

Has the placement of turbines in the Jupiter proposal been guided by best practice or desperation?

Wind turbines create wake turbulence. In Annex J, Aeronautical Assessment Report, this wake turbulence created by a wind turbine is of such magnitude, that a zone of influence exists (for the purpose of aircraft activity) of 16D (rotor diameters or 2.016Km) downstream from the turbine rotor.

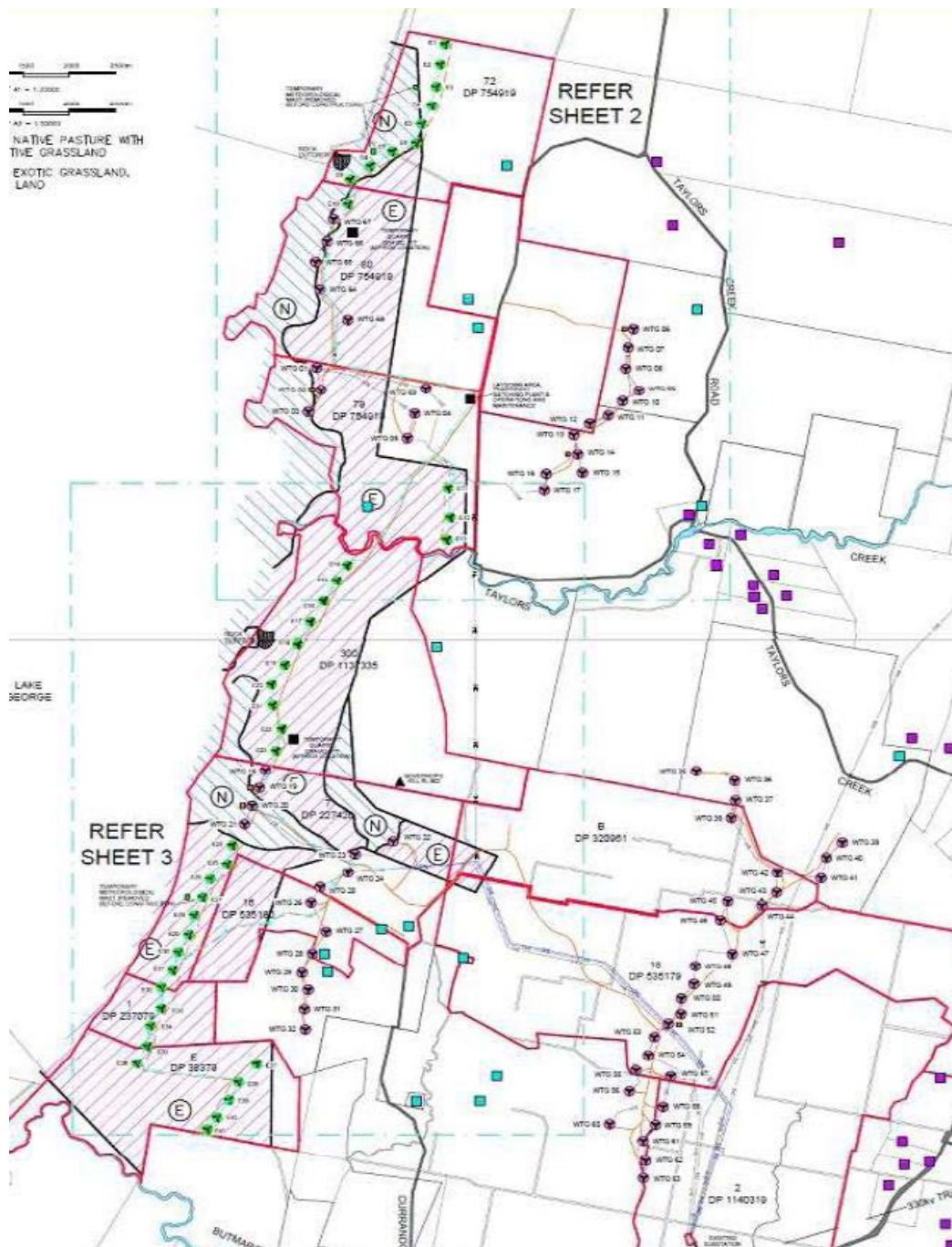
Clearly, for this turbulence to have a causal affect 2km downstream for aircraft, it is of significant magnitude.

