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Department of Planning
Sydney
NSW 2000

Dear Department of Planning

**Collector Wind Farm - Modification 1**

I understand that the deadline for submissions concerning the above modification has been extended. Therefore, I am now making this submission.

**I object to the proposed modification.**

This submission is concerned with the proposed change to the length of the turbine blades, and the proposed change to the noise limit.

The change to the length of the turbine blades and the change to the noise limit are connected, as blades of greater length will generate more noise. These two changes, therefore, need to be considered together.

**The change to the length of the turbine blades**

The proponent proposes to change the length of the turbine blades from 56m to 58.5m. This will increase the size of the rotor diameter from 112m to 117m.

The proponent emphasizes that the tip height of each wind turbine will remain the same, at 150m, as the height of the towers will be reduced to ensure this. However, this is not the only consideration. What is in fact important is the increase of the length of the blades.

If the blades are lengthened, the swept area of the rotor increases by a greater proportion than the increase in the length of the blades.

Thus, if the blades increase from 56m to 58.5m, that is an increase of 4.5%. However, such an increase of blade-length leads to an increase of swept area from 9850$m^2$ to 10,751$m^2$ (using the proponent's figures), which is an increase of 9.1%.

An increase in swept area of 9.1% is not insignificant. It will result in a considerable increase in sound energy generated. It is disingenuous of the proponent to refer to this increase as “minor increased rotor swept area” (*Modification Report*, p. 16).

**Increased noise and changes to noise limit**

The proponent claims that the predicted noise levels will remain under 35 dB(A) at all non-involved residences except FF and Z (p. 55).

In relation to this, the proponent is applying for the noise limit to be changed from 35 dB(A) to <u>35 dB(A), or background noise + 5 dB(A), whichever is greater</u>.

At residence FF the noise level is predicted to be 35.9 dB(A). (Appendix H, p. 11)

At residence Z the noise level is predicted to be 36 dB(A). (Appendix H, p. 11)

At residence FF the background noise levels have been calculated to range from 28 dB(A) at 3 m/s to 44 dB(A) at 13 m/s. (Mod. Rep., p. 51)

At residence Z the background noise levels have been calculated to range from 22 dB(A) at 3 m/s to 43 dB(A) at 13 m/s. (Mod. Rep., p. 51)

These background noise levels imply the following new noise limits, calculated as 35 dB(A) or background noise + 5 dB(A), whichever is greater:

FF: 35 dB(A) at 3 m/s up to 49 dB(A) at 13 m/s. (Mod. Rep., p. 51)

Z: 35 dB(A) at 3 m/s up to 48 dB(A) at 13 m/s. (Mod. Rep., p. 51)

It is obvious that the new noise limits would be very far above predicted noise levels in the higher reaches of the wind speed, when the turbines would be operating at or near full capacity, and making most noise.

Since the new noise limits would permit noise levels at FF up to 49 dB(A), and noise levels at Z up to 48 dB(A), clearly it is vital that the actual noise levels do not exceed the noise consultant’s predictions (35.9 dB(A) for FF, and 36 dB(A) for Z). But it is hard to have any confidence that this will be so.

**Causes for concern**

**Background noise + 5 dB(A)**

1. In rural NSW actual background noise in the evening and at night can fall to as low a level as 18-20 dB(A). 5 dB(A) above background noise in this circumstance would be 23-25 dB(A). The conditions of consent would ignore this, as 35 dB(A) would be set as the minimum noise limit. This in itself would be undesirable, since 35 dB(A) would be 17 dB above a background noise level of 18 dB(A), and 15 dB above a background noise level of 20 dB(A). It is commonly accepted that any noise level of 5 dB above background noise is unacceptable. Levels that are 15 or 17 dB above background noise would be intolerable.

But what would be far worse would be permitted noise levels up to 48 dB(A) or 49 dB(A). 48 dB(A) is 28 dB above a background noise level of 20 dB(A); 49 dB(A) is 29 dB above a background noise level of 20 dB(A).

It should be remembered that in the higher frequency range where dB(A) are applicable an increase of 5 dB means that the perceived noise is twice as loud. An increase of 10 dB means that the perceived noise is 4 times as loud. An increase of 15 dB means that the perceived noise is 8 times as loud.

If the actual noise level were to reach 49 dB(A), that would be almost 64 times as loud as the background noise level. Occurring at night, it would be impossible to live with.

The above calculations apply to the higher frequencies. In the lower frequency range it only needs an increase of about 3 dB to cause the perceived noise to appear twice as loud.

And, of course, it must be remembered that dB(A) do not measure much mid-frequency noise and all low-frequency noise accurately, as the dB(A) system filters out an increasing proportion of the sound energy below 1000 Hz.

2. The graphs on p. 16 of Appendix H show that the regression line used to mark the “official” background noise level is about 5 dB above the lowest data-points for background noise. Since the official noise limit is calculated to be 5 dB above the regression line, it follows that the noise limit is about 10 dB above the lowest real background noise level. 10 dB above background noise is unacceptable.

