

NOTES:

The ZVI methodology is a purely geometric assessment where the visibility of the proposed Rye Park wind farm is determined from carrying out calculations based on a digital terrain model of the site and the surrounding terrain.

This assessment methodology is assumed to be conservative as the screening affects of any structures and vegetation above ground level are not considered in any way. Therefore the wind farm may not be visible at many of the locations indicated on the ZVI maps due to the local presence of trees, vegetation or other screening potential. While the ZVI maps are a useful visualisation tool, they are very conservative in nature.

Additionally, the number of turbines visible at any one time is also affected by the weather condition at the time. Inclement or cloudy weather tends to mask the visibility of the proposed wind project.

LEGEND:

Number of wind turbine tip of blade visible

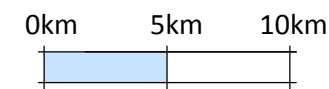
- 121 - 126
 - 101 - 120
 - 81 - 100
 - 61 - 80
 - 41 - 60
 - 21 - 40
 - 1 - 20
- Involved residential dwelling within 2 km of wind turbine
 - Involved residential dwelling beyond 2 km of wind turbine
 - Uninvolved residential dwelling within 2 km of wind turbine
 - Uninvolved residential dwelling between 2 km and 5 km of wind turbine
 - Uninvolved residential dwelling between 5 km and 10 km of wind turbine
 - Non residential structure
 - Proposed Rye Park wind turbine (indicative layout)
 - Distance from proposed Rye Park wind turbine

Figure 25
ZVI Diagram 2 Hub height

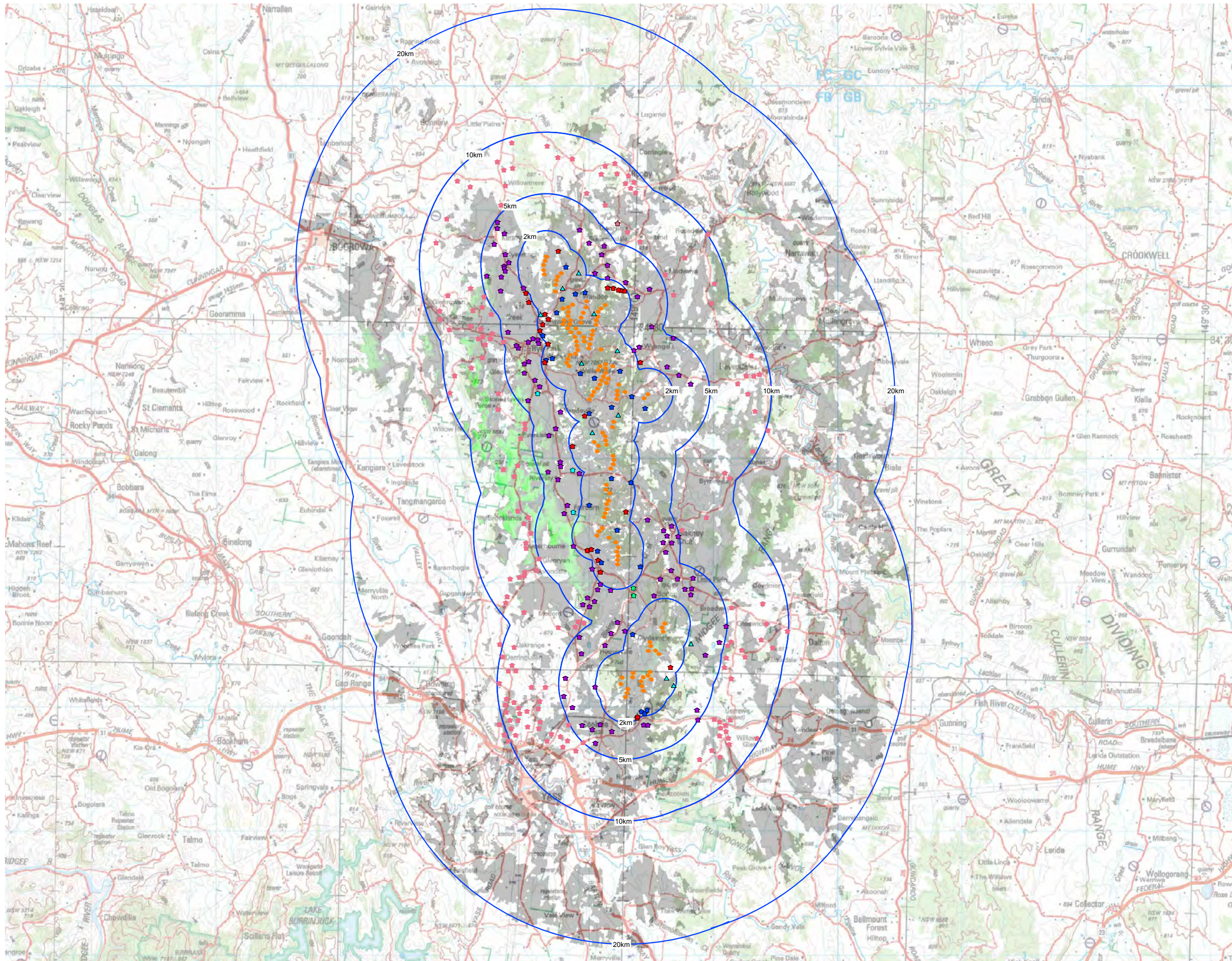
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Additionally, the number of turbines visible at any one time is also affected by the weather condition at the time. Inclement or cloudy weather tends to mask the visibility of the proposed wind project.

LEGEND:

Number of whole wind turbines visible

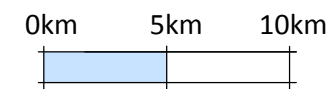
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- Non residential structure
- Proposed Rye Park wind turbine (indicative layout)
- Distance from proposed Rye Park wind turbine

Figure 26
ZVI Diagram 3 whole turbines

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This assessment methodology is conservative as:

- the screening effects of any structures and vegetation above ground level are not considered in any way. Therefore the wind farm may not be visible at many of the locations indicated on the ZVI diagrams due to the local presence of trees or other screening materials.
- additionally, the number of turbines visible is also affected by the weather conditions at the time. Inclement or cloudy weather tends to mask the visibility of the proposed wind project.

Accordingly, while ZVI diagrams are a useful visualisation tool, they are very conservative in nature.

7.5 ZVI summary

The most extensive and continuous area of visibility toward the project turbines would generally occur where the tips of the wind turbine rotor blades are visible above surrounding ridgelines or vegetation; however, views toward the tips and upper portions of the wind turbine rotors are likely to become less noticeable at reasonably short distances from the wind farm due to the screening influence of topography and dense tree cover. Views toward tip of blade are visually negligible from medium to longer distance view locations.

The ZVI diagrams for 'tip' and 'hub height' cover similar extents of landscape surrounding the wind farm, and extend toward isolated pockets of rural landscape beyond 10 km of the nearest wind turbine. The number and distribution of turbines visible between 'tip' and 'hub' height is influenced by ridgelines and surrounding hills for a number of areas between the 5 km to 10 km distance offsets.

The ZVI diagrams illustrate areas of landscape which are likely to offer views toward the wind turbines and demonstrate that the majority of views generally occur within private property and across tracts of unoccupied rural landscape.

The ZVI diagrams also illustrate a number of discrete pockets within portions of the 5 km to 10 km distance offset from which the wind turbines would not be visible, although this band of the viewshed also represents areas from which a greater number of turbines would also be visible.

The ZVI diagrams illustrate that the influence of surrounding landform begins to disperse visibility from beyond 5 km, although opportunities to view turbines from elevated, but moderately distant and generally unoccupied areas occur from areas beyond 5 km.

It should be noted that the wind turbines, when viewed from distances of around, or greater than 10 km, will generally be less distinct from other distant elements within the same field of view, and that the majority of land within the viewshed comprises rural agricultural land and areas of dense timber growth.

7.6 Visibility

The level of wind turbine visibility within the Rye Park wind farm 10 km viewshed can result from a number of factors such as:

- distance effect;
- movement;
- relative position; and
- weather.

7.6.1 Distance effect

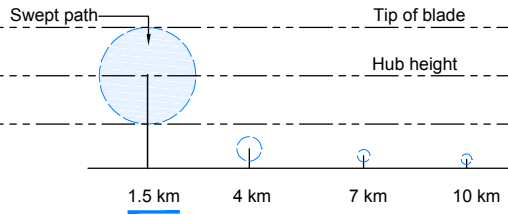
With an increase in distance the proportion of a person's horizontal and vertical view cone occupied by a visible turbine structure, or group of turbine structures, will decline. In order to demonstrate this a series of single frame photographs have been taken from pre-set distances (1.5 km, 4 km, 7 km and 10 km) toward wind turbines at the Capital wind farm in New South Wales. The photographs, illustrated in **Figure 27**, demonstrate the degree to which the apparent visible height of a wind turbine decreases with increasing distance (in a negative exponential relationship), and the increasing amount of horizontal skyline visible with an increasing distance.

As the view distance increases so do the atmospheric effects resulting from dust particles and moisture in the atmosphere, which makes the turbines appear to be grey thus potentially reducing the contrast between the wind turbines and the background against which they are viewed.

