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640 10127 Response to Community 20141219.docx

Union Fenosa Wind Australia Pty Ltd
Suite 4.03, 68 York Street
Sydney NSW 2000

Attention: Shaq Mohajerani

Dear Shaq

Paling Yards Wind Farm
Response to Community

SLR Consulting Australia Pty Ltd (SLR) is the acoustic consultant for Paling Yards Wind Farm and has prepared the noise impact assessment report for the project (Report No 640.10127-R1-R3)

Submission 098565

Issue: Thumping and beating turbines

This submission has made a lengthy case with respect to thumping and beating turbines. The phenomenon described is one of excessive amplitude modulation. There has been extensive and wide ranging study conducted by Renewable UK, which attempts to more accurately explain the phenomenon, its potential causes and highlights the difficulties in quantifying the phenomenon – particularly when there is appreciable distance between the turbines and the receiver.

The submission implies that infrasound is similar to (or related to) the amplitude modulation of audible sound. This is a common misconception, especially as both terms use 'Hertz' as their unit of measurement. In an effort to clarify the situation, we provide the following advice:

'Amplitude modulation' refers to the fluctuations of the overall (usually A-weighted) noise level. This fluctuation has its own frequency of modulation, which is usually at the blade pass frequency of the WTG, typically between 0.5 and 2 Hz. This is not an indication of the low frequency characteristics of the noise but a rate of change in overall loudness.

The 'beating' phenomenon is not synonymous with the 'thump' identified earlier and instead refers to where two or more sources have similar (but slightly differing) frequencies. For constant, pure tone noise sources, the small difference in frequency makes the overall noise level vary with a 'beat'. This phenomenon does not occur with broadband sources. WTG's are an inherently varying noise source, with their own rate or variation, which could be said to have its own 'beat'. Therefore the beat frequency referred to relates to where the variation in noise level from one WTG occurs at almost the same rate as another WTG and the two sources are at a maximum at the same time. How often this alignment occurs is the 'frequency of occurrence' but could also be called a 'beat frequency'. The alignment becomes less likely with an increasing number of turbines. With the natural variation of wind conditions on site, the alignment of turbines becomes increasingly unlikely as the rotational frequencies and phase differences between all the WTGs themselves are varying in nature.

Where the degree of amplitude modulation is typical, the overall degree modulation does not change with phase alignment of the two noise level waveforms. This is because the 'trough' of the waveform is also energetically summed, leading to an overall net increase in level, rather than an increase in the variation of the noise level. Furthermore, as the phase alignment between two noise level waveforms occurs only briefly, the increase in noise is momentary. As the waveforms shift to be out of phase, the noise level becomes more constant and almost does not modulate at all.

The claim that the NHMRC study, based on 10 WTGs is invalid does not reflect the true nature of large scale wind farm sites. Because of the offsets required between WTGs to get maximum output, the site takes up a very large area. This means that noise at a single location is mostly only due to the closest 6 to 10 turbines. The WTGs at greater distances contribute to the overall noise level but their variation of noise level does not contribute to the overall amplitude modulation.

Finally, should conditions that increase the prevalence of excessive amplitude modulation occur, it would be possible to implement an adaptive management approach where turbines are put into a noise optimised mode during identified times and conditions (sector management).

Submission 098743

Issue: Noise up to a 10km radius

The claim that wind turbines can be heard "for up to a 10 km radius" is potentially misleading. The noise modelling indicates that at distances greater than 5 km, the wind farm when operating at full capacity will be less than 20 dBA. This would typically be significant below background noise for such wind conditions and likely be inaudible. The measure of noise impact from wind farms is not inaudibility but comparison to a limit derived from annoyance studies.

Issue: Impact on fauna

No noise impact has been determined for native fauna as the assessment guideline is intended solely for assessing impacts to humans, however we note that no impact to fauna is anticipated as wind farm noise levels will be lower than many existing noise sources.

Submission 098819

Issue: Number of turbines

The objection regarding the final number of WTGs falling between 55 and 60 in number is not correct. The original noise impact assessment was carried out with up to 59 WTGs which is generally more conservative than the final EIS main report that includes up to 55 WTGs of those locations (excluding turbines P2, P6, P7 and P11 that were removed from the layout due to ecological considerations).The current proposed design is indicative and if there are any significant changes to the layout, a revised noise impact assessment with the final layout and specific WTG model types would be prepared to ensure that the noise limits are being met.

