



Biala Wind Farm  
Landscape Character &  
Visual Impact Assessment

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# BIALA WIND FARM LANDSCAPE CHARACTER AND VISUAL IMPACT ASSESSMENT

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## EXECUTIVE SUMMARY

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### E1- INTRODUCTION

Newtricity is proposing to construct the Biala Wind Farm (BWF or the Proposal) comprising up to 31 wind turbine generators (WTGs), transmission line, an electricity substation and ancillary infrastructure in the project area. The key purpose of this Landscape Character and Visual Impact Assessment (LCVIA) is to assess the visual and landscape character impacts of the Proposal, having regard to Part 4 of the Environmental Planning and Assessment Act 1979 (EP&A Act) and the Secretary's Environmental Assessment Requirements (SEARs) dated 19 May 2015.

### E2 - THE PROPOSAL

The Proposal will consist of the following key elements:

- construction of up to 31 WTGs
- construction of a central substation and other ancillary equipment
- construction of on-site operations and maintenance building and equipment storage facilities
- establishment of temporary concrete batching facilities to supply concrete for turbine footings and substation construction works
- construction of access roads for each turbine and other on-site structures and upgrades to existing roads/tracks as required.
- construction of up to 3 wind monitoring masts across the project area.

### E3 - THE PROJECT AREA

The project area is located in the Southern Tablelands region of New South Wales, approximately 8km to the east of the township of Biala and approximately 14.5km to the south west of Crookwell. The Proposal area covers a total area of approximately 1,936 hectares and is located within the Upper Lachlan Local Government Area (LGA). Currently the project area spans over 37 rural agricultural lots which form part of four separate privately owned land holdings.

### E4 - LANDSCAPE CHARACTER IMPACTS

The landscape character of the study area is found to be typical of the Southern Tablelands with undulating hillsides, large swathes of native vegetation, creek lines, ridges and a low density of rural residential development. Five landscape character zones have been established for the study:

- Rural Roads
- Main Roads
- Undulating Grassland
- Wooded Areas
- Rural Development

Based on a six point scale from negligible to high impact, the overall impact of the Proposal on landscape character is rated as:

- low across one character zone - rural roads
- moderate/low across one zone - wooded areas
- moderate across two zones - main roads and undulating grassland

The BWF may alter some of the distinguishable landscape characteristics of zones rated as moderate and moderate/high, although all zones have the capability to absorb change to some extent. The prominent height of the turbines will be the most noticeable element of the Proposal, standing out in a landscape with very few tall structures.

## E5 - VISUAL IMPACT ASSESSMENT

Ten key public and private receptor sites with the potential to be visually impacted by some element of the Proposal, were identified and selected for further analysis.

The visual impacts of the Proposal on the studied viewpoints are found to range from low to moderate/high. Overall this LCVIA concludes that the BWF has a relatively limited visual catchment due to:

- the relatively low density of residential viewer locations within the study area - the dwellings that have received the highest visual impact rating are often located on elevated ground with panoramic views over the surrounding landscape.
- low density and lightly used public viewpoints including roads and limited areas of public open space
- surrounding topography which limits views of the project area, blocking many views of the turbine clusters from distances of over 3km
- dense stands of tree planting, windbreaks and garden plantings (associated with individual properties) that block or filter views towards the Proposal

Public viewpoints are limited to the minor local road network and two main thoroughfares that traverses the study area (Grabben Gullen and Biala Gurrundah Road). The BWF will not impact the character of Grabben Gullen village, where views towards the wind farm are blocked by tree cover and landform.

Ancillary structures such as the access roads and temporary concrete batching plant are unlikely to result in any significant additional visual impact for surrounding residential or public view locations. This is due to their temporary nature and small scale.

If required, night time obstacle lighting would have the potential to be visible from surrounding view locations, as well as areas beyond the 12km viewshed. The level of visual impact would, however, be low and diminish when viewed from more distant view locations.

## E6 - CUMULATIVE IMPACT

There would be opportunities for combined views of BWF, Gullen Range and Gunning wind farms from a limited number of surrounding residential dwellings and local roads. Visibility toward these wind farms is restricted in the majority of locations within the study area by tree cover and undulating landform.

Overall it is determined that the BWF is unlikely to result in any significant combined or sequential cumulative visual impacts resulting from associated views toward other operational wind farm developments within the study area. This is due to the distance between impacted viewpoints and additional operational wind farms. The BWF may slightly increase the perceived density of wind farm development within this section of the Southern Tablelands. Any future developments should consider the BWF within any cumulative impact assessment.

## E6 - MITIGATION

Although some mitigation measures are considered appropriate to minimise the visual effects of the Proposal, it has been acknowledged that the degree to which the wind turbines would be visually mitigated is limited by their scale and position within the landscape relative to surrounding view locations. The extent and nature of appropriate mitigation measures would be subject to consultation and agreement with individual property owners.



1

Introduction

## 1. INTRODUCTION

### 1.1 PURPOSE OF THE REPORT

The key purpose of this Landscape Character and Visual Impact Assessment (LCVIA) is to assess the visual and landscape character impacts of the proposed Biala Wind Farm (BWF or the Proposal), having regard to Part 4 of the Environmental Planning and Assessment Act 1979 (EP&A Act). This specialist study will form part of the Environmental Impact Statement (EIS) for the Proposal.

This LCVIA addresses and responds to the Secretary's Environment Assessment Requirements (SEARs) dated 19.05.15 for the assessment of potential landscape and visual impacts. Table 1 outlines the relevant LCVIA requirements of the SEARs and the corresponding section of this report in which they are addressed.

| SEARs                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | Report Reference                                                                                                                                                                                                        |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Provide a comprehensive assessment of the landscape character and values and any scenic or significant vistas of the area potentially affected by the project taking into account cumulative impacts from surrounding proposed, approved or operational wind farms in the locality, including an assessment of the significance of landscape values and character in a local and regional context. This should describe community and stakeholder values of the local and regional visual amenity and quality, and perceptions of the project based on surveys and consultation*. | Part 3 - Landscape Character Assessment<br>Part 6 - Mitigation Recommendations<br>*Community consultation has not been carried out by the authors of this report. Refer to the EIS for further details on consultation. |
| Assess the impact of shadow "flicker", blade "glint" and night lighting from the wind farm.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | Refer to separate specialist study                                                                                                                                                                                      |
| Identify the zone of visual influence of the wind farm including consideration to night lighting (no less than 10km) and assess the visual impact of all project components on this landscape.                                                                                                                                                                                                                                                                                                                                                                                    | Part 4 - Visual Impact Assessment                                                                                                                                                                                       |
| Include an assessment of any visual impacts from transmission line infrastructure including cumulative impacts.                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | Will be assessed separately under a Part 5 REF.                                                                                                                                                                         |
| Include photomontages of the project taken from potentially affected dwellings and in particular from all non-host Dwellings within 2km of a proposed wind turbine (including approved but not yet developed Dwellings or subdivisions with residential rights), settlements and significant public view points, and provide a clear description of proposed visual amenity mitigation and management measures for both the wind farm and the transmission line*. The photomontages must include representative views of turbine night lighting if proposed.                      | Part 6 - Mitigation Recommendations<br>Part 8 - Photomontages<br>*Note the transmission line will be assessed as part of a separate EIS under part 5 of the EP & A Act.                                                 |
| Provide an assessment of the feasibility, effectiveness and reliability of proposed mitigation measures and any residual impacts after these measures have been implemented.                                                                                                                                                                                                                                                                                                                                                                                                      | Part 6 - Mitigation Recommendations                                                                                                                                                                                     |
| Include consideration of alternative transmission line pole designs to minimise visual impact.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | The transmission line will be assessed as part of a separate EIS under part 5 of the EP & A Act.                                                                                                                        |

Table 01 - SEAR Requirements

## 1.2 STUDY CONTEXT

This LCVIA aims to ensure that all possible effects of change and development in the landscape, views and visual amenity are taken into account. It is concerned with how the surroundings of individuals or groups of people may be specifically affected by such changes, both quantitatively and qualitatively. Judgement as to the significance of the effects is arrived at by a process of reasoning, based upon analysis of the baseline conditions, identification of receptors and assessment of their sensitivity, as well as the magnitude and nature of the changes that may result from any development.

This assessment is an independent report and is based on a professional analysis of the landscape and the Proposal at the time of writing. The current and potential future viewers (visual receptors) themselves have not been consulted about their perceptions. The analysis and conclusions are therefore based solely on a professional assessment of the anticipated impacts, based on a best practice methodology.

## 1.3 METHODOLOGY

An LCVIA is by its nature not an exact science and consequently is subject to varied methodologies both in Australia and overseas. Potentially subjective assessment material and differences of opinion about how to best assess visual characteristics, qualities, degrees of alteration and viewer sensitivity often arise. As a consequence, and as identified by the NSW Land and Environment Court, the key to a robust process is to explain clearly the criteria upon which an assessment is made.

### 1.3.1 Wind Farms and Landscape Values National Assessment Framework - NAF (June 2007)

Within Australia, a national framework exists in the form of the NAF, published by the Australian Wind Energy Association and Australian Council of National Trust. Key components of the National Wind farm Development Guidelines are shown in table 02.

### 1.3.2 Draft NSW Planning Guidelines Wind farms (December 2011)

The NSW Department of Planning and Infrastructure issued the guidelines to provide guidance and information for wind farm applicants, consent authorities as well as communities and stakeholder groups. The draft guidelines set out key considerations for the initial assessment of landscape and visual impact for residential dwellings within a 2km radius of proposed wind turbines (through the Gateway Process and Site Compatibility Certification). The draft guidelines recommend that photomontages are prepared for properties within 2km of a proposed turbine where written consent from the land owner is not secured.

This study is broadly consistent with the NAF methodology with additional regard for several best practice guidelines, including the:

- National Wind farm Development Guidelines (Public Consultation Draft V2.4 July 2010)
- Draft NSW Planning Guidelines Wind farms (Department of Planning and Infrastructure, December 2011)
- Auswind Best Practice Guidelines (December 2006)
- Environmental Impact Assessment Practice Note: Guidelines for Landscape Character and Visual Impact Assessment (RMS March 2013)

The authors of this report have compiled a set of assessment criteria to form a robust and thorough assessment methodology for landscape and visual impacts. For more detail refer to the individual Methodology section within Part 3 and Part 4 of this report.

| Wind farms and Landscape Values National Assessment Framework Methodology                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | Report Reference                                                                                                                                                                                                                             |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Step 1 Assess the Landscape Values<br>1A Preliminary Landscape Assessment <ul style="list-style-type: none"> <li>• 1A.1 Desktop Review</li> <li>• 1A.2 Seek information from Local Authority</li> <li>• 1A.3 Identify potential community and stakeholder interests</li> <li>• 1A.4 Site survey</li> <li>• 1A.5 Preliminary assessment of landscape values</li> </ul> 1B Full Landscape Assessment <ul style="list-style-type: none"> <li>• 1B.1 Define the study area for assessment, including the zone of visual influence</li> <li>• 1B.2 Landscape Character Analysis</li> <li>• 1B.3 Natural and cultural values analysis</li> <li>• *1B.4 Involve communities and stakeholders in identifying landscape values</li> <li>• 1B.5 Document values and analyse significance</li> </ul> | Part 2 - the Proposal<br>Part 3 - Landscape Character Assessment<br><br>*Community consultation has not been carried out by the authors of this report. Refer to the Environment Impact Statement (EIS) for further details on consultation. |
| Step 2 Describe and Model the Wind farm in the Landscape <ul style="list-style-type: none"> <li>• 2.1 Describe the development</li> <li>• 2.2 Model the development</li> <li>• 2.3 Prepare a visual assessment report</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | Part 2 - the Proposal<br>Part 4 - Visual Impact Assessment                                                                                                                                                                                   |
| Step 3 Assess the Impacts of the Wind farm on Landscape Values <ul style="list-style-type: none"> <li>• 3.1 Seek community input to potential impacts</li> <li>• 3.2 Identify and describe impacts</li> <li>• 3.3 Identify potential cumulative impacts</li> <li>• 3.4 Identify other relevant factors</li> <li>• 3.5 Evaluate impacts</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                         | Part 3 - Landscape Character Assessment<br>Part 5 - Cumulative Impacts                                                                                                                                                                       |
| Step 4 Respond to Impacts <ul style="list-style-type: none"> <li>• 4.1 Changes to location or siting of the wind farm or ancillary infrastructure</li> <li>• 4.2 Layout and design considerations</li> <li>• 4.3 Minor changes and mitigation measures</li> <li>• 4.4 Recommend changes to the development</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | Part 3 - Landscape Character Assessment                                                                                                                                                                                                      |

Table 02 - NAF Methodology

## 1.4 REPORT STRUCTURE

The report is structured into eight parts.

Part 1 - Introduction - An introduction section that described the planning and methodology context for the study.

Part 2 - The Proposal - A description of the proposed development including site layout, turbine specification and ancillary facilities.

Part 3 - Landscape Character Assessment - An overview of the existing landscape character of the study area including land use and vegetation. The study area is then described under distinct landscape character zones before the impact of the Proposal on each is assessed.

Part 4 - Visual Impact Assessment - An overview of the existing visual environment of the study area and the subsequent visual impacts of the Proposal. Selected viewpoints are assessed on a range of qualitative and quantitative criteria.

Part 5 - Cumulative Impact Assessment - A description of the potential additional impacts on landscape character and visual impact from nearby current and future similar development.

Part 6 - Mitigation Recommendations - A discussion as to the means by which the visual impacts identified can be reduced or offset.

Part 7 - Conclusion - Conclusions are drawn on the overall impact of the Proposal within the study area.

Part 8 - Photomontages - Spatially accurate photomontages of the Proposal taken from varied locations throughout the study area.



# 2

THE PROPOSAL

## 2. THE PROPOSAL

### 2.1 LOCATION

The project area is located in the Southern Tablelands region of New South Wales, approximately 8km to the east of the township of Biala and approximately 14.5km to the south west of Crookwell (refer Figure 1A and 1B). The project area covers a total of approximately 1,936 hectares and is located within the Upper Lachlan Local Government Area (LGA). Currently the Project spans over 37 rural agricultural lots which form part of four separate privately owned land holdings (involved landholders).



