



## **Yass Valley Wind Farm – Submissions Report**

*Landscape and Visual Impact Assessment*

*For: Yass Valley Wind Farm Pty. Ltd.*

0092376 RPT2 Final

December 2012





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For and on behalf of  
**Environmental Resources Management Australia**

Approved by: Allan Wyatt  
Position: Partner  
Signed:



Date: 17 December 2012



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## Contents

<b>1</b>	<b>INTRODUCTION</b>	<b>1</b>
1.1	<i>EA Application</i>	1
1.2	<i>Submission</i>	1
1.3	<i>The Current Proposal</i>	2
1.4	<i>LVIA Methodology</i>	3
1.4.2	<i>Photomontages</i>	4
<b>2</b>	<b>PROJECT DESCRIPTION</b>	<b>5</b>
2.1	<i>Visual components of the Current Proposal</i>	6
<b>3</b>	<b>THE VIEWSHED</b>	<b>8</b>
3.1	<i>The Zones of Visual Impact</i>	8
3.2	<i>Landscape Units and Sensitivity</i>	9
3.3	<i>Implications</i>	9
<b>4</b>	<b>SEEN AREA ANALYSIS</b>	<b>10</b>
4.1	<i>Visibility of entire wind turbines</i>	10
4.2	<i>Visibility of part or whole of the swept path of the rotor</i>	10
4.3	<i>The relevance of this analysis</i>	12
<b>5</b>	<b>ASSESSMENT OF VISUAL IMPACT</b>	<b>13</b>
5.1	<i>Publicly accessible viewpoints</i>	14
5.2	<i>Sequential viewpoints</i>	17
5.2.1	<i>SVP1 – Hume Highway</i>	17
5.2.2	<i>SVP2 – Hume Highway</i>	18
5.3	<i>Residential viewpoints</i>	20
5.3.1	<i>Viewpoint R5 – “Naranghi” (House #C54)</i>	22
<b>6</b>	<b>CUMULATIVE VISUAL IMPACT</b>	<b>24</b>
6.1	<i>Change in perception</i>	25
6.1.1	<i>Views from towns and regional centres</i>	25
6.1.2	<i>View from main highways</i>	25
6.1.3	<i>Views from minor / local roads</i>	26
6.1.4	<i>Views from residential dwellings</i>	26
6.2	<i>Overall cumulative impact</i>	26
<b>7</b>	<b>RESPONSE TO SUBMISSIONS</b>	<b>27</b>
<b>8</b>	<b>CONCLUSION</b>	<b>30</b>

## Annex

Annex A -	Seen Area Analysis
Annex B -	Photomontages

## Figures

Figure 2-1	Site layout – Current Proposal	5
Figure 2-2	Site layout - EA Application	5
Figure 2-3	Indicative wind turbine	6
Figure 3-1	Zones of Visual Impact for the Current Proposal	8
Figure 4-1	Zone A – Whole wind turbine (Source: YVWF)	10
Figure 4-2	Zone B – Whole swept path of turbine (Source: YVWF)	11
Figure 4-3	Zone C– hub and above of wind turbine (by YVWF)	11
Figure 5-1	Publicly accessible viewpoints (Current Proposal for wind farm)	14
Table 5-1	Comparison summary assessment of publicly accessible viewpoints	14
Figure 5-2	Sequential viewpoints (Current Proposal for wind farm)	17
Figure 5-3	EA Application - SVP1 Photomontage	18
Figure 5-4	Current Proposal - SVP1 Photomontage	18
Figure 5-5	EA Application - SVP2 - Photomontage	19
Figure 5-6	Current Proposal - SVP2 - Photomontage	19
Figure 5-7	Residential viewpoints (Current Proposal for wind farm)	20
Figure 5-8	Shows the existing vegetation surrounding the residence	22
Figure 5-9	EA Application - View from the entry driveway to the south east	23
Figure 5-10	EA Application – RVP5 - Photomontage	23
Figure 5-11	Current Proposal – RVP5 - Photomontage	23
Figure 6-1	Existing and proposed wind farms	24

## Tables

Table 1-1	Submissions summary of landscape and visual amenity impacts	1
Table 2-1	Comparison of number of wind turbines proposed	6
Table 3-1	Zones of Visual Impact	8
Table 3-2	Landscape Units and Sensitivity	9
Table 5-2	Comparison summary assessment of residential viewpoints	20
Table 6-1	Existing and proposed wind farms in the area	24
Table 7-1	Response to submissions on landscape and visual amenity impacts	27

## 1 INTRODUCTION

The Yass Valley Wind Farm proposal is for the development of a wind farm in the Southern Tablelands region of NSW, approximately 30 km west of Yass and around 300 km west of Sydney.

An application for the wind farm proposal was lodged with the NSW Department of Planning on 2 December 2008 and Director General's Requirements were issued to the proponent on 12 January 2009 to guide the work required in assessing the proposed wind farm.

The final revision of the Environmental Assessment (EA) for the Yass Valley Wind Farm, consisting of up to 152 wind turbines (EA Application), which addressed the issues raised in the Director General's Requirements, was lodged in November of 2009 and placed on exhibition by the Department from 13 November 2009 to 14 December 2009.

### 1.1 EA Application

The EA Application sought Development Approval of the Coppabella Hills and the Marilba Hills Precincts only. A future Development Approval was to be sought for the Carrolls Ridge Precinct making the overall number of wind turbine to up to 182 wind turbines (including those in Carrolls Ridge).

ERM prepared the landscape and visual impact assessment (LVIA) component of the EA Application of Coppabella Hills and the Marilba Hills precincts as well as the Carrolls Ridge precinct in July 2009. This assessment formed part of EA Application to the Part 3A Major Project, under the New South Wales Environment Planning and Assessment Act 1979.

### 1.2 Submission

Twenty two submissions were received in response to the exhibition of the Environmental Assessment of the wind farm, ten of which were from government agencies. *Table 1-1* summarises the submissions relevant to the landscape and visual amenity impacts.

**Table 1-1** *Submissions summary of landscape and visual amenity impacts*

Item	Submissions raised
1	<b>Loss of visual amenity and rural character</b> <i>adverse impacts on tourism and traveller amenity and on potential for rural residential development</i>
2	<b>Size and scale of wind farm</b> <i>the unprecedented size and scope of the project in NSW and the consequent impact on the hosting district, including 90 non-involved residences within 5 km of the proposed wind farm precincts, several villages, two towns and the visual gateway to the Yass Shire along the Hume Highway from the Riverina</i> <i>... people find it difficult to comprehend the imposing size and scale of a modern industrial wind turbine in the landscape.</i>
3	<b>Cumulative visual impact</b> <i>flawed analysis of the pervasive cumulative visual impact, especially relating to poor presentation of visual impacts of giant wind turbines at close viewing distances along public roadways</i> <i>It is inevitable that there will be a large cumulative visual impact on the immediate vicinity (in particular, at distances under 5 km) due to the high number of wind stations proposed. The turbines are inherently conspicuous structures that have been intentionally located in prominent positions. The visual effect of the wind turbines will be pervasive in the district to the south of Binalong, along the Hume Highway, along NSW state road Burley Griffin Way to Harden, minor sealed roads (Illalong) and numerous unsealed routes.</i>
4	<b>Night lighting</b> <i>insufficient information given in relation to obstacle lighting, preventing assessment of the adverse impact of night</i>

Item	Submissions raised
	<p>obstacle lighting on traffic, and in causing degradation of the night sky</p> <p>CASA have advised the project that about 50 aircraft obstacle lights may be needed to fulfil its safety requirements. This is roughly one strobing high-powered obstacle light for approximately every third wind station.</p>
5	<p><b>Viewpoint selection</b></p> <p>Instead, the proponent generates a selective shortlist of locations and uses photomontages with an unusual choice of aspect ratios, camera lens angles, and printing formats to support its arguments that the visual impact is "low to medium" at every viewing location in the affected district.</p> <p>Locations chosen are highly selective and sometimes hard to understand. The visual impact over more than 20 kilometres of Burley Griffin Way is represented by only a few photomontage locations.</p>
6	<p><b>Photomontages</b></p> <p>... the photomontages understate the probable visual impact of the wind turbine arrays</p> <p>If there are no conditions under which visual impact would be unacceptable, a genuine judgment cannot be made</p>
7	<p><b>Residential viewpoints</b></p> <p>We find it unacceptable that your assessment concludes there were no areas where the wind farm would create unacceptable visual impacts. I am unable to find an area in the report where you define unacceptable, in our view the visual impacts from Viewpoint RVPS (House #C34) will be unacceptable if the towers are to be lit in the same fashion as the Gunning towers.</p> <p>...Gunning has 15 turbines and the Impact of 15 red flashing lights at night time is substantial. We point out that this DA application proposes up to 200 turbines and that number of red flashing lights spread across such a large area will have an enormous impact. Anyone living within a line of sight of these turbines will be forced to have special window treatments to block out these lights if installed, no mention of support or compensation for this action.</p>

In response to the submissions, some wind turbine locations and the associated infrastructure have been revised by Yass Valley Wind Farm Pty Ltd (YVWF). A response to the submissions raised in discussed in Chapter 7.

The following report will discuss the change in the landscape and visual impact for the Current Proposal and respond to relevant submissions.

### 1.3 The Current Proposal

As presented in the Environmental Assessment the Yass Valley Wind Farm proposal would involve the construction and operation of a wind farm. The Current Proposal includes:

- Up to 148 wind turbines across the Coppabella and Marilba precincts;
- Internal site access tracks and minor upgrades to existing public roads required for the installation and maintenance of the wind turbines;
- Electrical connection between the turbines and on-site substations using a combination of underground and overhead power lines;
- Overhead power lines connecting the on-site substations to the nearby TransGrid transmission lines; and
- An onsite operation and maintenance facility
- Additional temporary construction activities and infrastructure such as a temporary construction compound, concrete batching plant and storage areas would be required during the construction and refurbishment phases.