Issue: Humming noise

The concern relating to any 'hum' from the wind farm would likely be due to transformer infrastructure on site. Wind Turbines typically do not hum and produce a broadband noise which is typically 'masked' by local, natural noise sources such as wind in trees. When there is absolutely no wind the wind farm would not operate, making it inaudible. At other times the wind farm may be slightly audible, or even audible but not so high above the background noise to make it intrusive. At times when the wind farm is audible, the noise predictions have determined that the level of noise would not be unacceptably high. The challenge to produce transparent, accessible data does not recognise the diligent work that has already been conducted to quantify noise levels. The noise impact assessment is a comprehensive document that describes site measurements to establish existing noise levels across the site, predictions of noise levels at all relevant residential receptors at all relevant wind speeds and produces a noise contour plot for graphical visualisation purposes. The report considers the prevalence of conditions that may enhance propagation of noise and explains how our modelling uses inputs regarding the frequencies of noise generated and makes conservative (worst case) assumptions, in line with current best practice for wind farms.

Submission 098922

Issue: Buffer distance

The submission makes a claim that there is no buffer distance between them and the wind turbines but states that their property is located up to 5 kilometres from the proposed Wind Farm site. This distance of 5 km between the submitter and the wind farm would greatly reduce the noise exposure to the dwelling.

Concerns about 'thumping' turbines have been addressed in the noise impact assessment (Section 10.2.3), an excerpt of which follows:

> *"Research evidence would suggest that excessive AM has only been confirmed at a small number of wind farm sites and when it occurs it is relatively infrequent. Nevertheless, should excessive AM be found to be a problem with the wind farm, it would be possible to limit the impact on the residents through adaptive management techniques."*

Furthermore, it is unlikely that at a distance of several kilometres that the degree of amplitude modulation would be above acceptable limits as the noise level would already be close to or below ambient background masking noise.

Submission 099004

Issue: Noise impact

With regards to the audibility of the wind farm, we cannot guarantee that wind farms will be inaudible at all times at all locations or under all meteorological conditions. However, we would stress the importance of distinguishing between audibility and noise impact. In this case, noise impacts are defined as breaching the limits in the SA EPA Guideline. The noise impact assessment under SA EPA Guideline aims to balance the needs of the community and broader society, local residents and the need to develop alternative energy sources. Times when the area is very quiet would probably be when wind speeds are calm or very low. In these conditions, the wind turbines may not be operating at all, due to a minimum cut-in speed required, and the ambient environment may not be any different from that experienced now.

With various wind speeds and directions, meteorological conditions and local sources of noise, quantifying the audibility is impossible, however, we can state that at times when the wind farm is audible, it would most likely be a broadband (non-tonal) and would blend in with naturally occurring noise sources (wind in trees, distant cars etc) and would unlikely be subjectively intrusive.

Submission 099006

Issue: Noise impact

With regards to the 'potential' audibility of the wind farm, it is difficult to characterise or quantify this without visiting the site. The noise level is predicted to be below 30 dBA, this is a reasonably low level of sound, which may be 'masked' by the noise of wind in trees or other foliage. Should the wind farm be audible at times, due to local background noise sources being low, then the maximum predicted level is still 5 dBA below the minimum criteria of 35 dBA and would not be deemed intrusive or annoying. Wind turbine noise is a typically broadband (non-tonal) source and is variable with wind conditions.

Issue: Health impact

With regards to health impacts, the statement has used provides:*"…We reject the proposal due to potential issues caused to health due to their existence…"*The rhetoric surrounding wind farm noise contends that inaudible noise can have an effect on health; there is no scientific evidence to show that this is the case. If the existence of the wind farm is what causes the ill-health, and not an emission of noise from it, then the health impacts are due to the nocebo effect.

There is no statistical evidence that wind farms affect rates of epilepsy, tinnitus or imbalance in exposed populations. With regards to wind from north and north-westerly directions, the noise model assumes downwind propagation from all sources to the receiver, a situation that would not actually occur but is assumed for conservatism. The predicted noise level when winds were lower or when wind was blowing in another direction would be lower than those shown in the model and would be even more likely to be inaudible.

Submission 099008

Issue: Health impact

With regards to health impacts, we advise that there is no evidence to causally link wind turbines with adverse health effects (National Health and Medical Research Council) as discussed above. This issue is still being studied however in the absence of any demonstrable links between wind turbines and health effects we would recommend that all stakeholders be quite sceptical of claims to the contrary.

We trust this letter addresses all issues raised by the community satisfactorily.

Yours sincerely,

Philip Setton
Project Consultant