AWTM Pty Ltd ATF Witherby Family Trust (ABN 50 285 185 541) T/A Wakefield Planning

Visual Assessment Report

Project

Upgrade Two Turbines at Hampton Village Wind Farm
43 Hampton Road, Hampton 2790
Lot 1 in DP 1031694

For Windfarm 1 Pty Ltd

Version 1.4

PO Box 594
MOREE NSW 2400
P 0427 257 244
E admin@wakefieldplanning.com.au
W wakefieldplanning.com.au

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- The information contained in this Report is neither false nor misleading; and
- It contains all relevant available information that is current at the time of release.

John Wolfenden PhD

Senior Planner

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1 Introduction

1.1 Background

The project is located in Hampton, NSW. The site contains an existing two-turbine windfarm. It is proposed to replace the two aging wind turbines with new turbines. The new turbines would be on 80m tall towers (compared to the existing towers at 50m). This would result in greater visibility of the turbines from various locations around the site.

The purpose of this report is to document an assessment of the likely perceived changes in visual impact and the significance of that impact.

1.2 Existing Turbines

As noted above, the nacelles of the existing turbines are placed upon 50m towers. They were installed around 20 years ago, and are now a well-known part of the local landscape (see Figure 1-1).

Figure 1-1 Existing turbines in the landscape.

2 Assessing Views

2.1 The planning principles

The court case Tenacity versus Waringah Council[1] establishes key planning principles around views. The planning principles are set out below:

Step One – Assessment of the views to be affected. "Water views are valued more highly than land views. Iconic views (eg of the Opera House, the Harbour Bridge or North Head) are valued more highly than views without icons. Whole views are valued more highly than partial views, eg a water view in which the interface between land and water is visible is more valuable than one in which it is obscured."

Step Two – Consideration from what part of the property the views are obtained. "For example the protection of views across side boundaries is more difficult than the protection of views from front and rear boundaries. In addition, whether the view is enjoyed from a standing or sitting position may also be relevant. Sitting views are more difficult to protect than standing views. The expectation to retain side views and sitting views is often unrealistic."

Step Three – Assessment of the extent of the impact. "This should be done for the whole of the property, not just for the view that is affected. The impact on views from living areas is more significant than from bedrooms or service areas (though views from kitchens are highly valued because people spend so much time in them). The impact may be assessed quantitatively, but in many cases this can be meaningless. For example, it is unhelpful to say that the view loss is 20% if it includes one of the sails of the Opera House. It is usually more useful to assess the view loss qualitatively as negligible, minor, moderate, severe or devastating."

Step Four – Assessment of the reasonableness of the proposal that is causing the impact. "A development that complies with all planning controls would be considered more reasonable than one that breaches them. Where an impact on views arises as a result of non-compliance with one or more planning controls, even a moderate impact may be considered unreasonable. With a complying proposal, the question should be asked whether a more skilful design could provide the applicant with the same development potential and amenity and reduce the impact on the views of neighbours. If the answer to that question is no, then the view impact of a complying development would probably be considered acceptable and the view sharing reasonable".

2.2 NSW Department of Planning Visual Assessment Bulletin

In addition to the principles above, in order to assess the visual impact of the larger turbines, reference is made to the guidance from "Wind Energy: Visual Assessment Bulletin" from the Department of Planning and Environment. Figure 2 from that document is reproduced below as Figure 2-1. From this it can be seen that for a tower height of 80m, the distance to which the visual magnitude would be significant is 1000 metres. It should also be noted that the proposed turbines are at the lower end of the size range addressed in this policy.