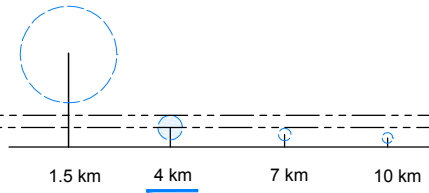
Whilst the distance between a view location and the wind turbines is a significant factor to consider when determining potential visibility, there are other issues which may also affect the degree of visibility. **Table 11** outlines the relative effect of distance on visibility and has been based on empirical



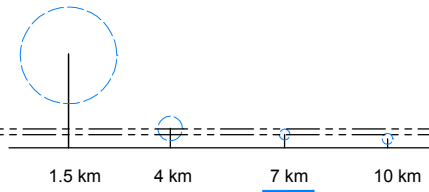
Capital Wind Farm - View distance 1.5 km



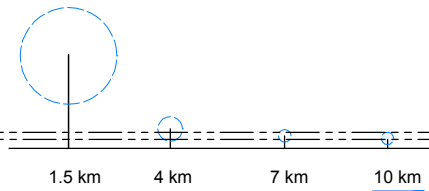
Capital Wind Farm - View distance 4 km



Capital Wind Farm - View distance 7 km



Capital Wind Farm - View distance 10 km



Capital Wind Farm turbines: Suzlon88,
80 m hub height, 88 m rotor diameter

Photographs: Pentax K10D, 50mm lens

Figure 27
Distance effect

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research conducted by the University of Newcastle (2002) as well as direct observations made during wind farm site inspections.

Table 11 – Distance effect

Distance from turbine	Distance effect
>20 km	<p>Wind turbines become indistinct with increasing distance. Rotor movement may be visible but rotor structures are usually not discernible.</p> <p>Turbines may be discernible but generally indistinct within viewshed resulting in Low level visibility and Nil where influenced or screened by surrounding topography and vegetation.</p>
10 km – 20 km	<p>Wind turbines noticeable but tending to become less distinct with increasing distance. Blade movement may be visible but becomes less discernible with increasing distance.</p> <p>Turbines discernible but generally less distinct within viewshed (potentially resulting in Low level visibility).</p>
5 km – 10 km	<p>Wind turbines visible but tending to become less distinct depending on the overall extent of view available from the potential view location. Movement of blades discernible where visible against the skyline.</p> <p>Turbines potentially noticeable within viewshed (potentially resulting in Low to Moderate level visibility).</p>
3 – 5 km	<p>Wind turbines clearly visible in the landscape but tending to become less dominant with increasing distance. Movement of blades discernible.</p> <p>Turbines noticeable but less dominant within viewshed (potentially resulting in Moderate level visibility).</p>
1 – 3 km	<p>Wind turbines would generally dominate the landscape in which the wind turbine is situated. Potential for high visibility depending on the category of view location, their location, sensitivity and subject to other visibility factors.</p> <p>Turbines potentially dominant within viewshed (potentially resulting in Moderate to High level visibility).</p>
<1 km	<p>Wind turbines would dominate the landscape in which they are situated due to large scale, movement and proximity.</p> <p>Turbines dominant and significant within viewshed (potentially resulting in High level visibility).</p>

7.6.2 Movement

The visibility of the wind turbines would vary between the categories of static and dynamic view locations. In the case of static views the relationship between a wind turbine and the landscape would not tend to vary greatly. The extent of vision would be relatively wide as a person tends to scan back and forth across the landscape.

In contrast views from a moving vehicle are dynamic as the visual relationship between wind turbines is constantly changing, as is the visual relationship between the wind turbines and the landscape in which they are seen. The extent of vision can be partially constrained by the available view from within a vehicle at proximate distances.

7.6.3 Relative position

In situations where the view location is located at a lower elevation than the wind turbine, most of the turbine would be viewed against the sky. The degree of visual contrast between a white coloured turbine and the sky would depend on the presence of background clouds and their colour. For example, dark grey clouds would contrast more strongly with white turbines than a background of white clouds.

The level of visual contrast can also be influenced by the position of the sun relative to individual wind turbines and the view location. Where the sun is located in front of the viewer some visible portions of the wind turbine would be seen in shadow. If the background to the wind turbine is dark toned then visual contrast would tend to be reduced. Conversely where the sun is located behind the view location then the visible portion of the wind turbine would be in full sun.

Significance of visual impact

Section 8

8.1 Introduction

The significance of visual impact resulting from the construction and operation of the Rye Park wind farm would result primarily from a combination of:

- the overall sensitivity of visual receptors in the surrounding landscape; and
- the scale or magnitude of visual effects presented by the wind farm development.

The sensitivity of visual receptors has been determined and described in this LVIA by reference to:

- the location and context of the view point;
- the occupation or activity of the receptor; and
- the overall number of people affected.

This LVIA notes that although a large number of viewers in a category that would otherwise be of low or moderate sensitivity may increase the sensitivity of the receptor, it is also the case that a small number of people (such as residents) with a high sensitivity may increase the significance of visual impact.

Table 12 – View Location Sensitivity

View Category	Sensitivity
Residential Properties	Highest Sensitivity
Pedestrians (recreational)	▽
Public Recreational Space	▽
Rural employment/farming	▽
Motorists	▽
Business (commercial)	▽
Industry	Lower Sensitivity

Table 13 – Numbers of viewers

Criteria	Definition
Number of viewers	
High	> 400 people per day
Medium to high	100 - 399 people per day
Medium	50 - 99 people per day
Low	10 - 25 people per day
Very low	< 10 people per day

The scale or magnitude of visual effects associated with the project have been determined and described by reference to:

- the distance between the view location and the wind farm turbines;
- the duration of effect;
- the extent of the area over which the wind farm could be theoretically visible (ZVI hub height)
- the degree of visibility subject to existing landscape elements (such as forested areas or tree cover).

An overall determination of visual impact at each view location has also been assessed and determined against the criteria outlined in **Table 14** below:

Table 14 – Sensitivity and magnitude assessment criteria

Criteria	Definition
Distance	
Very short	<1 km
Short	1 – 3 km
Medium	3 km – 5 km
Long	5 km - 10 km +
Duration of effect	
High	> 2 hours
Medium	30 - 120 minutes
Low	10 – 30 minutes
Very low	< 10 minutes
Extent of visibility	

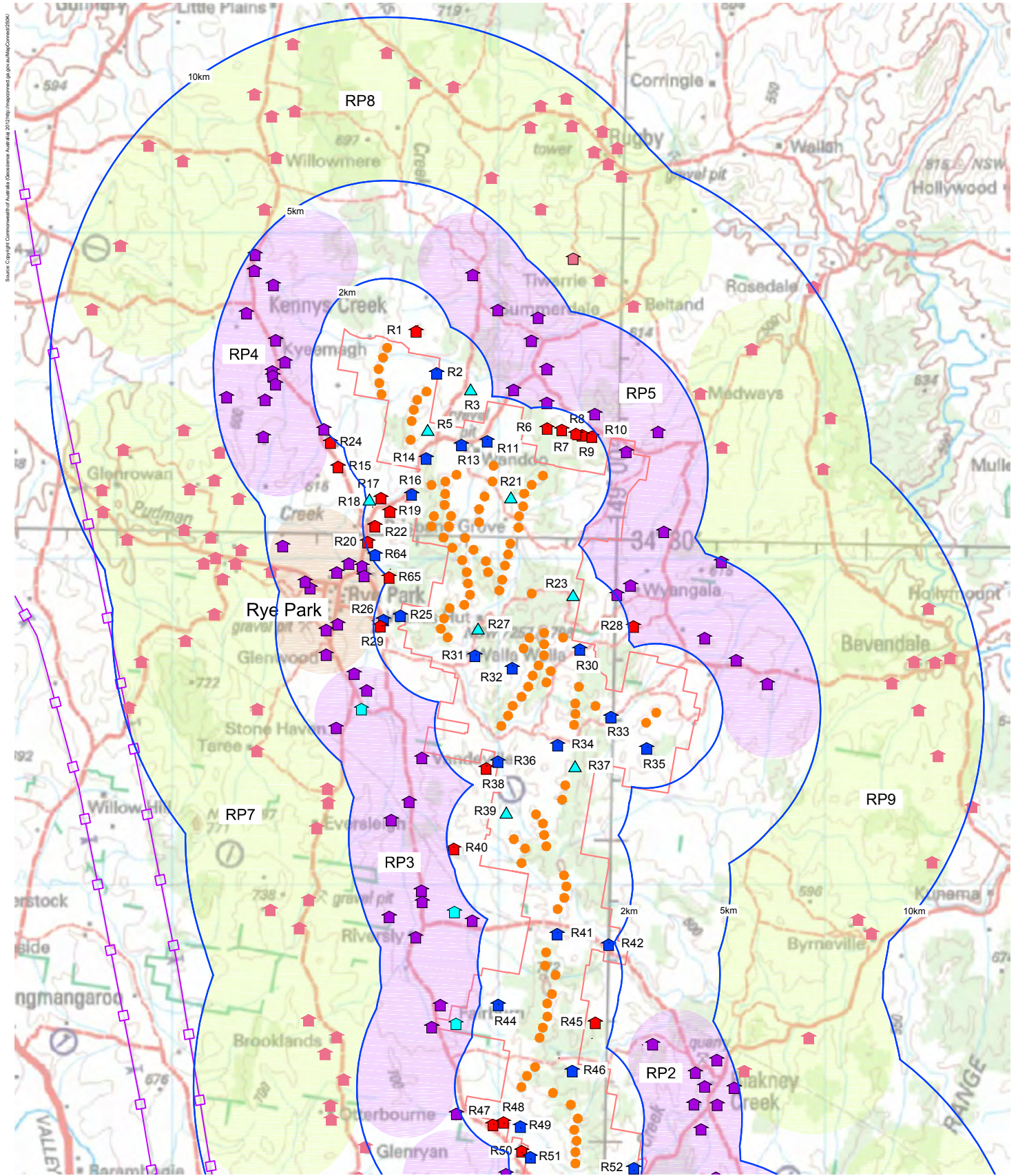
Criteria	Definition
High	81 -126 wind turbines visible
Medium	41 – 80 wind turbines visible
Low	21 – 40 wind turbines
Very low	1 – 20 wind turbines visible

The levels of view sensitivity and scale or magnitude of change outlined in **Table 15** is used as a guide to determine levels of visual significance.

