

# 5.0 LANDSCAPE CHARACTER

## 5.2.4 LCU 4: COMOBELLA

The Comobella LCU includes Comobella, Comobella road and the land to the east of Montefiores Nr Elong Elong Road. The LCU incorporates the northern section of Mitchell Creek and Yarindury State Forest to the north.

The landscape quality of this LCU has been rated as low - moderate.

CHARACTER	LANDSCAPE QUALITY RATING		
	LOW	MEDIUM	HIGH
LANDFORM & SCALE	<div></div>		
LANDCOVER	<div></div>		
SETTLEMENT & HUMAN INFLUENCE	<div></div>		
MOVEMENT	<div></div>		
RARITY	<div></div>		
INTERVISIBILITY WITH ADJACENT LANDSCAPES	<div></div>		

TABLE 9: LCU 4 Comobella Landscape Quality Rating



Comobella Road



Windora Road



Grazing land

### VIEWS:

Views from the Comobella LCU are typically vast towards the east. A number of local rises and foreground vegetation obstruct most views out of the LCU and therefore the proposed wind farm would be screened from view in most parts.

### TOPOGRAPHY:

The LCU is typified by low undulating hills ranging in elevation from 300 - 500 metres. The landscape is generally sloping with a local relief from 40-100m. There are some local rises that slightly incline at a grade of approximately 3-10%.

### ROADS / INFRASTRUCTURE:

Montefiores Nr Elong Elong Road is a sealed local travel corridor which runs along the eastern edge of the LCU in a north south direction from Montefiores (north of Wellington) to Comobella. A number of unsealed and some unnamed minor roads run off Montefiores Nr Elong Elong Road servicing properties to the east and west. Comobella Road runs off Montefiores Nr Elong Elong Road to the east connecting Comobella to Geurie.

### VEGETATION:

Vegetation coverage through the LCU varies, however for the most part it is typically cleared grazing land with a sparse coverage of native vegetation. Dense vegetation surrounds Comobella and riparian vegetation associated with the northern extent of Mitchell Creek. The Yarindury State Forest to the north contains a large area of retained vegetation.

### LAND USE:

The land use in this LCU is dominated by grazing of improved pasture and lucerne and dryland cropping of wheat, canola, oats and legume crops. A number of isolated homesteads are scattered throughout the LCU associated with the agricultural land use.

### WATERCOURSES:

The main watercourse is Mitchell Creek which runs through the LCU eventually into the Talbragar River to the north. A number of smaller intermittent water courses run through the LCU draining into Mitchell Creek.

# 5.0 LANDSCAPE CHARACTER

## 5.2.5 LCU 5: SPICERS CREEK

The Spicers Creek LCU encompasses land between Mullion Creek and Gollan Road. The LCU incorporates Spicers Creek, Spicers Creek Road, Oakey Creek Road and Browie Road. The LCU is characterised by gently undulating land with Red / Brown Soils and areas of improved pasture.

The landscape quality of this LCU has been rated as moderate.

CHARACTER	LANDSCAPE QUALITY RATING		
	LOW	MEDIUM	HIGH
LANDFORM & SCALE	<div></div>		
LANDCOVER	<div></div>		
SETTLEMENT & HUMAN INFLUENCE	<div></div>		
MOVEMENT	<div></div>		
RARITY	<div></div>		
INTERVISIBILITY WITH ADJACENT LANDSCAPES	<div></div>		

TABLE 10: LCU 5 Spicers Creek Landscape Quality Rating



Spicers Creek Road



Spicers Creek



Improved pasture along Oakey Creek Road

### VIEWS:

Views from this LCU are generally contained within as a result of the local rises and vegetation. It is likely that views to the proposed wind farm would be limited from this LCU and potentially screened due to distance, topography and vegetation.

### TOPOGRAPHY:

The topography of the Spicers Creek LCU is characterised by gently undulating rises and undulating low hills ranging from 280 - 560 metres above sea level. Slopes gently incline at approximately 2 - 6% and extend approximately 1500 - 3000 m.

### ROADS / INFRASTRUCTURE:

Gollan Road runs along the northern edge of the LCU connecting Goolma and Gollan. A few minor unsealed roads run south off Gollan Road through the LCU. Old Station Road, Oakey Creek Road, Browie Road and Spicers Creek Road run through the LCU servicing isolated homesteads.

### VEGETATION:

The LCU is mostly cleared for agricultural use however some retained vegetation occurs as open woodlands on slopes. Riparian vegetation is present in Spicers Creek and several of the smaller drainage lines.

### LAND USE:

The landscape is intensely utilised for agriculture with improved pastures and large areas of cropping. Crops include wheat, oats, canola, peas and large areas of lucerne. Grazing of sheep and cattle is also undertaken in this LCU. A number of isolated homesteads are present within the LCU.

### WATERCOURSES:

Spicers Creek is the main water body running through the LCU. A number of small drainage lines and intermittent water courses run through the landscape into Spicers Creek at approximately 1000 - 2000m apart.



