

ATTACHMENT 8 VISUAL AND LANDSCAPE ASSESSMENT

Conroy's Gap Wind Farm

Visual Impact Assessment

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Prepared for: Taurus Energy Pty Ltd



Executive Summary

Scenic Landscape Architecture was commissioned by nqh Environmental to complete the visual assessment component of the Environmental Assessment Report for the proposed wind farm at Conroy's Gap. The proposed wind farm contains up to 15 wind turbines, each with three blades up to 46m long mounted on tubular steel towers up to 80m high. They will be located on Black Range, south of the Hume Highway between Bookham and Bowning, 15 kilometres west of Yass.

The method used to determine the visual impacts has been adapted from the *Windfarms and Landscape Values*, a report commissioned by Australian Wind Energy Association and the National Trust (Planisphere 2005), and from the Bureau of Land Management in the United States, known as the BLM method.

The report identifies the scenic quality of the region, divided into landscape character types. The report then assesses the contrast of the proposed wind farm to the existing landscape character of the region. It also identifies key viewpoints of surrounding residents, towns and roads to the wind farm and determines the visual sensitivity of users to the proposed wind farm, and the visibility of the wind farm from each view point. The report determined the visual impact on residents and users of the area.

Five landscape character types were identified in the region determined largely by the dominance of agriculture as the primary land use. The landscape types include country towns, transport corridors, waterways, agricultural land and ranges and hills.

Most of the region consists of a modified farming landscape, which is characterised by pastures with light scattered timber, located on surrounding rolling hills, typical of much of the farming land on the western slopes of the Great Dividing Range. Lake Burrinjuck is a key landscape component in the area. There are also a series of large ridges running through the landscape.

The report found that the contrast of the wind farm to the surrounding modified farming landscape was acceptable. Consequently the landscape of the area will be able to absorb the change in the landscape character resulting from the introduction of a wind farm.

User groups in the area were identified to determine the visual sensitivity to the wind farm. Visual sensitivity assists in determining the visual impact of the wind farm from various locations. The main users of the area are graziers/primary producers, rural residential land owners, towns' people, arterial road users and recreational users. Each group varies in their sensitivity to the proposed wind farm based on a number of factors including their attachment and relationship to the landscape of the area.

The report determined locations with views to the wind farm within a 15 kilometres radius of the site. There are a number of large working properties and rural residential homes around the site who will be able to view the wind farm, particularly the properties around Black Range Road to the south of the site and houses on working properties to the west of the Range. There will be a considerable visual impact from some locations particularly from around Black Range. There will be views of the wind farm from the towns of Bowning and limited views from Yass, Bookham and Goondah. From other locations around the site, the wind farm will not represent a significant visual impact. There will be a small visual impact from other factors such as shadow flicker, substation and control facilities building and access road.

There are some measures that can be taken to reduce the visual impact of the wind farm including using vegetation around houses to screen the view. There is some flexibility in layout options that may reduce the visual impact of the wind farm.

There is unlikely to be a cumulative impact from other wind farms, as the closest known approved or proposed wind farm is approximately 60 kilometres away.

EXECUTIVE SUMMARY	II
1 INTRODUCTION	1
1.1 Methodology	2
1.2 Structure of this Report	3
2 VISUAL CHARACTERISTIC OF WIND FARMS AND THE LANDSCAPE	4
2.1.1 Distance of visual perception	5
2.1.2 Public perception of wind farms	6
2.2 Public Views of the Landscape	7
3 SCENIC QUALITY	8
3.1 Introduction	8
3.1.1 Scenic quality ratings	8
3.2 Landscape Character	8
3.2.1 Local and regional landscape character	8
3.2.2 Landscape character types	9
3.3 National Scenic Significance	15
4 VISUAL SENSITIVITIES AND LANDSCAPE VALUES	16
4.1 Introduction	16
4.2 Public Perception and Consultation	16
4.3 Type of users	17
4.4 Major Viewpoints	19
4.4.1 Public consultation regarding views to the site	19
4.4.2 Zone of Visual Influence (ZVI) Analysis	19
4.4.3 Visual sensitivity of major viewpoints	21
5 VISIBILITY OF THE WIND FARM	30
6 VISUAL ASSESSMENT	32
6.1 Introduction	32
6.2 Visual Impacts of the Wind Farm	32
6.2.1 Scenic interest of a wind farm	32
6.2.2 Contrast to the cultural & natural environment	33
6.2.3 Size of the wind farm and turbine size	33
6.2.4 Siting of turbines	34
6.3 Visual Impact from Specific Locations	35
6.4 Cumulative Visual Impacts	41
6.5 Shadow Flicker	43
6.5.1 Glint	44
6.6 Other Visual Impacts	44
6.6.1 Electrical transmission lines	44
6.6.2 Substation and the control and facilities building	44
6.6.3 Access road	44
6.7 Recommendations	45
7 CONCLUSION	46
8 PHOTOMONTAGES	50
9 AUTHORS	55
10 SHADOW FLICKER RESULTS	56
11 REFERENCES	60

1 Introduction

Scenic Landscape Architecture was commissioned by ngh Environmental to complete a visual assessment as part of the Environmental Assessment Report for the proposal of a wind farm at Conroy's Gap. This report provides an analysis of the existing visual amenity and landscape character of Black Range and the surrounding area, and an analysis of users and provides an assessment of the visual impact of the proposed development. The report also includes recommendations to minimise the visual impact of the development.

The proposed wind farm is located along Black Range, 15kms to the east of Yass, between Bowning and Bookham. The name, Conroy's Gap, refers to the gap in the ridge over which the Hume Highway passes.

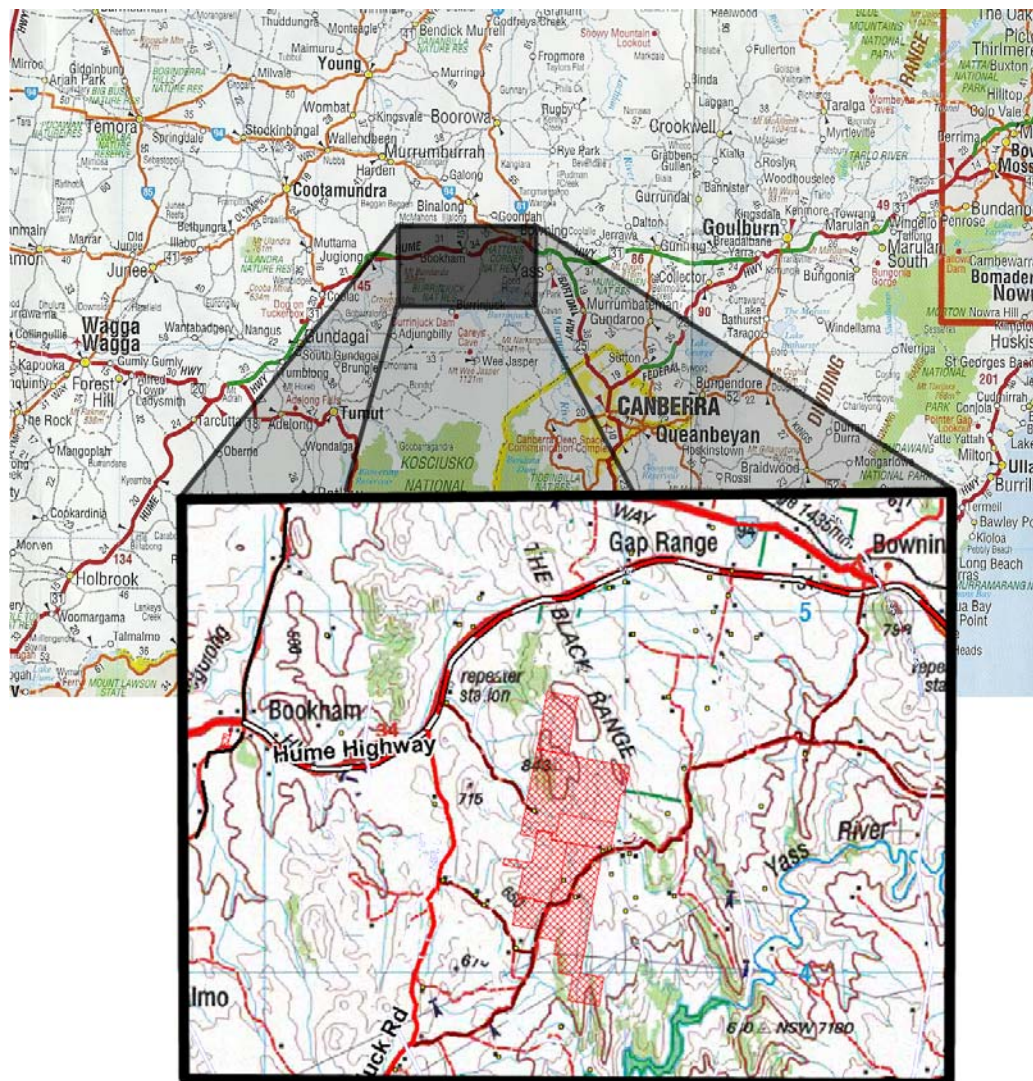


Figure 1 Location map of wind turbines

The proposed wind farm involves the construction, operation and decommissioning of:

- up to 15 wind turbines, each with three blades up to 46m long mounted on a tubular steel towers up to 80m high;
- electrical connections between wind turbines using a combination of underground cable and overhead concrete pole power lines;
- a substation and transmission connection up to 4 kilometres long linking the wind turbines to the existing Transgrid 132kV transmission system (located to the south of the site);
- access roads around the site, and minor upgrades to existing roads for the installation and maintenance of wind turbines on Black Ridge;
- an on-site control room; and
- equipment storage facilities.

The wind farm will have a maximum capacity of 30 Megawatts.

1.1 Methodology

The method used to determine the visual impacts has been adapted from the *Windfarms and Landscape Values*, a report commissioned by Australian Wind Energy Association and the National Trust (Planisphere 2005), and from the Bureau of Land Management in the United States, known as the BLM method. This method identifies methodologies for assessing and documenting landscape values, significance and sensitivities.

This visual assessment has been completed by the:

- review of existing literature;
- review of topographical maps and aerial photographs;
- review of Photomontage Visualisations;
- review of shadow flicker analysis;
- review of Zone of Visual Influence map;
- visiting the site and adjacent areas; and
- using the community workshop to document the community's and stakeholder's values of the landscape setting in the local and regional area.

The visual assessment ultimately identifies the visual impact that the proposed wind farm will have on various viewpoints in the surrounding landscape. This is done by:

- categorising the landscape into character types and uses, and describing those types;
- identifying the landscape quality through the assessment of the scenic quality. The scenic quality of the site is described and measured as the visual appeal or value of the landscape as determined by scarcity or uniqueness of landscape, landscape type, natural features, vegetation and water within each landscape character type;
- identifying important views to the wind turbines and associated infrastructure from surrounding areas including roads, farms, neighbouring residences and towns;
- identifying the type of user in the surrounding areas, duration of exposure, dominance of exposure and therefore draws a determination of the visual sensitivity of views to the wind farm;
- identifying the distance from viewpoints to the site;
- identifying the degree of change introduced by the project and subsequent contrast to the existing landscape; and

- a determination of the ability of the landscape to absorb the proposed changes.

It should be noted that the Planisphere approach also identifies contemporary cultural values for consideration. This aspect is covered in other specialist reports.

While the visual impact assessment process attempts to derive an objective measure of visual impact, there will always be a degree of personal subjectivity on the part of the viewer that determines whether the wind farms will be considered favourably or not. Aspects such as the personal attachment to a particular element of the landscape, and the extent to which the viewer values the contribution of the proposal to essentially pollution free energy production cannot always be determined. This aspect has been partially addressed by considering the type of user and by making an assessment as to their sensitivity to the landscape around them. The community workshops and other discussions with local land holders also provided the basis for a qualitative and quantitative analysis of the perception of different viewers.

1.2 Structure of this Report

This report is structured as follows:

- Section 2: Visual characteristics of the wind farm and the landscape;
- Section 3: Scenic quality of the region – divides the area into character types and areas;
- Section 4: Visual sensitivities and landscape values – outlines the outcomes from public consultation, uses the Zone of Visual Influence study to clarify the location of potential vantage points, identifies the types of uses and draws out the visual sensitivities from the major viewpoint locations around the site;
- Section 5: Visibility of the wind farm – establishes the visibility of the wind farm from locations around the site;
- Section 6: Visual assessment - discusses the visual impacts of the wind farm proposal from specific locations, cumulative visual impacts, shadow flicker and other visual effects of the wind farm proposal. Recommendations are made to minimise the visual impact of the proposal; and
- Section 5: Conclusion – summarises the results of the assessment.

2 Visual Characteristic of Wind Farms and the Landscape

Wind turbines can be perceived as either being majestic or dominating depending on where it is seen from and the viewers' perception (Planisphere 2004). They are often perceived as being interesting in their own right and have been likened to sculptured forms due to their sleek and simplistic appearance. Alternatively, some people find them unattractive. Additionally, rather than being just static objects, the movement of the wind turbine blades can attract attention.

Within close proximity to wind farms, it is likely that the structures will be revered as being dominating. However, from mid-ground or distant view, the structures will be less dominating and may be perceived by people as being majestic due to their scale and simplistic form. Some people dislike their form or the change that they create to the existing landscape, while others appreciate the distinctive visual quality they introduce to a landscape (Planisphere 2004).

The visibility of the turbines will vary throughout the day and season due to the level of the intensity of light. The turbines will be more visible in the early morning and evening when light shines directly upon the structure. Additionally, the backdrop to the structures can also affect the visual contrast. Where the structures are located against the sky, the structures, due to the off-white colour, blend into the horizon especially when there is haze or cloud. When the structures are viewed against land, the colour contrast increases the visual prominence of the structure (Planisphere 2004).

The visual impact is also determined by the orientation of the viewpoint to the wind towers, as the turbine blades will be more visible when viewed straight on. The orientation of the blades will be generally north-south taking advantage of the western prevailing winds. As such, the structures will be most prominent from a western or eastern viewpoint.

A wind farm will be far more visible when viewed at a 90 degree angle to the line of turbines (ie face on) compared to when viewed from end on where only a few turbines will be visible and the wind farm will appear considerably smaller.

The Australian Council of National Trust and the Australian Wind Energy Association embarked on a project to establish agreed landscape assessment procedures. Stage One of the project has been completed which looks at issues associated with visual characteristics of wind farms.

The visual characteristics of a wind farm include the physical form of a wind farm and its potential visual effects within a landscape and to surrounding users of the landscape, as outlined in Table 1 (Planisphere 2005). The table has been modified as necessary to be applicable to the Conroy's Gap proposal.

Table 1: Visual Characteristics and Effect of a Wind Farm

Characteristics	Effect	Examples of responses
Scale of development – height and numbers of turbines	Change of landscape character Eye catching High visibility from short to long distances Contrast to the horizon and ridgelines	Majestic or dominant – depending on perceived perception of landscape and user
	Effects to cultural heritage values	Loss of cultural heritage
Form of development	Eye catching Change of landscape character	Majestic or dominant – depending on perceived perception of landscape and user

Characteristics	Effect	Examples of responses
Movement of turbines	Sun glint and shadow flicker	Distracting
	Eye catching	Relaxing or irritating
Colour of towers and blades	Level of contrast to surrounding landscape	Intrusive or integrated
Location and layout in landscape	Change of landscape character	Majestic or dominant – depending on perceived perception of landscape and user
	Change visual appeal of landscape	Loss, change or gain of visual features
	Layout of towers– cumulative effect of grouping etc	Dramatic, harmonious or dominant
Location of substations	Change in landscape character	Dominant or non intrusive
	Potential change in visual appeal	Loss or change
Location of power lines and easements	Change in landscape character – structures and clearing of trees	Dominant or non intrusive
	Potential change in visual appeal	Loss or change

Additionally Planisphere (2005) gave further conclusions as to the visual integrity of a wind farm, which includes the following:

- Positive visual impacts of a wind farm can include:
 - : form, line colour and movement of the turbines are interesting and pleasing;
 - : the clean, modern lines, form, height can be seen by some people as visually interesting and pleasing;
 - : “... just as individual turbines can become dominant elements by virtue of their height, collection of turbines are potentially impressive and highly visible because of a combination of height, repeating elements and the geographical area they cover” (Planisphere p.8 2005);
 - : “The cumulative impact of numerous functional turbines can have a particularly strong visual impression on a landscape” (Planisphere p 43 2005);
 - : the contrast to the surrounding natural environment can be seen as dominating or interesting; and
 - : perception as to their function – providing environmentally sustainable power may mean that the wind turbines are more acceptable.
- Negative impacts of a wind farm can include:
 - : scale, form and colour can contrast to the surrounding landscape changing the landscape character, landscape value and cultural heritage;
 - : scale and height can be dominant in the landscape – exceed both the human scale and the scale of the surrounding landscape; and
 - : the number of turbines will accentuate the impacts.

2.1.1 Distance of visual perception

The Planisphere Report (2005) claims that wind turbines can be seen up to 20km away in clear weather but are difficult to perceive. At 14km away, a single turbine is insignificant although a collection of turbines becomes more significant depending on the number of towers and the horizontal area they occupy.

