

On Ignoring Inconvenient Published Research

Objection to the Proposed Jupiter Wind Farm

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Irrespective of any other defects in the VIA, it is totally invalidated by the arbitrary but developer-friendly shrinking of thresholds used for the “Distance of View” dimension in Clouston’s “impact schema”. ***The Department therefore has no option but to reject the alleged visual impact presented in the EIS for every viewpoint and every residence covered.***

The problems don’t stop there. The EIS has presented no evidence to reject the visual dominance threshold identified by the BLM and Offshore studies, of 6.4 kms for 120m turbines. That means that if the Clouston’s “impact schema” is employed, the cut point for “High Impact” on the “Distance of View” dimension must be at least 6.4 kms.

This means that any residential viewpoint within 6.4 kms is, under that schema, capable of experiencing an overall high visual impact if the “Quantum of View” is substantial. That includes properties in Tarago and many others within 6.4 kms, and possibly some beyond. All those residences need to be individually evaluated.

On top of that, the VIA is clearly misleading if not downright false under the *Environmental Planning and Assessment Act 1979* (and the NSW Crimes Act). ***That has legal consequences the Department is obliged to pursue.***

It is generally recognised that the distance of wind turbines from a viewer is an absolutely central factor in the visibility and visual impact of wind turbines, and that turbine height is a critical determinant of visibility and visual impact distance thresholds.

Cloustons purports to understand this and includes distance from turbines as an element in its assessment schema. Unfortunately the way it does so imposes thresholds that are simply arbitrary and have no relationship to published empirical studies by independent researchers with strong international reputations.

Cloustons cavalier treatment of the height-distance visibility threshold relationship invalidates **ALL** of its VI assessments, for both viewpoints and individual properties, in the Jupiter EIS. It has also provided a specious rationale for Cloustons to exclude from careful consideration many residences and viewpoints that, based on the published research, warrant evaluation.

In addition this section of the EIS appears to very clearly contravene s148B of the *Environmental Planning and Assessment Act 1979* in relation to the provision of information that the responsible person knows, *or ought reasonably to know*, is false or misleading and which is material.

Blatant and Misleading Omission of Previous Distance Studies

Section 4.1 of the VI Assessment (VIA) is headed “Distance and Wind Farm Visibility”. Within that is subsection 4.1.1 headed “Previous Distance Studies”.

That subsection refers to the Sinclair-Thomas Matrix which was initially developed with observations on turbines about 30m high. The VIA then says

“As the WTGs considered within this assessment are over 170m tall, the authors of this report consider the CPRW, 1999; Sinclair, 2001 matrix to be outdated and of limited value in assessing the visual impacts of modern sized turbines.”¹

That is the end of the section. It introduces and then dismisses the Sinclair-Thomas Matrix, laying the ground to rely solely on Clouston’s own claims about what are appropriate distances for key thresholds for visibility and visual impact.

In so doing, the report totally ignores a number of other research studies on the relationship between wind turbine height, distance and visibility, where most of the studies are actually more recent than the Sinclair-Thomas work **and** involve higher turbines. Specifically it fails to mention:

- the Stevenson & Griffiths (1994) study² of eight wind farms, with most turbines in the range 40.0 – 43.5 m.
- the University of Newcastle (UK) (2002) study³ of eight wind farms, with the majority of turbines in the range 53.5 – 65.5 m.

¹ *Jupiter Wind EIS_ Appendix F_ Landscape and Visual Part 1*, p. 47.

² Described in *University of Newcastle Study*.

³ University of Newcastle (2002) *Visual Assessment of Windfarms Best Practice*. Scottish Natural Heritage Commissioned Report F01AA303A [*University of Newcastle Study*].

- the Bureau of Land Management (BLM) (2012) study⁴ of five wind farms conducted by Argonne National Laboratory (a unit of the US Department of Energy), with most of the turbines about 120 m.
- the Offshore Study⁵ (2013) also conducted by Argonne National Laboratory, on 11 wind farms with turbines averaging around 128 m.

