

## Landscape Character Areas and Sensitivity Assessment

### SECTION 6

#### 6.1 Landscape Character Areas

As part of the LVIA process it is important to understand the nature and sensitivity of different components of landscape character, and to assess them in a clear and consistent process. For the purpose of this LVIA, landscape character is defined as *'the distinct and recognisable pattern of elements that occur consistently in a particular type of landscape'* (The Countryside Agency and Scottish Natural Heritage 2002).

The LVIA has identified seven Landscape Character Areas (LCA's), which generally occur within the viewshed of the Boco Rock wind farm site. The LCA's represent areas that are relatively consistent and recognisable in terms of their key landscape elements and physical attributes; which may include a combination of topography/landform, vegetation/landcover, land use and built structures (including settlements and local road corridors). For the purpose of this LVIA the LCA's have been identified as:

- LCA 1 – Undulating grasslands;
- LCA 2 – River valley and drainage lines;
- LCA 3 – Broad river valley;
- LCA 4 – Simple slope and ridgeline areas;
- LCA 5 - Upland wetland and plateau;
- LCA 6 – Timbered areas (cultural and remnant native); and
- LCA 7 – Settlements

#### 6.2 Landscape Sensitivity Assessment

The British Landscape Institute describes landscape sensitivity as *'the degree to which a particular LCA can accommodate change arising from a particular development, without detrimental effects on its character'*.

The assessment of landscape sensitivity is based upon an evaluation of the physical attributes identified within each LCA, both singularly and as a combination that gives rise to the landscape's overall robustness and the extent to which it could accommodate the wind farm development. The criteria used to determine landscape sensitivity are outlined in **Table 4** and based on current good practice employed in the assessment of wind farm developments and draws on the Land Use Consultants report on landscape sensitivity for wind farm developments on the Shetland Islands (March 2009). Landscape sensitivity is a relative term, and the intrinsic landscape values of the Monaro landscape may be considered of a higher or lower sensitivity than other areas in the New South Wales Southern Tablelands region.

Whilst the assessment of landscape sensitivity is largely based on a systematic description and analysis of landscape characteristics, the LVIA acknowledges that individuals and some members of the local community will place higher values on the local landscape which may transcend preferences (likes and dislikes) and include personal, cultural as well as other parameters, to evaluate landscape sensitivity.

**Table 4 – Criteria for the assessment of Landscape Sensitivity**

<b>Landscape Sensitivity Assessment Criteria</b>			
<b>Characteristic</b>	<b>Aspects indicating lower sensitivity to the wind farm development</b>	<b>↔</b>	<b>Aspects indicating higher sensitivity to the wind farm development</b>
Landform and scale: patterns, complexity and consistency	<ul style="list-style-type: none"> <li>• Large scale landform</li> <li>• Simple</li> <li>• Featureless</li> <li>• Absence of strong topographical variety</li> </ul>	↔	<ul style="list-style-type: none"> <li>• Small scale landform</li> <li>• Distinctive and complex</li> <li>• Human scale indicators</li> <li>• Presence of strong topographical variety</li> </ul>
Landcover: patterns, complexity and consistency	<ul style="list-style-type: none"> <li>• Simple</li> <li>• Predictable</li> <li>• Smooth, regular and uniform</li> </ul>	↔	<ul style="list-style-type: none"> <li>• Complex</li> <li>• Unpredictable</li> <li>• Rugged and irregular</li> </ul>
Settlement and human influence	<ul style="list-style-type: none"> <li>• Concentrated settlement pattern</li> <li>• Presence of contemporary structures (eg utility, infrastructure or industrial elements)</li> </ul>	↔	<ul style="list-style-type: none"> <li>• Dispersed settlement pattern</li> <li>• Absence of modern development, presence of small scale, historic or vernacular settlement</li> </ul>
Movement	<ul style="list-style-type: none"> <li>• Prominent movement, busy</li> </ul>	↔	<ul style="list-style-type: none"> <li>• No evident movement, still</li> </ul>
Rarity	<ul style="list-style-type: none"> <li>• Unique or limited example of landscape character area within a regional context</li> </ul>	↔	<ul style="list-style-type: none"> <li>• Common or widely distributed example of landscape character area within a regional context</li> </ul>
Intervisibility with adjacent landscapes	<ul style="list-style-type: none"> <li>• Limited views into or out of landscape</li> <li>• Neighbouring landscapes of low sensitivity</li> <li>• Weak connections, self contained area and views</li> <li>• Simple large scale backdrops</li> </ul>	↔	<ul style="list-style-type: none"> <li>• Prospects into and out from high ground or open landscape</li> <li>• Neighbouring landscapes of high sensitivity</li> <li>• Contributes to wider landscape</li> <li>• Complex or distinctive backdrops</li> </ul>

The criteria set out in **Table 4** have been used to evaluate each of the LCA's using sensitivity grades of higher, medium or lower. The sensitivity grades are illustrated in **Tables 5 to 11** using shading against each of the criteria set out in **Table 4**.

The sensitivity of overall grades of higher, medium or lower were determined using the following definitions:

**Higher** – Key characteristics of the LCA may be adversely impacted by the wind farm development, and may result in major alterations to perceived characteristics of the landscape. The degree to which the landscape may accommodate the wind farm development would potentially result in a number of perceived uncharacteristic and significant changes.

**Medium** – Some characteristics of the LCA may be altered by the wind farm development, although the landscape may have the capability to absorb some change. The degree to which the landscape may accommodate the wind farm development would potentially result in the introduction of prominent elements but may be accommodated to some degree.

**Lower** – The characteristics of the LCA are generally robust, and would be less affected by the wind farm development. The degree to which the landscape may accommodate the wind farm development would not significantly alter existing landscape character.

## 6.3 Analysis of Landscape Sensitivity

The following section of the LVIA provides an analysis of landscape sensitivity within the viewshed of the wind farm development and considers each of the seven LCA's.

### 6.3.1 LCA 1 Undulating grassland



*Plate 1 – Typical views across undulating grassland landscape*

**Table 5 – LCA 1, Landscape Sensitivity**

	Lower Sensitivity	↔	Higher Sensitivity
<b>Landform and Scale</b>			
	The low undulating grassland is a <b>large scale</b> and open landscape with a <b>gently undulating landform</b> . The structure of the landform is <b>simple</b> containing few distinct features and has a general <b>absence of any strong topographical elements</b> .		
<b>Landcover</b>			
	Landcover is predominantly <b>simple and predictable</b> within the context of widespread pasture areas across the Monaro and regional area of the Southern Tablelands.  The overall landscape pattern created by the grass pasture is <b>smooth, regular and uniform</b> .  Areas of cultural planting surround the majority of rural dwellings in the form of evergreen windbreaks.		
<b>Settlement and human influence</b>			
	A <b>dispersed settlement</b> pattern occurs across the landscape and comprises rural farm homesteads including documented local historical structures.  There is a general <b>absence of modern development</b> throughout this		

	landscape, excluding agricultural structures and local roads and access tracks.
<b>Movement</b>	
	Movement is generally <b>restricted</b> to occasional passing traffic, livestock as well as agricultural machinery.
<b>Rarity</b>	
	Undulating grassland is generally <b>well represented and a common feature</b> across the Monaro, as well as the broader regional area of the Southern Tablelands.
<b>Intervisibility</b>	
	Undulating grassland areas appear as a <b>simple backdrop</b> in views from surrounding elevated areas. Undulating landform can retain and constrict views within the landscape, but <b>generally contributes</b> to the wider landscape.
<b>Overall Sensitivity to the wind farm development.</b>	<b>Medium</b>