Figure 1A - Site context

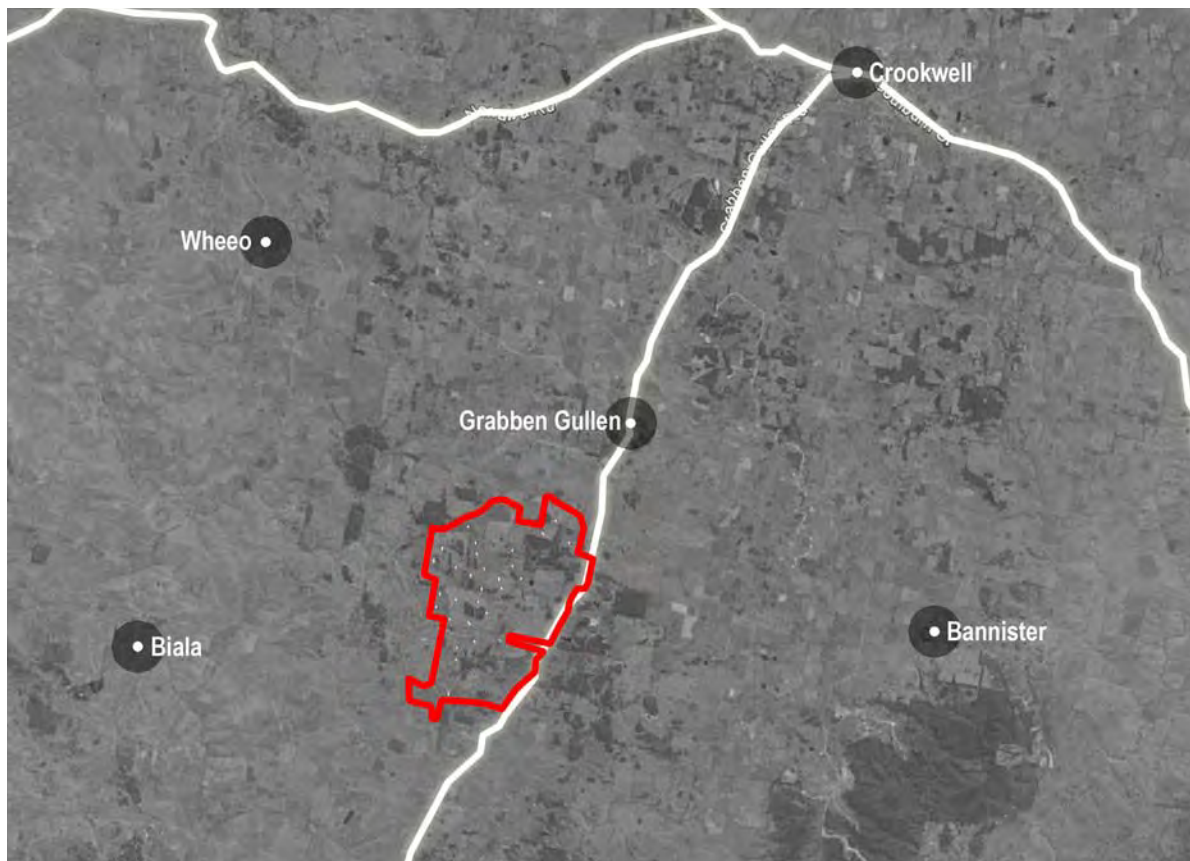


Figure 1B- Site location

— Project area

## 2.2 PROPOSAL

Newtricity is proposing to construct the BWF comprising up to 31 wind turbine generators (WTGs), an electricity substation and ancillary infrastructure in the project area.

Elements of the Proposal relevant to this study include (refer Figure 03):

- construction of up to 31 WTGs
- construction of a central substation and other ancillary equipment
- construction of on-site operations and maintenance building equipment storage facilities
- construction of temporary on-site office and storage facilities
- establishment of temporary concrete batching facilities to supply concrete for turbine footings and substation construction works
- construction of access roads for each turbine and other on-site structures and upgrades to existing roads/tracks as required
- construction of monitoring masts for wind speed verification and monitoring during operation
- construction of up to 3 wind monitoring masts across the project

### 2.2.1 Wind Turbine Generators

Each WTG will consist of a tubular steel or concrete hybrid tower at a hub height of up to 110m. Three rotor blades are attached to the hub, which connects to the nacelle. The nacelle houses the gear box and generator. Each rotor blade will have a diameter of up to 150m, giving a maximum blade tip height of 185m (refer Figure 2A and 2B). All components will be painted a similar colour, within a white to light grey colour palette.

### 2.2.2 Wind Monitoring Masts

Up to 3 wind monitoring masts may be installed on-site, extending to between 60 and 100m in height. The wind monitoring masts would be of a guyed, narrow lattice or tubular steel design. The masts would be unlikely to create a significant visual impact due to their slight structure. They have not been considered further in this assessment.

### 2.2.3 On-site access roads

Access roads would be constructed to provide access to turbine locations across the project area during construction and operation. During construction the majority of access roads would be approximately 8m wide to allow for vehicle manoeuvring but may be increased up to 10m wide to allow for crane access if necessary.

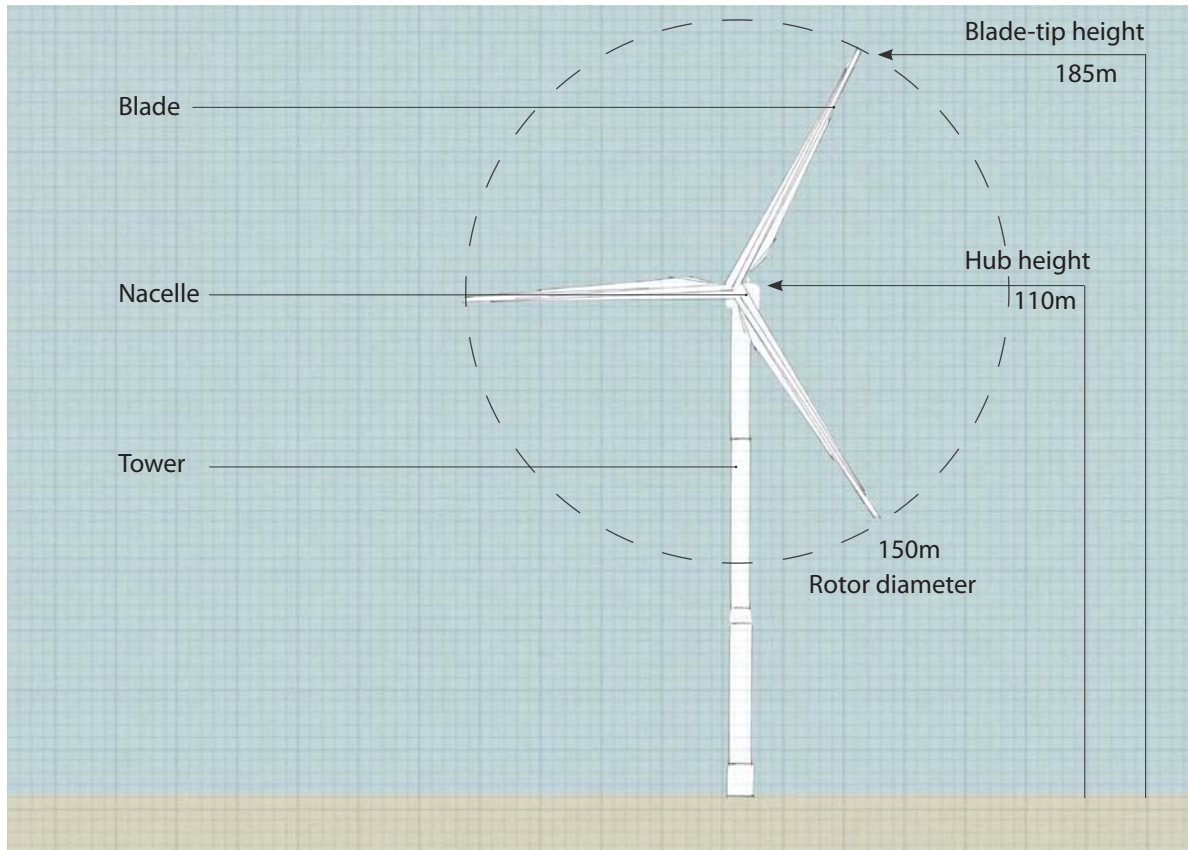


Figure 2A - WTG Specifications

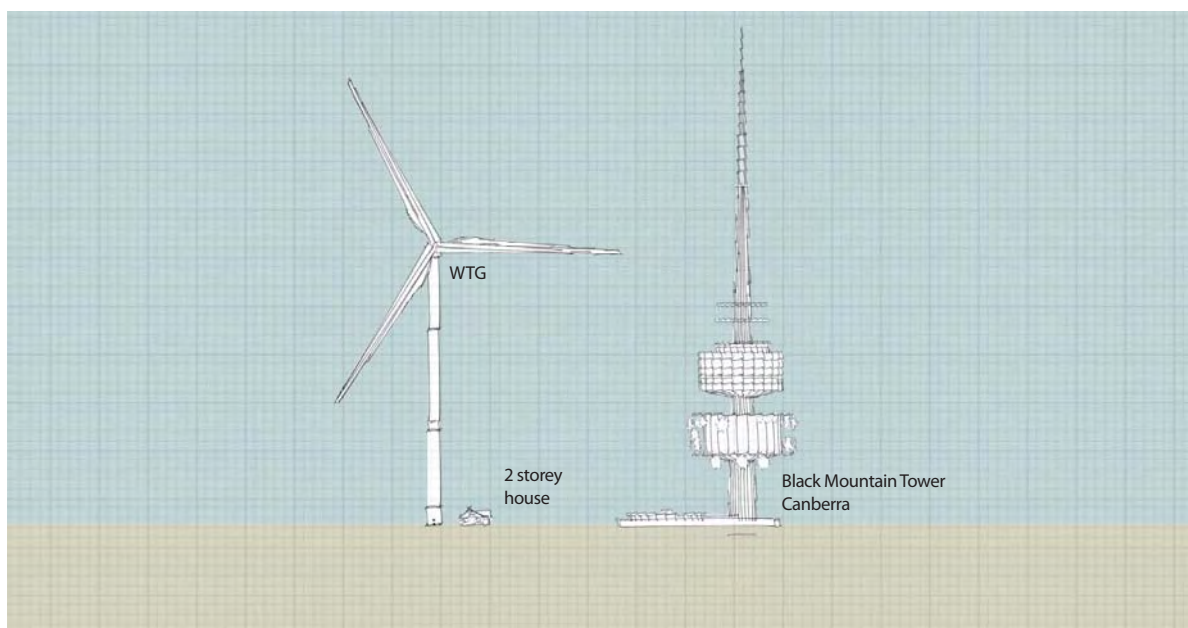


Figure 2B - WTG height comparison

#### 2.2.4 Electrical connection

An electrical substation compound is proposed on-site with approximate dimensions of 95m by 100m. The electrical substation will house a series of transformers, switch gear and ancillary equipment for transformation and distribution of energy.

The majority of electrical cabling works, including the installation of control cables linking the turbines to the substation would be installed underground within the project area, however there may be instances where sections of the network are required to be located above ground due to topographical or environmental constraints. This will be confirmed during the detailed design phase.

A 132kV overhead transmission line connection is proposed to connect the on-site substation to the existing Essential Energy 132kV overhead transmission line network, located 22km south of the project area. At the time of preparing this report, the alignment of the transmission line had not been finalised, however a corridor extending to the existing Essential Energy 132kV line has been identified based on preliminary investigation. The visual impacts of the transmission line will be assessed separately by way of a Review of Environmental Effects under Part 5 of the EP&A Act.

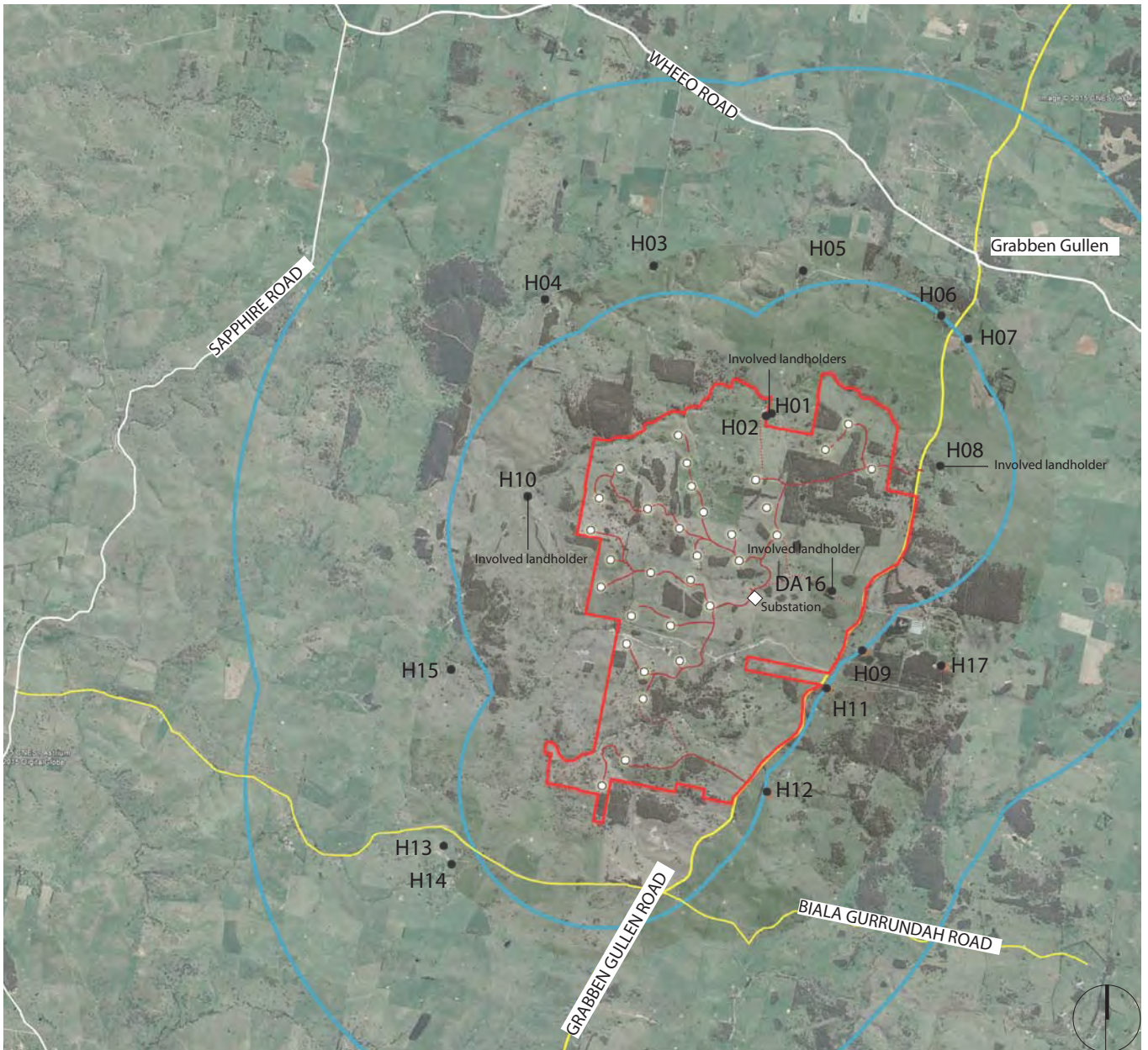


Figure 03 - Project components

-  Main Roads
-  Minor Roads
-  2 and 5km WTG offset
-  Project area
-  Dwelling
-  WTG
-  Access roads
-  Substation