The University of Newcastle (2002) also note that:

“The most explicit and structured recommendations on the specific issue of the potential visual impact of wind turbines in relation to distance appears to be the self-styled Sinclair-Thomas Matrix (Sinclair, 2001)... At that time, Thomas concluded that *“15 km is considered to be the appropriate radius distance for study”* and according to Sinclair, this became recognised as the norm for ZVI [Zone of Visual Influence] in EIA (apparently irrespective of turbine size).”

On that basis this visual assessment focuses on views within 15 kilometres from the site, as beyond this distance, wind farms and especially individual turbines are considered to be difficult to perceive.

2.1.2 Public perception of wind farms

When wind farms are proposed, there is usually some concern by the public over the likely visual impact. By their very nature wind farms are highly visible. Meridian Energy (May 2005) note:

“For a wind farm, potential visibility and related landscape effects are usually the key issues. Wind farms are generally highly visible activities given that turbines are usually sited on ridges and hilltops where the wind flow is greatest.”

But visual impact does not necessarily mean a negative impact as is largely assumed and often voiced by some in the community. It is apparent that the beliefs of the individual are the major determinant of whether a wind farm will be viewed favourably or not. In the Environmental Impact Statement for the Crookwell wind farm, DIPNR (2004, p25) stated that:

“The key premise underlying the visual assessment is that visual impacts of the wind farm are largely determined by the perception of viewers to wind farms and wind energy per se.”

Warren et al, (2005) note that:

“... even if the facts are not in dispute, a perceptual gulf defined by individual's values and beliefs separates those in favour and those against.”

Most people believe there is broader public benefit from the production of ‘green’ and sustainable energy. An understanding of the broader benefits of wind farms can result in people being more accepting of the structures and this type of development. However, there is usually opposition from some local residents to wind farms proposed in their locality.

Recent studies show that opposition to wind farms (especially to their visual impact) does not appear to be the majority view. Lothian (undated) notes that in the United Kingdom, most people regard them favourably, and that surveys indicate broad support for wind farms. Further:

“An Irish survey of 1200 people found that only 1 per cent of the general public is opposed to wind farms, that 84 per cent regard them as a good thing, and that most of those with direct experience of wind farms do not consider that they have had any adverse impact on the scenic beauty of the area ... “(Warren et al, 2005; SEI, 2003).

And that:

“Prior to construction, locals typically expect the landscape impacts to be negative, whereas, once in operation, many people regard them as an attractive addition (Warren et al, 2005).”

Therefore, the visual impact of wind farms is not necessarily negative and wind turbines can sometimes add a positive visual quality to the landscape.

2.2 Public Views of the Landscape

The perception of the wind farm often has much to do with how an individual views the landscape.

Section 3 of this report offers an independent view of scenic quality of the landscape based on United States Bureau of Land Management's visual resource management system. These observations on the landscape are utilised in the report, primarily to gain an understanding of the contrast that the wind farm will present to the existing landscape.

In Section 4.3 of this report, the users of the region are broadly listed and an assessment of their likely perspective on the surrounding landscape is provided. This should only be seen as a guide to the views of the users to the landscape. Planisphere (2005, p65) states:

“Many of the values identified as of importance through the stakeholder survey are not easy to measure or quantify. For example, it is easier to quantify the effects of a wind farm development on tangible values of native vegetation (if any), but far more difficult to quantify the effects on intangible values such as an individual's feelings about a place.”
(Schwann, 2002)

This visual assessment has tried to incorporate the differences in attitude to the landscape into the assessment.

3 Scenic quality

3.1 Introduction

This section describes the existing visual environment of the local and regional landscape, its landscape character, significance and determines the landscape character types. Landscape character types are used to determine the visual impact of the wind farm on the surrounding landscape.

Scenic quality is a way to describe and measure the visual appeal of the immediate landscape and the surrounding area. This is largely determined by reviewing seven key factors including:

- landform;
- vegetation;
- water;
- colour;
- adjacent scenery;
- scarcity; and
- cultural modifications.

3.1.1 Scenic quality ratings

Each landscape character type (outlined below) determined for the region is given a rating. The rating system is based on the United States Bureau of Land Management's visual resource management system, and it assumes that the areas with the most variety and most harmonious landscapes is of high visual quality. It should also be noted that human built features do not always detract from the visual setting.

The rating system has three levels:

- Low scenic quality – fairly common scenic quality to the physiographic region;
- Moderate scenic quality – a combination of common or outstanding scenic quality to the physiographic region; and
- High scenic quality – outstanding scenic quality to the physiographic region

3.2 Landscape Character

3.2.1 Local and regional landscape character

The region has interesting topography with moderately large ranges running across the landscape. Black Range itself is 841 metres ASL, over 300m above some of the surrounding landscape. The land drops away to the south towards Lake Burrinjuck which has a high water level of 363 metres, almost 500 metres below Black Range. Other ranges in the area such as Mount Bowning and Mount Mylora, add to the hilliness of the landscape.

The landscape is largely a cultural landscape due to the modifications that have been brought around by 180 years or so of rural practices. Wool production has been the mainstay of the region since the 1820s, and rural industries continue to be the major visual focus. Much of the land has been substantially cleared of native vegetation, with only scattered timber through the paddocks and along roads and isolated larger areas of remnant vegetation. The remnant eucalypt species include *Eucalyptus blakelii*, *Eucalyptus melliodora*, *Eucalyptus macrorhyncha* and *Eucalyptus bridgesiana*.

Black Range has largely been cleared of vegetation so the grass colour and time of the year is a strong determinant of the visual character of the area. This is particularly so given the Range's domination of the landscape from many view points.

The rolling hills with scattered remnant trees and grazing herds can create a picturesque scene in some areas. The hilly country is interesting with wooded valleys and interesting landform, but is typical of much of the landscape across the western slopes of NSW and Victoria. In other areas, erosion has created scars through the landscape, and dying trees within an over cleared landscape tends to give the impression of an unhealthy landscape. Introduced trees generally surround houses and willows and poplars along creeks add other attractive element to the landscape.

There are a number of towns surrounding the site. The old buildings and streets of towns in the area have an historic feel to them, particularly when located away from the Highway.

One key change to the region is the increasing number of subdivisions for rural residential development around Yass. Increasing numbers of people are moving to the Yass region, many of whom commute to Canberra for work. Some of these subdivisions are located close to the site.

The Burrinjuck Dam is a key landscape feature of the district, although out of sight of the Highway and towns. Built just prior to the First World War, the dam provided energy for Yass and is now part of the energy grid. It sets a precedent for energy production in the district, but also provides a source of recreation for boating and fishing. There is also a convention centre located on the Lake. The Burrinjuck State Forest lines the western portion of the Lake and provides an alternative industry to the region.

The Hume and Hovell walking track passes just to the south of the wind farm site. The track has historical significance as the approximate route that Hume and Hovell made on their trek to Port Phillip in the 1820s, although the actual route that Hume and Hovell took passes to the south of Lake Burrinjuck.

The other key dominant feature of the landscape is the presence of the Hume Highway. The roadway creates a strong horizontal built form in the landscape, particularly with its size as a dual carriageway. Views to the site from the Highway range from within 3 kilometres to greater than 20 kilometres. The service centre located at Yass, located about 12 kilometres from the site, creates a busy, almost industrial feel to the area particularly through the large number of trucks present.

3.2.2 Landscape character types

The local and regional landscape within a 15 kilometre radius around the wind farm site can be broadly divided into 5 landscape character types. The area is dominated by agricultural land, and character types are largely defined by topography and distinctive landscape features. The landscape character types described below are used to determine the level of contrast of the wind farm and the surrounding landscape. The five landscape character types include:

- **Type A:** Country towns – Yass, Bowning, Bookham and Goondah;
- **Type B:** Transport Corridors – Hume Highway and Southern Railway;
- **Type C:** Waterways – primarily the Burrinjuck Dam and the Yass River Valley;
- **Type D:** Agricultural land - typically cleared rolling hills with scattered timber; and
- **Type E:** Ranges and hills.

These character types are defined into areas as outlined in the table, and shown in the map below. These areas are used consistently throughout the report.

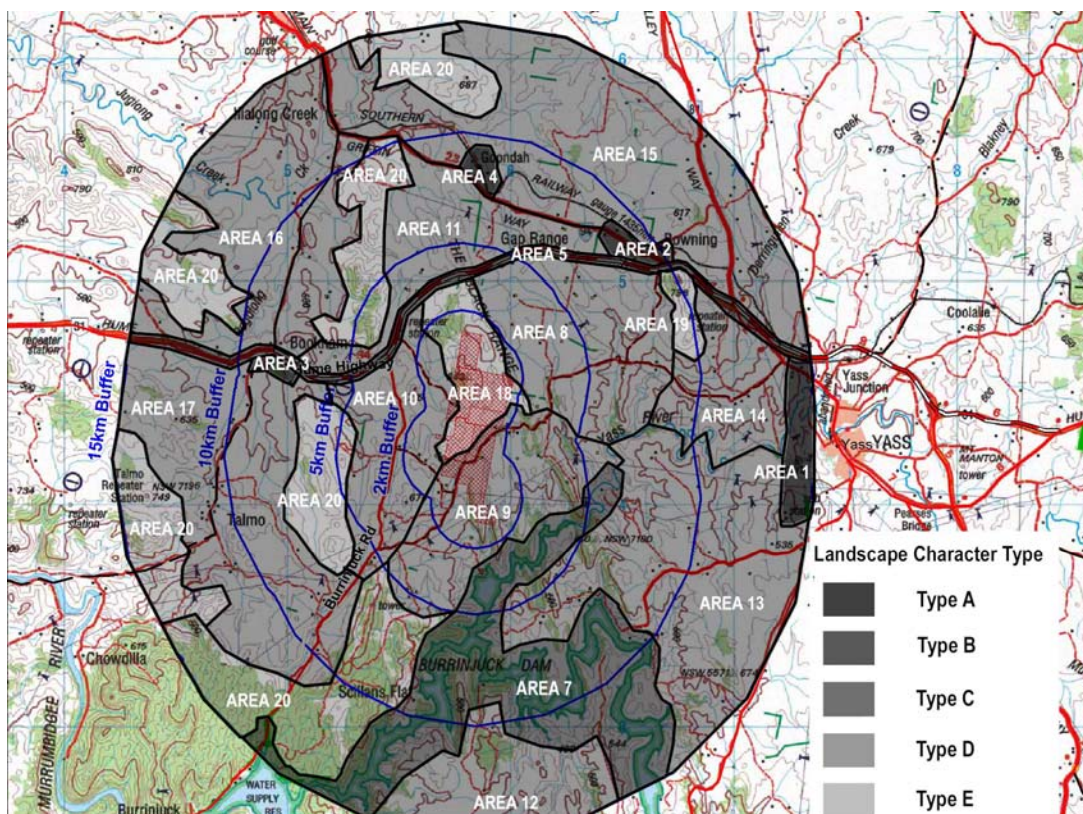


Figure 2 Landscape Character Types

Table 2: Landscape Character Types (refer to the map above)

Location	
Type A	Country Towns
Area 1: Yass	Description: Yass is active and growing town. Bypassed by the Hume Highway, Yass has continued to grow largely through a population that commutes to Canberra for work, and the vibrancy contributes to the character of the town. Founded in the 1820's, Yass has several old buildings including Cooma Cottage (1835), Rose Inn (1835) and the Courthouse (1880), combined with attractive streetscapes that contribute to the attractive and established character of the town. To the west of the town the infrastructure and industry that serviced passing highway traffic is apparent, much of which is no longer functioning, giving this part of Yass a distinct industrial character. The Yass Service Centre located on the Hume Highway also creates a transport/industrial character. Scenic Quality: Low to moderate scenic quality
Area 2: Bowning	Description: Bowning was established after Yass and is located north of Bowning Hill and is an irregular collection of houses and building. Located on the hills around the Bowning Creek, its character is influenced by the quite dense vegetation in and around the town, giving the town a rambling but attractive character. There is an enclosed feel to the town with surrounding hills, vegetation and Mount Bowning restricting the views out to the surrounding farming landscape. The Hume Highway passes directly adjacent to the main street of the town and this introduces a constant transport/industrial influence on the character of the town. The town has a number of notable buildings dating back to the mid 1800s. Scenic Quality: Low to moderate scenic quality

Location	
Area 3: Bookham	Description: Bookham is a small, quiet town to the west of the site. The landscape character of the town is influenced by large exotic trees that feature in the town and around Bogolong Creek to the west of the town, that provide an attractive contrast to the surrounding open landscape. Bookham has recently been bypassed by the Highway which passes directly adjacent to the main street of the town. As a result the Highway introduces a constant transport/industrial influence on the character of the town. Scenic Quality: Low to moderate scenic quality
Area 4: Goondah	Description: Goondah is a small rambling collection of homes around the main rail link between Sydney and Melbourne. Goondah was the start of the railway line to the Burrinjuck dam to provide cement for the construction of the dam (Chanson and James 1999). The landscape of Goondah consists of scattered homes and homesteads associated with larger surrounding properties. The landscape has sparsely scattered remnant native and exotic trees. The railway provides a central focus of the town, and adds a slightly industrial character to the area. Scenic Quality: Low scenic quality
Type B	Transport Corridors
Area 5: Hume Highway	Description: The Hume Highway passes east-west through the middle of the study area. The highway passes to the north of the proposed wind farm crossing Black Range at Conroy's Gap. The presence of roadside vegetation further confines views along the road corridor in some sections of the road. The highway adds a strong built form to the landscape, with an industrial edge due to the number of large trucks using the highway. The views out from the highway are generally across the modified farming landscape. Scenic Quality: Low scenic quality
Area 6: Southern Railway	Description: The Southern Railway winds its way through the hills to the north of the site. The line passes to the north of Yass, and through Bowning, Goondah and Binalong. Scenic Quality: The scenic quality of the railway line is determined by the surrounding landscape and will vary depending on location. Generally there is low to moderate scenic quality.
Type C	Waterways
Area 7: Lake Burrinjuck and Yass River	Description: Lake Burrinjuck lies to the south of Black Ridge and is a unique element in the region. The dam construction was completed in 1928 and serves as a source of irrigation and power production. It is now used for recreational pursuits such as fishing and boating. The lake meanders through steep hills following the Murrumbidgee River, which was dammed to create the lake. Most of the surrounding banks are cleared (modified farming land) but there is a large area of state forest to the western end of the dam and other isolated patches of vegetation also remain. The large expanse of water is impressive but is clearly a man made creation, particularly with the evidence of dead trees swamped by the rising waters. The Yass River also flows into the Burrinjuck Dam and is similarly characterised by steep banks of cleared farming land. Scenic Quality: Moderate to high scenic quality

<u>Type D</u>	Agricultural land
Area 8: Black Range East	Description: This area is located between Black Range and Mount Bowning, south of the Hume Highway and north of the Yass River. It is modified farming land and mostly flat and cleared of vegetation, except for some isolated patches of vegetation. Remnant vegetation tends to be larger trees and original understorey plants have generally been grazed out. The area is bisected by Black Range Road that runs east-west. Common Road links Black Range Road to the Highway. Black Range Road is lined with trees for some of its length, giving areas an attractive rural character from the road, although beyond the road verge, only scattered remnant trees generally exist in the paddocks. The isolated character of Black Range Road is enhanced by the gravel road and visual separation from the nearby Hume Highway. There is also a sizeable area of vegetation adjacent to the road as it bends around the southern end of Black Range. There are a growing number of rural residential holdings, along the road and building activity is evident. Common Road links Black Range Road and the Highway and is lined by vegetation for some of its length. Graces Flat Road runs from the Hume Highway, and provides access for residents to homes and properties at the base of Black Range, and is open flat farming land, largely cleared of vegetation. Around the creeks that run across the area, there is more remnant and regrown vegetation. Views to the Hume Highway provide a contrasting landscape character. A quarry along the road and powerlines running through the area contrasts to the agricultural landscape character. Exotic trees dot the paddocks and hedgerows of pines are prominent. Homesteads are surrounded by large exotic trees. In general, the landscape is a modified farming landscape, typical of much of the region with some attractive locations. Scenic Quality: Low to moderate scenic quality
Area 9: Black Range South	Description: This area lies to the south of Black Range. Black Range Road passes through the area and is lined by trees for most of its length. Beyond the road corridor, the landscape opens out to a heavily cleared landscape, with a scattering of mature eucalypts. The absence from built elements such as the highway and sealed roads gives the area an isolated rural/bush landscape character. The landscape is hilly which contributes to the attractive character of the area. There are larger areas of vegetation on hilly country directly south of the Range as the land descends to the Burrinjuck Dam. Farm houses are scattered along side the road and are the main built element in the landscape. This area also contains a well vegetated campsite for the Hume and Hovell walking track which further enhances the isolated nature of the area. Further to the west, around the Woolgarlo Road, the land is flatter and features more open farming land. Scenic Quality: Moderate scenic quality.
Area 10: Black Range West	Description: Bordered by Black Range to the east, Bookham Hill to the west and the Hume Highway to the north, this area is characterised by heavily cleared farming land and large working properties, typical of much of the landscape in the region. There are a couple of isolated patches of remnant native vegetation, and some scattered mature eucalypts in the paddocks. The area is bisected by the road to Burrinjuck Dam and Sutton Grange Roads and a small number of homesteads adjacent to the roads typically surrounded by large exotic vegetation that provides an attractive contrast to the surrounding landscape. It is a modified farming landscape moulded by intensive primary production activities. A quarry located along Paynes Road further emphasises the production character but contrasts to the surrounding agricultural land uses. Views to the highway add a strong built form element to the landscape character. Scenic Quality: Low scenic quality

