

Annex F

Landscape and Visual Impact Assessment Report





JUPITER WIND FARM

Landscape Character and Visual Impact Assessment

S14-0147

Issue H

17/10/2016





JUPITER WIND FARM LANDSCAPE CHARACTER AND VISUAL IMPACT ASSESSMENT

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Document	Issue	Date	Status	Verified	Validated
S13-0150	A	05/05/2014	FIRST DRAFT	MK	
	B	12/01/2014	DRAFT	MK	
	C	28/07/2015	DRAFT	MK	
	D	11/09/2015	DRAFT	MK	CL
	E	01/10/2015	DRAFT	MK	CL
	F	02/08/2016	DRAFT	MK	CL
	G	02/09/2016	FINAL DRAFT	MK	CL
	H	17/10/2016	FINAL	MK	CL



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EXECUTIVE SUMMARY

E1 INTRODUCTION

EPYC Pty. Ltd. (EPYC) (the Proponent) is proposing to construct the Jupiter Wind Farm (JWF or Project) in the Southern Tablelands of New South Wales (NSW). The key purpose of this Landscape Character and Visual Impact Assessment (LCVIA) is to assess the visual and landscape character impacts of the Project with regard to:

- Part 4 of the Environmental Planning and Assessment Act 1979 (EP&A Act)
- Secretary's Environmental Assessment Requirements (SEARs) dated 02 March 2016

E2 THE PROJECT

The Project will involve construction of up to 88 wind turbine generators (WTGs) within two distinct precincts (northern and southern) with a maximum height of 173 m above ground level (AGL). The Project will also involve construction of a series of internal access roads and 33 kV reticulation network connecting the WTGs. An electrical substation and connection to the existing TransGrid 330 kV transmission line that passes through the Project Area (PA) is also proposed, along with other associated buildings, ancillary structures and equipment.

E3 THE PROJECT AREA

The Project Area (PA) covers land of approximately 4,999 hectares (ha) spanning across both the Goulburn Mulwaree and former Palerang Local Government Areas (LGAs) and is situated approximately 5 kilometres (km) south east of the township of Tarago and approximately 18km east of Bungendore.

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 grassland, stands of native vegetation, creek lines, ridges and a low density of rural development. The PA and surrounds have been assessed and five landscape character zones have been established: Rural Roads, Main Roads, Undulating Grassland, Woodland Areas and Rural Development.

The overall impact of the Project on landscape character is rated as

- Moderate/Low across two character zones - Rural Roads/Woodland Areas
- Moderate across one zone - Main Roads
- Moderate/High across two zones - Rural Development/Undulating Grassland

The JWF may alter some of the landscape characteristics of zones rated as Moderate/High impact, although all zones have the capability to absorb change to some extent. The prominent height of the turbines will be the most discernible element of the Project in these zones.

E5 VISUAL IMPACT ASSESSMENT

- the expected unmitigated visual impacts of the Project on all dwellings within 3km offset of a WTG range from Negligible to High (refer Figure E1)
- unmitigated Negligible to Moderate/Low visual impacts are predicted to affect approximately 47 (34%) dwellings within 3km of the WTGs
- unmitigated Moderate visual impacts are predicted to affect approximately 34 (24%) dwellings within 3km of the WTGs
- unmitigated Moderate/High and High visual impacts are predicted to affect approximately 59 (42%) dwellings within 3km of the WTGs
- the greatest visual impacts may be experienced by dwellings on elevated terrain to the east and west of the northern turbine precincts from where views of multiple turbines will be available

- the extensive north/south geographical spread of WTGs potentially increases the number of viewers affected, with the majority of dwellings located on the western side of Goulburn/Braidwood road
- there is a limited quantum of public open space within the study area from which views of the WTGs might be had
- Moderate/High impacts on public viewpoints are limited to motorists using sections of Goulburn/Braidwood Road
- dense stands of tree planting, windbreaks and garden plantings (associated with individual properties) block or filter many views towards the Project from habitable areas of dwellings
- there is a relatively low density of residential viewer locations surrounding the southern precinct cluster, limiting Moderate/High and High visual impacts to a small number of dwellings within 2km of these turbines
- the JWF is unlikely to have a major impact on the character of Tarago village, although views to multiple WTGs may be available from some dwellings on Tarago Road (approximately 5km from the nearest WTG) and the new subdivision of Sherwins Ridge (approximately 6km from the nearest WTG)
- the visual catchment beyond 6-7km offset from the PA is constrained by topography and vegetation which blocks the majority of views to the turbine clusters from beyond this distance.

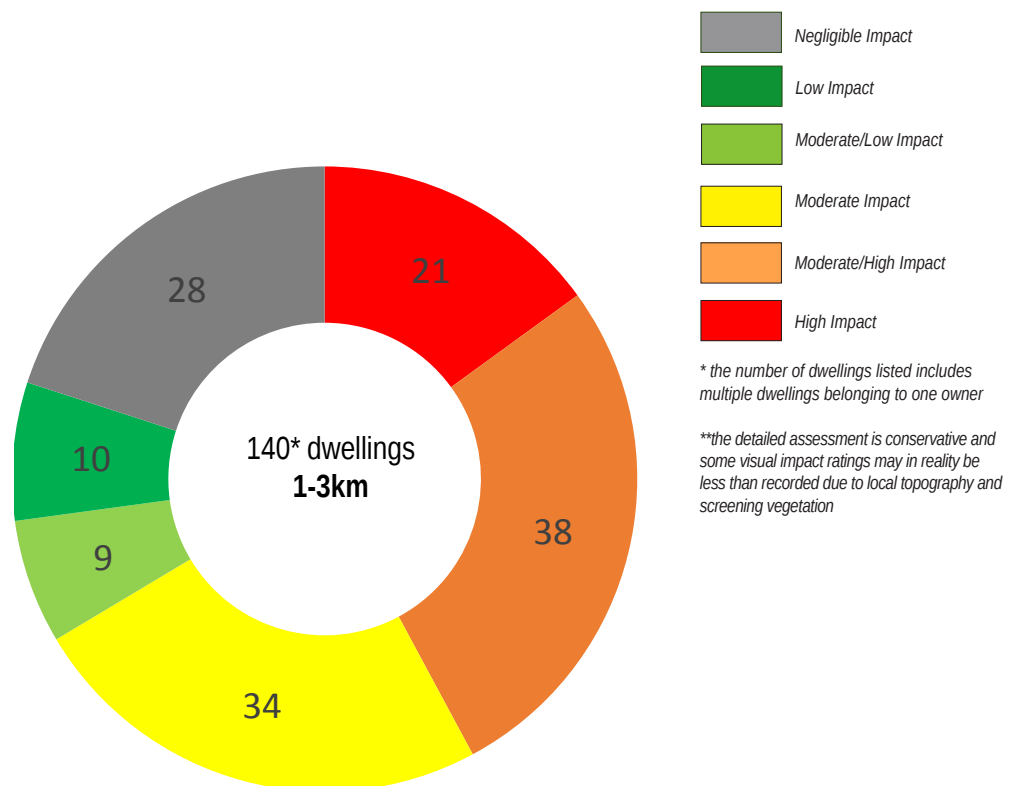


Figure E1 - Overall summary of unmitigated visual impacts of the Project on individually assessed dwellings between 1-3km from nearest WTG** (refer Appendix A for further details)

E6 NIGHT TIME IMPACTS

- night time impacts are generally less severe than day time impacts due to the reduced number of viewers, reduced viewing duration and lack of visual context (ie. the majority of view is obscured by darkness)
- there is a limited number of existing light sources within the JWF visual catchment, increasing the visibility of any new light source
- the greatest night time impacts may be experienced by dwellings on elevated terrain to the east and west of the northern turbine precincts from where views of multiple turbine lights may be available
- night lighting will have limited visual impacts on motorists
- the use of low intensity lighting will assist in reducing the level of impact experienced
- the implementation of radar activated lighting would likely diminish any night time visual impacts to negligible.

E7 CUMULATIVE IMPACT

- the JWF is unlikely to result in any significant combined or sequential cumulative visual impacts resulting from associated views towards Capital and Woodlawn wind farm developments within the study area
- the JWF will, however, increase the perceived density of wind farm development within this section of the Southern Tablelands
- the re-occurrence of wind farms within a region, due to the wind resource in the area, has the ability to alter the perception of the overall visual and landscape character, irrespective of being viewed in a single viewshed.

E8 MITIGATION

- WTGs are by their nature tall and visually prominent. The turbine design and location is limited by functional requirements and minor changes such as colour choice and reflectivity are unlikely to change the visual impact enough to alter any impact ratings recorded within this report
- new screen planting around affected dwellings would likely reduce some of the visual impact ratings recorded within this report. This solution may be effective for some landowners based on the location of their dwelling
- the expected unmitigated and mitigated (through screen planting) visual impacts of the 59 dwellings identified as having Moderate/High to High visual impacts are shown in Figure E2 and E3
- whilst screening planting can be highly effective in blocking or filtering views, the impact is often of a highly local nature and can remove parts of the view that may still be considered desirable. The extent and nature of appropriate mitigation measures for private receptors should be subject to consultation and agreement with individual property owners.

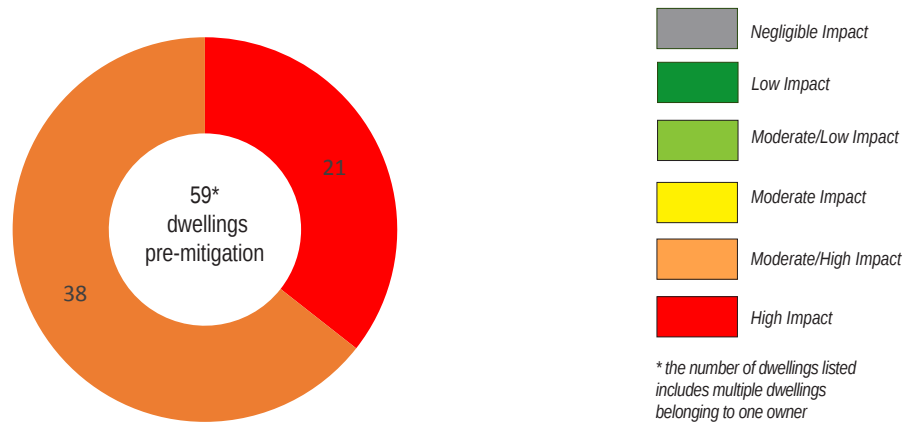


Figure E2 - Number of dwellings within 3km offset of WTGs predicted to be affected by High or Moderate/High visual impacts pre mitigation

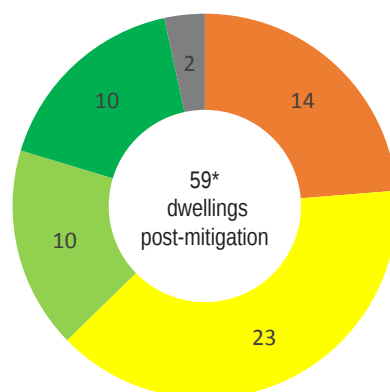


Figure E3 - Predicted residual visual impact on same dwellings post mitigation (screen planting of vegetation at mature height)



01

Introduction

1.0 INTRODUCTION

1.1 PURPOSE OF THE REPORT

The key purpose of this Landscape Character and Visual Impact Assessment report (LCVIA) is to assess the visual and landscape character impacts of the proposed Jupiter Wind Farm (JWF or the Project) having regard to Section 4 of the Environmental Planning and Assessment Act 1979 (EP&A Act).

The Project is a State Significant Development (SSD) under Schedule 1 of the (State Environmental Planning Policy State and Regional Development) 2011. This specialist assessment will form part of the Environmental Impact Statement (EIS) for the Project.

This LCVIA addresses and responds to the Secretary's Environmental Assessment Requirements (SEARs) dated 02 March 2016, for the assessment of potential landscape and visual impacts.

Table 1.1 outlines the relevant assessment requirements of the SEARs and the corresponding section of the report in which they are addressed.

SEARs	Report Reference
Provide a comprehensive assessment of the visual impacts of all components of the Project (including turbines, transmission lines, sub-stations, and any other ancillary infrastructure) on landscape values, scenic vistas, rural townships, non-associated residences (including approved but not yet developed dwellings or subdivisions with residential rights), significant public viewing locations, and any cumulative impacts associated with surrounding proposed, approved or operational wind farms in the locality.	Section 2 - The Project Section 3 - Landscape Character Assessment Section 4 - Visual Impact Assessment Section 5 - Cumulative Impact Assessment Section 6 - Mitigation Assessment Appendix A - Detailed Assessment of Dwellings within 3km Offset of a Turbine
Identify a zone of visual influence for the wind farm (no less than 10km).	Section 4 - Visual Impact Assessment
Assess the impact of shadow "flicker", blade "glint", and night lighting from the wind farm.	Section 4 - Visual Impact Assessment - night lighting impacts Appendix B - Photomontages and Wireframes Refer to separate specialist assessment for flicker and blade glint assessment.
Utilise recognised tools (such as photomontages and wireframes) at representative locations to adequately assess the visual impacts of the Project, particularly for non-associated residences within 3 km of a proposed turbine.	Section 4 - Visual Impact Assessment Appendix B - Photomontages and Wireframes
Provide detailed consideration of the feasibility and effectiveness of the proposed mitigation measures, including consultation with all landowners of non-associated residences within 3 km of a proposed turbine where significant visual impacts are predicted to identify potential approaches to mitigate any adverse impacts, including consideration of negotiated agreements.	Section 6 - Mitigation Assessment Appendix A - Detailed Assessment of Dwellings within 3km Offset of a Turbine

Table 1.1 - SEAR requirements and where they are addressed in this report

1.2 LEGISLATIVE AND POLICY CONTEXT

As described in Section 1 above, the purpose of this LCVIA is to achieve the requirements specified in the SEARs, dated 02 March 2016. Given the subjective nature of an individual's appreciation of any given scene, LCVIA is by its nature not an exact science and consequently methodologies for preparing assessments vary both within 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. It is therefore necessary to address the legislative and policy context and recognised guidelines for wind farm visual impact assessment.

The nature of the public's perception to wind farm developments is particularly subjective. Developments can be viewed as either positive or negative, depending on an individual's opinion of renewable energy, wind turbines and how they view and value the existing landscape. With any infrastructure project of this nature there is a balance to be struck between national and local concerns.

As a consequence, and as identified by the NSW Land and Environment Court, the key to a robust assessment process is to explain clearly the criteria upon which an assessment is made:

'The outcome of a qualitative assessment will necessarily be subjective. However, although beauty is inevitably in the eye of the beholder, the framework for how an assessment is undertaken must be clearly articulated. Any qualitative assessment must set out the factors taken into account and the weight attached to them. Whilst minds may differ on outcomes of such an assessment, there should not be issues arising concerning the rigour of the process.'

Within Australia, there are two recognised guidelines for wind farm visual impact assessment:

1.2.1 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 1.2.

1.2.2 Draft NSW Planning Guidelines Wind Farms (December 2011)

The NSW Department of Planning and Infrastructure issued the guidelines to provide direction and information for wind farm applicants and consent authorities, as well as communities and stakeholder groups. The draft guidelines set out key considerations for the initial assessment of landscape and visual impacts for residential dwellings within a 2km radius of proposed wind turbines.

