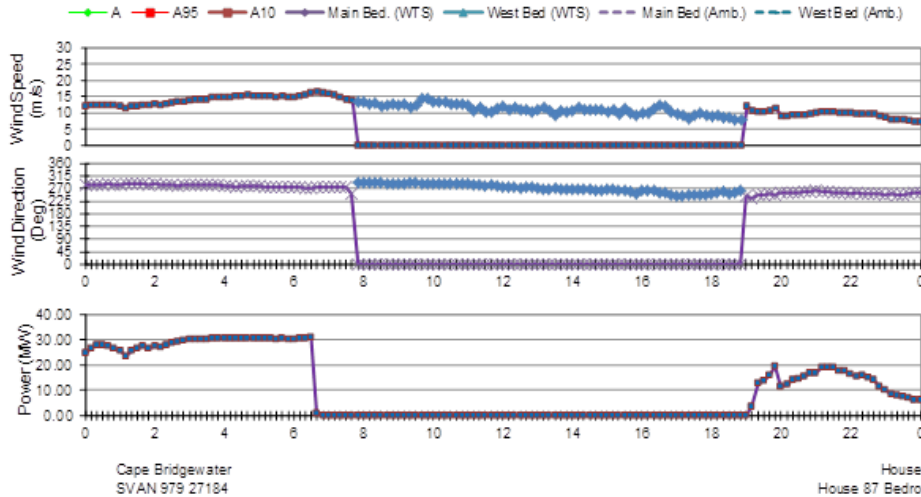
House 87
House 87 Bedroom

Ambient Measurements

Thursday, 15 May 2014

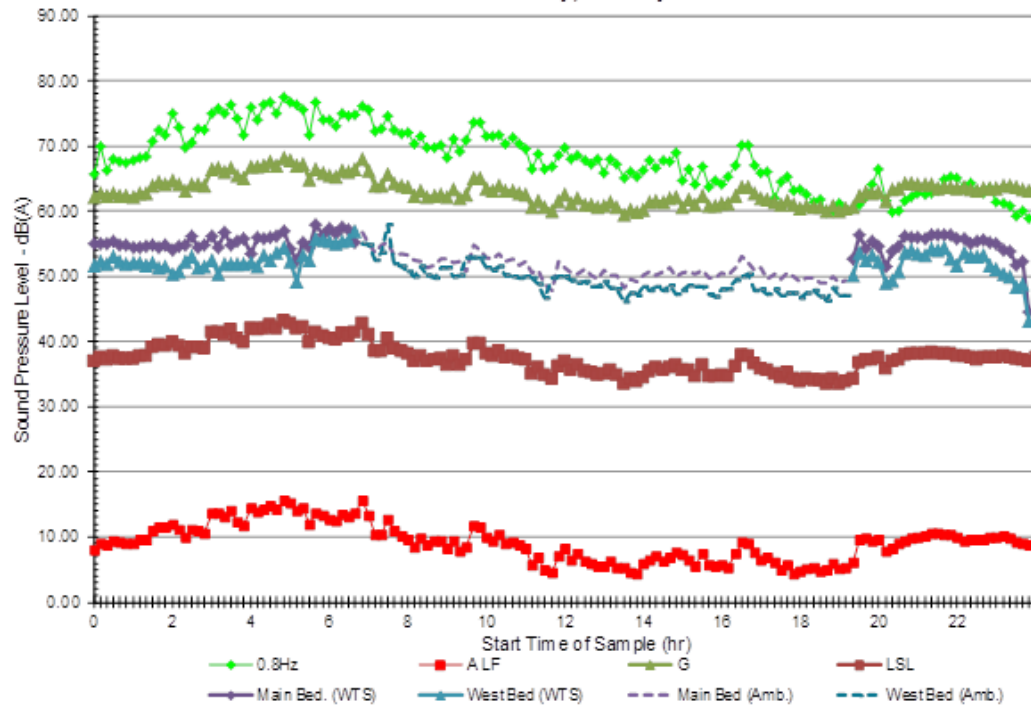


6 dB down

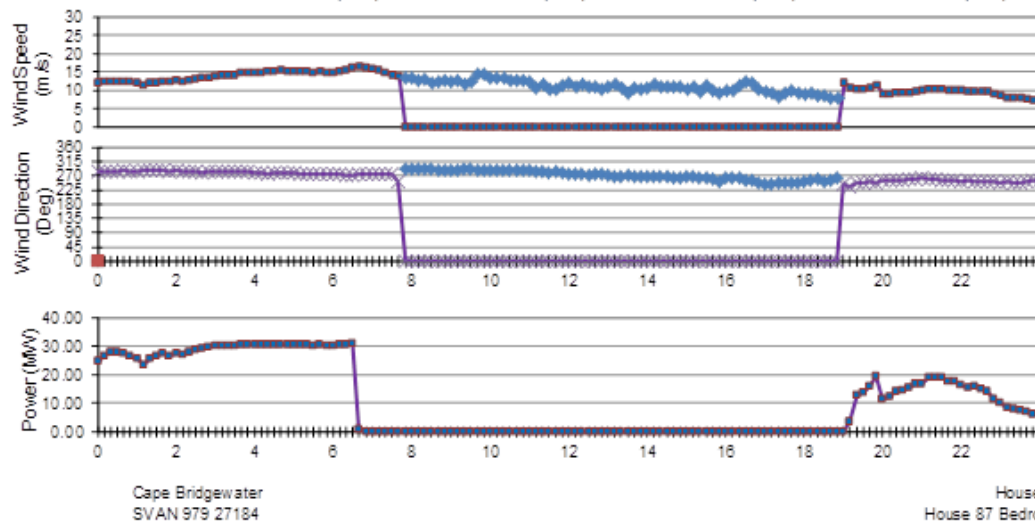


Ambient Measurements

Thursday, 15 May 2014



Other parameters
Raw data



On-Off testing – Wind turbine signature concept

9. The on-off testing clearly shows the (WTS) signature to be coming from the turbines. Can you please explain why 1/3 octave band results show no difference whereas narrow band results do show a difference?