In addition, it ignores the laboratory research by Bishop (2002)⁶ using the equivalent of 63 m turbines.

Either Cloustons are abysmally ignorant of the field or they have deliberately chosen to not mention the majority of studies of the relationship between turbine height, distance and visibility. Most of those studies are more recent than the Sinclair-Thomas work and were on turbines substantially higher than those of the Sinclair-Thomas study, in fact up to 4 times higher and far closer to what is proposed for Jupiter.

Anyone seeing a heading “Previous Distance Studies” would expect to then learn about all studies that might reasonably be considered pertinent and certainly the most recent ones published before the VI Assessment was prepared.

Under s6(f)(ii) of Schedule 2 of the *Environmental Planning and Assessment Regulation 2000*, the responsible person must certify that “the statement contains all available information that is relevant to the environmental assessment of the development”. At the front of the main EIS Report, Claire Burnes and Murray Curtis have certified just that – despite the fact that at least the VI section of the EIS has omitted critical information. Someone appears to be in contravention of s148B of the *Environmental Planning and Assessment Act 1979*.

Comparison of Thresholds from BLM Study and Cloustons

The VIA includes a visibility classification table⁷

| Distance | Perception | Likely visual impact |
|----------|---|---|
| 0-3kms | Highly prominent to prominent feature within the landscape | WTG likely to dominate the field of view and appear large scale. Movement of the blades clearly visible. Potential for moderate to high visibility depending on view location, vegetation, built form etc. |
| 3-6kms | Prominent | Visually prominent - the turbines may appear large scale and an obvious element in the landscape. Blade movement is clearly discernible. Wind turbines clearly visible in the landscape but tending to become less dominant with increasing distance. |
| 6-10kms | Prominent in clear visibility - seen as part of a wider landscape | Noticeable - the turbines are visible but do not necessarily dominate the view frame. Blade movement is visible but the turbines appear less noticeable within the field of view as distance increases. |

⁴ Sullivan, Robert G., et. al., 2012. *Wind Turbine Visibility and Visual Impact Threshold Distances in Western Landscapes*. Argonne National Laboratory and the U.S. Department of the Interior, Bureau of Land Management. USA [**BLM Study**].

⁵ Sullivan, Robert G., et. al., “Offshore Wind Turbine Visibility and Visual Impact Threshold Distances”, *Environmental Practice* 15(01):33-49, March 2013 [**Offshore Study**].

⁶ Bishop, Ian D, 2002. “Determination of Thresholds of Visual Impact: The Case of Wind Turbines”, *Environment and Planning B: Planning and Design* Vol. 29: p. 718.

⁷ *Jupiter Wind EIS_ Appendix F_ Landscape and Visual Part 1*, p. 47.

Much of the descriptive statements under “Likely visual impact” are redundant verbiage. For instance, in relation to whether blade movement is visible. The BLM Study reported that for 120m turbines, blade movement was visible up to 39 kms,⁸ so it is irrelevant in distinguishing the three Cloustons categories (< 10 kms) above and just obscures the differences. Likewise statements within the categories about turbines becoming less visible or dominant with difference are just padding, since that is always the case. With the padding removed we have:

| Distance | Perception | Likely visual impact |
|----------|---|--|
| 0-3kms | Highly prominent to prominent feature within the landscape | WTG likely to dominate the field of view and appear large scale. Potential for moderate to high visibility depending on view location, vegetation, built form etc. |
| 3-6kms | Prominent | Visually prominent - the turbines may appear large scale and an obvious element in the landscape. Wind turbines clearly visible in the landscape. |
| 6-10kms | Prominent in clear visibility - seen as part of a wider landscape | Noticeable - the turbines are visible but do not necessarily dominate the view frame. ⁹ |

That can be compared with the BLM Study results¹⁰, which identified two major thresholds, what it termed “*visual dominance*” and “*visual pre-eminence*”.