### 6.3.2 LCA 2 River Valley and Drainage Lines



*Plate 2 – Typical views across river valley and drainage lines landscape*

**Table 6 – LCA 2, Landscape Sensitivity**

	Lower Sensitivity	↔	Higher Sensitivity
<b>Landform and Scale</b>			
	<p>River valley and drainage line areas are generally contained by the gently sloping landform resulting in a <b>small to moderate scale</b> landform.</p> <p>The landform is <b>simple</b> containing <b>few distinct features</b> and has an <b>absence of any strong topographical elements</b>.</p>		
<b>Landcover</b>			
	<p>Landcover is predominantly <b>simple and predictable</b> within the context of widespread drainage areas across the Monaro and the broader regional area of the Southern Tablelands.</p> <p>The overall landscape pattern created by grass pasture within this landscape is <b>smooth, regular and uniform</b>, although mosaics of timbered stands on adjoining slopes and hillsides create some <b>diversity and contrast</b> in pattern.</p>		
<b>Settlement and human influence</b>			
	<p>There is a <b>general absence of settlement</b> within this landscape with a small and dispersed number of agricultural structures (some abandoned), minor access tracks and fences occurring throughout. Some modifications to landscape have been carried out to accommodate road access and the former railway line.</p>		
<b>Movement</b>			
	<p>A <b>lack of any significant movement</b> gives this landscape an overall still character.</p>		
<b>Rarity</b>			
	<p>River valleys and drainage lines are generally <b>well represented</b> and a</p>		

	<b>common feature</b> across the Monaro, as well as the broader regional area of the Southern Tablelands.
<b>Intervisibility</b>	Intervisibility is <b>limited</b> as views from within this landscape are often contained by sloping landform rising above the river valley and drainage lines. Views along drainage lines, as well as views from areas above and across river valley and drainage lines <b>provide links</b> with adjoining landscape areas.
<b>Overall Sensitivity to the wind farm development.</b>	<b>Medium</b>

### 6.3.3 LCA 3 Broad River Valley



*Plate 3 – Typical views to, and within broad river valley landscape*

**Table 7 – LCA 3, Landscape Sensitivity**

	Lower Sensitivity	↔	Higher Sensitivity
<b>Landform and Scale</b>	<p>Broad river valley areas are generally contained by gently sloping landform resulting in a <b>moderate scale</b> landform.</p> <p>The landform is <b>simple</b> containing <b>few distinct features</b> and has an <b>absence of any strong topographical elements</b>.</p>		
<b>Landcover</b>	<p>Landcover is predominantly <b>simple and predictable</b> within the context of similar areas across the Monaro and the broader regional area of the Southern Tablelands.</p> <p>The overall landscape pattern defined by grass pasture and cultivated areas within this landscape is <b>smooth, regular and uniform</b>. Small and dispersed timbered areas on adjoining slopes create some <b>diversity and contrast</b> in pattern.</p>		
<b>Settlement and human influence</b>	<p>Settlement is <b>occasional</b> and <b>dispersed</b> along the river valley, with the main visible influences of human activity resulting from <b>agricultural improvement</b> within the landscape.</p>		
<b>Movement</b>	<p>Movement is generally <b>limited</b> to local roads, including the Snowy River Way, and local access tracks.</p>		
<b>Rarity</b>	<p>Broad river valleys are generally <b>well represented</b> and a relatively <b>common feature</b> across the Monaro, as well as the broader regional area of the Southern</p>		



	Tablelands.
<b>Intervisibility</b>	
	Intervisibility is <b>limited</b> as views from within this landscape are often contained by sloping landform rising above the river valley. Views along drainage lines, as well as views from areas above and across river valley areas <b>provide links</b> to adjoining landscape areas.
<b>Overall Sensitivity to the wind farm development.</b>	<b>Medium</b>

### 6.3.4 LCA 4 Simple slopes and ridgelines



*Plate 4 – Typical views along simple slope and ridgeline landscape*

**Table 8 – LCA 4, Landscape Sensitivity**

	Lower Sensitivity	↔	Higher Sensitivity
<b>Landform and Scale</b>	<p>Simple slope and ridgeline areas are represented by a generally open and <b>large scale</b> landform with distant views available from elevated areas within this landscape.</p> <p>The landform is <b>simple</b> containing <b>few distinct features</b> and has a general <b>absence of any strong topographical elements</b>.</p>		
<b>Landcover</b>	<p>Landcover is predominantly <b>simple and predictable</b> within the context of similar areas across the Monaro and Southern Tablelands.</p> <p>The overall landscape pattern created by grass pasture within this landscape is <b>smooth, regular and uniform</b>, although mosaics of timbered areas on surrounding slopes and cultural planting surrounding dwellings create some <b>diversity and contrast</b> in pattern.</p>		
<b>Settlement and human influence</b>	<p>Settlement is <b>occasional</b> and <b>dispersed</b> within this landscape and does not generally occur along the top of ridgelines or on elevated and exposed slopes. The main influences of human activity are the effects of <b>agricultural improvement</b> within the landscape.</p>		
<b>Movement</b>	<p>Movement is generally <b>limited</b> to local roads and access tracks.</p>		
<b>Rarity</b>	<p>Simple slopes and ridgelines are generally <b>well represented</b> and a <b>common feature</b> across the Monaro, as well as the broader regional area of the Southern</p>		

	Tablelands.
<b>Intervisibility</b>	
	Intervisibility is <b>limited</b> as views from within this landscape are often contained by undulating or sloping landform rising to ridgelines, however, potential distant views do occur from elevated landform to <b>provide links</b> to adjoining landscape areas.
<b>Overall Sensitivity to the wind farm development.</b>	<b>Medium</b>

### 6.3.5 LCA 5 Upland Wetland and Plateau



*Plate 5 – Typical views across upland wetland and plateau landscape*

**Table 9 – LCA 5, Landscape Sensitivity**

	Lower Sensitivity	↔	Higher Sensitivity
<b>Landform and Scale</b>	<p>Upland wetland and plateau areas are a <b>large scale</b> and open landscape with a <b>gently undulating landform</b>.</p> <p>The structure of the landform is <b>simple</b> containing few distinct features and has a general <b>absence of any strong topographical elements</b>.</p>		
<b>Landcover</b>	<p>Landcover is predominantly <b>simple and predictable</b> within the context of similar areas across the Monaro.</p> <p>The overall landscape pattern created by the grass pasture within this landscape is <b>smooth, regular and uniform</b>.</p>		
<b>Settlement and human influence</b>	<p>Settlement is <b>occasional</b> and <b>dispersed</b> within this landscape. The main influences of human activity are the effects of <b>agricultural improvement</b> within the landscape.</p>		
<b>Movement</b>	<p>Movement is generally <b>limited</b> to local roads and access tracks.</p>		
<b>Rarity</b>	<p>Plateau landscape is generally <b>well represented</b> and a <b>common feature</b> across the sub-alpine Monaro landscape. The occurrence of 'natural' upland wetland areas is more sporadic and generally dispersed along the eastern and central portions of the Monaro.</p>		

<b>Intervisibility</b>	Views from elevated portions of the plateau landscape <b>provide links</b> to adjoining landscape areas, and from some areas the landscape affords distant prospects toward mountain ranges.
<b>Overall Sensitivity to the wind farm development.</b>	<b>Medium</b>

### 6.3.6 LCA 6 Timbered Areas



*Plate 6 – Typical views across timbered areas*

**Table 10 – LCA 6, Landscape Sensitivity**

	Lower Sensitivity	↔	Higher Sensitivity
<b>Landform and Scale</b>	<p>Timbered areas occur across a range of landform types that are generally defined by gently sloping or undulating landform resulting in a <b>moderate scale</b> landform.</p> <p>The landform is <b>simple</b> containing <b>few distinct features</b> and has an <b>absence of any strong topographical elements</b>.</p>		
<b>Landcover</b>	<p>Landcover is predominantly <b>simple and predictable</b> within the context of similar timbered areas across the Monaro and Southern Tablelands.</p> <p>The overall landscape pattern created by timbered areas creates <b>diversity and contrast</b> to the <b>smooth, regular and uniform</b> grass pasture and cultivated areas within this landscape.</p> <p>The darker coloured foliage of timbered areas contrast against the surrounding backdrop of lighter toned pasture and cultivated areas.</p>		
<b>Settlement and human influence</b>	<p>Settlement is <b>occasional</b> and <b>dispersed</b> within timbered areas with the majority of dwellings visually screened from surrounding landscape areas. The main influences of human activity are the effects of <b>agricultural improvement</b> within the landscape.</p>		
<b>Movement</b>	<p>Movement is generally <b>limited</b> to local roads and access tracks.</p>		
<b>Rarity</b>	<p>Timbered areas are reasonably <b>well represented</b> and an established <b>feature</b></p>		