3

LANDSCAPE CHARACTER  
ASSESSMENT

## 3.0 LANDSCAPE CHARACTER ASSESSMENT

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### 3.1 CHAPTER OVERVIEW

This section of the LCVIA provides an overview of the existing landscape character of the study area including land use, vegetation, built form and topography. The study area is then described under distinct landscape character zones before the impact of the Proposal on each is assessed.

### 3.2 STUDY AREA

The study area specific to the landscape character assessment comprises the land within the project area and the surrounding landscape up to 15km from this boundary.

#### 3.2.1 Topography

The landform and topography within and surrounding the project area is generally undulating and indicative of the Southern Tablelands. Broad and rounded crests and ridges grade into concave lower slopes and drainage lines. A broad ridgeline at approximately 900m elevation extends along the eastern boundary of the project area. The landform falls away either side of this ridge with the centre of the project area approximately 100m lower.

#### 3.2.2 Vegetation

A detailed survey of existing vegetation has been undertaken as part of the Ecology Impact Assessment prepared for ERM for the BWF and forms part of the Environmental Impact Statement (EIS). A summary will can be found within the EIS and detailed within the relevant EIS Appendix.

In general the landscape within the study area contains vegetation associated with woodland, riparian corridors, native grasslands and cleared land for pasture and agricultural crop cultivation. Stands of remnant woodland occur within the wider context of a modified landscape which continues to be managed through a variety of farming activities.

#### 3.2.3 Land Use

The majority of land use within the study area is agricultural with some areas of rural residential.

### 3.3 LANDSCAPE CHARACTER ASSESSMENT METHODOLOGY

To enable the assessment of impacts on landscape character, landscape character zones have been determined for the study area.

#### 3.3.1 Landscape Character Zones

Landscape character zones are defined as areas having a distinct, recognisable and consistent pattern of elements, be they natural (soil, vegetation, landform) and/or human built form, making one landscape different from another. The study area and surrounds have been assessed and five landscape character zones have been established (refer Figure 05):

|   |                      |
|---|----------------------|
| 1 | Rural Roads          |
| 2 | Main Roads           |
| 3 | Undulating grassland |
| 4 | Wooded areas         |
| 5 | Rural development    |

#### 3.3.2 Assessment

The overall impact rating of the Proposal on any given landscape character zone is based on themes of sensitivity and magnitude.

##### Sensitivity

The degree to which a particular landscape type can accommodate change arising from a development, without detrimental effects on its character. This includes factors such as:

- existing land use
- the pattern and scale of the landscape
- visual enclosure, openness of views and distribution of visual receptors
- the value placed on the landscape.

##### Magnitude

The magnitude of the effects of the development within the landscape. Consideration is given to existing built form in the landscape and how closely the development matches this in bulk, scale and form. Magnitude is a study of the scale or degree of change to the landscape resource, the nature of the effect and its duration including whether it is permanent or temporary.

##### Overall Impact Rating

The severity of these impacts are calculated using Table 03 - based on a combination of magnitude and sensitivity.

|             |            | MAGNITUDE       |                 |              |            |
|-------------|------------|-----------------|-----------------|--------------|------------|
|             |            | HIGH            | MODERATE        | LOW          | NEGLIGIBLE |
| SENSITIVITY | HIGH       | HIGH            | HIGH - MODERATE | MODERATE     | NEGLIGIBLE |
|             | MODERATE   | HIGH - MODERATE | MODERATE        | MODERATE/LOW | NEGLIGIBLE |
|             | LOW        | MODERATE        | MODERATE/LOW    | LOW          | NEGLIGIBLE |
|             | NEGLIGIBLE | NEGLIGIBLE      | NEGLIGIBLE      | NEGLIGIBLE   | NEGLIGIBLE |

Table 03: Landscape Character Impact Rating as a combination of Sensitivity and Magnitude.

Source: RMS Guidelines for Landscape Character and Visual Impact Assessment

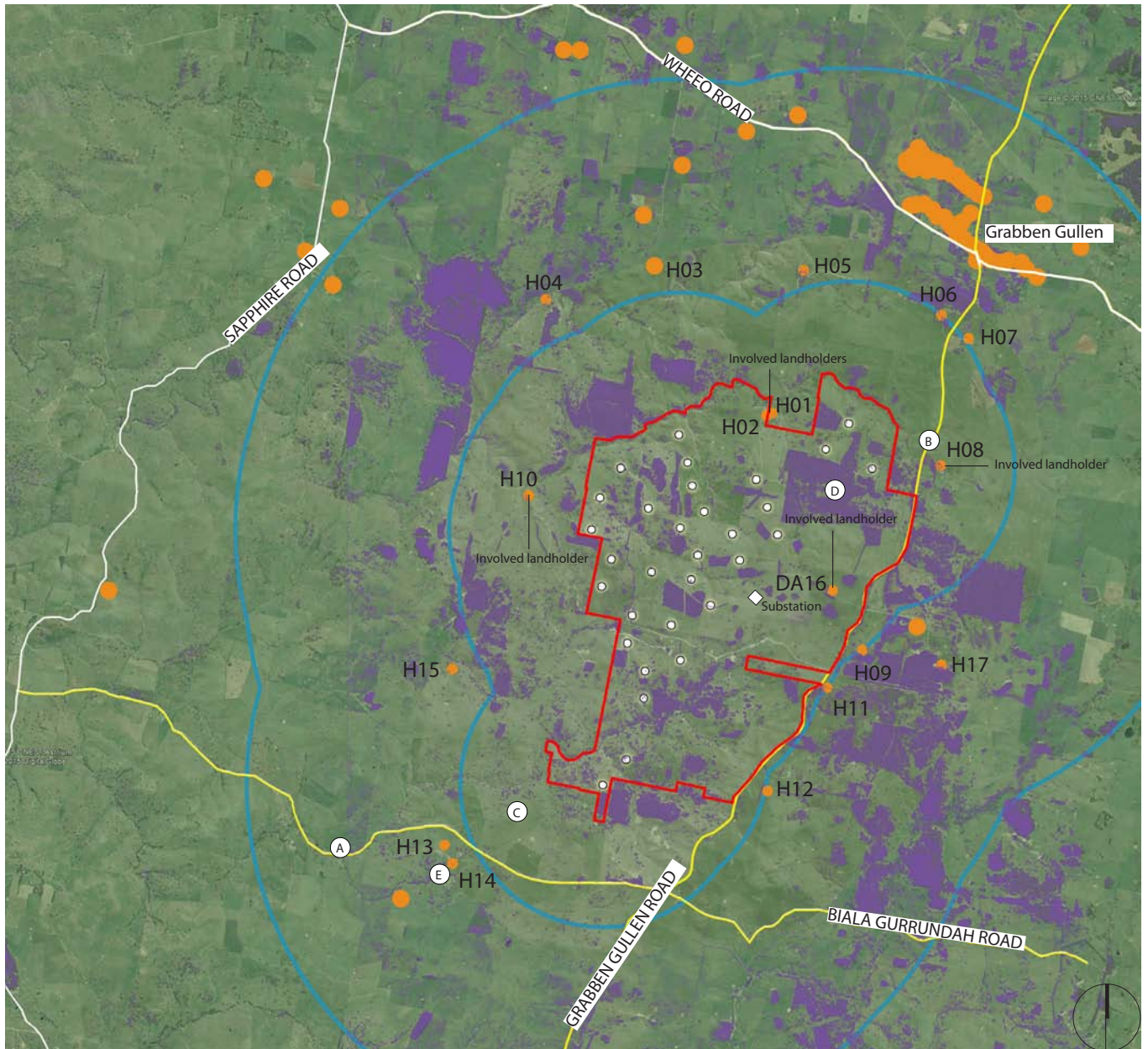
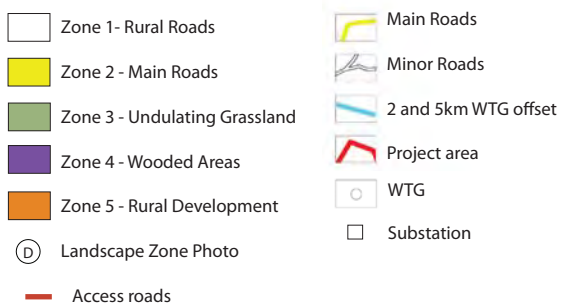


Figure 05 - Landscape Character Zones



LANDSCAPE CHARACTER ZONE 1 - RURAL ROADS



Photo A

| Element            | Description                                                                                                                                                              |
|--------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Topography         | The road carriageway traverses through a modified landscape of undulating landform                                                                                       |
| Hydrology          | Rainfall drainage varies, however in most situations drains from a central pitch in the road toward the road edge                                                        |
| Ecology/vegetation | Undisturbed native bushland is evident throughout the study area along the perimeter of the road corridor as well as swathes of native grasses and modified pasture land |
| Land use           | Transport Corridor                                                                                                                                                       |
| Built form         | Rural road infrastructure                                                                                                                                                |
| Spatial            | Varies between linear and enclosed with some views blocked by dense roadside vegetation. Other areas are open with extensive views either side of the road corridor      |

**DESCRIPTION**

Several lightly trafficked rural roads cross the study area, linking rural properties to the wider sealed road network. The quality of the road surfacing varies but is mostly unsealed and lined with banks or swales with no permanent kerb or gutter. The roads traverse areas of low lying grasses and areas enclosed by trees and shrubs. Where the roadside is clear of trees, far reaching views are available across the surrounding landscape.

**ASSESSMENT**

| Sensitivity                                                                                                                                                                                                                                                                                                                                                                                           | Magnitude                                                                                                                                                                                                                                                                                                |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| The roads are lightly trafficked and mainly used by local residents to access remote properties. These roads are often highly scenic, with extensive views over the surrounding landscape although only serve the local community and are not used as scenic drives. Receptors move through this landscape zone relatively quickly. The sensitivity of this landscape zone to change is rated as low. | The closest turbine of the BWF development is over 1.4km from a rural road corridor. The turbines will be visible from sections of the road where views are not blocked by vegetation but will not be visually dominant. The Proposal is described as having a low magnitude within this landscape zone. |

|                                           |     |
|-------------------------------------------|-----|
| Sensitivity                               | LOW |
| Magnitude                                 | LOW |
| Overall Landscape Character Impact Rating | LOW |

From Table 03, using a combination of sensitivity and magnitude ratings.

LANDSCAPE CHARACTER ZONE 2 - MAIN ROADS



Photo B

| Element            | Description                                                                                                                                                         |
|--------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Topography         | The road carriageway traverses through a modified landscape of undulating landform                                                                                  |
| Hydrology          | Rainfall drainage varies, however in most situations drains from a central pitch in the road toward the road edge                                                   |
| Ecology/vegetation | The road corridor passes through areas of native bushland, swathes of native grasses and rehabilitated/replanted vegetation                                         |
| Land use           | Transport Corridor                                                                                                                                                  |
| Built form         | Road infrastructure                                                                                                                                                 |
| Spatial            | Varies between linear and enclosed with some views blocked by dense roadside vegetation. Other areas are open with extensive views either side of the road corridor |

**DESCRIPTION**

Two main roads cross the study area - Grabben Gullen Road and Biala Gurrundah Road. The roads are sealed and mostly two lane with no median. The roads traverse areas of low lying grasses and areas where the road is enclosed by trees and shrubs. Where open, there are long distance views over the surrounding landscape.

**ASSESSMENT**

| Sensitivity                                                                                                                                                                                                                                                                                                                                                                                                                                    | Magnitude                                                                                                                                                                                                                                                                                                                                                           |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| The roads are moderately trafficked, being used to access properties and traverse through the study area. These roads are often highly scenic, with extensive views over the surrounding landscape. They serve the local community and visitors to the area and may be used as scenic drives. Receptors will move through this landscape zone relatively quickly and so the sensitivity of this landscape zone to change is rated as moderate. | The BWF development is in close proximity to the Grabben Gullen Road. The turbines will be highly visible from sections of this road where views are not blocked by roadside vegetation. The Proposal is described as having a moderate magnitude within this landscape zone and is expected to have a moderately detrimental affect on the character of this zone. |

|                                           |          |
|-------------------------------------------|----------|
| Sensitivity                               | MODERATE |
| Magnitude                                 | MODERATE |
| Overall Landscape Character Impact Rating | MODERATE |

From Table 03, using a combination of sensitivity and magnitude ratings.