The proposed wind turbine specifications for the Current Proposal remain consistent with those within the EA Application.



## 1.4

### LVIA Methodology

The methodology adopted as part of the original LVIA within the EA Application has not been changed to assess the Current Proposal. The methodology is reproduced below.

#### ***The visual components of the Yass Valley Wind Farm***

*Describing the visual components of the Yass Valley Wind Farm. These include, but are not limited to, wind turbines, substations and access roads.*

#### ***Statutory context***

*Describing the planning policies and plan provisions that apply to the site and the surrounding areas.*

#### ***Perception studies***

*Understanding peoples' perception of wind farms in the landscape based upon past research in Australia and overseas, is an important step in assessing the visual impact. Wind farms are unusual in that they are perceived as positive elements in many landscapes by a great majority of viewers. This is dissimilar to the acceptance of any other infrastructure within the landscape, which is generally perceived as negative. Therefore it is important that this perception data is understood and that it is recognised as a factor that needs to be considered when assessing the extent of visual impact. The results of several overseas studies, which share similar findings to the Australian studies, are appended to this report (Refer Annexure A).*

#### ***The Viewshed and Zones of Visual Influence***

*Defining the viewshed of the Yass Valley Wind Farm based upon the parameters of human vision. The rationale behind the definition of the viewshed is appended to this report (Refer Annexure B) which also describes the parameters of human vision, which assists in defining the viewshed.*

#### ***Landscape Units and Sensitivity***

*Landscape Units are based on the physical characteristics of the area within the viewshed. The characteristics that assist in defining the Landscape Units include geology, vegetation, topography and drainage patterns as well as the extent of man-modifications and urban development.*

*The sensitivity of the landscape units is primarily an assessment of the extent to which the landscape units can accept further change. Generally, the greater the extent of existing man-modifications, the lesser the sensitivity.*

*However when assessing residential properties the landscape sensitivity is always rated as high.*

#### ***Seen Area Analysis***

*The Geographical Information Systems software (GIS) can map those areas from which wind turbines, whole or in part, are visible. This is referred to as a Seen Area Analysis.*

#### ***Assessment of publicly accessible viewpoints***

*The visual impact of a development is affected by:*

- the distance of the viewer from the development;*
- the nature of the surrounding landscape (including the landscape units represented and their sensitivity); and*
- the number of viewers able to see the development.*

*Accordingly, the overall effect of the development of the proposed wind farm on each viewpoint has been assessed by evaluating the value of each of those criteria, ranking those as being either low, medium, or high, and subsequently making an assessment as to the overall effect by balancing each of those criteria and deriving an overall visual impact along a scale of effects.*

*The scale of effects that has been used to describe the overall visual impact (low moderate, high) is discussed in Chapter 7 'Assessment of the visual impact from publicly accessible viewpoints'.*

*As assessment of the visual impact from indicative viewpoints within the public domain is partly based on photomontages which show the view of the existing landscape and the alteration to this view to include the proposed wind farm. These have also been used to show a range of sequential impacts on viewers travelling along the Hume Highway, along Burley Griffin Way and near the Hume & Hovell Walking Track to the south of the Hume Highway.*

#### **Mitigation Measures for Publicly Accessible Viewpoints**

*Mitigation measures are also considered if such measures may be appropriate in reducing the visual impact from a publicly assessable viewpoint. For example, roadside planting along a section of highway may significantly reduce the visual impact.*

#### **Residential Viewpoints**

*Locating and assessing the visual impact from residential properties. Residences are usually selected that are representational of properties within precincts around the wind farm (with priority given to those that are closest to the wind farm) or who have expressed particular concerns.*

*The assessment of visual impact from residences is different to one undertaken from publicly accessible viewpoints. An assessment of visitor numbers is not applicable. The landscape sensitivity is always rated as "high", as it must be recognised that people feel most strongly about the view from their house and from their outdoor living spaces.*

#### **Mitigation Measures for Residential Viewpoints**

*Mitigation measures have also been considered and these will be evaluated to see how they may reduce the visual impact from residences.*

#### **Cumulative Visual Impact**

*Examining the cumulative visual impact of the Yass Valley Wind Farm against other approved or existing wind farms. A cumulative visual impact will occur when either sequential and/or simultaneous views to wind turbines from publicly accessible viewpoints or from private viewing locations lead to a change in a community's, resident's or visitor's perception of the Yass locality.*

#### **Implication of night lighting**

*Discuss the implication of night lighting and assess the level of impact based on past studies.*

### **1.4.2**

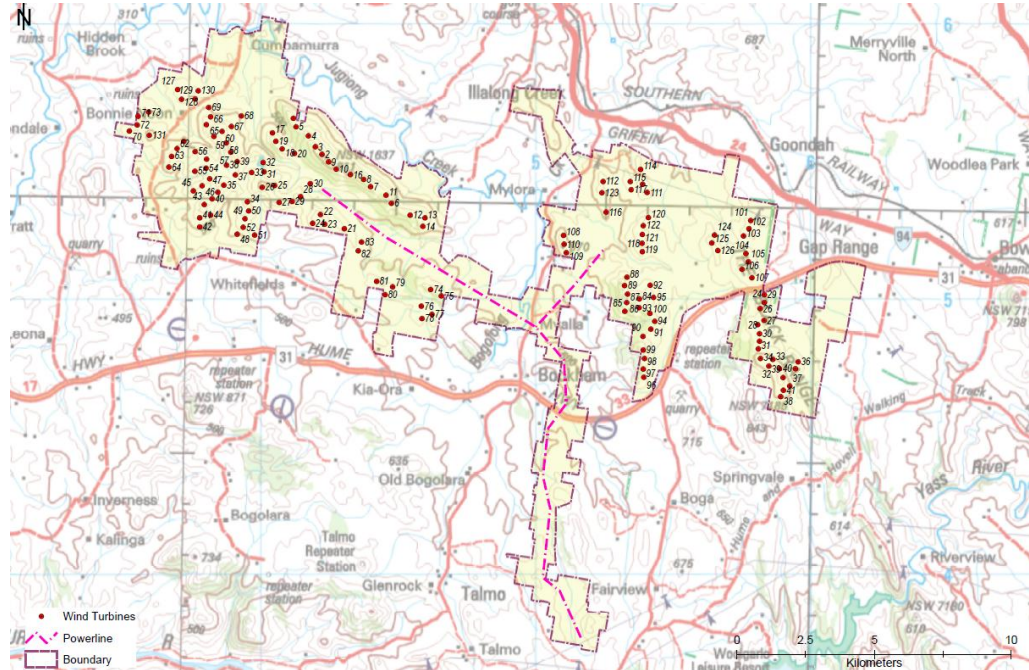
#### **Photomontages**

In order to assess the change in landscape and visual impact, photomontages were prepared based on the photographs included in the LVIA. The photomontages used within this report have been prepared by Yass Valley Wind Farm Pty Ltd.

## 2 PROJECT DESCRIPTION

The Yass Valley Wind Farm is located to the west of Yass and to the north and south of the Hume Highway. It consists of two precincts the Coppabella Hills Precinct (west) and the Marilba Hills Precinct (east). *Figure 4-1* shows the site layout for the Current Proposal with the external powerline route connecting to the grid is proposed as shown in *Figure 4-1*.

**Figure 2-1 Site layout – Current Proposal**



**Figure 2-2 Site layout - EA Application**



The wind turbines that were initially proposed within the Carrolls Ridge Precinct are not part of this current application.

The main implication for the Current Proposal is the reduction in the overall number of wind turbines from 152 (EA Application) to 148 (Current Proposal) for the Coppabella Hills and the Marilba Hills Precincts. *Table 2-1* compares the number of proposed wind turbines in the EA Application and the Current Proposal.

**Table 2-1** Comparison of number of wind turbines proposed

	Coppabella Hills Precinct	Marilba Hills Precinct
	<i>Number of wind turbines proposed</i>	
EA Application	86	66
Current Proposal	87	61

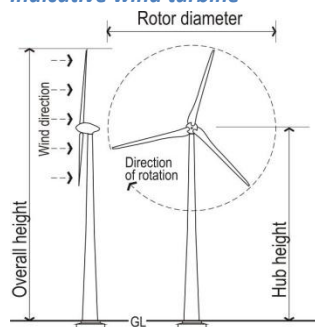
The wind turbine locations have been optimised for the two precincts with one additional wind turbine proposed within the Coppabella Precinct and five fewer wind turbines proposed in the Marilba Hills Precinct.

## 2.1 Visual components of the Current Proposal

The wind turbines are the most visually apparent element of a wind farm. The wind turbines within the Current Proposal are consistent to the size specifications as shown in the EA Application and are reproduced in *Figure 2-3*.

**Figure 2-3**

*Indicative wind turbine*



ITEM	Maximum Values
Hub Height	100 metres (Approx.)
Rotor Diameter	100 metres (Approx.)
Overall Height	150 metres (Approx.)
Proposed number of turbines	148 wind turbines

### *Access tracks, ancillary operations areas & substation(s)*

The Current Proposal also includes a switchyard and substation compound located within the site. The substation compound would be approximately 100 m x 100 m and enclosed by a 2.4 m high security fence and perimeter screen planting. Most structures will be less than 6 m high with the highest structure would be less than 12 m high.

There will be a number of access tracks, approximately 6 to 10 m wide that will allow for the construction of the turbines and provide access for ongoing maintenance. Where practicable, these access tracks will utilise existing farm tracks. Cabling to each wind turbine will be underground and will generally follow the access tracks.