This LCVIA is consistent with the NAF and Draft NSW Planning Guidelines Wind Farms methodologies with additional regard for several best practice guidelines, including the:

- National Wind Farm Development Guidelines (Public Consultation Draft V2.4 July 2010)
- Auswind Best Practice Guidelines (December 2006)
- Environmental Impact Assessment Practice Note: Guidelines for Landscape Character and Visual Impact Assessment (RMS March 2013)

Wind Farms and Landscape Values National Assessment Framework Methodology
Step 1 Assess the Landscape Values 1A Preliminary Landscape Assessment • 1A.1 Desktop Review • 1A.2 Seek information from Local Authority • 1A.3 Identify potential community and stakeholder interests • 1A.4 Site survey • 1A.5 Preliminary assessment of landscape values 1B Full Landscape Assessment • 1B.1 Define the study area for assessment, including the zone of visual influence • 1B.2 Landscape Character Analysis • 1B.3 Natural and cultural values analysis • 1B.4 Involve communities and stakeholders in identifying landscape values • 1B.5 Document values and analyse significance
Step 2 Describe and Model the Wind Farm in the Landscape • 2.1 Describe the development • 2.2 Model the development • 2.3 Prepare a visual assessment report
Step 3 Assess the Impacts of the Wind Farm on Landscape Values • 3.1 Seek community input to potential impacts • 3.2 Identify and describe impacts • 3.3 Identify potential cumulative impacts • 3.4 Identify other relevant factors • 3.5 Evaluate impacts
Step 4 Respond to Impacts • 4.1 Changes to location or siting of the wind farm or ancillary infrastructure • 4.2 Layout and design considerations • 4.3 Minor changes and mitigation measures • 4.4 Recommend changes to the development

Table 1.2 - NAF Methodology

The Project is located within both the Goulburn Mulwaree and former Palerang LGAs. On 12 May 2016, the NSW Government announced the merger of the Palerang and Queanbeyan Councils to become the Queanbeyan-Palerang Regional Council. The Local Environment Plans (LEPs) for the former Palerang and Queanbeyan LGAs will continue to apply to their respective areas until such time as a new LEP covering the new LGA has been gazetted. Thus, for the purposes of the EIS assessment, reference has been made to the former Palerang LGA throughout.

1.2.3 Goulburn Mulwaree Development Control Plan DCP (2009)

The Goulburn Mulwaree DCP includes a specific provision for wind farms with the objective:

- to minimise the impacts of wind farm development on the environment of the Goulburn Mulwaree local government area.

The key guidelines related to landscape character impacts are that:

- proposals must be permissible under the LEP, compatible with the existing uses of the subject land and surrounding land and avoid areas identified for future urban development.

The key guidelines for visual impacts are:

- to minimise visual impact, avoid locations where turbines are seen by many people. To this end towers are not to protrude beyond ridgelines within view of land visible from areas of existing and future closer settlement such as residential land, large lot residential land; the range of rural lifestyle blocks and the villages of Bungonia, Lake Bathurst, Tallong and Tarago. Similarly, the visual impact of new transmission lines must be evaluated.

1.2.4 The Land and Environment Court Planning Principles

The Land and Environment Court of New South Wales was established in 1980 by the Land and Environment Court Act 1979. Relevant planning principles have been developed in visual assessment case judgments over the years to guide future decision-making in development appeals. These include separate but related principles for private and public domain views.

The principles set out a process for assessing the acceptability of impact. The two most relevant cases to this site are:

- Public domain views - *Rose Bay Marina Pty Limited v Woollahra Municipal Council* (2013)
- Private views - *Tenacity Consulting v Warringah Council* (2004)

Overall, the Court Commissioners conclude that public domain views should be given more weight than private domain views due to the potential for visual impacts to affect a greater number of viewers.

Planning Principles for Public domain views - *Rose Bay Marina Pty Limited v Woollahra Municipal Council* (2013)

The assessment process from these planning principles includes:

Identification Stage

Identify the nature and scope of the existing views from the public domain:

- the nature and extent of any existing obstruction of the view
- relevant compositional elements of the view
- what might not be in the view - such as the absence of human structures in the outlook across a natural area
- whether the change permanent or temporary

This is followed by identifying the locations in the public domain from which the potentially interrupted view is enjoyed and the extent of obstruction at each relevant location. The intensity of use of this location is also to be recorded. Finally, the existence of any document that identifies the importance of the view ie. international, national, state or local heritage recognition is ascertained.

Analysis of impacts

- the analysis required of a particular development proposal's public domain view impact is both quantitative as well as qualitative
- a quantitative evaluation of a view requires an assessment of the extent of the present view, the compositional elements within it and the extent to which the view will be obstructed by or have new elements inserted into it by the proposed development
- any qualitative assessment must set out the factors taken into account and the weight attached to them. Whilst minds may differ on outcomes of such an assessment, there should not be issues arising concerning the rigour of the process
- as with Tenacity, a high value is to be placed on what may be regarded as iconic views (major landmarks or physical features such as land/water interfaces).

Planning Principles for Private views - Tenacity Consulting v Warringah Council (2004)

The planning principles from this judgement include:

Assessment of views to be affected

- water views are valued more highly than land views
- iconic views (eg of the Opera House, the Harbour Bridge or North Head) are valued more highly than views without icons
- whole views are valued more highly than partial views, e.g. a water view in which the interface between land and water is visible is more valuable than one in which it is obscured.

From what part of the property the views are obtained

- the protection of views across side boundaries is more difficult than the protection of views from front and rear boundaries
- sitting views are more difficult to protect than standing views.

Extent of the impact

- the impact on views from living areas is more significant than from bedrooms or service areas
- it is usually more useful to assess the view loss qualitatively as negligible, minor, moderate, severe or devastating.

Reasonableness of the proposal

- with a complying proposal, the question should be asked whether a more skilful design could provide the applicant with the same development potential and amenity and reduce the impact on the views of neighbours. If the answer to that question is no, then the view impact of a complying development would probably be considered acceptable and the view sharing reasonable.

The principles established by the Court from both cases have been integrated into the methodology adopted for this evaluation and detailed in the Methodology section of this report.

1.2.5 Wind Energy Assessment Policy Draft for Consultation August 2016

The authors of this report recognise that the Wind Energy Assessment Policy Draft for Consultation August 2016 (draft assessment policy) and Wind Energy Visual Impact Assessment Bulletin Draft for Consultation August 2016 (draft visual bulletin) documents were released for public consultation during the preparation of this LCVIA.

As per Section 1.4 of the draft assessment policy (similarly the section titled 'Application of this Bulletin' of the draft visual bulletin) these documents apply to all applications for development consent for an on-shore SSD wind energy development where the SEARs were issued after the date of the publication of the draft assessment policy and visual bulletin. In addition these documents may apply to applications for modification to an existing wind farm approval submitted after the date of publication of this Policy.

The Project SEARs are dated 02 March 2016 (prior to release of the draft assessment policy and draft visual bulletin) and the Project does not represent an application for modification to an existing wind farm approval, hence the draft assessment policy and visual bulletin do not apply the Project, or this LCVIA prepared to address the relevant assessment requirements of the SEARs.

1.3 ASSESSMENT METHODOLOGY

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 individuals or groups of people may be specifically affected by changes in their surroundings, 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 visual receptors (viewers of the scene) 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 visual environment and the Project at the time of writing. The current and potential future viewers (visual receptors) have not been consulted about their perceptions by the authors of this report (refer Section 1.7). The analysis and conclusions are therefore based solely on a professional assessment of the anticipated impacts, based on a best practice methodology.

CLOUSTON Associates has developed a best practice methodology based on internationally recognised approaches and 20 years of experience in the field of visual assessment. There are several critical dimensions demonstrated through this assessment and evaluation:

- ensuring all receptors (viewers) have been adequately identified, even at distance
- comprehensive evaluation of context to determine visual catchment of site from these areas
- being clear on and separately defining quantitative impacts (distance, magnitude, duration etc) as against qualitative impacts (viewer type and context of view)
- providing a clear rationale for how impacts are compared and contrasted
- ensuring photomontages include views from highest potential impact locations, identified from analysis above.

Figure 1.1 summarises the methodology employed for the assessment of JWF. For more details, refer to the individual methodology sections within Section 3 - Landscape Character and Section 4 - Visual Impact Assessment of this report.

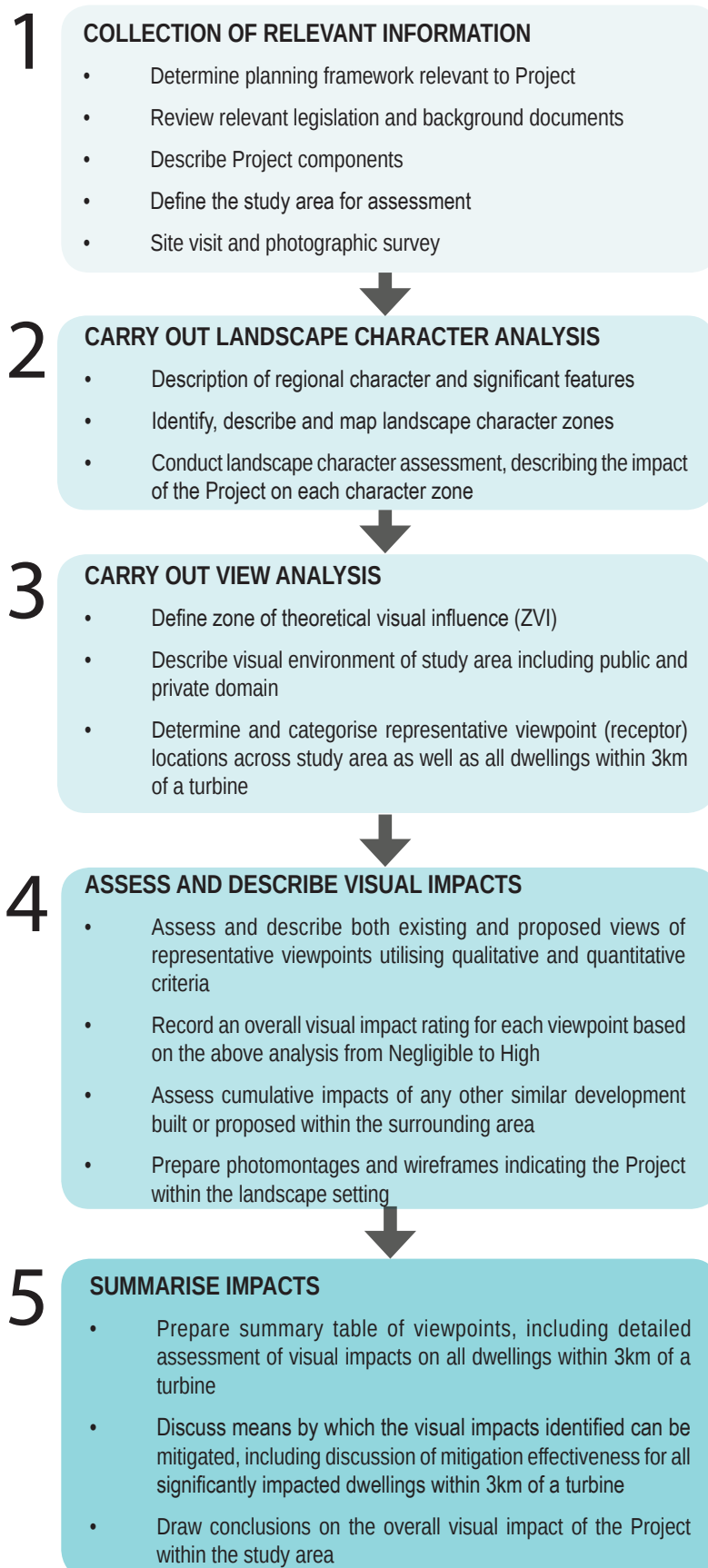


Figure 1.1 - Summary of CLOUSTON methodology
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1.4 REPORT STRUCTURE

The report is structured into seven sections.

Section 1 - Introduction	An introduction section that described the planning and methodology context for the study.
Section 2 - The Project	A description of the proposed development including site layout, turbine specification and ancillary facilities.
Section 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 Project on each is assessed.
Section 4 - Visual Impact Assessment	An overview of the existing visual environment of the study area and the subsequent visual impacts of the Project. Selected representative viewpoints are assessed on a range of qualitative and quantitative criteria.
Section 5 - Cumulative Impact Assessment	A description of the potential additional impacts on landscape character and visual impact from nearby current and future similar development.
Section 6 - Mitigation Assessment	A discussion as to the means by which the visual impacts identified can be reduced or offset.
Section 7 - Conclusion	Conclusions are drawn on the overall impact of the Project within the study area.
Appendix A	A detailed assessment of visual impacts and mitigation effectiveness/feasibility for every dwelling within 3km offset of a turbine.
Appendix B	Wireframes and spatially accurate photomontages of the Project taken from varied locations throughout the study area.

1.5 COMMON TERMS

The following provides a brief explanation of some of the terms used within this report:

Landscape Character Zone: area 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.

Receptor/Receiver: the public or community at large who would have views of the Project either by virtue of where they live and/or work or from transport routes, paths, lookouts and the like. Refer Section 4.5.4 of this report for a description of the method adopted by the Proponent and for the purposes of the EIS to uniquely identify each applicable dwelling, receptor and other structures within and surrounding the PA.

View: the sight or prospect of some landscape or scene.

View Corridor: a line of sight of an observer looking toward an object.

View Frame: the extent of the observable world that can be seen by an observer from a fixed location, moving their head from side to side.

Visual Accessibility: the extent to which an area or object is visible to an observer.

Visual Amenity: the measure of the visual quality of a site or area experienced by residents, workers or visitors. It is the collective affect of the visual components which make a site or an area pleasant to be in.

Viewshed/Visual Catchment: the area which the Project is visible to the human eye from a fixed vantage point.

1.6 STUDY EXTENT

For the purposes of this report, the following definitions have been used to describe the geographical extent of the assessment.

- Project Area (PA): As defined by the Project boundary, including all Project components (WTGs, substation, underground cables or overhead transmission lines, access tracks and other associated infrastructure)
- Study Area: The geographical extent specific to the Landscape Character and Visual Impact Assessments which comprise the entire PA and land within the surrounding landscape up to approximately 12km from the PA.

It should be noted that the proposed Project layout is indicative only and subject to detailed design and micro-siting. All layout maps and figures are indicative only and are subject to detail design.

1.6.1 Micro-siting

Future iterations of the JWF turbine layout may provide the opportunity to relocate some of the WTGs to different positions within the PA. Turbine location is limited by functional requirements; wind velocities tend to be at their greatest on elevated hillsides and ridges, locations which may correlate to high visibility.

Relocated turbines can reduce the visual impact on one receptor, but may increase it for another. As long as separation distances are similar to the current layout, moving WTGs is unlikely to alter the impact ratings outlined within this report and any subsequent changes to visual amenity are likely to be minor or negligible.

1.7 COMMUNITY CONSULTATION

Community consultation has not been carried out by the authors of this report, however a comprehensive community and stakeholder engagement program is in place and managed by the Proponent. This process of engagement has been undertaken in accordance with the Stakeholder and Community Engagement Strategy (the Strategy) developed for the Project.

Chapter 7 of the EIS outlines the process of consultation and engagement the Proponent has undertaken with key stakeholders (including the local community and government), and highlights where key issues raised throughout the consultation process to date have been addressed in the remainder of the EIS, including visual aspects. The Strategy was prepared by ERM and is provided as Annex B to the EIS.

Targeted site visits were however conducted by the authors of this report (with support of the Proponent) to assist in providing a detailed consideration of the feasibility and effectiveness of any proposed mitigation measures. This included consultation with all landowners of non-associated residences within 3km of a proposed turbine, where contact or access was possible and where significant visual impacts were predicted.

The purpose of these targeted site visits was to identify potential approaches to mitigate any adverse impacts, however all detailed consultation aspects including consideration of negotiated agreements, was undertaken by the Proponent. The mitigation analysis and outcomes applicable to this assessment are discussed in Section 6 - Mitigation and tabulated in Appendix A.



02

The Project

2.0 THE PROJECT

2.1 LOCATION

The PA covers an area of approximately 4,999ha spanning the Goulburn Mulwaree and former Palerang LGAs and is situated approximately 5km south east of the township of Tarago and approximately 18km east of Bungendore (refer Figure 2.1 and 2.2).