| Distance ¹¹ | Perception | Likely visual impact |
|------------------------|---------------------|--|
| 0-6.4kms | Dominates the view | Dominates view because study subject fills most of visual field for views in its general direction; and the visual prominence of the study subject detracts noticeably from views of other landscape elements. |
| 6.4-16kms | Visual pre-eminence | Strongly attracts visual attention of views in general direction of study subject; and the visual prominence of the study subject interferes noticeably with views of nearby landscape elements |

It can be seen that the BLM study descriptor for “*dominance*” is basically the same as the Cloustons one for “*Highly prominent*” and that “*visual pre-eminence*” is basically the same as Cloustons “*prominent*”.

But what is different is the threshold distances. Cloustons threshold for “highly prominent” (3 kms) is less than half the BLM threshold for “dominant” (6.4 kms) – and this is despite the fact that the BLM Study was with 120m turbines, i.e. only two thirds the size of the ones for which Clouston’s table is supposed to apply.

Taken together, the various studies mentioned earlier of wind turbine visibility indicate a linear relationship between turbine height and threshold distances (e.g. for visual pre-eminence, dominance and ZVI). On that basis, the appropriate threshold for dominance for 173m turbines is about 9kms.

In any case, the dominance threshold for 173m turbines cannot be less than for 120m turbines, and those thresholds were confirmed by the Offshore Study.

⁸ Sullivan, Robert G., *et. al.*, *op cit*, p. 4.

⁹ Note the convoluted wording here “turbines are visible but do not *necessarily* (emphasis added) dominate the view frame”. Inclusion of the phrase “do not necessarily dominate” clearly implies that in some instances, but not all, wind farms seen from the category distance may actually “dominate the view frame”. Which leads to the question why threshold distances have been set to exclude such instances from the first category.

¹⁰ Sullivan, Robert G., *et. al.*, *op cit*, pp. 40-41.

¹¹ The BLM Study expressed distances in miles, here converted to kilometres.

Note, these thresholds, whether from the BLM Study or Clouston's table do not indicate that every wind farm seen at the threshold distance will necessarily *dominate* the view or be *pre-eminent*. There is the additional matter of how many turbines are visible, how much of them are visible and how far they spread across the field of view.

Cloustons has a distinct dimension for that aspect, which they call "Quantum of view" and use it together with "Distance of view"¹² (and other factors) to make a judgement about actual visual impact in specific cases.

Since the Clouston approach includes the separate "Quantum of view" dimension, it is clear that in comparing the BLM Study thresholds with those presented by Cloustons, we are comparing like with like, i.e. distances at which the view of the wind farm is likely to be *dominant* or *pre-eminent* if the "Quantum of view" is substantial.

Except that the Cloustons thresholds turn out to be less than half what the BLM and Offshore studies indicate are the appropriate distances.

It should also be noted that the Stevenson & Griffiths Study, with turbines about *one quarter* the size Cloustons are working on, concluded "In most situations turbines dominated the view up to a distance of 2 km"¹³. Thus, allowing for differences in height of turbines studies, the Stevenson & Griffiths result supports that of the BLM and Offshore studies and not that of Cloustons.

The University of Newcastle Study did not present categories such as *dominant* and *visually pre-eminent*. It did, however, report that "Higher turbines are visible over a larger distance"¹⁴ and based on the research it recommended height-related ZVI distances for turbines up to 100m high. Those ZVI distances are very similar to what Sinclair-Thomas had previously recommended for similar heights, thus appearing to validate the Sinclair-Thomas results despite the unsubstantiated dismissal by Cloustons.

So from where did the Cloustons thresholds come? According to the VIA they are "based on current best practice and field observations by the author"¹⁵. Who knows what "current best practice" refers to, since no citation is provided. We do know the result is contrary to all the actual published research on wind farm visibility, which makes "current best practice" appear to be no more than an attempt to give a misleading impression of authority to Clouston's opinion. So we are left with "field observations by the author".