Table 15 Visual significance matrix

		Scale or magnitude of change in view caused by proposed development				
		High	Medium	Low	Very Low	
		Very short distance view over a long duration of time. A high extent of wind turbine visibility would tend to dominate the available skyline view and significantly disrupt existing views or vistas.	Short to medium distance views over a medium duration of time. A moderate extent of wind turbine visibility would have the potential to dominate available views with visibility recessing over increasing distance.	Medium to long distance views over a low to medium duration of time. Wind turbines in views, at long distances or visible for a short duration not expected to be significantly distinct in the existing view.	Visible change perceptible at a very long distance, or visible for a very short duration, and/or is expected to be less distinct within the existing view.	
Sensitivity of visual receptor	High	Indicator Large numbers of viewers or those with proprietary interest and prolonged viewing opportunities such as residents and users or visitors to attractive and/or well-used recreational facilities. Views from a regionally important location whose interest is specifically focussed on the landscape	High	Medium to High	Medium	Low to Medium
	Medium	Medium numbers of residents and moderate numbers of visitors with an interest in their environment e.g. visitors to State Forests, such as bush walkers and horse riders etc.... Larger numbers of travellers with an interest in their surroundings	Medium to High	Medium	Low to medium	Low
	Low	Low numbers of visitors with a passing interest in their surroundings e.g. those travelling along principal roads. Viewers whose interest is not specifically focussed on the landscape e.g. workers, commuters.	Medium	Low to Medium	Low	Very low to low
	Very Low	Very low numbers of viewers or those with a passing interest in their surroundings e.g. those travelling along minor roads.	Low to Medium	Low	Very low to low	Very low

This table is used as a guide only. The descriptions of magnitude and sensitivity are illustrative only. Each case is assessed on its own merits using professional judgement and experience, and there is no defined boundary between levels of impacts.



Legend

- Involved residential dwelling within 2 km of wind turbine
- Involved residential dwelling beyond 2 km of wind turbine
- Uninvolved residential dwelling within 2 km of wind turbine
- Uninvolved residential dwelling between 2 km and 5 km of wind turbine
- Uninvolved residential dwelling between 5 km and 10 km of wind turbine
- ▲ Non residential structure
- Proposed Rye Park wind turbine (indicative layout)
- (Distance from proposed Rye Park wind turbine
- Existing powerline
- Area between 2 km and 5 km of wind turbines
- Area between 5 km and 10 km of wind turbines

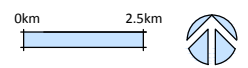
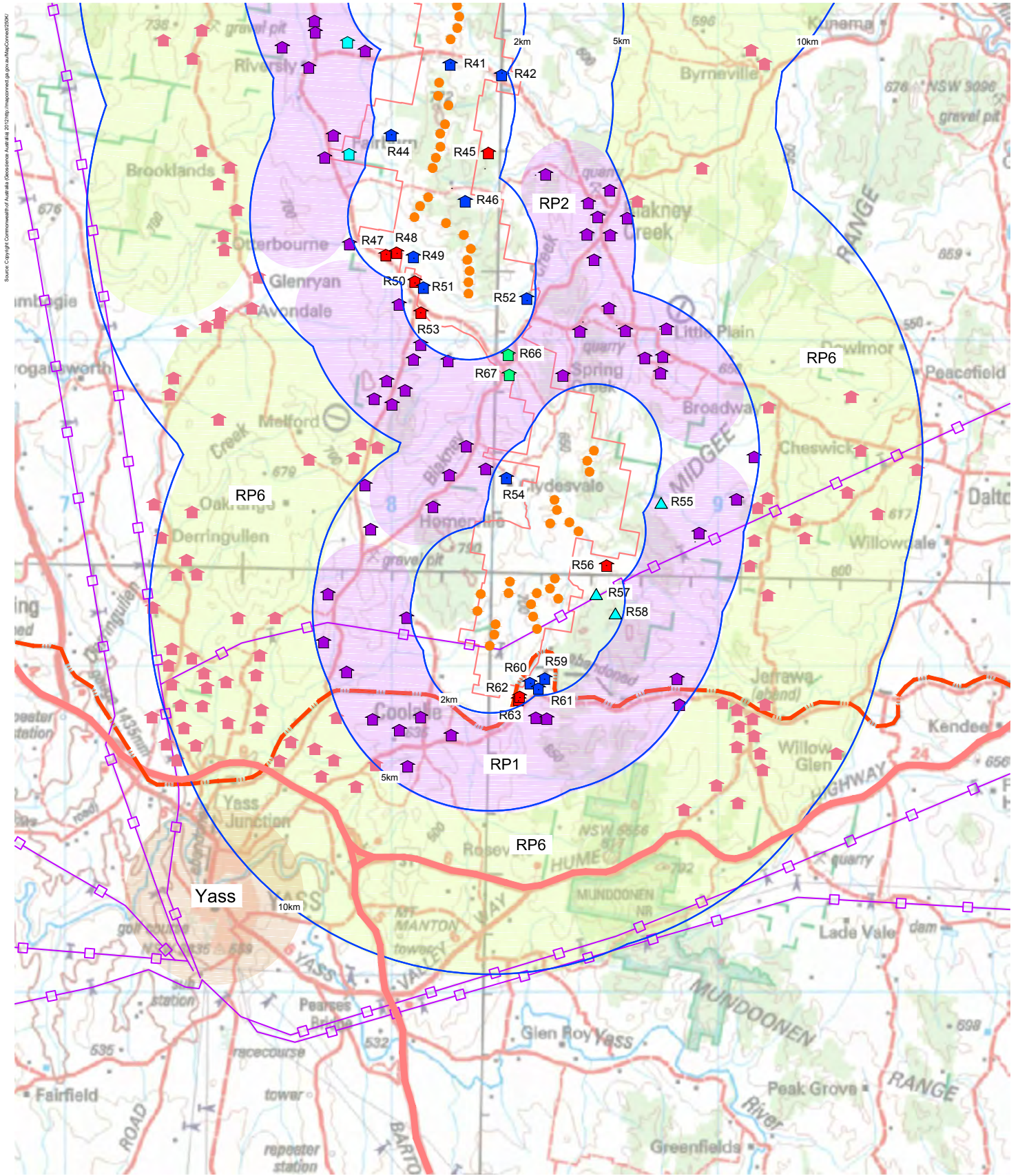


Figure 28a
Residential view locations north

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Legend

- Involved residential dwelling within 2 km of wind turbine
- Involved residential dwelling beyond 2 km of wind turbine
- Uninvolved residential dwelling within 2 km of wind turbine
- Uninvolved residential dwelling between 2 km and 5 km of wind turbine
- Uninvolved residential dwelling between 5 km and 10 km of wind turbine
- ▲ Non residential structure
- Proposed Rye Park wind turbine (indicative layout)
- (Distance from proposed Rye Park wind turbine
- Existing powerline
- Area between 2 km and 5 km of wind turbines
- Area between 5 km and 10 km of wind turbines

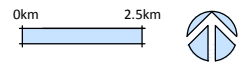


Figure 28b
Residential view locations south

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8.2 Residential visual significance matrix (dwellings within 2 km of wind turbines)

Table 16 – Residential visual significance matrix (Refer **Figures 28a** and **28b** for residential view locations)

View location (Refer to Figure 28)	Category of view location and sensitivity	Relative number of people	Approximate distance to closest turbine	Duration of effect	Extent of visibility (ZVI hub height)	Degree of visibility	Visual significance
R1	Uninvolved landowner Residential dwelling High sensitivity	Very low	Short 1,100 m	High	Medium to High	Views extend south toward wind turbines along the northern portion of the project area. Short distance views extend toward a medium to high extent of wind turbines within the project site which occupy a significant proportion of the existing skyline view.	High
R2	Involved landowner Residential dwelling High sensitivity	Very low	Very short 630 m	High	Medium to High	Very short distance views extend toward wind turbines elevated on steep sided hills as well as more distant views toward wind turbines along ridgelines across the northern portion of the project area.	High
R3	Non residential structure	n/a	n/a	n/a	n/a	n/a	n/a
R5	Non residential structure	n/a	n/a	n/a	n/a	n/a	n/a
R6	Uninvolved landowner Residential dwelling High	Very low	Short 1,400 m	High	Medium	Foreground tree cover largely screens views south east to south west. Proximate wind turbine visibility will be restricted to upper portion views.	Low

Table 16 – Residential visual significance matrix (Refer Figures 28a and 28b for residential view locations)

View location (Refer to Figure 28)	Category of view location and sensitivity	Relative number of people	Approximate distance to closest turbine	Duration of effect	Extent of visibility (ZVI hub height)	Degree of visibility	Visual significance
	sensitivity						
R7	Uninvolved landowner Residential dwelling High sensitivity	Very low	Short 1,500 m	High	Medium	Short distance views will extend to wind turbines within the northern portion of the project area. Generally located on low hills above timbered slopes, the wind turbines will occupy a large proportion of the existing skyline view.	Medium to High
R8	Uninvolved landowner Residential dwelling High sensitivity	Very low	Short 1,680	High	Low	Views toward the wind turbines within the northern portion of the project area will be mostly screened by timbered areas beyond the residential dwelling. Occasional tip of blade movement may be visible above tree canopies.	Low
R9	Uninvolved landowner Residential dwelling High sensitivity	Very low	Short 1,760 m	High	Low	View south toward proximate wind turbines within the northern portion of the project area will be screened by landform and tree cover. The closest (and partially visible wind turbine) will be located approximately 8 km south from dwelling.	Low (Nil)
R10	Uninvolved landowner Residential dwelling High sensitivity	Very low	Short 1,955 m	High	Medium	View south toward proximate wind turbine will be screened by tree cover.	Low

Table 16 – Residential visual significance matrix (Refer Figures 28a and 28b for residential view locations)