External overhead powerlines will be supported on mono pole structures built of timber, steel or concrete.

***Aviation obstacle lighting***

In the EA Application it was expected that up to 40 turbines may have required aviation obstacle lighting. It is noted that the installed aviation obstacle lighting on the nearby Cullerin Range Wind Farm has been recently decommissioned.

It is now expected that there will be no requirement of aviation obstacle lighting due to the physical separation between the Current Proposal and the closest airports. Given no aviation obstacle lighting is proposed within the Current Proposal, there is no requirement for a visual assessment of night lighting.

### 3 THE VIEWSHED

As in the LVIA, the viewshed of the Current Proposal is based on the overall height of the proposed wind turbines and the parameters of human vision. Given that the overall height of the wind turbines remains at 150 m, the viewshed will extend to a distance of 17 km wherein a wind turbine will take up 5% of the vertical field of view. Refer to LVIA within the EA Application for a more detailed explanation.

#### 3.1 The Zones of Visual Impact

Within the viewshed there are differing Zones of Visual Impact (ZVI). The ZVI for the Current Proposal is shown in Figure 3-1.

Figure 3-1 Zones of Visual Impact for the Current Proposal

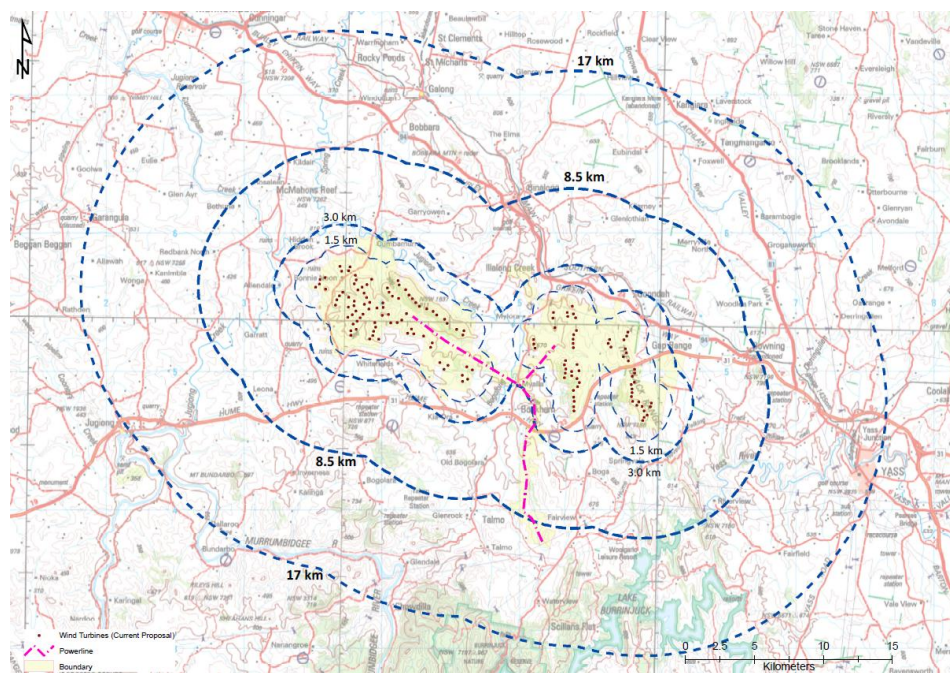


Table 3-1 reproduces the ZVI within the LVIA.

Table 3-1 Zones of Visual Impact

Distance of an observer to nearest wind turbine	Zones of visual influence
>17km	<i>Outside the viewshed</i>
8.5-17km	<i>Visually insignificant</i> <i>A very small element which are difficult to discern and will be indistinct in different lighting and weather conditions.</i>
3-8.5km	<i>Potentially noticeable, but will not dominate the landscape.</i> <i>The degree of visual intrusion will depend on the landscape sensitivity and the sensitivity of the viewer; however the proposed wind turbines will not dominate the landscape.</i>
1.5 – 3km	<i>Highly visible and will usually dominate the landscape</i> <i>The degree of visual intrusion will depend on the wind turbines' placement within the landscape and factors such as foreground screening.</i>
<1.5km	<i>Will be visually dominant in the landscape from most viewing locations.</i> <i>The degree of visual intrusion will only be reduced by screening by nearby vegetation or buildings.</i>

### 3.2 Landscape Units and Sensitivity

The LVIA outlined five landscape units within the viewshed. Table 3-2 reproduces the table outlining the sensitivity of the landscape units within the viewshed of the Yass Valley Wind Farm from the LVIA within the EA Application.

**Table 3-2** *Landscape Units and Sensitivity*

Landscape Unit	Sensitivity
Unit 1 Gently Undulating and Flat Cleared Farmland	<b>Low</b> This unit is highly modified, contains visible infrastructure, is not topographically dramatic and does not contain large areas of water.
Unit 2 Steeply Undulating Cleared Farmland	<b>Medium</b> This landscape is largely cleared of vegetation however the steeply folded hills create an appealing landscape.
Unit 3 Forested Hills	<b>Medium to High</b> This landscape is attractive
Unit 4 Rural Townships	<b>Medium</b> The concentration of houses increases the visual sensitivity of this landscape unit.
Unit 5 Recreation Resorts	<b>High</b> Used for recreation and to enjoy views of the landscape.

### 3.3 Implications

Overall, there is a minor change to the extent of the viewshed of the proposed wind farm under the Current Proposal in comparison to the EA Application.

The landscape units and sensitivity within the revised viewshed will remain consistent with those described within the LVIA.

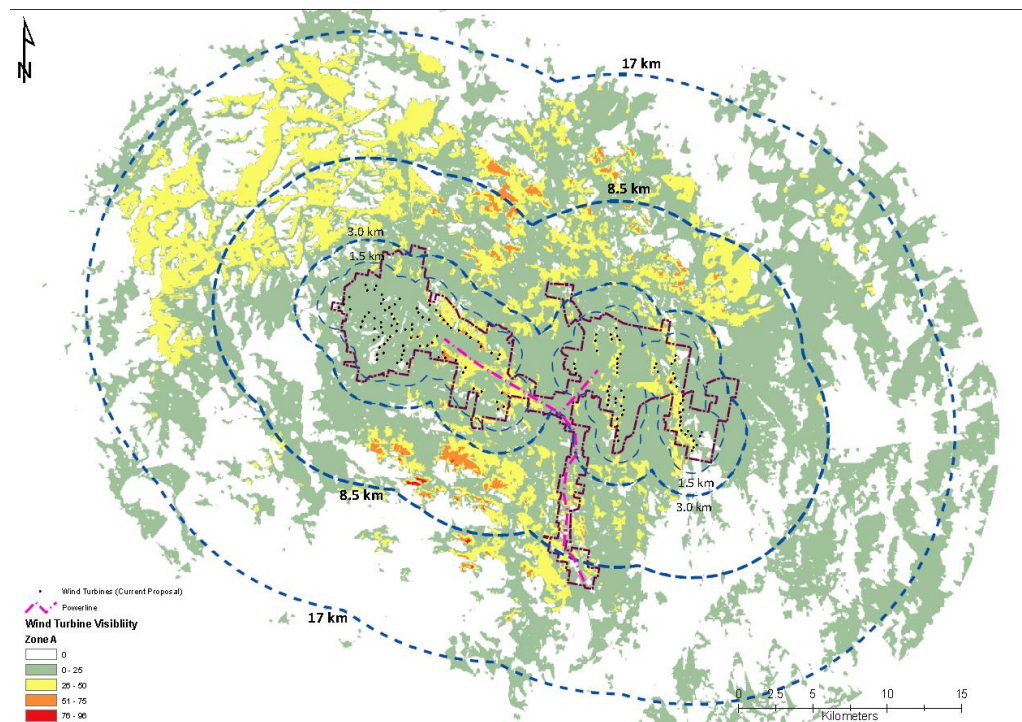
## 4 SEEN AREA ANALYSIS

A Seen Area Analysis (SAA) was part of the initial EA Application. This assessment has been redone to show from which of the surrounding areas a viewer can potentially see either entire wind turbines or part of wind turbines. It is stressed that these seen area analysis diagrams are based solely on topography and do not take into account the screening by vegetation or by buildings. An A3 enlarged version of the SAA undertaken for the Current Proposal is enclosed in *Annex A*.

### 4.1 Visibility of entire wind turbines

Figure 4-1 shows those areas that a viewer can potentially see entire wind turbines.

Figure 4-1 Zone A – Whole wind turbine (Source: YVWF)



In those areas surrounding the wind farm viewers can typically see up to 50 wind turbines in their entirety (yellow areas). In the green areas a viewer could potentially see up to 25 wind turbines in their entirety. These areas are less extensive than shown in the EA Application.

In part the extent of visibility reflects the relatively undulating character of the surrounding landscape. Again it is stressed that this analysis does not take into account vegetation and building structures.