Area 11: Black Range North	Description: Bordered by the Hume highway to the south, the road to Bowning to the north and Mylora Ridge to the west, the landscape character is a modified farming landscape with little native vegetation remaining except for the occasional mature eucalypt tree in paddocks. There is more vegetation around Mylora Ridge. Occasional erosion scars dot the paddocks. It is typical of much of the landscape in the region. The area is made up of large working properties, and homesteads are usually surrounded by large exotic vegetation that provides a contrast to the surrounding landscape. The view shed from the area is largely contained by the large ridges, Black Ridge, Mylora Ridge, Mt Bowning and the hills to the north. Scenic Quality: Low scenic quality
Area 12: South of Lake Burrinjuck	Description: This area lies 10 to 15 kilometres to the south of the Lake Burrinjuck. It is characterised by rolling hills with scattered remnant native vegetation, usually as single trees in the paddocks and generally contains large working properties. There are some larger patches of remnant native vegetation. Scenic Quality: Low scenic quality
Area 13: South of Yass	Description: This area lies to the south of the Yass River and east of the Burrinjuck Dam. It is characterised by flatter land, mostly cleared with scattered trees in the paddocks. The area generally contains large working properties. It is bisected by Good Hope Road and smaller access roads for surrounding properties. Homesteads are usually surrounded by large exotic trees. The character is heavily influenced by the sweeping views (from higher vantage points) across the landscape, particularly to the west and east, across the heavily cleared farming land. Scenic Quality: Low scenic quality
Area 14: West of Yass	Description: The area to the east of Yass is typical of much of the landscape character of the region. It is characterised by rolling hills with scattered remnant native vegetation and some older homesteads, and other farm buildings located either side of Black Range Road. There are a number of subdivisions and an increasing number of rural residential holdings along the road. Views across the rural landscape, to the south are quite attractive where the land drops away towards the Lake Burrinjuck. The north of the area, the highway introduces a contrasting built form to the landscape. Patches of large exotic vegetation are also present, especially willows and blackberries in creek lines, which adds another modified element to the landscape. Mt Bowning to the north-west tends to dominate the view. Scenic Quality: Low to moderate scenic quality
Area 15: North of Bowning	Description: This area is located to the north of Bowning and the Hume Highway and is bisected by Burley Griffin Way that heads to Binalong, and Lachlan Valley Way which heads to Boorowa. It is typical of most of the landscape, rolling hills generally cleared of native vegetation and open in character. Paddocks contain the occasional large mature eucalypt. Hills are generally bare and where extensively cleared, erosion scars are evident. Creeks generally have more vegetation around them and are usually lined with eucalypts and willows. There are a couple of larger patches of remnant vegetation in the area. The land is typically made up of large working properties, but there are a number of newer houses along the southern most extent of the Eastern Valley Way. Older homesteads are typically surrounded by large exotic trees. To the west of site near Binalong, the land ascends in altitude and the topography becomes hillier. The landscape is a modified farming landscape. Scenic Quality: Low scenic quality

Area 16: Mylora	Description: This area consists of large properties with thinly scattered native timber scattered through the paddocks. There are few homesteads, surrounded by exotic vegetation providing an attractive contrast to the surrounding landscape. The occasional large exotic tree dots the paddocks. The area is bisected by the road between Binalong and Bookham. The road follows the valley defined by Jugiong and Illalong Creeks. The creeks meander through the landscape, and are often lined by native trees, willows, blackberries and other exotic plants. The area is largely contained by the Mylora Ridge to the east and Coppabella Ridge to the west, which contains views in the area. Trees line the roads and with the contained views create an attractive scene, but the area is generally typical of the broader modified rural landscape. Scenic Quality: Low to moderate scenic quality
Area 17: Childowla	Description: Located to the west of Bookham Hill, the area is bounded by the north by the Hume Highway, Bookham Hill to the east and Dwyers Ridge to the west. The landscape is typical of the agricultural character of the area. The land is mostly cleared in paddocks aside for scattered old eucalypts. There are some areas of remnant or native regrowth, where grazing pressures have been eased. Vegetation lines Childowla Road that bisects the area, and contributes to an attractive rural character. Eucalypts also line the creeks. A number of large properties line the road and the Hume Highway, and homesteads are scattered through the landscape. Homesteads are generally surrounded by exotic vegetation. Although attractive, the area is generally typical of the broader modified rural landscape. Scenic Quality: Low to moderate scenic quality
Type E	Ranges and hills
Area 18: Black Range	Description: Black Ridge is a prominent landmark rising approximately 300 metres above the surrounding land. Its prominence makes it a key feature of the landscape, but still broadly consistent with the hilly nature of the surrounding landscape. It is largely cleared of vegetation with scattered trees, some dead or dying, around most of the ridge. There is one large patch of remnant vegetation on the western slopes a little south of the Hume Highway. Although the size of the range is impressive, it is typical of much of the hilly landscape found throughout the western slopes of New South Wales. Scenic Quality: Low to moderate scenic quality
Area 19: Mount Bowning	Description: Mount Bowning is a prominent feature along the Hume Highway as it is located close to and is considerably higher than the adjacent Highway. Its prominence makes it a key feature of the regional landscape. The northern and western slopes are covered in native vegetation, including some older large trees and regrowth, particularly on the lower slopes, thinning towards the top. The ridge extends to the south to Stumpy Hill. The ridge is largely cleared with scattered native vegetation. Although the mountain is prominent, it is typical of much of the hilly landscape found throughout the western slopes of New South Wales. Scenic Quality: Low to moderate scenic quality
Area 20: Other Ranges and Hills	Description: There are a number of other hills and ridges, grouped as there are no houses located on these ridges and hills. Similar to Black Ridge, Mylora Ridge runs north-south and has a number of areas of remnant or regrowth vegetation. Most of the ridge has been cleared of vegetation. Bookham Hill is located on the northern end of a short ridge that runs to the south of Bookham. There are a number of patches of remnant vegetation on the ridge. To the south of Black Ridge is Carroll's Ridge. This is a well treed ridge and borders the well treed Burrinjuck State Forest. The ridge is surrounded by mostly cleared farming land with scattered large eucalypts through the paddocks. To the west of Carrolls Ridge is some very undulating country around Dwyers and Armour Hills. These hills are mostly cleared of vegetation with only few scattered large eucalypts on the slopes of the hills. West of Mylora Ridge is Coppabella Ridge and other hilly country. Generally cleared of native vegetation, there are some scattered remnant large eucalypts. There are a couple of larger patches of remnant vegetation in the area. Scenic Quality: Low to moderate scenic quality.

3.3 National Scenic Significance

There is significance in the history of the region in terms of the development of the grazing industry in Australia. Wool production has been the rural mainstay of the region since the 1820s which has been a major contributor to shaping the landscape character of the region.

There is some historical significance to the region as it contains the original route of the expedition of Hamilton Hume and William Hovell to Port Phillip. Yass contains the former home of Hamilton Hume. The length of European settlement in this part of New South Wales is visible in many elements of the landscape such as native tree coverage, the size and extent of exotic vegetation, the age of homesteads and the architecture of regional towns.

This area is now the location of the major north-south transport corridor in Eastern Australia for both road and rail.

4 Visual Sensitivities and Landscape Values

4.1 Introduction

The purpose of this section is to determine the visual sensitivity from various locations around the site. To account for differences in personal perceptions of landscapes, this section of the report incorporates a generalised perspective of different users and their sensitivity to changes in the landscape. The visual sensitivity of the user has three components:

- Dominance of exposure to the wind farm;
- Duration of exposure to the wind farm; and
- Likely relationship of the user to the environment.

For example, a resident who looks across at the turbines every day will have a substantially different experience of a wind farm than a motorist passing the site while travelling to their destination elsewhere. Other factors that will contribute to visual sensitivity include (Planisphere 2005):

- personal meaning attached to the landscape;
- personal feeling of inspiration and interpretation derived from the landscape;
- diversity, composition, and accessibility of the landscape;
- lack of change (timeless quality); and
- a sense of grandeur and integrity.

For the purpose of this report, three categories have been used to assist in the determination of the level of user sensitivity to the landscape (based on the BLM method). These three categories are allocated based on feedback from questionnaires, personal feedback from community information sessions and reasonable expectations of personal preferences based on experience:

- Low – views from low use sites where duration of view are short or not important or maybe partially obscured by landscape features;
- Moderate – duration of view is moderate, such as views from roads where many of the viewers are frequent and their visual sensitivity is constrained due to the orientation of the user; and
- High – duration of view is high from, for example, residential and recreational areas, where the perceived degree of concern about scenic quality is evident and the project site is dominant in the visual catchment and views are highly regarded.

4.2 Public Perception and Consultation

In order to develop an understanding of the public perception of the Conroy's Gap wind farm proposal, Taurus Energy conducted an initial community survey by mail. This was followed by a public meeting on 16 November 2005 at the Yass Soldiers Club. Community members were asked their opinion of the proposal and what impact they believed the wind farm will have on them. The public was also provided the opportunity to fill out feedback forms where they could express their opinions openly. This form and its analysis and results are included in the Environmental Assessment Report prepared by ngh Environmental.

The consultation for the proposed Conroy's Gap wind farm was useful in encapsulating the range of views of wind farms and, in particular highlighted the differences in sensitivity to the proposal from different groups of people.

There appeared to be considerable opposition from some members of the community to the wind farm particularly rural residential owners located along Black Range Road. At the time of the open day, Taurus Energy had proposed to locate turbines along the eastern most ridgeline making the turbines highly visible to the eastern side of Black Range. The extent of opposition resulted in Taurus adjusting the layout of the wind farm so that turbines will not be located in this highly visible location which should go some way to addressing the concerns of a number of residents in the area.

Aside from specific concerns associated with turbine layout, there are also more general concerns relating to wind farms. The findings of the Department of Infrastructure, Planning and Natural Resources in their consideration of the Crookwell 2 wind farm note:

"The Department acknowledges the very strong and often highly emotive views of the potentially affected residents. It is quite clear that many within the local community (whom have no financial benefit from the project) have very strong negative feelings about the wind farm. In many cases this is regardless of the actual proximity to the turbines. Overall, the proposal would result in visual changes to the locality and, thereby, associated perceived changes in the community's amenity, regardless of the specific selection of turbine locations." (DIPNR 2004, p27)

Positive views have also been expressed in favour of the wind farms from a visual point of view. Planisphere (2005, p8) note that:

"In debates about the impact of wind farms on landscape values, there is a tendency for polarised views on the part of people with firm opinions ... But this polarisation is not necessarily an accurate reflection of the views of the wider community."

The results of a recent on-line survey conducted by the Yass Tribune indicated that approximately 71% of respondents (as of 23 March 2006) were in favour of the Conroy's Gap Wind Farm. Care must be taken in drawing firm conclusions from such surveys, but the results indicate that there are a range of opinions on the wind farm, and this range of opinion is likely to include support for the proposal. This may extend to majority support.

This report has, wherever possible, incorporated the views of public relating to the visual impact. The public response to the wind farm is detailed further in the Environmental Assessment Report prepared by ngh Environmental.

4.3 Type of users

The perception of the visual impact will largely be a result of the perspective of the viewer. Landowners may view the landscape differently than people who make a choice of location largely based on visual amenity. People who have long connections to the region might have a closer connection to a landscape and may be opposed to visual changes in that landscape. Passing traffic will generally have a low sensitivity to the site as they have no stake in the view or little relationship to the surrounding landscape.

This assessment tries to incorporate the range of views of users. A broad categorisation of users within the local area is listed below; however, these user types must only be regarded as representative of a wide range of views and not inclusive of all perspectives.

Graziers/Primary Producers

Many of the people living within close proximity of the site are graziers and other property owners that generally work the land for a living. 31% of respondents to the questionnaire at the public consultation day (4 of 13) stated that their interest in the area was commercial. One respondent planned to develop a horse stud in the area.

Some of the property owners in and around the site have agreed to have turbines on their land and will receive financial benefit via lease arrangements. Other property owners that

are not part of the project will be near to the turbines and may not receive any direct benefit from the development.

In general it is assumed that land holders are sensitive to changes to the landscape but generally most land holders have a largely pragmatic approach to the landscape. It is a source of production and income primarily and its visual quality tends to be of secondary consideration. Primary producers tend to equate a low value to the visual aspect of the landscape.

Unscreened or unfiltered views from a house, regardless of the user type, tend to be valued highly and are appreciated more than other views. Views from working areas of properties are generally going to be valued lower as they tend to be of lower duration, and will generally be experienced while conducting other activities.

Rural Residential/Residential Subdivision Owners

There are a growing numbers of people living in rural residential sub-divisions around Yass and there are a significant number of new buildings, subdivisions and properties for sale in and around Yass. It is this group that displayed the greatest objection to the wind farm on the community consultation day.

In a visual sense, hobby farmers and new rural residential owners tend to move to rural areas for the experience of living 'in the bush' or 'on the farm'. Visual consistency is very important to people seeking a particular lifestyle. This type of user is choosing to live in a place where the environment, including the visual quality, is important. As a result, the hobby farmer generally has a high sensitivity to their visual surroundings and any significant change to those surroundings is likely to have a negative impact.

Towns People

Few towns' people attended the open day conducted by Taurus Energy and therefore it is difficult to ascertain the level of interest in the surrounding landscape for this user group. Given their choice to live in town, it is assumed that town's people have a lower sensitivity to the surrounding landscape than say rural residential land holders. On balance, town's people are expected to equate a low to moderate value to the visual aspect of the surrounding landscape.

Arterial Road Users

It is reasonable to expect that the users of the roads, especially the Hume Highway will have, on the whole, a low sensitivity to the wind farm development as there is personal attachment to the landscape. Generally these people are using the road to get to their destination, rather than for its scenic quality. In most cases, these people place a low value on the surrounding landscape.

Recreational Users

Most recreational users (such as those using Burrinjuck Dam for boating or fishing) in the area will only experience the wind farm as passing traffic, although there are several localities on the lake or shoreline where the turbines may be visible. Recreational users may not have a particularly high sensitivity to the landscape while travelling to their destination, but once conducting their recreational activity, say fishing, are likely to have a moderate to high sensitivity to the landscape.

Users of the Hume and Hovell walking track may view the turbines from camping areas and the walking track. The numbers of people utilising this part of the walking track are likely to be small. In general, recreational users will have a moderate to high value of the landscape.

4.4 Major Viewpoints

4.4.1 Public consultation regarding views to the site

At the open day, the public were asked where the site could be viewed from. Participants noted that good views of the site are from the following locations:

- Yass – addressed as Area 1;
- Bookham – addressed as Area 2;
- Bowning – addressed as Area 3;
- Binalong – addressed in discussion under Area 16;
- Hume Highway – addressed as Area 5;
- Black Range Road – addressed in discussion of Areas 9, 10 and 14;
- Graces Flat Road – addressed in discussion of Areas 10;
- Common Road – addressed in discussion of Areas;
- Burrinjuck National Park – addressed in discussion under Area 4;
- Road to Harden – addressed in discussion under Area 4; and
- Wee Jasper Road – addressed in discussion of other areas beyond 15 kilometres from the site.

4.4.2 Zone of Visual Influence (ZVI) Analysis

A ZVI study was undertaken by Garrod Hassan Pty Ltd of the proposed Conroy's Gap wind farm (see Figure 3 below), and was based on turbine layout Option A (refer to Section 6.2.3 for layout options). The ZVI study identifies, within a 15 kilometres radius around the site, where the turbines can be viewed from and how many turbines can be viewed from any given location.

The ZVI is based on topographical maps and does not take into account vegetation which can screen views of the wind farm from specific viewpoints. Nor does it give additional weighting to key viewpoints such as from individual houses. However, the ZVI is useful in verifying and confirming information obtained during site visits.

The analysis shows clearly the high visibility of the turbines east of Mount Bowning, south across Black Range Road to the area south of Yass River, but close to Black Range, the turbines will not be visible. Further back from the Range, more turbines will be visible. 4 to 6 turbines will be visible from the area around Graces Flat Road. From the hills around Bowning, more turbines are visible. North of the site, views of the site are intermittent due to the hilliness of the terrain.

On the western side of Black Range, the wind farm will be highly visible from a strip of land between Black Range and the Ranges to the west. The ZVI shows the wind farm is especially visible from within 5 kilometres to the south west of Black Range. The road from the Hume Highway to Lake Burrinjuck bisects this area. The ranges to the west of Black Range screen most of the views to the west of the site, except for either side of the Hume Highway, where the wind farm will be clearly visible. To the south of the site, the wind farm is visible from several locations on or around Lake Burrinjuck from with 3 or 4 kilometres of the wind farm.