View location (Refer to Figure 28)	Category of view location and sensitivity	Relative number of people	Approximate distance to closest turbine	Duration of effect	Extent of visibility (ZVI hub height)	Degree of visibility	Visual significance
R11	Involved landowner Residential dwelling High sensitivity	Very low	Very short 836 m	High	Medium	Very short distance views extend toward wind turbines will be partially screened by windbreak planting surrounding residential dwelling.	Low to Medium
R12 Not shown on Figure 28	Non residential structure	n/a	n/a	n/a	n/a	n/a	n/a
R13	Involved landowner Residential dwelling High sensitivity	Very low	Very short 980 m	High	Medium	Very short distance views extend toward wind turbines to the north and south of the residential dwelling within the northern portion of the project area.	Medium to High
R14	Involved landowner Residential dwelling High sensitivity	Low	Very short 697 m	High	Low	Very short distance views extend toward wind turbines to the north and south of the residential dwelling within the northern portion of the project area.	Medium to High
R15	Uninvolved landowner Residential	Very low	Short 2,416 m	High	Medium to High	Short distance view extends toward wind turbines above timbered slopes and cleared pasture hilltops. Distant views extend toward	Medium

Table 16 – Residential visual significance matrix (Refer Figures 28a and 28b for residential view locations)

View location (Refer to Figure 28)	Category of view location and sensitivity	Relative number of people	Approximate distance to closest turbine	Duration of effect	Extent of visibility (ZVI hub height)	Degree of visibility	Visual significance
	dwelling High sensitivity					turbines along the western edge of the northern project area.	
R16	Involved landowner Residential dwelling High sensitivity	Very low	Very short 680 m	High	Low to Medium	Very short distance views extend toward wind turbines to the north and south of the residential dwelling within the northern portion of the project area.	Medium to High
R17	Uninvolved landowner Residential dwelling High sensitivity	Very low	Short 1,960 m	High	Low to Medium	Views toward wind turbines from dwelling are partially obscured by scattered tree cover to the north east and east of the property. Views toward wind turbines will be visible on hilltops and beyond timbered slopes and ridgelines.	Medium
R18	Non residential structure	n/a	n/a	n/a	n/a	n/a	n/a
R19	Uninvolved landowner Residential dwelling High sensitivity	Very low	Short 1,350 m	High	Low to Medium	Short distance views extend toward wind turbines to the north and south of the residential dwelling within the northern portion of the project area.	Medium to High

Table 16 – Residential visual significance matrix (Refer **Figures 28a** and **28b** for residential view locations)

View location (Refer to Figure 28)	Category of view location and sensitivity	Relative number of people	Approximate distance to closest turbine	Duration of effect	Extent of visibility (ZVI hub height)	Degree of visibility	Visual significance
R20	Uninvolved landowner Residential dwelling High sensitivity	Very low	Short 1,870 m	High	Low to Medium	Views toward wind turbines from dwelling are partially obscured by scattered tree cover to the north east and east of the property. Views toward wind turbines will be visible on hilltops and beyond timbered slopes and ridgelines.	Medium
R21	Non residential structure	n/a	n/a	n/a	n/a	n/a	n/a
R22	Uninvolved landowner Residential dwelling High sensitivity	Very low	Short 1,850 m	High	Low	Views north to north east will extend to wind turbines along hill top areas, with tree cover providing partial screening toward portions of the project area.	Low
R23	Non residential structure	n/a	n/a	n/a	n/a	n/a	n/a
R24	Uninvolved landowner Residential dwelling High sensitivity	Very low	Short 2,150 m	High	Medium to High	Direct views from the residential dwelling toward the proximate wind turbines are partially screened by surrounding tree cover and outbuildings; however wind turbines will be visible from garden areas surrounding the residential dwelling.	Medium to High

Table 16 – Residential visual significance matrix (Refer Figures 28a and 28b for residential view locations)

View location (Refer to Figure 28)	Category of view location and sensitivity	Relative number of people	Approximate distance to closest turbine	Duration of effect	Extent of visibility (ZVI hub height)	Degree of visibility	Visual significance
R25	Involved landowner Residential dwelling High sensitivity	Very low	Short 1,240 m	High	Low to Medium	Views toward wind turbines along the western edge of the northern project area are partially screened by vegetation and landform. Short distance and elevated views to the east of the residential dwelling will occupy a portion of the available view.	Low to Medium
R26	Involved landowner Residential dwelling High sensitivity	Very low	Short 1,800 m	High	Medium	Views toward wind turbines along the western edge of the northern project area are partially screened by vegetation and landform. Short distance and elevated views to the east of the residential dwelling will occupy a portion of the available view.	Low to Medium
R27	Non residential structure	n/a	n/a	n/a	n/a	n/a	n/a
R28	Uninvolved landowner Beyond 2 km	Very low	Short 2,172 m	High	Low to Medium	Views extend toward wind turbines along the eastern edge of the northern project area.	Low to Medium
R29	Uninvolved landowner Residential dwelling High sensitivity	Very low	Short 1,850 m	High	Medium	Views toward wind turbines along the western edge of the northern project area are partially screened by vegetation and landform. Short distance and elevated views to the east of the residential dwelling will occupy a portion of the available view.	Low to Medium

Table 16 – Residential visual significance matrix (Refer Figures 28a and 28b for residential view locations)

View location (Refer to Figure 28)	Category of view location and sensitivity	Relative number of people	Approximate distance to closest turbine	Duration of effect	Extent of visibility (ZVI hub height)	Degree of visibility	Visual significance
R30	Involved landowner Residential dwelling High sensitivity	Very low	Very short 615 m	High	Low	Elevated views toward wind turbines within the northern portion of the project area. View opportunities are generally restricted by the proximate location of the residential dwelling to the folded and bisected landform of low hills.	Medium
R31	Involved landowner Residential dwelling High sensitivity	Very low	Short 1,015 m	High	Low to Medium	Elevated views toward wind turbines within the northern portion of the project area. View opportunities are generally restricted by the proximate location of the residential dwelling to the folded and bisected landform of low hills.	Medium
R32	Involved landowner Residential dwelling High sensitivity	Very low	Very short 693 m	High	Low to Medium	Elevated views toward wind turbines within the northern portion of the project area. View opportunities are generally restricted by the proximate location of the residential dwelling to the folded and bisected landform of low hills.	Medium
R33	Involved landowner Residential dwelling High sensitivity	Very low	Very short 564 m	High	Low	Elevated views toward wind turbines within the northern portion of the project area. View opportunities are generally restricted by the proximate location of the residential dwelling to the folded and bisected landform of low hills.	Low to Medium

Table 16 – Residential visual significance matrix (Refer Figures 28a and 28b for residential view locations)

View location (Refer to Figure 28)	Category of view location and sensitivity	Relative number of people	Approximate distance to closest turbine	Duration of effect	Extent of visibility (ZVI hub height)	Degree of visibility	Visual significance
R34	Involved landowner Residential dwelling High sensitivity	Very low	Very short 725 m	High	Low	Elevated views toward wind turbines within the northern portion of the project area. View opportunities are generally restricted by the proximate location of the residential dwelling to the folded and bisected landform of low hills.	Medium
R35	Involved landowner Residential dwelling High sensitivity	Very low	Very short 745 m	High	Low to Medium	Elevated views toward wind turbines within the northern portion of the project area. View opportunities are generally restricted by the proximate location of the residential dwelling to the folded and bisected landform of low hills.	Low to Medium
R36	Involved landowner Residential dwelling High sensitivity	Very low	Short 1,033 m	High	Medium	Elevated views toward wind turbines within the northern portion of the project area. View opportunities are generally restricted by the proximate location of the residential dwelling to the folded and bisected landform of low hills.	Medium to High
R37	Non residential structure	n/a	n/a	n/a	n/a	n/a	n/a
R38	Uninvolved landowner Residential dwelling	Very low	Short 1,400 m	High	Medium to High	Views extend toward wind turbines across hills and ridgelines with partial screening provided by tree cover within property.	Medium to High

Table 16 – Residential visual significance matrix (Refer **Figures 28a** and **28b** for residential view locations)

View location (Refer to Figure 28)	Category of view location and sensitivity	Relative number of people	Approximate distance to closest turbine	Duration of effect	Extent of visibility (ZVI hub height)	Degree of visibility	Visual significance
	High sensitivity						
R39	Non residential structure	n/a	n/a	n/a	n/a	n/a	n/a
R40	Uninvolved landowner Residential dwelling High sensitivity	Very low	Short 1,870 m	High	Low	Views toward wind turbines are framed by a series of hills and slopes with timbered and scattered tree cover.	Medium
R41	Involved landowner Residential dwelling High sensitivity	Very low	Very short 718 m	High	Medium to High	Views extend north and south toward wind turbines within the central portion of the project area. Views will be partially screened by tree planting and timbered areas surrounding and beyond the residential dwelling.	Low to Medium
R42	Involved landowner Residential dwelling High sensitivity	Very low	Short 1,873 m	High	Low to Medium	Views extend north and south toward wind turbines within the central portion of the project area. Views will be partially screened by tree planting and timbered areas surrounding and beyond the residential dwelling.	Medium
R43 Not shown on	Non residential	n/a	n/a	n/a	n/a	n/a	n/a

Table 16 – Residential visual significance matrix (Refer Figures 28a and 28b for residential view locations)