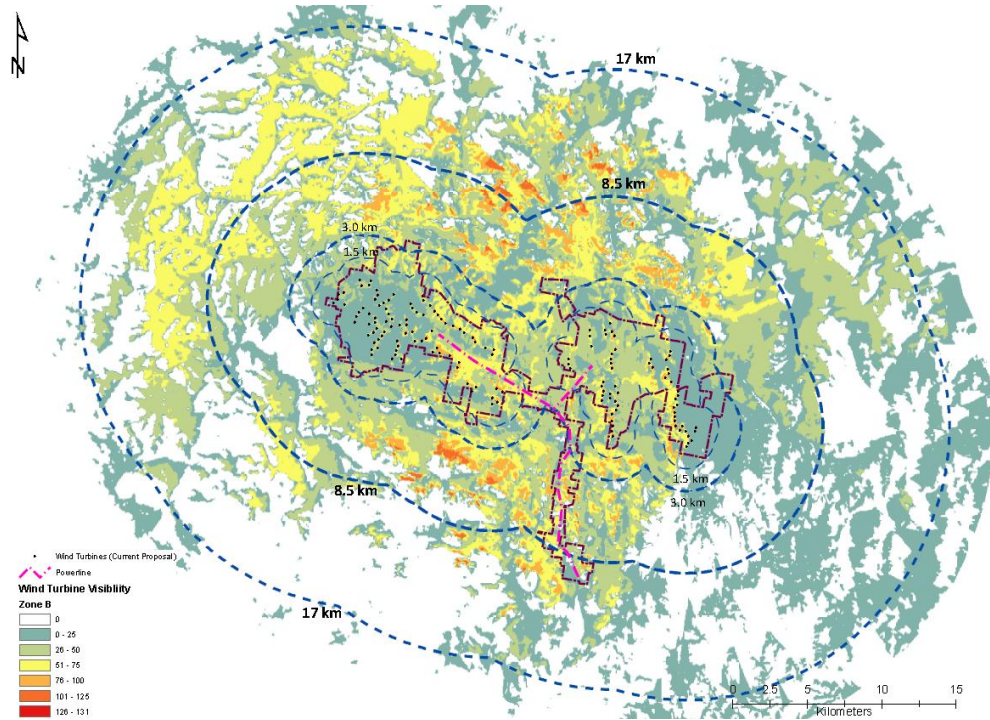
### 4.2 Visibility of part or whole of the swept path of the rotor

Figure 4-2 shows those areas that a viewer can potentially see the entire swept path of the rotor on the proposed wind turbines.



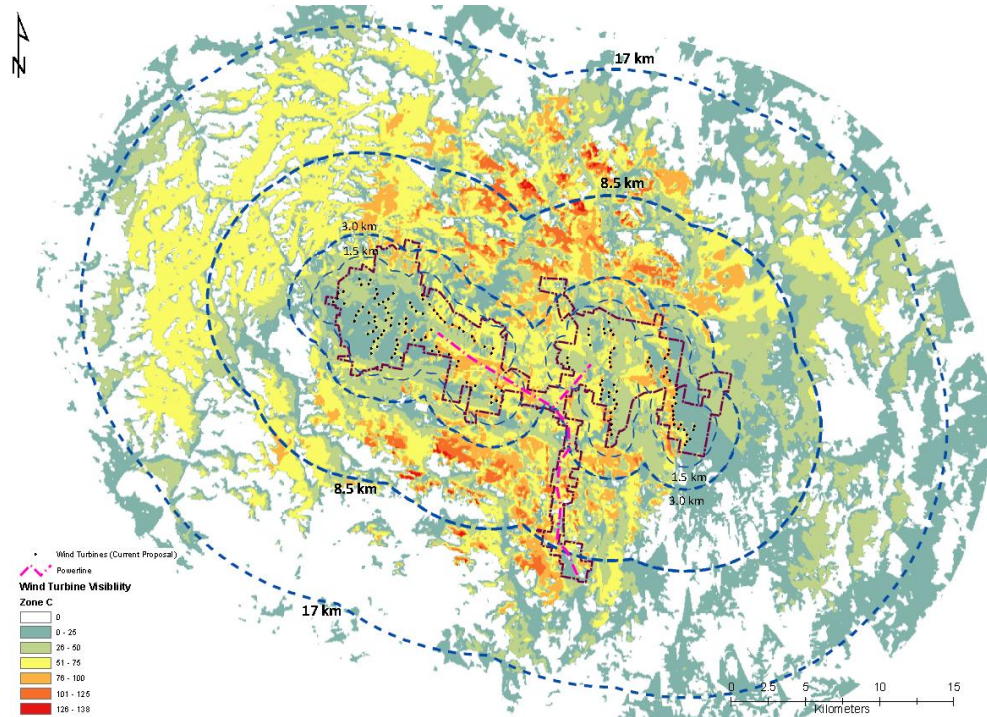
Figure 4-3 shows those areas that a viewer can potentially see the half of the swept path of the rotor (from the nacelle upwards) on the proposed wind turbines.

Figure 4-2 Zone B – Whole swept path of turbine (Source: YVWF)



Text

Figure 4-3 Zone C – hub and above of wind turbine (by YVWF)



Once again the areas affected are less than those shown in the initial EA Application and the overall pattern is also similar with those areas potentially able to see more wind turbines located to the north and south of the wind farm.

### 4.3

#### The relevance of this analysis

The nature of the surrounding landscape means that there are no locations within the 18 km viewshed from where viewers can potentially see all of the wind turbines in their entirety and there are very few locations within the viewshed that will view all of the proposed wind turbines from the nacelle and above. This remains unchanged since the EA Application.

This Seen Area Analysis led to the selection of the initial viewpoints within the EA Application. In this amended application there are now areas, mainly in the south adjacent to the Carrolls Ridge precinct, where there are now areas from which a viewer will not have any potential views of the proposed wind turbines. However in the main the areas from which wind turbines were visible in the EA Application and in the current proposal are similar.

For this reason and for the sake of clarity the viewpoints that were selected in the initial EA Application have also been discussed in the re-assessment of this Current Proposal.

## 5 ASSESSMENT OF VISUAL IMPACT

In the EA Application, a qualitative assessment of visual impact was undertaken from the following locations:

- Publicly accessible viewpoints
- Sequential viewpoints
- Residential viewpoints

Revised photomontages have been prepared to illustrate the Current Proposal from three viewpoints based on photographs shown in the LVIA. The preparation methodology for these is consistent with that described within the LVIA which is reproduced below:

- *The methodology used in the creation of the photomontages includes a computer model of the existing topography and the wind turbines and this model is then overlaid on the photographs of the existing view. Wind turbines from this model are then rendered for the “after” view.*
- *Generally the field of view for photomontages is approximately 60° horizontal and 15° vertical. The rationale behind this field of view is set out in Annexure B.*
- *It is stressed that the small images used within the report are only for referencing comments made within the text. While technically correct, they do not accurately portray a perceptually accurate image to assess the visual impact. For this reason larger (A3) images are appended to this report (Annexure C) however while these are better, a proper assessment of the visual impact can be made when the images are produced at A0 sizes and held at arm’s length.*

Enlarged version of the revised photomontages comparing the EA Application and the Current Proposal are enclosed in *Annex B*.

The following section will discuss the change in the assessment of visual impact for the Current Proposal, if any.

### 5.1 Publicly accessible viewpoints

Figure 5-1 shows the location of the publicly accessible viewpoints and the Current Proposal.

Figure 5-1 Publicly accessible viewpoints (Current Proposal for wind farm)

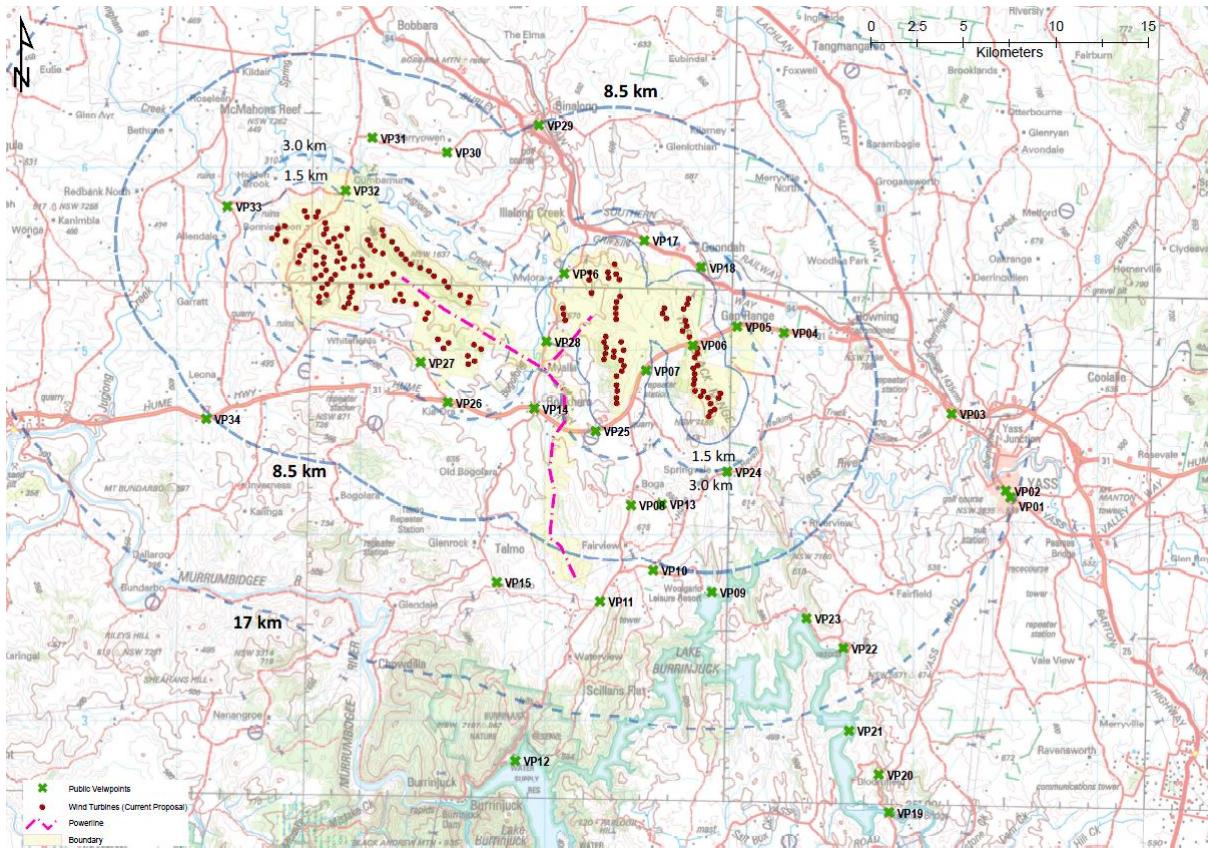


Table 5-1 compares the visual impact change between the EA Application and the Current Proposal from publicly accessible viewpoints.