	<p>across portions of the Monaro, although some areas of the Monaro are recognised as being naturally tree-less, where growth is considered to be restricted by climatic or local environmental conditions.</p> <p>Timbered areas also occur across the broader regional area of the Southern Tablelands.</p>
<p><b>Intervisibility</b></p>	<p>The level of intervisibility between this landscape and adjoining areas is generally determined by the location and extent of timbered area relative to receptor locations, but on the whole is <b>limited</b> as views from within this landscape are constrained by vegetation, combined with sloping landform. Views from scattered or lightly timbered areas <b>provide links</b> to adjoining landscape areas.</p>
<p><b>Overall Sensitivity to the wind farm development.</b></p>	<p><b>Medium</b></p>

### 6.3.7 LCA 7 Settlements



*Plate 7 – Typical views across settlement areas*

**Table 11 – LCA 7, Landscape Sensitivity**

	Lower Sensitivity	↔	Higher Sensitivity
<b>Landform and Scale</b>			
	The main settlement of Nimmitabel is generally surrounded and contained by gently sloping and low undulating landform resulting in an overall <b>small scale</b> rural urban environment.		
<b>Landcover</b>			
	The overall landscape pattern is defined by human scale indicators including houses, shops and roads together with a variety of urban structures which create some <b>diversity and contrast</b> in pattern. There are generally no elements that result in the presence of strong topographical variety.		
<b>Settlement and human influence</b>			
	Settlement is <b>concentrated</b> around the main street and surrounding roads of Nimmitabel with a general absence of modern or recent urban development. The majority of built form is human scale with occasional historical features.  Dwellings are more dispersed beyond the main settlement area and are generally associated with individual farms and rural structures.		
<b>Movement</b>			
	Movement within this landscape is reasonably constant with traffic on the Monaro Highway passing through the centre of the settlement. Human movement occurs along the main street and interconnecting streets.		
<b>Rarity</b>			
	<b>Small scale</b> urban settlements are <b>dispersed</b> across the Monaro, as well as the broader regional area of the Southern Tablelands.		



<b>Intervisibility</b>	
	Intervisibility is <b>limited</b> where views are partially contained by buildings and structures, although views from elevated areas of the settlement extend beyond and across adjoining landscape areas.
<b>Overall Sensitivity to the wind farm development.</b>	<b>Medium</b>

In terms of overall landscape sensitivity, the LVIA has determined that the landscape within the viewshed of the proposed Boco Rock wind farm has a Medium sensitivity to accommodate change, and represents a landscape that is reasonably typical of landscape types found in surrounding areas of the Monaro, as well as landscapes within the wider regional context of the New South Wales Southern Tablelands.

As a landscape with an overall Medium sensitivity to accommodate change, some characteristics are likely to be altered by the wind farm development; however, the landscape may also have some capability to accommodate change. This capability is largely derived from the presence of predominantly large scale and open landscape across portions of the wind farm development, together with the relatively low density of settlement and potential receptors located within the immediate and surrounding areas of the viewshed. The LVIA has determined that the wind farm would not be an unacceptable development within the Boco Rock wind farm viewshed, which in a broader context also contains built elements such as roads, agricultural industry, aircraft landing strips, communication towers and power lines.

## 7.1 Introduction

A key component of the LVIA is defined by the description, assessment and determination of the viewshed, zone of visual influence and visibility associated with the wind farm. It is a combination of these issues that sets out the framework for determining the significance and magnitude of potential visual impact of the wind farm on receptors within the landscape.

In order to clarify and explain this component of the LVIA, the relationship between viewshed, zone of visual influence and visibility is outlined and defined in **Table 12**.

**Table 12 – Definitions**

	Definition	Relationship
<b>Viewshed</b>	An area of land surrounding and beyond the project area which may be potentially affected by the wind farm.	Identifies the majority of the LVIA study area that incorporates receptors that may be subject to a degree of visual impact.
<b>Zone of Visual Influence (ZVI)</b>	A theoretical area of landscape from which the wind farm structures may be visible.	Determines areas within a viewshed from which the wind turbines may be visible.
<b>Visibility</b>	A relative determination at which a wind turbine or group of wind turbines can be clearly discerned and described.	Describes the likely number and relative scale of wind turbines visible from a receptor location.

An overview of viewshed, zone of visual influence and visibility is discussed in the following sections.

## 7.2 Viewshed

For the purpose of the LVIA viewshed is defined as the area of land surrounding and beyond the project area which may be potentially affected by the wind farm. In essence, the viewshed defines the LVIA study area. The viewshed for the Boco Rock wind farm has been illustrated as a series of concentric bands (in 5km widths) extending across the landscape up to 15km from the wind turbines. The distance of the viewshed can vary between wind farm projects, and may be influenced and informed by a number of criteria including the height of the wind turbines together with the nature, location and height of landform that may limit visibility.

It is important to note that the wind turbines may be visible from some areas of the landscape beyond the nominated viewshed; however, within the general parameters of normal human

vision, a wind turbine at a maximum height of 152m to the tip of the rotor blade would occupy a relatively small proportion of a receptor's field of view from distances in excess of 10km.

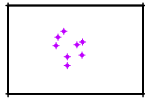
The viewshed is used as a framework and guide for visibility assessment, as the degree of visual impacts will tend to be gradated with distance although there are unlikely to be any distinct or abrupt noticeable changes between the nominated distance bands. For the purpose of the LVIA, the viewshed assumptions for the Boco Rock wind farm are outlined in **Table 13**.

**Table 13 – Viewshed Descriptors**

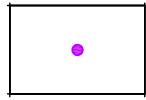
Distance from turbine	Potential Viewshed Descriptors
>15km	<p>Wind turbines less distinct and tending to become indistinct with increasing distance. Some blade movement visible but less discernable with increasing distance.</p> <p>Partially discernable but generally indistinct within viewshed (potentially resulting in <b>Low</b> level visibility).</p>
10km – 15km	<p>Wind turbines visible but tending to become less distinct depending on the overall extent of view available from the potential receptor location. Movement of blades may be discernable where visible against the skyline.</p> <p>Potentially noticeable within viewshed (potentially resulting in <b>Low</b> level visibility).</p>
5 – 10km	<p>Wind turbines clearly visible in the landscape but tending to become less dominant with increasing distance. Movement of blades discernable.</p> <p>Noticeable but less dominant within viewshed (potentially resulting in <b>Low to Moderate</b> level visibility).</p>
1 – 5km	<p>Wind turbines would generally dominate the landscape in which the wind turbine is situated. Potential for high visibility depending on the category of receptor, their location, sensitivity and subject to other visibility factors.</p> <p>Potentially dominant within viewshed (potentially resulting in <b>Moderate to High</b> level visibility).</p>
<1km	<p>Wind turbines would dominate the landscape in which they are situated due to large scale, movement and proximity.</p> <p>Dominant and significant within viewshed (potentially resulting in <b>High</b> level visibility).</p>

The relationship between the Boco Rock wind farm viewshed and potential receptor locations is illustrated in **Figure 17**.