That leads to the obvious question of what are the research credentials of Matt Knight compared to those of the teams that conducted the BLM Study, the Offshore Study, the University of Newcastle Study, and Stevenson & Griffiths. Each of those teams systematically studied multiple wind farms, using multiple observers, and provided detailed records of their studies. In the case of the BLM and Offshore studies they also determined the inter-rater reliability of the observations, most of which were done by multiple observers, and reported high levels of inter-rater reliability.

¹² *Jupiter Wind EIS_ Appendix F_ Landscape and Visual Part 1*, p. 60.

¹³ Described in University of Newcastle Study.

¹⁴ *University of Newcastle Study*, p. 51.

¹⁵ *Jupiter Wind EIS_ Appendix F_ Landscape and Visual Part 1*, p. 47.

Seriously, if someone is going to claim in a VIA that we should rely on their “field observations” instead of the careful, systematic and fully documented observations of a number of experienced and independent research teams, they had better provide systematic detail of their process and observations and rationale for why that trumps published research. Otherwise they just seem clueless.

Cloustons Ignores Its Own Thresholds as Apparently Too Inconvenient

Having first relied on Matt Knight’s “field observations” to determine distance thresholds, those thresholds got abandoned when it came to actually assessing visual impact at viewpoints and on residences.

Cloustons introduced a 6 dimension schema it applied to deciding the overall visual impact rating for each instance considered.¹⁶ For each dimension, the schema has cut points that separate various degrees of “impact” (negligible, low, moderate, and high).

One of the six dimensions is “Distance of View”. It turns out in this schema the cut point for “high impact” on “Distance of View” is 2 kms. Two kilometres? Where did that come from?

According to the Matt Knight table of thresholds, WTGs are “highly prominent” at 3 kms, and “prominent” up to 6 kms. But, according to Cloustons, once they are considered in terms of impact, they can only have a “high impact” within 2 kms.

It should be noted that the Stevenson & Griffiths study reported wind farms dominating the view *in most situations* up to 2 kms – but this was with turbines a little over 40m high, i.e. turbines *one quarter* the size of the proposed Jupiter turbines. Despite that, Cloustons claims 2 kms is the appropriate cut point for visual dominance by 173m turbines and offers exactly zero substantiation.

Don’t forget that the Cloustons “impact schema” also includes “Quantum of View”. So according to this schema, you could have 80 wind turbines visible, with the closest at 2.5 kms and what you would get is “High impact” on the “Quantum of View” (probably) but only “Moderate impact” on the “Distance of View” dimension. That conveniently provides the opening for claiming that the total impact is something less than High.

There are a number of viewpoints which are given a “Distance of View” impact rating of “Moderate” which would have a rating of “High” were 3 kms, rather than 2 kms, used as the cut point for “Distance of View” in Cloustons schema.

Perhaps feeling sensitive about the sleight of hand going on in the switch from 3 kms to 2 kms, Cloustons includes a footnote for “Distance of View” in its Visual Impact Assessment Criteria table. The footnote says:

“The distance of view thresholds presented in this table are indicative of potential impacts only. The distance of view factor forms part of the overall assessment process adopted here. Actual visibility of WTGs may vary greatly within any given distance band, being influenced by multiple factors including nature of location, landform and quantity of vegetation.”¹⁷

¹⁶ *Jupiter Wind EIS_ Appendix F_ Landscape and Visual Part 1*, p. 60.

¹⁷ *Jupiter Wind EIS_ Appendix F_ Landscape and Visual Part 1*, p. 60.

Cloustons doesn't find the need to offer such commentary on any of the other dimensions and it actually justifies nothing in this context. As the footnote says, "Actual visibility of WTGs may vary greatly within any given distance band, being influenced by multiple factors including nature of location, landform and quantity of vegetation." But that is precisely what the "Quantum of View" dimension is supposed to pick up. If most of the theoretically visible wind farm is actually hidden by terrain or vegetation or other buildings then "Quantum of View" will be low. There is no justification for further reducing the rating on "Distance of View", which ought to be a simple, straightforward, non subjective measure.