Those viewpoints which have had an alteration in the assessed level of visual impact are highlighted in red.

Table 5-1 Comparison summary assessment of publicly accessible viewpoints

VP	Dominant landscape units and sensitivity	Viewer numbers	Distance to nearest turbine (approx.) EA App	Overall visual impact EA Application	Distance to nearest turbine (approx.) Current Prop	Overall visual impact Current Prop
1	4 - Medium	High	16.7 km - W	Negligible	16.7 - NW	Negligible
2	4 - Medium	High	16.4 km - W	Nil	16.3 - NW	Nil
3	1 - Low	High	12.6 km - W	Minor	12.5 - W	Minor
4	1 - Low	Low on Graces Flat Road High on the Hume Highway	4.7 km - W	Minor	4.7 - SW	Minor
5	2 & 1 - Medium	High	2.4 km - NW	Medium	2.4 - SW	Medium

VP	Dominant landscape units and sensitivity	Viewer numbers	Distance to nearest turbine (approx.) EA App	Overall visual impact EA Application	Distance to nearest turbine (approx.) Current Prop	Overall visual impact Current Prop
6	2 - Medium	High	300 m - SE	Medium	0.3 - SE	Medium
7	2 - Medium	High	1.2 km - W	Medium	1.2 - NW	Medium
8	2 - Medium	Medium	4.5 km - S	Medium	5.6 - N	Medium
9	5 & 2 - High - Medium	Medium	4.5 km - SW	Medium	9.5 - N	Minor
10	2 & 3 - Medium	Medium	1.7 km - SW	Medium	8.9 - NE	Minor
11	- High	Medium	814 m - SE	Medium	10.8 - N	Minor
12	3 - High	High	4.5 km - NE	Nil	20.2 - NE	Nil
13	3 - High	Low	4.9 km - SW	Minor	5.4 - NE	Minor
14	2 - Medium	High	4.3 km - NW	Medium	4.1 - NW	Medium
15	2 - Medium	Low	6.2 km - E	Minor	11.7 - NE	Minor
16	2 - Low	Low	1.3 km - E	Minor	1.3 - E	Minor
17	2 - Medium	High	2.3 km - SW	Medium	2 - SW	Medium
18	2 - Medium	High	1.8 km - SW	Medium	1.7 - SE	Medium
19	2 - Medium	Low	16.5 km - NW	Minor	23.6 - NW	Negligible
20	2 - Medium	Low	15.3 km - NW	Minor	21.5 - NW	Negligible
21	2 - Medium	Low	13.3 km - NW	Nil	18.7 - NW	Nil
22	2 - Medium	High	11.9 km - NW	Nil	14.5 - NW	Nil
23	5 - High	Low	9.7 km - W	Nil	12.1 - NW	Nil
24	2 - Medium	Low	3.2 km - NW	Minor	3.1 - NW	Minor
25	2 - Medium	High	2.3 km - NE	Minor	1.9 - NE	Minor
26	2 - Medium	High	2.4 km - NE	Minor	2.3 - NE	Minor
27	1 - Low	Low	1.5 km - NE	Minor	1.4 - NE	Minor
28	2 - Medium	Low	1.5 km - NE	Minor	1.5 - NE	Minor
29	1 - Low	Medium	8.0 km - SW	Minor	8.4 - SE	Minor
30	4 & 2 - Medium	Low	5.5 km - SW	Minor	5.4 - SW	Minor
31	2 - Medium	Low	5.1 km - S	Minor	4.9 - SW	Minor
32	2 - Medium	Low	2.4 km - S	Minor	1.8 - SW	Minor
33	2 - Medium	Low	3.5 km - SE	Minor	2.9 - SE	Minor
34	2 - Medium	High	7.7 km - NE	Minor	8.8 - NE	Minor

Of the 34 viewpoints that were assessed as part of the EA Application, six of these have been re-assessed at a lower level of visual impact. There are no locations where wind turbines are

located substantially closer to an identified viewpoint. This reduction in visual impact has been the result of a major increase in the distance to the nearest visible wind turbine.

Where minor changes in distance to the nearest wind turbine have occurred as a result of the alterations in the current layout, the visual impact remains unchanged. For example if the nearest wind turbine in the EA Application assessment was 4.9 km and it is now 5.4 km and the visual impact would be assessed equally.

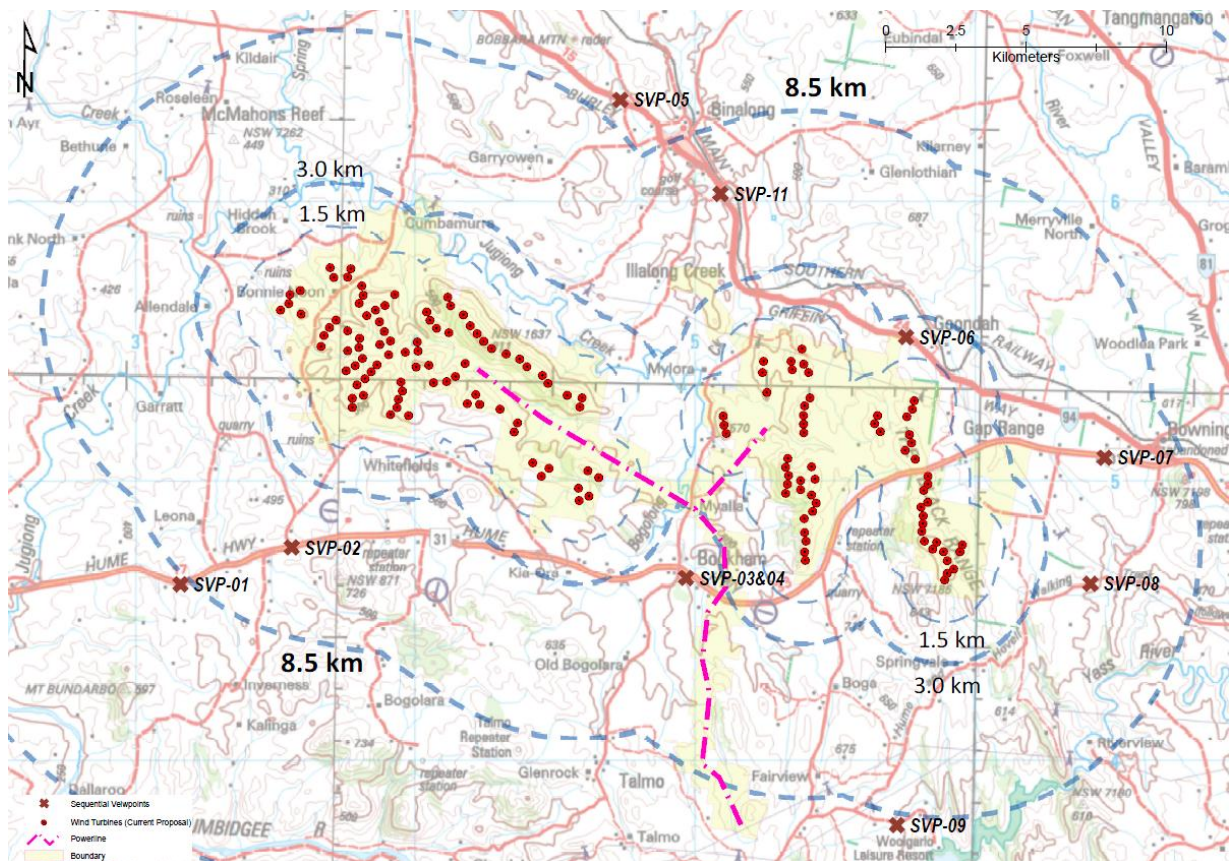
However where distance to the nearest wind turbine increases dramatically, say from 1.7 km to a distance of 8.9 km, the visual impact is less, based solely on this increased distance.

## 5.2 Sequential viewpoints

Sequential viewpoints (SVP's) were selected from locations along the Hume Highway, along Burley Griffin Way and from the local road network to the south of the Hume Highway serving Lake Burrinjuck.

Figure 5-2 shows the location of the sequential viewpoints and the Current Proposal.

**Figure 5-2** Sequential viewpoints (Current Proposal for wind farm)



The original viewpoints that were assessed as part of the EA Application were:

- SVP1, SVP2, SVP3 look at the sequential views for a traveller heading east on the Hume Highway towards Yass. SVP7 was taken from the Hume Highway looking west.
- SVP5, SVP6 and SVP11 examined the views from Burley Griffin Way for a traveller heading south towards Yass.
- SVP8, SVP9 and SVP10 examined the views from locations near the Hume & Hovell Walking Track which parallels Black Range Road.
- Two photomontages (SVP1 and SVP2) have been re-done to examine the likely change in visual impact with the reduction in turbine numbers and particularly the removal of the wind turbines within the Carrolls Ridge Precinct.

### 5.2.1 SVP1 – Hume Highway

For travellers heading east towards Yass and using the Hume Highway the wind farm will firstly appear to the north and then closer to Yass, wind turbines will be visible on both sides of the Highway. Figure 5-3 and Figure 5-4 show the view from a location approximately 44 km

from Yass. An A3 enlarged version of the photomontages comparing the EA Application and the Current Proposal is enclosed in *Annex B*.