LANDSCAPE CHARACTER ZONE 3 - UNDULATING GRASSLAND



Photo C

| Element            | Description                                                                                                        |
|--------------------|--------------------------------------------------------------------------------------------------------------------|
| Topography         | Undulating topography with ridgelines and valleys                                                                  |
| Hydrology          | Rainfall drains to creeks and rural dams                                                                           |
| Ecology/vegetation | Native undulating grasses and bushland is evident with a majority of vegetation being low lying grasses and shrubs |
| Land use           | Open fields/pasture                                                                                                |
| Built form         | Rural residential dwellings and farm buildings                                                                     |
| Spatial            | Mostly open with far reaching views to surrounding hills                                                           |

**DESCRIPTION**

This landscape character zone is of a large scale and mostly open with a gently rolling landform. The overall landscape pattern created by the grass pasture is smooth, regular and uniform. Trees are present in groups or as isolated individuals. Areas of tree planting also surround the majority of rural dwellings in the form of evergreen windbreaks.

**ASSESSMENT**

| Sensitivity                                                                                                                                                                                                                                                                                                                                                                                        | Magnitude                                                                                                                                                                                                                                                                                                                                                                                                                                          |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| There is a general absence of development throughout this landscape zone. Extensive views to ridgelines and distant hills are available from open areas. The structure of the landform is simple, containing few distinct features. Any new tall development will potentially stand out prominently within the landscape. This landscape zone is rated as having a moderate sensitivity to change. | The BWF turbines will be clearly visible within this landscape and will appear prominent when positioned on elevated topography. The open character of the landscape and lack of other features/built form will potentially make the turbines more noticeable. Overall, the Proposal is described as having a moderate magnitude within this landscape zone and is expected to have a moderately detrimental affect on the character of this zone. |

|                                           |          |
|-------------------------------------------|----------|
| Sensitivity                               | MODERATE |
| Magnitude                                 | MODERATE |
| Overall Landscape Character Impact Rating | MODERATE |

From Table 03, using a combination of sensitivity and magnitude ratings.

LANDSCAPE CHARACTER ZONE 4 - WOODED AREAS



Photo D

| Element            | Description                                                                                                  |
|--------------------|--------------------------------------------------------------------------------------------------------------|
| Topography         | Varied topography                                                                                            |
| Hydrology          | Rainfall drains to creeks and rural dams                                                                     |
| Ecology/vegetation | The vegetation is dense consisting of a large variety of chiefly native trees, dense shrubs and some grasses |
| Land use           | State forest                                                                                                 |
| Built form         | Limited to residential dwellings and farm buildings                                                          |
| Spatial            | Mostly enclosed with views blocked by dense vegetation                                                       |

**DESCRIPTION**

This landscape character zone occurs across a range of landform types from gentle slopes to steep gullies and ridgelines. Vegetation is predominately native and occurs in dense stands with little understorey. This zone commonly lines road verges and blocks wider views. The darker coloured foliage of wooded areas contrast against the surrounding backdrop of lighter toned pasture and cultivated areas.

**ASSESSMENT**

| Sensitivity                                                                                                                                                                                                 | Magnitude                                                                                                                                                                                                                                 |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| This landscape zone is enclosed in nature with views generally blocked by the surrounding dense vegetation. There is limited development within the zone and it has recorded a moderate sensitivity rating. | Some vegetation removal will be required to accommodate the project components including the turbines and access roads, although the quantum is small and the Proposal is described as having a low magnitude within this landscape zone. |

|                                           |              |
|-------------------------------------------|--------------|
| Sensitivity                               | MODERATE     |
| Magnitude                                 | LOW          |
| Overall Landscape Character Impact Rating | MODERATE/LOW |

From Table 03, using a combination of sensitivity and magnitude ratings.

LANDSCAPE CHARACTER ZONE 6 - RURAL DEVELOPMENT



Photo E

| Element            | Description                                                                             |
|--------------------|-----------------------------------------------------------------------------------------|
| Topography         | Varied topography                                                                       |
| Hydrology          | Rainfall drains to creeks and rural dams                                                |
| Ecology/vegetation | Native and exotic planting within property boundaries, often planted as tall windbreaks |
| Land use           | Residential and farm development                                                        |
| Built form         | Houses and farm buildings                                                               |
| Spatial            | Varies between enclosed and open depending on topography and vegetation                 |

**DESCRIPTION**

This character zone is dispersed across the study area and consists of residential dwellings and farm buildings. Many properties are isolated and located within bushland, with others in elevated positions with far reaching views over the surrounding landscape. Vegetation planted as windbreaks often surrounds properties and where present, limits long distant views. Small towns within the study area such as Grabben Gullen have a higher density of dwellings.

**ASSESSMENT**

| Sensitivity                                                                                                                                                                                                                                                                                                                   | Magnitude                                                                                                                                                                                                                                                                                                                                                                                                  |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Residential development is widely dispersed and mostly of a very low density. The isolation, large plot sizes and lack of surrounding development are important features of this character zone. Any new bulky development may alter the character of the area. The zone is described as having a high sensitivity to change. | The BWF turbines may be clearly visible from some parts of this zone. They are significantly taller than any other features within the landscape. Many dwellings, however, have dense vegetation surrounding the property, blocking views of the turbines and reducing the magnitude of the Proposal within the zone. The Proposal is described as having a moderate magnitude within this landscape zone. |

|                                           |               |
|-------------------------------------------|---------------|
| Sensitivity                               | HIGH          |
| Magnitude                                 | MODERATE      |
| Overall Landscape Character Impact Rating | MODERATE/HIGH |

From Table 03, using a combination of sensitivity and magnitude ratings.

### 3.4 LANDSCAPE CHARACTER SUMMARY

The landscape character of the study area is typical of the Southern Tablelands with undulating hillsides, large swathes of native vegetation, creek lines, ridges and a low density of rural residential development.

The overall impact of the Proposal on landscape character is rated as (refer summary Table 04)

- low across one character zone - rural roads
- moderate/low across one zone - wooded areas
- moderate across two zones - main roads and undulating grassland
- moderate/high across one zone - rural development

The BWF may impact the amenity value of zones rated as moderate and moderate/high, as well as altering some of their distinguishable landscape characteristics. The turbines will form a stark new feature within the project area's undulating grassland and small areas of rural development. All the zones studied, however, have the capability to absorb change to some extent. The prominent height of the turbines will be the most noticeable element of the Proposal, standing out in a landscape with very few tall structures.

Despite being naturalistic in appearance, large portions of the NSW Southern Tablelands has been heavily modified by agricultural for pasture and crop production. Irrespective of the extent and nature of modifications to the landscape, it is not correct to assume that the landscape surrounding the Proposal should be any less valued as a result of modification. Physical change in the appearance of the landscape is an ongoing and constant process from both human and environmental influences and can result in both positive and negative effects.

Summary of Landscape Character impacts

| Zone           | Rural Roads | Main Roads | Undulating grassland | Wooded areas | Rural Development |
|----------------|-------------|------------|----------------------|--------------|-------------------|
| Sensitivity    | LOW         | MODERATE   | MODERATE             | MODERATE     | HIGH              |
| Magnitude      | LOW         | MODERATE   | MODERATE             | LOW          | MODERATE          |
| Overall Rating | LOW         | MODERATE   | MODERATE             | MODERATE/LOW | MODERATE/HIGH     |

Table 04 Summary of Landscape Character Impacts





4

Visual Impact  
Assessment

## 4.0 VISUAL IMPACT ASSESMENT

### 4.1 WIND FARM VISIBILITY

Before any assessment of visual impacts associated with the BWF can be undertaken, it is important to describe the general nature of the visibility of WTGs within the landscape. Much of the best practice literature on wind farm visual assessment is based upon first and second generation turbines up to 100m in total height.

Recent technological advancements and continued turbine development has lead to third and fourth generation turbines of up to 185m (such as the ones proposed for BWF). This increased height leads to a potential increase in turbine visibility.

The visibility of WTGs can vary between wind farm projects, being influenced by multiple factors including turbine specification, nature of location, landform and quantity of vegetation.

A Scottish Executive Planning Advice Note (2002) offered the following general guidance to the effect that distance has on the perception of a wind farm development in an open landscape (refer Table 05).

| Distance   | Perception                                                        | Likely visual impact                                                                                                                                                                                                                       |
|------------|-------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Up to 2kms | Likely to be a prominent feature                                  | WTG likely to dominate the field of view and appear large scale. Movement of the blades obvious.                                                                                                                                           |
| 2-5kms     | Relatively prominent                                              | Visually intrusive - the turbines appear fairly large scale and an obvious element in the landscape. Blade movement is clearly visible but they may not dominate the field of view.                                                        |
| 5-15kms    | Prominent in clear visibility - seen as part of a wider landscape | Noticeable - the turbines are visible but not intrusive. The wind farm is noticeable as an element within the landscape. Blade movement is visible but the turbines appear less noticeable within the field of view as distance increases. |
| 15-30kms   | A minor element in the landscape                                  | Element within distant landscape - turbines are indistinct and form minor elements within a broader landscape. Movement of blades is generally indiscernible.                                                                              |

Table 05 - Visibility guidelines (Scottish Executive Planning Advice Note)

Figure 06 indicates the theoretical visibility of 185m high WTGs in an open landscape at various viewing distance bands. The actual visibility of the turbines will vary due to numerous factors including weather conditions, time of day, vegetation, landform and viewer position.

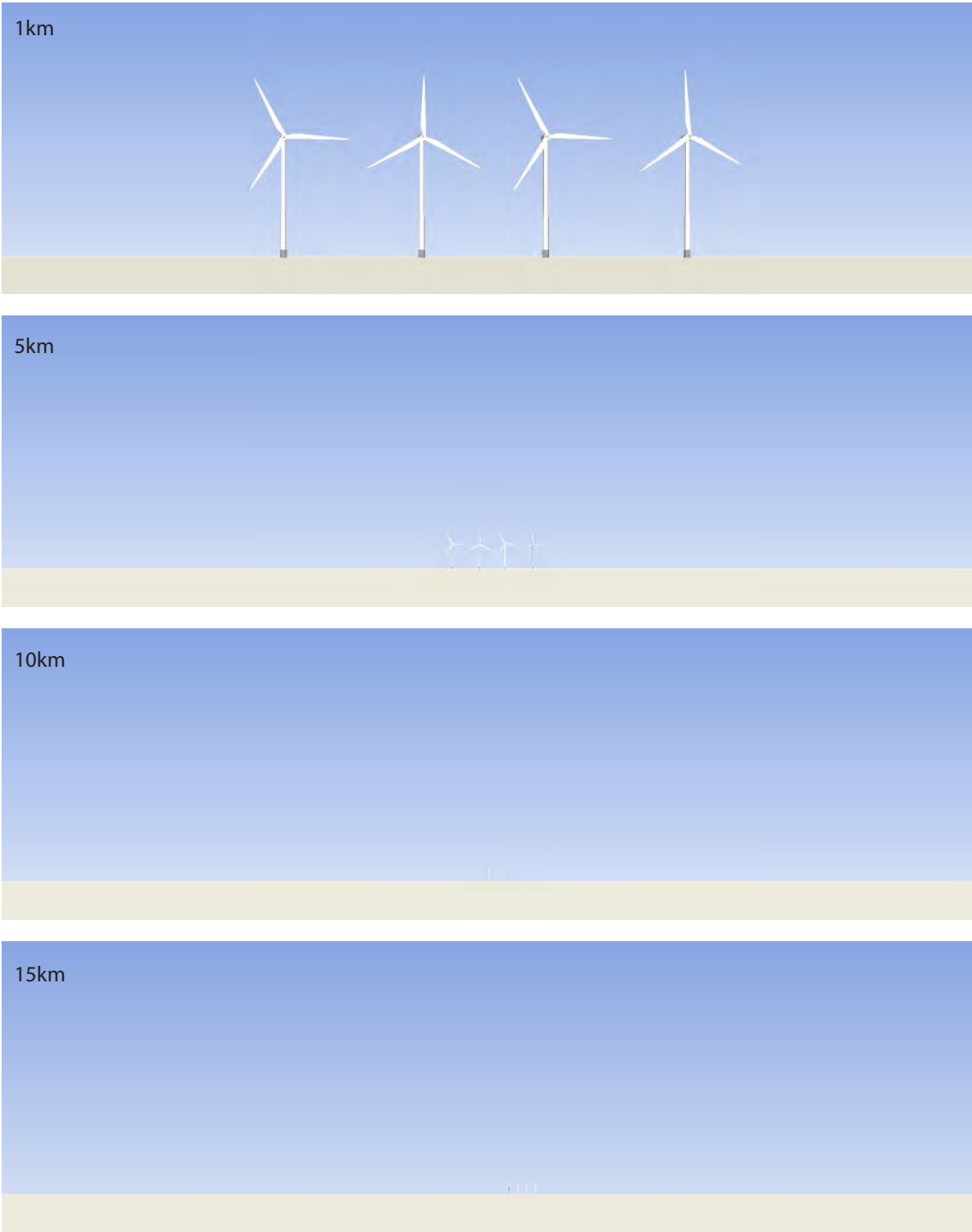


Figure 06 - WTG visibility at increasing distance

#### 4.1.1 Perception of visibility

Human perception is important in considerations of wind turbine visibility. People perceive size, shape, depth and distance using many cues, so that context is critically important. The magnitude or size of wind farm elements, and the distance between them and the viewer, are basic physical measures that affect visibility, but the real issue is human perception of visual effects and that is not simply a function of size or distance. The Scottish Natural Heritage Visual Assessment of Wind farms Best Practice elaborates:

‘When people see partial or incomplete objects, they may mentally “fill in” the missing information, so that partial views of turbines may have a greater effect than imagined. Large size, movement, brightness and contrast, as well as new, unusual or unexpected features, can draw attention to an object. In all these effects, issues such as experience, familiarity and memory may have an important role to play. Therefore, perception depends on experience, the visual field, attention, background, contrast and expectation, and may be enhanced or suppressed.