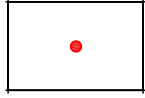
LEGEND



WIND TURBINES - '125'  
INDICATIVE DESIGN LAYOUT



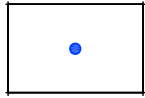
RESIDENCE BETWEEN 5 TO 10KM  
OF WIND FARM



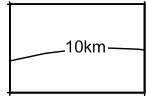
ASSOCIATED RESIDENCE



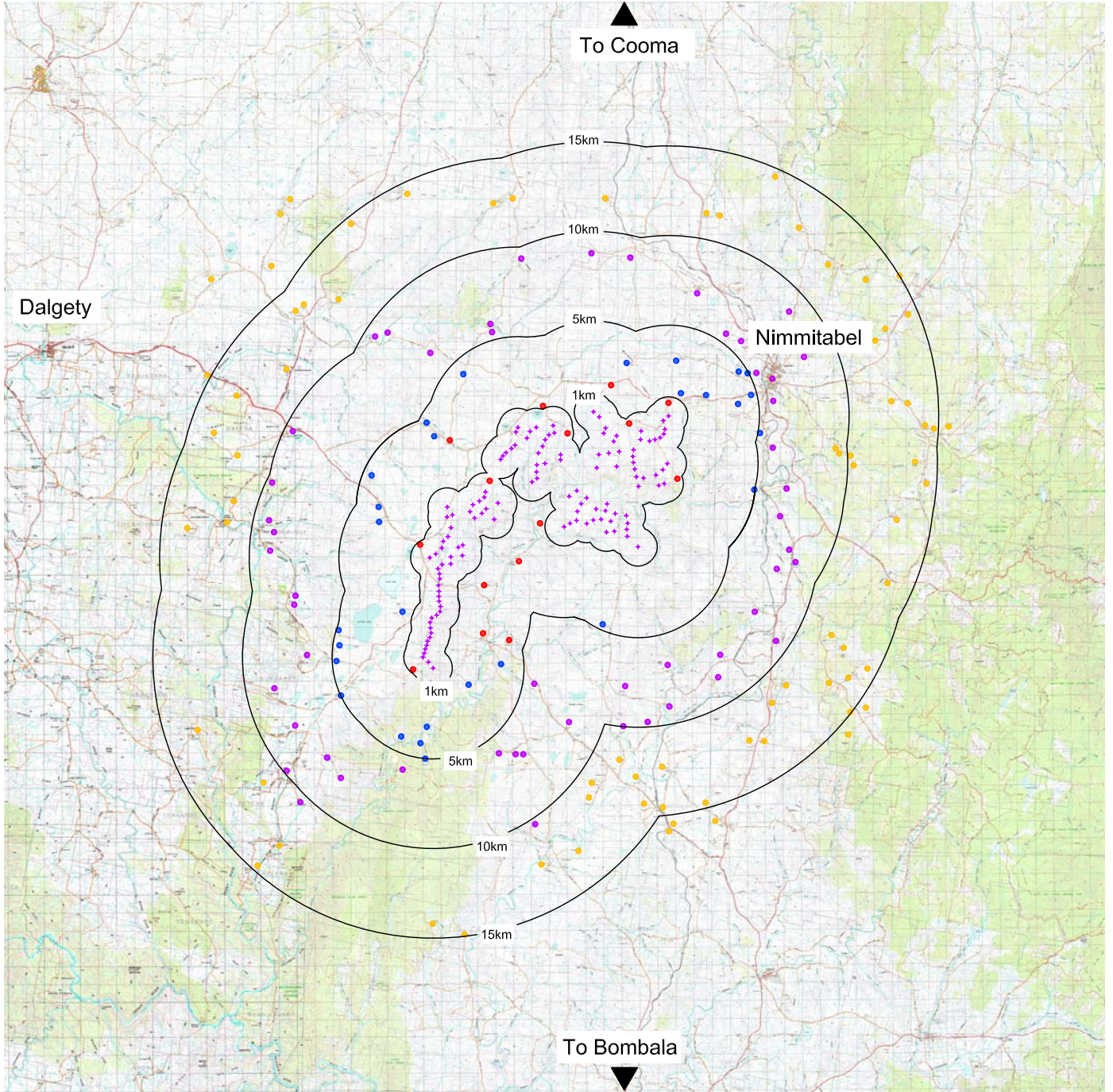
RESIDENCE BEYOND 10KM OF  
WIND FARM



RESIDENCE BETWEEN 1 TO 5KM  
OF WIND FARM

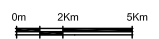


10km  
NOMINATED VIEWSHED  
DISTANCE



BOCO ROCK WIND FARM - VIEWSHED WITH '125' DESIGN LAYOUT

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



# BOCO ROCK WINDFARM

Fig 17 - Viewshed

### 7.3 Zone of Visual Influence (ZVI)

The ZVI diagrams are used to identify theoretical areas of the landscape from which a defined number of wind turbines, or portions of turbines, may be visible within the viewshed. They are useful for providing an overview as to the extent to which the Boco Rock wind farm may be visible from surrounding areas.

Five ZVI diagrams have been prepared by Garrad Hassan Pacific Pty Ltd including:

- '125' ZVI diagram from wind turbine tip of blade;
- '125' ZVI diagram from full face of rotor;
- '107' ZVI diagram from wind turbine tip of blade;
- '107' ZVI diagram from full face of rotor; and
- '127' and '125' ZVI diagrams from wind turbine tip of blade.

The ZVI diagrams are illustrated in **Figures 18 to 20**.

### 7.4 ZVI Methodology

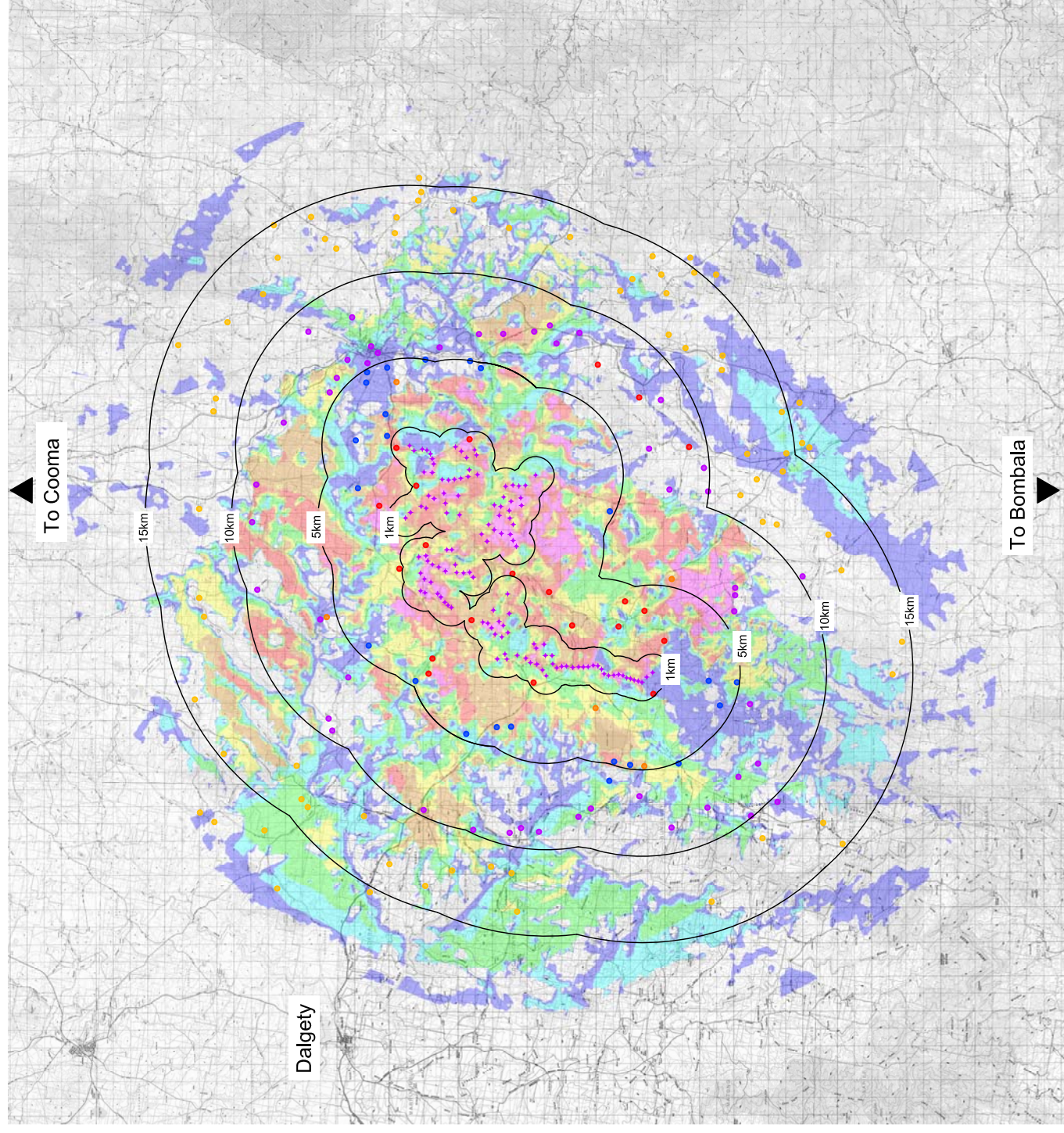
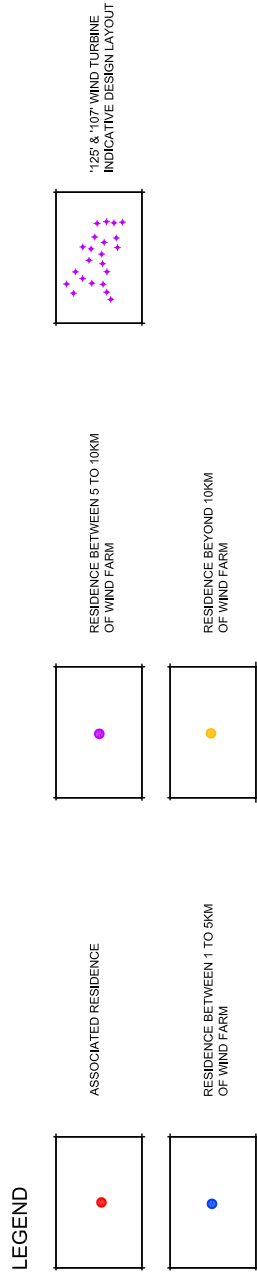
The methodology adopted by Garrad Hassan is a purely geometric assessment where the visibility of the proposed Boco Rock wind farm is determined from carrying out calculations based on a digital terrain model of the site and the surrounding terrain.