The southern extent of Goulburn is located approximately 35km to the north of the PA. The village of Lake Bathurst and localities of Mayfield, Boro, Mount Fairy and Manar are located in the broader region with a combined population of less than 3,000 (2011 census data).

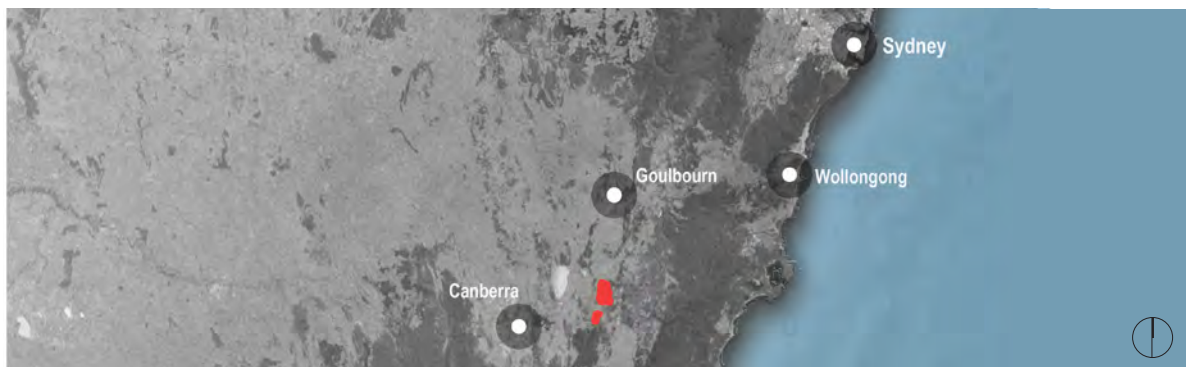


Figure 2.1 - Site context

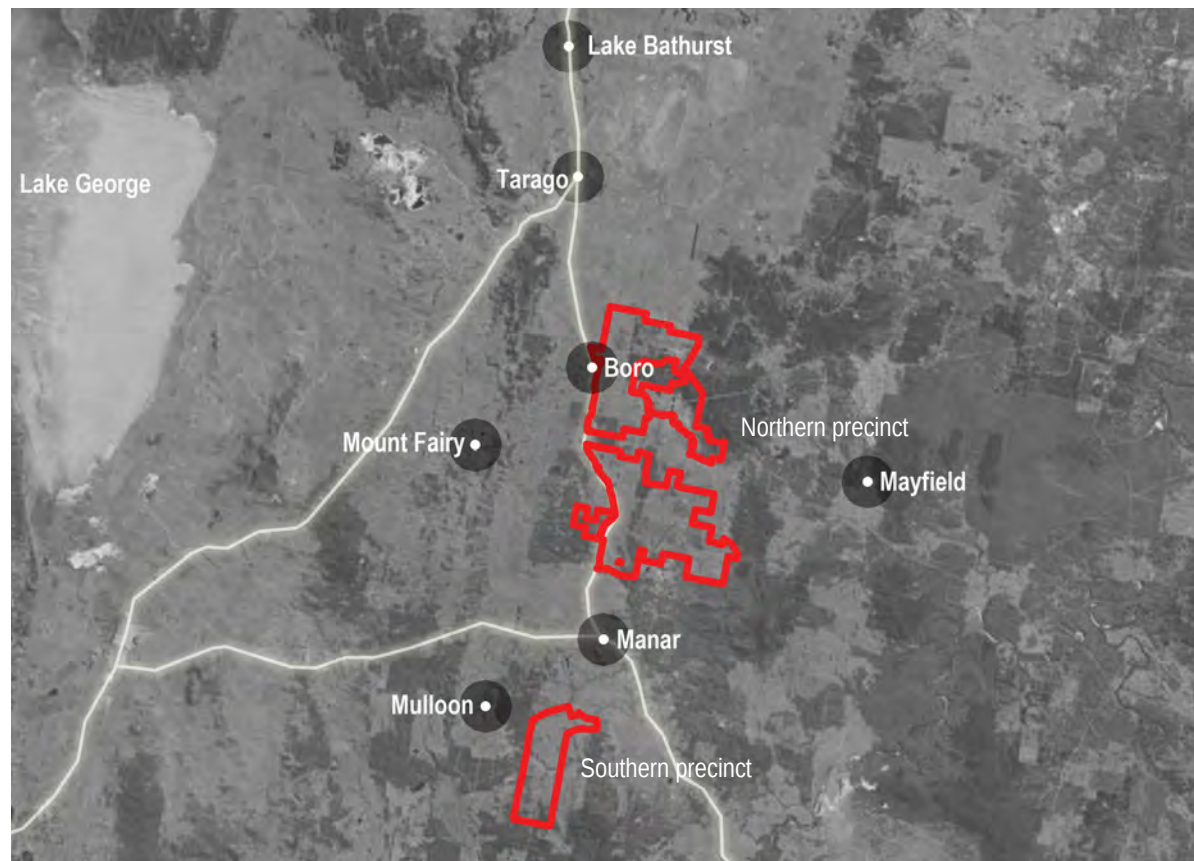


Figure 2.2 - Site location

— Project Area

2.2 PROJECT

The Proponent is proposing to construct the JWF comprising up to 88 WTGs, transmission lines, an electricity substation and ancillary infrastructure in the Southern Tablelands PA. The Project was initiated in 2012 with site selection and wind resource mapping.

Elements of the Project relevant to this study include (refer Figure 2.3, 2.4 and 2.5):

- construction of up to 88 WTGs located within northern and southern precincts
- construction of an electrical substation / switchyard building located in the northern precinct, including transformers, switchgear, insulators and other ancillary equipment
- 33 kV electrical reticulation and fiber optic cabling connecting the WTGs within each precinct (predominantly installed underground, with some sections above ground), located generally along the same alignment as the internal private access road network
- a 33 kV transmission line connecting the 33 kV electrical reticulation networks within the southern and northern WTG precincts to the substation, to be located within the road reserve of Goulburn Road, the Kings Highway and the proposed access road into the southern precinct
- short 330 kV above ground transmission line connecting the on-site substation to the existing TransGrid 330 kV transmission line, which passes through the PA
- construction of a permanent operations and maintenance building, located within the substation site
- construction of an internal private access road network (approximately 54.8km in length) connecting the WTGs and the Project site to the public road network
- construction of up to four permanent meteorological monitoring masts
- three temporary mobile concrete batching plants to supply concrete for turbine footings and substation construction works and cleared hardstand areas for construction equipment and storage (construction laydown areas)
- temporary buildings and facilities for construction personnel / equipment.

2.2.1 Wind Turbine Generators

Each WTG will consist of a tubular steel or concrete hybrid tower with 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 maximum diameter of up to 126m; giving a total blade tip height of up to 173m (refer Figure 2.3 and 2.4).

It is understood that a number of potential models of WTG are currently under consideration, however the WTG model upon which this assessment is based represents the maximum physical dimensions of the models under consideration.

2.2.2 Meteorological monitoring masts

Three meteorological monitoring masts are currently installed on site, ranging in height from 80m to 104m. It is understood that these monitoring masts may be replaced with three to four permanent monitoring masts during construction, extending to approximately 110m in height.

The meteorological 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 are similar in scale to a number of surrounding communication masts visible in the landscape and have not been considered further in this assessment.

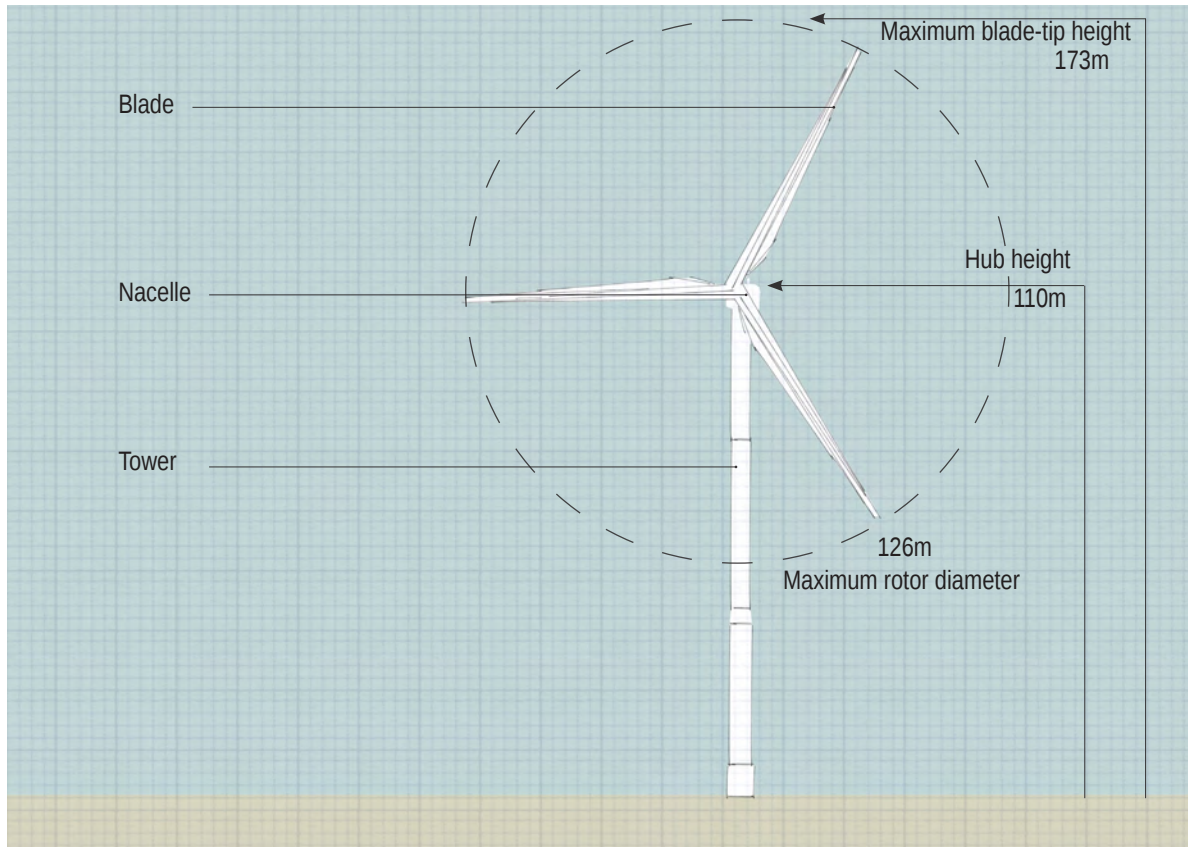


Figure 2.3 - WTG Specifications

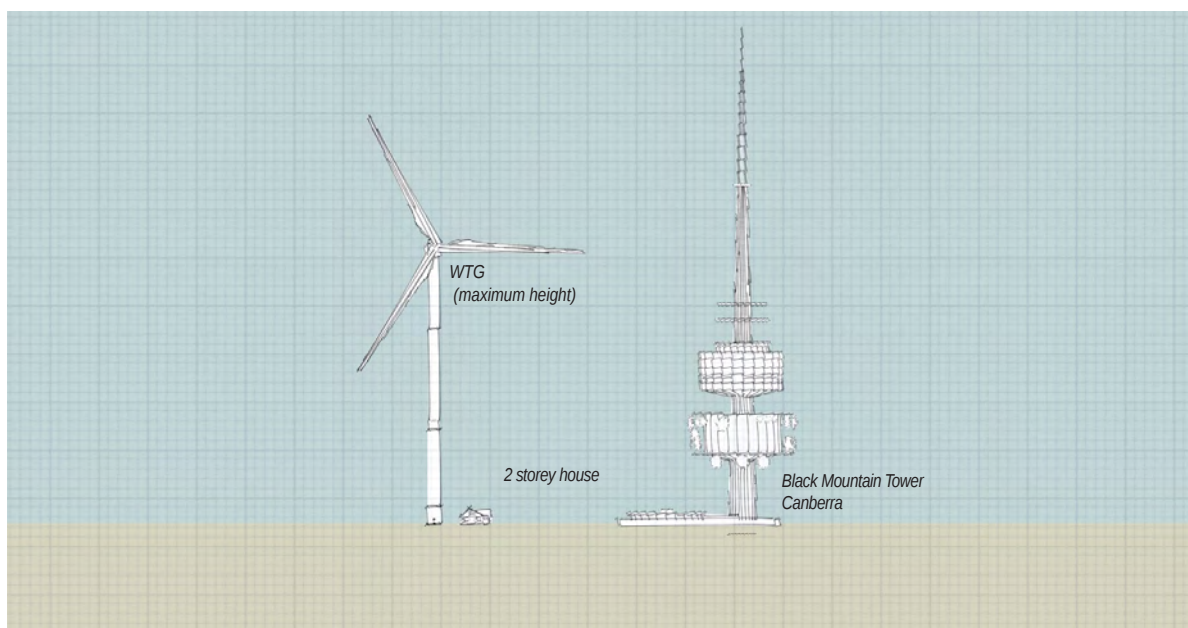


Figure 2.4 - WTG height comparison

2.2.3 On-site access roads

Up to 55km of private access roads will be constructed to provide access to turbine locations and other Project infrastructure across the site during construction and operation. Where possible, the internal road network will be aligned on the route of existing farm or other tracks. The internal roads will be up to 8m wide with localised widening where required to support transportation of the WTG components.

2.2.4 Electrical connections

The 33 kV transmission line that will connect the underground 33 kV electrical reticulation networks from the southern and northern WTG precincts to the substation is yet to be confirmed in detail. At this stage, the 33 kV transmission line is proposed to be constructed within the road reserve of Goulburn Road, the Kings Highway and the proposed access road into the southern precinct.

The 33 kV transmission line will be built as either an above-ground line consisting of poles and wires, or a buried underground cable. At this stage the authors of this report understand that a buried underground cable is preferred by the relevant electrical suppliers (TransGrid) and regulatory authorities (Roads and Maritime Services, RMS). The transmission line alignment and overall construction type will be determined during detailed Project design in consultation with relevant electrical suppliers and regulatory authorities.

An above-ground electrical connection may have associated impacts for visual amenity and these impacts have been further investigated within Section 4 of this report. The preferred option is for an underground transmission line which will have negligible visual impacts once constructed.