View location (Refer to Figure 28)	Category of view location and sensitivity	Relative number of people	Approximate distance to closest turbine	Duration of effect	Extent of visibility (ZVI hub height)	Degree of visibility	Visual significance
Figure 28	structure						
R44	Involved landowner Residential dwelling High sensitivity	Very low	Short 1,500 m	High	High	Views extend toward wind turbines along ridgeline within central portion of the project area. The wind turbines would occupy the skyline to the east of the residential dwelling.	Medium to High
R45	Uninvolved landowner Residential dwelling High sensitivity	Very low	Short 1,486 m	High	Low	View extends toward wind turbines along ridgeline beyond and above timbered slopes. Wind turbines occupy skyline view extending through north to west.	Medium to High
R46	Involved landowner Residential dwelling High sensitivity	Very low	Very short 875 m	High	Low to Medium	Elevated views toward wind turbines above timbered slopes within the central project area.	Medium
R47	Uninvolved landowner Residential dwelling High	Very low	Short 1,100 m	High	Low to Medium	Elevated views extend toward wind turbines on ridgeline and low hills within central portion of the project area. Landform and wind turbine enclose and occupy skyline view through north to east orientation. Views would also extend toward the 330 kV powerline	Medium to High

Table 16 – Residential visual significance matrix (Refer Figures 28a and 28b for residential view locations)

View location (Refer to Figure 28)	Category of view location and sensitivity	Relative number of people	Approximate distance to closest turbine	Duration of effect	Extent of visibility (ZVI hub height)	Degree of visibility	Visual significance
	sensitivity					along the ridgeline and between the wind turbines.	
R48	Uninvolved landowner Residential dwelling High sensitivity	Very low	Short 1,236 m	High	Low to Medium	Elevated views extend toward wind turbines on ridgeline and low hills within central portion of the project area. Landform and wind turbine enclose and occupy skyline view through north to east orientation. Views would also extend toward the 330 kV powerline along the ridgeline and between the wind turbines.	Medium to High
R49	Involved landowner Residential dwelling High sensitivity	Very low	Short 1,253 m	High	Medium	Elevated views extend toward wind turbines on ridgeline and low hills within central portion of the project area. Landform and wind turbine enclose and occupy skyline view through north to east orientation. Views would also extend toward the 330 kV powerline along the ridgeline and between the wind turbines.	Medium to High
R50	Uninvolved landowner Residential dwelling High sensitivity	Very low	Short 1,674 m	High	Medium	Elevated views extend toward wind turbines on ridgeline and low hills within central portion of the project area. Landform and wind turbine enclose and occupy skyline view through north to east orientation. Views would also extend toward the 330 kV powerline along the ridgeline and between the wind turbines.	Medium to High
R51	Involved landowner Residential dwelling High	Very low	Short 1,386 m	High	Medium	Elevated views extend toward wind turbines on ridgeline and low hills within central portion of the project area. Landform and wind turbine enclose and occupy skyline view through north to east orientation. Views would also extend toward the 330 kV powerline	Medium to High

Table 16 – Residential visual significance matrix (Refer Figures 28a and 28b for residential view locations)

View location (Refer to Figure 28)	Category of view location and sensitivity	Relative number of people	Approximate distance to closest turbine	Duration of effect	Extent of visibility (ZVI hub height)	Degree of visibility	Visual significance
	sensitivity					along the ridgeline and between the wind turbines.	
R52	Involved landowner Residential dwelling High sensitivity	Very low	Short 1,780 m	High	Very low to low	Views toward wind turbines within the central portion of the project area are partially screened by tree planting to the west of the residential dwelling.	Low to Medium
R53	Uninvolved landowner Residential dwelling High sensitivity	Very low	Short 1,573 m	High	Low to Medium	Views extend toward wind turbines on ridgeline within the central portion of the project area. The wind turbines occupy central field of view with potential to dominate view, Views would also extend toward portions of the 330 kV powerline along ridgeline and between wind turbines.	Medium to High
R54	Involved landowner Residential dwelling High sensitivity	Very low	Short 1,516 m	High	Very low	Elevated views extend toward wind turbines on low hills within the southern portion of the project area occupying partial and available skyline views.	Medium to High
R55	Non residential structure	n/a	n/a	n/a	n/a	n/a	n/a
R56	Uninvolved landowner	Very low	Short 1,364 m	High	Low	Views extend toward wind turbines within the southern portion of the project area and occupy a relatively small area of the central	Low to Medium

Table 16 – Residential visual significance matrix (Refer **Figures 28a** and **28b** for residential view locations)

View location (Refer to Figure 28)	Category of view location and sensitivity	Relative number of people	Approximate distance to closest turbine	Duration of effect	Extent of visibility (ZVI hub height)	Degree of visibility	Visual significance
	Residential dwelling High sensitivity					field of view with some visual separation to adjacent turbines.	
R57	Non residential structure	n/a	n/a	n/a	n/a	n/a	n/a
R58	Non residential structure	n/a	n/a	n/a	n/a	n/a	n/a
R59	Involved landowner Residential dwelling High sensitivity	Very low	Short 1,559 m	High	Very low	Views extend toward a small number of wind turbines within the southern portion of the project area.	Low
R60	Involved landowner Residential dwelling High sensitivity	Very low	Short 1,695 m	High	Very low	Views extend toward a small number of wind turbines within the southern portion of the project area.	Low
R61	Involved landowner	Very low	Short 2,160 m	High	Very low	Tree planting around property provides partial screening toward southern portion of the project area.	Low

Table 16 – Residential visual significance matrix (Refer Figures 28a and 28b for residential view locations)

View location (Refer to Figure 28)	Category of view location and sensitivity	Relative number of people	Approximate distance to closest turbine	Duration of effect	Extent of visibility (ZVI hub height)	Degree of visibility	Visual significance
R62	Uninvolved landowner Residential dwelling High sensitivity	Very low	Short 1,978 m	High	Very low	Views toward turbines in the southern portion of the project area are largely screened by tree planting surrounding residential dwelling.	Low
R63	Uninvolved landowner Residential dwelling High sensitivity	Very low	Short 2,200 m	High	Very low	Views toward turbines in the southern portion of the project area are largely screened by tree planting surrounding residential dwelling.	Low
R64	Involved landowner Residential dwelling High sensitivity	Very low	Short 1,960 m	High	Low	Views toward wind turbines within the northern portion of the project area are partially screened by tree planting and shed to the east of the residential dwelling. Views will extend to broader areas of the project along the western face of the northern portion from areas surrounding the residential dwelling.	Low to Medium
R65	Uninvolved landowner Residential dwelling High sensitivity	Very low	Short 2,000 m	High	Very low	Views toward the wind turbines within the northern portion of the project area are largely screened by landform and tree cover within the vicinity of the residential dwelling.	Low (Nil)

Table 16 – Residential visual significance matrix (Refer Figures 28a and 28b for residential view locations)

View location (Refer to Figure 28)	Category of view location and sensitivity	Relative number of people	Approximate distance to closest turbine	Duration of effect	Extent of visibility (ZVI hub height)	Degree of visibility	Visual significance
Assessment of residential dwelling between 2 km and 5 km of the proposed Rye Park wind turbines (Refer Figure 28a and 28b for locations)							
RP1	Uninvolved landowners Residential dwellings High sensitivity	Low	Short to Medium 2,000 m to 5,000 m	High	Very low	Views toward the wind turbines within the southern portion of the project area will be influenced by a combination of topography and vegetation which will tend to restrict the visibility of the wind turbines from a number of the residential dwelling locations.	Low to Medium
RP2	Uninvolved landowners Residential dwellings High sensitivity	Low	Short to Medium 2,000 m to 5,000 m	High	Low to Medium	Views toward the wind turbines within the southern and central portion of the project area will be influenced by a combination of topography and vegetation which will tend to restrict the visibility of the wind turbines from a number of the residential dwelling locations. Visibility will also be restricted by tree planting around residential dwellings and alongside road corridors.	Low to Medium
RP3	Uninvolved landowners Residential dwellings High sensitivity	Low	Short to Medium 2,000 m to 5,000 m	High	High	View will extend toward wind turbines along the west edge of the northern project area.	Medium
Rye Park	Uninvolved landowners Residential	Low	Short to Medium 2,000 m to	High	High	Views from the Rye Park township extend east toward the northern portion of the project area. Wind turbines would be visible	Low to Medium

Table 16 – Residential visual significance matrix (Refer Figures 28a and 28b for residential view locations)

View location (Refer to Figure 28)	Category of view location and sensitivity	Relative number of people	Approximate distance to closest turbine	Duration of effect	Extent of visibility (ZVI hub height)	Degree of visibility	Visual significance
	dwelling High sensitivity		5,000 m			above and along ridgeline areas, but generally set back from the closest hills to the township. The wind turbines would be visible from a number of locations within the township and occupy portions of the skyline view but would not tend to dominate the view. Visibility would increase around the elevated areas within the western portion of the township.	
RP4	Uninvolved landowners Residential dwellings High sensitivity	Low	Short to Medium 2,000 m to 5,000 m	High	Medium to High	Views will extend across generally cleared pastoral land toward wind turbines within the northern portion of the project area.	Medium
RP5	Uninvolved landowners Residential dwellings High sensitivity	Low	Short to Medium 2,000 m to 5,000 m	High	Medium	Views will extend toward wind turbines in the northern portion of the project area with some level of screening due to an undulating landform and areas of tree cover to hillsides and ridgeline areas.	Low to Medium
Assessment of residential dwelling between 5 km and 10 km of the proposed Rye Park wind turbines (Refer Figure 28a and 28b for locations)							
RP6	Uninvolved landowners Residential dwellings	Low	Long 5,000 m to 10,000 m	High	Low	Some views toward wind turbines within the southern portion of the project area would be partially screened by topography and timbered areas for a number of the residential dwellings located in the surrounding landscape. Where visible, wind turbines are	Low

Table 16 – Residential visual significance matrix (Refer **Figures 28a** and **28b** for residential view locations)

View location (Refer to Figure 28)	Category of view location and sensitivity	Relative number of people	Approximate distance to closest turbine	Duration of effect	Extent of visibility (ZVI hub height)	Degree of visibility	Visual significance
	High sensitivity					unlikely to form a dominant element and will occupy a relatively small proportion of the available view.	
RP7	Uninvolved landowners Residential dwellings High sensitivity	Low	Long 5,000 m to 10,000 m	High	Medium to High	Views toward wind turbines within the central portion of the project area would, in some instances, be screened by undulating landform and tree cover surrounding dwellings, as well as tree planting along the Wargeila Road corridor. Where visible, wind turbines are unlikely to form a dominant element and will occupy a relatively small proportion of the available view.	Low
RP8	Uninvolved landowners Residential dwellings High sensitivity	Low	Long 5,000 m to 10,000 m	High	Low to Medium	Views toward wind turbines in the northern portion of the project area are largely blocked by an undulating and folding landform. Where visible, wind turbines are unlikely to form a dominant element and will occupy a relatively small proportion of the available view.	Low
RP9	Uninvolved landowners Residential dwellings High sensitivity	Low	Long 5,000 m to 10,000 m	High	Medium to High	Views toward wind turbines in the northern portion of the project area are largely blocked by an undulating and folding landform. Where visible, wind turbines are unlikely to form a dominant element and will occupy a relatively small proportion of the available view.	Low

8.3 Summary of residential visual significance (within 2 km of wind turbines)

This LVIA identified a combined total of 51 involved and uninvolved residential dwellings within the Rye Park wind farm 2 km viewshed.