[1] After Tenacity Consulting vs Warringah Council

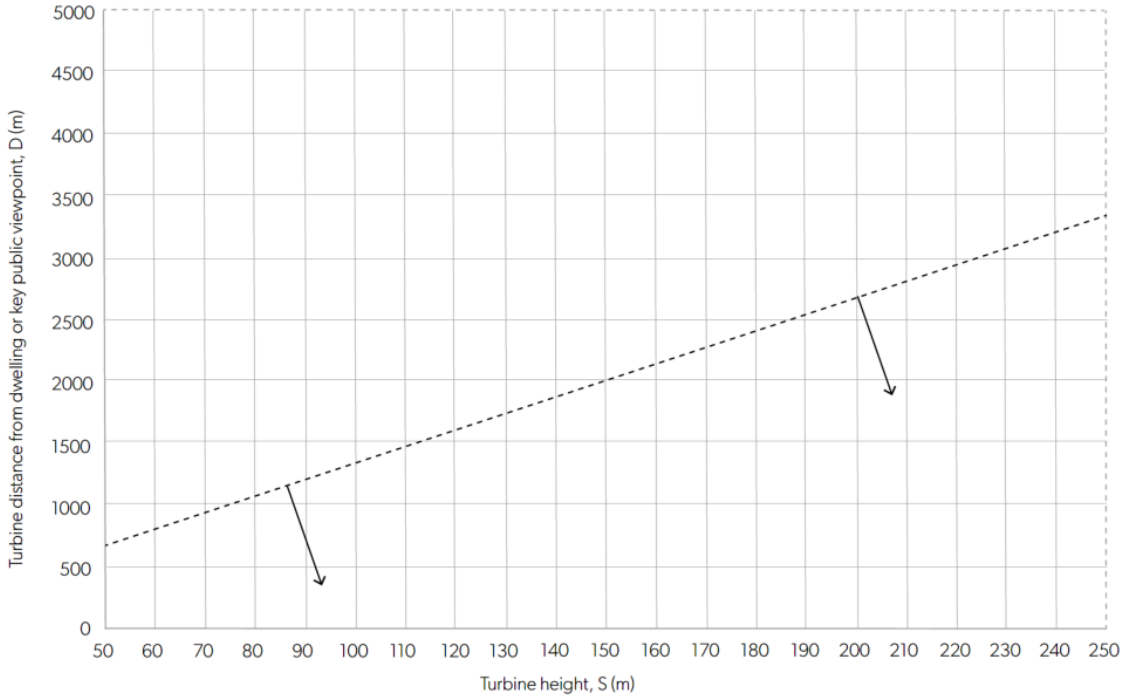

Figure 2-1 Potential visual impacts

2.3 GIS Review

In order to understand the overall impacts of the proposal, a GIS analysis was undertaken within an initial 5 km radius of the site. This identified, based on a digital terrain model, areas with potential visibility of the current and proposed turbines. The GIS analysis is set out in Figure 2-1 and Figure 2-2.

The first image provides insights into where the towers would be visible based on landform alone. It does not account for the shielding effect of vegetation which is significant in this area. To gain some understanding as to where the towers would be visible above the vegetation, a spatial layer derived from LIDAR[2] mapping was created which can identify vegetation extents and plot heights.

We used this data to create a GIS layer indicating where 80m towers would be visible at eye level for a person standing. The result of this analysis is provided in Figure 2-2. We then checked this predictive model with known on-ground locations where the existing 50m towers are visible. Reviews were undertaken of the identified viewsheds to consider, where information was available, whether the vegetation was likely to provide full or partial shielding. In particular, we know that the existing towers are visible at location B and C (Figure 1-2) whereas the predictive model does not show this. As a result of this, we needed to resort to local knowledge and the results of a photographic survey to determine the best locations from which to assess visual impacts. From a combination of the GIS analysis, and the on-ground site survey, locations A, B and C (Figure 1-2) were selected for further analysis.