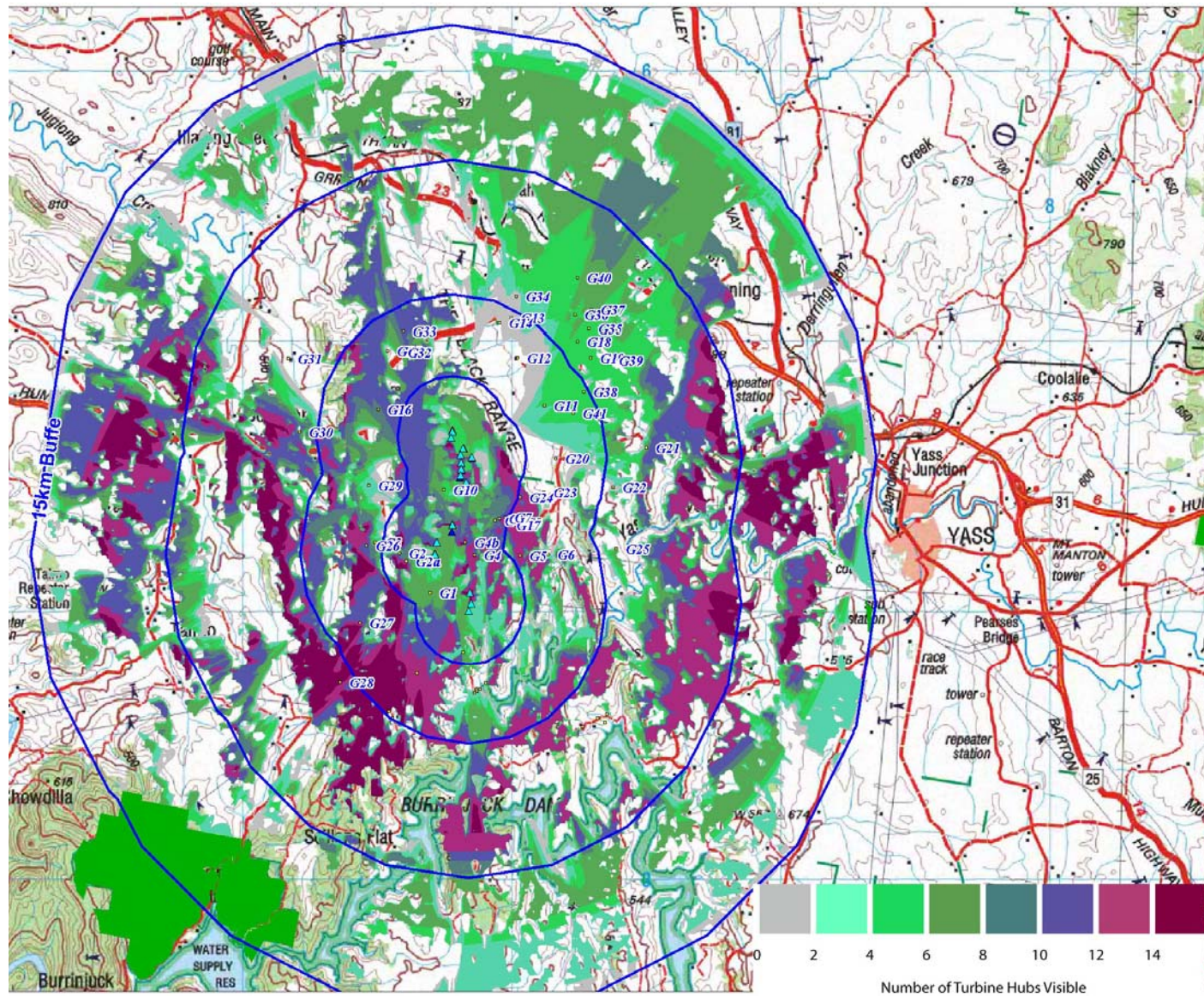


Figure 3 Zone of Visual Influence analysis

4.4.3 Visual sensitivity of major viewpoints

This section determines the visual sensitivity of the user to the wind farm from each location taking into account the visual catchment, duration and dominance of exposure, and how the user values the landscape. It does not take into account the distance from the site or the surrounding scenic quality of the landscape as this is discussed in Section 5.

Table 3: Visual sensitivity of major viewpoints

Main viewpoints	Land use, user & duration	Visual Sensitivity ¹
Type A	County towns	
Area 1: Yass	Land use: Predominantly residential land use. Yass acts as a service centre for surrounding properties, residents and passing traffic. Type of user and frequency: Town residents and passing traffic using Yass service centre and other facilities. Visual catchment: There are limited views of Black Ridge from Yass due primarily to the high ridge that lies on the western edge of the town. There are houses along this ridge with views to the site including, but not limited to, Irving Drive and Rossi Street (on which is a new residential estate, Hatton Park). The Yass cemetery is on this hill and there are views through trees to the site from the cemetery. There are also views of the site from the hill to the north of Yass River including from but not limited to Orian Street, Mount Street, Poloux Street, Ford Street and Hume Street from greater than 15 kilometres. There is a subdivision to the north of Yass, homes along Yass Junction Road and houses around the Yass railway station that have views to the site. From the Yass service centre the site is visible over the Mount Bowning ridgeline. There is some existing vegetation around the centre. Duration of exposure (to the development): From houses without screening, duration will be long. From traffic in town and at the service centre, duration will be intermittent. Dominance of exposure: Dominance of exposure is low, as from this distance, the low angle of the view to the site means that the site will appear to be a similar grade rather than looking up to the wind farm. The wind farm will be only a small component of a wide expanse of view. From the service centre, the focus will tend to be on traffic and other factors rather than more distant view points. Landscape value: Low to moderate landscape value for towns' people. Low landscape value for road traffic. Travellers have little investment in the surrounding landscape.	Low visual sensitivity

¹ The distinction between landscape value and visual sensitivity should be noted. Landscape value relates to how a group of users are likely to view a landscape in general. Visual sensitivity relates to a specific measure of the relationship of a group of users to the landscape at a specific location, and incorporates "landscape value" as one of several factors.

Area 2: Bowning	Land use: Residential and rural residential land use. Type of user and frequency: Town residents. Visual catchment: There are some open views to the site from several houses particularly from the higher eastern areas of Bowning, including but not limited to houses along Silver Street, Montem Street, Leake Street and Walls Junction Road. From Bowning, the southern most turbines are unlikely to be seen. Approximately 10 to 12 turbines will be visible from the higher parts of Bowning There are views of the wind farm site from the grounds of the churches so people mingling before or after services will have views of the wind farm. Most views however are generally contained within the town. For example, the views from the lower areas of Bowning are limited by the small hills to the west of the town, and vegetation also tends to screen some views to the site. There are a couple of houses on the hill to the east of Bowning with clear views to the site. Duration of exposure (to the development): Houses with more open views to site have a long duration of exposure. Travelling through Bowning, only intermittent views of the site are available. Dominance of exposure: There are some houses with clear views to the house with a moderate dominance of view. Most views will have a low dominance, screened by vegetation or by topography. Bowning is lower than the site so there is a reasonably angle of view up to the wind farm, adding to the dominance of the wind farm. Landscape value: Low to moderate landscape value for towns' people and low landscape value for passing traffic.	Moderate visual sensitivity
Area 3: Bookham	Land use: Residential land use. Type of user and frequency: Town residents. It also serves as a "Revive and Survive" location for travellers. Visual catchment: The extensive vegetation in the town restricts views out. For example, along the main road Fagan Drive, the views are confined to the road and immediate surrounds. Other views out are limited. "Bogolong" is the closest house to the site and is surrounded by trees and is screened from the site. There are only two or three houses (including the house next to "Bogolong") that will have filtered views to the wind farm, as most are surrounded by vegetation. A Uniting Church is located on a hill at the western end of the town, from where there will be views of the wind farm as people enter or exit the church, or mingle outside. Duration of exposure (to the development): Houses with filtered views will have moderate to long duration of exposure. Dominance of exposure: Dominance of exposure is low as the views to the towers are generally screened. Through winter, views will be more open as the deciduous trees lose their leaves. Landscape value: Towns' people are expected to place a low to moderate value on the surrounding landscape. Passing traffic is expected to place a low value on the landscape.	Moderate visual sensitivity
Area 4: Goondah	Land use: Residential land use Type of user and frequency: Town residents. Visual catchment: Goondah is largely screened from views to the site as it is low in the landscape. There are a few houses that may see the tops of the turbines above the hills at the northern end of Black Range. Duration of exposure (to the development): Houses with views will have moderate to long duration of exposure. Dominance of exposure: There is a low dominance of exposure to the wind farm. The top of the turbines only will be seen and the view point is located end on to the site and few turbines will be visible. Landscape value: Residents are expected to place a moderate value on the landscape.	Low to moderate visual sensitivity

Type B	Transport corridors	
Area 5: Hume Highway	Land use: Main transport and travel route between Sydney and Melbourne. Type of user and frequency: Primarily used by passing traffic and some local traffic. Large numbers of people will view the site from close range. Visual catchment: From the west, the wind farm will be visible from about 15 kilometres away and is in view for the whole distance to Conroy's Gap. For most of the distance, the road heads straight towards the site, until about 3 kilometres from the site where the road heads to the north. From the west, most turbines in the wind farm will be visible. From the east, the site is in view from around 20 kilometres from Manton's Gap. As the road heads through hilly country to the north of Yass, views to the site are intermittent, until the road comes round Mount Bowning, where the site is in clear view across the flats to the east of Black Ridge, from where the tops of between 2 and 8 turbines will be visible. Duration of exposure (to the development): Duration is reasonably constant from the highway except for undulation of the road and roadside vegetation which can screen the view of the wind farm. The speed of traffic along the highway means however that view will ultimately be transient. Dominance of exposure: Close to the site on the west side of Black Range, the exposure will be dominant as the turbines will be high above the road. The road heads straight at the site for some distance, where the wind farm will be in full view. From the east the turbines will be partially screened by the eastern ridge of Black Range and localised hills beside the road. Landscape value: Travellers are likely to place a low to moderate value on the surrounding landscape as they are likely to have little investment and attachment in local landscape. Local traffics' value of the landscape will vary depending on user type.	Low visual sensitivity
Area 6: Southern Railway	Land use: Main rail transport and travel route between Sydney and Melbourne. Type of user and frequency: Passenger and freight trains. Visual catchment: There will be limited views of the wind farm from the railway primarily due to the winding nature of the railway and the consequent screening of hills and cuttings. There are likely to be views of the wind farm from the railway just to the east of Goondah, and possibly views from just south of Binalong. Duration of exposure (to the development): View duration is relatively short, especially in the context of an extended journey. Dominance of exposure: Dominance of exposure is low. Travelling at speed, views will only be temporary. Landscape value: Passengers are likely to place a moderate value on the surrounding landscape as experiencing the passing landscape is an important part of a rail journey.	Low visual sensitivity
Type C	Waterways	
Area 7: Lake Burrinjuck	Land use: Recreational users and primary producers. Type of user and frequency: Infrequent use by recreational users for boating and fishing. A few properties surround the lake. Visual catchment: The wind farm will be visible high above the Lake, particularly from approximately 8 kilometres due south of Black Range. The southern most group of turbines will be highly visible. There will be limited views of the turbines available from other parts of the Lake as the steep edges of the lake will generally screen the site. Good Hope, the convention centre Woolgarlo and properties such as "Bloomfeld", "Cooyong", "Webo" and "Fifeshire" are located beside the Lake and are likely to see some turbines but not usually from the house. Other properties are generally screened by the steep banks of the lake. Duration of exposure (to the development): Views from slow moving boats may be extended within the context of a day's recreational use. Other views are limited. Dominance of exposure: The turbines will sit high above the area, but the views are end on to the wind farm so only a limited number of turbines will be seen and the width of the wind farm will be narrow. The turbines may not be in a regular field of view for users of the lake as they are considerably higher than the Lake. Landscape value: Recreational users will place a moderate to high value on the landscape. Primary producers are expected to place a low value on the landscape.	Moderate to high visual sensitivity

Type D	Agricultural land	
Area 8: Black Range East	Land use: Primary production. Properties along Black Range Road have been subdivided into rural residential lots. The Hume and Hovell Walking Track passes along the road. There is a scout hall on Common Road. Type of user and frequency: Primary producers and residential and some infrequent recreational use. Visual catchment: From Black Range Road, there are several houses with views to the site. From close to the site, the east ridge will screen views of the wind farm. Further back from the ridge only the top sections of the turbines will generally only be visible. Properties with clear views to the site include "Jindalee", "Bull Rue", and "Vale Beder". "Deringullen" has views partially filtered by trees. There are new subdivisions around the road where houses are partially or yet to be constructed. The road itself heads straight towards the wind farm site and the wind farm is in view from the road for much of the journey. Along Common Road, there are two houses to the east of the road facing the site but will be partially screened from the site by vegetation. The scout hall will have no views of the site. There is one house on the side of Mount Bowning, on the east side of the road which looks directly across at the site. From Graces Flat Road, the view to the wind farm will be partially screened by the eastern ridge and only about half of the turbines will be visible. "Glendale" is screened from the site by pine trees lining the hill behind the house. "Elvington" is surrounded by trees and may have filtered views to the site from the house. "Rose Hill" is surrounded by trees, but will see the site from the house. "Tannochbrae" is surrounded by trees but will have filtered views to the site. "Waterview" will have views of the wind farm (surrounding vegetation unclear). "Canyon" is unlikely to have views of the wind farm. Adjacent to the Highway, "Pounie" near the Bowning cemetery is surrounded by trees and low in the landscape and unlikely to have views of the wind farm. "Pindari" is unlikely to have views due to surrounding vegetation. "Fairview" has only limited views filtered by vegetation at the rear of the house. The "Woodleigh" homestead is surrounded by trees and will have filtered views to the site from the house. "Tulley Vale Hall" located to the west of "Woodleigh", will have filtered views of the tops of the turbines through vegetation at the back of the house. These properties will see only a small number of turbines as the views is screened by Black Ridge. Duration of exposure (to the development): From houses with views to the site, duration will be significant. From the road, duration is intermittent. Dominance of exposure: Dominance is reasonably low as the eastern edge of Black Range will screen some or the entire wind farm from certain view points, particularly from close to the base of Black Range. The blades will usually be facing the westerly prevailing winds, so viewed from the east; the blades will be highly visible. From some locations only the blades of the turbines will be visible which, while low in visual dominance, might be disconcerting to some viewers. Landscape value: Primary producers are considered to place a low value on the landscape, although direct views from the home are considered highly valued. Rural residential landowners place a high value on the landscape.	Moderate to high visual sensitivity

Area 9: Black Range South	Land use: Mainly primary production and some rural residential and the Hume and Hovell Walking Track passes along the road. Type of user and frequency: Primary producers and residential. Some infrequent recreational users. Minimal visitation by others. Visual catchment: The area is bisected by Black Range Road and most properties and houses are located off this road. Properties such as “Ferndale”, “Springvale” and “Sunnyside” are close to the site along the Black Range Road. These properties have quite clear views to the wind farm. “Sunnyside” will be screened partially by trees. “Wattle Valley” and “Riverlea” are located on a loop road to the south of Black Range Road. These properties will have partial views of the wind farm. “Yoweraweena” is close to the site, high on the slopes of Black Ridge. There will be clear views of the southern end of the wind farm from the house. “Sutton Grange”, on Sutton Grange Road is surrounded by vegetation and unlikely to have views from the house. The Hume and Hovell track goes through this area and there are campsites along the route that will have filtered views to the wind farm through vegetation. Off Woolgarlo Road, “Bertangles” and “Riverview” will have views of the nearer turbines although views may be screened by vegetation around the house. From the roads, the views to the site are clear but intermittent through gaps in the roadside vegetation. Duration of exposure (to the development): From houses with views to the site, duration will be significant. From the road, duration of exposure will be intermittent. Dominance of exposure: Where clear views are available, dominance will be moderately high as the wind farm will sit high above the area and dominate the hill tops. Turbines on the northern end of the site will generally be screened by Black Range. Landscape value: Primary producers are considered to place a low value on the landscape, although direct views from houses are highly valued. Recreational uses place a moderate to high value on the surrounding landscape.	Moderate to high visual sensitivity
Area 10: Black Range West	Land use: Primary production and some rural residential. The road that bisects the area provides access to Burrinjuck State Recreation Area and the convention centre at Woolgarlo. Paynes Road also serves as the access point for a quarry along the road. Type of user and frequency: Primary producers and infrequent recreational users. Visual catchment: A number of houses have views to the site. “Bogo” (along the road to Lake Burrinjuck) has partial views screened largely by Bald Hill, “Cooinda” is partly screened by vegetation and “Fairview” has open views to the site. From the road to Lake Burrinjuck, there are mostly open views to the sight screened only by the prominent Bald Hill and occasional roadside vegetation and undulations. Beyond the intersection with Woolgarlo Road, the site is screened from view from the road by vegetation coverage and other properties including “Lynn Lee”. There is a house at the start of Paynes Road that is surrounded by vegetation and will have filtered views of the wind farm. “Linbrook” at the end of the road and at the base of the ridge and have clear views to the site. Along Sutton Grange Road, “Bogo” is mostly screened by surrounding hills and “Greenville” will have clear views of a few turbines, although most turbines will be screened by the hills in front of the house. Duration of exposure (to the development): From houses with views to the site, duration will be significant. From the road, duration is constant but ultimately transient. Dominance of exposure: Most homes are screened from some or all of the turbines so few will view the entire wind farm. However, individual turbines will be quite dominant as they will tower over the area. The blades of the turbines will usually be facing the westerly prevailing winds, so viewed from the west; the blades will be highly visible. Landscape value: Primary producers are considered to place a low value on the landscape, although direct views from the home are considered highly valued. Recreational uses place a moderate value on the surrounding landscape while travelling to their destination.	Moderate to high visual sensitivity