An additional thirteen view locations were determined to be either uninhabitable or not a residential structure. Unoccupied residential dwellings have been included and assessed as part of this LVIA where structures and buildings were considered to be habitable at the time of the field work.

The Boorowa Shire, Yass Valley Shire and the Upper Lachlan Shire Councils have confirmed that there are no development applications for approved but not yet developed dwellings (or subdivisions with residential rights) within 2 km of the Rye Park wind farm turbines.

An assessment of each potential residential view location determined:

- 10 of the 51 residential view locations would have a low visual significance;
- 10 of the 51 residential view locations would have a low to medium visual significance;
- 12 of the 51 residential view locations would have a medium visual significance;
- 17 of the 51 residential view locations would have a medium to high visual significance; and
- 2 of the 51 residential view locations would have a high visual significance.

The field assessment for the majority of residential view locations was undertaken from the closest publicly accessible location, with a conservative approach adopted where there was no opportunity to confirm the actual extent of available view from areas within or immediately surrounding the residence. It is anticipated that some visibility ratings would be less than those determined subject to a process of verification from private property.

8.4 Summary of residential visual significance (beyond 2 km of wind turbines)

The majority of residential dwellings located beyond the 2 km wind turbine offset are unlikely to be significantly impacted by the wind farm development. The localised influence of topography, as illustrated in the ZVI diagrams, has a direct and marked impact on the extent and nature of views within the 2 km and wider viewshed.

8.5 Public view locations

A local road network extends roughly parallel to the main ridgelines and hills within the project area and provides a variety of direct and indirect view opportunities toward the wind farm turbines. Tree planting alongside road corridors to the west of the project area tends to restricts views to partial and glimpsed opportunities (including views from the Rye Park Dalton Road and the Wargeila Road). A greater range of open views tend to occur along minor roads to the east of the site. This LVIA did not identify any formalised or designated public lookout points within the Rye Park wind farm 10 km viewshed.

8.6 Towns and localities

There are a small number of towns and localities (which include a small number of dwellings), that surround the Rye Park wind farm project area and occur partially or wholly within the 10 km viewshed. Those within the 10 km viewshed include:

- Rye Park (approximately 3.3 km to the west)
- Rugby (approximately 9.3 km to the north east)
- Yass - outlying north east portion (approximately 9.3 km to the south west)
- Bevendale (approximately 8.5 km to the east); and
- Jerrawa (approximately 6.9 km to the south east).

Other than Rye Park (which is discussed in Table 16) it is not expected that the Rye Park wind farm will have any significant visual impact on towns and smaller rural localities in the landscape surrounding the project site. This is primarily due to the screening influence of undulating landform as well as the distance between the wind farm and potential view locations within residential urban and rural localities.

8.7 Future residential dwellings

In general existing residential dwellings in the vicinity of the wind farm are located below surrounding ridgelines to maximise potential for shelter from prevailing wind, and/or where exposed tend to include a degree of shelter from windbreak planting or tree planting around dwellings. The tendency

to locate residential dwellings in sheltered situations also acts to limit the extent of available views across the surrounding landscape for the majority of residential view locations, although there are a small number of dwellings that appear to have been located on properties to take advantage of distant and panoramic views.

Potential future planning considerations for residential dwellings would be able to take advantage of any approved layout design for the Rye Park wind farm when determining the optimal location for residential dwellings on individual portions of land to minimise views toward wind turbines if desired. In some circumstances future residential dwellings could be located to take advantage of local topographic features in order to screen views toward wind turbines or implement in advance mitigation measures such as tree planting for windbreak and/or screening purposes.

Should residential dwellings be constructed on existing portions of land immediately adjacent to the wind farm site, there is likely to be an associated visual impact not only with additional residential structures within the landscape but also a range of domestic infrastructure associated with it.

Cumulative assessment

Section 9

9.1 What is cumulative assessment?

A cumulative impact could result from a proposed wind farm development being constructed in conjunction with other existing or proposed wind farm developments, and could be either associated or separate to it.

Separate wind farm developments could occur within the established viewshed of the proposed wind farm, or be located within a regional context where visibility is dependent on a journey between each site or an individual project viewshed. Cumulative impacts presented by multiple wind farm developments may be presented as 'direct', 'indirect' or 'sequential' impacts.

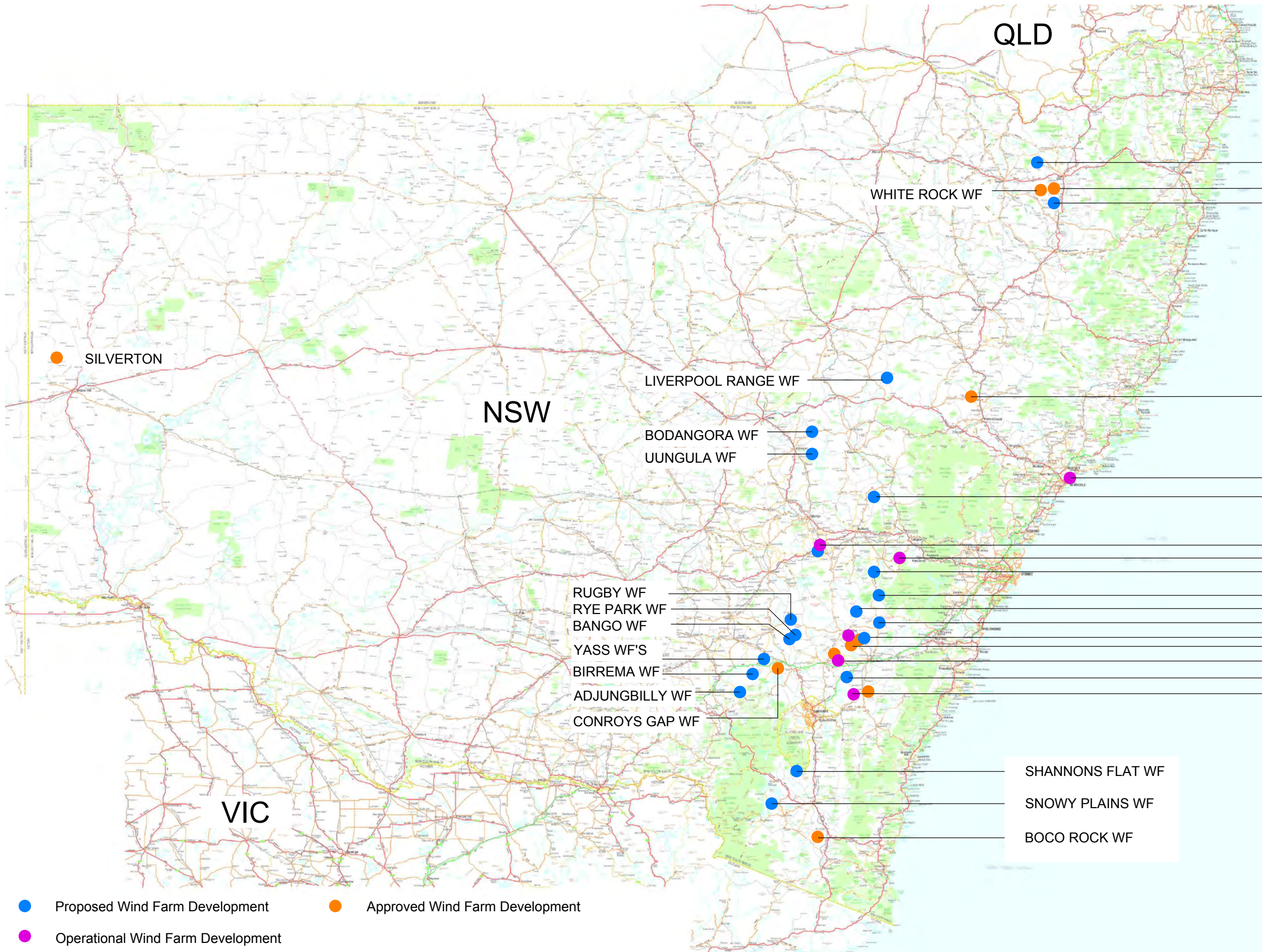
- 'direct' cumulative visual impacts could occur where two or more wind farms have been constructed within the same locality, and could be viewed from the same view location simultaneously.
- 'indirect' cumulative visual impacts could occur where two or more wind farms have been constructed within the same locality, and could be viewed from the same view location but not within the same field of view.
- 'sequential' cumulative visual impacts could arise as a result of multiple wind farms being observed at different locations during the course of a journey (e.g. from a vehicle travelling along a highway or from a network of local roads), which could form an impression of greater magnitude and impact within the construct of short term memory.