Instead Cloustons apparently claims the ability to apply some fudge factor to that dimension as well as actually reducing the threshold below what Matt Knight's threshold table presented.

Conclusion

So, to summarise:

- The VIA purports to provide a description of prior "Distance Studies" and then fails to mention almost all of them, including the ones most recent and with turbines the closest in size to those of Jupiter, and despite those ignored having been conducted by research organisations with international reputations.
- It then, apparently based on "field observations" by Matt Knight (who does not appear to have employed a methodology as rigorous and well documented as that used by Argonne National Laboratory, University of Newcastle, or by Stevenson and Griffiths), produces its own set of distance thresholds for visibility of 173m turbines.
- It turns out that, conveniently for the developer, those thresholds are less than half as far (e.g. for dominant impact) as were found by the independent researchers.
- Finally, when it comes to actually using distance in Clouston's "impact schema", Matt Knight's "field observations" are junked and instead of using 3 kms as the cut point for "high impact" (as Matt Knight's threshold table requires), somehow the VI Assessment ended up with the much more developer-friendly distance of 2 kms.

Consequently

Irrespective of any other defects in the VIA, it is totally invalidated by the arbitrary but developer-friendly shrinking of thresholds used for the "Distance of View" dimension in Clouston's "impact schema". ***The Department therefore has no option but to reject the alleged visual impact assessment in the EIS for every viewpoint and every residence covered.***

The problems don't stop there. The EIS has presented no evidence to reject the *visual dominance* threshold identified by the BLM and Offshore studies¹⁸, of 6.4 kms for 120m turbines. Arguably the threshold should be greater for 173m turbines, and actually about 9 kms for that height. In any case the visual dominance threshold for Jupiter cannot be less than the 6.4 kms found for 120m turbines.

¹⁸ And supported by the Stevenson & Griffiths study finding of visual dominance at 2 kms with turbines a little over 40m.

That means that if the Clouston's "impact schema" is employed, the cut point for "High Impact" on the "Distance of View" dimension must be at least 6.4 kms. That does not mean that every viewpoint within 6.4 kms will have overall high impact. The schema includes other dimensions and in particular the "Quantum of View" dimension.

However, this does mean that any residential viewpoint within 6.4 kms is, under that schema, capable of experiencing an overall high visual impact if the "Quantum of View" is substantial. That includes properties in Tarago and many others within 6.4 kms, and possibly some beyond. All those residences need to be individually evaluated.

On top of that, the VIA is clearly misleading if not downright false under the Act (and the *NSW Crimes Act*).

As earlier noted, the section dealing with relevant "Distance Studies" is grossly misleading by ignoring almost all the relevant work. Either this was done consciously, which would indicate an intention to deceive the Department, or it was done in ignorance. Yet the Act also prohibits providing information that the responsible person *ought reasonably to know* is false or misleading.

It is difficult to conceive how someone who purports to be an expert in visual impact assessment for wind farms can also claim it was reasonable for them to not know of the published research on wind farm visibility – it is all accessible over the internet with a little research using Google.

In addition the sleight of hand that converted the 3 kms "Highly prominent" threshold in Matt Knight's threshold table to 2 kms for the cut point in the "impact schema" adds to the disturbing picture of misleading practices. Whether intentional or otherwise, the net result is a VIA which is misleading from one end to the other and contravenes s148B of the *Environmental Planning and Assessment Act 1979* and possibly sections of the *Crimes Act*.

Given how extensive is the scope of the misleading information, covering all of one of the major parts of the EIS, it must be considered "material" in terms of the Acts.

Consequently ***legal action by the Department seems to be required – unless the Department regards the law under which it operates as irrelevant.***