[2] Light Detection and Ranging

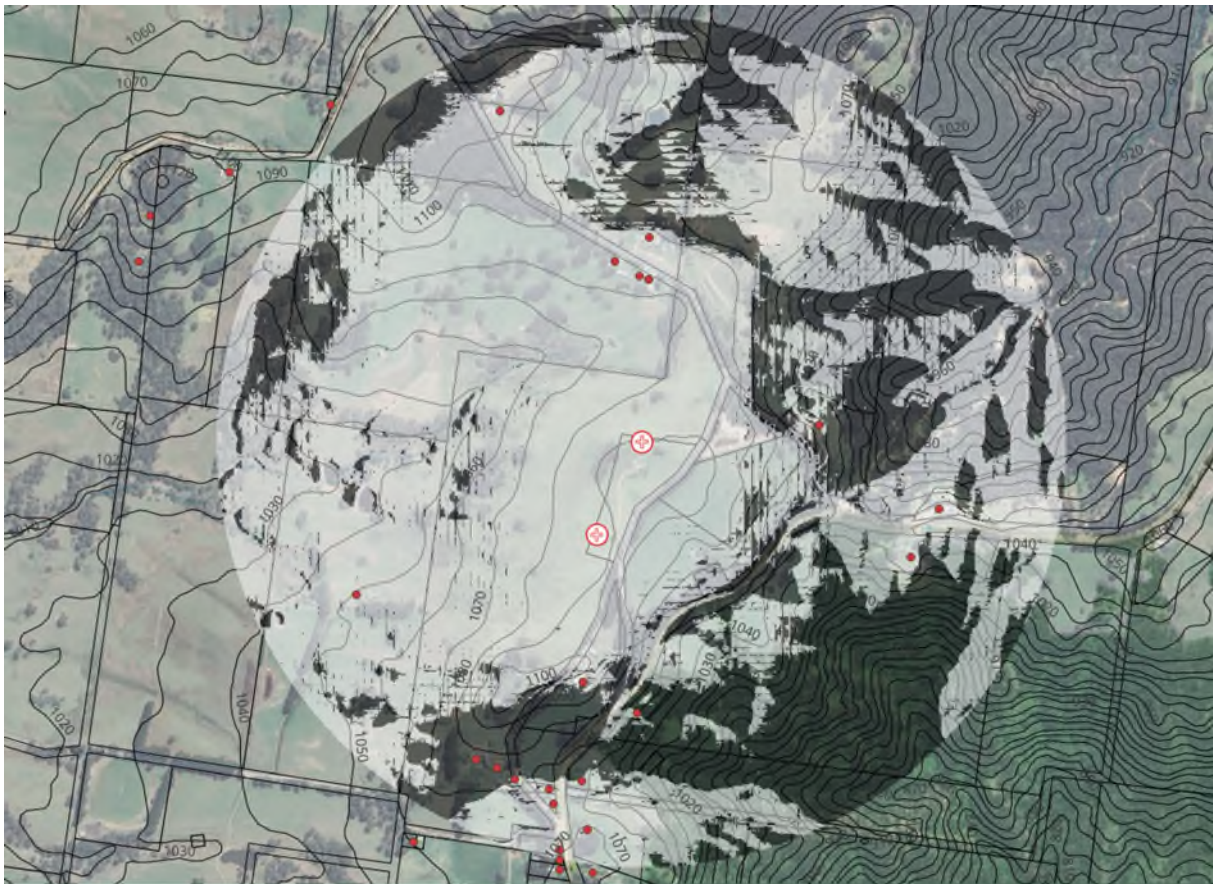

Figure 2-2 Predicted visibility of 80m towers within a radius of 1km based on landform alone (i.e. vegetative shielding not accounted for).