# 6.0 THE PROPOSAL

## 6.1 PROPOSED WIND FARM LAYOUT

The proposed Bodangora Wind Farm consists of 36 wind turbines to be sited within 1km north east of Mudgee Road. The wind turbines are sited in an irregular pattern along two low ridges to the north and north west of Mount Bodangora on land between 400 - 700 metres above sea level.

The proposed development envelope spans approximately 11km from east to west and 6.5 km north to south. Spacings between the proposed wind turbines range from approximately 300 metres to 1300 metres. It important to note the layout identified in Figure 9 is based on worst case scenario and each turbine has a development envelope of 200m.

In addition to the wind turbines, associated infrastructure is included as part of the proposal. An overview of these additional components is included in Section 6.3 of this report.

## 6.2 WIND TURBINE DESIGN

The wind turbines proposed for the development have an overall height of approximately 150m base to blade tip from ground level. Supporting towers taper from 6 metres diameter at the base to 3 metres at the top. The three blades are approximately 56m long from the hub to the tip and have a diameter of approximately 112m (See Figure 8 and Table 12). Each wind turbine will have a generator transformer located at the base of the structure.

COMPONENT	NUMBER/SIZE
Total number of Turbines	36
Hub Height (Max.)	94 metres
Blade Length	54.65 metres
Number of Blades	3
Rotor Diameter	112m
Tower (Max. Diameter)	4.2m
Overall height (to tip of blade)	150 metres
Colour	White
Swept Area	9852m2
Generator transformer	Located at the base of each turbine