Area 11: Black Range North	Land use: Primary production and a small number of tourists. Type of user and frequency: Primary producers. "Crisp Galleries" attracts visitors and passing traffic. Visual catchment: Along the Hume Highway there are a number of houses that will have views to the wind farm. "Spring Vale" sits high on the hill near Bowning and will have views to the site. "Bella Vista" next door sits lower in the landscape and is unlikely to have views of the wind farm. The house opposite the junction of Graces Flat Road and the highway is surrounded by vegetation and is unlikely to have views to the site. "Crisp Galleries" is surrounded by large exotic and native trees and therefore screened from the site. A house just to the west of the gallery is also surrounded by vegetation but may have filtered views of the site. "Sandford" and two other houses on the south side of Burley Griffin Way, west of Bowning, have views to the wind farm heavily screened by vegetation at the rear of the houses. "Marilba" on the western side of the Black Range will have partial views through vegetation, looking along the turbines. A house at the base of Mylora Ridge near Bookham is surrounded by vegetation but have filtered views to the site. Duration of exposure (to the development): From houses with views to the site, duration will be significant. From the road, duration will be intermittent and transient. Dominance of exposure: The wind farm sits high above the surrounding landscape on the ridge but few houses will have clear views of the turbines. From houses more to the east of the area such as "Spring Vale", most of the wind farm will be visible. From other locations, particularly from close to the Ridge, some turbines will be blocked or partially screened from view by the Ridge itself, reducing the dominance of exposure. The blades will usually be facing the westerly prevailing winds; therefore, viewed from northerly locations, the blades will be difficult to see. The top of the turbine only will be visible. Landscape value: Primary producers are considered to place a low value on the landscape, although direct views from the home are considered highly valuable. Tourists are expected to place a moderate value on the landscape.	Low to moderate visual sensitivity
Area 12: South of Lake Burrinjuck	Land use: Mainly large working properties Type of user and frequency: Mainly primary producers and infrequent use by other users. Visual catchment: The views to the site are open across Lake Burrinjuck to the site. There are very few residences in the area. Duration of exposure (to the development): From houses with views to the site, duration will be significant. From the roads in the area, views to the site are transient. Views from working properties will be intermittent. Dominance of exposure: Dominance varies from site to site. The whole wind farm will be visible from most of the area. Viewed from some distance across a wide vista, the width of the wind farm will be very narrow on an expansive view shed. Landscape value: Primary producers are considered to place a low value on the landscape, although direct views from the home are considered highly valued.	Low visual sensitivity
Area 13: South of Yass	Land use: Mainly large working properties Type of user and frequency: Mainly primary producers and infrequent use of the roads by other users. Visual catchment: The views to the site are open across the Yass River valley to the site. Some properties have views of the site. "Euralie" "Mount View", "Fairfield" and "Avondale" "Baileu" and "Glenroy Allord" will have views depending on vegetation surrounding the houses. "Riverview" will have only partial views due to local topography. Views from the roads in the area are fairly open. Duration of exposure (to the development): From houses with views to the site, duration will be significant. From the roads in the area, views to the site are transient. Views from working properties will be intermittent. Dominance of exposure: Dominance varies from site to site. The whole wind farm will be visible from most of the area. Generally dominance is quite high as there are open views to the site across the open landscape. The wind farm will be viewed close to side on, but the wind farm will not be a large feature on a wide view shed to the north and west. Landscape value: Primary producers are considered to place a low value on the landscape, although direct views from the home are considered highly valued.	Moderate visual sensitivity

Area 14: West of Yass	Land use: Primary production and rural residential land. Type of user and frequency: Primary producers and rural residential landholders, some commuting to Canberra for work. Visual catchment: There are a number of properties around Black Range Road that have views of the site, including but not limited to three houses in a subdivision next to “Rosebank” that have open views of the site, and a house on the southern side of the road near Hingerty’s Creek also has views to the site. The more established properties tend to have partially screened and filtered views of the site including “Elmside”, “Bellevale”, “Spring Mount”, “Living Spring”, “Yurrah” and “Cowridge”. Black Range Road heads straight towards the eastern most ridge of Black range, which is clearly in view for much of the journey but sometimes screened by vegetation or landform. Further north towards the highway, the Mount Bowning ridge screens views of the site. Duration of exposure (to the development): From houses with views to the site, duration will be significant. From the roads in the area, views to the site are intermittent. Dominance of exposure: The dominance of the view varies, but those homes with clear views will experience a high dominance of exposure and screened or filtered views offer a lower dominance of exposure. The blades of the turbines will usually be facing the westerly prevailing winds. Therefore, viewed from the east, the blades will be highly visible. Landscape value: Primary producers are considered to place a low value on the landscape, although direct views from the home are considered highly valuable. Rural residential landowners place a high value on the landscape.	Moderate to high visual sensitivity
Area 15: North of Bowning	Land use: Mainly primary production Type of user and frequency: Primary producers and passing traffic on the roads in the area. Visual catchment: The site will be visible from some locations including some homes around Bowning on Burley Griffin Way. There are few houses in this area. Most views from houses are well filtered or screened by vegetation. “Glencoe” will have views of the wind farm from the house filtered by vegetation. “Red Hill” is surrounded by trees have no views of the site, but two houses either side of “Red Hill” will have filtered views through vegetation from the house. A house to the north of the “Red Hill” homestead will have partial views of the wind farm. As Burley Griffin Way heads west, the turbines will be only intermittently visible as the northern end of Black Ridge will screen the site from the road. There are views from the road around Binalong, but no views of the site from Binalong itself. The wind farm will be visible from “Emu Flat” however, it is unclear the extent of view from the house. Further north, views of the site are screened by the hills including a ridgeline separating the Murrumbidgee catchment to the south and the Lachlan catchment to the north. There are no significant views to the site from the Lachlan Valley Way. Duration of exposure (to the development): Views from homes will be considerable, although few houses will have good views of the site. Views from working properties will be intermittent. From the roads in the area, only occasional views of site will occur. Dominance of exposure: Generally low dominance of exposure as there are few clear views of the site from homes. Landscape value: Primary producers are considered to place a low value on the landscape, although direct views from houses are highly valued.	Low to moderate visual sensitivity

Area 16: Mylora	Land use: Mainly primary production Type of user and frequency: Primary producers and infrequent passing traffic. Visual catchment: From most of this area, there are no views of the site as it is screened by the Mylora Ridge to the east. However, there are a small number of houses on the northern side of the Hume Highway near Bookham that will have views to the site, including “Willow Creek”. Another house on Illalong Road, “Aughnacoly” will be able to see part of the wind farm and the third house to the north side of Illalong Road will not have views of the wind farm. West along the Hume Highway, there are a number of houses with views to the site. “Tralee” is on a hill facing the road, but there will be limited views to the site from houses. “Shirrarea” is along Whitefields Road, with partial views of the site. Next to “Shirrarea” there is another house facing the Highway with partial views of the site. “Deep water” faces the highway but will see only a small section of the wind farm. Duration of exposure (to the development): From houses with views to the site, duration will be significant. From the roads in the area, views to the site will be infrequent. Dominance of exposure: Dominance from houses varies. Around Bookham, the view is up to the site. Along the Hume Highway, views are more at grade and therefore less dominant. Viewed from these houses, the wind farm will be reasonably small in a wide view shed. From some houses along the Hume Highway the whole wind farm will be seen. The blades of the turbines will usually be facing the westerly prevailing winds, so viewed from the west; the blades will be highly visible. Landscape value: Primary producers are considered to place a low value on the landscape, although direct views from houses are considered highly valuable.	Moderate visual sensitivity
Area 17: Childowla	Land use: Primary production Type of user and frequency: Primary producers. Visual catchment: Views from houses are limited by Bookham Hill that lies to the east of this area. There are views from some houses along the Hume Highway. “Kia Ora” is sitting on a small hill and will have clear views of the wind farm. A house at the end of Robinson’s Road is partially screened from the site by a hill but will be able to see part of the wind farm. Along Childowla Road, views to the site are limited to occasional views from the road. Duration of exposure (to the development): Houses with more open views to site have a long duration of exposure. From the roads, views to the site are infrequent. Dominance of exposure: There are few houses with views. Views tend to be at grade to the proposed wind farm. Viewed from these houses, the wind farm will be reasonably small in a wide view shed. The blades of the turbines will usually be facing the westerly prevailing winds, and will be highly visible from around the Hume Highway. From other locations, the dominance of exposure will be low. Landscape value: Primary producers are expected to place a low value on the landscape, however, views from homes are considered to be highly valued.	Low to moderate visual sensitivity
Type E	Ranges and hills	
Area 18: Black Range	Land use: Primary production. Type of user and frequency: Primary producers working on properties. Visual catchment: The wind farm will be seen by farmers working on their properties. Duration of exposure (to the development): Duration will be short and only experienced while undertaking farming activities. Dominance of exposure: Dominance of exposure will be high as the towers as the towers are in close proximity. Landscape value: Primary producers are expected to place a low value on the landscape.	Low to moderate visual sensitivity

Area 19: Mount Bowning	Land use: Primary production. Type of user and frequency: Infrequent use by primary producers. Visual catchment: The wind farm will be visible from the western slopes of Mount Bowning and seen by farmers working on their properties. Duration of exposure (to the development): Duration will be short and only experienced while undertaking farming activities. Dominance of exposure: Dominance of exposure will be moderate as views will be at grade from almost 10 kilometres so the angle of view is quite low. Viewed from this location, the wind farm will be reasonably small in a wide view shed. Landscape value: Primary producers are expected to place a low value on the landscape.	Low visual sensitivity
Area 20: Other Ranges and Hills	Land use: Primary production. Type of user and frequency: Infrequent use by primary producers. Visual catchment: The wind farm will be seen by farmers working on their properties. Duration of exposure (to the development): Duration will be short and only experienced while undertaking other activities. Dominance of exposure: Dominance of exposure will be moderate as views will be at grade to the wind farm rather than up at the wind farm. Landscape value: Primary producers are expected to place a low value on the landscape.	Low visual sensitivity

Distant Views (greater than 15 kilometres)

It should be noted that there might be a number of locations from greater than 15 kilometres that have views to the site, including:

- the Hume Highway to the east of the site;
- roads and properties to the south of Yass, including Dog Trap Road and Gums Road;
- areas around Binalong; and
- the Wee Jasper Road to the south.

Due to the distance the visual sensitivity of the users were not assessed, as from that distance the wind farm will be difficult to perceive.

5 Visibility of the Wind Farm

This section establishes the visibility of the wind farm from various distances. There are no set guidelines on visibility or dominance of wind farm turbines from certain distances. De Gryse (2000) uses the table below to express the general concept that at greater distances variations in the landscape become less obvious based on the proportion of the vertical field the towers occupy:

Table 4: Significance of Wind Turbine as a Vertical Element

(adapted from De Gryse 2000)

Distance at which the turbine becomes:	Height of Wind Turbine (eg 120m)
Insignificant vertical element (less than 0.5% of the vertical line of sight)	>13.75 km
Visible but not dominating vertical element (less than 0.5% - 2.5% of the vertical line of sight)	2.7 km – 13.75 km
Dominant vertical element in the viewed landscape (greater than 2.5% of the vertical line of sight)	<2.7 km

The study that this table was used related to a wind farm on coastal lowlands on the north east coast of Tasmania and as this wind farm is proposed on a ridgeline, the distance zones have been altered as it is assumed that the visibility of the wind farm will increase.

For this visual assessment, four distance zones are used to categorise visibility, as follows:

- Foreground views: High visibility - within 5km of the wind farm;
- Mid-ground views: Moderate visibility - 5km to 10km of the wind farm;
- Background views: Low visibility - 10km to 15 kms of the wind farm; and
- Distant views: Low visibility - greater than 15km from the wind farm.

The distance from the site assists in determining the visual prominence of the wind turbines and therefore their visual impact from various distances. The distance each area is from the site is shown in Table 5 below:

Table 5: Distance Zones

Location	Distance from Site	Visibility
<u>Type A</u>		
Area 1: Yass	14 – 15 kms	Low visibility
Area 2: Bowning	8 – 10 kms	Moderate visibility
Area 3: Bookham	8 – 10 kms	Moderate visibility
Area 4: Goondah	8 – 9 kms	Moderate visibility
<u>Type B</u>		
Area 5: Hume Highway	3 – 15 kms	Low to high visibility
Area 6: Southern Railway	8 – 15 kms	Low to moderate visibility
<u>Type C</u>		
Area 7: Lake Burrinjuck	5 – 15 kms	Low to moderate visibility

Location	Distance from Site	Visibility
<u>Type D</u>		
Area 8: Black Range East	1 – 8 kms	Moderate to high visibility
Area 9: Black Range South	1 – 9 kms	Moderate to high visibility
Area 10: Black Range West	1 – 7 kms	Moderate to high visibility
Area 11: Black Range North	3 – 9 kms	Moderate to high visibility
Area 12: South of Lake Burrinjuck	10 – 15 kms	Low to moderate visibility
Area 13: South of Yass	6 – 15 kms	Low to moderate visibility
Area 14: West of Yass	7 – 14 kms	Moderate to low visibility
Area 15: North of Bowning	8 – 15 kms	Low to moderate visibility
Area 16: Mylora	5 – 15 kms	Low to moderate visibility
Area 17: Childowla	7 – 15 kms	Low to moderate visibility
<u>Type E</u>		
Area 18: Black Ridge	Within 2 kms	High visibility
Area 19: Mount Bowning	7 – 9 kms	Moderate visibility
Area 20: Other Ranges and Hills	4 – 15 kms	Low to high visibility

6 Visual assessment

6.1 Introduction

The visual assessment involves an evaluation of two aspects of the visual impact of the wind farm:

- the contrast that the wind farm will create in the landscape and whether the proposal can be absorbed into the landscape; and
- the visual impact on the user in the landscape.

The contrast to the existing landscape relates to the impact that the wind farm will have on the different landscape character types, and an assessment is made as to whether the contrast of the wind farm to the landscape is acceptable or not.

The second aspect of the visual impact is to consider the proposal and subsequent impact on the user. This aspect includes consideration of:

- visual sensitivity of the user to changes in the landscape; and
- the distance that the viewer is from the wind farm.

For example, the wind farm will have a lower visual impact from a road to passing traffic than from a house. The scenic quality of the landscape is a consideration in determining the visual impact on the user. That is, the visual impact of a wind farm across a pristine landscape is greater than the visual impact of a wind farm in an industrial landscape. The visual impact on the viewer considers three levels of impact:

- High – proposal is dominant within the landscape and generally not overlooked by the observer;
- Moderate – moderately dominant and is noticed; and
- Low – can be seen but does not attract attention.

The visual impact assessment makes an independent assessment as to the extent of visual impact of the wind farm on the user. It does not conclude whether the visual impact is acceptable or not to the user, as that judgement depends on the user.

The visual impact of the proposal will firstly be reviewed by considering the general impacts of the whole development. A more detailed assessment is then made from each of the main viewpoints.

6.2 Visual Impacts of the Wind Farm

6.2.1 Scenic interest of a wind farm

By their very nature, wind farms are highly visible and in some circumstances, they create an unacceptable visual impact. However, when considering the visual impact of wind farms, the positive aspects should not be ignored. De Gryse (2000) notes that:

“The overall assessment of visual impact must consider the positive contribution that the scenic interest of wind farms generally has on the landscape ... While scenic interest does not necessarily mitigate these impacts, it does, nonetheless, ameliorate them, by adding positively to the landscape setting thus contributing to the acceptability of the impact.”

While their positive visual aspects of wind farms is not considered in detail in this report, this aspect needs to be kept in mind when their visual impact and the contrast they present to the surrounding landscape is being assessed.

6.2.2 Contrast to the cultural & natural environment

The wind turbines introduce a very contemporary visual form to the area. The surrounding rural landscape is a 'cultural' landscape and the wind farm will contrast to this cultural landscape. Their tall sleek form provides an industrial element to the largely cultural landscape that has a strong historical essence. The height and scale of the turbines also contrasts to elements within the landscape, and their visual appearance can add an element of high visual contrast to the existing environment.

However, the landscape in which the wind farm will be located is not unique and similar landscapes can be found in many areas on the western slopes of the Great Dividing Range from New South Wales through Victoria.

There are other modern elements in the landscape that are broadly consistent in scale to the wind farm turbines. The telecommunications tower on Black Range stands at 60 metres and is similar in scale to the height of the turbines. Other vertical elements include telegraph poles, signage, and transmission towers, although at a different scale. The visual quality of a wind farm is arguably higher than many of the existing man made elements already in the landscape.

The close proximity of the Hume Highway located to the north of the wind farm site adds a prominent built form to the area. The Highway and Yass Service Centre also introduces a transport/industrial element to the region. It is on the Hume Highway that the vast majority of people will view the wind farms, albeit for a relatively short time compared to local residents. The wind farms actually may be seen as a more dynamic and attractive landmark by many Highway users.