**Figure 5-3** EA Application - SVP1 Photomontage



**Figure 5-4** Current Proposal - SVP1 Photomontage



In the EA Application the closest wind turbines were approximately 7.6 km to the north and are visible on the left of *Figure 5-3*.

*Figure 5-4* shows that in the Current Proposal these wind turbines have been removed and the nearest wind turbines are now 8.8 km to the north east. These wind turbines are still visible on the ridge to the right hand side of *Figure 5-4*. In assessing the sequential impact there would only be a minor reduction in visual impact.

Other turbines would also be visible to the right of these wind turbines and these are further away and remain in the current proposal. The turbines will remain in view as a traveller moves closer to Yass.

### 5.2.2 SVP2 – Hume Highway

SVP2 is taken from a location on the Hume Highway approximately 37 km from Yass. From this location, for a viewer looking north through breaks in the roadside vegetation, the nearest wind turbines parallel the Highway and take up more than a 120° field of view. The nearest group of wind turbines which are visible on the left of *Figure 5-5* are approximately 7 km from the Highway. An A3 enlarged version of the photomontages comparing the EA Application and the Current Proposal is enclosed in *Annex B*.



**Figure 5-5**      **EA Application - SVP2 - Photomontage**



**Figure 5-6**      **Current Proposal - SVP2 - Photomontage**



The wind turbines in Figure 5-6 continue parallel to the Highway approximately 6 – 7 km from the roadway. There would only be a minor reduction in visible impact with the removal of the wind turbines to the left.

There would only be minor changes to the arrangements of wind turbines that were visible to the right of this panorama. The visual impact would remain unchanged.

These two viewpoints illustrate that there would be a minor and inconsequential change to the sequential views for a traveller moving through the region and a similar minor change is expected for travellers on Burley Griffin Way and walkers on the Hume & Hovell Walking Track as assessed in the EA Application.

### 5.3 Residential viewpoints

Figure 5-7 shows the location of the residential viewpoints and the Current Proposal.

Figure 5-7 Residential viewpoints (Current Proposal for wind farm)

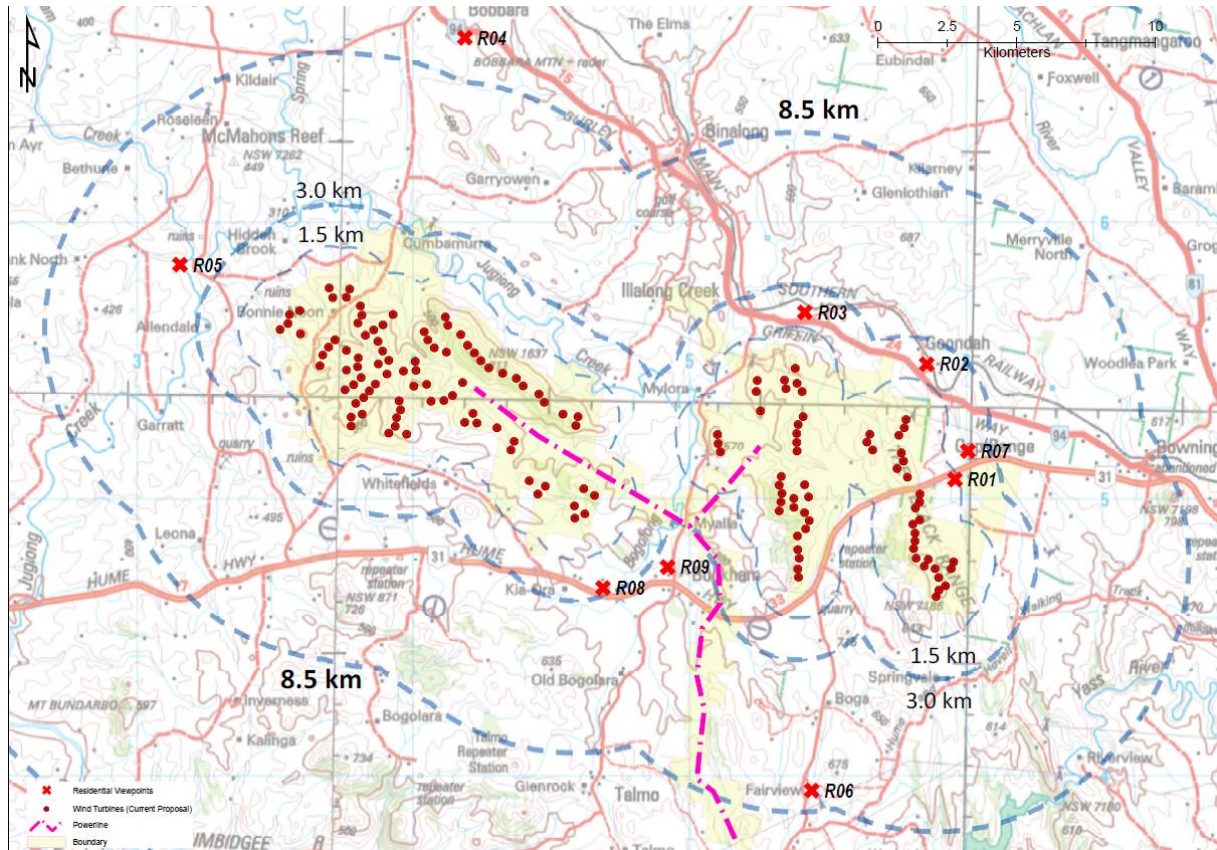


Table 5-2 compares the visual impact change between the EA Application and the Current Proposal from residential viewpoints.

Table 5-2 Comparison summary assessment of residential viewpoints

VP #	Distance to nearest wind turbine EA Application	Overall visual impact EA Application	Direction to nearest wind turbine Current Proposal	Overall visual impact Current Proposal
R1	1.3 km - S	Low – without screening Existing screening	1.3 km - SW	Low – without screening Existing screening
R2	2.1 km - S	Low – without landscape mitigation Screening may not be appropriate	2.1 km - SW	Low – without landscape mitigation Screening may not be appropriate
R3	2.2 km - S	Low – without landscape mitigation Screening may not be appropriate	2 km - S	Low – without landscape mitigation Screening may not be appropriate
R4	10 km - S	Negligible – without landscape mitigation Extensive existing screening	9.9 km - SW	Negligible – without landscape mitigation Extensive existing screening
R5	4.5 km - SE	Medium - without landscape mitigation	4.3 km - SE	Medium - without landscape mitigation

VP #	Distance to nearest wind turbine EA Application	Overall visual impact EA Application	Direction to nearest wind turbine Current Proposal	Overall visual impact Current Proposal
R6	2.4 km to the South	Low – without screening	No turbines to the south.	Not applicable
	8.1 km to the north	Existing screening	7.7 km - N	Existing screening
R7	2.3 km - S	Negligible – Existing vegetation around gallery Medium – Bamboo garden without mitigation Low – Eco village site	2.3 km - SW	Negligible – Existing vegetation around gallery Medium – Bamboo garden without mitigation Low – Eco village site
R8	2.7 km - N	Low - without landscape mitigation	2.7 km - NW	Low - without landscape mitigation
R9	3.8 km - NW	Medium - without landscape mitigation	3.5 km - NW	Medium - without landscape mitigation

The assessment of visual impact from residential properties remains unchanged from that assessed within the LVIA except for the reduction in impact from one residential property at discussed in residential viewpoint R6. In this instance, the nearest wind turbines were approximately 2.4 km to the south in the EA Application and these turbines, which were part of the Carrolls Ridge Precinct, have been removed. The nearest wind turbines are now some 7.7 km to the north.

The similarity in the visual impact for many other of the residential viewpoints is shown by the following example of Viewpoint R5.

## 5.3.1

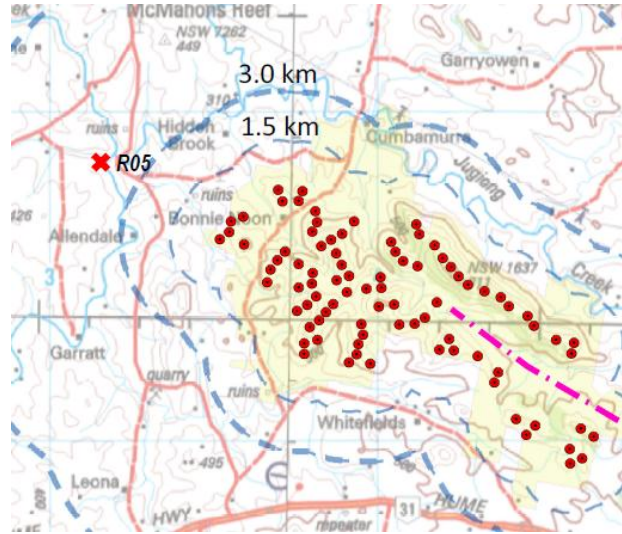
## Viewpoint R5 – “Naranghi” (House #C54)

“Naranghi” (House #C54) is located north west of the Coppabella Hills.

The nearest wind turbine COP74 is 4.5 km to the south-east.

The dwelling sits on a hill located to the east of a small creek.

Figure 5-8 shows the location of the existing dwelling with Jugiong Creek visible to the right of this photograph.



VP R5 (0631542, 6158496, E313)

Figure 5-8

Shows the existing vegetation surrounding the residence



The existing house is orientated to the east across the creek. However from the rear yard there are views to the wind turbines in the Coppabella Hills precinct to the south-east.