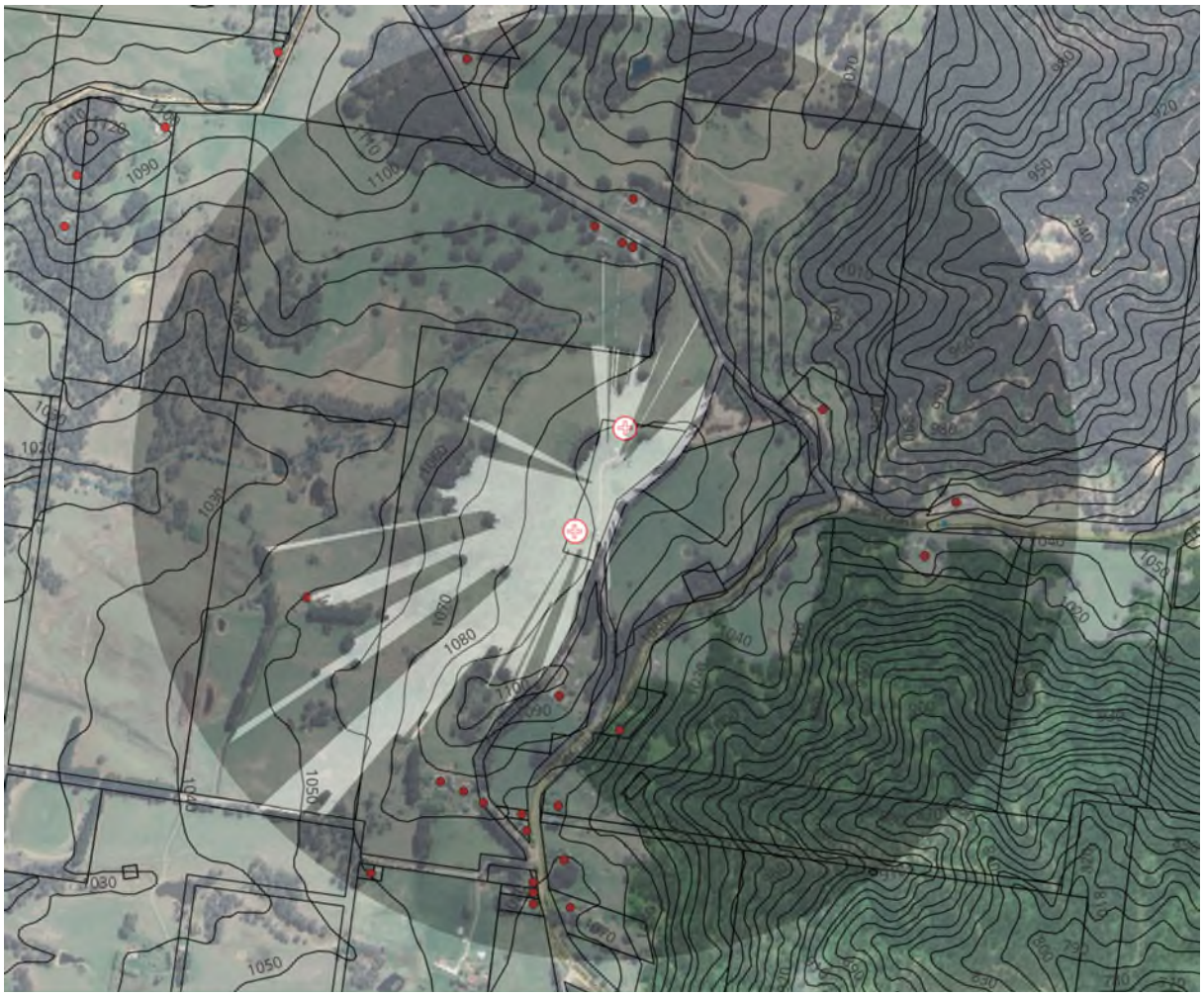

Figure 2-3 Predicated visibility of 80m towers within a radius of 1km based on LIDAR data which estimates the shielding effect of vegetation.

2.4 Selection of Representative Properties

The 1000 metre distance is shown as a circle of 1000m radius in Figure 2-2. A consideration of both this radius and known points of potential significant impact has led to the selection of Points A, B and C (Figure 1-2) as representative sites for further analysis.