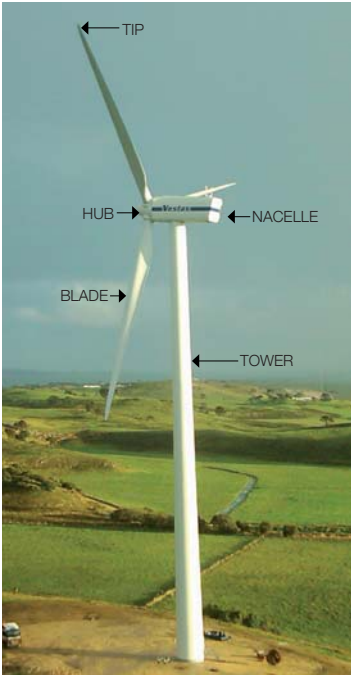


TABLE 12: Details of proposed wind turbines

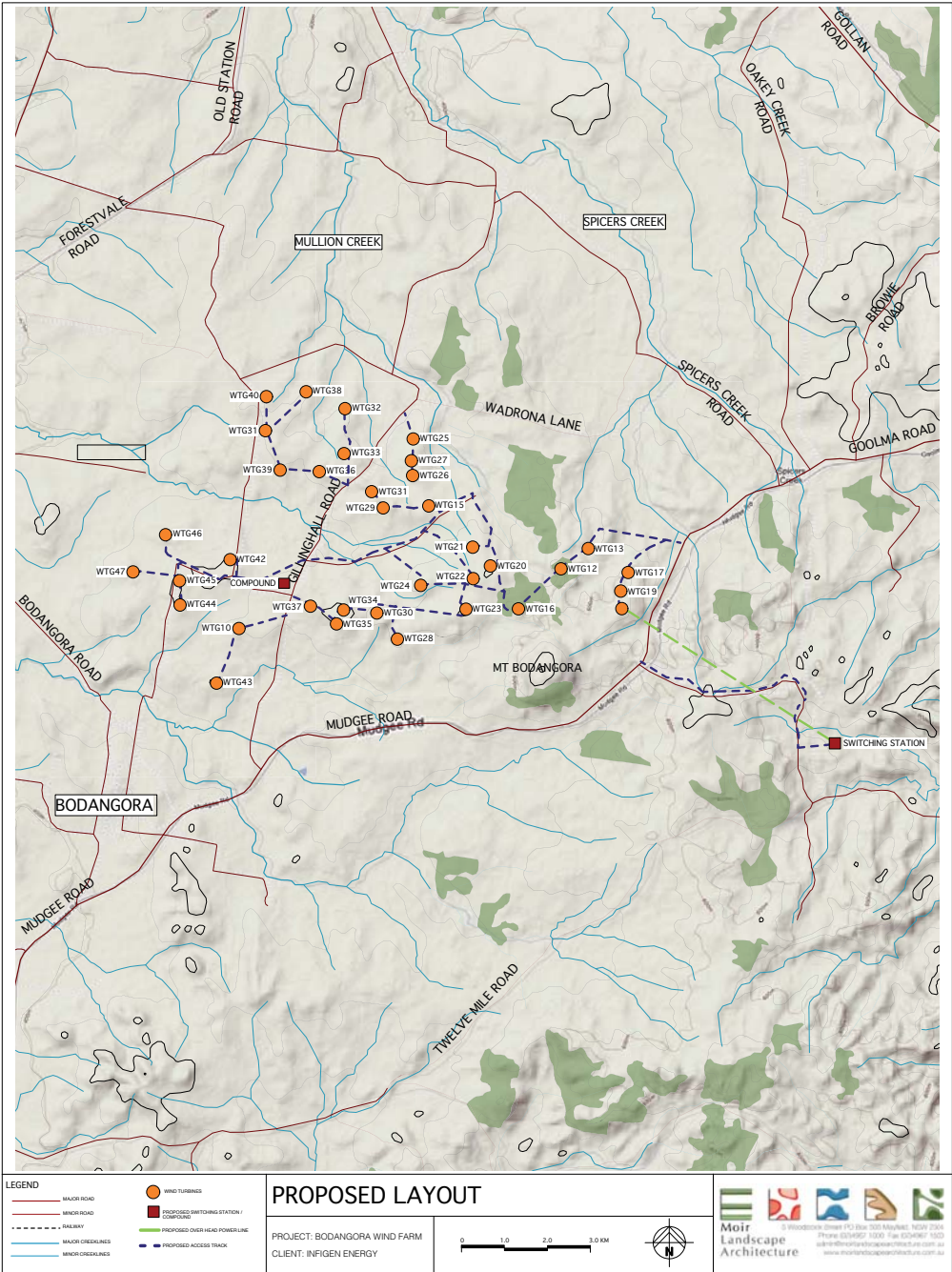


FIGURE 9: Proposed Wind Farm Layout

# 6.0 THE PROPOSAL

## 6.3 ASSOCIATED INFRASTRUCTURE

The visual character of the associated components proposed for the development of Bodangora Wind Farm which may have a visual effect are outlined in this section of the VIA.

### 6.3.1 Access Roads

A number of internal access tracks are proposed as part of the wind farm development. These access roads are generally proposed to be located along existing roads and between wind turbines for construction and maintenance purposes. The proposed roads are typically located to minimise cut and fill and the clearing of vegetation. Access roads are generally an extension of existing farm roads and are generally not visible from the surrounding viewpoints.

Following the installation of the turbines it is envisaged that any temporary access roads will be returned to grazing land or utilised as farm roads. Site entrances will be gated, sign posted and set back from major roads.

### 6.3.2 Substation

The existing Wellington electrical substation is located approximately 12.5km south west of the proposed wind farm on Mudgee Road.

### 6.3.3 Connection to the Grid

Individual wind turbines will be connected via underground power and control cables. An overhead power line will be used to connect the wind turbines to the switching station. The overhead power line is less than 6km long and runs between WTG 18, crossing the Mudgee Road and connecting to the proposed switching station (refer to figure 9). The proposed switching station will connect to the existing high voltage power lines that run through the landscape.



Generator Transformer (Source: Infigen Energy)



Concrete Footings (Source: Infigen Energy)

# 7.0 ZONE OF VISUAL INFLUENCE

## 7.0 ZONE OF VISUAL INFLUENCE

### 7.1.1 Zone of Visual Influence Process

Infigen Energy engaged Aurecon to undertake an assessment of visibility and shadow flicker effects in the vicinity of the wind farm (Refer to Appendix A). The assessment of visibility or Zone of Visual Influence (ZVI) identifies the areas of surrounding land from which the Wind Farm may be partially or completely visible. The ZVI has been determined through the use of digital topographic information and 3D modelling software.

As accurate information on the height and coverage of vegetation and buildings is unavailable, it is important to note the ZVI is based solely on topographic information. Therefore this form of mapping should be acknowledged as representing the worst case scenario. In reality the zone of visibility of the Bodangora Wind Farm is far less than that shown in the following ZVI figures due to the screening from vegetation and buildings.

Although it is possible for the development to be visible from further than 10km away, distance limits visibility greatly. The ZVI has been assessed on a distance of up to 10km (as per the Director Generals Requirements) and defines the number of visible turbines from 1-10, 11-20 and 21-37.

Following the development of the ZVI using a digital terrain model, detailed site investigations were undertaken to ground truth the findings and define a visual catchment for the proposal. The visual catchment essentially being the area of land which will have views to the wind turbines. It is from this analysis that viewpoint locations were selected for further investigation.

### 7.1.2 Zone of Visual Influence Results

Figure 10 on the following page illustrates the extent to which the proposed wind turbines would be visible based on a wind turbine at a height of 150m above ground level. It is important to note since the ZVI was developed, the two wind turbines indicated plan to the south east of Mudjee Road have been removed.

Due to the elevation of the proposed wind turbines and the gently undulating landscape, the modelled ZVI suggests the visual catchment extends through a large portion of the landscape. However the ZVI is based solely on topographic information and the proposed wind turbines will have a much lower visual catchment.

Overall the ZVI indicates the highest visual impact would be felt within 2km of the proposed wind turbines. Land immediately surrounding the wind turbines the ZVI shows that up to 100% of the proposed wind turbines will be visible within a 2km range. A larger percentage of wind turbines are shown to be visible towards the north east towards Comobella. As retained native vegetation covers a large portion of this land, it is likely the true ZVI would be significantly reduced.