**Figure 5-9** EA Application - View from the entry driveway to the south east



Existing vegetation will filter the view to the wind turbines from some locations within this garden. However, from this location the existing trees frame the Coppabella Hills.

**Figure 5-10** EA Application – RVP5 - Photomontage



The photomontage shows the proposed wind turbines on the Coppabella Hills. Because of the views from the dwelling and the front verandah, the overall visual impact from this residence was assessed as medium within the EA Application. An A3 enlarged version of the photomontages comparing the EA Application and the Current Proposal is enclosed in *Annex B*.

**Figure 5-11** Current Proposal – RVP5 - Photomontage

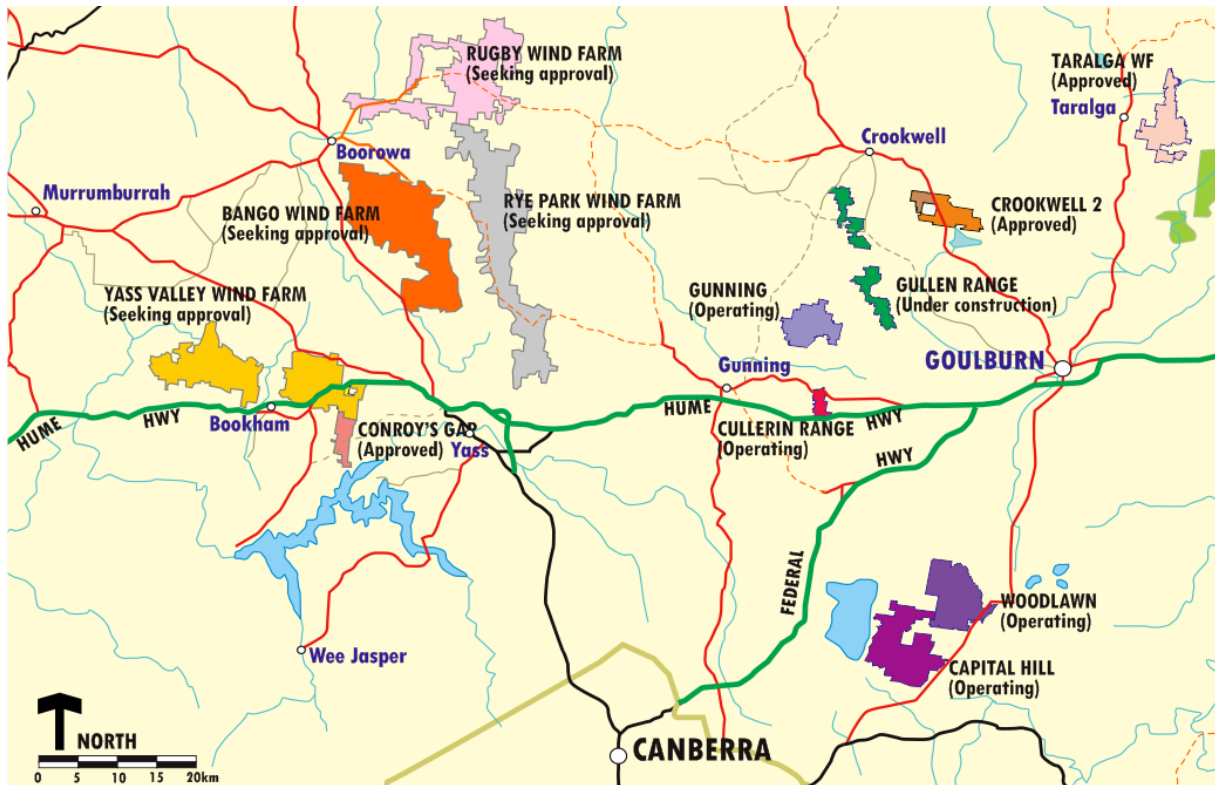


Although the photomontage shows the turbines removed from the ridge on the right a similar group or wind turbines will be located to the left and behind the tree in *Figure 5-11*. As these wind turbines would be more visible if the vantage point was moved a little to the left, a similar level of visual is assessed for both the initial EA Application and the current proposal.

## 6 CUMULATIVE VISUAL IMPACT

The presence of multiple wind farms in an area can create a cumulative visual impact. Since the EA Application, several wind farms have been proposed in the region. *Figure 6-1* shows the approved, proposed and existing wind farms in the vicinity of the Yass Valley Wind Farm.

**Figure 6-1** Existing and proposed wind farms



Operating wind farms in the area include the Crookwell 1, Cullerin Range, Woodlawn, Capital Hill and Gunning wind farms. Conroy’s Gap Wind Farm is the nearest approved wind farm to the Yass Valley Wind Farm and comprises of 15 turbines. Apart from Conroy’s Gap Wind Farm (shown in *Figure 6-1*) other existing and approved wind farms lie more than 50 km further to the east. The Gullen Range Wind Farm is currently under construction and over 60km east of the Yass Valley Wind Farm proposal.

Several wind farms are also proposed in the area such as the Bango Wind Farm, Rye Park Wind Farm and the Rugby Wind Farm. *Table 6-1* lists the existing and proposed wind farms in the vicinity of the Yass Valley Wind Farm and their location is shown in *Figure 6-1*.

**Table 6-1** Existing and proposed wind farms in the area

Project and Location	Proponent	Project Capacity	No. of Turbines	Status
Bango Wind Farm	Wind Prospect	200 MW	100	Proposed
Capital WF, Bungendore	Renewable Power Ventures	126 MW	63	(Operational)
Conroys Gap WF	Origin Energy	30 MW	15	(DA approved)

Project and Location	Proponent	Project Capacity	No. of Turbines	Status
Crookwell 1 WF, near Crookwell	Delta Electricity	4.8 MW Built 1997	8	(Operational)
Crookwell 2 WF, near Crookwell	TME	92 MW	46	(DA approved)
Cullerin WF, near Goulburn	Origin Energy	30 MW	15	(Operational)
Gullen Range WF, near Gunning	Gullen Range Wind Farm P/L	Up to 278 MW	84	(Under construction)
Gunning WF, near Gunning	Delta Electricity	64 MW	32	(Operational)
Rugby Wind Farm	Windlab & Repower Australia	166 MW	52	Proposed
Rye Park Wind Farm	Epuron	200 MW?	100	Proposed
Taralga WF, near Taralga	RES Southern Cross	186 MW	62	(DA approved)
Woodlawn WF, near Tarago	Wind Energy JV	50 MW	25	(Operational)

## 6.1 Change in perception

The main cumulative visual impact is that which changes a visitor's or residents perception of an area through which they are travelling.

This is brought about by sequential and/or simultaneous views of multiple wind farms. The greatest chance of changing a viewer's perception of an area is when these views are available from the highways and roads that people use.

### 6.1.1 Views from towns and regional centres

There are no locations within the township of Yass where one can perceive the Yass Valley Wind Farm. Therefore as there are no views to multiple wind farms from Yass there would be no direct cumulative impact on the township of Yass.

The Yass Valley Wind Farm would be visible from the townships of Bookham and Bowning and there are limited views from Binalong. However there would be no township location where the proposed Conroy's Gap wind farms would add to the impact of the Yass Valley Wind Farm. Therefore there would be no cumulative impact on the townships in the viewshed of the Yass Valley Wind Farm.

### 6.1.2 View from main highways

Travellers along the Hume Highway will pass by the Gullen and Cullerin Range Wind Farm more than 50 km to the east of the Yass Valley Wind Farm site once they are constructed.

However as has been demonstrated previously, views from the Hume Highway to the Yass Valley Wind Farm are limited to the road between Bowning and some distance west of Bookham. The only wind farm with the potential to increase a viewer's exposure to wind farms in this area is the Conroy's Gap Wind Farm on the same range of hills. This would appear as part of the Yass Valley Wind Farm for viewers travelling along the Hume Highway and local roads. Therefore it would only be expected to marginally add to the visual impact of the Yass Valley Wind Farm.

For these reasons, whilst it may be possible for more than one wind farm to be viewed while travelling through the Yass Valley, the cumulative impact would be minimal.

### 6.1.3 Views from minor / local roads

There may be a cumulative visual impact for users of roads running near the Yass Valley Wind Farm and continuing past other wind farms. However these are typically small gravel roads, serving local farms and the cumulative impact would be negligible.

### 6.1.4 Views from residential dwellings

There will be simultaneous and sequential views of the proposed Yass Valley Wind Farm and the approved Conroy's Gap Wind Farm. The most effected residential properties will be those that are located to the east and west of the Conroy's Gap Wind Farms.

An initial assessment has also shown that many of these houses are well screened by existing vegetation. Therefore the combination of few locations and this existing vegetation would lead to the assumption that the likely cumulative visual impact is probably low.

Residents to the north and south of Conroy's Gap Wind Farm will be potentially more affected by the proposed Yass Wind Farm and Conroy's Gap. From these locations turbines from both wind farms may be silhouetted against each other. However where this where to occur, it would be difficult to differentiate the Conroy's Gap and Yass Valley wind turbines and they would therefore appear as the one wind farm.

Therefore the additional visual impact will be relatively low in comparison to the level of impact that these properties will incur from the presence of the nearest wind turbines.

## 6.2 Overall cumulative impact

This assessment of the cumulative visual impact of the Yass Valley Wind Farm has concluded that there would be minimal cumulative visual impact and that the changes to peoples' perception of the surrounding area would not be significantly changed by the presence of multiple wind farms in the locality.

However there would be no change to the assessment if these were not constructed as any impact that does occur, is present because of the adjacent location of the Marilba Hills Precinct and the Conroy's Gap Wind Farm. The presence of the Coppabella Precinct adds little to the (minimal) cumulative impact of the wind turbines at these two locations.