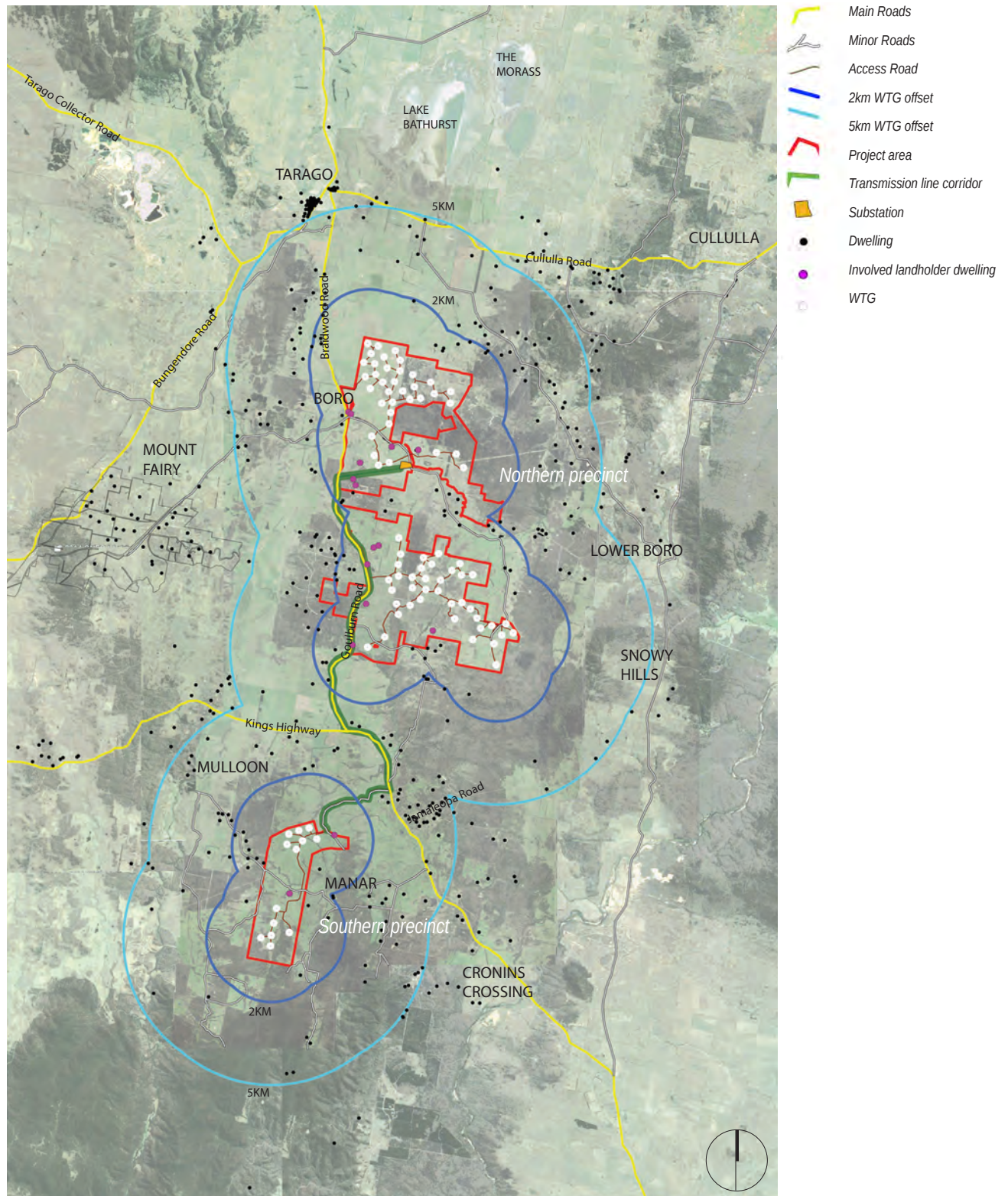


Figure 2.5 - The Project



03

LANDSCAPE CHARACTER
ASSESSMENT

3.0 LANDSCAPE CHARACTER ASSESSMENT

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 Project on each zone is assessed.

3.1 SITE ANALYSIS

The study area specific to the landscape character assessment comprises the land within the PA and the surrounding landscape up to approximately 12km from this boundary.

3.1.1 Topography

The landform and topography within and surrounding the PA is generally undulating and characteristic of the Southern Tablelands.

Typically, broad and rounded crests and ridges transition into concave lower slopes and drainage lines. A ridgeline ranging from approximately 750m to 900m in elevation extends along the western boundary of the PA with a series of smaller ridges approximately 750m in elevation along the eastern boundary. To the north of study area, the landscape forms a mostly flat plain associated with Lake Bathurst. To the south the terrain rises steeply to over 1000m within the Tallaganda State Forest area (refer Figure 3.1).

3.1.2 Vegetation

A detailed survey of existing vegetation has been carried out as part of the biodiversity assessment for the JWF EIS and is found summarised 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.

3.1.3 Land Use

The study area is located in both the Goulburn Mulwaree and former Palerang LGA. Land uses within these areas are typical of a semi-rural region with the Local Environmental Plans (LEPs) indicating land zoned as (refer Figure 3.2):

- Environmental Management (E3)
- Primary Production (RU1)
- Rural Landscape (RU2)
- Village (RU5)
- Transition (RU6)

Future rural residential areas

There are a number of regional strategies in place that outline the processes by which future rural residential subdivision should be managed within the area. Key to these strategies is the concept that existing supply of approved subdivided lots of 40 ha or less should be taken up and developed before any new areas are considered for subdivision. No new rural residential zones will be supported unless as a part of an agreed structure plan or local settlement strategy.

The majority of the existing supply of lots zoned up to 40ha in the vicinity of the Project is located within a band extending north-south through the Queanbeyan Council LGA and west of Bungendore, located a significant distance from the Project and from which views of the WTGs would be unlikely.

The draft former Palerang LGA Rural Lands Strategy provides preliminary recommendations for future rural residential areas. One location is identified as an area in proximity to the PA, located in Mount Fairy. This area is indicated on Figure 3.2 and discussed in relation to visual impact within Section 4, viewpoint 14.

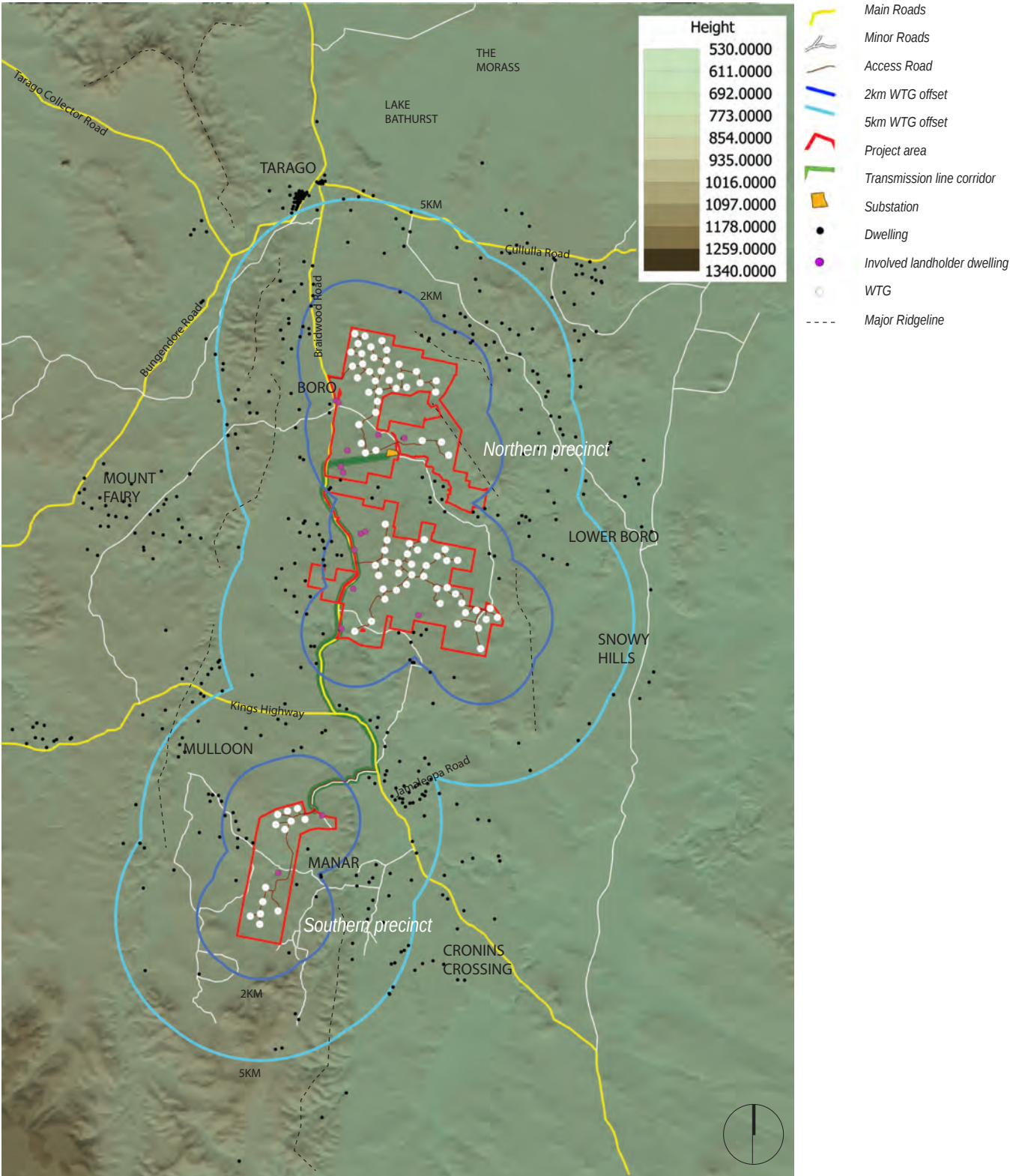


Figure 3.1 - Topographical map of the study area

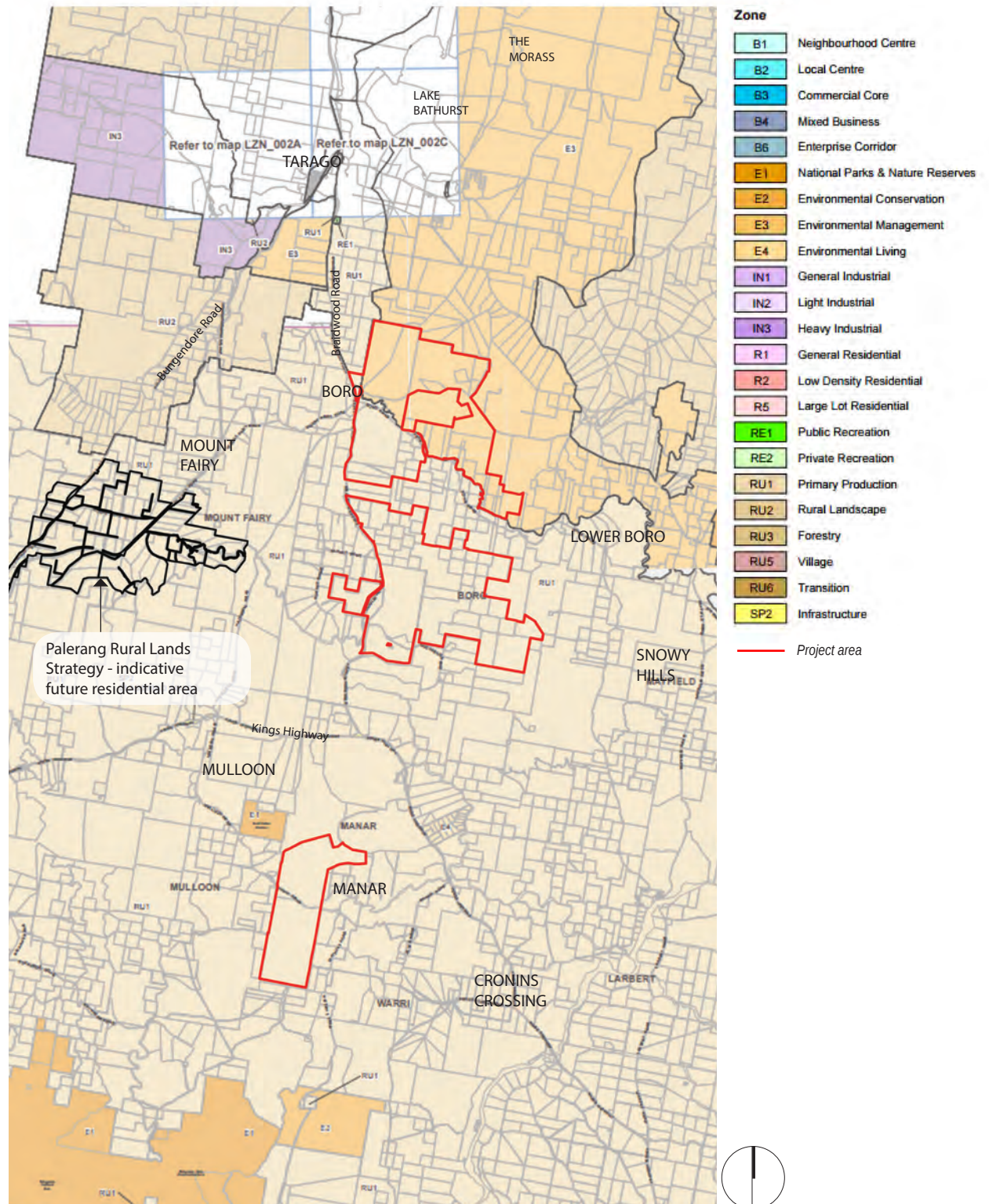


Figure 3.2 - Study area land use and Palerang Rural Lands Subdivision proposal (source: Goulburn Mulwaree and former Palerang LEPs)

3.2 LANDSCAPE CHARACTER ASSESSMENT METHODOLOGY

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

3.2.1 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 3.3):

1	Rural Roads
2	Main Roads
3	Undulating Grassland
4	Woodland Areas
5	Rural Development

3.2.2 Assessment

The overall impact rating of the Project 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
- the scale or degree of change to the landscape resource
- the nature of the effect
- the duration of the effect including whether it is permanent or temporary.

Overall Impact Rating

The severity of these impacts is calculated using Table 3.1 - based on a combination of magnitude and sensitivity. Refer Table 3.2 for an explanation of overall landscape character impact ratings.

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

Table 3.1: Landscape Character Impact Rating as a combination of Sensitivity and Magnitude.
Source: RMS Guidelines for Landscape Character and Visual Impact Assessment

NEGLIGIBLE	The Project has limited to no impact on the landscape zone. Only a very small part may be discernible and consequently it would have very little effect to the overall character of the zone.
LOW	The Project constitutes only a minor component within the landscape zone, which might be missed by the casual observer or receptor. Awareness of the Project would not have a marked effect on the overall character of the zone.
MODERATE/LOW	The Project is a recognisable element within the character zone although would not have a marked effect on the overall quality of the landscape.
MODERATE	The Project may form a visible and recognisable new element within the overall landscape that affects and changes its overall character.
MODERATE/ HIGH	The Project forms a major and immediately apparent part of the scene that affects and changes its overall character.
HIGH	The Project becomes the dominant feature of the scene to which other elements become subordinate, extensively affecting and changing the character of the landscape zone.