It is illustrated that land to the south east of the proposed wind farm has a significantly lower visual

impact. Views from land to the south east appear to be obstructed by the undulating topography typical of the Mount Bodangora Landscape Character Unit. A moderate to dense coverage of vegetation forms part of the landscape character through this south eastern area of the study area and therefore the visual impact is likely to be further reduced through this area.

As the ZVI is based on topographic mapping it should be considered as a worst case scenario and is used only as a guide to select areas for further assessment. The ZVI has been included in this report to demonstrate the methodology used in the viewpoint analysis process and should not be considered to be an accurate portrayal of the visual impact.



# 7.0 ZONE OF VISUAL INFLUENCE

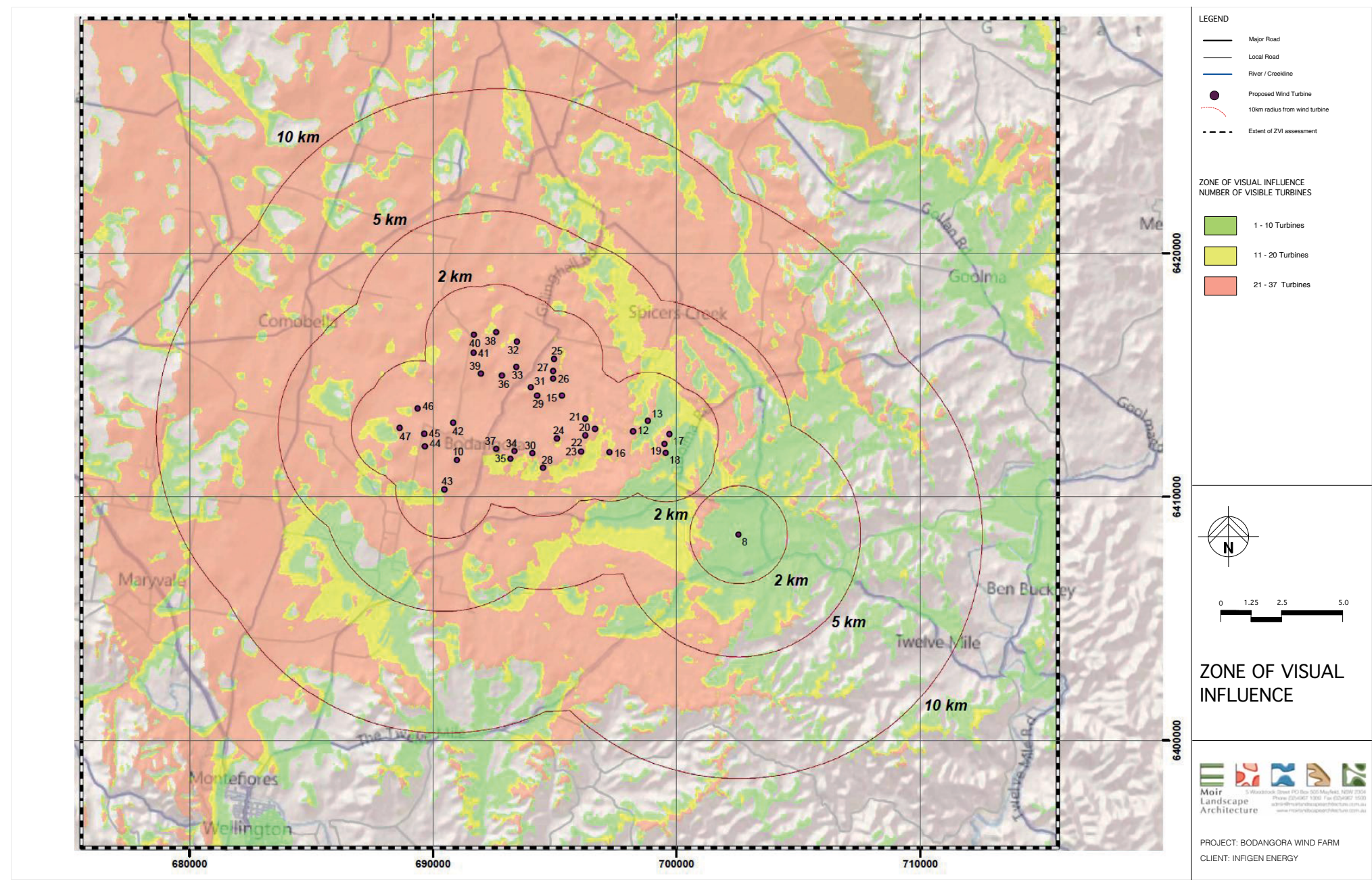


FIGURE 10: Zone of Visual Influence (Adapted from Aurecon)



# 8.0 VIEWPOINT ANALYSIS

## 8.1 VIEWPOINT ANALYSIS

This part of the visual assessment report considers the likely impact that development would have on the existing landscape character and visual amenity by selecting prominent sites, otherwise referred to as viewpoints.