Calculations have been made to determine the visibility of the wind turbines:

- blade tips (essentially a view toward any part of the wind turbine rotor, including views toward the tips of blades above ridgelines);
- rotor face (essentially a view toward the entire swept path of the wind turbine blades).

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 diagrams due to the local presence of trees or other screening potential. While the ZVI diagrams are a useful visualisation tool, they are very conservative in nature.

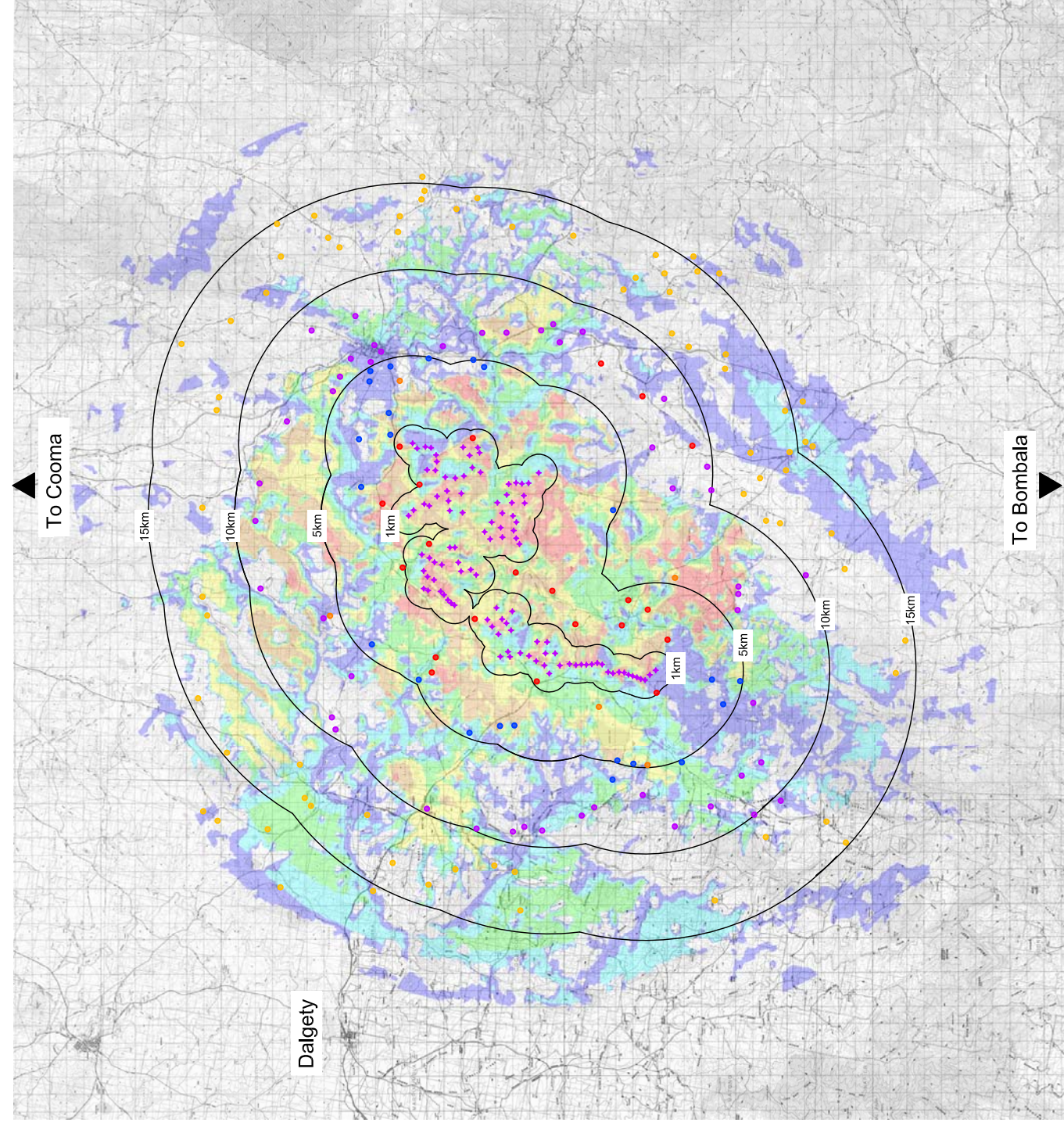
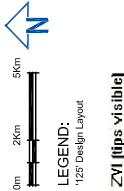
Additionally, the number of turbines visible is also affected by the weather conditions at the time. Inclement or cloudy weather tends to mask the visibility of the proposed wind project. The calculations also take into account the terrain relief and earth curvature.



BOCO ROCK WIND FARM - '125' DESIGN LAYOUT 100m HIGH TOWER, ZONE OF VISUAL INFLUENCE, TIP OF BLADE

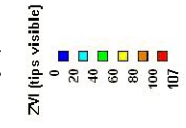
Source: Copyright Department of Lands  
Parramatta Avenue, Bathurst 2156  
(www.lands.nsw.gov.au)

**NOTES:**  
The ZVI methodology is a purely geometric assessment where the visibility of the proposed Boco Rock 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. The calculations also take into account the terrain relief and earth curvature.