From the perspective that this landscape has evolved through production activities, energy production could be considered consistent with the existing land use. Indeed, energy production and primary production have co-existed in several other locations. Meridian Energy (May 2005) note:

"Harvesting the power of the wind can be seen as an appropriately rural activity."

Heinemann (2006) note that "windmills have been a common feature of Australia's rural built environment for more than 100 years ... Until electricity and gas grids spread throughout non-urban Australia, small wind generators were used to provide energy on individual farms", albeit the scale of these structures is on a significantly smaller scale.

Burrinjuck Dam also provides the historical precedent for energy production in the area, and there is already considerable electrical infrastructure in the area including the Yass substation. While recreational users will be quite sensitive to a wind farm, the creation of the water body is functionally consistent with the wind farm that is electricity production.

The wind farm will be visible to recreational users from the Hume and Hovell Walking track. However, at this point the Hume and Hovell Walking Track is located in a rural rather than wilderness landscape and does not follow the original route.

While the wind farm will provide a contrast to this landscape, it is a change that the landscape should be able to absorb.

Conclusion: Low to moderate visual impact

6.2.3 Size of the wind farm and turbine size

Compared to the recently approved wind farms and proposed wind farms in New South Wales (see Table 6 in Section 6.4), the Taurus Energy proposal is a small wind farm (maximum of 15 turbines). In relation to the numbers of towers, Planisphere (2005, p80) note that:

"... collections of turbines can be highly visible because of the combination of their height, repeating elements and the geographical area they cover."

A study of inland wind farms in South Australia found that "the presence of the smaller number of turbines enhanced landscape quality" (Lothian, undated), over a larger number of turbines. Warren et al, (2005) note that:

“It is clear ... that the public has a clear preference for smaller wind farms.”

A smaller number of towers in this proposal will reduce the visual impact of the wind farm by reducing the overall area of the proposal. Potentially there are fewer vantage points to the site. There is also a reduction in the visual impact by viewing fewer turbines.

The proposal may include the use of comparatively large towers (up to 80m tall), with blades up to 46m long for a total height of 126 metres. Planisphere (2005, p80) note that:

“The height of individual turbines can make them visible for long distances, and they can be prominent features on the horizon when viewed with the sea or sky as a backdrop. The turbines can also stand in dramatic contrast with the height of features of the surrounding landscape.”

The possible use of large towers will mean that they will be more easily seen from a distance and increases the visual impact of an individual tower from any given distance. Located on Black Range will in one sense add to their dominance, however, in relation to the monolith of Black Range, the turbines will not be dominating. They will be approximately one third the height of the range in relation to the surrounding landscape. The size of Black Range may reduce the apparent dominance of the turbines.

In the case of Conroy's Gap wind farm, three distinct small groups of turbines is a good layout from reducing the visual impact of the wind farm.

6.2.4 Siting of turbines

The siting of turbines in some installations can have bearing on the visual impact on certain specific locations around the wind farm. In the case of the Conroy's Gap, three options have been considered in preparing this assessment, each with approximately the same number of turbines; Option A has 15 turbines where Options B and C have 14 turbines. The three layouts have positive and negative impacts from various locations around the site, and the difference in visual impact between the three options is marginal.

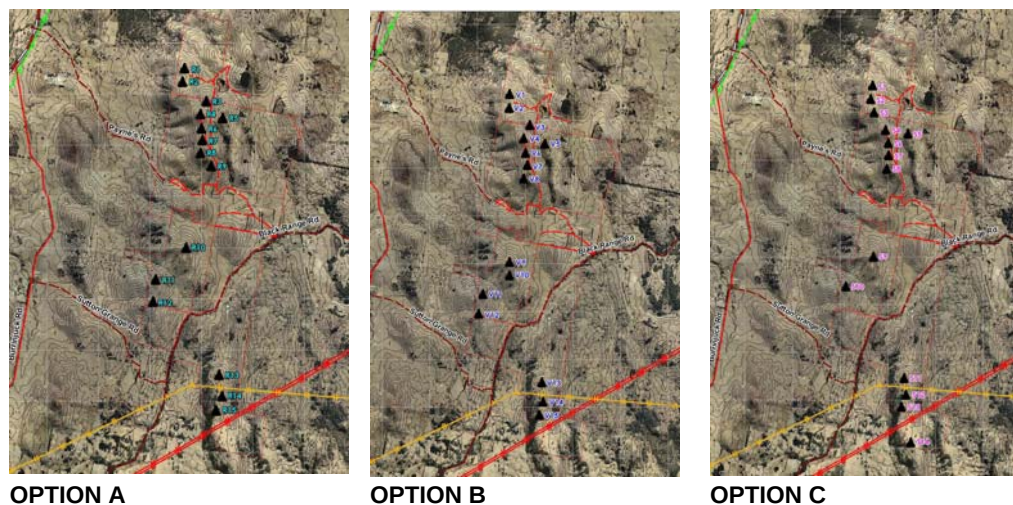


Figure 4 Turbine layout options

The turbines are arranged in three groups. The group of turbines that will be viewed by most people is the northern most group which sits on the highest section of the range. Option B and C have 8 turbines in this area, where Option A has nine turbines, which increases their visibility marginally from more northern locations including Bowning and the Hume Highway, although the area that the turbines cover is basically the same for all options.

The middle group to the south varies from 2 to 4 turbines. This area is close to Black Range and Sutton Grange Roads. Minimising the numbers of turbines in this location will have the greatest benefit on individual residents along Black Range Road and Sutton Grange Road, as seen in Option C, and Option A to a lesser extent. Option B is a less attractive option from a visual impact perspective on that basis, although the difference is marginal.

The southern most group is located along Sugarbag Hill and are the most remote and, therefore, will be the least observed from northern locations. These turbines will be most visible to recreational users on the lake and a larger number of turbines will increase the visual impact from that location. Option C extends further south than the other 2 options, which will make the wind farm visible from southern locations especially by recreational users in and around the Lake.

On balance, Option A is likely to be the best layout option, from a visual impact perspective, although the difference in visual impact of the three options is marginal.

6.3 Visual Impact from Specific Locations

Localised topography and vegetation and the perspective of the viewer all contribute to the visual impact of the wind farm from various locations. The visual impact of the wind farm from key locations is outlined below.

Type A – Country towns

Area 1: Yass

The landscape character of Yass reflects in part its long history, with old buildings, large exotic trees and wide streets typical of country towns. Yass is also growing and changing through an influx of commuters and the more modern built elements are evident. Yass is considered to have a low to moderate scenic quality. However, few, if any, locations will view these historic elements of Yass and the wind farm as from most locations the wind farm is hidden from Yass. The introduction of the wind farm, particularly located 15 kilometres from the town should create a low contrast to the surrounding landscape.

From the town of Yass, there are limited locations from where the wind farm will be visible. The main viewing location will be the residential area along the western edge of the town, and from the hill north of the river. From the west facing locations from Yass, the views across to the site are quite impressive. However, the wind farm will be located approximately 15 kilometres to the west, and from that distance the wind farm will be difficult to perceive and have a low visual presence on the landscape.

There are views of the wind farm from the Yass service centre from around 14 kilometres. From that location, the wind farm will be more visible than from Yass, although the activity of the service centres tends to draw the attention in rather than viewing the surrounding landscape. Users will have a low visual sensitivity. The wind farm is unlikely to be a strong visual presence from this location.

Conclusion: Low visual impact

See Photomontage 1 in Section 8

Area 2: Bowning

Bowing is well treed and not particularly structured giving it an attractive rambling character. It is considered to have a low to moderate scenic quality. The wind farm will introduce a modern element to the landscape of Bowning; however, the contrast is reduced by the presence of the highway and other built elements such as powerlines, railway line and roads. As a result the contrast of the wind farm to the landscape is acceptable, and the wind farm will not unduly alter the landscape character of Bowning.

The wind farm will be located 8 to 10 kilometres away and will be moderately visible at that distance. There are a number of houses that have views of the site as they look out across the highway and the surrounding agricultural land. Some viewpoints are quite open to the site. In general, users will have a moderate visual sensitivity to the surrounding landscape. On balance, the wind farm will create a low to moderate visual impact from Bowning.

Conclusion: Low to moderate visual impact

Area 3: Bookham

The landscape character of Bookham is dominated by contrasting elements, the large trees and the adjacent highway. It is considered to have a low to moderate scenic quality. The built form of the highway and surrounding elements tends to dominate the character of the town and the introduction of a wind farm will be an acceptable contrast to the landscape character. As such the landscape could absorb the change.

Bookham is 8 to 10 kilometres from the site and the wind farm will be moderately visible from that distance. Residents of Bookham are likely to have a moderate visual sensitivity to the surrounding landscape, largely because the large trees limit the views out from the town to the site. In winter, views to the wind farm may be clearer once the deciduous trees lose their leaves.

The wind farm will not be a significant visual presence from the town but will be experienced when exiting the town from the Hume Highway where the built form of the highway reduces the visual contrast to the wind farm. There will be some views of the wind farm from the church grounds however, but this will be short term.

Conclusion: Low to moderate visual impact

See Photomontage 2 in Section 8

Area 4: Goondah

The wind farm will not be visible from most locations in Goondah. Any views will be of the tops of one or two turbines and therefore will not create a visual impact, and the contrast between the landscape character and the wind farm will be acceptable.

Of the few houses from where the tops of a small number of turbines will be visible from 8 to 9 kilometres, the limited views to a small number of turbines create a low visual impact.

Conclusion: Low visual impact

Type B – Transport corridors

Area 5: Hume Highway

The Hume Highway presents a dominant transport-related built form to the area. For the majority of the length of highway, the surrounding landscape consists of large farms, which are generally cleared. As such, the views of the traveller will either be directed along the road corridor or across a modified rural environment. The Hume Highway is considered to have a low scenic quality. Therefore the contrast between the built form of the highway and the wind farms is low, and the landscape could absorb the change.

The close proximity of the towers (as the Hume Highway passes approximately 3 kilometres from the turbines) makes the wind farm clearly visible from sections of the Highway and will be visually dominant when viewed from below. The predominantly westerly winds will result in the blades being in full view from along the road for a large portion of time from the west. However, the wind farm is in view from some distance so the wind farm will not be a surprise to motorists rather introduced from a distance. This will minimise their initial visual impact. From the east, the wind farm is not particularly visible.

For users of the Highway, the wind farm may present an interesting feature to view while travelling along the road to a destination elsewhere. The speed of traffic along the highway means that the wind farm will be viewed from close distance for only a short time, which also reduces the visual impact.

For most users, they will have personal detachment from its presence and personal detachment from the surrounding landscape. It is assumed that travellers will have a low to moderate visual sensitivity to the wind farm. The visual impact of the wind farm from the Hume Highway will be low.

Conclusion: Low visual impact

See Photomontages 3 and 4 in Section 8

Area 6: Southern Railway

The landscape character that the railway line passes through varies from low to moderate in scenic quality. Most of the landscape is a modified farming landscape, scattered with modern built elements such as powerlines, the highway transmission towers and signage. As a result, the wind farm will provide some contrast to this landscape, but it is a change that the landscape should be able to absorb.

Views from the railway line are very limited and will consist of occasional views through gaps in hills and cuttings as the railway winds through the hilly landscape. Passengers on a train, enjoying the landscape views are expected to have a low visual sensitivity to the wind farms, and passengers are unlikely to have any connection with the surrounding landscape.

Conclusion: Low visual impact

Type C – Waterways

Area 7: Lake Burrinjuck

The landscape character of the Lake has a moderate to high scenic quality. The large expanse of water, although man made is a unique element in the landscape. The steep banks of the lake also create an interesting landscape feature. The wind turbines add a contrasting element to the landscape, and the turbines will tower above the viewer on the lake. However, Lake Burrinjuck has been constructed for the purpose of energy production and therefore has a strong functional connection with wind farms and energy production. Further, much of the landscape surrounding the Lake is a modified farming landscape oriented to production purposes. In that sense the contrast that the wind farm introduces to the existing landscape is acceptable, and the landscape will be able to absorb the change.

The Lake varies in distance from the site from between 3 and 15 kilometres. Users of the Lake are expected to have a moderate to high visual sensitivity to the wind farm. The viewpoints from where the wind farm will be most visible are around 8 to 9 kilometres. From that distance, the wind farm will be of moderate visibility particularly as the wind farm will be viewed looking along the wind farm and the wind farm will be narrow in the field of view from the Lake. The wind farm will be considerably higher than the Lake surface so will not be the normal field of view of users of the Lake but the experience of relaxing on the Lake will be impacted by the presence of the wind farm.

Some properties around the Lake and a convention centre will have views to the wind farm. On balance, the visual impact of the wind farm from Lake Burrinjuck and surrounds will be moderate.

Conclusion: Moderate visual impact

Type D – Agricultural land

Area 8: Black Range East

Along Black Range Road, the landholders are perhaps the most sensitive to the wind farm as the majority of properties are subdivisions from original farms and owned by rural residential land owners, many of whom commute to work in Canberra. This group generally will have purchased property in the area for the aesthetic quality. At the public consultation day, some expressed opposition to changes that the wind farm will have on the visual appeal of the landscape. Since the public consultation day, the siting of the turbines that will have created the most concern (on the eastern most ridge) have been removed from the plans. As a result, the visual impact of the current plan is less than what was originally proposed.

The area around Black Range Road is rural in character and there is little obvious built form except for the houses that are being built along the road. Beyond the tree lined roads, the land is mostly cleared and is a modified farming landscape. Closer to the Hume Highway and Graces Flat Road, the landscape is modified being largely cleared of natural timber. The area is considered to have a moderate scenic quality.

The wind farm will create a contrast with the existing landscape by introducing a modern visual element. However, the landscape is a modified rural landscape, created through years of production oriented land use, and there are sufficient built elements in the landscape such as the highway, power lines and the telecommunications tower on Black Range itself so as to make the contrast acceptable.

The main visual impact is created by the number of houses with direct views to the wind farm. Distances of houses vary from 3 to 10 kilometres and residents with views are likely to have a moderate to high visual sensitivity. The views to the wind farm are largely screened by the east ridge the whole wind farm will not be visible. For example, close to Black Range no turbines will be visible. Further back from the Range along Blake Range Road, only the tops of the turbines will be visible. From Graces Flat Road, approximately 4 to 6 turbines will be visible. Where homes have views of the turbines, they will tend to dominate the views to the west, and site prominently on the Range. On balance, the visual impact of the wind farm from this location is moderate to high.

Conclusion: Moderate to high visual impact

See Photomontages 5, 6 and 7 in Section 8

Area 9: Black Range South

The landscape character of this area is of moderate scenic quality. The secluded nature and well treed road verge gives a bush character. There are some areas with reasonable coverage of vegetation, but the majority of the area beyond the road verge is a modified rural landscape with only scattered trees.

The introduction of a modern visual element of a wind farm will create a contrast to the existing landscape. In this location, the impact of the wind farm on landscape character will be the largest of any of the land surrounding the wind farm site. However, the surrounding landscape has been modified by years of farming and primary production. In addition, there are 330kV and 132kV power lines running through the area that introduce power infrastructure to the area. On that basis, the landscape character should be able to absorb the introduction of the wind farm without being unduly impacted.

In this area, there are a number of larger properties to the south of the site that will be very close to the turbines, including "Ferndale", "Springvale", "Riverlea", and "Wattle Valley". The turbines are close to the properties (within 1 km from some properties) and the visual impact will be significant from this location. The property "Yoweraweena" is high on a ridge north of the Black Range Road and has views of the turbines from within 2kms. These properties will not see all of the turbines, but these turbines will sit high above the houses and dominates the views to the hills. The Hume and Hovell walking track is also in this area and a campsite along the road will have views to the wind farm filtered by vegetation.

The residents and occasional recreational user in the area are expected to have a moderate to high visual sensitivity to the wind farm. On that basis, the wind farm is likely to have moderate to high visual impact on the area.

Conclusion: Moderate to high visual impact

See Photomontage 8 in Section 8

Area 10: Black Range West

The landscape in this area is a highly cleared and modified farming landscape and is considered to have a low scenic quality. The dust rising from the quarry along Paynes Road creates an industrial oriented character of the land. The proximity of the Hume Highway adds a strong built form character to the landscape. The introduction of a wind farm will add a modern visual element to the landscape, but should not contrast significantly on the visual character of this (primary) production oriented area.

The area lies within 7 kilometres of the site. Houses with views to the wind farm are located between 1 and 4 kilometres from the wind farm, but only one house "Fairview" will view the whole wind farm.

There will be views of the wind farm from the road from as close as 3 kilometres. The wind farm will be highly visible from this distance. Users of the area, residents and traffic travelling to Lake Burrinjuck are expected to have a moderate to high visual sensitivity to the wind farm.

The towers will be clearly visible from quite close range and sit high above the area creating a dominating visual character. The wind farm will be viewed from a number of houses in the area. The visual impact of the wind farm will be moderate to high from this location.

Conclusion: Moderate to high visual impact

See Photomontage 9 and 10 in Section 8

Area 11: Black Range North

This area is, similar to much of the land surrounding the site is heavily cleared of vegetation and is a modified farming landscape of low scenic quality. The views to the site are across the Hume Highway and power infrastructure which adds a strong built form to the landscape. Clearly visible road and advertising signs also contribute to the altered landscape. The introduction of a wind farm will add a modern element but the contrast between the wind farm and the surrounding landscape is acceptable and the change could be absorbed into the landscape.