9.2 Regional wind farm developments

There are a number of proposed, approved and operating wind farm developments within New South Wales which are illustrated in **Figure 29**. The general location of wind farms surrounding the Rye Park wind farm are illustrated in **Figure 30**. These figures illustrate the location of wind farms known at the time this LVIA was prepared. The number and location of wind farms is likely to change as more wind farm projects are announced.

There are currently around 20 existing or proposed wind farm projects at various stages of development within an approximate 70 km radius of the proposed Rye Park wind farm. Whilst 5 of

Source: Copyright Department of Lands Panorama Avenue Bathurst 2795 (www.lands.nsw.gov.au)



SAPPHIRE WF
GLEN INNES WF
BEN LOMOND WF

KYOTO ENERGY
PARK WF

KOORAGANG WF
CRUDINE RIDGE

BLANEY/FLYERS CREEK WF
HAMPTON PARK WF
BLACK SPRINGS WF

PALING YARDS WF
GOLSPIE WF
TARALGA WF
CROOKWELL WF'S
GULLEN RANGE WF
CULLERIN & GUNNING WF'S
COLLECTOR WF
CAPITAL & WOODLAWN WF'S

- Proposed Wind Farm Development
- Approved Wind Farm Development
- Operational Wind Farm Development

Figure 29
NSW wind farms
(as of November 2012)

EPURON

Rye Park Wind Farm Pty Ltd

Not to scale



RYE PARK WIND FARM

GREEN BEAN DESIGN

landscape architects

Source: Copyright Department of Lands Panorama Avenue Bathurst 2795 (www.lands.nsw.gov.au)



Legend

- 1 Adjunbilly Wind Farm
- 2 Birrema Wind Farm
- 3a Yass Wind Farm (Coppabella)
- 3b Yass Wind Farm (Marilba)
- 3c Conroys Gap Wind Farm
- 4 Rugby Wind Farm
- 5 Capital Wind Farm (I & II)
- 6 Woodlawn Wind Farm
- 6a Collector Wind Farm
- 7 Cullerin Wind Farm
- 8 Gunning Wind Farm
- 9 Gullen Range Wind Farm
- 10 Crookwell Wind Farm
- 11 Crookwell 2 Wind Farm
- 12 Crookwell 3 Wind Farm
- 13 Taralga Wind Farm
- 14 Golspie Wind Farm
- 15 Paling Yards Wind Farm
- 16 Rye Park Wind Farm
- 17 Bango Wind Farm

- Operational wind farm
- Approved wind farm (not constructed)
- Proposed wind farm development beyond 50 km of the Rye Park wind farm
- Proposed wind farm development between 20 km and 50 km of the Rye Park wind farm
- Proposed Rye Park wind farm project boundary
- Proposed Rugby and Bango wind farm investigative areas
- Locality
- Hume Highway
- Great Southern Railway
- Existing transmission line

Figure 30 Regional wind farm developments

EPURON

Rye Park Wind Farm Pty Ltd

GREEN BEAN DESIGN

landscape architects

Not to scale



RYE PARK WIND FARM

the 21 wind farms are operational and 4 have progressed to early construction phases, the remaining 11 projects (including those that have been approved) may not necessarily progress to construction.

The existing and proposed wind farm developments within the Rye Park project 70 km radius and identified and described in **Table 17**.

Table 17 Regional wind farm developments

Wind Farm	Proponent or Owner	Status	Number of turbines
Adjungbilly	CBD Energy	Planning stage – not yet lodged	Up to 26
Birrema	Epuron	Planning stage – not yet lodged	Up to 68
Coppabella	Epuron	Planning - assessment	Up to 86
Marilba	Epuron	Planning - assessment	Up to 66
Conroy's Gap	Epuron	Approved	15
Rugby	Suzlon Energy and Windlab	Planning stage – not yet lodged	Up to 52
Capital 1	Infigen Energy	Operational	63
Woodlawn	Infigen Energy	Operational	23
Collector	RATCH	Planning - assessment	68
Cullerin	Origin Energy	Operational	15
Gunning	Acciona	Operational	31
Gullen Range	Gullen Range Wind Farm Pty Ltd	Approved - Construction Stage	73
Crookwell 1	Eraring Energy	Operational	8
Crookwell 2	Crookwell Development	Approved – Construction Stage	46

Wind Farm	Proponent or Owner	Status	Number of turbines
Crookwell 3	Crookwell Development	Planning – not approved	30
Taralga	RES Australia	Approved – Construction Stage	62
Golspie	Wind Prospect/ CWP	Planning stage – not yet lodged	up to 100
Paling Yards	Union Fenosa Wind Australia	Planning stage – not yet lodged	Up to 60
Capital 2	Infigen Energy	Approved – Construction Stage	41

Table 18 Wind farm developments within Rye Park 10 km viewshed

Wind Farm	Proponent or Owner	Status	Number of turbines
Bango	Wind Prospect	Planning stage – not yet lodged	Up to 122
Rugby	Suzlon Energy and Windlab	Planning stage – not yet lodged	Up to 52

GBD is not aware of any smaller wind farm developments that are currently lodged, or being assessed by the Upper Hunter, Yass Valley or Boorowa Shire Councils.

Long distance views (around 30 km) can be obtained toward the operational Gunning and Cullerin wind farms from elevated areas of the landscape to the south west of the Rye Park project area. Although visible, these wind farm developments are unlikely to result in any significant additional level of 'direct' and 'indirect' cumulative impact for view locations within the Rye Park 10 km viewshed due to the distance effect on overall visibility between the wind farm developments. The potential for cumulative impact will be dependent on a number of factors such as the separation distance between turbines and layout of turbines relative to the proposed Rye Park project.

9.3 Rye Park, Bango and Rugby wind farm intervisibility

The proposed Bango and Rugby wind farm developments are currently in the planning stage. The proposed location and number of turbines associated with each development was not publically known or made available during the preparation of this LVIA. The investigative areas included in the preliminary environmental assessment for each project indicate that some wind turbines are likely to be located within the Rye Park 10 km viewshed. The Bango wind farm turbines are likely to be located beyond 5 km west of the Rye Park wind turbines, and the Rugby wind farm turbines around 2 km north of the Rye Park wind turbines.

It would be expected that some level of cumulative impact will occur for some public and residential view locations to the west, north west and north of the Rye Park project area including opportunities for 'direct', 'indirect' and sequential impacts, which may result in an increase in the significance of impacts determined for individual view locations in this LVIA. View locations to the east of the Rye Park wind farm will be afforded a greater degree of screening toward other wind farm projects by the undulating landform and tree cover along the projects central north south alignment.

There will be some limited potential for 'direct' and 'indirect' views toward the Rye Park, Bango and Rugby wind farm projects from the Boorowa township and Rye Park village; however, views toward multiple projects from urban areas will be largely restricted by distance, landform and tree cover. Views toward wind turbines within other wind farm developments will generally be located away from urban areas and across rural agricultural landscape with a very low density occupation.

Whilst some degree of intervisibility between all three projects is expected for a small number of rural residential dwellings, the nature and extent of the undulating landform surrounding each of the project sites, would partially limit the overall potential for 'direct' and 'indirect' views for many of the residential dwellings located between them.

A series of 'sequential' views would also occur from local roads although the journey between the wind farms would include a range of views extending toward and beyond turbines. The extent and overall visibility of turbines would be influenced by the direction of travel relative to the alignment of the wind farm developments as well as the relatively short travel time along the local road network between wind farm developments.

Photomontages

Section 10

10.1 Photomontages

The DGR's state that the EA must *"include photomontages of the project taken from potentially affected residences (including approved but not yet developed dwellings or subdivisions with residential rights), settlements and significant public view points..."*

A total of thirty two photomontages have been prepared to illustrate views from uninvolved residential dwellings within 2km of the proposed Rye Park wind farm turbines, and public view locations from surrounding road corridors. Twenty two photomontages have been prepared from private uninvolved residential dwellings within 2 km the Rye Park wind farm turbines. The location of each photomontage taken from a private uninvolved residential dwelling was identified in consultation with the landowner. Three landowners (R50, R19 and R62) chose not to have a photomontage prepared from their residential dwelling however; photomontages from neighbouring residential dwellings provide indicative illustrations of the view within the general locality of these dwellings.

Photomontages PM 1 to PM 9 illustrate the proposed wind turbines from public view locations (such as road corridors). PM 10 illustrates a typical view toward the proposed 330 kV powerline. The public photomontage locations are illustrated in **Figure 31** and the public photomontage are presented in **Figures 32 to 40**.

The uninvolved residential dwelling photomontages locations within 2 km of the proposed Rye Park wind farm turbines are illustrated in **Figures 28a** and **28b**, and are presented in **Figures 41 to 62**. A photomontage for the proposed 330 kV powerline is illustrated in **Figure 69** in **Section 12** of this LVIA.

10.2 Photomontages preparation

The photomontages have been prepared with regard to the general guidelines set out in the Scottish Natural Heritage (2006) Visual representation of windfarms: good practice guidance and British Landscape Institute Advice Note 01/11 (March 2011) Photography and photomontage in landscape and visual impact assessment.

Photography for the photomontages was undertaken by the Proponent and GBD using tripod mounted Nikon D700 and D90 digital single-lens reflex (SLR) cameras. A 50 mm focal length prime lens was attached to the Nikon D700 and D90 SLR cameras.

The Nikon D700 has a full frame image sensor (36 x 23.9 mm Nikon FX format), and when mounted with a 50mm lens results in a single photographic image with a view angle equivalent to a 35 mm SLR camera with a 50 mm lens. The Nikon D90 has a smaller image sensor than the D700 (23.6 x 15.8 mm Nikon DX format) and results in an effective picture angle with a crop factor of 1.5 x the lens focal length. Therefore a Nikon D90 when mounted with a 50mm lens results in a single photographic image with a view angle equivalent to a 35 mm SLR camera with a 75 mm lens.