Some of these factors are illustrated in the figures 7A-C. Figure 7A indicates the affect on visibility of turbine elevation in relation to surrounding terrain. A turbine that is fully visible on the horizon may draw the eye more than a turbine against a dark coloured background. The effect is variable and in some instances and lighting conditions, a turbine may be more visible against a background compared to the sky.

The visual layout of turbines in relation to the horizon and skyline profile is an important factor for consideration when assessing the effect at any given viewpoint. The extent, pattern and proportions of structures in the view in relation to the scale and form of the landscape and the skyline are all important.

Figure 7B and 7C illustrates the difference that climatic conditions can make on turbine visibility. WTGs are more visually prominent against a clear blue sky (7B) than a sky of white/grey haze or clouds (7C).

On clear or partly cloudy days, the position of the sun would have an impact on the degree of visibility of the turbines. The degree of impact would be largely dependent on the relationship between the position and angle of the sun relative to the view location. Late afternoon and early evening views toward the west would result in the wind turbines silhouetted above the horizon line.

## 4.2 VISUAL IMPACT ASSESSMENT STUDY AREA

For the purpose of this report the study area for the VIA is defined as the area of land within and beyond the project area which could be potentially visually affected by the BWF. Based on a desktop analysis and site visit, a study area of approximately 12km offset from the WTGs was identified based on topography, receptor location and viewing distance.

It is important to note that some of the WTGs would be visible from areas of the landscape beyond the nominated study area, however within the general parameters of normal human vision, the visibility of a wind turbine at a maximum height of 185m would occupy a relatively insignificant proportion of a the visual scene from distances in excess of 15km.



Figure 7A - WTG against a dark/light background



Figure 7B - WTG in clear conditions



Figure 7C - Group of WTGs against a cloudy sky

#### 4.3 ZONE OF VISUAL INFLUENCE (ZVI)

ZVI diagrams are used to identify theoretical areas of the landscape from which a defined layout of WTGs could potentially be visible. This is a helpful tool for providing an overview as to the extent to which a wind farm may be visible from the surrounding area.

The ZVI for BWF has been produced using a digital terrain map of the study area, indicating the number of turbines visible from any given point within the landscape. Two assessments have been carried out - one to count the number of WTGs visible at hub height and another where any part of the structure is visible, including just the blade tips (refer Figure 8A and 8B).

The assessment does not take into account the screening affects of built structures and vegetation above ground level. WTGs may, therefore, not be visible at many of the locations indicated on the ZVI diagrams due to the local presence of vegetation or built form. Additionally, the number of turbines visible is affected by the weather conditions at the time.

##### 2.3.1 BWF ZVI Analysis

The most extensive and continuous area of theoretical visibility of the BWF turbines is associated with elevated terrain within and in close proximity to the project area, especially to the north. From these locations up to 31 turbines may be visible, both at tip height and hub height (indicated by yellows and reds on the ZVI figures).

The area of WTG visibility greatly reduces for turbines that are only visible at hub height and above. This indicates that many of the locations within and surrounding the project area only have visibility of WTG tips due to the undulating topography. Views toward the tips and upper portions of the wind turbine rotors are likely to become much less noticeable at reasonably short distances from the Proposal, and are generally visually negligible from medium to longer distance view locations. It is also highly likely that vegetation will block many of these views.

The eastern and far western sections of the study area have limited visibility of the turbines due to the undulating nature of the local topography. These areas show mostly blues and greens, indicating visibility of between 1 and 19 turbines. The low ridgeline following Grabben Gullen road assists in reducing the viewshed to the east.

A very low density of residential properties are scattered through out the study area with a number falling within areas of theoretically high visibility of WTGs. In reality, built form and vegetation will obscure many of the views from these properties.

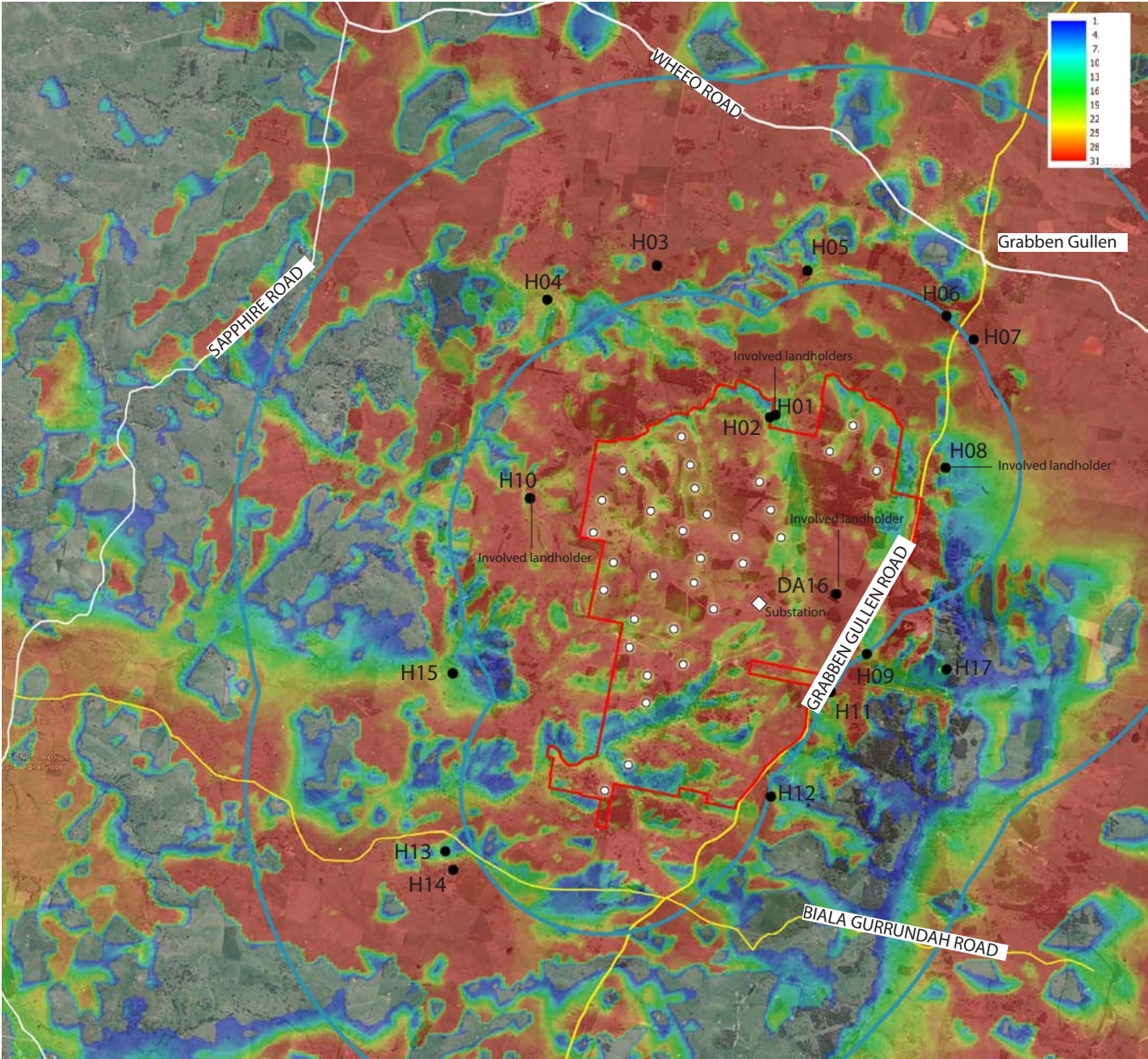


Figure 8A - Number of turbines visible at blade tip height (185m) and below



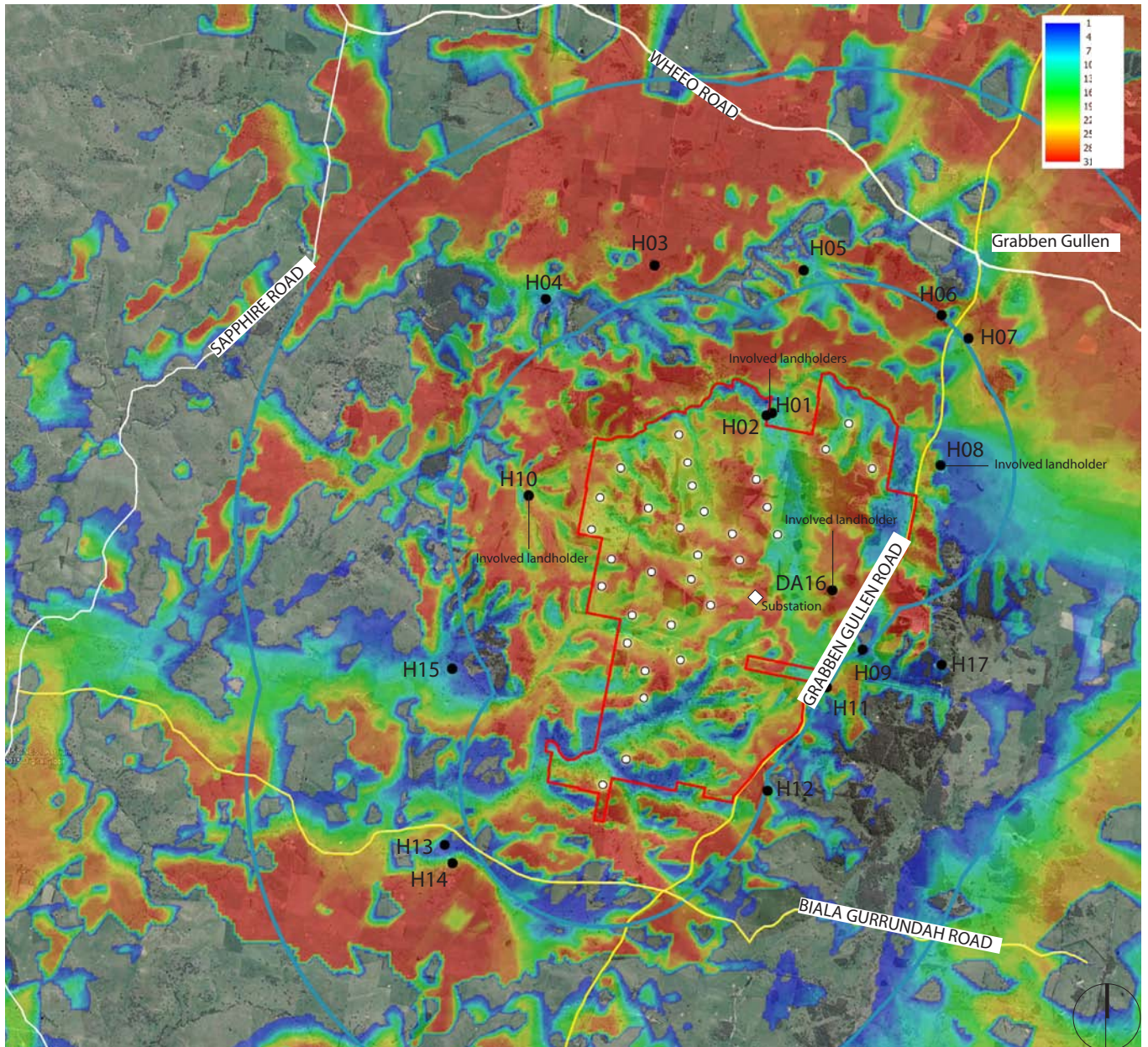
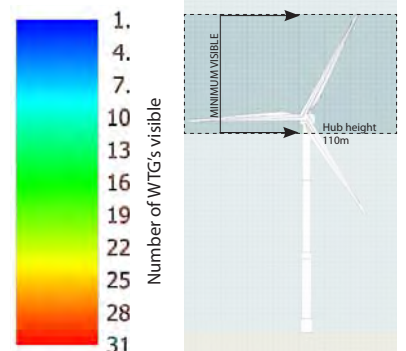


Figure 8B - Number of turbines visible at hub height (110m) and below

- Main Roads
- Minor Roads
- 2 and 5km WTG offset
- Project Area
- Dwelling
- WTG
- Substation



#### 4.4 KEY VISUAL RECEPTORS

During a detailed site visit, 10 key receptor sites with the potential to be visually impacted by some element of the Proposal were identified and selected for further analysis. These included both public and private domain views (refer Figure 09 and Table 06). This is not an exhaustive list of all receptors that will be impacted by the Proposal but is considered representative of the spread of receptors within the study area.

##### 4.4.1 Public Domain

The public domain within the study area with visibility of the Proposal is mostly limited to minor and major roads. There are no parks, reserves or major walking trails identified.

##### 4.4.2 Private Domain

A low density of residential receptors are dispersed throughout the study area. There are 4 participating landowners in relatively close proximity to the turbines. These properties have agreed to host turbines on their land and it is understood they do not have concerns regarding impacts to visual amenity. They have therefore not been assessed further within this report. An approximate further 12 dwellings are located within 2-3km of the WTGs. The extent of the visibility of the Proposal from these locations is influenced by topography, orientation and extent of vegetation.

#### 4.5 VIA METHODOLOGY

The overall impact rating of the Proposal on any given visual receptor is based on factors of magnitude and sensitivity.

##### Sensitivity

Each visual receptor type has an inherent and varied sensitivity to change in the visual scene based on their personal context in which the view is being experienced. This will have a direct bearing on the perception of visual impact experienced by the receptor and qualifies the quantitative impacts. Appendix A describes the levels of sensitivity for each receptor type.

##### Magnitude

The magnitude of the visual effects of the development within the landscape. A series of quantitative assessments are studied, including distance from development, quantum of view, duration of view and magnitude of change. Appendix A describes the ratings assigned to these quantitative assessments.