### 8.1.1 Viewpoint Selection Process

Viewpoints are selected to illustrate a combination of the following:

- Present landscape character types.
- Areas of high landscape or scenic value.
- Visual composition (eg. focused or panoramic views, simple or complex landscape pattern).
- Range of distances.
- Varying aspects.
- Various elevations.
- Various extent of wind farm visibility (full and partial visibility).
- Sequential views along specific routes.

Viewpoints have been carefully selected to be representative of the range of views within the study area. The selection of viewpoints is informed by ZVI and topographical maps, field work observations and other relevant influences such as access, landscape character and the popularity of vantage points.

A total of 35 viewpoints were taken as apart of the field work process. Of these 35 viewpoints, 30 have been selected for inclusion in the report. The viewpoints which have been included represent the areas from where the development would appear most prominent, either based on the degree of exposure or the number of people likely to be affected.

It is important to note that viewpoints for this study have been taken only from accessible public land, however this does incorporate viewpoints adjacent to residences potentially affected by the development.

### 8.1.2 Process of Viewpoint Analysis

Once the viewpoint had been selected, panoramic photographs were taken on a level tripod at a height of 150cm (to represent eye level). Photographs were taken with a Canon 40D digital SLR through a 50mm fixed focal lens (Equivalent to 80mm on 35mm) in portrait.

The visual impact of the viewpoint was then assessed both on site and with the topographic and aerial information to ensure accuracy. Viewpoint photographs and analysis are included on pages 24 to 53 of this report. The findings of each viewpoint analysis have been quantified and are summarised in table 13.