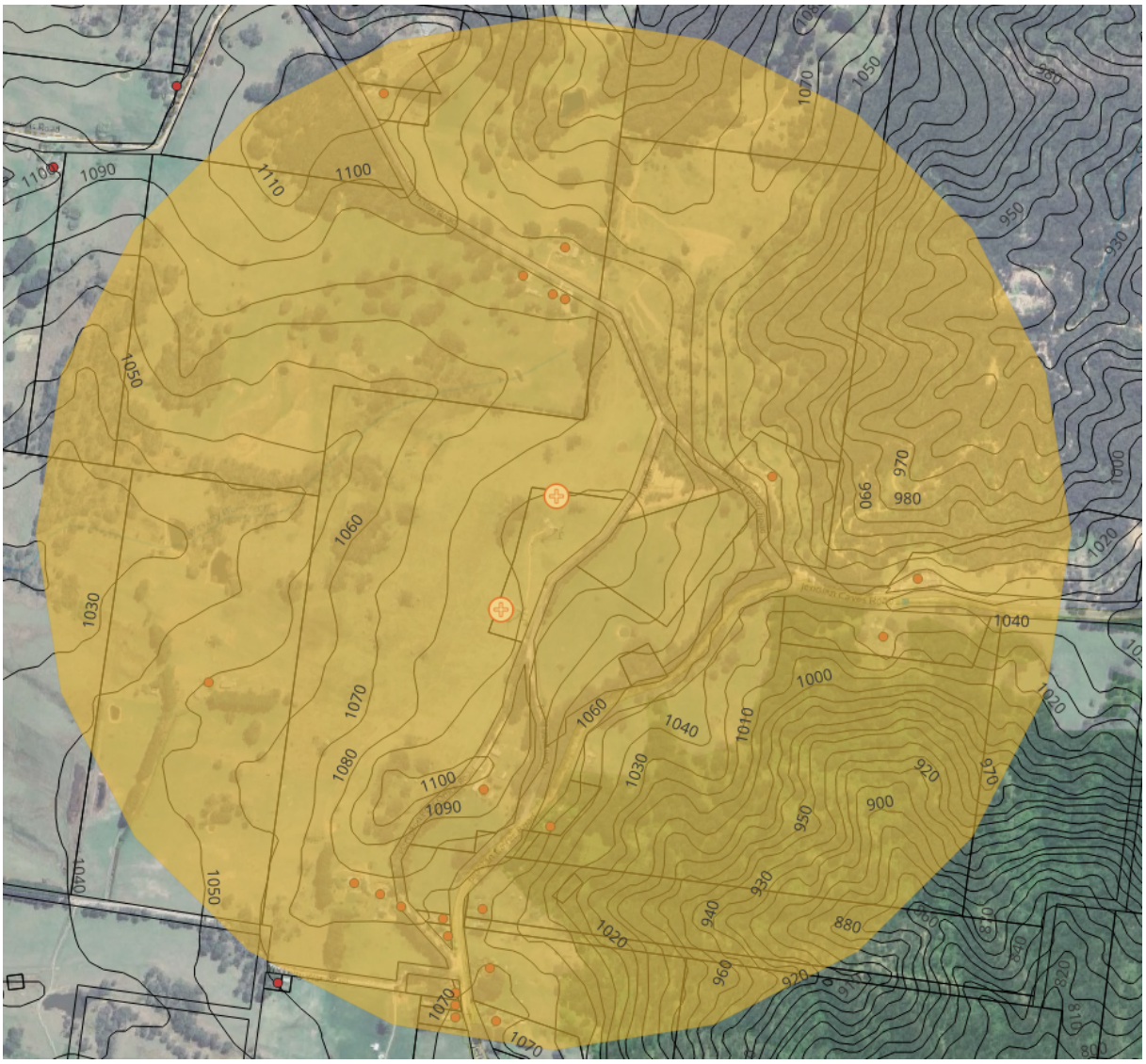

Figure 2-4 1000 metre radius around the development location

The properties involved are all single story buildings. Photographs have been taken from various view points either on (or near to) the buildings. This was to record the view of the existing turbines and to provide a basis for comparing this to the proposed replacement turbines.

These turbines can be seen from a number of locations around the site. Key sites have been selected as representative of locations of potential viewer sensitivity and these are indicated in Figure 1-2. Location A is 91 Dowdells Road Hampton, Location B is 119 Hampton Road Hampton and Location C is the Hampton Halfway Hotel Motel at 1856 Jenolan Caves Road Hampton.