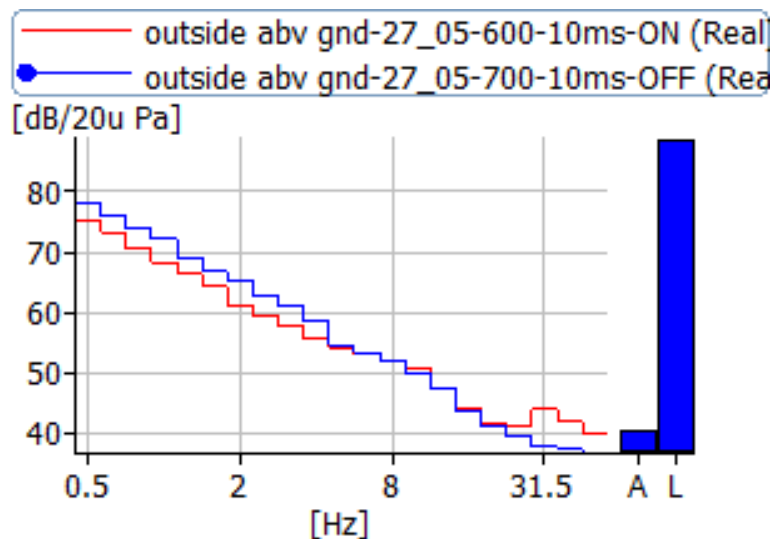


Figure 84: 1.5m above ground house 87 10m/s wind

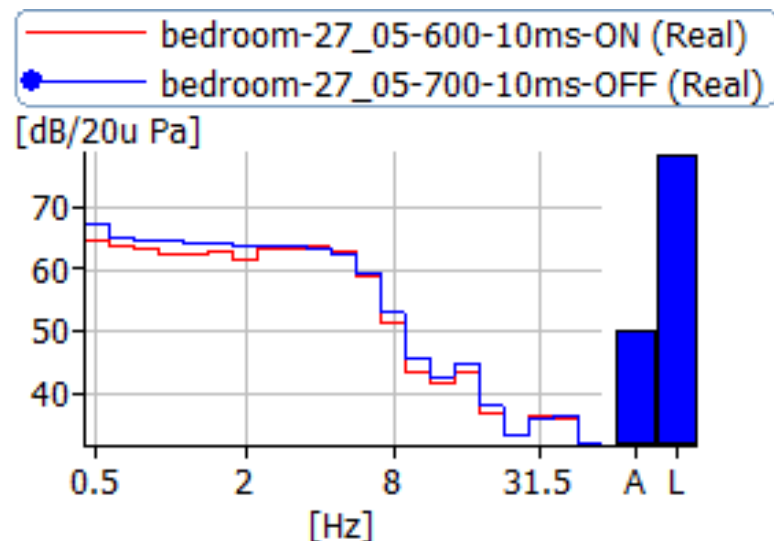


Figure 86: Bedroom house 87 10m/s wind

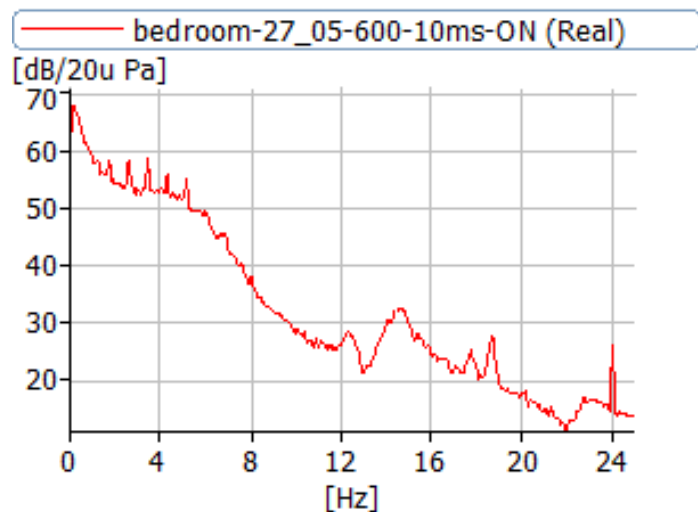


Figure 92: 6am turbines on (0 – 25Hz)

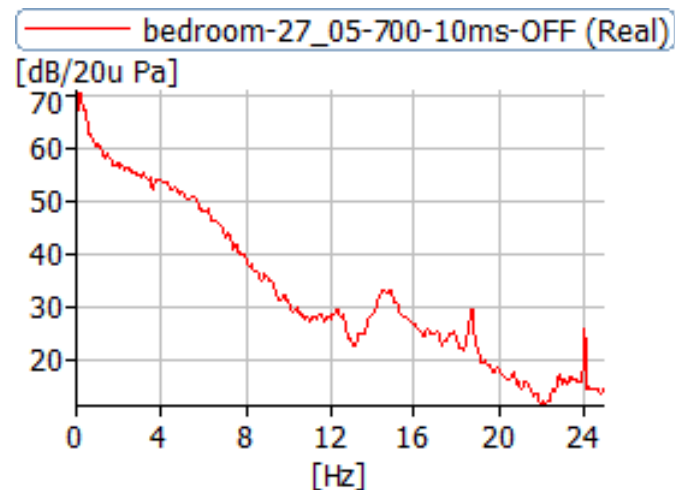


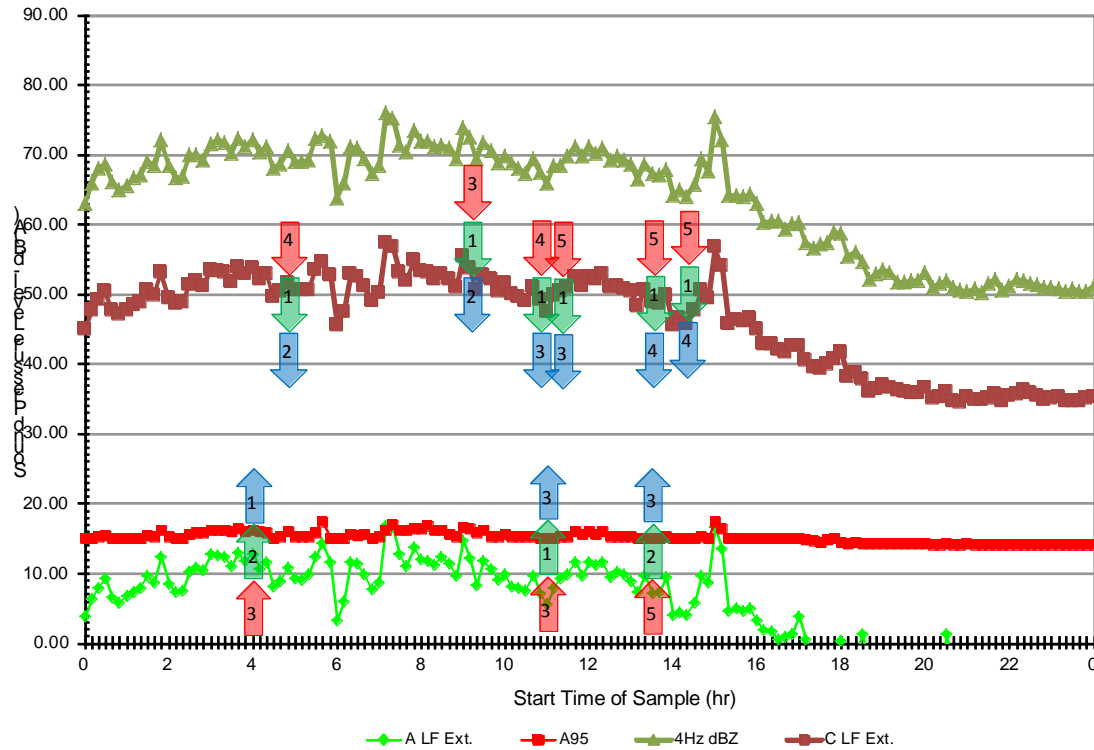
Figure 93: 7am turbines off (0 – 25Hz)

Wind turbine signature – sensations 'trend' finding

10. At the Community Consultative Meetings in Cape Bridgewater you have explained the methodology lining up patterns, reactions and observations to identify wind farm operations that gave rise to the highest level of sensation. Would you please explain that procedure to the people present here, who were not at the community consultative meetings in Cape Bridgewater.