The NSW Wind Energy Handbook, on page 53, describes a 5r-8r rule for turbine placement which states:

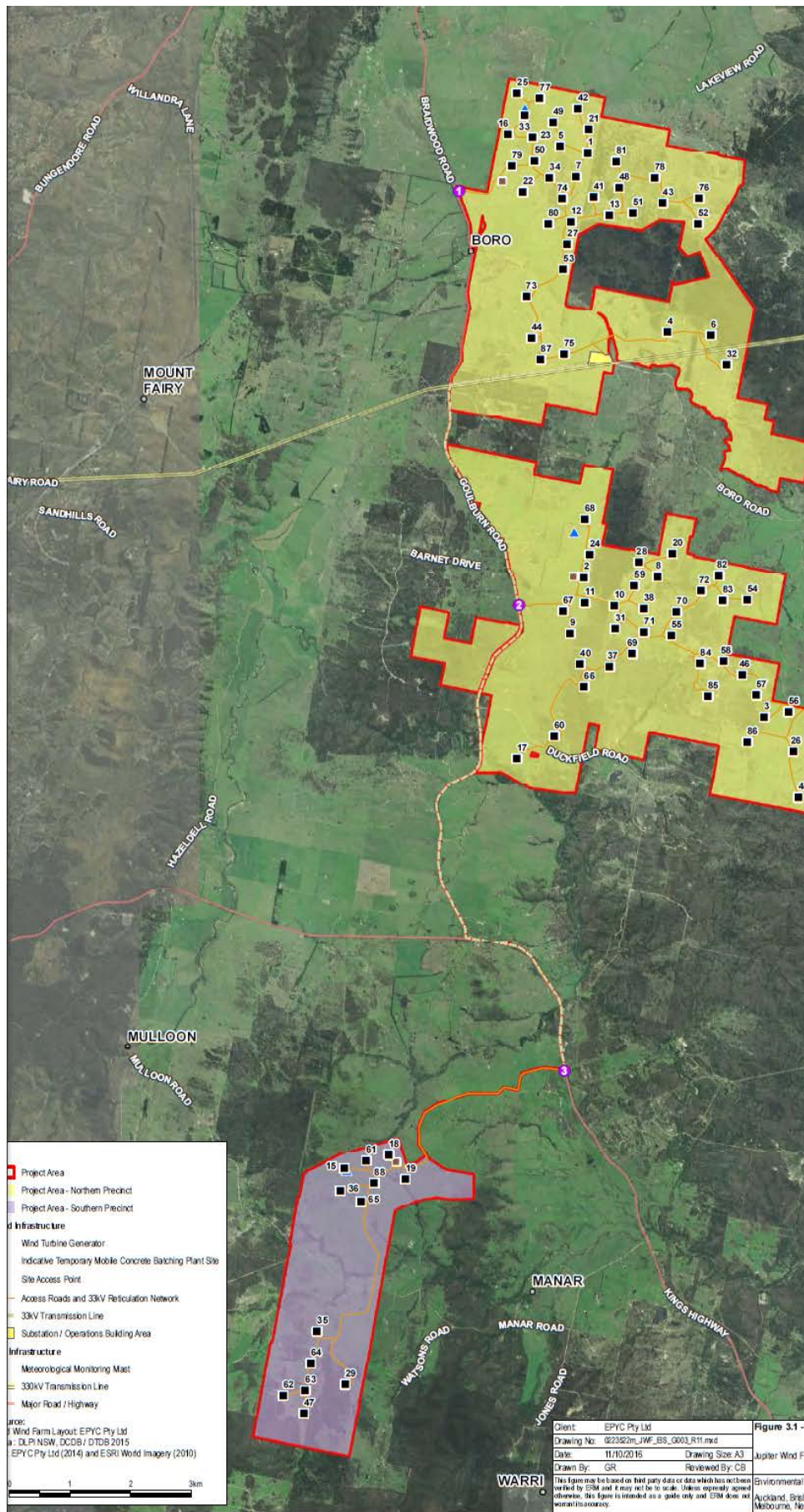
“A wind-farm layout must take into account that turbines have substantial ‘wakes’, which interfere with each other depending on wind direction and spacing. The general rule of thumb for spacing (the ‘5r-8r rule’) is five times rotor diameter abreast and eight times rotor diameter downwind.”

Evidently this is considered to be significant, as it has been given a “must” compliance requirement. Given the prevailing wind for the proposed area is from the WNW, for Jupiter to be designed to comply with this rule, there would need to be a distance of 8D (8x126), or 1008 metres of separation between turbines to allow for this turbulence and the interference between turbines. Note: This allowance does not take into account a number of turbines placed down-wind of each other and the aggregated turbulence from multiple turbines.

When analysing the Capital 1 and 2 layouts (below), it is clear that the general positioning of turbines is in a North-south direction, which places them in a line abreast of the prevailing wind. This is not by chance. Obviously the turbines have been placed in such a way as to ensure they receive a clean prevailing wind, which in turn allows them to operate at their most efficient, both for maximum output, minimum noise and internal wear that occurs through the operation within dirty wind.