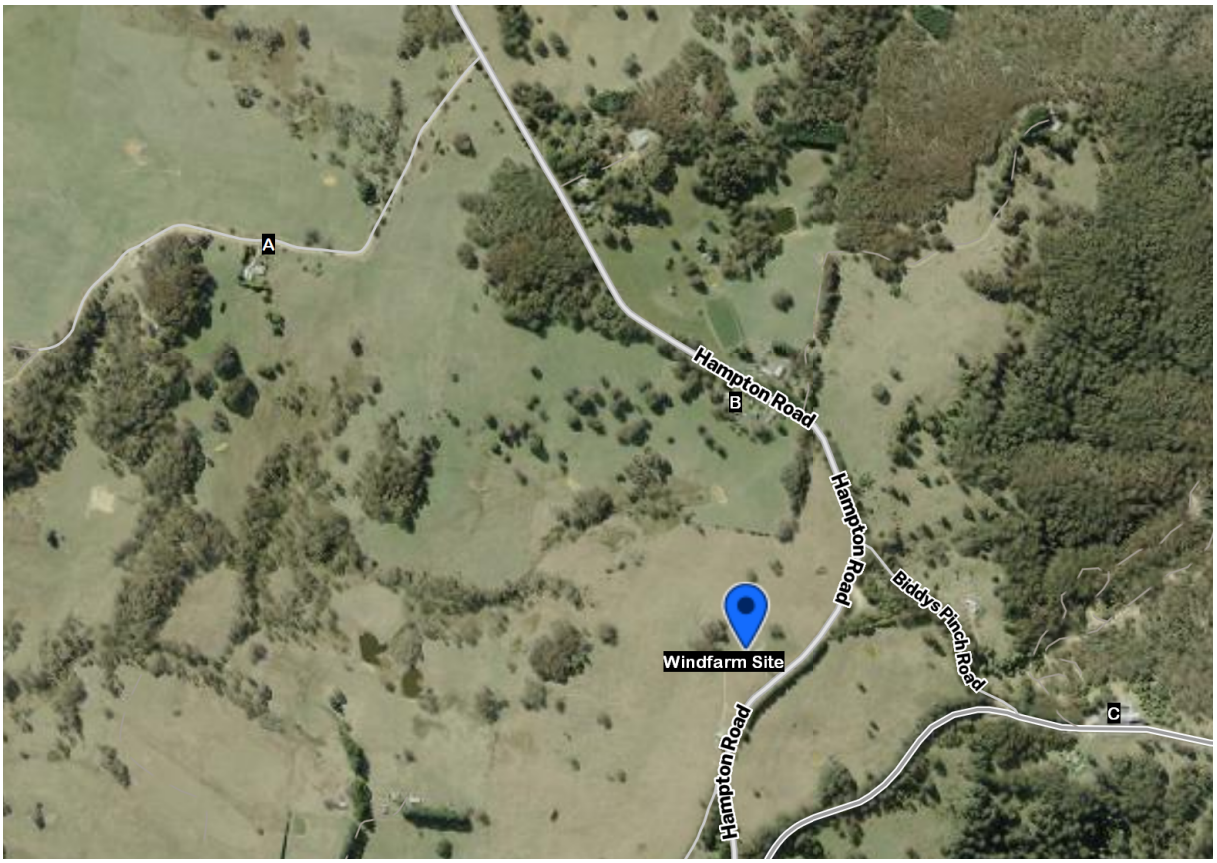

Figure 2-5 Location of selected locations of potential viewer sensitivity.

This is a project which involves replacing the existing turbines with turbines that are somewhat higher in the landscape. In assessing the visual impact of this change, we have considered the incremental change only. That is, how much more perceived visual impact will there be for the replacement towers when compared to the existing towers.

2.5 Step Three – Assessment of the extent of the impact

2.5.1 General comments about the extent of the impact

A search of the research literature indicates that sounds can affect how we perceive things. For example, an article in Neuroscience News[3] makes the point that "… auditory cues … (can) even alter our visual perception". This is relevant here as it is likely that a relatively noisy wind turbine is likely to be perceived as visually larger than it is in reality. The proposed new turbines are predicted to operate at noise levels of just 2dB higher than existing turbines were designed to operate at when they were installed. The Noise and Vibration Impact Assessment report makes the point that the additional 2dB of noise "would not be perceptible to the average listener". As such, those viewing the turbines will not have any auditory cues to suggest that the turbines are actually bigger than the previous ones. We note an absence of concerns or complaints raised by surrounding landholders about noise or visual impact of the existing turbines.

On balance, it is expected that the *perceived* additional visual impact of the replacement turbines will be modest, and after a period of adjustment they will just be recognised within the landscape as a local feature, just as the existing turbines appear to have been.

[3] https://neurosciencenews.com/auditory-visual-perception-22027/

This project is intended to replace two aging wind turbines (which are presently running less efficiently and more noisily than was originally installed) with two new turbines.

The replacement will be using larger turbines (the smallest ones presently available) than what is currently installed. These new larger turbines require a higher placement (i.e. tower height) in order to operate efficiently. A project to bring aging green-energy equipment up to current standards (including increasing output efficiency) is reasonable within the current search for improved levels of green-energy to power New South Wales.

2.5.2 Viewing location A

This is the site at 91 Dowdells Road Hampton. It is about 1200m from the development site. The image in Figure 2-3 shows the existing turbine towers faded out, and the proposed turbines indicated in their proposed locations (subject to final survey). The picture was taken on the roadside just to the north of the residence at that address. The indicated view is very similar to what would be seen from the rear of that residence.

Figure 2-6 Viewing location A

Qualitatively, there is a clear difference between the existing and proposed turbines. While there are two turbines there now, there will be two new turbines when the project is complete. The new turbines are certainly taller (80m towers as compared to 50m), so they will both be somewhat larger in the viewshed. In addition, from some perspectives, the turbines appear closer together.

The Table below sets out an assessment against the planning principles. The scoring is out of 5, with lower scores indicating lower impact. The scores are based on the following system:

1-<2 – Low impact

2-<3 – Moderate impact

3-<4 – High impact

4-5 - Very high impact.