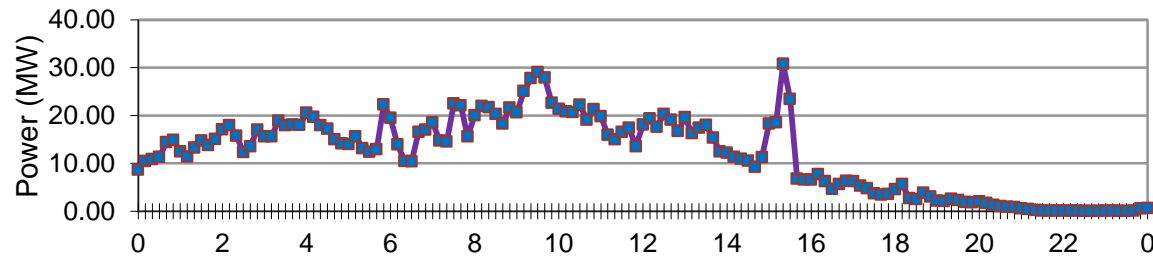
Ambient Measurements

Wednesday, 28 May 2014



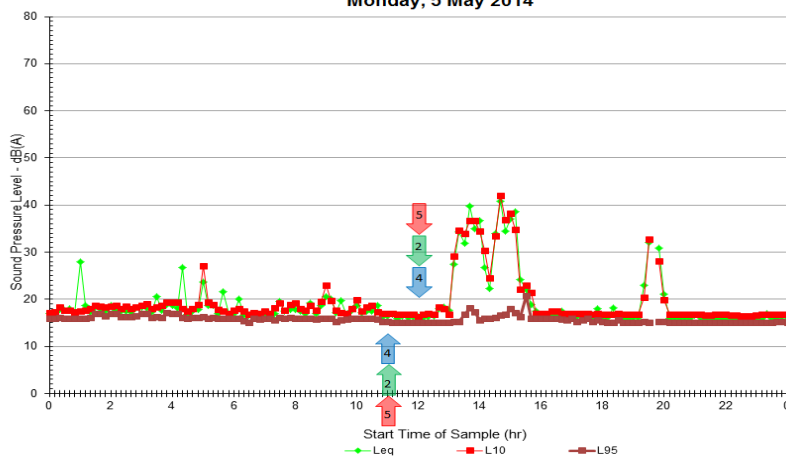
Internal Measurements

Blue – noise
Green – vibration
Red - Sensation

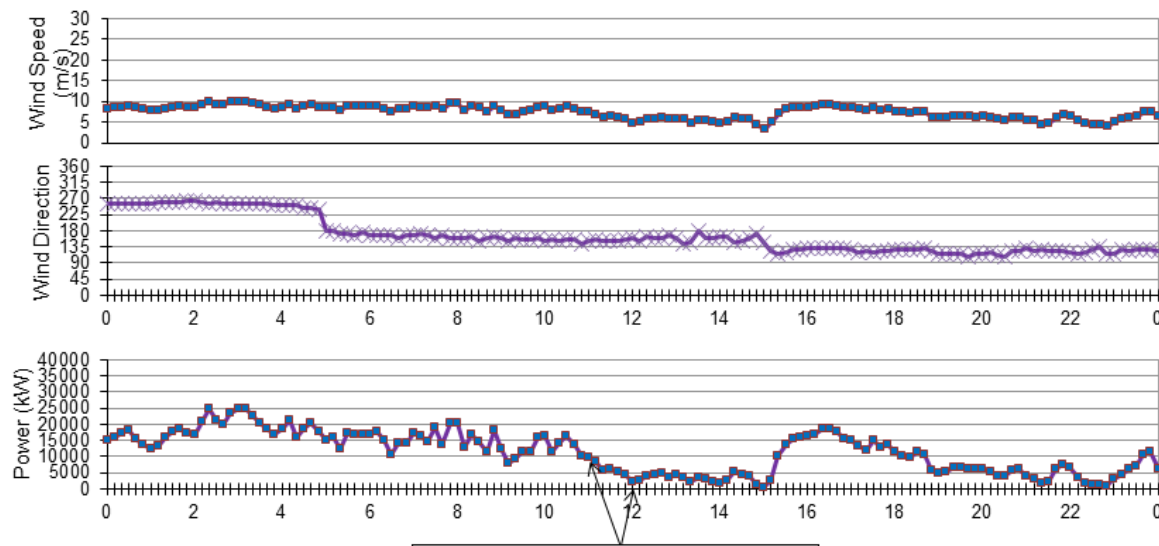
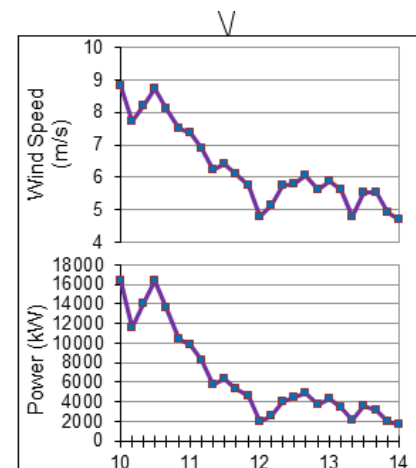


Ambient Measurements

Monday, 5 May 2014



Bedroom



Wind turbine signature – sensations ‘trend’ finding

11. If drug company conducted a trial on 100 patients, and then only followed up with 6 of the patients to assess their reactions to the drug, one would imagine the study would have little or no credibility. Of the 552 physiological experience reports collated in your study, you state on page 115 that you only analysed 31 of them primarily due to insufficient time to perform the analysis. Do you think this methodology would successfully pass through a peer-review process?
12. In Figures 49 and 50, with the ‘sensation 5’ vs. Wind Turbine Signature’ relationship is based on just 6% of the data collected, therefore can these results be considered valid on a scientific basis?

Wind turbine signature – sensations ‘trend’ finding

13. How can you draw any conclusions when you base your final report analysis on only 5 per cent of the sensations diarised by the residents, or 31 reports, of people feeling 'sensations'? This is a very small percentage of the material you had available, and is very, very selective, yes?
14. Sensation 5 is an extreme level of disturbance which we too experience on a regular basis. The Report utilises the extreme or unacceptable situation of Sensation 5 to determine a new perimeter. There has been adverse comment as to why Sensation 4 was not assessed. Could you clarify why Sensation 4 was not used, if it is relevant, noting that the Report indicates a large amount of time would be required to process the Data. To enlighten us could you advise what are the steps in undertaking the process and analysing the Data?

Wind turbine signature – sensations ‘trend’ finding

15. If as Pacific Hydro claims there is no correlation of Noise or Vibration from the Wind Farm, but there is a trend of sensation versus the Wind Farm, what is the difference between correlation and trend?
16. According to the appendices of the report, the residents reported a very large number of noise, vibration and physiological complaints during extremely low wind speeds and the shutdown period--- both instances when the wind turbines were not operational. If residents were reporting noise, vibration and physiological impacts during times of low and shutdown, how can it be possible to determine any linkage between diary entries and wind farm operation?
17. You attributed recorded 'sensations' that the 6 residents felt to both moving, and stationary wind turbines (ie. when the turbines have been turned off). If the sensations can be detected at both times (on and off), how do we know the turbines are the cause of these sensations at all? This conclusion is unfalsifiable, isn't it?

Wind turbine signature – sensations ‘trend’ finding

18. You told The Australian some of these sensations were recorded when the turbines were switched off, but that the sensations were being experienced when there were strong wind gusts, causing the stationary towers to vibrate. However, some of these sensations were recorded when there were low wind speeds. Can you explain the latter reporting of high sensation, then?
19. How does your “sensation” and dB(WTS) work here at Cape Bridgewater relate to measurements you did at Waterloo (concurrent with the 2013 SA EPA Waterloo Noise study) and noise diaries provided by the residents at the SA EPA sites?

Wind turbine signature – sensations ‘trend’ finding

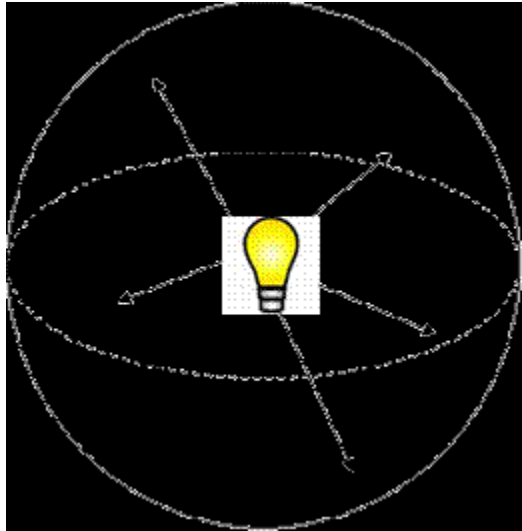
20. On reading your report I find that the brief was very specific to investigating specific local residents complaints. I see that you were required to determine certain wind speeds and certain sound levels that related to disturbances reported by the residents. There has been adverse comments about the conduct of the study that would appear to originate from persons not having actually read the study. I see that sensation covers what residents actually experience. Your report does not identify what the residents noted as to their experiences during the study but kept it in the severity ranking set out in the instructions for the survey. My question is that whilst you have protected the residents observations from being given to anybody outside of your office, from the diaries can you confirm that the residents reported sleep disturbance, nausea, headaches etc when sensation 5 was experienced?

Wind turbine signature – sensations ‘trend’ finding

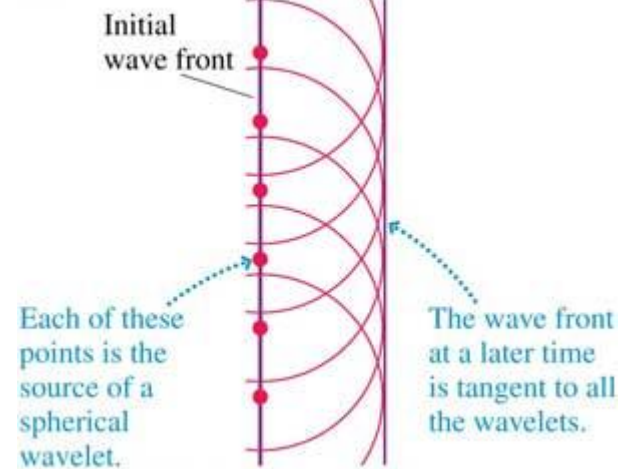
21. The definition of Sensation covers a range of feelings or experiences. The report indicates all residents noted experiences of sensation. Therefore it follows that at the worst sensation levels of 4 and 5 involving those adverse impacts, our health and quality of life is affected. Whilst the report is an Acoustic Measurement Study is it not correct that it also indicates by definition, people's health is being affected? The report identified sensation as resulting in impacts we feel that significantly affect our quality of life. Sensation 5 is clearly an unacceptable impact with the sensation of having to leave our homes immediately. To be consistent with general environmental acoustics where the aim is to protect residents 90% of the time, what sensation level on the measuring scale used in this study is consistent with that aim? I think you have said it is sensation 2 but I would like to clarify that.

Findings or conclusions of the report

22. We are the residents of House 87 referred in the Steven Cooper noise report. We understand the three homes in this study were subject to different exposure levels dependent upon the relative height/shadow zone of infrasound generated by the turbines. Could you please explain the shadow zones?

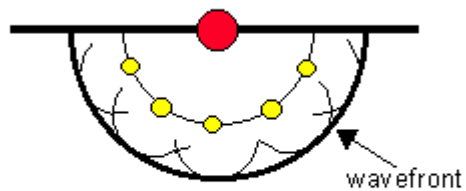


(a) Plane wave



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HUYGEN'S PRINCIPLE



- = source
- = secondary sources



Figure 5-1: Test set-up with G58 wind turbine and microphone array platform. The noise sources in the rotor plane (averaged over several rotations) are projected on the picture.