##### Overall impact rating

The severity of these impacts is calculated using matrix Table 03 - based on a combination of magnitude and sensitivity.

|             |            | MAGNITUDE       |                 |              |            |
|-------------|------------|-----------------|-----------------|--------------|------------|
|             |            | HIGH            | MODERATE        | LOW          | NEGLIGIBLE |
| SENSITIVITY | HIGH       | HIGH            | HIGH - MODERATE | MODERATE     | NEGLIGIBLE |
|             | MODERATE   | HIGH - MODERATE | MODERATE        | MODERATE/LOW | NEGLIGIBLE |
|             | LOW        | MODERATE        | MODERATE/LOW    | LOW          | NEGLIGIBLE |
|             | NEGLIGIBLE | NEGLIGIBLE      | NEGLIGIBLE      | NEGLIGIBLE   | NEGLIGIBLE |

Table 03: Landscape Character Impact Rating as a combination of Sensitivity and Magnitude.

Source: RMS Guidelines for Landscape Character and Visual Impact Assessment

#### 4.5.1 Viewpoint Analysis

Each viewpoint analysis includes a description of the current view from the viewpoint followed by a discussion of the potential visual impacts of the Proposal on that view. Each viewpoint is accompanied by a location map and photograph of the current view, including a basic wireframe representation of the turbines within the view. For a detailed description of the assessment factors and impact ratings used see Appendix A.

#### EXAMPLE

**VIEWPOINT X**




Viewpoint number

Location map

Viewpoint location

Photo location and direction marker

Viewpoint photo

Wireframe model

| RECEPTOR IDENTIFICATION | RECEPTOR SENSITIVITY | MAGNITUDE |                 |                |                     |                    |
|-------------------------|----------------------|-----------|-----------------|----------------|---------------------|--------------------|
|                         |                      | DISTANCE  | QUANTUM OF VIEW | PERIOD OF VIEW | MAGNITUDE OF CHANGE | SUMMARY OF RATINGS |
| 1                       | M                    | M         | L               | M              | M                   | M                  |

Assessment matrix table  
Refer Appendix A for more details

|                      |
|----------------------|
| Visual Impact Rating |
|----------------------|

MODERATE

Overall visual impact

#### 4.5.2 Viewpoint Access

For residential receptors, access was not normally possible to the property itself. For the visual impact assessment, a photo was taken at the closest publicly accessible point - often the end of the properties driveway. The description of visual impact is therefore estimated from the property's main dwelling area.

A separate site visit was conducted for the spatially accurate photomontages within section 8 of this report. For this visit, access was agreed and the photos were taken from the property itself, providing a more accurate representation of potential visual impact.

#### 4.5.3 Wireframe model

Each viewpoint analysis includes a wire frame model overlaid on the viewpoint photo to indicate the approximate location and extent of WTGs visible from that viewpoint. The wire frame models have been created using 3D modelling and geographical mapping software. They are overlaid on photos taken with a 35mm lense which gives a slightly wider field of view than the human eye. This shows the wider context of the viewpoint but will make the turbines seem more distant. The wireframe model is indicative only but offers a good indication of the likely extent of turbine visibility. Environmental factors such as weather and lighting conditions will impact the overall visibility of the Proposal on any given viewpoint. Spatially accurate photomontages of the Proposal can be found in Section 8 - Photomontages.

### 4.6 KEY VISUAL RECEPTORS

#### 4.6.1 Public Domain

| Viewpoint Number | Type of receptor | Description                              |
|------------------|------------------|------------------------------------------|
| 1                | Major Road       | Biala Gurrundah Road, looking north west |
| 2                | Minor Road       | Sapphire Road, looking east              |
| 3                | Major Road       | Grabben Gullen Road, looking west        |
| 4                | Major Road       | Grabben Gullen Road, looking west        |

#### 4.6.2 Private Domain

| Viewpoint Number | Type of receptor | Dwelling Reference | Description                         |
|------------------|------------------|--------------------|-------------------------------------|
| 5                | Dwelling         | H13, H14, H15      | Properties off Biala Gurrundah Road |
| 6                | Dwelling         | H03                | Properties off Church Lane          |
| 7                | Dwelling         | H06, H07           | Properties off Grabben Gullen Road  |
| 8                | Dwelling         | H05                | Property off Grabben Gullen Road    |
| 9                | Dwelling         | H09, H11, H12, H17 | Properties off Grabben Gullen Road  |
| 10               | Dwelling         | H04                | Property off Sapphire Road          |

Table 06: Summary of key viewpoints

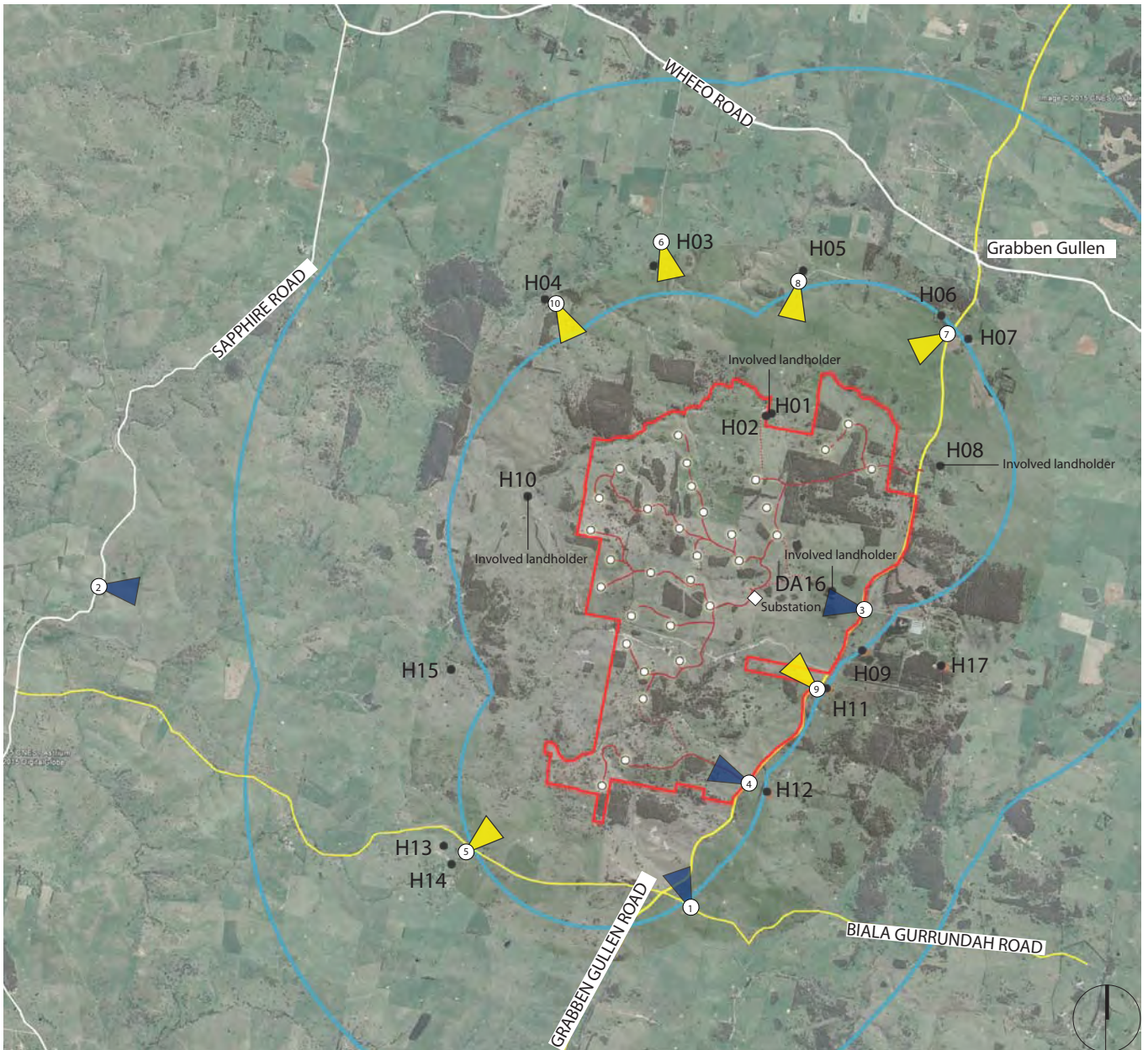
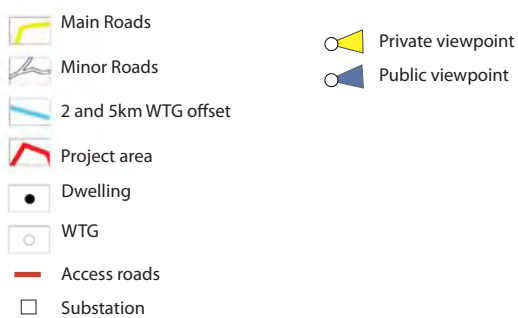


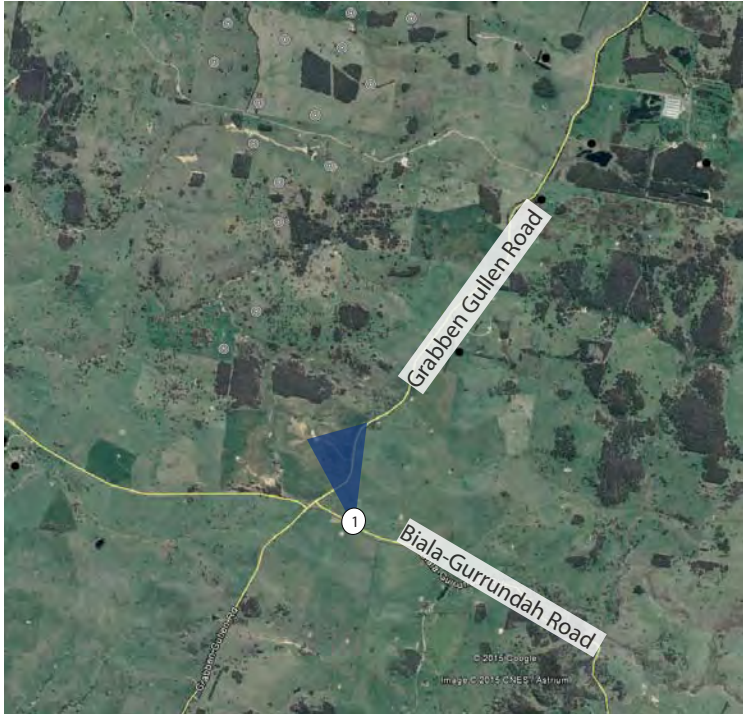
Figure 09 - Public and private viewpoint locations within the study area



CLOUSTON associates  
PUBLIC RECEPTOR  
VIEWPOINT 1



Viewpoint Location



Area plan



Photo 1

| Location             | Type       | Nearest WTG | No. of properties | Receptors                                             |
|----------------------|------------|-------------|-------------------|-------------------------------------------------------|
| Biala-Gurrundah Road | Major road | 2.1km       | N/A               | Users of the road travelling in a westbound direction |

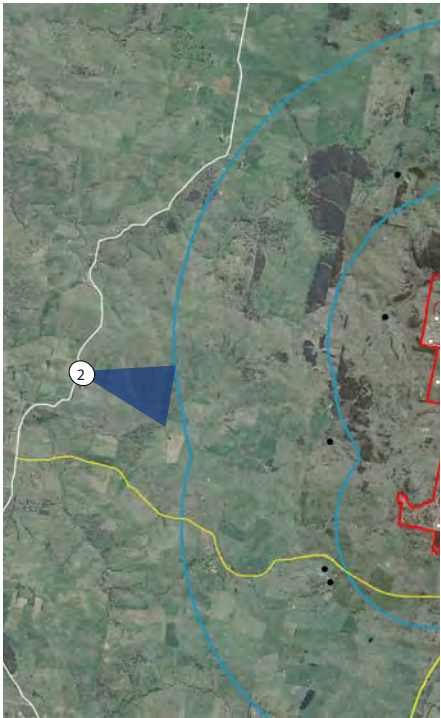
| Current view                                                                                                                                                                                                                                                                 | Expected Visual Impact                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| As shown in Photo 1, this viewpoint looks north from the Biala-Gurrundah Road from an elevated position. The foreground and middle distance are dominated by undulating open fields, stretching to the horizon. Very little built form is currently visible within the view. | <p>A cluster of WTGs will be visible in the middle of the viewframe at a distance of 2.1km. These will be noticeable to westbound travellers on the road, visually prominent within a wide panoramic view. Receptors will move along the road quickly, although the Proposal is likely to have a moderately negatively impact on visual amenity from this section of the road.</p> <p>Refer Photomontage 1 within Section 8 of this report for spatially accurate existing and proposed views from this location.</p> |

| RECEPTOR IDENTIFICATION | RECEPTOR SENSITIVITY | MAGNITUDE |                 |                |                     |                    |
|-------------------------|----------------------|-----------|-----------------|----------------|---------------------|--------------------|
|                         |                      | DISTANCE  | QUANTUM OF VIEW | PERIOD OF VIEW | MAGNITUDE OF CHANGE | SUMMARY OF RATINGS |
| 1                       | M                    | M         | M               | L              | M                   | M                  |

|                              |          |
|------------------------------|----------|
| Overall Visual Impact Rating | MODERATE |
|------------------------------|----------|

From Table 03, using a combination of sensitivity and magnitude ratings.