Assessment of the View	Consideration as to where the views are obtained	Extent of the Impact	Reasonableness of the project
The affected view has two, smaller, turbines. The views are skyline views not water views. The turbines would be a more significant skyscape element but would not directly affect landscape views.	The views are generally representative of the views that would be obtainable from the dwelling on the land, as well as much of the property. In this respect the views are significant views.	Two turbines are existing. They would be replaced by two larger turbines. This would result in a slightly larger impact on overall views. The distance from the proposal has an impact on the extent of impact. The site is outside the 1km raidius of significance.	The project is considered reasonable in that it is re-turbining an existing facility. This has a much less significant impact than a new facility.
Score: 2/5	Score 4/5	Score 1/5	Score 1/5

Assessed overall impact – 2/5 This is considered to be at the low end of Moderate impact, and is considered acceptable.

2.5.3 Viewing location B

This is the site at 119 Hampton Road Hampton. The existing conditions photo (Figure 2-4) has been taken (with permission) from just behind the dwelling at that location. The new towers will be about 380m and 610m from this location. The difference in the relative distances of the towers will influence their apparent sizes when view from Location B – as can be seen in Figure 2-4. Again, the differences in visual impact are obvious. There will still be two turbines, although clearly these will be a somewhat more prominent on the skyline than the existing ones.

Figure 2-7 Viewing location B

The Table below sets out an assessment against the planning principles. The scoring is out of 5, with lower scores indicating lower impact. The scores are based on the following system:

1-<2 – Low impact

2-<3 – Moderate impact

3-<4 – High impact

4-5 - Very high impact.

Assessment of the View	Consideration as to where the views are obtained	Extent of the Impact	Reasonableness of the project
The affected view has two, smaller, turbines. The views are skyline views not water views. The turbines would be a more significant skyscape element but would not directly affect landscape views.	The views are generally representative of the views that would be obtainable from the dwelling on the land, as well as much of the property. In this respect the views are significant views.	Two turbines are existing. They would be replaced by two larger turbines. This would result in a larger impact on overall views. The distance from the proposal has an impact on the extent of impact. The site is well within the raidius of	The project is considered reasonable in that it is re-turbining an existing facility. This has a much less significant impact than a new facility.

		significance being within 400m.	
Score: 2/5	Score 4/5	Score 3/5	Score 1/5

Assessed overall impact – 2.5/5 This is considered to be in the mid-range of Moderate impact and is considered acceptable.

2.5.4 Viewing location C

The Hampton Halfway Hotel Motel at 1856 Jenolan Caves Road Hampton has been selected as the third location to assess visual impact from. The new towers will be 700m and 800m away respectively. Both towers will be largely occluded by the vegetation as can be seen in Figure 2-5. The existing southern-most tower can only just be seen from this location, and does not show in the image below.

Figure 2-8 Viewing location C

The Table below sets out an assessment against the planning principles. The scoring is out of 5, with lower scores indicating lower impact. The scores are based on the following system:

1-<2 – Low impact

2-<3 – Moderate impact

3-<4 – High impact

4-5 - Very high impact.

Assessment of the View	Consideration as to where the views are obtained	Extent of the Impact	Reasonableness of the project
The affected view has two, smaller, turbines.	The views are not affecting the outlook	Two turbines are existing. They would	The project is considered reasonable

The views are skyline views not water views. The turbines would be a more significant skyscape element but would not directly affect landscape views. The turbines continue to be partially obscured.	from the Hampton Hotel over the valley. In this respect the views are not significant views.	be replaced by two larger turbines. This would result in a larger impact on overall views. The distance from the proposal has an impact on the extent of impact. The site is well within the raidius of significance being within 400m.	in that it is re-turbining an existing facility. This has a much less significant impact than a new facility.
Score: 1.5/5	Score 1/5	Score 3/5	Score 1/5

Assessed overall impact – 1.625/5 This is considered to be of Low impact. This is considered acceptable.

3 Conclusion

The proposed replacement of two aging wind turbines with slighly larger and more modern turbines will produce some additional visual impact, however this is in the low-moderate range. On balance, it is expected that the *perceived* additional visual impact of the replacement turbines will be low, and they will come to be recognised within the landscape as a local feature, just as the existing turbines appear to have been. On this basis the proposed development is considered to be acceptable from a visual impact perspective.