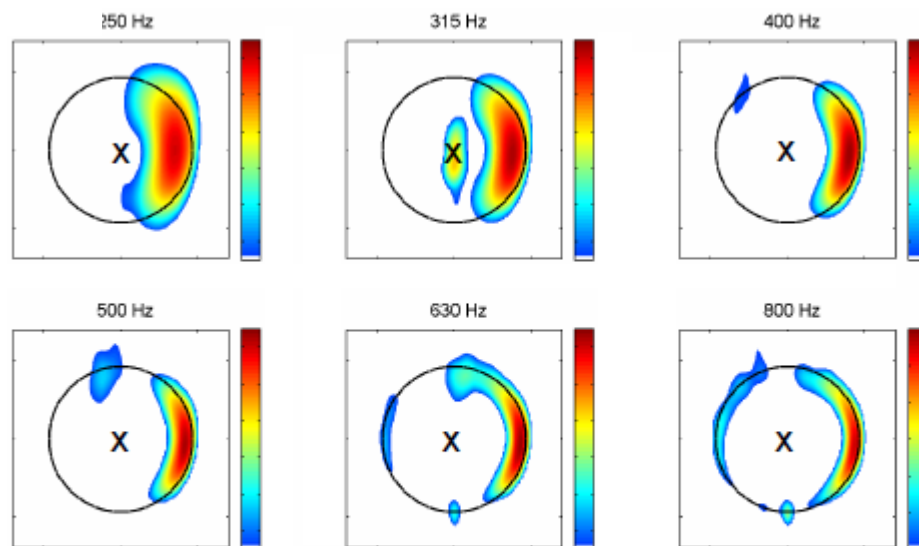


Figure 8-8: Average stationary source maps for State 2a (clean rotor, upwind array position). The range of the color scale is 12 dB and the maximum is adjusted for each frequency band.

Figure 4 Cavitation behind a propeller in water [www1]

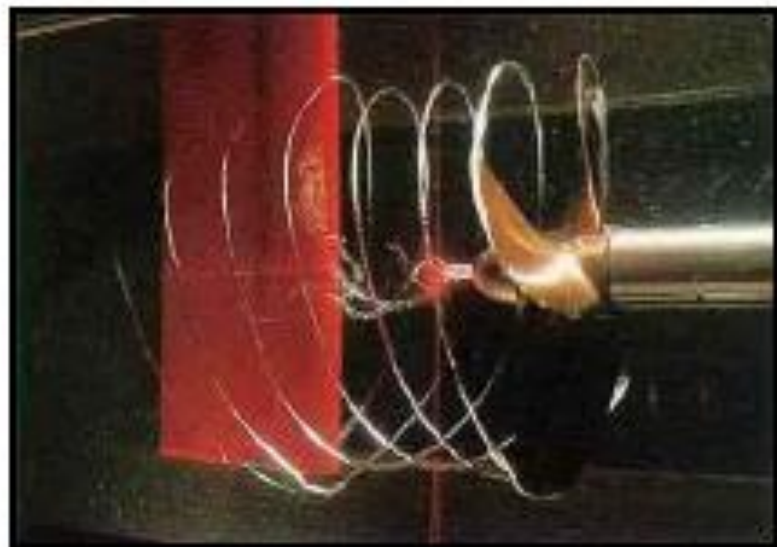


Figure 5 A trace from one blade of a wind turbine



Findings or conclusions of the report

23. Were the wind farms audible at the complainants' houses? So if audible, could you have described a correlation between audible noise and distress?
24. The participants in your study published a press release on an anti-wind group website, in which they state "Our diaries and the concurrent full spectrum acoustic measurements inside and outside our homes clearly demonstrate that it is the operation of the wind facility correlating with our symptoms". According an article in The Australian, you are quoted as declaring a 'cause and effect' relationship between wind turbine operation and health impacts. Do the contents of your study agree with your quotations in The Australian, or the media release from the residents?

The Australian on 21 January 2015 indicates that I had said:

Mr Cooper said it was the first time that sensation rather than audible noise had been used as an indicator of residents' perception of nearby wind turbines.

Mr Cooper said the findings were consistent with research into health impacts from early model wind turbines conducted in the US more than 20 years ago.

Mr Cooper said the findings had totally discounted the so-called "nocebo" effect put forward by some public health officials, who said symptoms were the result of concerns about the possibility of experiencing them.

Mr Cooper said residents' threshold of sensations were experienced at narrow band sound pressure levels of four to five hertz at above 50 decibels.

Mr Cooper said an earlier investigation into health impacts of wind farms by the South Australian EPA had been flawed by limiting the study to only one-third octave bands and not looking at narrow band analysis.

"By looking at high sensation and narrow band I have developed a methodology to undertake assessments using narrow band infrasound. We now have a basis on how to start the medical studies" he said.

Mr Cooper said Pacific Hydro should be commended for allowing the work to proceed.

"It is the first time ever in the world that a wind farm has co-operated with a study including shutting down its operations completely," he said.

The following day the Australian ran another article.

Attributed to Mr Marsh is the quote:

Noise measurements had been taken at just three houses and a small number of self-nominated people participated who had previously made complaints about the wind farm's operation," Mr Marsh said.

He said the report's author, acoustics expert Steven Cooper, "believes he has discovered a link between 'sensations' felt by the participants and the operation of the wind turbines".

"However, a number of these 'sensations' were reported when the wind turbines were not operating," Mr Marsh said.

What was attributed to me was:

Mr Cooper said wind farm owner Pacific Hydro had limited the study to three houses and the brief was to measure noise and vibration and see if the complaints from residents could be related to specific wind conditions or noise levels.

"The study was required to work backwards from the resident's observations and see what wind or noise levels agreed with the complaint," Mr Cooper said. "I don't think you can get any more objective than that."

Mr Cooper said simple monitoring of each house had cost about \$40,000 and complex monitoring with multiple microphones and vibration detectors was \$100,000. On-site monitoring of the turbines had cost a further \$40,000.

Some sensations and vibration impact had been reported when the turbines were not operating. But Mr Cooper said this was due to vibration of the blades and towers when they were subjected to wind gusts.

On 23 January The Australian ran another article “Noise specialist cheers wind farm report”

The “quotes” provided are:

In his report, Mr Cooper said the residents’ observations “indicates that the major source of complaint from the operation of the turbines would appear to be related to sensation rather than noise or vibration”.

Mr Cooper said the results were in line with studies in the US on early-model wind turbines and appeared to be the result of instability of the turbine blades, which did not have free air flowing over them.

Due to the small number of residents surveyed, Mr Cooper and the company said, more testing was required.

Pacific Hydro has said that it did not accept Mr Cooper’s findings that a “cause and effect” had been established between wind-farm performance and resident complaints.

So the actual facts are that I never said or was I quoted in The Australian as declaring a “cause and effect’ relationship. Pacific Hydro made the quote that appears in The Australian. A global search of my report could not find the phrase “cause and effect”.

Findings or conclusions of the report

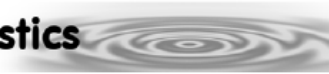
25. One statement published in the Portland Observer by the study participants said "our diaries and the concurrent full spectrum acoustic measurements inside and outside our homes clearly demonstrate that it is the operation of the wind facility correlating with our symptoms." (23/1/15) What is your comment on that statement as it relates to your report? Is there a correlation?
26. Your 'multi-channel acquisition' system, with which you measure your 'wind turbine signature', was, as you state in your report on Page 27, only at an occupied house for four nights out of an eight week study period. This is only 7% of the period, and it is these four nights on which your major conclusions are based. Is this enough data to state conclusively, as you have in an article in The Australian, that there is a cause and effect relationship between physiological symptoms and the operation of the wind farm?

Findings or conclusions of the report

27. It is common practice in scientific studies to use measures of statistical significance when determining correlations and causal relationships. Why did you choose to reject any measure of statistical significance in this study? Would you be willing to make full data sets available, to enable others to perform statistical tests on your data?
28. It is noted from the study that all the low frequency and infrasound measurements were found to be below the recognized human thresholds of perception, therefore how could the residents be 'sensing' the emissions from the wind turbines?

Findings or conclusions of the report

29. As the level of 'unacceptable presence of sensation' inside a dwelling is specific only to the residents in question, according to their subjective observations - therefore is it true that the use of Wind Turbine Signature could never be extrapolated beyond the specific individuals involved in determining it?
30. A study released by Health Canada a few months ago found no link between wind turbine operation and human health impacts. It involved 1,238 residences, 4,000 hours of acoustic data, objective and subjective health measures, a peer-reviewed published methodology, measures of statistical significance, a randomly selected sample, 17 different wind turbine models, two provinces, 24 government, academic and industry experts and 4 international advisors. Are you aware of this study, and would you say that your report is of higher or lower scientific accuracy than the Health Canada research?



**Analysis, Modeling, and Prediction of Infrasound
and Low Frequency Noise from
Wind Turbine Installation**

Phase 2: Southern Ontario Site

Final Report

Please note that, in accordance with the provisions of the Access to Information and Privacy Act these documents have been redacted to protect confidential business information and the identity of study participants.