## 7 RESPONSE TO SUBMISSIONS

A response to the relevant landscape and visual amenity submissions is discussed in *Table 7-1*.

**Table 7-1** *Response to submissions on landscape and visual amenity impacts*

Item	Submissions raised	Response
1	<p><b>Loss of visual amenity and rural character</b></p> <p><i>adverse impacts on tourism and traveller amenity and on potential for rural residential development</i></p>	<p>Many studies have shown that the majority of people do not object to wind turbines in any but the most pristine landscapes. Therefore the presence of the Yass Valley Wind Farm is not expected to impact on tourism and traveller amenity.</p> <p>A similar finding is also relevant for rural residential.</p>
2	<p><b>Size and scale of wind farm</b></p> <p><i>the unprecedented size and scope of the project in NSW and the consequent impact on the hosting district, including 90 non-involved residences within 5 km of the proposed wind farm precincts, several villages, two towns and the visual gateway to the Yass Shire along the Hume Highway from the Riverina</i></p> <p><i>... people find it difficult to comprehend the imposing size and scale of a modern industrial wind turbine in the landscape.</i></p>	<p>See above.</p> <p>Most people have now seen wind turbines in the landscape and the approval rating has increased in those areas where wind farms have been commissioned.</p>
3	<p><b>Cumulative visual impact</b></p> <p><i>flawed analysis of the pervasive cumulative visual impact, especially relating to poor presentation of visual impacts of giant wind turbines at close viewing distances along public roadways</i></p> <p><i>It is inevitable that there will be a large cumulative visual impact on the immediate vicinity (in particular, at distances under 5 km) due to the high number of wind stations proposed. The turbines are inherently conspicuous structures that have been intentionally located in prominent positions. The visual effect of the wind turbines will be pervasive in the district to the south of Binalong, along the Hume Highway, along NSW state road Burley Griffin Way to Harden, minor sealed roads (Illalong) and numerous unsealed routes.</i></p>	<p>The analysis tries to explore the effect of the wind turbines on both sequential viewpoints along the major highways through the region. It is recognised within the EA Application that <i>“the small images used within the report are only for referencing comments made within the text. While technically correct, they do not accurately portray a perceptually accurate image to assess the visual impact. For this reason larger (A3) images are appended to this report (Annexure D) however while these are better, a proper assessment of the visual impact can be made when the images are produced at A0 sizes and held at arm’s length.”</i> (EA Application, LVIA page 3)</p> <p>There is a visual impact but for the reasons stated above the visibility of wind turbines not necessarily mean that there is a high cumulative impact.</p>

Item	Submissions raised	Response
4	<p><b>Night lighting</b></p> <p><i>insufficient information given in relation to obstacle lighting, preventing assessment of the adverse impact of night obstacle lighting on traffic, and in causing degradation of the night sky</i></p> <p><i>CASA have advised the project that about 50 aircraft obstacle lights may be needed to fulfil its safety requirements. This is roughly one strobing high-powered obstacle light for approximately every third wind station.</i></p>	<p>Not required as night lighting is not proposed.</p> <p>Not required as night lighting is not proposed.</p>
5	<p><b>Viewpoint selection</b></p> <p><i>Instead, the proponent generates a selective shortlist of locations and uses photomontages with an unusual choice of aspect ratios, camera lens angles, and printing formats to support its arguments that the visual impact is "low to medium" at every viewing location in the affected district.</i></p> <p><i>Locations chosen are highly selective and sometimes hard to understand. The visual impact over more than 20 kilometres of Burley Griffin Way is represented by only a few photomontage locations.</i></p>	<p>The use of 34 viewpoints plus additional viewpoints is not a selective shortlist. Most locations that were chosen were chosen for their potential to see the wind farm.</p> <p>Panoramas are of necessity of different viewing angles as sometimes the panorama has to show 90° and at other times over 180° field of view. It is recognised that this automatically changes the "apparent" size of wind turbines and for this reason a 60° field of view is always constructed for the area which has the closes wind turbines.</p> <p>Refer to Section 5 for photomontage preparation methodology.</p> <p>It is impossible to take photographs from all locations. However, the viewpoints selected were from locations that would represent the worst case locations, where wind turbines were visible.</p>
6	<p><b>Photomontages</b></p> <p><i>... the photomontages understate the probable visual impact of the wind turbine arrays</i></p> <p><i>If there are no conditions under which visual impact would be unacceptable, a genuine judgment cannot be made</i></p>	<p>Refer quote above and the LVIA for the EA Application.</p> <p>In past applications viewpoint locations have had high levels of visual impact. The assessment of unacceptable has to balance other criterion besides visual (e.g. Policy and potential for mitigation).</p>
7	<p><b>Residential viewpoints</b></p> <p><i>We find it unacceptable that your assessment concludes there were no areas where the wind farm would create unacceptable visual impacts. I am unable to find an area in the report where you define unacceptable, in our view the visual impacts from Viewpoint RVPS (House #C34) will be unacceptable if the towers are to be lit in the same fashion as the Gunning towers.</i></p> <p><i>...Gunning has 15 turbines and the Impact of 15 red flashing lights at night time is substantial. We point out that this DA application proposes up to 200 turbines and that number of red flashing lights spread across such a large area will have an enormous impact. Anyone living within a line of sight of these turbines will be forced to have special window treatments to block out these</i></p>	<p>Unacceptable is not a level of impact. Visual impact is assessed as high, medium or low. Acceptability or unacceptability is a balanced assessment of a number of criteria.</p> <p>Night lighting is not required in the Current Application.</p>

Item	<i>Submissions raised</i>	Response
	<i>lights if installed, no mention of support or compensation for this action.</i>	

## 8

**CONCLUSION**

In summary, the landscape and visual impact assessment within the EA Application is supported by this response to the submissions.

The initial EA Assessment concluded that *“that the proposed Yass Valley Wind Farm will have a generally low visual impact on its surrounds, and the site is a suitable landscape for the construction of a wind farm.*

This conclusion was based on:

- *Perception studies which continually show that the majority of viewers do not object to the construction of wind turbines on any but the most sensitive and localised landscapes. This is supported by the social research undertaken not only for the Yass Valley Wind Farm but also for other wind farms.*
- *Targeted social research on perception was also undertaken by the proponent and has clearly demonstrated that there is a very high level of support for wind farms amongst local residents in the area with 89% supporting wind farms on the Southern Tablelands and 71% supporting wind farms within 1km of their residence.*
- *The proposed Yass Valley Wind Farm site is located in a man-modified landscape. The landscape units in the viewshed are well represented across this area. Agricultural activity, associated structures and other signs of human intervention have also created a landscape that can absorb other changes.*
- *There is low visual impact on townships. There are limited locations from which long distance views are available from the townships of Yass to the east and the villages of Bowning and Binalong to the east and north-east. The visual impact from these towns would be negligible. There is also minimal to no visibility of the wind turbines from other smaller settlements in the area.*
- *The main visibility is from major roads. The Hume Highway, to the south and the Burley Griffith Way to the north are two major roads within the region. Although there will be views from these two highways the overall impact is expected to be medium due to the predominately medium landscape sensitivity.*
- *There will be a visual impact on viewers using the minor roads within the locality especially where these run along the wind farm precincts. These un-made roads run along and through the different precincts within the Yass Valley Wind Farm. Visibility from these minor roads, which have far fewer users than the highways and main roads, is sometimes, but not always, restricted by roadside vegetation, however there is no doubt that there will be extensive views from this road network. It is considered that the visual impact will be minor from these locations predominately because the viewer numbers are low. The addition (or removal) of the Carrols Ridge Precinct will make no difference to the impact from these minor roads, except from roads that run adjacent to the Carrols Ridge Precinct wind turbines..*
- *The zone of greatest potential visual impact for residential properties lies within three kilometres of the nearest wind turbine. There are 26 non-participatory residences within 3 km of the two precincts within the current Project Application for Development Approval. This increases by a further 7 houses to a total of 33 non-participatory residences, when the wind turbines within the Carrols Ridge Precinct are also included. However many of these existing residences have screening in the form of wind breaks. Landscape mitigation can be effective in lessening the visual impact on residential properties without existing screening.*
- *The cumulative visual impact of the proposed Yass Valley Wind Farm with other wind farms in the area is expected to be no greater than the visual impact of the Yass Valley Wind Farm by itself.*

*Users of the Hume Highway and Burley Griffin Way will, in the future, pass other sites, and there is the probability that the acceptance levels will reduce. There is no doubt that this will be the case for users of the Hume Highway to the south, where there is the potential for sequential views to be afforded by the Yass Valley Wind Farm and the proposed Conroy's Gap Wind farm.. Further away travellers will pass the Cullerin Range Wind Farm. The addition (or removal) of the wind turbines within the Carrols Ridge Precinct, will make little difference to the cumulative impact on Highway users as these additional wind turbines, should they be approved within a future Development Approval, will be read as part of the Conroy's Gap Wind Farm.*

- *The level of cumulative visual impact for users of Burley Griffin Way would be less as there are few opportunities for sequential wind farm views. It is therefore assessed as being a low adverse visual impact. The presence of the Carrols Ridge Precinct would make no difference to any assessment of the cumulative visual impact from this Highway.*
- *There are few local roads where multiple wind farms become visible, either sequentially or simultaneously and as it is these viewing experiences that can change peoples' perception of an area. Therefore the visual impact is no greater than that assessed from individual viewpoints and that the cumulative visual impact is considered to be low.*

This Current Application also does not include any night time lighting.

Therefore the conclusions within the EA Application are still relevant to the overall visual impact of the Current Proposal.



## **Annex A - SEEN AREA ANALYSIS**





## **Annex B - PHOTOMONTAGES**







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