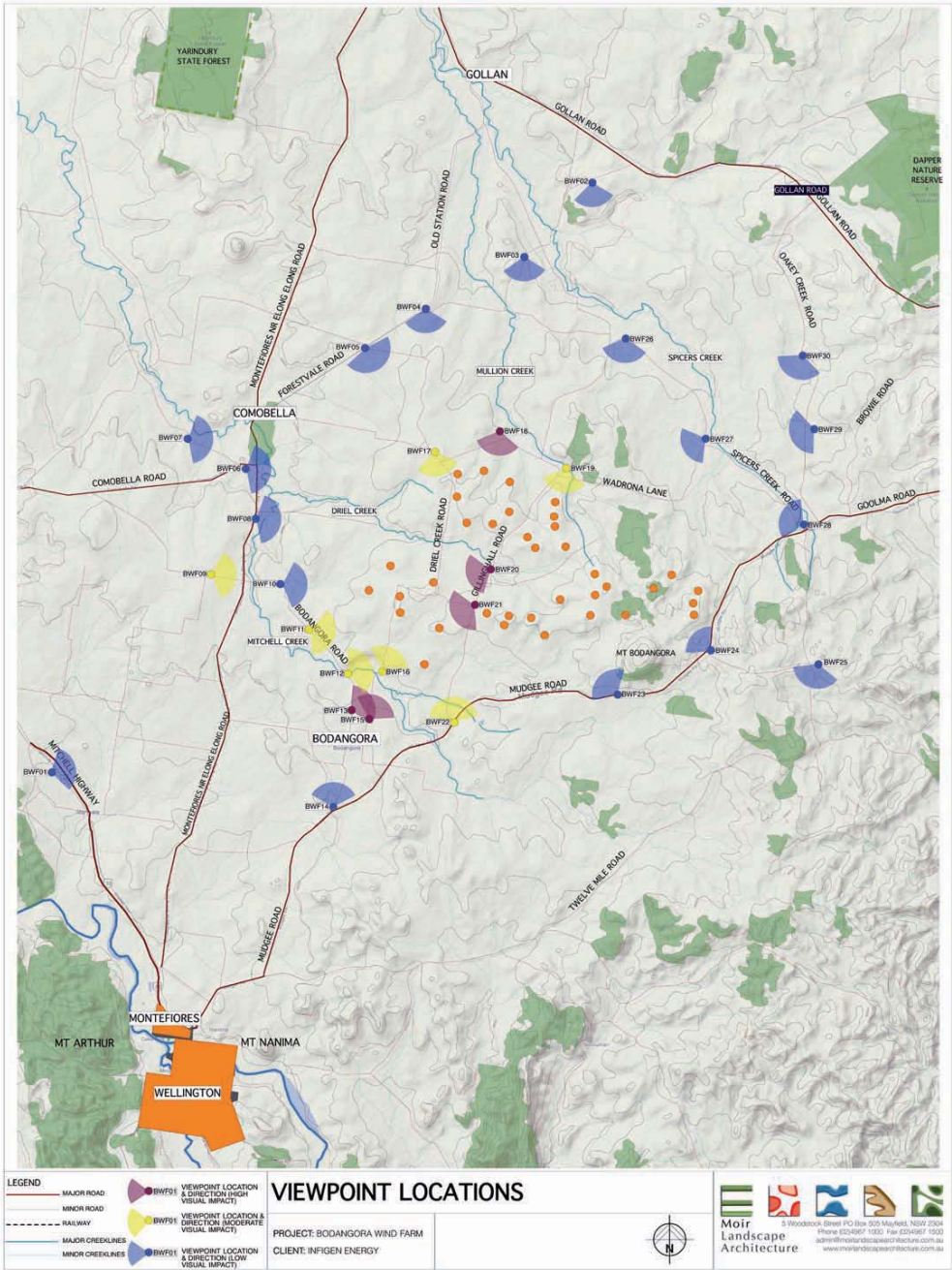


FIGURE 11: Viewpoint Locations

# 8.0 VIEWPOINT ANALYSIS

VIEWPOINT BWF01- Mitchell Highway



VIEWPOINT BWF01- Mitchell Highway



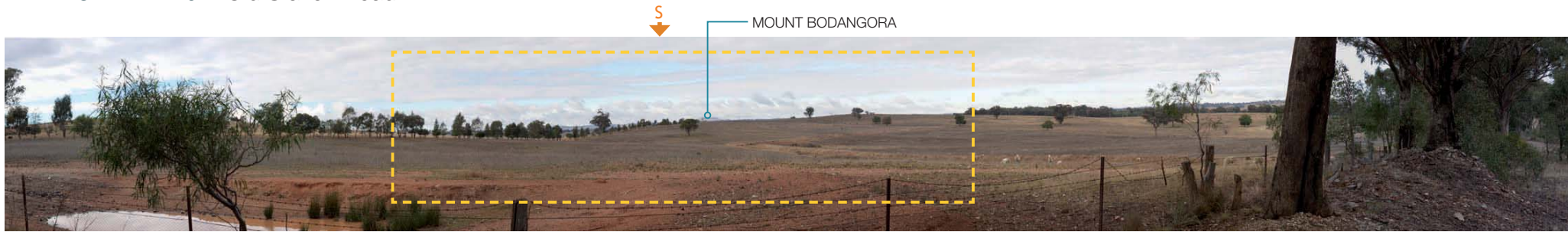
Image cropped from BWF01

VIEWPOINT BWF01		Landscape Description	Potential Visual Impact
Location	Mitchell Highway	Photograph taken from a raised roadside mound along the Mitchell Highway approximately 11km north of Wellington. The Mitchell Highway is a major road connecting Dubbo and Wellington. The topography of the area is gently undulating. Views are open and expand to the distant ridge lines. The landscape is typically cleared sheep grazing land with improved pasture. Scattered groups of trees occur in the foreground.  The visual sensitivity of this viewpoint has been rated as low. This is due to the land use as a travel corridor and the long distance to the proposed wind farm.	From this viewpoint it is likely that approximately 27 of the proposed wind turbines would be visible. However due to a combination of the distance from the site and the speed of travel along the Mitchell Highway, the visual effect from viewpoint has been rated as low.  The potential visual impact has been rated as low from this viewpoint.
Coordinates	S 32 ° 27.596 E 148 ° 53.737		
Elevation	350m		
Viewing Distance (to nearest turbine)	12.18 km		
Viewing Direction	East		
Land use	Major Road		
LCU	Wellington		
Visual Sensitivity	Low		
Visual Effect	Low		
Potential Visual Impact	Low		



# 8.0 VIEWPOINT ANALYSIS

## VIEWPOINT BWF02- Old Station Road



VIEWPOINT BWF02- Old Station Road



Image cropped from BWF02

VIEWPOINT BWF02		Landscape Description	Potential Visual Impact	
Location	Old Station Road	View from Old Station Road approximately 1.34 km south of Gollan Road. The northern section of Old Station Road between Gollan Road and Spicers Creek is characterised by dense roadside vegetation. Photograph was taken from a clearing in roadside vegetation on top of an embankment on the southern side of the road. Land use in the area is typically open grazing land with isolated native trees. Screen planting of native vegetation can be seen in the middle ground along the boundary line. Mount Bodangora is a local high point and is visible in the distance.	From this viewpoint views are typically contained to the study area by local rises and road side vegetation. Approximately 32 of the proposed wind turbines would be visible from this viewpoint. Due to the distance from the proposal visual effect from this viewpoint has been rated as low.	
Coordinates	S 32 ° 16.774' E 149 ° 05.259'			
Elevation	427m		The overall visual impact from this viewpoint has been rated as low.	
Viewing Distance (to nearest turbine)	10.27 km			
Viewing Direction	South east			
Land use	Grazing Land			
LCU	Spicers Creek			
Visual Sensitivity	Low	The visual sensitivity from this viewpoint has been rated as low.		
Visual Effect	Low			
Potential Visual Impact	Low			