MG Acoustics
IPF M-50
1200 Montreal Road
Ottawa, Ontario
K1A 0R6

February 2014

I. INTRODUCTION

Analysis, modeling, and prediction of infrasound and low frequency noise from wind turbines at two different sites is to be carried out as part of a study investigating potential health effects for individuals living at varying distances from wind turbine installations.

This work will allow Health Canada to evaluate whether or not infrasound and/or low frequency noise (from wind turbines in the locations specified) can be detected at different distances; and secondly to determine whether the Parabolic Equation method of calculation gives an adequate explanation of the experimental values with regards to infrasound and/low frequency and distances at which it can be detected. Thirdly, the work being completed will allow Health Canada to reliably make infrasound and low frequency noise predictions (using Harmonoise) with respect to the southern Ontario site.

X. CONCLUDING REMARKS

Separating low-frequency wind turbine noise from the ambient background noise is a non-trivial challenge. The spectra of both are similar, rising at about 6 dB per octave as frequency decreases. As well, the overall level of both wind turbine and background noise increase in proportion to the wind speed. The only signals that can be unequivocally ascribed to the wind turbines are harmonically-related spectral peaks synchronous with the periodic passage of the turbine blades. Our propagation calculations have focused on these spectral peaks.

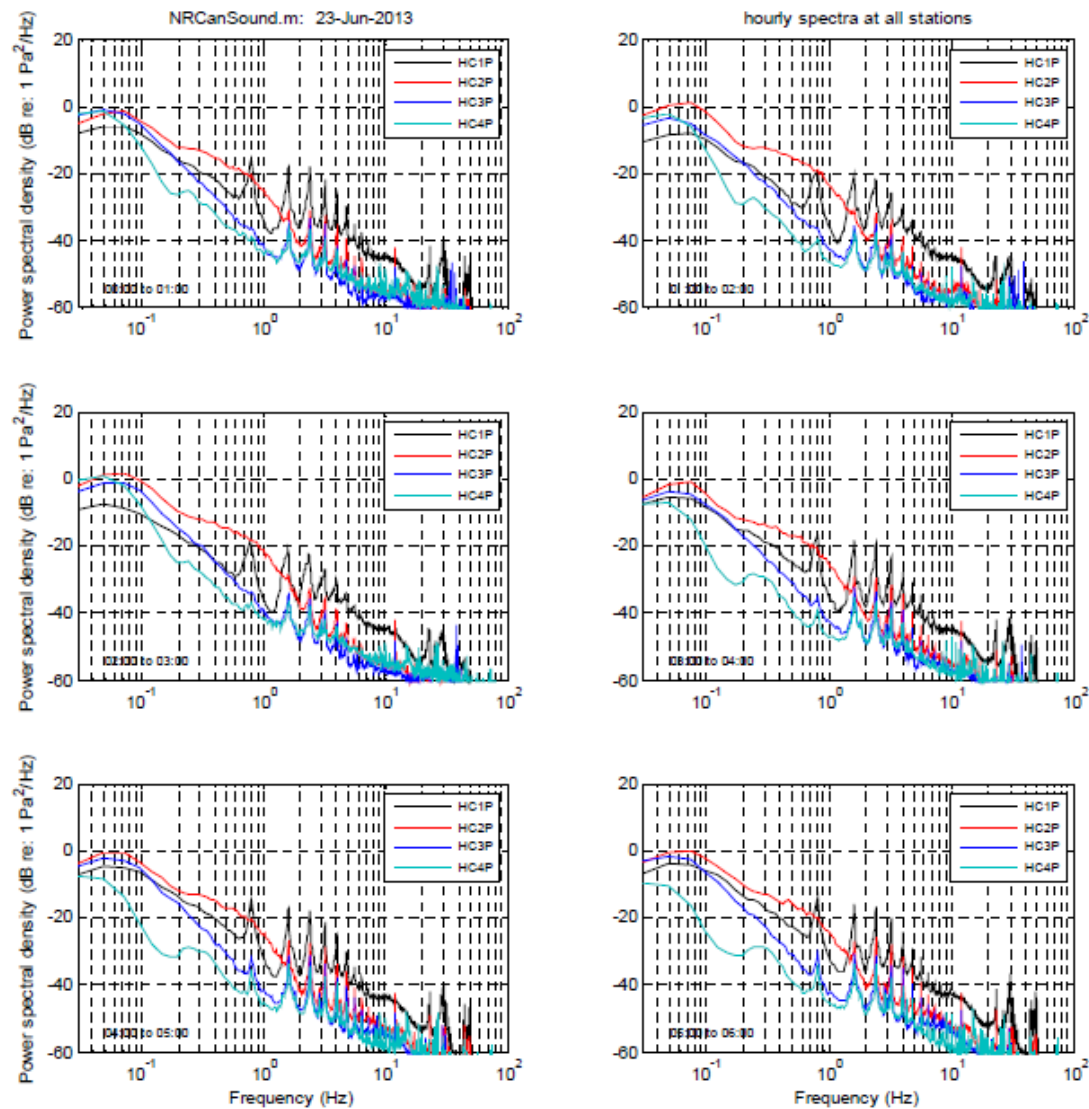


FIG. 12. Sample spectra obtained from the four measurement stations

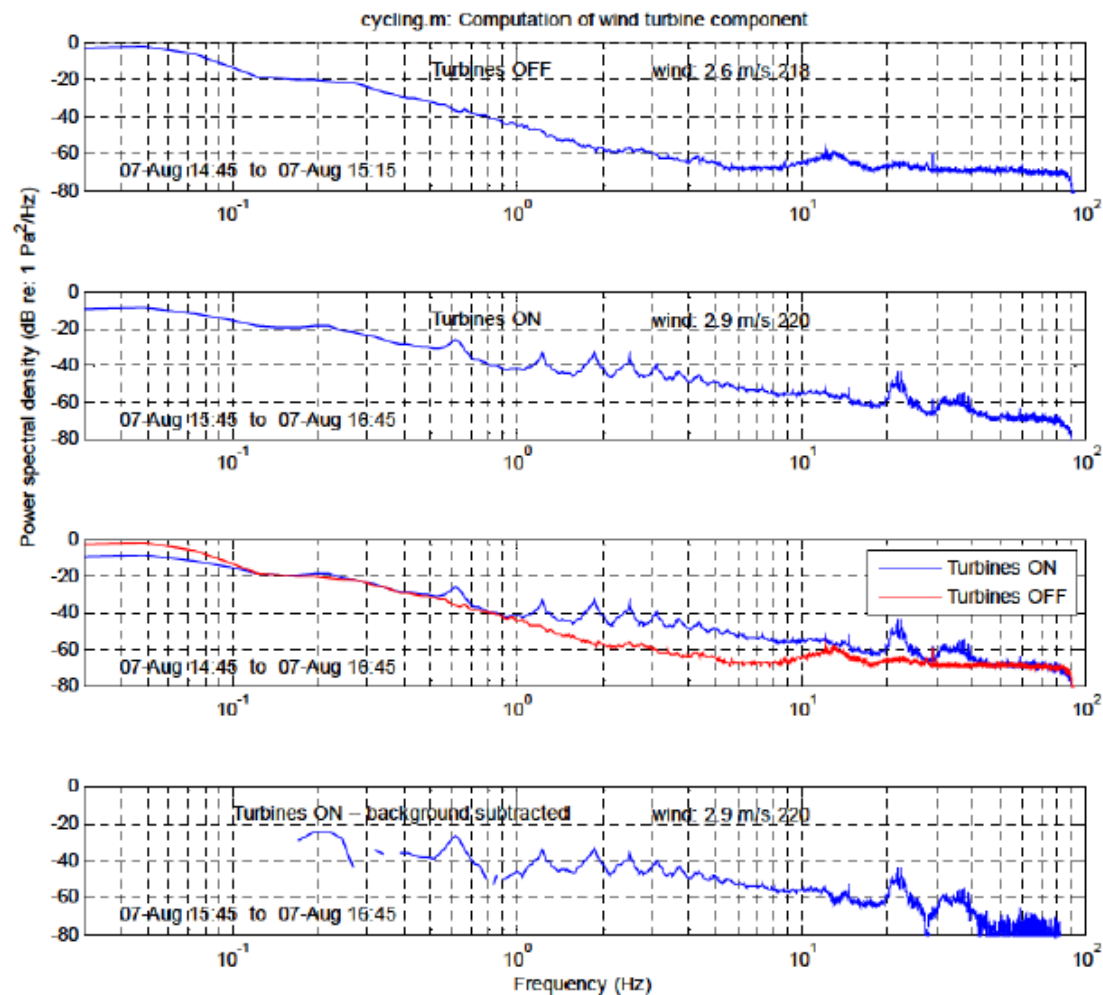


FIG. 29. Comparison of spectra for periods with wind turbines on and off

Summary of Wind Turbine Noise Propagation below 100 Hz

The measurement of sound at very low frequencies, below 100 Hz, is difficult and requires the use of special instruments. In the Wind Turbine Noise & Health Study conducted by Health Canada,, microbarometers were used because they are capable of measuring frequencies between 0.1 Hz and 100 Hz. Microbarometers were installed at distances of 125 m, 2.5 km, 5 km and 10 km from the nearest wind turbine in a [REDACTED] [REDACTED] wind turbines.