Table 3.2 Explanation of ratings

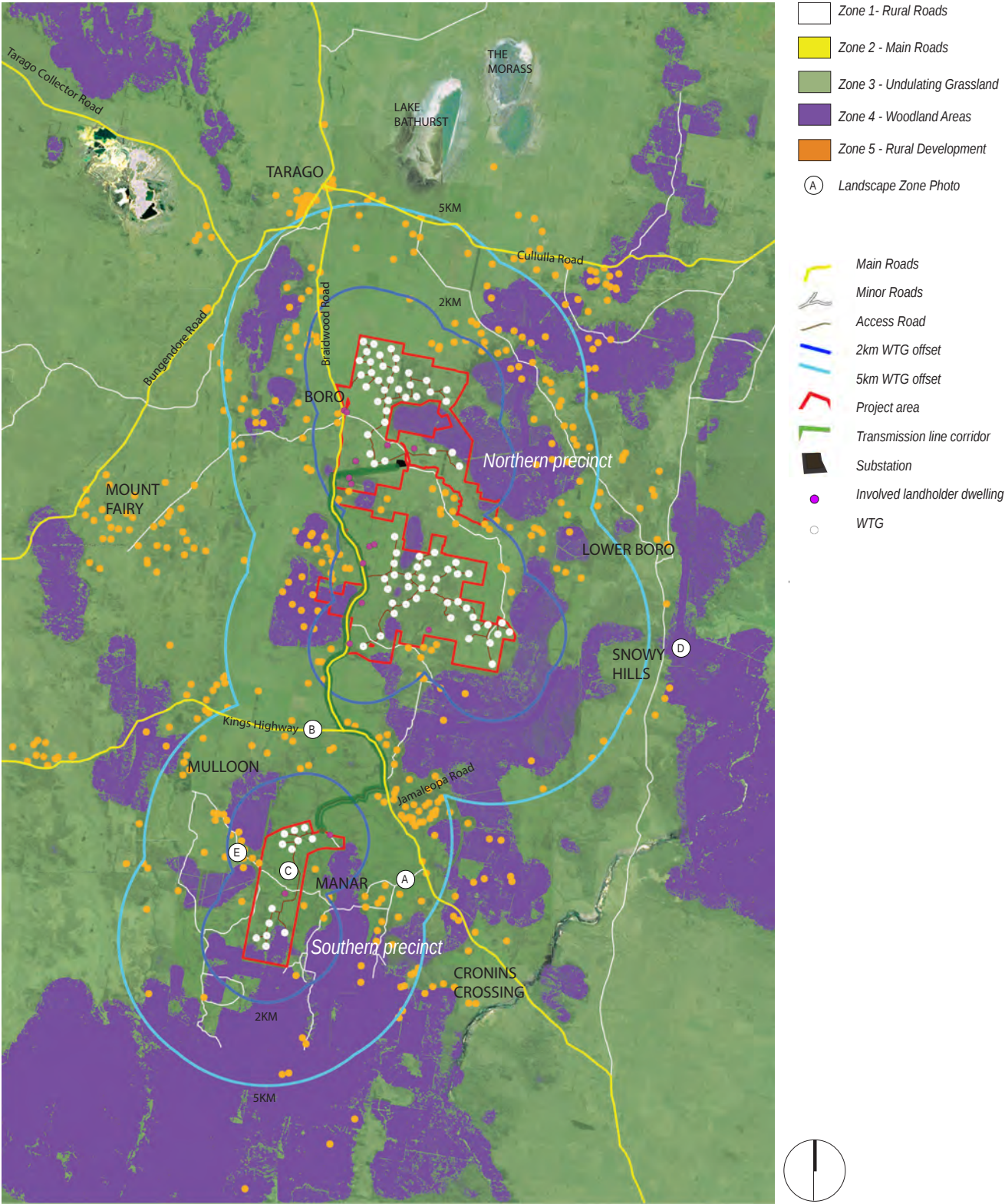


Figure 3.3 - Landscape Character Zones



LANDSCAPE CHARACTER ZONE 1 - RURAL ROADS



LANDSCAPE CHARACTER ZONE 2 - MAIN ROADS



LANDSCAPE CHARACTER ZONE 3 - UNDULATING GRASSLANDS



LANDSCAPE CHARACTER ZONE 4 - WOODLAND AREAS



LANDSCAPE CHARACTER ZONE 5 - RURAL DEVELOPMENT

LANDSCAPE CHARACTER ZONE 1 - RURAL ROADS



Photo A - Manar Road

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

A network of lightly trafficked rural roads spread throughout the study area, linking rural properties to the wider sealed road network. These roads include Boro and Lower Boro Road, Duckfield Road and Manar Road.

The quality of the road surfacing varies but is mostly unsealed and lined with banks or swales with no permanent kerb or gutter, characteristic of unsealed rural roads in NSW. The roads traverse areas of low lying grasses and sections 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 are generally not used for scenic drives or as tourist routes. Receptors move through this landscape zone relatively quickly with the roads serving a mostly functional purpose. The sensitivity of this landscape zone to change is rated as Low.	The JWF development is in close proximity to several rural road corridors that run through the study area. The turbines will be highly visible from sections of the road where views are not blocked by vegetation. Where visible, the WTGs will stand out clearly - the Project is described as having a Moderate magnitude within this landscape zone.
Overall Rating	
Despite the JWF being a noticeable element from this character zone, a significant impact to its character is not expected. The lightly trafficked and functional nature of these road corridors has led to an overall impact rating of Moderate/Low.	

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

From Table 3.1, using a combination of sensitivity and magnitude ratings.

LANDSCAPE CHARACTER ZONE 2 - MAIN ROADS



Photo B - The Kings Highway

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

A network of main roads crosses the study area including Braidwood/Goulburn Road that runs north to south and the Kings Highway that runs from east to west. The roads are sealed and are mostly of two lane width with no median, with a speed limit of 100km/h. The roads traverse areas of low lying grasses and locations where the road is enclosed by trees and shrubs.

ASSESSMENT

Sensitivity	Magnitude
The roads are moderately trafficked, being used to access properties and traverse through the study area. Where breaks in vegetation allow, these roads have extensive views over the surrounding landscape that contribute strongly to their character. They serve the local community, as well as visitors to the area. The zone has a Moderate capacity to accommodate change without altering its landscape character.	The JWF development is in close proximity to Braidwood/Goulburn Road and Kings Highway. The turbines will be highly visible from sections of these roads, where views are not blocked by roadside vegetation. If constructed above-ground, the transmission line will run parallel to and be visible from sections of these roads, although the preferred option is for the line to be underground. The Project is described as having a Moderate magnitude within this landscape zone.
Overall Rating	
The JWF will become a discernible new element within the landscape alongside this character zone. Although the main focus of this zone is transport, the character of some sections of the road may be affected and a Moderate overall impact rating has been recorded.	

Sensitivity	MODERATE
Magnitude	MODERATE
Overall Landscape Character Impact Rating	MODERATE

From Table 3.1, using a combination of sensitivity and magnitude ratings.

LANDSCAPE CHARACTER ZONE 3 - UNDULATING GRASSLAND



Photo C - Undulating Grassland in proximity to Manar Road

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 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 in nature 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 and contains few distinct features.	The JWF turbines will be clearly visible within this landscape and may appear prominent when positioned on elevated topography and ridgelines. The WTGs may create a strong contrast in the undulating grassland as a result of their large scale, vertical lines and lack of visual integration
Any new tall development will potentially stand out prominently within the landscape, although the large scale of the landscape allows it to absorb some change. This landscape zone is rated as having a Moderate sensitivity.	The magnitude of the Project within this zone is rated as High .
Overall Rating	
The JWF will become a prominent new element within this landscape zone. Overall, the Project is described as having a Moderate/High impact on its landscape character, limited to the undulating grassland in proximity to the WTGs, altering the landscape pattern to one of strong vertical forms.	

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

From Table 3.1, using a combination of sensitivity and magnitude ratings.

LANDSCAPE CHARACTER ZONE 4 - WOODLAND AREAS



Photo D - Woodland off Goulburn Road

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/National Park/Conservation Area/Nature Reserve/Private Property
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 contrasts with the surrounding backdrop of lighter toned pasture and cultivated areas.

ASSESSMENT

Sensitivity	Magnitude
This landscape zone is enclosed 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 woodland vegetation removal may be required for the construction of the turbines, electricity transmission line and access roads, although the quantum will be small and the Project is unlikely to significantly alter the character of this landscape. The Project is described as having a Low magnitude within this landscape zone.
Overall Rating	
The wooded areas within the study area are unlikely to be significantly affected by the JWF. Overall, the Project is described as having a Moderate/Low impact on its landscape character.	

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

From Table 3.1, using a combination of sensitivity and magnitude ratings.

LANDSCAPE CHARACTER ZONE 5 - RURAL DEVELOPMENT



Photo E - Rural Development off Manar Road

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 positioned on raised slopes and ridge lines with far reaching and panoramic views over the surrounding landscape.

Vegetation planted as windbreaks often surrounds properties and where present, limits long distance views. Small villages and localities within the study area such as Tarago, Boro and Mount Fairy have a higher density of dwellings.

ASSESSMENT

Sensitivity	Magnitude
Rural 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 are often reasons for residents locating here.	The JWF 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 Project within the zone.
Any new development may alter the character of the area. The zone is described as having a High sensitivity to change.	The Project is described as having a Moderate magnitude within this landscape zone.
Overall Rating	
The JWF will become a prominent new element within some sections of this landscape zone. The Project's influence on landscape character will vary across the zone. Overall, the Project is described as having a Moderate/High impact on its landscape character, limited to certain areas of rural development dependent on the location of dwelling and its surrounding context.	

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

From Table 3.1, using a combination of sensitivity and magnitude ratings.

3.3 LANDSCAPE CHARACTER SUMMARY

The landscape character of the study area has been found to be typical of the Southern Tablelands with undulating hillsides, large swathes of native woodland, creeks, elevated ridge lines and a low density of rural development. The patchwork of fields and stands of remnant vegetation contribute strongly to the spatial quality of this area and its scenic nature.

The overall impact of the Project on landscape character is rated as: (refer summary Table 3.3)

- Moderate/Low across two character zones - Rural Roads/Woodland Areas
- Moderate across one character zone - Main Roads
- Moderate/High across two character zones - Rural Development/Undulating Grassland

It should be noted that 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, dependent on an individuals perspective.

Limited impacts on the character of the Rural Road network are expected due to their low sensitivity to change, despite close proximity to Project elements. Woodland areas across the study area are similarly lightly affected with their structural and spatial quality remaining largely intact.

A Moderate impact is expected on the character of Braidwood/Goulburn and Kings Highway road corridors that run through the study area. Project infrastructure will be visible alongside and at a distance from the road, potentially influencing the visual amenity of road users. It should be noted that the perception of turbines by motorists is particularly subjective with some motorists viewing the WTGs as potentially interesting features within the landscape.

The Project is likely to alter some of the distinguishable landscape characteristics of the Rural Development and Undulating Grassland zones, limited to areas in close proximity to the turbines. The large north to south geographical spread of the JWF will increase the area of these landscape zones affected by the Project.

The prominent height of the turbines will be the most discernible element of the Project in these zones, standing out as vertical elements in a landscape with few tall structures.

3.3.1 Cumulative Landscape Impacts

The re-occurrence of wind farms within a region has the ability to alter the perception of the overall landscape character of an area. The Southern Tablelands region has experienced a steady increase in wind farm developments in recent years due to the wind resource identified in this area.

Whilst no other nearby existing or planned wind farms contribute strongly to the landscape character impacts of the JWF, as wind farm developments prevail, it is important to determine whether the cumulative effect of wind farms and other major infrastructure within the region would combine to become the dominant landscape element, potentially altering the perception of the general landscape character of the region.

SUMMARY OF LANDSCAPE CHARACTER IMPACTS

Zone	Rural Roads	Main Roads	Undulating Grassland	Woodland Areas	Rural Development
Sensitivity	LOW	MODERATE	MODERATE	MODERATE	HIGH
Magnitude	MODERATE	MODERATE	HIGH	LOW	MODERATE
Overall Rating	MODERATE/LOW	MODERATE	MODERATE/HIGH	MODERATE/LOW	MODERATE/HIGH

Table 3.3 Summary of Landscape Character Impacts of the Project

A landscape photograph showing a wide, open field with a winding road or path. In the background, there are rolling hills and a few small buildings. The sky is clear and blue. The foreground is a rocky, gravelly area.

04

Visual Impact Assessment

4.0 VISUAL IMPACT ASSESSMENT

This section of the LCVIA provides an overview of the nature of wind farm visibility, before describing the existing visual environment of the study area and the subsequent visual impacts of the Project on viewpoints through an assessment of qualitative and quantitative criteria.

4.1 DISTANCE AND WIND FARM VISIBILITY

Before any assessment of visual impacts associated with the JWF can be undertaken, it is important to describe the general nature of the visibility of WTGs within any given landscape.

Table 4.1 provides general guidance as to the effect that distance has on the perception of a wind farm development. This information is for 173m tall WTGs in an open landscape based on current best practice and field observations by the author.

It should be noted that the visibility of WTGs can vary greatly between viewpoints in the same distance band, being influenced by multiple factors including nature of location, landform and quantity of vegetation. The actual visibility of the turbines at any given time will depend on weather conditions, time of day and viewer position.

Distance	Perception	Likely visual impact
0-3kms	Highly prominent to prominent feature within the landscape	WTG likely to dominate the field of view and appear large scale. Movement of the blades clearly visible. Potential for moderate to high visibility depending on view location, vegetation, built form etc.
3-6kms	Prominent	Visually prominent - the turbines may appear large scale and an obvious element in the landscape. Blade movement is clearly discernible. Wind turbines clearly visible in the landscape but tending to become less dominant with increasing distance.
6-10kms	Prominent in clear visibility - seen as part of a wider landscape	Noticeable - the turbines are visible but do not necessarily dominate the view frame. Blade movement is visible but the turbines appear less noticeable within the field of view as distance increases.
10-20kms	A small element in the landscape	Wind turbines noticeable but tending to become less distinct with increasing distance. Blade movement may be visible but becomes less discernible with increasing distance.
20-30kms	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 4.1 - Effect of distance on turbine visibility

4.1.1 Previous Distance Studies

Much of the best practice literature on wind farm visual assessment and viewing distance is based upon first and second generation turbines up to 100m in total height. Recent technological advancements and continued turbine development has led to third and fourth generation turbines of up to 173m (such as the ones proposed for JWF).

One source of recommendations referred to for assessing potential visual impact of wind turbines in relation to distance is the Sinclair-Thomas Matrix (CPRW, 1999; Sinclair, 2001). This source presented an initial matrix table devised on the 25 and 31m hub machines built at Cemaes and Llandinam (Wales) in 1992. Both authors of this table acknowledge that the CPRW, 1999; Sinclair, 2001 matrix is a general guide, especially at the margins of each band, and both recognise the important influences of local conditions, viewing direction, turbine angle and the scale and nature of the landscape context.

As the WTGs considered within this assessment are over 170m tall, the authors of this report consider the CPRW, 1999; Sinclair, 2001 matrix to be outdated and of limited value in assessing the visual impacts of modern sized turbines.

4.2 VISUAL CONTEXT

4.2.1 Perception

Human perception is important in consideration of wind turbine visibility. People perceive size, shape, depth and distance using many cues, so the context of that view 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, although human perception also has an effect on the perceived visual impact, which is not simply a function of size or distance.

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. Perception depends on factors such as experience, the visual field, attention, background, contrast and expectation.

4.2.2 Visual contrast

Figure 4.1 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 earth background. The effect is variable and in some instances and lighting conditions, a turbine may be more visible against the land compared to the sky.

Figure 4.2 and 4.3 illustrates the difference that climatic conditions can make on turbine visibility. WTGs are often more visually prominent against a clear blue sky (Figure 4.2) than a sky of white/grey haze or clouds (Figure 4.3).

On clear or partly cloudy days, the position of the sun has an impact on the degree of visibility of the turbines. The degree of impact is 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 commonly result in the wind turbines being silhouetted above a horizon line, which may increase their prominence.

4.2.3 Viewer Movement

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

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

4.2.4 Turbine Movement

Moving objects tend to attract the eye, meaning that movement of a WTG blade during operation is likely to increase the perceived visibility of that turbine. Multiple moving blades will generally increase a viewers awareness of a wind farm. WTGs are therefore likely to be perceived as more visible during windy days than still days when blades are stationary.



Figure 4.1 - the raised topography behind this turbine assists in reducing its visibility



Figure 4.2 - turbines appear prominent against a blue sky



Figure 4.3 - turbines appear muted against a cloudy background

4.3 VIA STUDY AREA

The SEARs require the identification of 'a *zone of visual influence for the wind farm (no less than 10 km)*'. Through a desktop analysis and site visit, a study area of approximately 12km offset from the PA was identified based on topography, receptor location and viewing distance.

It is important to note that some of the WTGs will 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 173m would occupy a relatively small proportion of a the visual scene from distances in excess of 12km.

4.4 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, or may not be visible from the surrounding area.

The ZVI for JWF 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 or above and another where any part of the structure is visible, including just the blade tips (refer Figure 4.4 and 4.5).

The assessment is theoretical and assumes a perfectly bare and smooth terrain unencumbered by houses, buildings or other structures. **The results do not take into account landscape features above ground level that affect visibility such as trees, hedgerows, fences and buildings. WTGs will, therefore, not be visible from many of the locations indicated on the ZVI diagrams due to the presence of vegetation and/or built form.**

4.4.1 JWF ZVI Analysis

The most extensive and continuous area of theoretical visibility of the JWF turbines is associated with elevated terrain within and in close proximity to the PA. From these locations between 70 and 88 turbines may be visible (indicated by orange and reds on the ZVI figures).