CLOUSTON associates  
PUBLIC RECEPTOR  
VIEWPOINT 2



Viewpoint location



Area plan

- Dwelling
- Wind Turbine
- Viewpoint location



Photo 2

| Location      | Type       | Nearest WTG | No. of properties | Receptors                            |
|---------------|------------|-------------|-------------------|--------------------------------------|
| Sapphire Road | Minor Road | 6.9km       | N/A               | Users of Sapphire Road, looking east |

| Current view                                                                                                                                                                                                                                                                                                                                                                 | Expected Visual Impact                                                                                                                                                                                                                                                                                                                   |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| As shown in Photo 2, this elevated viewpoint looks east from Sapphire Road. The foreground and middle distance are dominated by undulating open grassland, dotted with individual trees. Distant hills are visible on the horizon. The Gunning wind farm is just visible on the horizon at a distance of over 15km. Very little other built form is visible within the view. | WTGs will be visible stretching across a low ridgeline in the middle distance. In clear conditions the WTGs will be apparent against the skyline, although are unlikely to dominate the view. Blade movement will be discernible.<br><br>Refer Section 5 of this report for analysis of cumulative impacts of BWF and Gunning Wind farm. |

| RECEPTOR IDENTIFICATION | RECEPTOR SENSITIVITY | MAGNITUDE |                 |                |                     |                    |
|-------------------------|----------------------|-----------|-----------------|----------------|---------------------|--------------------|
|                         |                      | DISTANCE  | QUANTUM OF VIEW | PERIOD OF VIEW | MAGNITUDE OF CHANGE | SUMMARY OF RATINGS |
| 2                       | L                    | M         | L               | L              | L                   | L                  |

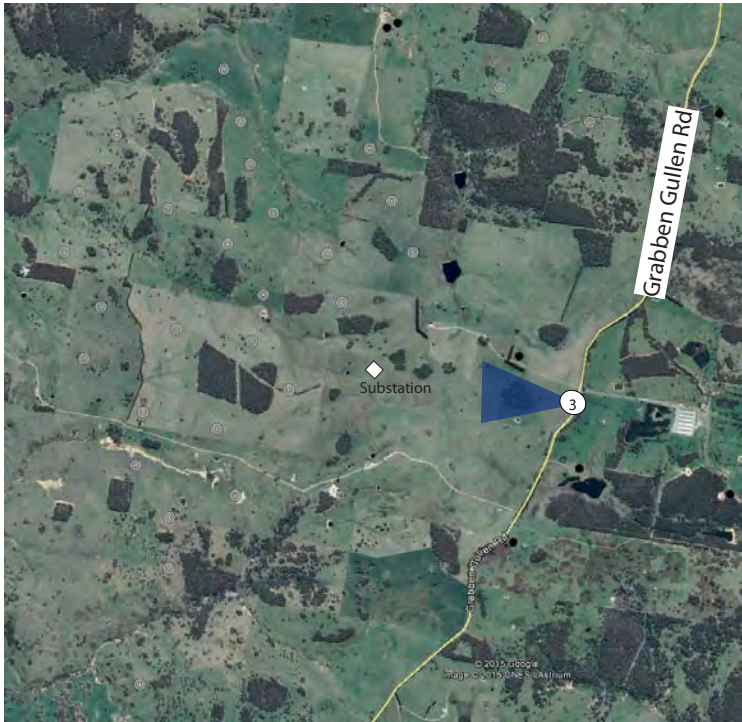
|                              |     |
|------------------------------|-----|
| Overall Visual Impact Rating | LOW |
|------------------------------|-----|

From Table 03, using a combination of sensitivity and magnitude ratings.

CLOUSTON associates  
PUBLIC RECEPTOR  
VIEWPOINT 3



Viewpoint location



Area plan



Photo 3

| Location            | Type      | Nearest WTG | No. of properties | Receptors                                  |
|---------------------|-----------|-------------|-------------------|--------------------------------------------|
| Grabben Gullen Road | Main Road | 1.5km       | N/A               | Users of Grabben Gullen Road, looking west |

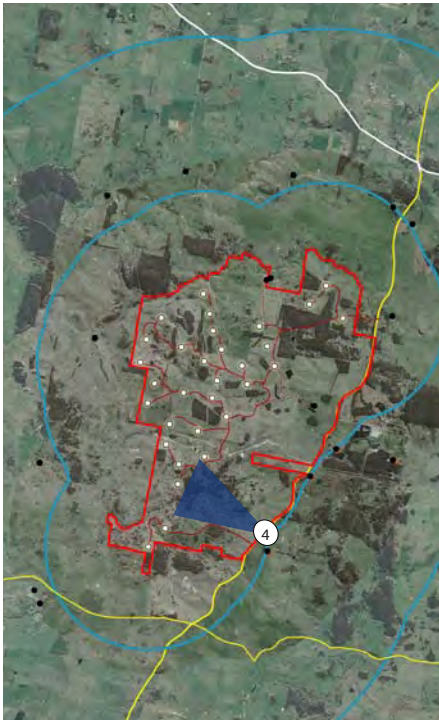
| Current view                                                                                                                                                                                                                                                       | Expected Visual Impact                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| As shown in Photo 3, this viewpoint looks west from the Grabben Gullen Road. The foreground slopes up to a low ridge and comprises open fields with a large stand of vegetation and a line of windbreak trees. No built form is currently visible within the view. | <p>A cluster of WTGs will be visible in close proximity to the road, partially obscured by topography and vegetation. The turbines will be visually prominent to road users travelling in both directions. The receptors will move past the Proposal quickly although the WTGs are likely to have a moderate impact on visual amenity from this section of the road. Views towards the substation will be blocked by the local topography.</p> <p>Refer Photomontage 2 within Section 8 of this report for spatially accurate existing and proposed views from this location.</p> |

| RECEPTOR IDENTIFICATION | RECEPTOR SENSITIVITY | MAGNITUDE |                 |                |                     |                    |
|-------------------------|----------------------|-----------|-----------------|----------------|---------------------|--------------------|
|                         |                      | DISTANCE  | QUANTUM OF VIEW | PERIOD OF VIEW | MAGNITUDE OF CHANGE | SUMMARY OF RATINGS |
| 3                       | M                    | H         | M               | L              | M                   | M                  |

|                              |          |
|------------------------------|----------|
| Overall Visual Impact Rating | MODERATE |
|------------------------------|----------|

From Table 03, using a combination of sensitivity and magnitude ratings.

CLOUSTON associates  
PUBLIC RECEPTOR  
VIEWPOINT 4



Viewpoint location



Area plan



Photo 4

| Location            | Type       | Nearest WTG | No. of properties | Receptors                                  |
|---------------------|------------|-------------|-------------------|--------------------------------------------|
| Grabben Gullen Road | Major Road | 1.7km       | N/A               | Users of Grabben Gullen Road, looking west |

| Current view                                                                                                                                                                                                                                                                                                                  | Expected Visual Impact                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| As shown in Photo 4, this viewpoint looks west from an elevated position. The foreground and middle distance are dominated by undulating open fields, stretching to the horizon. Patches of remnant vegetation and small stands of trees dot the landscape. Very little built form is currently visible within the viewframe. | <p>A long line of WTGs will be visible in the middle of the viewframe at a distance of 1.7km. These will be noticeable to west and eastbound travellers on the road, visually prominent within a wide panoramic view. Receptors will move along the road quickly, although due to the large area covered by WTGs, the turbines will be visible for a reasonable length of time. The Proposal is likely to have a moderately negatively impact on visual amenity from this section of the road.</p> <p>Refer Photomontage 3 within Section 8 of this report for spatially accurate existing and proposed views from this location.</p> |

| RECEPTOR IDENTIFICATION | RECEPTOR SENSITIVITY | MAGNITUDE |                 |                |                     |                    |
|-------------------------|----------------------|-----------|-----------------|----------------|---------------------|--------------------|
|                         |                      | DISTANCE  | QUANTUM OF VIEW | PERIOD OF VIEW | MAGNITUDE OF CHANGE | SUMMARY OF RATINGS |
| 4                       | M                    | H         | H               | L              | M                   | M                  |

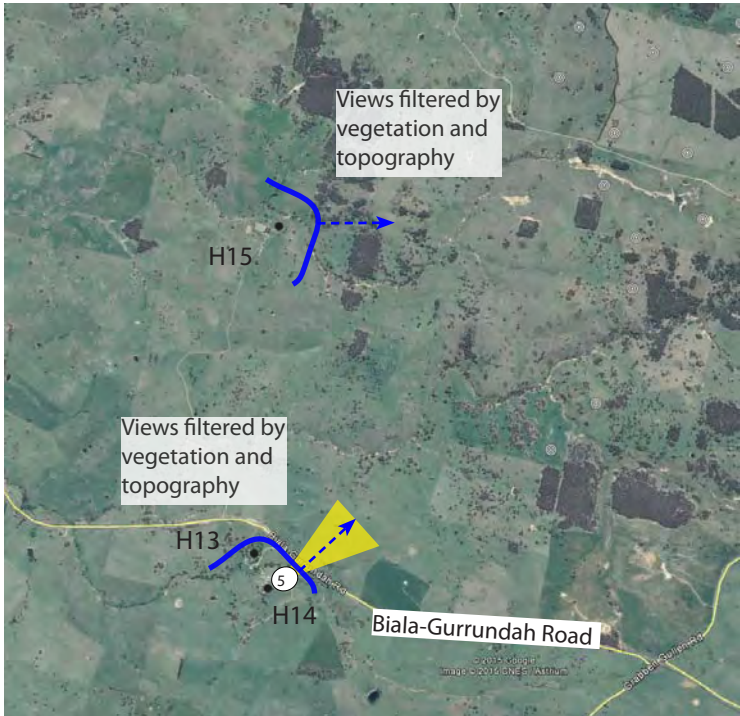
|                              |          |
|------------------------------|----------|
| Overall Visual Impact Rating | MODERATE |
|------------------------------|----------|

From Table 03, using a combination of sensitivity and magnitude ratings.

CLOUSTON associates  
PRIVATE RECEPTOR  
VIEWPOINT 5



Viewpoint location



Area plan

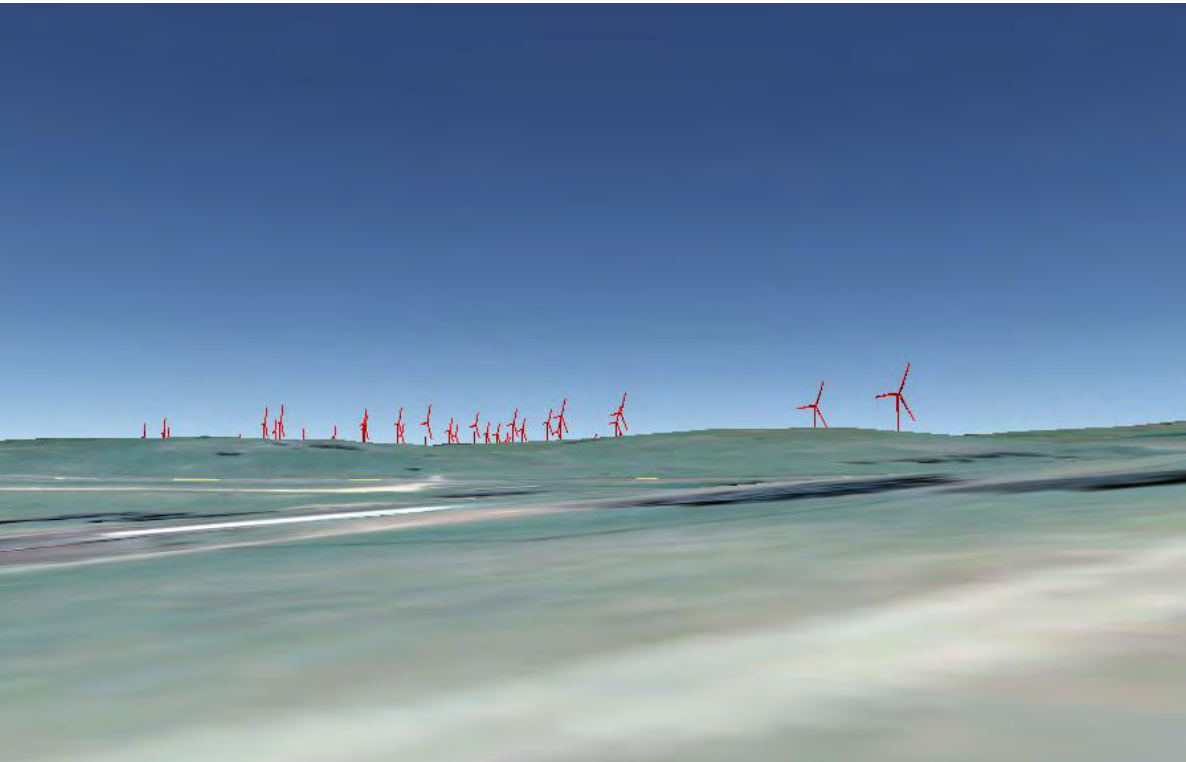


Photo 5 - simulated view

| Location             | Type     | Nearest WTG | No. of properties | Receptors                                  |
|----------------------|----------|-------------|-------------------|--------------------------------------------|
| Biala-Gurrundah Road | Dwelling | 2.4km       | 3                 | Residents of properties - H13, H14 and H15 |

| Current view                                                                                                                                                                                                                                                                                                                                     | Expected Visual Impact                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Access was not possible to these properties and so a simulated view from the southern most property (H14) has been created using Google Earth and 3D modelling software - as shown in Photo 5. This property is surrounded by a small quantity of screening vegetation and undulating topography, which rises up to a low ridgeline in the east. | A study of topography and vegetation indicates these properties will have filtered views of the turbines, depending on topography and the level of screening vegetation present. The southern most property (H14) is likely to have the most unobstructed view of the turbines which may be clearly visible along a ridge in the middle distance. All properties will have only partial views of the turbines with the undulating topography blocking views towards the base of the WTGs. |

| RECEPTOR IDENTIFICATION | RECEPTOR SENSITIVITY | MAGNITUDE |                 |                |                     |                    |
|-------------------------|----------------------|-----------|-----------------|----------------|---------------------|--------------------|
|                         |                      | DISTANCE  | QUANTUM OF VIEW | PERIOD OF VIEW | MAGNITUDE OF CHANGE | SUMMARY OF RATINGS |
| 4                       | H                    | M         | M               | M              | M                   | M                  |

| Overall Visual Impact Rating | MODERATE/HIGH* |
|------------------------------|----------------|
|------------------------------|----------------|

From Table 03, using a combination of sensitivity and magnitude ratings.