The noise levels from a wind turbine can and has been predicted using mathematical models. However, commercially available software that is in general use today cannot be used for very low frequencies and long distances. For example, the calculation procedure published by the International Standards Organization (ISO) is not intended to be used for frequencies below 63 Hz. Further, the ISO procedure was not originally intended to be used for distances greater than 1 km or for sources as high as modern day wind turbines (in this study, [REDACTED] m hub heights).

One of the main challenges found in this study related to measurement of wind turbine noise below 100 Hz was separating the wind turbine noise from the ambient background noise. The ambient background noise is comprised of noise generated by man-made sources, such as highway traffic, trains, aircraft, and industry, and by naturally-occurring sources including surf-generated infrasound noise. The separation was only possible when the measured spectra showed the characteristic peaks related to the blade passage frequency as discussed above.

Figure 3 shows noise generated by a wind turbine clearly evident above the ambient background. The red peaks are the infrasonic frequencies between 0.8 Hz and 8.0 Hz produced by the [REDACTED] wind turbines. They are an example measured by the microbarometer at a distance of 2.5 km during one night. The blue line is the ambient background noise. Observe that the blade passage frequency of 0.8 Hz is just evident above the ambient background noise around this frequency.

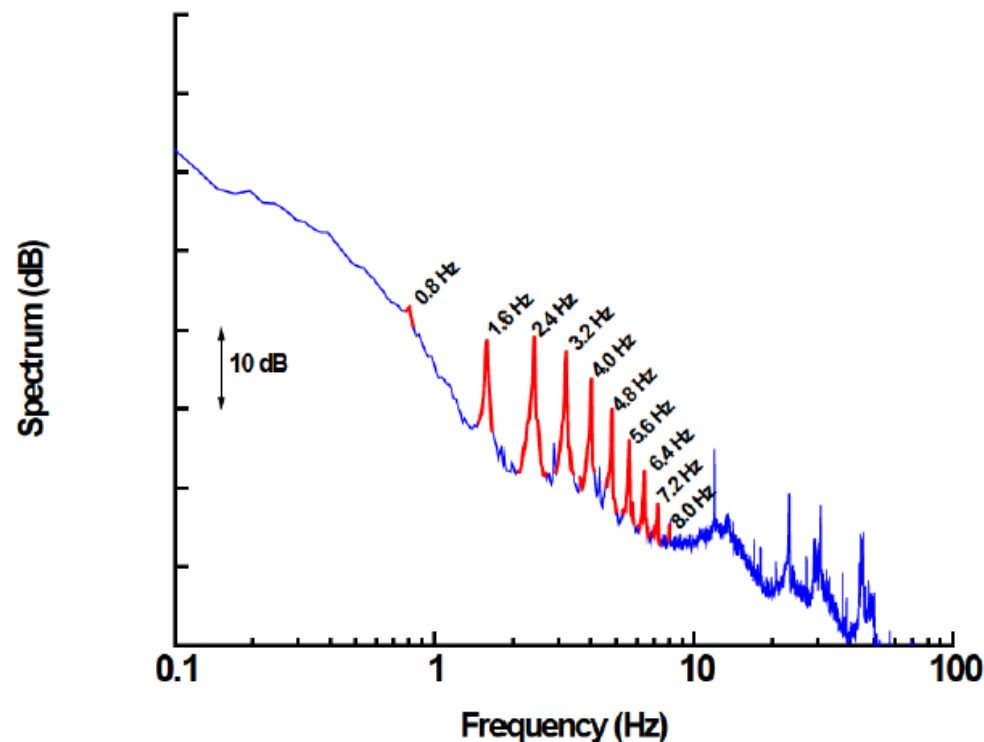
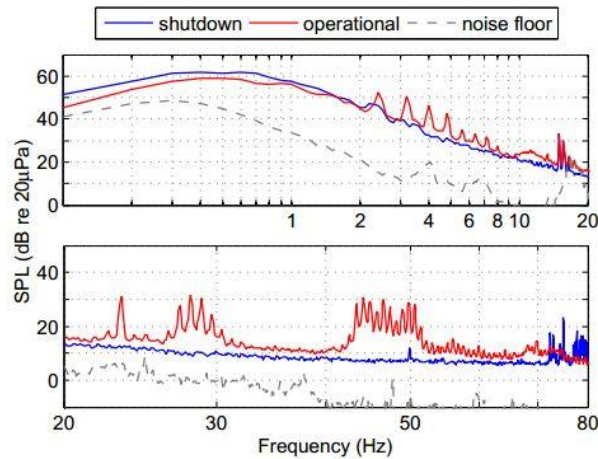


Figure 3. Spectrum measured by the microbarometer at 2.5 km during one night from the [REDACTED] PEI wind turbines. The red peaks are the infrasonic frequencies generated by the turbines. The blue line is the ambient background noise.

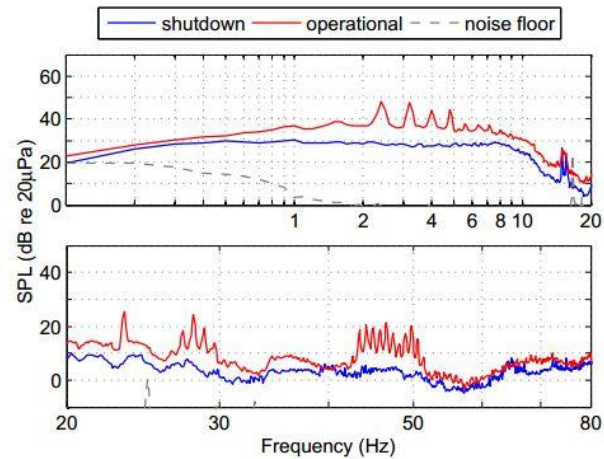
One outcome of this study is a general idea of how often wind turbine noise below 100 Hz is likely to be measured up to a distance of 10 km. Weather observations published by Environment Canada were monitored for an entire year. The weather observations were classified in terms of wind speed and daytime and nighttime cloud cover. For example, in 2013 at one weather station, nighttime inversion conditions occurred about 45% of the time (or 3942 hours out of 8760 hours). Thus, taking into account wind speed and direction, infrasonic frequencies from wind turbines are likely to be measured fairly often at distances up to 10 km, and even beyond.

In conclusion, measuring wind turbine noise below 100 Hz requires special equipment. The ability to measure wind turbine noise depends strongly on the prevailing weather conditions and the ambient background noise, especially at large distances. Further, it was found that wind turbine noise below 100 Hz can be predicted with accuracy down to a frequency of 1.6 Hz and up to distances of 10 km using on-site weather station measurements.

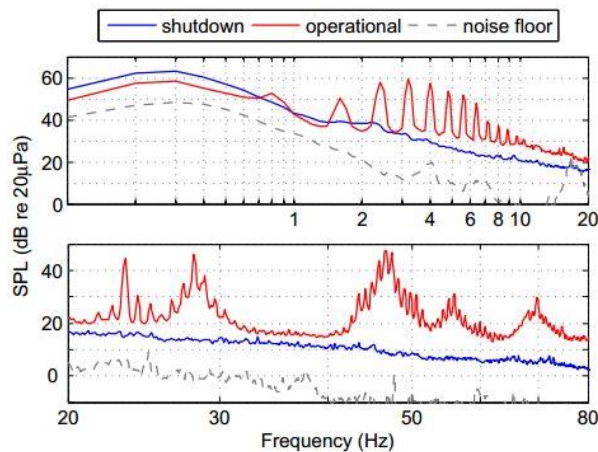
Adelaide University



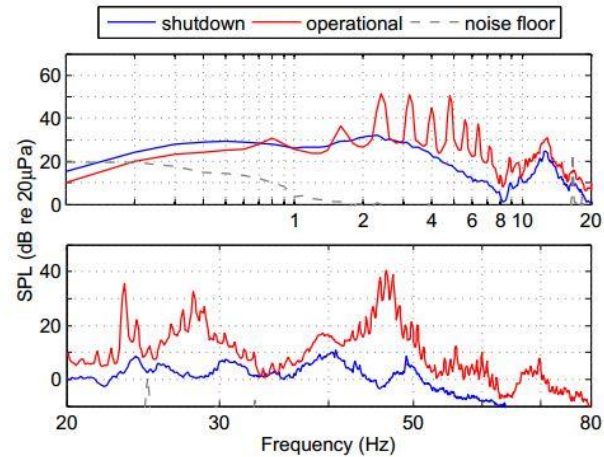
(c) Outdoor spectra - House 2 (ON 10/6, 4:40; OFF 10/6, 5:40)