The graphs show clearly that the background noise level does in fact fall below 20 dB(A), and that when it does, the noise limit at 3 m/s is 35 dB(A), and at 9 m/s about 40 db(A). This will be intolerable for neighbours.

If the real noise level at night is anywhere near the highest predicted noise level of 35.9 or 36 dB(A), then with a real background noise level of, say, 20 dB(A), the real gap between

background noise and turbine noise could be anything up to 16 dB. This could happen as a result of a high wind speed ratio or temperature inversion (see below). This would be unacceptable to neighbours.

However, the actual noise from the wind farm may be higher than what the noise consultant predicts. See 4. And 5. below.

**Further causes for concern**

1. The noise consultant's calculations take no account of the wind speed ratio. This is the ratio between the wind speed at the turbines and the wind speed at a residence. It commonly happens in hilly country, as at Collector, that the wind at the turbines (on a ridge, say) is much stronger than the wind at a residence. This commonly happens in the evening and at night.

This increases the gap between the level of the noise coming from the turbines, and the level of background noise at the residence. As explained above, as the gap between background noise and turbine noise widens, the noise becomes increasingly intolerable for neighbours.

It is especially undesirable that this is likely to happen in the evening and at night.

2. On the Southern Tablelands temperature inversions are frequent in autumn and winter, and occasionally occur in spring as well. Temperature inversions can cause what is called a stable atmosphere. This is where layers of air near the ground do not mix with higher layers, and a layer of cold air can be trapped nearest to the ground.

Where turbines are set on a ridge, as is planned at Collector, there may be no stable atmosphere on the ridge where the turbines are set, but there may be a stable atmosphere in the valley below where residences are located. In this situation a layer of cold air can pour down from the ridge into the valley, acting as a conduit for the turbine noise.

This is one explanation why turbine noise can be greater at night than during the day. (The other explanation is that background noise is likely to be lower at night.)

The NSW *Industrial Noise Policy* refers to the above situation as "drainage flow", and assumes that it needs to be taken into account, because of the increased noise.

3. The noise consultant does not distinguish between daytime, evening and night-time measurements, and presumably is not obliged to do so by the noise guidelines. This is undesirable, given the fact that turbine noise is commonly louder in the evening and at night.

4. The noise report takes no account of the fact that turbine noise can be increased at a residence, both when (i) there is an array of turbines across the line of sight of a residence, and (ii) when the residence is in line with a line of turbines.

In the first situation sound waves from several turbines can converge on a residence. In the second situation the wakes from several turbines interfere with one another, increasing the final noise level at the residence.

5. No account has been taken of the relationship between increasing the length of the turbine blades and the distance between the turbines.

The NSW government's own *Wind Energy Handbook* (2002) points out that turbines should be 8 rotor diameters apart if the wind is blowing down the line of turbines, and 5 rotor diameters apart if the wind is blowing across the line of turbines.

If the new rotor diameter is to be 117m, then 8 rotor diameters = 936m; 5 rotor diameters = 585m. However, the photomontages on pp. 12 and 14 of Appendix H suggest that most of the turbines of the Collector Wind Farm are no more than about 400m apart. In these circumstances one must expect the noise emissions from the wind farm to be greater than what they would be if one were calculating on the basis of an individual turbine.

One cannot help suspecting that the noise levels from the Collector Wind Farm will be significantly greater than what the noise consultant has predicted.

And if they are, then the new noise limits that are monstrously high will allow that noise to be generated, however disturbing it may be to neighbours.

**Conclusions**

1. Increasing the length of the turbine blades will certainly increase the volume of noise coming from the wind farm.

2. The proposed new noise limit of 35 dB(A), or background noise + 5 dB(A), whichever is greater will not protect neighbours from adverse impacts.

3. The method of calculating the noise limit is itself inadequate, because it does not take into account all the aspects of turbine noise and rural conditions that are relevant.

4. The noise received at neighbours' residences is likely to be greater than what the noise consultant predicts, for various reasons that the noise consultant does not take into account.

**Final note**

I have said nothing about infrasound or about adverse health effects. I should hope that by now the Department of Planning would be willing to take account of the experience of neighbours of existing wind farms in NSW, and of the expert evidence offered to the federal Senate Select Committee on Wind Turbines.

Neighbours of the Gullen Range Wind Farm are already complaining of sleep disturbance from the audible noise from the wind farm. Some neighbours are also already complaining of the kinds of symptoms associated with modulated infrasound and low-frequency noise.

Expert evidence from scientifically and medically qualified persons to the Select Committee has supported the health complaints of wind farm neighbours. It is time for the Department of Planning to take notice of these complaints, and to cease hiding behind the demonstrably inadequate studies of the NHMRC.

If there is one day a Royal Commission into wind farm development in Australia, the planning failure in NSW will be exposed, and the Department of Planning will be held to account.

Yours sincerely

David Brooks

Chairman
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