The far western and southern ends of the study area have limited visibility of the turbines due to the nature of the undulating local topography, blocking views from these locations. Visibility of more than 20 turbines at hub height and above is generally concentrated within the 5km offset from the WTGs. Elevated ridge lines constrain more distant views towards the wind farm.

The number of WTGs visible where the tips of the wind turbine rotor blades can be seen above surrounding ridgelines covers a greater area, however 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 Project, and are generally visually negligible from medium to longer distance view locations.

Residential properties are scattered throughout the study area with a number falling within areas of theoretically high visibility of WTGs, including the settlements of Tarago and locality of Boro.

The ZVI indicates that some dwellings have limited or negligible views towards the Project due to topographical constraints. These include the localities of Mount Fairy and properties off Jamaleopa Road.

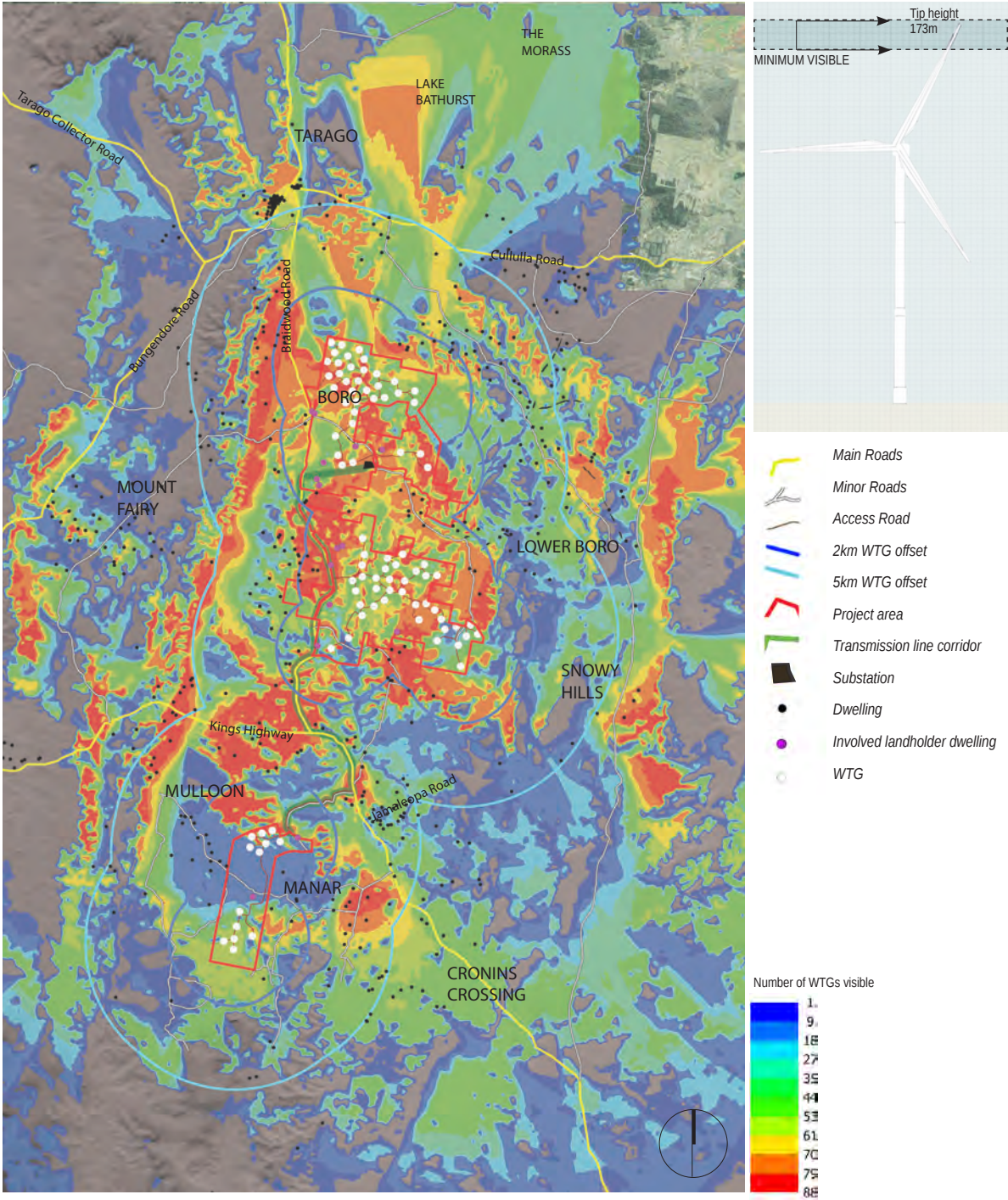


Figure 4.4 - Number of turbines visible at blade tip height (173m) and below

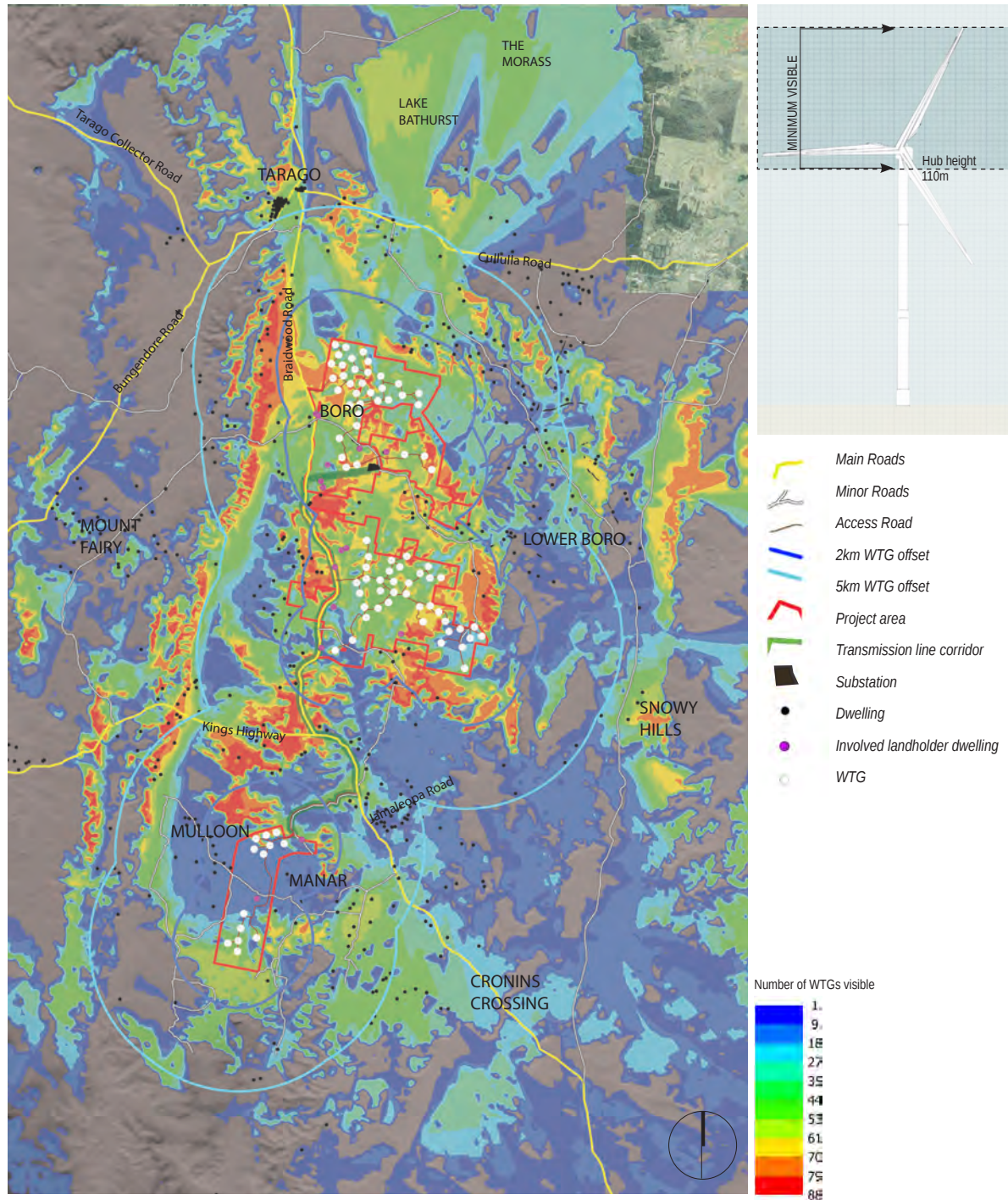


Figure 4.5 - Number of turbines visible at hub height (110m) and below

4.5 EXISTING VISUAL ENVIRONMENT

4.5.1 Public Domain

There is limited public open space within the study area, confined to a small area of recreational playing fields in Tarago (the Tarago Oval). This playing field has limited visual accessibility to the wind farm due to a dense row of trees running the length of its southern boundary. No parks, reserves or major walking trails were recorded within the study area.

A network of minor and major roads runs through the study area. In many locations these are in close proximity to PA and proposed transmission line. Where vegetation permits, these roads often have far-reaching views across the surrounding rural landscape.

Lightly-trafficked rural roads link properties to the wider sealed road network. The quality of the road surfacing varies but is mostly unsealed. Rural roads include Boro and Lower Boro Road (viewpoint 4), Duckfield Road, Jamaleopa Road (viewpoint 7) and Manar Road to the south (viewpoint 8).

Major road corridors include the Braidwood/Goulburn Road (viewpoints 3 and 5) that runs north to south through the study area and the Kings Highway (viewpoint 6) that traverses from east to west. Views across the landscape are available from the road where breaks in vegetation permit.

4.5.2 Private Domain

A low density of residential dwellings is dispersed across the study area. Table 4.2 indicates the number of existing and proposed dwellings (with an approved development application) at varying distance bands from the nearest WTG. The numbers exclude the dwellings of participating land holders but include multiple dwellings that belong to a single owner.

Distance Band	Number of Dwellings
1-2km	63
2-3km	77
3-4km	66
4-5km	67
Over 5km	Numerous

Table 4.2 - Number of dwellings

The majority of dwellings within 3km offset of the turbines are positioned west of the PA within the locality of Mount Fairy and along Goulburn/Braidwood Road. A lower density of dwellings can be found to the south of the study area near Manar and Mulloon. The highest density of dwellings is found within the village of Tarago, approximately 5km north of the PA.

Many properties are isolated and located within bushland. Vegetation planted as windbreaks often surrounds properties and where present, may limit long distance views. Other dwellings, particularly properties off Roseview Road (viewpoint 11) and Lakeview Road (viewpoint 18) are positioned on elevated slopes to the east and west of the study area with far reaching, panoramic views over the surrounding landscape.

The village of Tarago has a population of 351 (2011 census). Dwellings within the village with visual accessibility to the Project site include those along Tarago Road (viewpoint 9) and a subdivision site known as Sherwins Ridge (viewpoint 13) on elevated ground to the northwest of Tarago. At the time of writing, no dwellings have been constructed here although lots have been sold (refer Figure 4.6).



Figure 4.6 - Indicative layout of Sherwin's Ridge subdivision

4.5.3 Participating Landowners

There are 15 participating landowner dwellings within the study area, located mostly in close proximity to the turbines. The owners of these properties have agreed to host turbines on their land and it is understood that they do not have concerns regarding impacts to visual amenity. They have therefore not been considered further within this visual assessment.

4.5.4 Dwelling/Receptor Identification

Properties or land holdings identified by the Proponent have been assigned a unique 'J' number. This 'J' number is determined by the Proponent on a case-by-case basis and uniquely identifies each property or land that was considered by the Proponent inside (ie. involved or participating land holders) or surrounding (non-involved land holders) the PA.

In multiple circumstances individual properties or land holdings include more than one dwelling or other structure, which would otherwise be identified by the same 'J' number based on land ownership. For the purposes of the EIS and associated technical studies however it is important to be able to differentiate between individual dwellings or receptors, especially where multiple dwellings (or structures) existing within a property area.

Accordingly, ERM assigned each dwelling or structure a unique ID for the purposes of the EIS. These EIS ID are based on and are clearly linked to the Proponents 'J' number. Where multiple dwellings or other structures have been identified in a property or land holding the EIS ID was established by simply including a letter (A, B, C or D etc) to the end of the existing 'J' number. For example at property J103, four structures have been identified; two dwellings and two sheds. For the purpose of the EIS these structures are uniquely identified as J103A and J103B for the dwellings and J103-SA and J103-SB for the other structures (sheds). Where only one dwelling (or other structure) has been identified in a property or land holding the Proponent's 'J' number was applied for the purposes of the EIS.

The EIS ID were finalised in May 2016. Subsequently, the features of some dwellings may have changed to that assessed here. Specifically, a number of dwellings are identified as "to be built" but may have been partially or fully constructed and occupied at the time the EIS (and this LCVIA) was submitted and the subsequent public display. These features do not affect the outcomes of this LCVIA which, for the purpose of assessing impacts, were prepared based on the dwellings being constructed and occupied.

Recognising the importance of differentiating between individual dwellings, the authors of this LCVIA have adopted the ERM EIS ID where applicable and relevant.

For the photomontages and wireframes (refer Appendix B), the ERM EIS ID referenced in this LCVIA has been adopted to identify each location. This approach was necessary to ensure consistency throughout this report and to avoid the unnecessary, and potentially confusing, introduction of other alternate dwelling identifiers not already referenced or described in this report.

4.6 VIEWPOINT SELECTION

4.6.1 Representative viewpoints

Following a thorough desktop study and site visit within the locality of the JWF, the subsequent representative viewpoints with the potential to be visually affected by elements of the Project were identified and thus selected for further detailed analysis (refer Table 4.3 and Figure 4.6). It should be noted that this is by no means an exhaustive list of all receptors that may be impacted by the Project but it is representative of the spread of receptors throughout the study area.

The selected viewpoints have been chosen to illustrate:

- a range of receptor types including public and private domain views
- a range of view types including elevated, panoramic and filtered views
- a range of viewer types (residents, motorists and users of public open space)
- a range of viewing distance from the WTGs.

4.6.2 Dwellings within 3km offset of a turbine

Appendix A includes a desktop or site-validated assessment of all existing and proposed approved dwellings within 3km offset of the JWF WTGs. During the desktop study, any dwelling noted with the potential for Moderate/High to High visual impacts was visited during an additional site visit to determine a site-validated visual impact rating, taking into account vegetation and built form.

4.6.3 Site Access

For residential receptors, access was not always possible to the property itself and so accordingly an assessment was made from the closest accessible public location with views towards the Project. In these instances, the description of visual impact was estimated from the main dwelling area of the property. Where access was permitted, all assessments were made from the actual location of the dwelling.

If no site access or visual accessibility was available to the dwelling, or an accurate assumption of expected visual impact could not be made, a worst case scenario rating has been given.