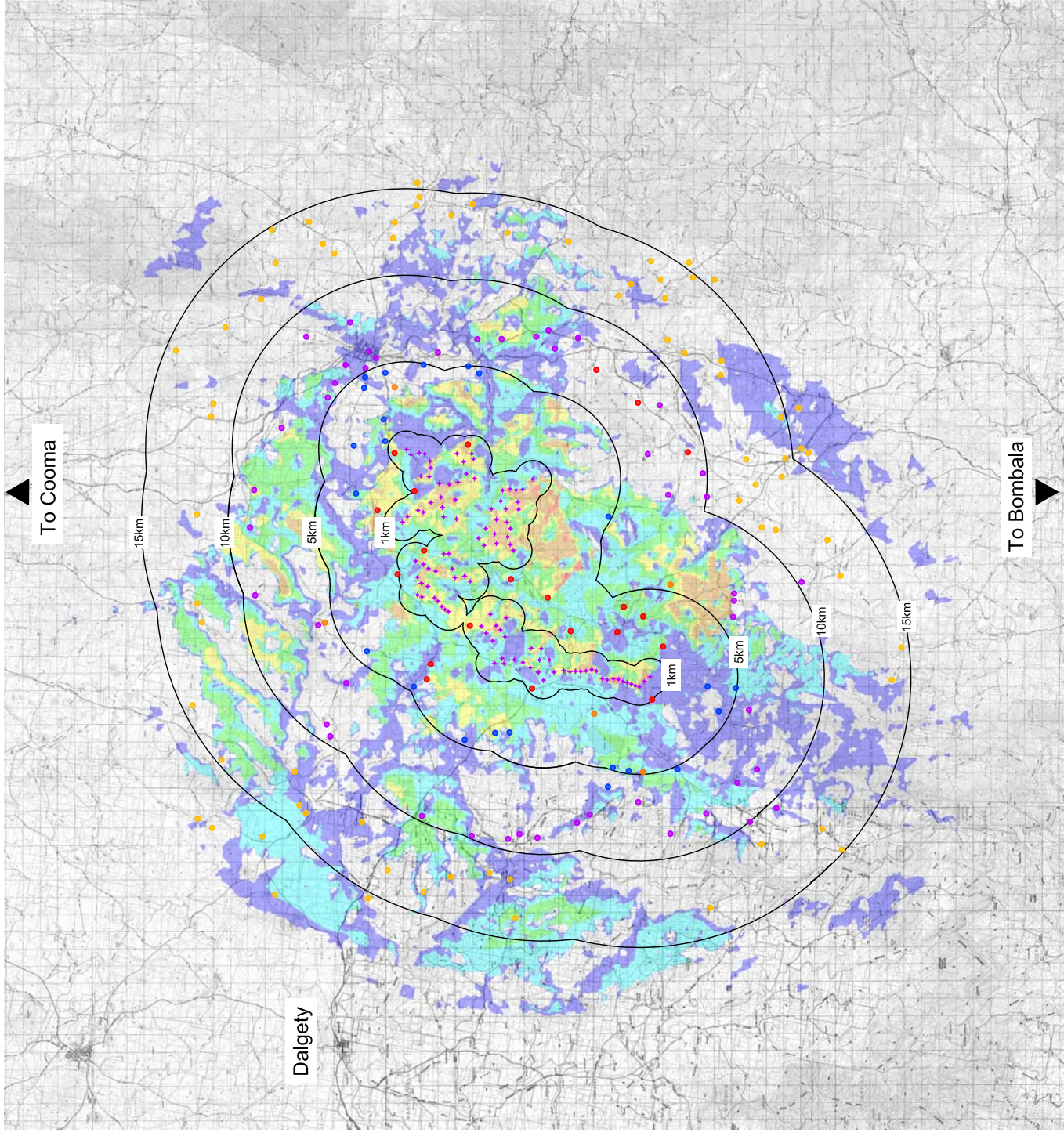
BOCO ROCK WIND FARM - '107' DESIGN LAYOUT 100m HIGH TOWER, ZONE OF VISUAL INFLUENCE, TIP OF BLADE

Source: Copyright Department of Lands  
Parramatta Avenue, Bathurst 2156  
(www.lands.nsw.gov.au)



# BOCO ROCK WINDFARM

Fig 18 - Zone of Visual Influence '125' and '107' design layouts - Tip of blade

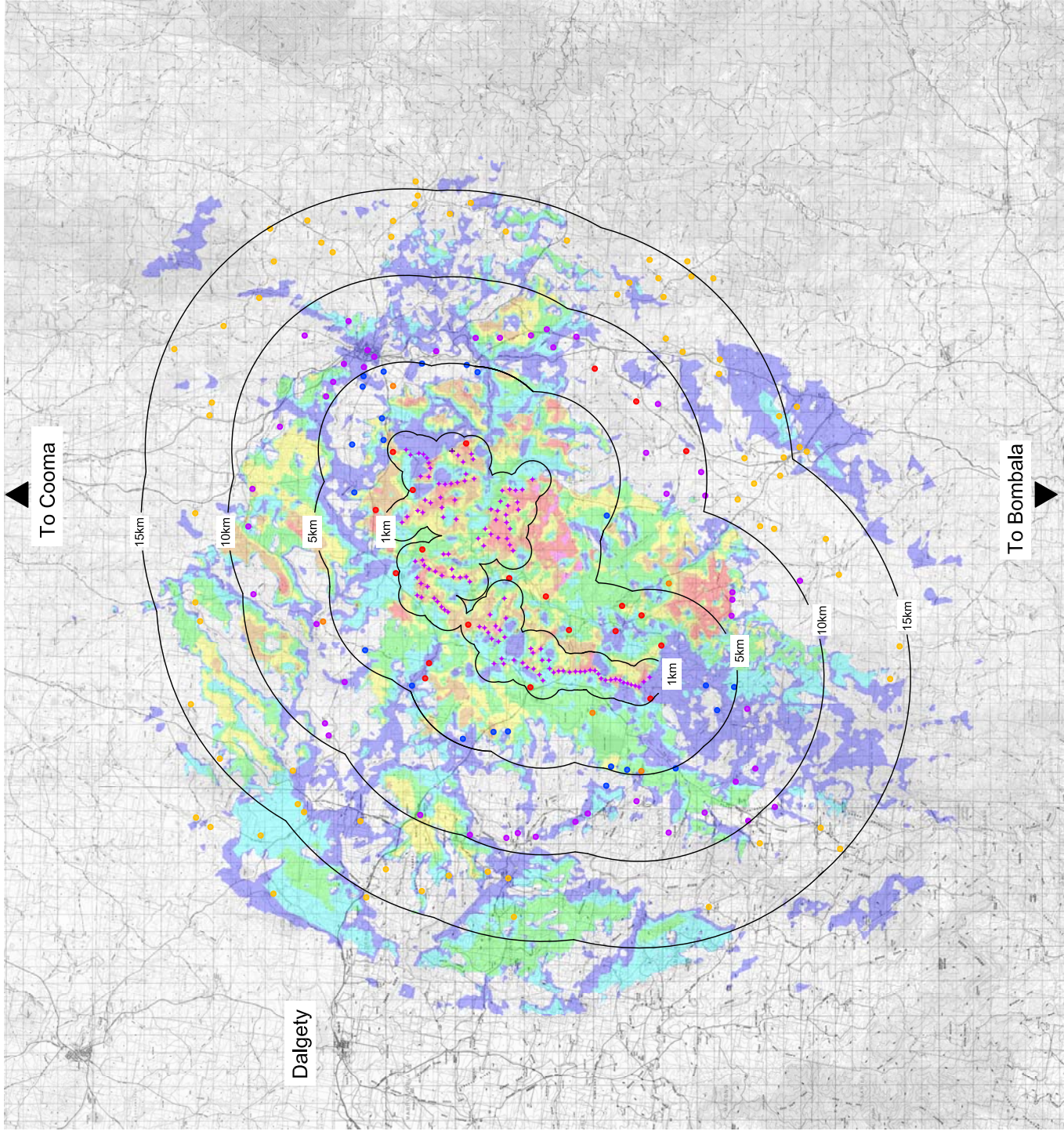
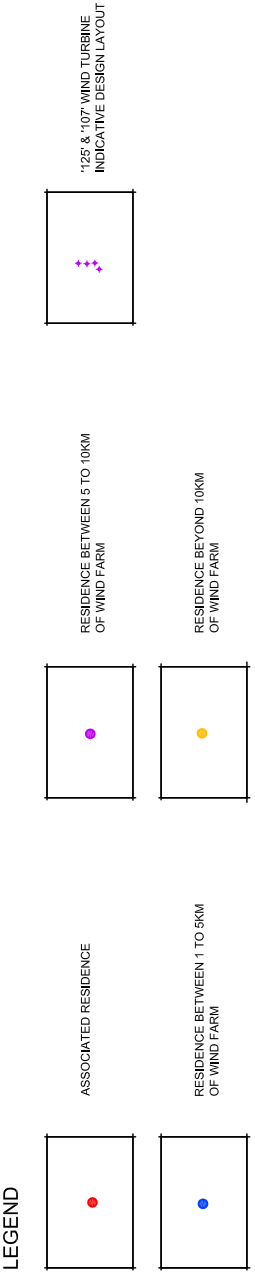