The Black Range North area lies between 3 and 9 kilometres from the wind farm, and from that distance the wind farm will vary between high and moderate visibility. The visual sensitivity of residents to the wind farm is considered to be moderate. There are few houses that will have clear views of the wind farm, as most are surrounded by vegetation. For example, the "Crisp Gallery", a tourist facility and likely to most impacted by changes in the landscape is surrounded by trees and visually separated from the surrounding landscape. "Spring Vale", the only house with clear unfiltered views to the site is viewing from the north east and will view the tops of only a few turbines. The view is also across the highly modified landscape of the Hume Highway.

In summary, the visual impact of the wind farm from this location is low to moderate.

Conclusion: Low to moderate visual impact

Area 12: South of Lake Burrinjuck

Most the area consists of large working pastoral properties being an extensively cleared agricultural landscape of low scenic quality. On that basis, the wind farm will not create a significant contrast to the existing landscape character, and will be an acceptable change to the landscape.

The users in this location are expected to have a low to moderate visual sensitivity to the wind farm. The wind farm is quite visible across the landscape from this area, but the area is sparsely populated and there are only a couple of houses in the area. These houses are around 13 to 15 kilometres and from that distance, the wind farm will have a low visibility. On balance, the visual impact of the wind farm from this location is low to moderate.

Conclusion: Low to moderate visual impact

Area 13: South of Yass

Most the area consists of large working properties. It is extensively cleared for agriculture and is a modified rural landscape. The area also contains the Yass electrical substation, located just to the south of Yass, and the substation and the many power lines that cross the landscape heading are visible. On that basis, the wind farm will not create a significant contrast to the existing landscape character, and will be an acceptable change to the landscape.

The users in this location are expected to have a moderate visual sensitivity to the wind farm. The wind farm is quite visible across the landscape from the roads, but the area is sparsely populated due to the presence of large working properties. The wind farm will be visible from around 7 kilometres from the working properties that are located between the

Yass River and the Good Hope Road. From that distance, the wind farm will have a moderate visibility.

Most other houses with views to the wind farm are located around 10 or more kilometres from the site, and from that distance, the wind farm will have low visibility. On balance, the visual impact of the wind farm from this location is moderate.

Conclusion: Moderate visual impact

Area 14: West of Yass

The landscape in this area is assessed as being a low to moderate scenic quality. Again the landscape is predominantly cleared farming land. There are a number of homesteads along Black Range Road that bisects the area, a number of recently built rural residential lots also line the road. The nearby Hume Highway and Yass Service Centre and powerlines visible from the eastern end of Black Range Road, are further reminders of a modern landscape. The wind farm will create a contrast with the landscape by introducing another modern visual element. However, there are sufficient modified or man made elements in the landscape so that the contrast between the wind farm and the landscape will be acceptable.

There are a number of properties who will have views of the wind farm. Several of these properties are recently built rural residential holdings. It is expected that residents in the area are likely to have a moderate to high visual sensitivity to the wind farm. The wind farm will be viewed from between 7 and 14 kilometres in this area. The closest house with views to the site is "Cowridge", whose views are partially screened by vegetation, is approximately 8 kilometres from the site. From that distance, the wind farm will have a moderate visibility. The closest houses with more clear views to the wind farm are around 9 to 10 kilometres from the site.

On balance, the visual impact of the wind farm from this location is moderate.

Conclusion: Moderate visual impact

Area 15: North of Bowning

This area is typically cleared agricultural landscape with some scattered timber. Most of the vegetation tends to be around the roads in the area or along creek lines. This modified farming landscape will not be significantly impacted by the introduction of a wind farm, particularly as the views of the wind farm are fairly limited. The contrast between the wind farm and the surrounding landscape is acceptable.

The limited views of the wind farm contributed to the assessment of the visual sensitivity of residents to the wind farm in the area to be low to moderate. The closest views of the wind farm are from approximately 8 kilometres on the Burley Griffin Way, and not all turbines will be visible. From most houses in this area, the views are screened by vegetation. On balance, the visual impact of the wind farm from this location is low.

Conclusion: Low visual impact

Area 16: Mylora

Views to the wind farm are limited from this area to the houses lining the highway. The contrast of the wind farm to the landscape is moderated by the presence of the strongly built form of the highway. The landscape is considered to have a low to moderate scenic quality. The land in this area is modified farming land, and as a result the contrast between the landscape and the wind farm will be acceptable.

The closest houses with views to the wind farm are near Bookham, at approximately 9 kilometres from the wind farm. From that location the wind farm will be moderately visible, located high on the Black Ridge. Other houses with views to the wind farm are located further from the site from approximately 12 to 15 kilometres. It is assessed that residents in the area will be moderately sensitive to the visual presence of the wind farm.

On balance, the wind farm will create a moderate visual impact from this area.

Conclusion: Moderate visual impact

Area 17: Childowla

Similar to the Mylora, the views to the wind farm are limited from this area to the houses lining the highway. The scenic quality of the area is considered low to moderate. The contrast of the wind farm to the landscape is moderated by the presence of the strongly built form of the highway. The land in this area is agricultural land, and as a result the contrast between the landscape and the wind farm will be acceptable.

Residents in the area are assessed as moderately sensitive to the wind farm. The closest houses with views to the wind farm from within this area are 12 to 13 kilometres from the site. From this distance, the wind farm will be of low visibility. On balance the visual impact of the wind farm from this location is low.

Conclusion: Low visual impact

Type E – Ranges and hills

Area 18: Black Range

Black Ridge is cleared farming land typical of the region and as a result the contrast between the landscape and the wind farm will be acceptable.

The towers will be viewed in close proximity, but views of the wind farm from a working property are generally valued lower as they tend to be of lower duration, and will be experienced while conducting other activities. As such, users are expected to have a low to moderate visual sensitivity to the surrounding landscape. On balance, the visual impact will be low to moderate.

Conclusion: Low to moderate visual impact

Area 19: Mount Bowning

Mount Bowning is a significant feature in the region and has a moderate amount of timber on the western slopes, although there is clearly evidence of farming practices that have altered the landscape, particularly south along the ridge. The views of the surrounding landscape are across the modified and mostly cleared rural landscape and also include the built form of the highway. The contrast between the landscape and the wind farm will be acceptable. There are no houses on Mount Bowning and the one house on the lower slopes that is addressed under Black Range East.

Conclusion: Low visual impact

Area 20: Other Ranges and Hills

Most of the other hills around the site are cleared or mostly cleared of vegetation and used for grazing and are generally modified rural landscapes. The exception to this is Carrolls Ridge that retains a good covering of timber. Carrolls Ridge is 10 to 15 kilometres from the site and is surrounded by modified farming landscape. The contrast between the landscape and the wind farm will be acceptable. There are no residences in these areas.

Conclusion: Low visual impact

6.4 Cumulative Visual Impacts

Cumulative visual impacts are assessed by reviewing the visual integrity and form of other built structures within the visual catchment of the proposed wind farm. Those structures with similar scale and dominance are identified as having a level of visual impact that together with the proposed wind farm will have a cumulative visual impact.

The development of wind farms in inland NSW has been predominantly along the Great Dividing Range as the Range that receives consistently higher winds and has the existing electrical infrastructure in place to allow economically viable development of wind farms in the area. Nearby wind farms may provide the additional cumulative visual impact. The proposed and approved wind farms in New South Wales are shown in Figure 4 below and listed in Table 6 below.

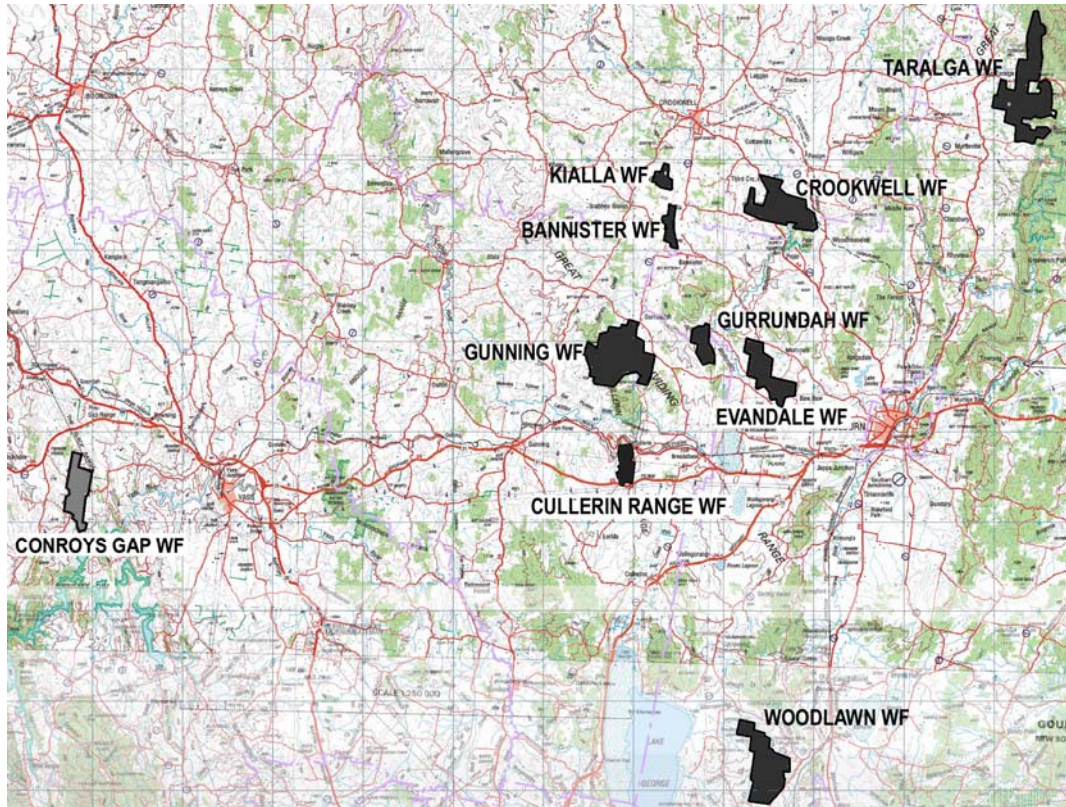


Figure 5 Location map of proposed and approved wind farms in NSW

Of these, the Gunning Wind Farm, Crookwell 2, Taralga and Woodlawn have been approved. Gunning Wind Farm is located approximately 60 kilometres to the east of Black Ridge. There will not be any locations that will be able to see both wind farms.

The closest of the proposed wind farms is Cullerin Range which is also located on the Hume Highway. Therefore, those driving along the Hume Highway will experience two separate wind farms. The likely impact of this is to provide a greater consistency in the views from the Highway. Where one wind farm visible from the highway is a unique element, two wind farms tends to create a repetitive element and is likely to be a less significant feature to the viewer.

Table 6: Proposed and approved wind farms in Goulburn, Crookwell and Yass areas of New South Wales

Proponent	Location in NSW	No. of Turbines	New Power Lines to Connect to Grid
Delta Electricity (Operational)	Crookwell 1 Wind Farm, near Crookwell	8	Substation on site
Delta Electricity (DA Approved)	Gunning Wind Farm, near Gunning	32	14km, 132kV, aerial
WindEnergy JV (DA Approved)	Woodlawn Wind Farm, near Tarago	25	Not specified
Gamesa Energia (DA Approved)	Crookwell 2 Wind Farm, near Crookwell	50	Not specified
RES Southern Cross (DA Approved)	Taralga Wind Farm, near Taralga	50	Not specified, >30km high voltage
Taurus Energy (under development)	Evandale Wind Farm, near Goulburn	Up to 15	<10km aerial
Taurus Energy (under development)	Cullerin Range Wind Farm, near Gunning	Up to 15	Substation on site
Taurus Energy (under development)	Conroy's Gap Wind Farm, near Yass	Up to 15	<4km aerial

It is understood that Taurus Energy has committed to switching offending turbines off for the duration of shadow impacts on residences. The shadow flicker results are included at Section 10.

6.5.1 Glint

The movement of the blades can catch the light and produce glint as seen from surrounding areas. This blade glint is spasmodic, highly dependent on the angle of sun, angle and orientation of the blade, and the location of the viewer and is therefore not able to be quantitatively assessed. The proposed paint to be used on the blades and tower of the turbines is expected to reduce blade glint.

It is understood that Taurus have agreed to monitor reports of blade glint for a period of 12 months after installation, and that Taurus consult with owners of any affected residences with a view to undertake the installation of mitigation measures such as screening.

6.6 Other Visual Impacts

De Gryse (2000) notes:

“Infrastructure such as transmission lines can represent a significant alteration to the landscape character, particularly in bushland areas where the removal of vegetation and disturbance of soils can impose an artificial and permanent linear disturbance in the landscape and/or where they cross or are visible on the skyline.”

Consideration needs to be given to the potential visual impacts of associated infrastructure associated with the wind farm, other than the turbines, including electrical transmission lines, substation and control facilities and access road.

6.6.1 Electrical transmission lines

The proposed location of the transmission lines are south of the ridgeline towards the “Ferndale” property. After crossing Black Range Road, the powerlines are proposed along the eastern slope of Sugarbag Hill and intersect with the 330kV line running east west across Sugarbag Hill.

The proposed route appears to be appropriate as there are very few vantage points of the powerlines. The property adjoining “Ferndale” to the east may have additional exposure to the electrical transmission lines, but this is offset by the existence of powerlines already running through the property. The additional power lines aligned down the hill will be viewed from Black Range Road. Little or no additional clearing of vegetation will be required.

6.6.2 Substation and the control and facilities building

The proposed locations for the substation are either in a small gully on top of the ridge or next to the 330kV transmission lines in the gully next to Sugarbag Hill. In a visual sense, the best location for the substation will be the lower site in the gully as it will be less visible from the road and surrounding properties.

There is one adjoining property that may be able to view the substation. If necessary, vegetation could be used to screen the substation, and the substation coloured to reduce its visual impact.

6.6.3 Access road

Access roads are generally proposed where existing roads are located. This reduces the visual impact of access roads, disturbance of land and properties and cost.

The two best options for access roads are from Black Range Road and Paynes Road. Of these options, the most suitable site is Paynes Road. Paynes Road provides access to

one homestead “Linfield”, and it is their land that the bulk of the turbines will be located. It also provides access to a quarry, from where the road building material might be located. Minimising transportation of the material and isolating road construction away from homes will greatly reduce the visual impact of the road construction.

The access road up to the top of the ridge could proceed up a shallow gully on the western face of the ridgeline. This site will be screened effectively from the Hume Highway by Bald Hill, minimising its visual impact.

It is important that road verges and surrounds are rehabilitated following road construction to minimise erosion and allow natural regeneration. This will mitigate long term visual impacts of road works.

Black Range Road is the least preferred option. This route is located closer to rural residential area that are generally more sensitive to changes in their environment.

6.7 Recommendations

Vegetation

It is recommended that Taurus Energy:

- Avoid locating turbines in areas of native vegetation, and minimise the removal of native vegetation for turbine bases and access roads.

Localised landscape treatments can assist greatly in reducing the visual impact of the wind farms from specific view points, particularly around houses. Placing vegetation carefully can allow key views from a home while screening less desirable views and mitigate the impact of shadow flicker. For example, some homes along Black Range Road could retain the key view shed to the south but screen views to the west.

It is recommended that Taurus Energy:

- Make provision for landscaping material to landholders where the visual impact of the wind farm is high to screen views of the wind farm from houses or outdoor entertaining areas around the site.

Tower colour

The turbine towers will be viewed predominantly from below as the ridge is significantly higher than the surrounding land. This means that it is relatively easy to select colours to reduce the colour contrast to the skyline and reduce the visual impact of the towers as much as possible.

It is recommended that Taurus Energy:

- Colour towers light off white/grey to help reduce visual impact of the towers.

Access Road

It is recommended that Taurus Energy:

- Access the site by provided by Payne's Road. Black Range Road should be avoided as residences are very sensitive to changes to the existing scenic quality of the area.

Substation

It is recommended that Taurus Energy:

- Locate the substation to minimise the visual impact from roads and surrounding properties.
- Use planting around the substation to screen the substation from the surrounding landscape. Planting should utilise species of the surrounding vegetation community.
- Colour structures grey to blend into the surrounding landscape and surrounding vegetation.

7 Conclusion

The visual assessment involves an evaluation of potential visual impacts assessed by the degree of change in the landscape as a consequence of the introduction of the wind farm and the visual impact on users around the site. The assessment determines the visual contrast of the wind towers, powerlines, and other associated infrastructure to the surrounding landscape.

The assessment of the contrast of the wind farm to the existing landscape character types found that there were no areas where the wind farm will create an unacceptable contrast to the landscape as the landscape is typical of a modified farming landscape. It is a landscape that is typical of the farming landscape that has evolved through many years of primary production along the western slopes of the Great Dividing Range. The area is bisected by the strong built visual form of the Hume Highway, and there are other sometimes large elements in the landscape that indicate the extent of landscape modification in the region. Lake Burrinjuck is a large body of water located to the south of the wind farm site and represents one of the few significant landscape elements in the region.

In relation to the visual impact on users in the area, the summary table below outlines the level of visual impact from various view points and areas surrounding the proposal.