(d) Indoor spectra - House 2 (ON 10/6, 4:40; OFF 10/6, 5:40)



(e) Outdoor spectra - House 3 (ON 29/7, 3:25; OFF 26/7, 1:55)



(f) Indoor spectra - House 3 (ON 29/7, 3:25; OFF 26/7, 1:55)

Reference
31

Figure 6 – Comparison of outdoor and indoor narrow-band spectra with local wind conditions similar to wind farm shutdown conditions

Environmental and Workplace Health

Wind Turbine Noise and Health Study: Summary of Results

Preliminary Research Findings²

Health Canada has completed its preliminary analysis of the data obtained. Research findings are presented below in accordance with the study component in which they were obtained i.e. in-person, self-report questionnaire findings, objectively measured responses, and noise measurements and calculations. As with other studies of this nature, a number of limitations and considerations apply to the study findings including:

- results may not be generalized to areas beyond the sample as the wind turbine locations in this study were not randomly selected from all possible sites operating in Canada;
- results do not permit any conclusions about causality; and,
- results should be considered in the context of all published peer-reviewed literature on the subject.

The following was found to be statistically associated with increasing levels of WTN:

- annoyance towards several wind turbine features (i.e. noise, shadow flicker, blinking lights, vibrations, and visual impacts).

5.3 Annoyance and Health

- WTN annoyance was found to be statistically related to several self-reported health effects including, but not limited to, blood pressure, migraines, tinnitus, dizziness, scores on the PSQI, and perceived stress.
- WTN annoyance was found to be statistically related to measured hair cortisol, systolic and diastolic blood pressure.
- The above associations for self-reported and measured health endpoints were not dependent on the particular levels of noise, or particular distances from the turbines, and were also observed in many cases for road traffic noise annoyance.
- Although Health Canada has no way of knowing whether these conditions may have either pre-dated, and/or are possibly exacerbated by, exposure to wind turbines, the findings support a potential link between long term high annoyance and health.
- Findings suggest that health and well-being effects may be partially related to activities that influence community annoyance, over and above exposure to wind turbines.

3. Infrasound

Long-term measurements over a period of 1 year were also conducted in relation to infrasound levels.

- Infrasound from wind turbines could sometimes be measured at distances up to 10km from the wind turbines, but was in many cases below background infrasound levels.
- The levels were found to decrease with increasing distance from the wind turbine at a rate of 3dB per doubling of distance beyond 1km, downwind from a wind turbine.
- The levels of infrasound measured near the base of the turbine were around the threshold of audibility that has been reported for about 1% of people that have the most sensitive hearing.

Due to the large volume of acoustical data, including that related to infrasound, analysis will continue over subsequent months with additional results being released at the earliest opportunity throughout 2015.



Preliminary report to public

Actual source document

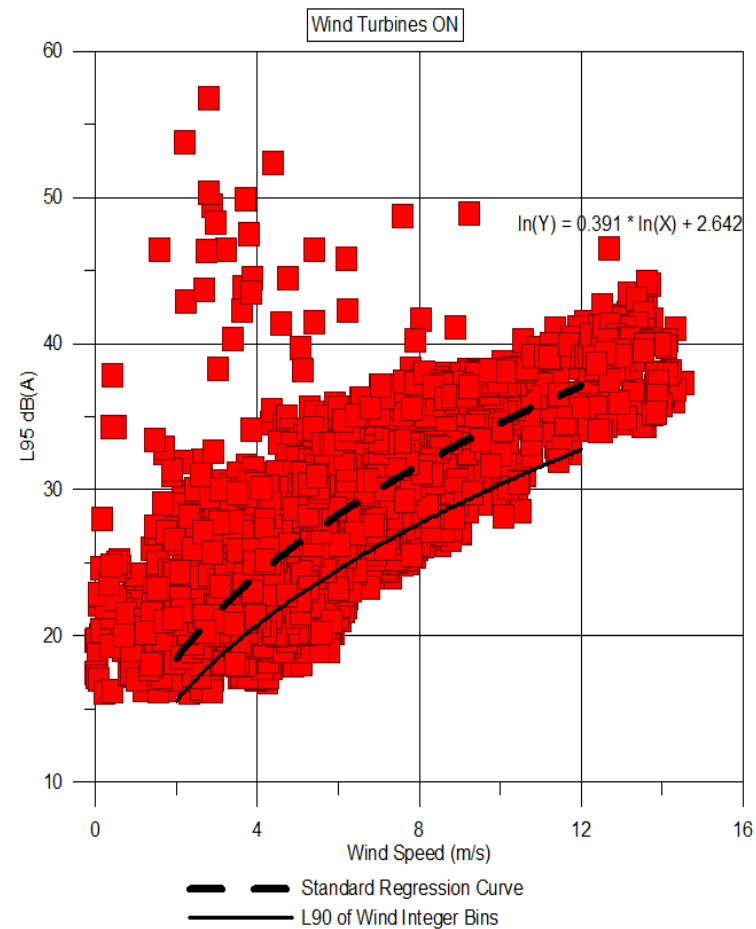
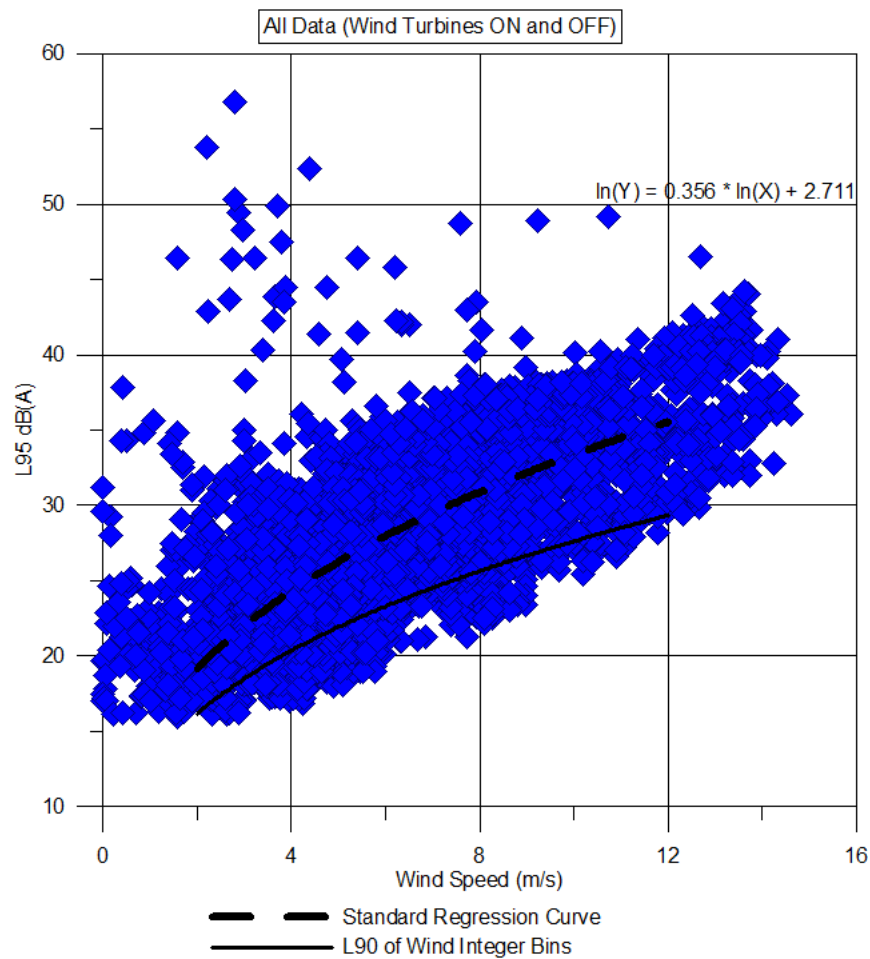