BOCO ROCK WIND FARM - '107' DESIGN LAYOUT 100m HIGH TOWER, ZONE OF VISUAL INFLUENCE, ROTOR FACE

Source: Copyright Department of Lands  
Panorama Avenue, Bathurst 2156  
(www.lands.nsw.gov.au)

# BOCO ROCK WINDFARM

Fig 19 - Zone of Visual Influence '125' and '107' design layouts - Rotor face

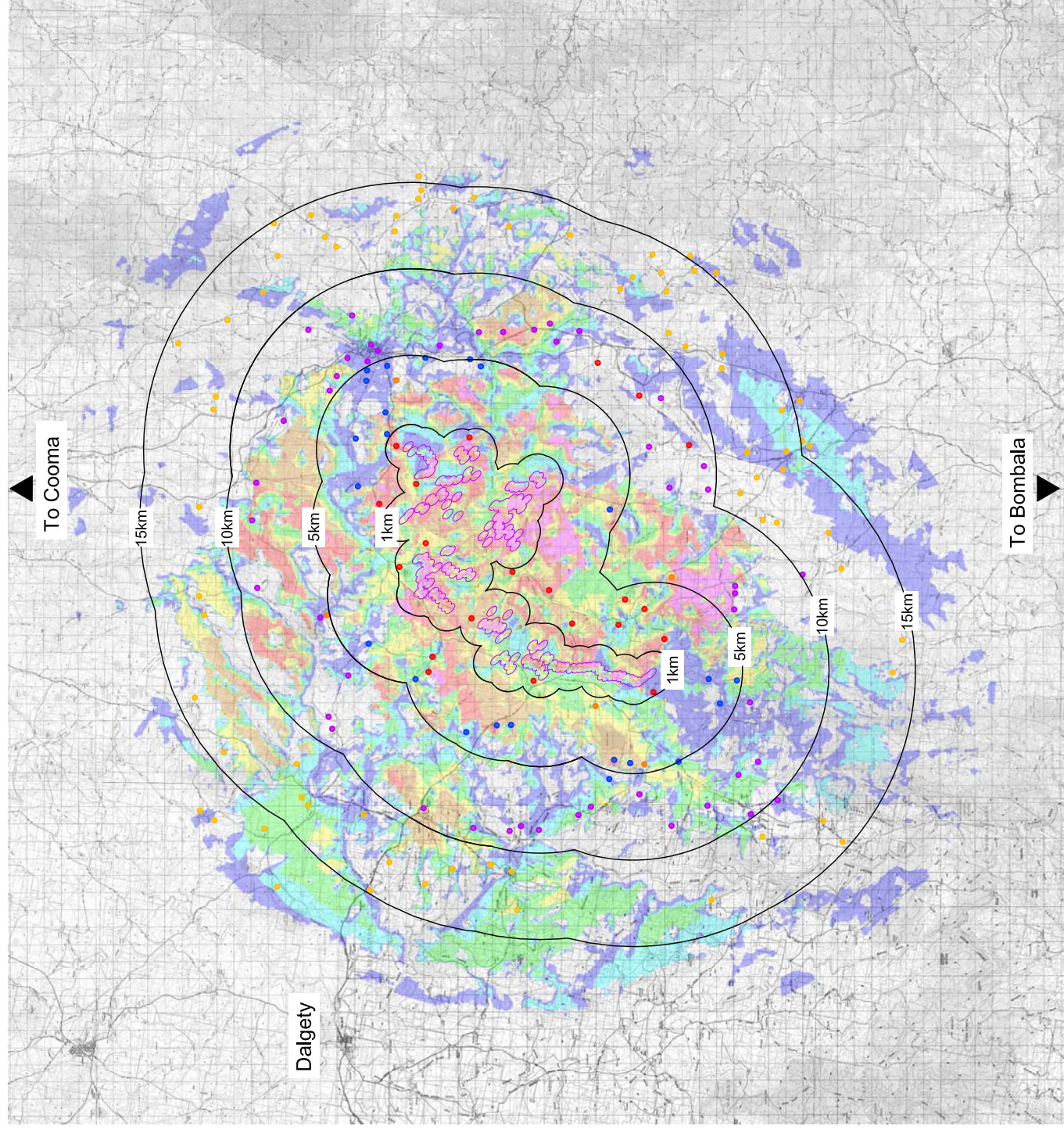
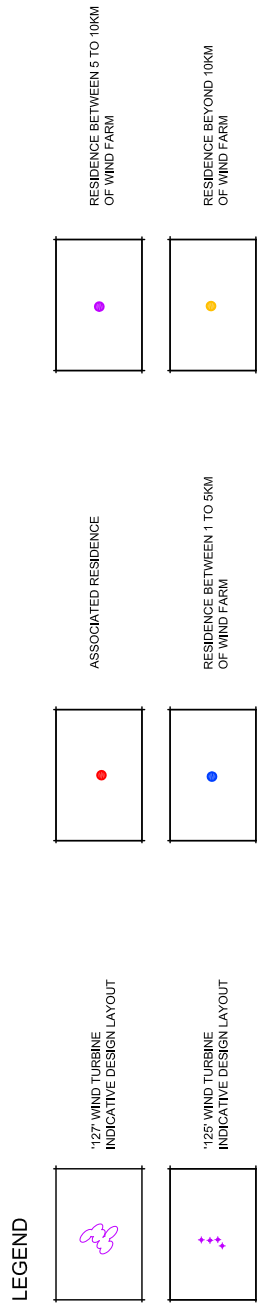


BOCO ROCK WIND FARM - '125' DESIGN LAYOUT 100m HIGH TOWER, ZONE OF VISUAL INFLUENCE, ROTOR FACE

Source: Copyright Department of Lands  
Panorama Avenue, Bathurst 2156  
(www.lands.nsw.gov.au)

**NOTES:**  
The ZVI methodology is a purely geometric assessment where the visibility of the proposed Boco Rock 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. The calculations also take into account the terrain relief and earth curvature.