# 8.0 VIEWPOINT ANALYSIS

VIEWPOINT BWF03- Old Station Road



VIEWPOINT BWF03- Old Station Road



Image cropped from BWF03

VIEWPOINT BWF03		Landscape Description	Potential Visual Impact
Location	Old Station Road	View from Old Station Road towards the study area. The photograph was taken from the base of a local high point. The viewpoint is slightly elevated providing distant views towards the mountain ranges of the Dapper Nature Reserve to the east. The topography slopes away to the north east towards Spicers Creek. The land use is predominantly grazing land with small pockets of improved pasture towards the east. Views to the proposed study area are screened from this viewpoint by a combination of dense vegetation and local rises in topography to the south.	From this viewpoint it is unlikely that any of the proposed wind turbines will be visible. Views to the study area are obstructed by a rise in topography and dense vegetation. This viewpoint has been included to illustrate the landscape character of Old Station Road. There would be no visual effect and therefore no visual impact resulting from the proposed development from this viewpoint.
Coordinates	S 32 ° 18.215' E 149 ° 03.683'		
Elevation	412m		
Viewing Distance (to nearest turbine)	7.09 km		
Viewing Direction	South		
Land use	Local Road / Grazing Land	The visual sensitivity from this viewpoint has been assessed as low.	
LCU	Spicers Creek		
Visual Sensitivity	Low		
Visual Effect	-		
Potential Visual Impact	-		



# 8.0 VIEWPOINT ANALYSIS

## VIEWPOINT BWF04- Forrestvale Road



VIEWPOINT BWF04- Forrestvale Road

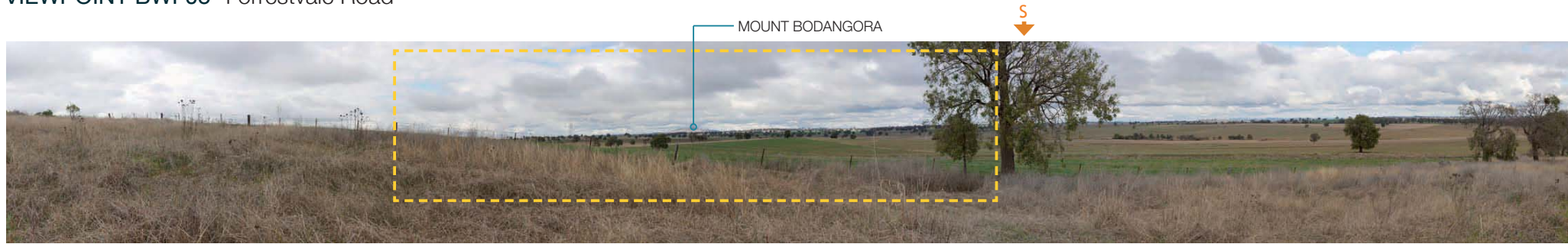


Image cropped from BWF04

VIEWPOINT BWF04		Landscape Description	Potential Visual Impact
Location	Forrestvale Road	View from Forrestvale approximately 300m north east of the end of Old Station Road. The photograph has been taken from a slightly elevated area. The landscape is gently undulating, and falls away from the road. The area is characterised by open grazing land with isolated trees and farm dams. Improved pasture and groupings of roadside vegetation occur in the mid distance. Mount Bodangora is visible in the distance and views extend to the ranges associated with Lake Burrendong are visible in the distance.	From this viewpoint approximately 25 of the proposed wind turbines would be visible. Although it is likely that these wind turbines have the potential to be noticeable, a combination of the distance from the viewpoint and the speed of travel along the road results in a low visual effect. From this viewpoint the proposed wind turbines would appear as a small element in the distance.
Coordinates	S 32 ° 18.215' E 149 ° 03.683'		
Elevation	412m		
Viewing Distance (to nearest turbine)	5.89 km		
Viewing Direction	South		
Land use	Minor Road / Grazing Land	The visual sensitivity of this viewpoint has been assessed as low.	The overall visual impact of the proposed wind turbines from this viewpoint has been assessed as low.
LCU	Bodangora		
Visual Sensitivity	Low		
Visual Effect	Low		
Potential Visual Impact	Low		

# 8.0 VIEWPOINT ANALYSIS

## VIEWPOINT BWF05- Forrestvale Road



VIEWPOINT BWF05- Forrestvale Road



Image cropped from BWF05

VIEWPOINT BWF05		Landscape Description	Potential Visual Impact
Location	Forrestvale Road	View from Forrestvale Road, close to the intersection to Boonah Lane. Photograph was taken from a slightly elevated section of the road near a crest in the road. The topography is slightly undulating with localised rises. The land is typically open improved pasture used for sheep grazing with no visible homesteads or infrastructure. Scattered retained trees are visible throughout the landscape becoming dense towards the south west. Views from this location are expansive and extend towards the study area with Mount Bodangora visible in the distance.	From this viewpoint approximately 28 of the proposed wind turbines would be visible. The proposed wind turbines would be in the sub-regional setting and would have a low visual effect. The distance to the proposed wind turbines and speed of travel along the road would result in a low visual impact from this viewpoint.
Coordinates	S 32 ° 19.858' E 149 ° 00.311'		
Elevation	453m		
Viewing Distance (to nearest turbine)	5.33 km		
Viewing Direction	South east		
Land use	Minor Road / Grazing Land	The visual sensitivity from this viewpoint has been assessed as low.	
LCU	Bodangora		
Visual Sensitivity	Low		
Visual Effect	Low		
Potential Visual Impact	Low		