Both the 50 mm and 75 mm lens are commonly utilised, and cited in landscape and visual assessment manuals and guidelines, for the preparation of landscape and visual assessment photomontages.

Following site photography each of the Rye Park photomontage was generated through the following steps:

- a digital terrain model (DTM) of the project site was created from a terrain model of the surrounding area using digital contours;
- the site DTM was loaded in the G-L Garrad Hassan 'WindFarmer' software package;
- the layout of the wind farm and 3D representation of the wind turbine was configured in WindFarmer;
- the location of each viewpoint (photo location) was configured in WindFarmer – the sun position for each viewpoint was configured by using the time and date of the photographs from that viewpoint;
- the view from each photomontage location was then assessed in WindFarmer. This process requires accurate mapping of the terrain as modelled, with that as seen in the photographs. The photographs, taken from each photomontage location were loaded into WindFarmer and the visible turbines superimposed on the photographs;
- the photomontage were adjusted using Photoshop CS3 to compensate for fogging due to haze or distance, as well as screening by vegetation or obstacles; and
- the final image was converted to JPG format and imported and annotated as the final figure.

Tables 19 and **20** identify the thirty two photomontage locations, property names (where relevant), corresponding reference number identified in the residential view matrix (**Table 16**) as well as the status of each photomontage location.

Table 19 – Public view location photomontage details

Photomontage Location	Figure Reference	Status:
PM 1 Coolalie Road	Figure 32	Unsealed road corridor (minor local road)
PM 2 Rye Park Dalton Road	Figure 33	Sealed road corridor (minor local road)
PM 3 Maryvale Road	Figure 34	Unsealed road corridor (minor local road)
PM 4 Maryvale Road	Figure 35	Unsealed road corridor (minor local road)
PM 5 Little Plains Road	Figure 36	Unsealed road corridor (minor local road)
PM 6 Kershaw Street, Rye Park	Figure 37	Sealed road corridor (minor local road) within Rye Park village
PM 7 Wargeila Road	Figure 38	Unsealed road corridor (minor local road)
PM 8 Rye Park Dalton Road	Figure 39	Unsealed road corridor (minor local road)
PM 9 Blakney Creek Road	Figure 40	Unsealed road corridor (minor local road)
PM10 Rye Park Dalton Road	Figure 70	Unsealed road corridor (minor local road)

Table 20 – Residential dwelling photomontage details

Photomontage Location (Refer Table 15 and Figures 28a and 28b)	Figure Reference	Status: Involved or uninvolved residential dwelling
R1	Figure 41	Uninvolved residential dwelling
R6	Figure 42	Uninvolved residential dwelling
R7	Figure 43	Uninvolved residential dwelling
R8	Figure 44	Uninvolved residential dwelling
R9	Figure 45	Uninvolved residential dwelling
R10	Figure 46	Uninvolved residential dwelling
R15	Figure 47	Uninvolved residential dwelling

Photomontage Location (Refer Table 15 and Figures 28a and 28b)	Figure Reference	Status: Involved or uninvolved residential dwelling
R17	Figure 48	Uninvolved residential dwelling
R20	Figure 49	Uninvolved residential dwelling
R22	Figure 50	Uninvolved residential dwelling
R24	Figure 51	Uninvolved residential dwelling
R29	Figure 52	Uninvolved residential dwelling
R38	Figure 53	Uninvolved residential dwelling
R40	Figure 54	Uninvolved residential dwelling
R45	Figure 55	Uninvolved residential dwelling
R47	Figure 56	Uninvolved residential dwelling
R48	Figure 57	Uninvolved residential dwelling
R53	Figure 58	Uninvolved residential dwelling
R55	Figure 59	Uninvolved residential dwelling
R56	Figure 60	Uninvolved residential dwelling
R62	Figure 61	Uninvolved residential dwelling
R65	Figure 62	Uninvolved residential dwelling

The horizontal and vertical field of view within the majority of the photomontages exceeds the parameters of normal human vision. However, in reality the eyes, head and body can all move and, under normal conditions, the human brain would 'see' a broad area of landscape within a panorama view. Each of the Rye Park photomontage panoramas indicates the extent of a single photograph within the full extent of the panorama.

Whilst a photomontage can provide an image that illustrates a photo realistic representation of a wind turbine in relation to its proposed location and scale relative to the surrounding landscape, this LVIA acknowledges that large scale objects in the landscape can appear smaller in photomontage than in real life and is partly due to the fact that a flat image does not allow the viewer to perceive any information relating to depth or distance.

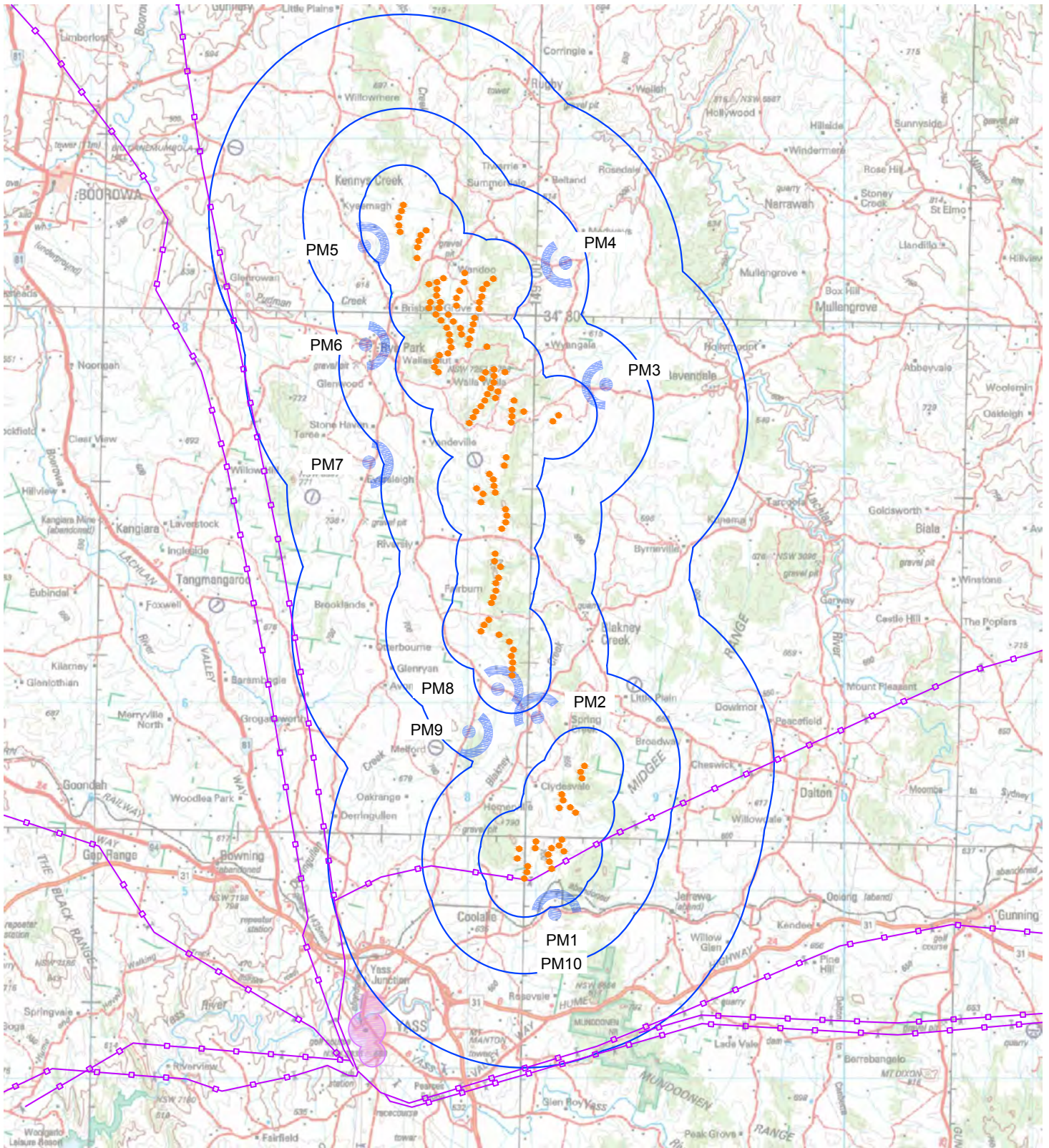
The British Landscape Institute states that *'it is also important to recognise that two-dimensional photographic images and photomontages alone cannot capture or reflect the complexity underlying the visual experience and should therefore be considered an approximate of the three-dimensional visual experiences that an observer would receive in the field'*.

10.3 Photomontage verification





Photomontages prepared for wind farm developments are sometimes claimed not to represent the correct relative scale of the wind turbines within the baseline panorama or single photographic images. Whilst modern windfarm industry software, such as WindFarmer, is able to produce correctly scaled turbines within photomontages, GBD undertook to independently verify the scale of the Rye Park wind turbines within the photomontages.

The verification process involved the direct photographic comparison of constructed and operational wind turbines (at the Capital and Gunning wind farm developments) with those presented in the photomontages. In order to undertake a direct comparison to the existing 124 m high Capital wind farm turbines, the wind turbines within the Rye Park verification photomontage were modelled at a tip height of 124 m. The wind turbines in the Rye Park residential dwelling photomontages have been modelled at a height of 157 m.

The results of the verification are illustrated in **Figures 63** and **64**, which demonstrate that the wind turbines in the Rye Park public and residential dwelling photomontages are correctly proportional relative to distance when compared to photographs of existing and operation wind turbines.



Legend

-  Proposed Rye Park wind turbine (indicative layout)
-  Distance from proposed Rye Park wind turbine
-  Public photomontage location
-  Existing powerline

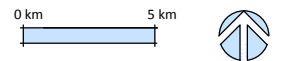


Figure 31
Public photomontages
locations