REPRESENTATIVE PUBLIC VIEWPOINTS					
Viewpoint No.	Type of receptor	Distance to nearest WTG (km)*	Location	Associated photomontages	
1	Public open space	5.6	Tarago - outside Loaded Dog Hotel	PM1	
2	Main Road	5.1	Cullulla Road	PM14	
3	Main Road	1.3	Braidwood Road	PM5	
4	Minor Road	1.0	Lower Boro Road	PM7	
5	Main Road	0.7	Goulburn Road	PM9	
6	Main Road	3.4	Kings Highway	PM10	
7	Minor Road	4.2	Jamaleopa Road	PM11	
8	Minor Road	1.4	Manar Road	PM12	
REPRESENTATIVE PRIVATE VIEWPOINTS					
Viewpoint No.	Type of receptor	Distance to nearest WTG (km)*	Location	Associated dwellings ID**	Associated photomontages/ wireframes
9	Dwelling	5	Properties along Tarago Road	-	-
10	Dwelling	2.4	Properties to the east of Braidwood Road, north of Boro	J158,J156, J157, J126B	WF10
11	Dwelling	2.3	Roseview Road	J134, J135, J93,J257, J130,J19, J272, J65, J33_DA, J10	PM4, PM38, WF1, WF2, WF3
12	Dwelling	2.3	Properties to the west of Braidwood Road along Barnet Drive	J5, J20, J186A, J186, J85, J181, J43, J58B	PM19, PM20, PM41
13	Dwelling	6.2	Sherwins Ridge Subdivision, Tarago	-	-
14	Dwelling	10.6	Properties either side of Mount Fairy Road	-	PM8
15	Dwelling	4	Properties either side of Mulloon Road	J406, J401, J195, J413	-
16	Dwelling	1.3	Properties either side of Watsons Road and adjacent properties to Project Area with similar views	J237, J255, J105, J393, J70	PM34, PM35, PM39, PM40, WF6
17	Dwelling	5.8	Properties either side of Mayfield Road	-	PM13
18	Dwelling	1.5	Properties at the end of Lakeview Road	J3, J76A	PM18
19	Dwelling	1.5	Properties either side of Lower Boro Road	J145, J146, J142, J147, J141, J174A, J174B, J162_TBB	PM24, PM25, PM26, PM32, PM33, WF5
20	Dwelling	1.2	Properties off Duckfield Road	J226, J208, J217, J216, J247	PM28,PM29, PM30, PM37, PM36

Table 4.3 : Summary of representative viewpoints

* Distances are taken from the location of viewpoint photo

** For a map of dwelling locations, refer Appendix A

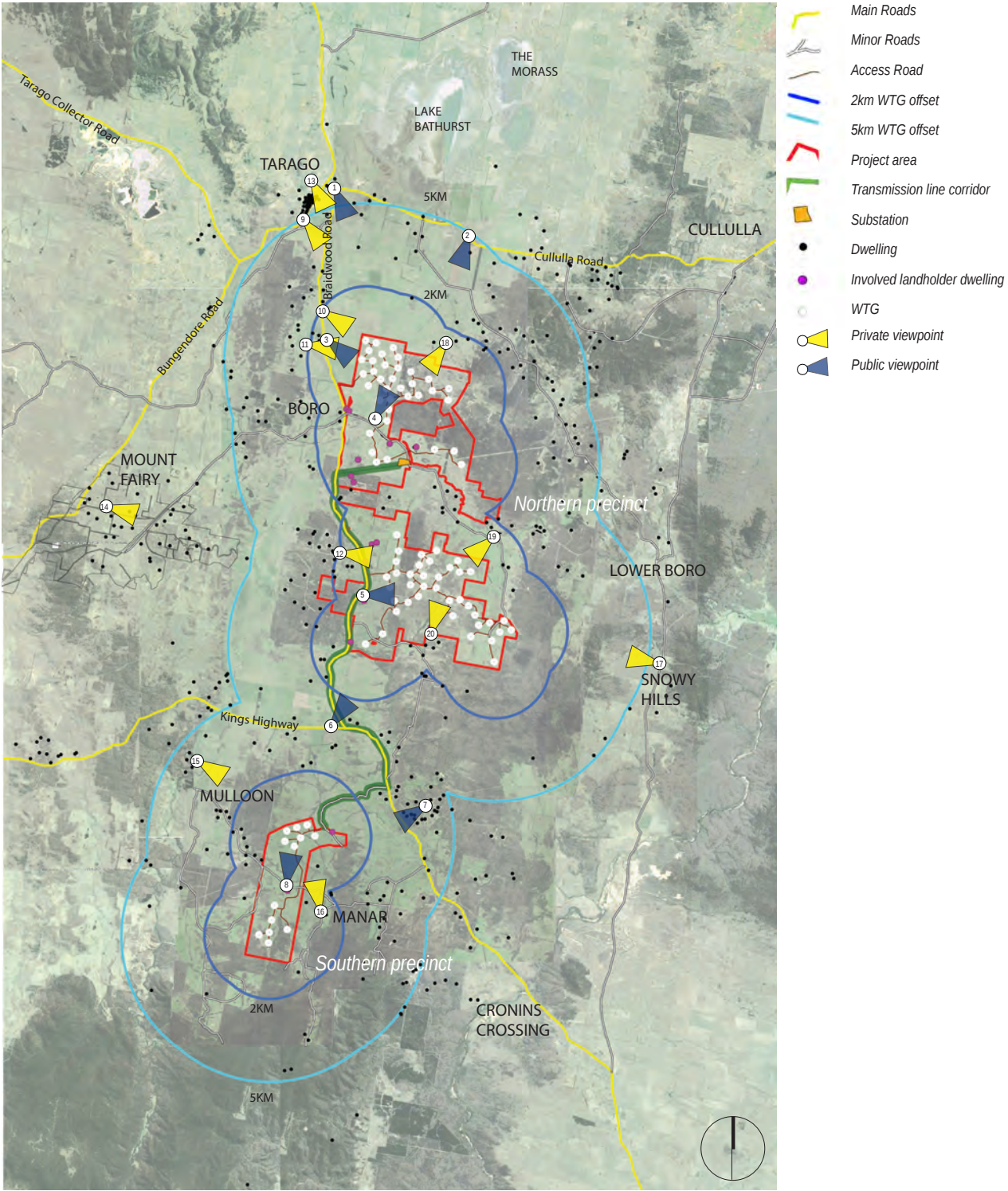


Figure 4.6 - Public and private domain viewpoint locations within the study area

4.7 VIA METHODOLOGY

The following section assesses the visual impact of the Project from each of the selected representative viewpoints. This includes a description of the current view from each viewpoint followed by a discussion of the potential visual impacts of the Project on that view.

Each viewpoint is accompanied by a location map, photo of the current view and wireframe model of the Project to indicate the expected view when complete. For a detailed description of the assessment criteria and impact ratings used, refer Table 4.6.

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. Table 4.6 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 and duration of view and magnitude of change. Table 4.6 describes the ratings assigned to these quantitative assessments.

Overall impact rating

The severity of these impacts is calculated using matrix Table 4.4 - based on a combination of magnitude and sensitivity, giving an overall impact rating - refer Table 4.5.

		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 4.4: Visual Impact Rating as a combination of Sensitivity and Magnitude.
Source: RMS Guidelines for Landscape Character and Visual Impact Assessment

NEGLIGIBLE	None or only an insignificant part of the Project is discernible.
LOW	The Project constitutes only a minor component of the view, which might be missed by the casual observer or receptor. Awareness of the proposal would not have a marked effect on character of the view.
MODERATE/LOW	Whilst discernible, the Project does not dominate the visual scene and has only slight impacts on the character of the view.
MODERATE	The Project may form a visible and recognisable new element within the overall scene that affects and changes its overall character.
MODERATE/HIGH	The Project is a discernible feature of the scene, altering the character of the view.
HIGH	The Project becomes the dominant feature of the scene to which other elements become subordinate, significantly affecting and changing the visual character.

Table 4.5 - Explanation of overall impact ratings

		FACTOR	DESCRIPTION	NEGLECTIBLE	LOW IMPACT	MODERATE IMPACT	HIGH IMPACT
QUALITATIVE	SENSITIVITY	Viewer Sensitivity	Each visual receptor type has an inherent and varied sensitivity to change in the visual scene based on the personal context in which their view is being experienced. This sensitivity has a direct bearing on the perception of visual impact experienced by the receptor and qualifies the quantitative impacts. Number of viewers also has a bearing on sensitivity. Viewpoints have a varied number of potential receivers depending on whether the viewpoint is public or private, the popularity of the viewing location and its ease of accessibility. Views from public reserves and open space are often given the highest weighting due to the increased number of viewers affected.	Vacant lot, uninhabited building, car park.	Minor roads, service providers.	Residential properties with limited views, commercial properties, scenic public roads (eg official tourist routes).	Public open space, public reserves, living areas or gardens/balconies of residential properties with direct views of Project.
		Quantum of View	The quantum of view relates to the openness of the view and the receptor's angle of view to the scene. A development located in the direct line of sight has a higher impact than if it were located obliquely at the edge of the view. Whether the view of the Project is filtered by vegetation or built form also affects the impact, as does the nature of the view (panoramic, restricted etc.). A small element within a panoramic view has less impact than the same element within a restricted or narrow view.	Only an insignificant part of the Project is discernible.	An oblique, highly filtered or largely obscured view of the Project or a view where the Project occupies a very small section of the view frame.	A direct view of the Project or its presence in a broader view where the Project occupies a moderate proportion of the view frame.	A direct view of the Project or its presence (sometimes in a very narrow or highly framed view), where the Project occupies the greater proportion of the view frame.
QUANTITATIVE	MAGNITUDE	Distance of View*	The effect the Project has on the view relating to the distance between the Project and the visual receptor. The distances are from the approximate location of the nearest WTG.	Over 15km	Viewing distance of between 10km and 15km.	Viewing distance between 2km and 10km.	Viewing distance between 0 and 2km.
		Period of View	The length of time the visual receptor is exposed to the view. The duration of view affects the impact of the Project on the viewer - the longer the exposure the more detailed the impression of the proposed change in terms of visual impact.	Less than 1 second	1 to 10 seconds: often from a road or walking past.	1 to 5 minutes: usually from a road/driveway entrance, walking past.	Significant part of the day: usually residential property.
		Magnitude of Change	Scale of change is a quantitative assessment of the change in compositional elements of the view. If the proposed development is largely similar in nature and scale to that of existing elements in the vicinity, the scale of change is low. If the development radically changes the nature or composition of the elements in the view, the scale of change is high. Distance from the development would accentuate or moderate the scale and variety of visible elements in the overall view and hence influence this rating.	Project barely discernible	Elements and composition of the view would remain largely unaltered.	Elements within the view would be at odds with existing features in the landscape	Elements within the view would greatly dominate existing features in the landscape

Table 4.6 - Visual Impact Assessment criteria

*The distance of view thresholds presented in this table are indicative of potential impacts only. The distance of view factor forms part of the overall assessment process adopted here. Actual visibility of WTGs may vary greatly within any given distance band, being influenced by multiple factors including nature of location, landform and quantity of vegetation.

4.7.1 Viewpoint Photography

The choice of lens, camera format and final presentation has a significant bearing on the interpretation of site photos. There is a balance to be struck in matching the human experience of the view with its wider context, so that a Project's appearance and its place within its environment can be recognised and understood.

In recognising that no photographic image can exactly replicate the view of the human eye, extensive literature has been published on the nearest equivalent combination of focal length and field of view of a camera that best emulates human vision. Much of this literature is highly contradictory with a further complication to this process created by the differing sensor formats of digital cameras which affect the apparent focal length and field of view.

It is important to note that the process of assigning visual impact ratings to viewpoints has been undertaken during a site visit and is calculated from a human vision perspective, on site. Photographic images should therefore be considered representative only.

Assessment Images in this Chapter

The photos within the following representative viewpoint analysis are taken with a Sony Cyber-shot DSC-HX9V with the following specification:

- Body type: Compact
- Sensor size: 1/2.3" (6.17 x 4.55 mm)
- Sensor type: BSI-CMOS
- ISO: Auto
- Focal length (equiv.) 24mm

These photos have a horizontal field of view slightly wider than human vision (approx. 86° degrees compared to a 46°). This wider-angle lens allows more of the site context to be visible, consistent with a viewer turning their head from side to side. This has the affect of making objects appear slightly more distant than when viewed with the human eye but allows more of the visual scene to be represented.

Wireframe model

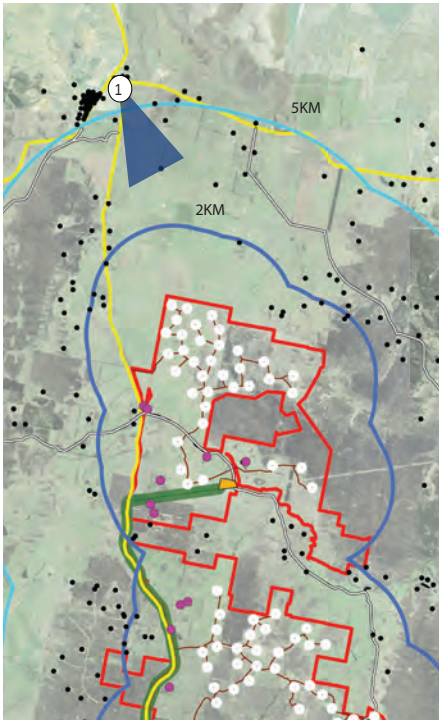
Each viewpoint analysis includes a wire frame model overlaid on the viewpoint photo to indicate the approximate location and extent of WTGs visible from that viewpoint. The wire frame models have been created using 3D modelling and geographical mapping software. They are overlaid on the wider angled photos showing the context of the viewpoint. Consequently, the turbines may seem more distant than in reality. The wireframe model is indicative only but offers a good representation of the likely extent of turbine visibility.

Photomontages

The spatially verified photomontages within Appendix B of this report utilise panoramic images to indicate the full horizontal sweep of a viewpoint, as if a viewer was turning their head fully from side to side. These images have been photographed to achieve the closest possible representation of human vision when printed to the appropriate size. For more details, refer to the Photomontage Methodology chapter within Appendix B of this report.

CLOUSTON associates

PUBLIC RECEPTORS VIEWPOINT 1



Viewpoint Location



Area plan

- Dwelling
- Wind Turbine
- Viewpoint location
- Photomontage reference - refer Appendix B



Photo 1 - Looking south east over Braidwood Road from the edge of Tarago

Location	Type	Nearest WTG	Receptors	Associated photomontages
Tarago	Public open space	5.6km	Users of public open space within Tarago, looking south east	PM1

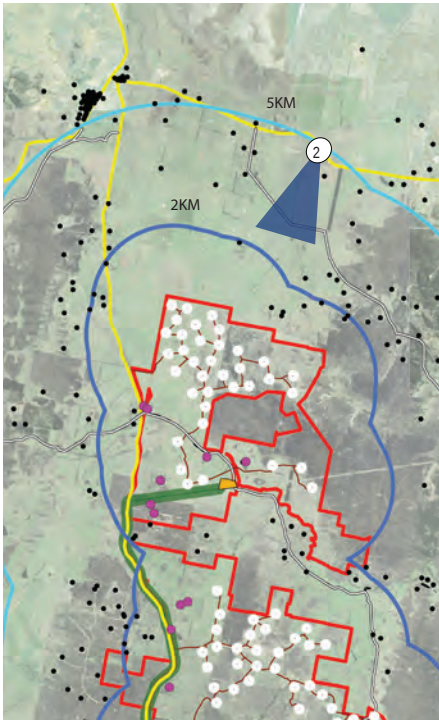
Current view	Expected Visual Impact
As shown in Photo 1, this viewpoint looks south east over Braidwood Road. The foreground is dominated by open fields, stretching up to a low ridgeline in the middle distance. Very little built form is currently visible within the view.	A cluster of WTGs will be visible in the middle of the view frame at a distance of over 5km. These will be noticeable from several areas of Tarago where there are clear views to the south east. The nearby sporting oval is surrounded by tall vegetation and unlikely to have views towards the turbines. Where visible, the turbines will occupy a relatively small part of the overall visual scene. A Moderate impact on visual amenity is expected, limited to the few public areas of Tarago with views towards the WTGs.

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

Overall Visual Impact Rating	MODERATE
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From Table 4.4, using a combination of sensitivity and magnitude ratings.