# 8.0 VIEWPOINT ANALYSIS

## VIEWPOINT BWF06- Comobella Road



VIEWPOINT BWF06- Comobella Road



Image cropped from BWF06

VIEWPOINT BWF06		Landscape Description	Potential Visual Impact
Location	Comobella Road	View from Comobella Road approximately 400m west of Montefiores Nr Elong Elong Road. Photograph was taken opposite the entry to a property located on a hill top to best represent the impact from the property. Comobella Road is a Minor Road connecting Montefiores Nr Elong Elong Road to the township Comobella. The landscape is predominately open and cleared grazing land with roadside vegetation visible to the east along Montefiores Nr Elong Elong Road. Views from this point are distant and extend towards Mount Bodangora to the east.	From this viewpoint, approximately 24 of the proposed wind turbines will be visible. From this viewpoint the wind turbines would be noticeable. Due to the distance from the proposed wind farm the visual effect of this viewpoint has been assessed as low.  The overall visual impact from this viewpoint has been assessed as low.
Coordinates	S 32 ° 22.032' E 148 ° 57.706'		
Elevation	402m		
Viewing Distance (to nearest turbine)	7.29 km		
Viewing Direction	East		
Land use	Minor Road / Rural Residential	The visual sensitivity of this viewpoint has been assessed as low due to the distance of the proposed wind farm.	
LCU	Comobella		
Visual Sensitivity	Low		
Visual Effect	Low		
Potential Visual Impact	Low		

# 8.0 VIEWPOINT ANALYSIS

## VIEWPOINT BWF07- Windora Road



VIEWPOINT BWF07- Windora Road



Image cropped from BWF07

VIEWPOINT BWF07		Landscape Description	Potential Visual Impact
Location	Windora Road	View from Windora Road, approximately 2 kilometres north west of Comobella Road. Windora Road is a minor unsealed road servicing a small number of isolated homesteads. The photograph was taken in a south easterly direction towards the proposed wind turbines near the entry to a homestead. The landscape is predominately flat to gently undulating with cleared land being used for cattle grazing. For the majority of Windora Road, views to the proposed wind turbines are restricted by a combination of vegetation and topography.	From this viewpoint a small number of wind turbines may be noticeable. However due to the dense vegetation in middle ground, low rises in topography and distance from the wind turbines the visual effect has been ranked as low.  The overall visual impact from this viewpoint has been assessed as low.
Coordinates	S 32 ° 21.366' E 148 ° 56.323'		
Elevation	369m		
Viewing Distance (to nearest turbine)	8.02 km		
Viewing Direction	South east		
Land use	Grazing Land / Rural Properties	The visual sensitivity of this viewpoint has been assessed as low due to a combination of the land use and proximity to the proposed wind farm.	
LCU	Comobella		
Visual Sensitivity	Low		
Visual Effect	Low		
Potential Visual Impact	Low		



# 8.0 VIEWPOINT ANALYSIS

## VIEWPOINT BWF08- Montefiores Nr Elong Elong Road - ‘Bodangora Station’



VIEWPOINT BWF08- Montefiores Nr Elong Elong Road (Entry to Bodangora Station)



Image cropped from BWF08

VIEWPOINT BWF08		Landscape Description	Potential Visual Impact
Location	Montefiores Nr Elong Elong Road	View from Montefiores Nr Elong Elong Road, approximately 1.6 km south of Comobella Road. Montefiores Nr Elong Elong Road sealed, major connecting road which runs west of the study area. The photograph was taken from the entry to Bodangora Station, an isolated homestead setback approximately 600m from the roadside. The landscape is predominantly grazing land with improved pasture. The property is surrounded by screening vegetation running along the paddock edges visible in the foreground and middle ground of the photograph. The topography is gently undulating with a densely vegetated ridge line visible in the background of the photograph.	From this viewpoint some glimpses of a small number of the proposed wind turbines may be visible through the vegetation. Dense screening vegetation surrounding the homesteads would assist in screening views to the proposed wind turbines. The visual effect from this viewpoint has been assessed as low.
Coordinates	S 32 ° 22.902' E 148 ° 57.965'		
Elevation	410m		
Viewing Distance (to nearest turbine)	4.52 km		The overall visual impact from this viewpoint has been assessed as low.
Viewing Direction	East		
Land use	Rural Residence		
LCU	Comobella		
Visual Sensitivity	Moderate	The visual sensitivity of this viewpoint has been assessed as moderate.	
Visual Effect	Low		
Potential Visual Impact	Low		