Table 6: Summary of Visual Impacts

Viewpoint/ Area	Level of Visual Impact	Contributing Factors
Type A - Country Towns		
Area 1: Yass	Low visual impact	- Views from Yass from 15 kilometres from the site and the towers are difficult to perceive. - The wind farm will be a small element on the landscape. - The built form of Yass reduces the visual contrast of the wind farm.
Area 2: Bowning	Moderate visual impact	- Bowning is located approximately 8 kilometres from the site. - Some of the views from Bowning are open and the wind farm will be quite visible. - Views to the site are across the built form of the Hume Highway which reduces the visual contrast of the wind farm to the landscape.
Area 3: Bookham	Low to moderate visual impact	- Views of the wind farm are limited by the mature trees through the town. - The landscape character of the town is dominated by the built form of the Hume Highway. - The limited views reduces the visual impact of the wind farm.
Area 4: Goondah	Low visual impact	There will be limited views of the wind farm from Goondah.
Type B – Transport Corridors		
Area 5: Hume Highway	Low visual impact	- The built form of the highway dominates the landscape character. - The surrounding landscape is a typical of much of the landscape along the Hume Highway. - The built form of the wind farm will not be a significant contrast to the landscape due to the strong built form of the highway.

Viewpoint/ Area	Level of Visual Impact	Contributing Factors
Area 6: Southern Railway	Low visual impact	- Views are very limited from the railway. - The railway runs no closer than 8 kilometres from the wind farm. - Passengers are not likely to have any connection with the landscape.
Type C - Waterways		
Area 7: Lake Burrinjuck	Moderate to high visual impact	- The lake is a unique landscape element in the region. - Predominantly used for recreational purposes and users will be relatively sensitive to the surrounding landscape. - The Lake was constructed for the purpose of electricity production and has a functional link to the wind farm. - The wind farm will sit high above the Lake and will not be in the normal field of view of users of the Lake.
Type D – Agricultural Land		
Area 8: Black Range East	Moderate to high visual impact	- Views to the site are open from houses and roads. - The landscape has a pleasant rural character along Black Range and Common Roads. The highway diminishes the landscape character in the north of the area. - The wind farm will have an impact on the landscape character but as a modified rural landscape, the contrast should be acceptable. - Rural residential land holders in the area are sensitive to changes in the landscape character as they have moved to the area for its scenic appeal.
Area 9: Black Range South	Moderate to high visual impact	- The area has a feeling of remoteness with few built elements tree lined roads - Beyond road verges, the landscape is predominantly a modified farming landscape with only scattered remnant vegetation - The wind farm will create a contrast to the existing landscape, but the landscape should be able to absorb the change - There are a number of rural residential owners who will have views of the wind farm and will be quite sensitive to changes in the landscape.
Area 10: Black Range West	Moderate to high visual impact	- This area consists of large working properties and the cleared landscape reflects the primary production nature of the landscape. - There are a number of houses with views to the wind farm from within 4 kilometres.
Area 11: Black Range North	Low to moderate visual impact	- The landscape is highly modified by primary production - Views to the wind farm include the strong built form of the highway - The contrast of the wind farm to the landscape is not significant - Few houses have clear views to the wind farm

Viewpoint/ Area	Level of Visual Impact	Contributing Factors
Area 12: South of Lake Burrinjuck	Low visual impact	- The landscape is open rural land. - There are clear views to the wind farm across the open landscape, but few residences in the area. - Views to the wind farm will be from 13 to 15 kilometres.
Area 13: South of Yass	Moderate visual impact	- The landscape is open rural land. - There are clear views to the wind farm across the open landscape, but few residences in the area. - Views to the wind farm will be from as close as 5 kilometres.
Area 14: East of Yass	Moderate visual impact	- This area has a number of rural residential land holders who are assessed to be sensitive to changes in the landscape. - The distance to the wind farm significantly reduces its visual impact. - The landscape is a modified rural landscape. - The built elements of the highway and Yass service centre are nearby. - The wind farm will create a contrast with the existing landscape but this will be an acceptable change from this location.
Area 15: North of Bowning	Low visual impact	- There are limited views of the wind farm from this location. - The closest views to the wind farm will be approximately 8 kilometres. - The landscape is heavily modified by its agricultural land use and other built elements on and around the site. The wind farm will be an acceptable change to the landscape character.
Area 16: Mylora	Moderate visual impact	- Views from this area are limited to houses along the highway. - The highway is an existing dominant built element in the landscape and reduces the visual impact of the wind farm. - There are some houses with views from greater than 9 kilometres.
Area 17: Childowla	Low visual impact	- Views from this area are limited to houses along the highway. - The highway creates a strong built element in the landscape and reduces the visual impact of the wind farm. - There are some houses with views from greater than 12 kilometres.
Type E – Ranges and Hills		
Area 18: Black Range	Low to moderate visual impact	- The landscape is heavily modified by its agricultural land use and other built elements on and around the site. The wind farm will be an acceptable change to the landscape character of Black Range. - Views to the wind farm will be by landholders working on their properties. The wind farm will be viewed occasionally while undertaking other activities.

Viewpoint/ Area	Level of Visual Impact	Contributing Factors
Area 19: Mount Bowning	Low visual impact	• The landscape character will not be unduly impacted by the wind farm • There are no houses that will view the wind farm from this location
Area 20: Other Ranges and Hills	Low visual impact	• The landscape character will not be unduly impacted by the wind farm • There are no houses that will view the wind farm from this location

The highest visual impact will be on the properties surrounding the site including along Black Range Road, Graces Flat Road and houses aligning the road to the Burrinjuck Dam. Taurus Energy also agreed to remove the option of placing turbines on the eastern ridge of Black Range which will reduce the visual impact of the wind farm from east of the site.

There will be a visual impact from other factors such as shadow flicker, substation and control facilities building and access road. Some of these visual impacts can be ameliorated by the use of vegetation around homes to screen off views of the site and Taurus Energy can assist with this matter.

The reality of wind farms is that structures of this size cannot be hidden and the requirements of wind production siting mean that they will not function if hidden. Consequently there will always be visual impacts associated with wind farms. This is not always a negative impact though, as some find the visual aesthetic of wind farms appealing.

As David Suzuki (2005) notes:

“With the growing urgency of climate change, we cannot have it both ways. We cannot shout from the rooftops about the dangers of global warming and then turn around and shout even louder about the “dangers” of windmills. Climate change is one of the greatest challenges humanity will face this century. It cannot be solved through good intentions.”

Balancing the local visual concerns of the community and the global benefits of clean energy production can be difficult. The more positive aspects of the development of a clean energy source and the positive visual landmark that wind farms can provide should not be overlooked.

8 Photomontages

The following photomontages have been taken from 11 sites around the wind farm.

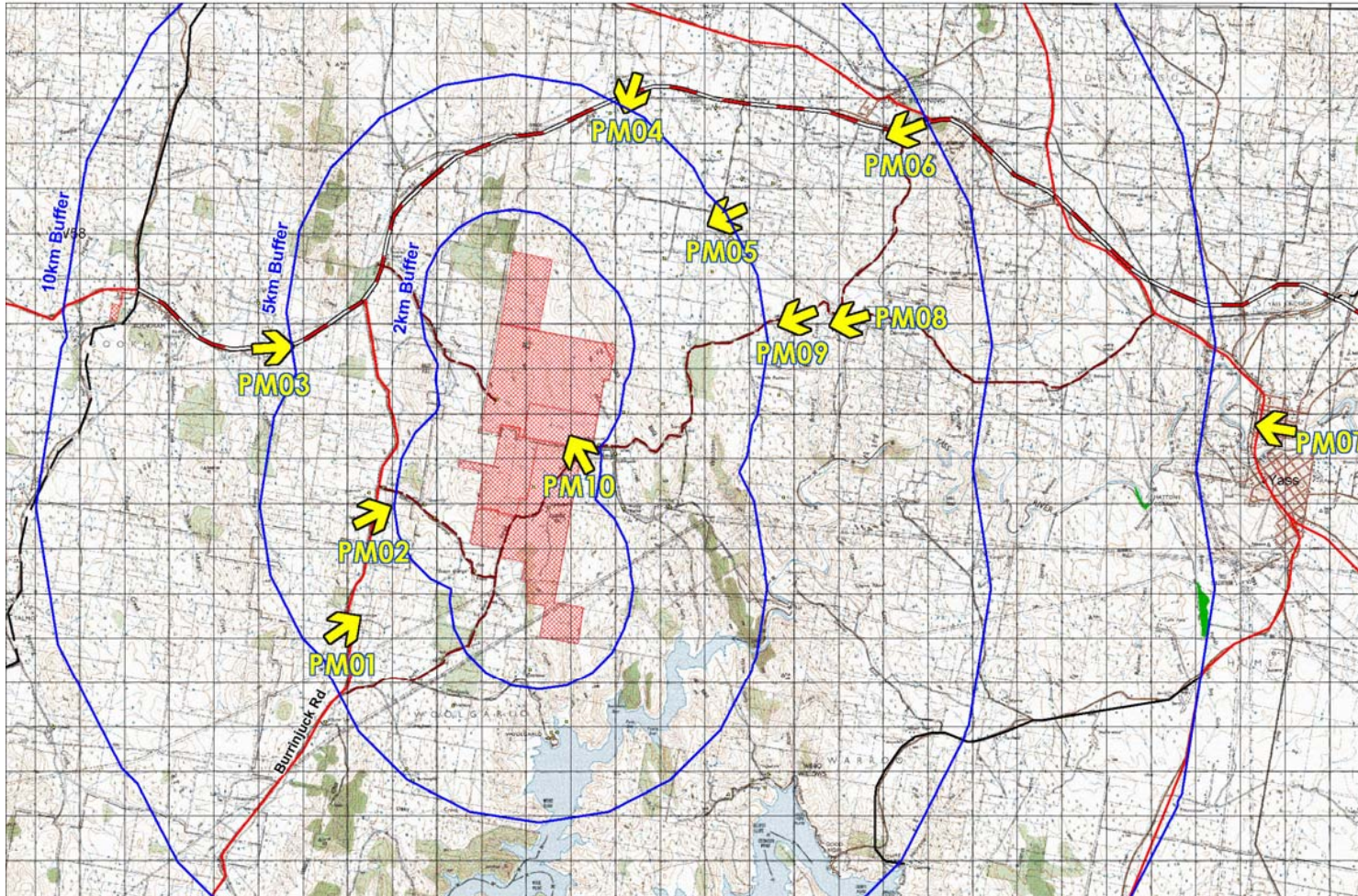


Figure 7 Map of photomontage locations



Photo PM01: Photomontage from “Fairview” on the road to Lake Burrinjuck



Photo PM02: Photomontage from “Cooinda” on the road to Lake Burrinjuck



Photo PM03: Photomontage from the Hume Highway near Bookham



Photo PM04: Photomontage from the Hume Highway near “Crisp Galleries”



Photo PM05: Photomontage from Graces Flat Road



Photo PM06: Photomontage from the Hume Highway near Mount Bowning



Photo PM07: Photomontage from Yass



Photo PM08: Photomontage from the Black Range Road near the junction with Common Road



Photo PM09: Photomontage from Black Range Road approximately 5 kilometres to the site



Photo PM10: Photomontage from Black Range Road near “Springvale”

9 Authors

This report was co-written by Philip Hutchinson and Kate Waldren. The approach was reviewed by Jerry De Gryse, who was able to provide valuable input on methodology and technical aspects relating to wind farm visual impact,

Kate Waldren

Bachelor of Landscape Architecture, University of Canberra & University of Guelph Canada;

Graduate Diploma in Environmental Management and Restoration, Charles Sturt University, Bathurst

Kate is a Director of Scenic Landscape Architecture. Kate Waldren has over nine years of experience in a wide range of landscape architecture, environmental and recreational planning projects and visual assessments. She has completed many Visual Assessments ranging from the assessment of major arterial roads within the ACT and Canberra through to developments within natural areas and national parks.

Kate has developed an inventory procedure to assess the visual impact by identifying existing landform, vegetation, built structures, colour and landscape character. This enables an objective approach to visual assessment by determining the level of contrast between the development and surrounding landscape.

Philip Hutchinson

Masters of Landscape Architecture, University of Canberra;
Graduate Diploma of Resource Management and the Environment, Australian National University;
Bachelor of Science University of Tasmania

Philip is based in Canberra and has been working as a landscape architect since 2004. He has a Masters of Landscape Architecture from the University of Canberra, and has undertaken a range of planning and design projects. Previous visual impact assessments include the visual assessment of a proposed large retardation basin located in Canberra.

Prior to that, Philip was worked in environmental policy and environmental program management in the Department of Environment and Heritage.

Jerry de Gryse

Bachelor of Science (Natural Resources), University of Michigan 1974;
Bachelor of Landscape Architecture (with Distinction), University of Minnesota 1979;
Masters of Environmental Studies, University of Melbourne 1985

Jerry grew up and did his professional training in the United States migrating to Tasmania in 1984.

Since then he has worked on approximately 150 projects across the profession of landscape architecture doing landscape design, land management, environmental planning, environmental impact assessment and most recently interpretation - working at scales from "square kilometres to square metres".

Jerry has been a guest lecturer at a number of overseas and Australian universities. In 2001 he was the HWS Cleveland Visiting Professor of Landscape Architecture at the University of Minnesota. In 1999, Jerry was named by his Australian peers as one of the most influential landscape architects of the 1990s.

10 Shadow Flicker Results

The results of the shadow flicker analysis are listed in tabular form below. Location points used are listed as "G" numbers. The only houses impacted are named.

Location	Number of hours of Shadow Flicker per annum	Comments
G1	0	
G2	0	
G2a	0	
G3	0	
G4	0	
G4a	0	
G4b - Proposed house near "Ferndale"	29	See below
G5	0	
G6	0	
G7	0	
G8	0	
G9	0	
G10 - "Linfield"	26	See below
G11	0	
G12	0	
G13	0	
G14	0	
G15	0	
G16	0	
G17	0	
G18	0	
G19	0	
G20	0	
G21	0	
G22	0	
G23	0	
G24	0	
G25	0	
G26	0	
G27	0	
G28	0	
G29	0	
G30	0	
G31	0	
G32	0	
G33	0	
G34	0	
G35	0	
G36	0	
G37	0	
G38	0	
G39	0	
G40	0	
G41	0	

G4b – Proposed house near “Ferndale”		
Day	Hours per year	
	Start time	End time
29 Apr		
30 Apr		
1 May		
2 May		
3 May		
4 May		
5 May		
6 May		
7 May		
8 May		
9 May		
10 May		
11 May		
12 May		
13 May		
14 May		
15 May		
16 May		
17 May		
18 May		
19 May		
20 May		
21 May	14.40	15:00
22 May	14.40	15:00
23 May	14.40	15:00
24 May	14.40	15:00
25 May	14.40	15:00
26 May	14.40	15:00
27 May	14.40	15:00
28 May	14.40	15:00
29 May	14.40	15.10
30 May	14.40	15.10
31 May	14.40	15.10
1 Jun	14.40	15.10
2 Jun	14.40	15.10
3 Jun	14.40	15.10
4 Jun	14.40	15.10
5 Jun	14.40	15.10
6 Jun	14.40	15.10
7 Jun	14.40	15.10
8 Jun	14.40	15.10
9 Jun	14.40	15.10
10 Jun	14.40	15.10
11 Jun	14.40	15.10
12 Jun	14.40	15.10
13 Jun	14.40	15.10
14 Jun	14.40	15.10
15 Jun	14.40	15.10

[illegible]

16 Jun	14.40	15.10
17 Jun	14.40	15.10
18 Jun	14.40	15.10
19 Jun	14.40	15.10
20 Jun	14.40	15.10
21 Jun	14.40	15.10
22 Jun	14.40	15.10
23 Jun	14.40	15.10
24 Jun	14.40	15.10
25 Jun	14.40	15.10
26 Jun	14.40	15.10
27 Jun	14.40	15.10
28 Jun	14.40	15.10
29 Jun	14.40	15.10
30 Jun	14.40	15.10
1 Jul	14.40	15.10
2 Jul	14.40	15.10
3 Jul	14.40	15.10
4 Jul	14.40	15.10
5 Jul	14.40	15.10
6 Jul	14.40	15.10
7 Jul	14.40	15.10
8 Jul	14.40	15.10
9 Jul	14.40	15.10
10 Jul	14.40	15.10
11 Jul	14.40	15.10
12 Jul	14.40	15.10
13 Jul	14.40	15.10
14 Jul	14.40	15.10
15 Jul	14.50	15.10
16 Jul	14.50	15.10
17 Jul	14.50	15.10
18 Jul	14.50	15.10
19 Jul	14.50	15.10
20 Jul	14.50	15.10
21 Jul	14.50	15.10
22 Jul	14.50	15.10
23 Jul	14.50	15.10
24 Jul		
25 Jul		
26 Jul		
27 Jul		
28 Jul		
29 Jul		
30 Jul		
31 Jul		
1 Aug		
2 Aug		
3 Aug		
4 Aug		
5 Aug		
6 Aug		
7 Aug		
8 Aug		

[illegible][illegible]

9 Aug		
10 Aug		
11 Aug		
12 Aug		
13 Aug		
14 Aug		

7.30	
7.30	
7.30	
7.30	
7.40	
7.40	

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