However, the Jupiter proposal does not follow this methodology at all. The turbine location and placement is shown below:



In complete contrast to the NSW Wind Energy Handbook, and the existing Capital 1 and approved Capital 2 wind farms, the predominant turbine position is in three clumps, with an emphasis of an East to west distribution. Further, the spacing between turbines is in contrast with the 8r best practice guide as these are clearly placed within 1008m (8D) of each other. In fact, one “line” of turbines are planned with the following distances between: turbine (**distance**)

56 (**612**) 57 (**407**) 46 (**385**) 58 (**957**) 55 (**449**) 71 (**660**) 10 (**494**) 11

In this instance, we have 8 turbines down-wind of each other (to the prevailing wind) covering a total distance of 3964m. These turbines have an average distance between them of 566m, **approximately half** of the best practice guideline. The permutations and combinations of all turbines allowing for all wind directions is endless, although **irrespective of wind direction, all three clusters of turbines in the proposal fail the 8D rule utterly and miserably.**

Section 9 of Appendix E of the EIS (Noise Assessment) identifies the concept of Special Audible Characteristics (SACs), and introduces the phenomenon of Aerodynamic Noise. It defines Aerodynamic noise as:

“Aerodynamic noise results from air passing over and around the blades. Aerodynamic noise is a broad spectrum sound, generated by random processes of air turbulence and the consequential air pressure fluctuations.”

It then goes on to state:

As the final WTG type and warranty provisions for the Project are not known at this stage, it has been assumed that the noise emissions from the WTGs or substation do not contain SACs and that no penalty is required. The tonal audibility for WTGs is usually the subject of warranty provisions provided by the WTG supplier.

This appears to be DNV GL and EPYC’s “Volkswagen” moment:

We have rules (NSW Wind Energy Handbook) that describe best practice to reduce or minimise inter-turbine wake interference (or SACs), and an acknowledgement from the consultant that aerodynamic noise (SACs) is increased if turbulence between turbines exists. This is all somehow waived away under the pretence that since the final turbine make and model is not known, it can be assumed that SACs do not apply to the design as a penalty. **What paralysis of the intellect gave birth to that rationale?**

Questions for the proponent via the Department of Planning and Environment:

1. Does the proponent acknowledge that the turbine siting distances (5r-8r) as described in the NSW Wind Energy Handbook provide best practice procedures for the placement of turbines in order to mitigate down-wind turbulence interference? If not,
2. Why not provide **peer reviewed** evidence to justify that the East/West placement of the proposed turbines is in any way equivalent to a best practice, **as opposed to a desperate attempt to co-locate as many turbines into a smaller than expected project area?**

3. What allowance has been made for multiple turbines being down-wind of each other, and what allowance has the modelling software made for this aggregation? Specifically, what is the effect upon turbine 56, given it is in the lee of turbines (in order) 57-46-58-55-71-10 and 11, with **each** gap being less than 8r (In fact, the total gap being less than 4000m?) Conversely, what is the aggregated turbulence effect of turbines 16-23-5-7-41 upon turbine 13?
4. What justification other than “we cannot make up our mind on the turbine make and model” does the proponent offer in order for SAC’s be ignored when it is clear that the current turbine placement will do anything but minimise their influence? Does the proponent believe this justification is sufficient to overlook something so important and fundamental to the conditions of operation?
5. If all confusion can be resolved by nominating a turbine make and type, why not then make that decision, model the results and publish them prior to receiving approval?

Questions for the Department of Planning and Environment:

It appears that this proposal knowingly delves deeply into unknown territory. The make and model of turbine has not been shared, and as a result the proponent intends to casually dismiss any relevance of SAC’s, even though their importance has resulted in the 8r rule in the NSW Wind Energy Handbook.

1. Why is something as fundamental as turbine make and model not a **mandatory** requirement for the EIS? How is modelling to be believed when the most fundamental element is undisclosed?
2. Does the Department of Planning and Environment endorse the 5r-8r turbine placement rule contained within the NSW Wind Energy Handbook as a best practice strategy for the minimisation of inter-turbine turbulence interference?
3. If not, then what alternative does it use to assess best practice, and how does the proposal comply to this assessment?
4. Does the Department of Planning and Environment believe that to allow this proposal to proceed without regard to these SACs is within their duty of care to the NSW public?

If no peer reviewed alternative can be provided by the proponent to justify the current turbine placement, then the Department of Planning and Environment must reject the current proposal as not meeting industry standards for turbine placement, and to proceed with the development introduces unacceptable risk to the residents potentially affected by it.