BOCO ROCK WIND FARM - '127' DESIGN LAYOUT 80m HIGH TOWER, ZONE OF VISUAL INFLUENCE, TIP OF BLADE

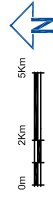
Source: Copyright Department of Lands  
Pavonema Avenue Ballarat 2715  
(www.lands.vic.gov.au)

**NOTES:**








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

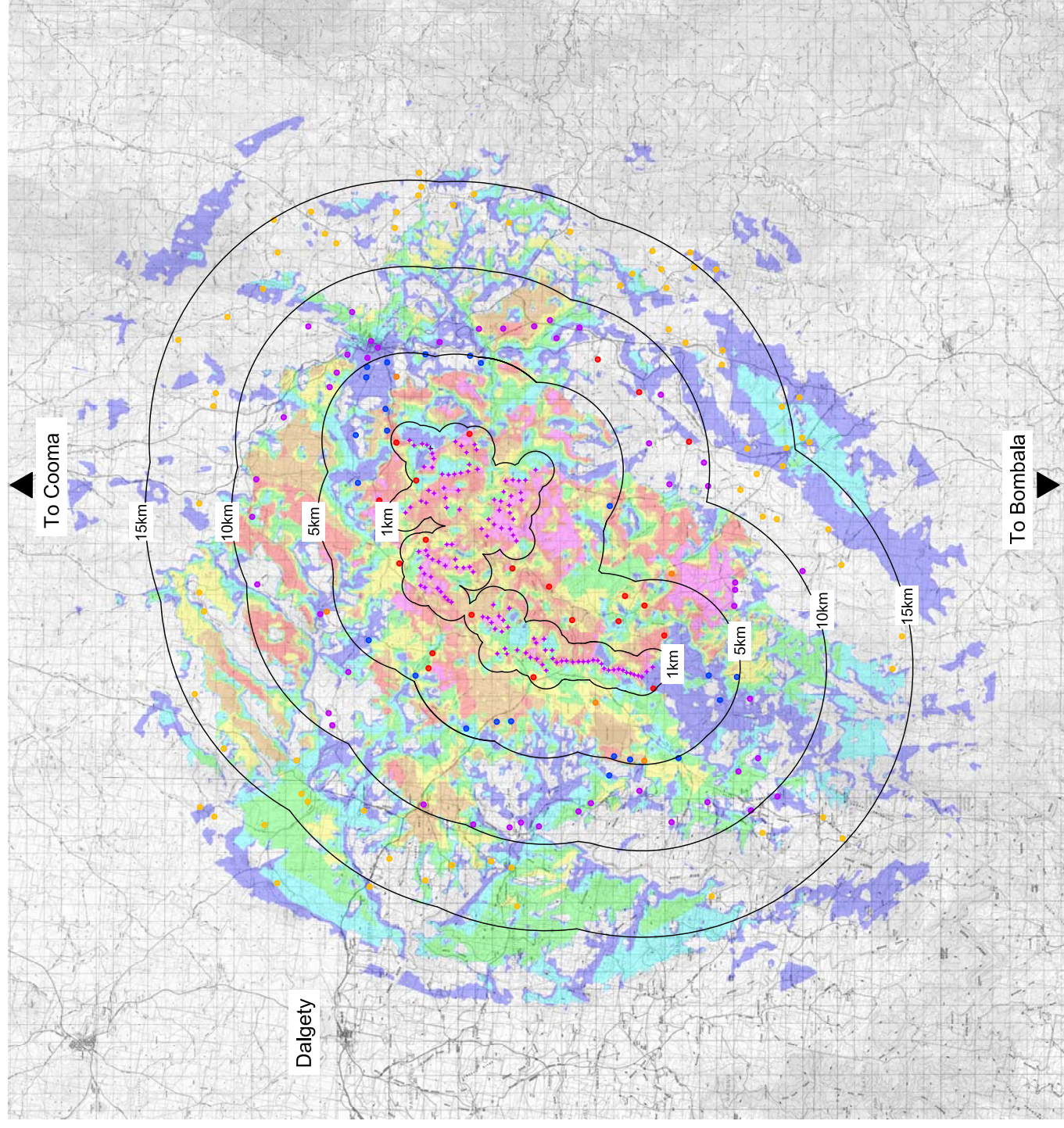
This assessment methodology is assumed to be conservative as the screening affects of any structures and vegetation above ground level are not considered in any way. Therefore the wind farm may not be visible at many of the locations indicated on the ZVI maps due to the local presence of trees, vegetation 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. The calculations also take into account the terrain relief and earth curvature.



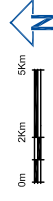
**LEGEND:**

- ZVI (tips visible) :-**
-  1 - 20 turbines
  -  21 - 40 turbines
  -  41 - 60 turbines
  -  61 - 80 turbines
  -  81 - 100 turbines
  -  101 - 120 turbines
  -  121 - 127 turbines



BOCO ROCK WIND FARM - '125' DESIGN LAYOUT 100m HIGH TOWER, ZONE OF VISUAL INFLUENCE, TIP OF BLADE

Source: Copyright Department of Lands  
Pavonema Avenue Ballarat 2715  
(www.lands.vic.gov.au)



# BOCO ROCK WINDFARM

Fig 20 - Zone of Visual Influence '127' and '125' design layouts - Tip of blade



## 7.5 Summary of ZVI diagrams

The key aspects of the Boco Rock wind farm ZVI diagrams are described and summarised below:

### *'125' and '107' Tip of blade:*

The most extensive and continuous area of visibility toward the wind turbines will 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, and generally visually negligible from longer distances.

The tip of blade ZVI diagrams for both the '125' and '107' design layouts cover similar extents of landscape surrounding the wind farm, and extend toward isolated pockets of rural landscape beyond 15km of the nearest wind turbine.

The ZVI diagrams indicate that the areas of landscape which provide the potential to view a large number of wind turbines occur within private property, including land belonging to associated landowners. Areas of land that also offer the opportunity to view a large number of wind turbines do, however, extend across neighbouring and non associated properties to the north, east and south of the wind farm.

The ZVI diagrams also indicate a small number of discrete pockets within the 1km to 5km viewshed band from which the wind turbines would not be visible, although this band of the viewshed also represents the area within which a greater number of turbines may be visible.

The ZVI diagrams indicate that the influence of surrounding landform begins to disperse visibility from beyond 5km, although opportunities to view a large number of turbines from elevated (but moderately distant) areas exist within this portion of the viewshed, including areas north of the wind farm toward Jinny Brother and The Peak as well as areas east toward Old Bombala Road.

The ZVI diagrams indicate that a small number of turbines may be visible from areas surrounding and within Nimmitabel. In reality, the opportunity to view wind turbines from the majority of Nimmitabel will be restricted by the screening influence of surrounding buildings and vegetation.

It should be noted that the wind turbines, when viewed from distances of around, or greater than 15km, 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 grazing land.

#### *‘125’ and ‘107’ Rotor face (full swept path):*

The ZVI diagrams for the full swept path of rotor are noticeably reduced in extent from the tip of blade ZVI. The greater number of turbine rotors visible for the full swept path are generally restricted to areas immediately surrounding or adjoining the wind farm, but also extend toward localised elevated areas of generally open and uninhabited agricultural or rural land including areas to the south of the wind farm site.

The ZVI diagrams for both tip of blade and the whole swept path illustrate that a small number of turbines may be visible from areas surrounding and within Nimmitabel. As for the tip of blade ZVI, the opportunity to view the full swept path of the wind turbines from the majority of Nimmitabel will be restricted by the screening influence of surrounding buildings and vegetation.

#### *‘127’ and ‘125’ Tip of blade:*

The ZVI diagrams for the **superseded** ‘127’ design layout and the current ‘125’ design layout demonstrate the relatively small degree of change in the overall and theoretical extent of visibility that is likely to occur due to a 20m increase in tower height. Whilst a small increase in the number of wind turbines is anticipated from some areas, the overall pattern of visibility appears to be very similar between the former and current design layouts.

## 7.6 Visibility

The level of wind turbine visibility within the viewshed can result from a number of factors:

### *Distance*

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, would decline.

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 receptor and the wind turbines is a primary factor to consider when determining potential visibility, there are other issues which may also affect the degree of visibility.

### *Movement*

The visibility of the wind turbines would vary between the categories of static and dynamic receptors. 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 may be relatively wide as the receptor 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 well as 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.

#### *Relative position*

In situations where the receptor is located at a lower elevation than the wind turbine structure most of it 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. Dark grey clouds would contrast more strongly with white turbines than a background of white clouds.

The level of contrast is also influenced by the position of the sun relative to the individual wind turbines and the receptor. Where the sun is located in front of the viewer, the visible portion of the wind turbine would be seen in shadow. Where the background to the wind turbine is dark toned the visual contrast would be reduced.

Where the sun is located behind the receptor then the visible portion of the wind turbine would be in full sun. If the background is also light toned, such as white clouds, then the contrast is less when compared to a dark background.