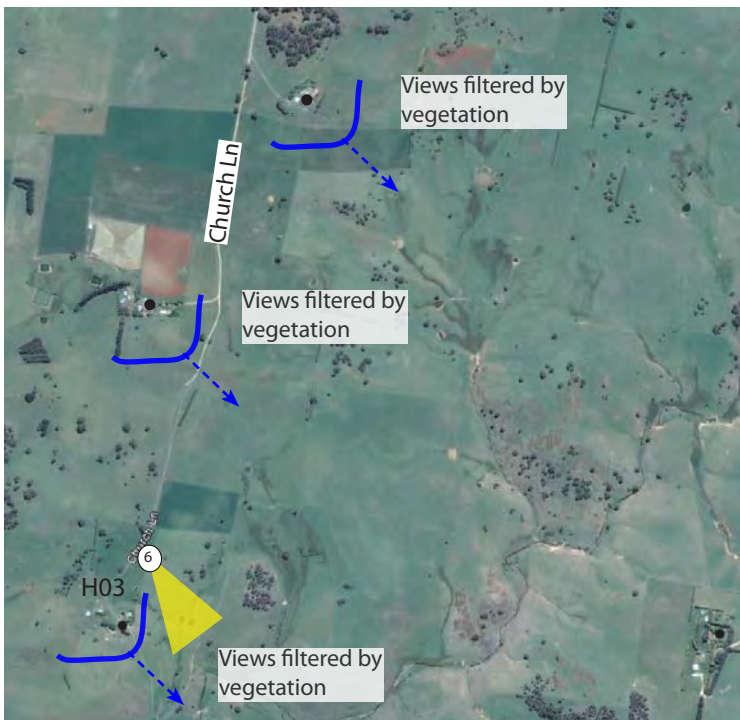
\* Screening vegetation and topography may reduce the visual impact on these properties. A worst case scenario rating has been given as access was not possible for individual assessment.

CLOUSTON associates

# PRIVATE RECEPTOR VIEWPOINT 6



Viewpoint location



Area plan



Photo 6

| Location    | Type     | Nearest WTG | No. of properties | Receptors                                       |
|-------------|----------|-------------|-------------------|-------------------------------------------------|
| Church Lane | Dwelling | 2.4km       | 3                 | Residents of properties along Church Lane (H03) |

| Current view                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | Expected Visual Impact                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <p>As shown in Photo 6, these properties look south east from an elevated position. The foreground and middle ground are dominated by undulating open grassland, stretching to a low ridgeline in the middle distance. Large stands of dark green woodland can be seen throughout the landscape, draped on hillsides. Minimal built form is visible within the viewframe.</p> <p>Both the Gullen Range and Gunning wind farm developments are also visible from this location - see Cumulative Impacts section of report.</p> | <p>A large cluster of WTGs will be visible stretching across the ridgeline in the near to middle distance. The turbines will appear prominent against the skyline and will be an obvious element within the landscape. Blade movement will be clearly visible.</p> <p>The level of visual impact on individual properties in this location will depend on their orientation and level of screening vegetation present - potentially reducing the level of visual impact experienced. All 3 properties are surrounded by tree planting which may filter views of the wind farm from the main dwelling areas of these properties. The most extensive views of the Proposal are likely to be from Church Lane and associated driveways.</p> <p>Refer Section 5 of this report for cumulative impact analysis of additional visible wind farms. Refer Photomontage 5 within Section 8 for spatially accurate existing and proposed views from property H03.</p> |

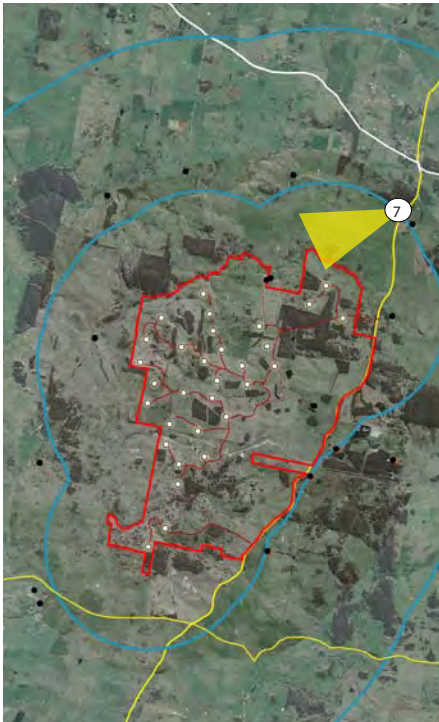
| RECEPTOR IDENTIFICATION | RECEPTOR SENSITIVITY | MAGNITUDE |                 |                |                     |                    |
|-------------------------|----------------------|-----------|-----------------|----------------|---------------------|--------------------|
|                         |                      | DISTANCE  | QUANTUM OF VIEW | PERIOD OF VIEW | MAGNITUDE OF CHANGE | SUMMARY OF RATINGS |
| 6                       | H                    | M         | H               | M              | H                   | M                  |

|                              |                |
|------------------------------|----------------|
| Overall Visual Impact Rating | MODERATE/HIGH* |
|------------------------------|----------------|

From Table 03, using a combination of sensitivity and magnitude ratings.

\* Screening vegetation may reduce the visual impact on these properties. A worst case scenario rating has been given as access was not possible for individual assessment.

CLOUSTON associates  
PRIVATE RECEPTOR  
VIEWPOINT 7



Viewpoint location



Area plan



Photo 7

| Location            | Type     | Nearest WTG | No. of properties | Receptors                                                      |
|---------------------|----------|-------------|-------------------|----------------------------------------------------------------|
| Grabben Gullen Road | Dwelling | 1.9km       | 2                 | Residents of properties off Grabben Gullen Road (H06 and H07). |

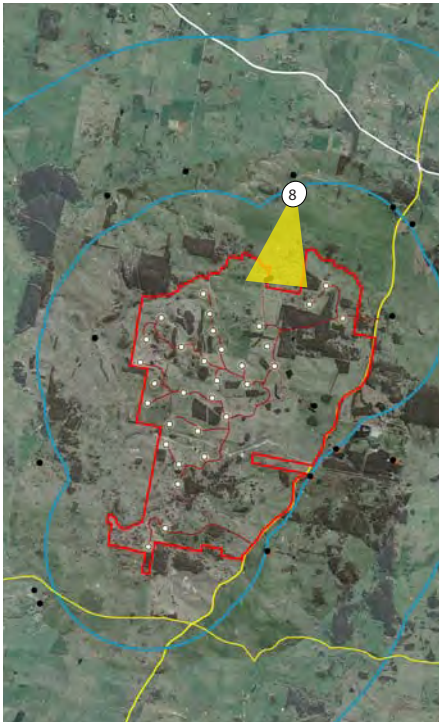
| Current view                                                                                                                                                                                                                 | Expected Visual Impact                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| As shown in Photo 7, these properties look west over undulating open grassland. The land rises to a low ridgelines in the middle distance, blocking long distance views. Minimal built form is visible within the viewframe. | <p>The level of visual impact on individual properties in this location will depend on their orientation and level of screening vegetation present - potentially reducing the level of visual impact experienced. The 2 properties are surrounded by tree planting. The most extensive views of the Proposal are likely to be from associated driveways.</p> <p>Where visible, a cluster of WTGs will be apparent to the west, partially obscured by the low ridgeline in the middle distance. The turbines will appear prominent against the skyline and blade movement will be clearly visible on the closer turbines. The WTGs will occupy a relatively small portion of the viewframe.</p> <p>Refer Photomontage 6 and 7 within Section 8 of this report for spatially accurate existing and proposed views from these properties.</p> |

| RECEPTOR IDENTIFICATION | RECEPTOR SENSITIVITY | MAGNITUDE |                 |                |                     |                    |
|-------------------------|----------------------|-----------|-----------------|----------------|---------------------|--------------------|
|                         |                      | DISTANCE  | QUANTUM OF VIEW | PERIOD OF VIEW | MAGNITUDE OF CHANGE | SUMMARY OF RATINGS |
| 7                       | M                    | H         | M               | M              | M                   | M                  |

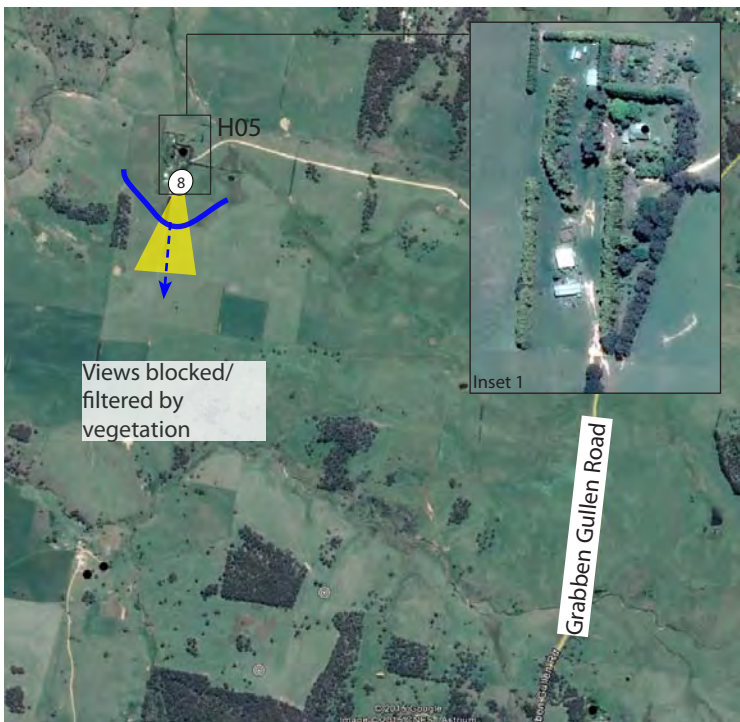
|                              |          |
|------------------------------|----------|
| Overall Visual Impact Rating | MODERATE |
|------------------------------|----------|

From Table 03, using a combination of sensitivity and magnitude ratings.

CLOUSTON associates  
 PRIVATE RECEPTOR  
 VIEWPOINT 8



Viewpoint location



Area plan

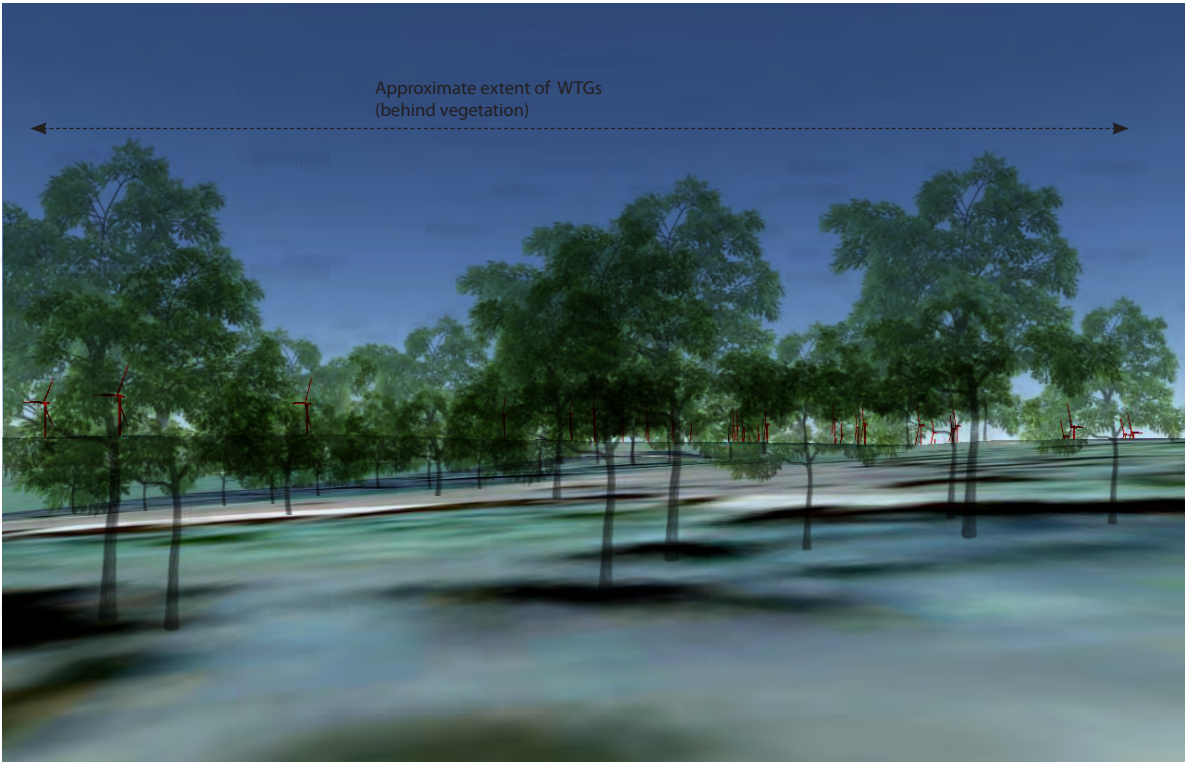


Photo 8 - simulated view

| Location                | Type     | Nearest WTG | No. of properties | Receptors                                            |
|-------------------------|----------|-------------|-------------------|------------------------------------------------------|
| Off Grabben Gullen Road | Dwelling | 2.1km       | 1                 | Residents of property off Grabben Gullen Road (H05). |

| Current view                                                                                                                                                                                                                                                                                     | Expected Visual Impact                                                                                                                                                                                                                                                                                                                                                 |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Access was not possible and so a simulated view from this property (H05) has been created using Google Earth and 3D modelling software - as shown in Photo 8. This property is surrounded by dense screening vegetation (see inset 1) which is likely to block or highly filter all views south. | <p>Screening vegetation planted as garden plantings and long windbreaks surrounding the property are expected to screen or block the majority of views towards the WTGs from the main dwelling spaces.</p> <p>Views of multiple WTGs are likely to be available from the driveway of the property and these will appear as dominant features within the viewframe.</p> |

| RECEPTOR IDENTIFICATION | RECEPTOR SENSITIVITY | MAGNITUDE |                 |                |                     |                    |
|-------------------------|----------------------|-----------|-----------------|----------------|---------------------|--------------------|
|                         |                      | DISTANCE  | QUANTUM OF VIEW | PERIOD OF VIEW | MAGNITUDE OF CHANGE | SUMMARY OF RATINGS |
| 8                       | H                    | M         | L               | L              | L                   | L                  |

|                              |              |
|------------------------------|--------------|
| Overall Visual Impact Rating | MODERATE/LOW |
|------------------------------|--------------|

From Table 03, using a combination of sensitivity and magnitude ratings.