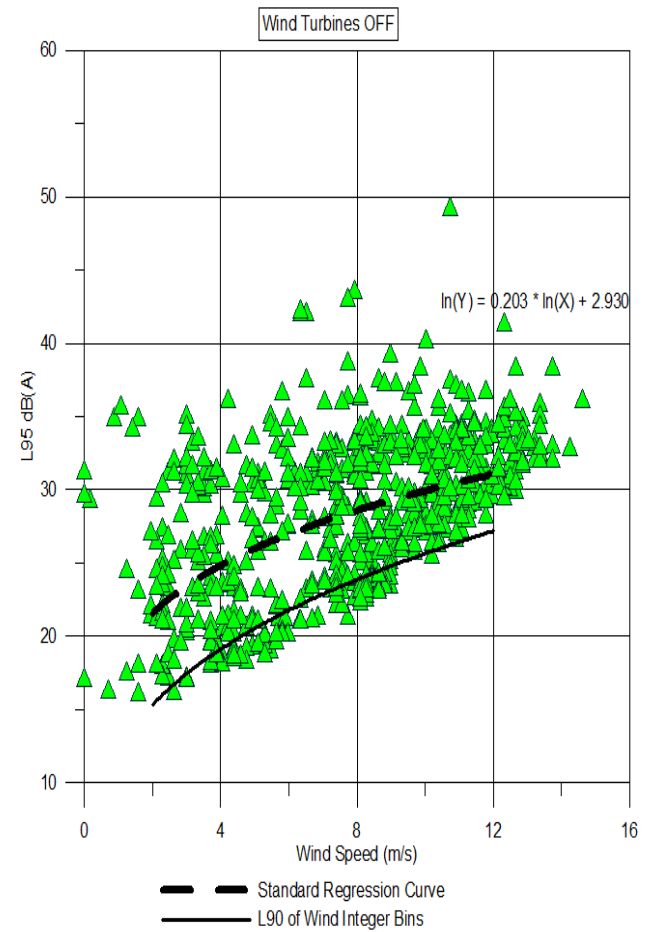
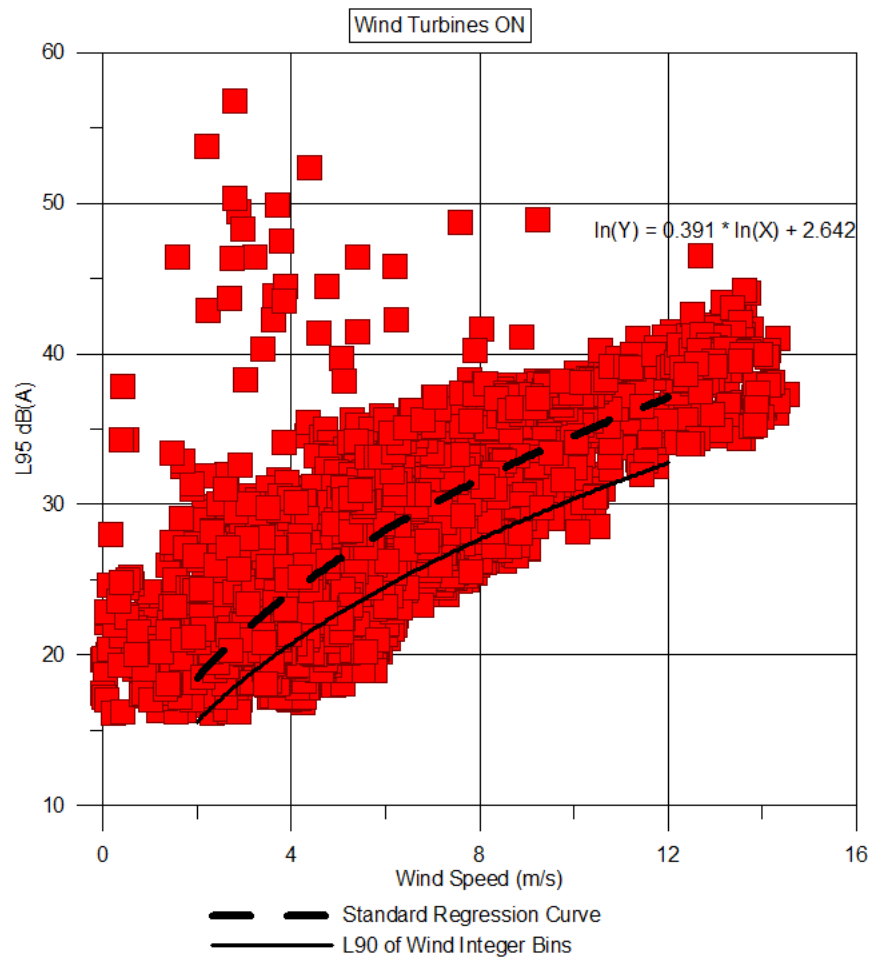
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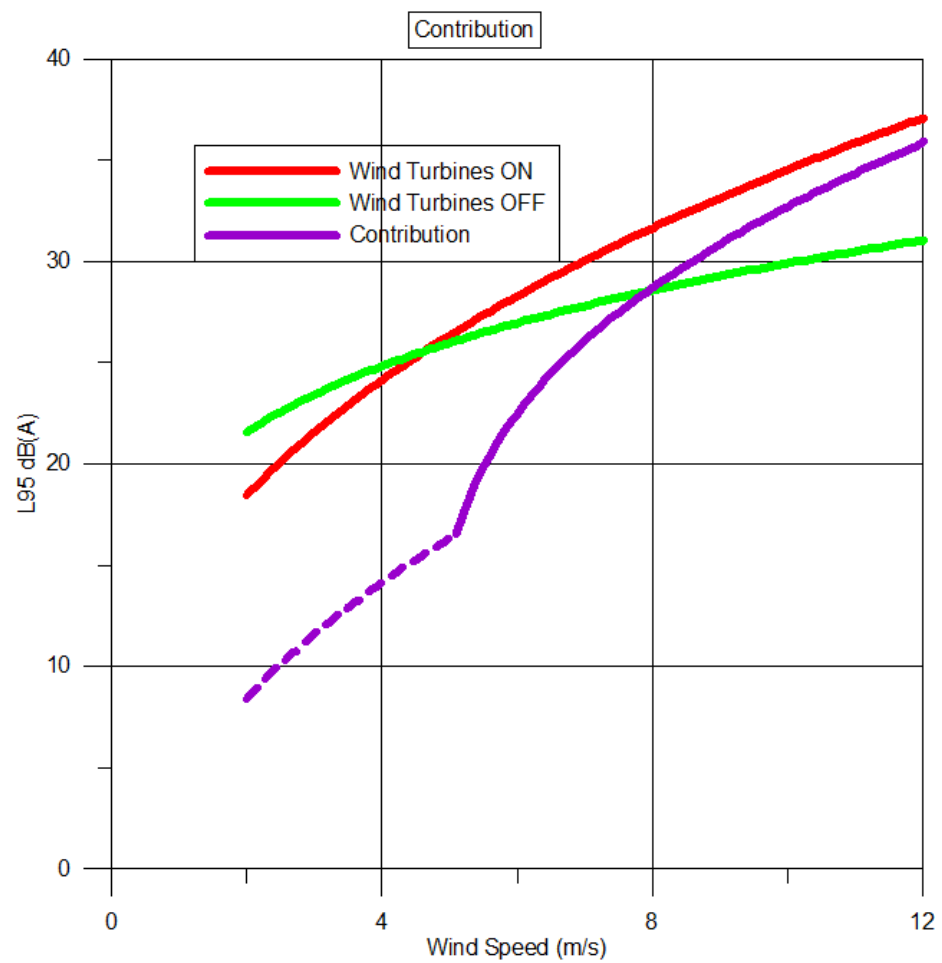
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***Questions pertaining to current or future noise
guidelines or regulations***

31. Could Professor Cooper expand on the inadequacies of the arguments on which the current noise guidelines are based?







Questions pertaining to current or future noise guidelines or regulations

33. The significant effects of turbines of this size are very concerning and no doubt very problematic for the residents of Cape Bridgewater and those living near other wind projects. New regulations now allow turbines to be built to any size. How do you think these effects will change when turbines are, for example, 4 or 5 MW and 200 metres high or even larger?

Questions pertaining to current or future noise guidelines or regulations

34. The on-off testing clearly shows the (WTS) signature to be coming from the turbines. Does this have implications for changes to international turbine noise measurement standards especially given that the current standards were created nearly 2 decades ago?
35. As a Cape Bridgewater resident of House 87 I ask the following: From your report can you derive a separation distance for wind turbines from homes based on sensation? For our three homes which were the subject of this study, what should those separation distances be? Given the severity of your findings from the testing at Cape Bridgewater would you accept that living permanently exposed to the reported conditions is a hazard?

Questions pertaining to current or future noise guidelines or regulations

36. Do you think your study's results justify a change in Victorian noise pollution guidelines?

Questions pertaining to current or future noise guidelines or regulations

38. By the use of dB(WTS) obtained in the study can you predict or calculate a separation distance which will agree or approximate with Sensation 2? If so, please provide an example.

Response to report

39. Mr Cooper's Acoustic Report identifies the specific brief for the Project yet Press Statements by the Wind Industry referred to a different type of Study. WHY? Please explain.

Next steps or further study

43. In view of the results of Mr Coopers study with a small specific number of impacted residents, would it be possible for him to comment on the idea that a wider assessment in terms of a larger area/ number of turbines /residents re the Wind Turbine Signature is likely to produce a more comprehensive result especially related to the topography of the area out to 5 km and 10 km.