CLOUSTON associates
PUBLIC RECEPTORS
VIEWPOINT 2



Viewpoint location



Area plan

- Dwelling
- Wind Turbine
- Viewpoint location
- Photomontage reference - refer Appendix B



Photo 2 - Looking south from Cullulla Road

Location	Type	Nearest WTG	Receptors	Associated photomontages
Cullulla Road	Minor Road	5.1km	Users of Cullulla Road, looking south	PM14

Current view	Expected Visual Impact
As shown in Photo 2, this viewpoint looks south from Cullulla Road. The foreground is dominated by open grassland with a band of windbreak trees in the middle distance. Distant hills are visible on the horizon. Very little built form is visible within the view.	A cluster of WTGs will be visible in the middle of the view frame behind the treeline at a distance of approximately 5km. These will be noticeable to users of Cullulla Road although viewed for a short duration of time as receptors travel along the road corridor quickly. The turbines will occupy a relatively small part of the overall visual scene and no major impact on visual amenity is expected.

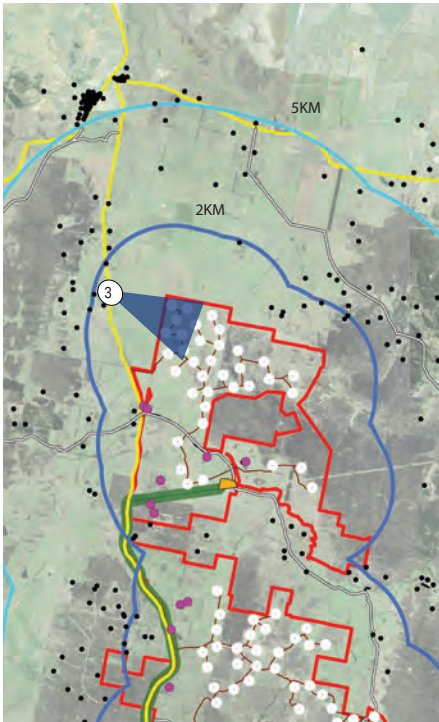
RECEPTOR IDENTIFICATION	RECEPTOR SENSITIVITY	MAGNITUDE				
		DISTANCE	QUANTUM OF VIEW	PERIOD OF VIEW	MAGNITUDE OF CHANGE	SUMMARY OF RATINGS
2	L	M	L	M	L	L

Overall Visual Impact Rating	LOW
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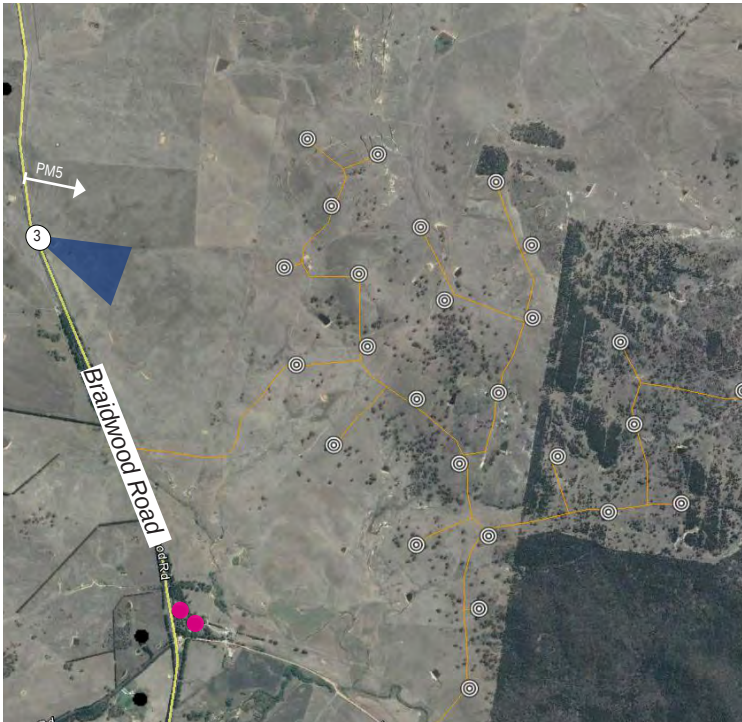
From Table 4.4, using a combination of sensitivity and magnitude ratings.

CLOUSTON associates

PUBLIC RECEPTORS VIEWPOINT 3



Viewpoint location



Area plan

- Dwelling
- Participating landholder dwelling
- ⊗ Wind Turbine
- ◻ Viewpoint location



Photo 3 - Looking east from Braidwood Road

Location	Type	Nearest WTG	Receptors	Associated photomontages
Braidwood Road	Main Road	1.3km	Users of Braidwood Road, looking east	PM5

Current view	Expected Visual Impact
As shown in Photo 3, this viewpoint looks east from Braidwood Road. The foreground is dominated by open fields, sloping up to a nearby ridgeline. A lone tree is visible to the east of the viewpoint.	A large cluster of WTGs will dominate the view frame, stretching to the east as road users travel south along Braidwood Road. The turbines are in close proximity to the road and will be clearly visible in most weather conditions. The receptors will move past the Project quickly, although due to the large area covered by WTGs, the turbines will be visible for a reasonable length of time. The Project is likely to impact visual amenity from this section of Braidwood Road.

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

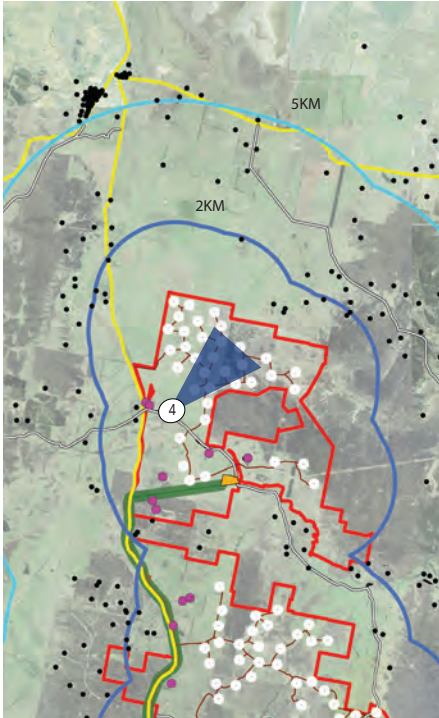
Overall Visual Impact Rating	MODERATE/HIGH
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From Table 4.4, using a combination of sensitivity and magnitude ratings.

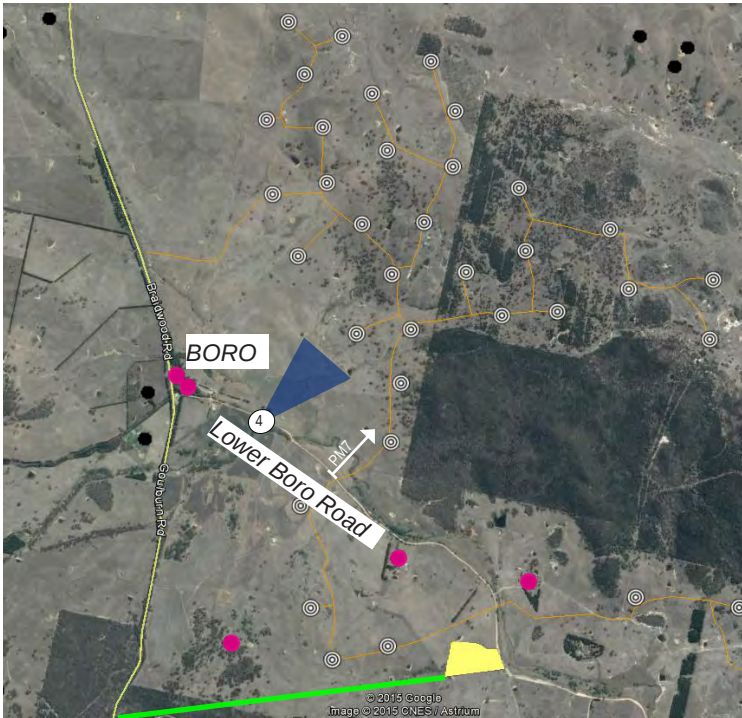
CLOUSTON associates

PUBLIC RECEPTORS

VIEWPOINT 4



Viewpoint location



Area plan



Photo 4 - Looking north east from Lower Boro Road towards a low wooded ridge line

Location	Type	Nearest WTG	Receptors	Associated photomontages
Lower Boro Road	Minor Road	1.0km	Users of Lower Boro Road, looking north	PM7

Current view	Expected Visual Impact
As shown in Photo 4, this viewpoint looks north east from Lower Boro Road towards a low wooded ridgeline. Four large trees are visible in the foreground. No built form is currently visible from this viewpoint.	A large cluster of WTGs will be visible along the ridgeline in the foreground. The turbines are in close proximity to the road (1km) and will be prominent in most weather conditions. Despite a large change to the visual scene, receptors will move past the turbines relatively quickly and due to the low sensitivity of this minor road, a major impact on visual amenity is not expected.

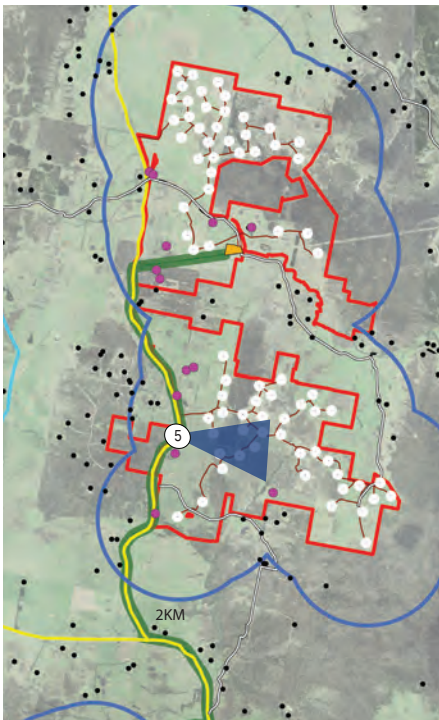
RECEPTOR IDENTIFICATION	RECEPTOR SENSITIVITY	MAGNITUDE				
		DISTANCE	QUANTUM OF VIEW	PERIOD OF VIEW	MAGNITUDE OF CHANGE	SUMMARY OF RATINGS
4	L	H	M	M	H	M

Overall Visual Impact Rating	MODERATE/LOW
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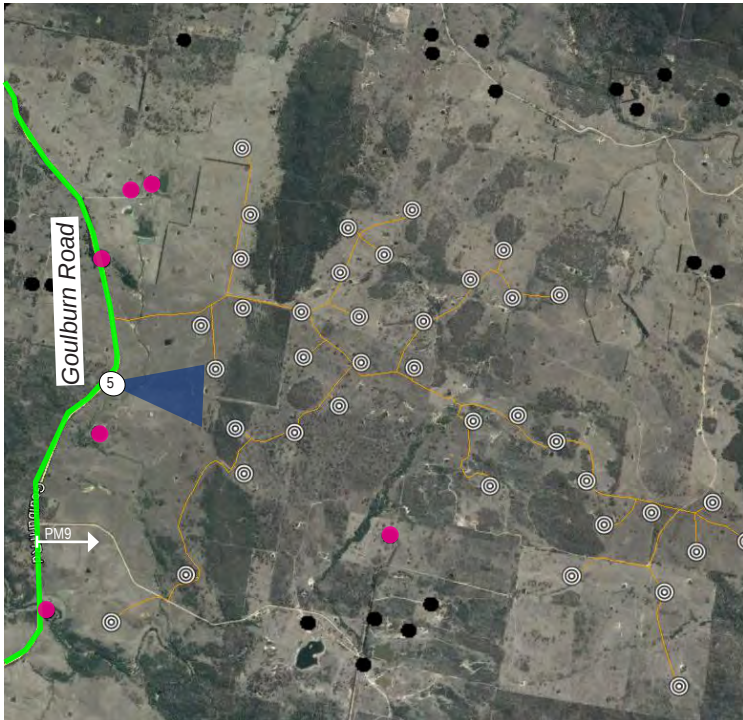
From Table 4.4, using a combination of sensitivity and magnitude ratings.

CLOUSTON associates

PUBLIC RECEPTORS VIEWPOINT 5



Viewpoint location



Area plan

- Dwelling
- Participating landholder dwelling
- Wind Turbine
- Viewpoint location
- ▲ Transmission line corridor

PM9
Photomontage
reference - refer
Appendix B



Photo 5 - Looking east from Goulburn Road over open fields to a low ridgeline in the middle distance

Location	Type	Nearest WTG	Receptors	Associated photomontages
Goulburn Road	Main Road	0.7km	Users of Goulburn Road travelling north and south (road speed limit 100km/h).	PM9

Current view	Expected Visual Impact
As shown in Photo 5, this viewpoint looks east from Goulburn Road, over open fields to a low ridgeline in the middle distance. Several wooded areas are visible across the landscape.	A large cluster of WTGs will dominate the view frame as road users travel along Goulburn Road. The turbines are in close proximity to the road and will be clearly visible against the skyline. The receptors will move past the Project quickly, although due to the large area covered by WTGs, the turbines will be visible for a reasonable length of time. The Project is likely to impact visual amenity from this section of Goulburn Road. If constructed above ground, poles and wires associated with the 33kv transmission line will also be visible running alongside the road corridor, contributing to the visual impact on road users.

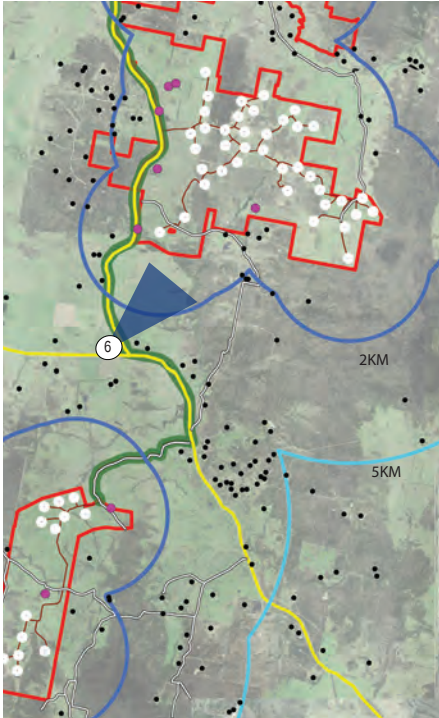
RECEPTOR IDENTIFICATION	RECEPTOR SENSITIVITY	MAGNITUDE				
		DISTANCE	QUANTUM OF VIEW	PERIOD OF VIEW	MAGNITUDE OF CHANGE	SUMMARY OF RATINGS
5	M	H	M	M	H	H

Overall Visual Impact Rating	MODERATE/HIGH
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From Table 4.4, using a combination of sensitivity and magnitude ratings.

CLOUSTON associates

PUBLIC RECEPTORS VIEWPOINT 6



Viewpoint location



Area plan



Photo 6 - Looking north east from the Kings Highway

Location	Type	Nearest WTG	Receptors	Associated photomontages
Kings Highway	Main Road	3.4km	Users of the Kings Highway, travelling east (road speed limit 100km/h)	PM10

Current view	Expected Visual Impact
As shown in Photo 6, this expansive viewpoint looks north east from the Kings Highway that traverses the study area. The foreground and middle ground of the view are dominated by mostly flat open grassland. Distant hills are visible on the horizon with very little built form in the view.	A long line of WTGs will be visible in the middle distance, stretching across much of the view frame. Turbines to the east of the view will be partially screened by sloping topography. If constructed above ground, the poles associated with the 33kv transmission line may also be visible running along Goulburn Road. These will be small and barely discernible from this distance. Although noticeable within the landscape, the majority of WTGs and transmission line are at distance which makes them not visually intrusive. Road users will pass through the area relatively quickly (the road is a 100km/h zone), leading to a short duration of view and a reduction in the level of visual impact expected.

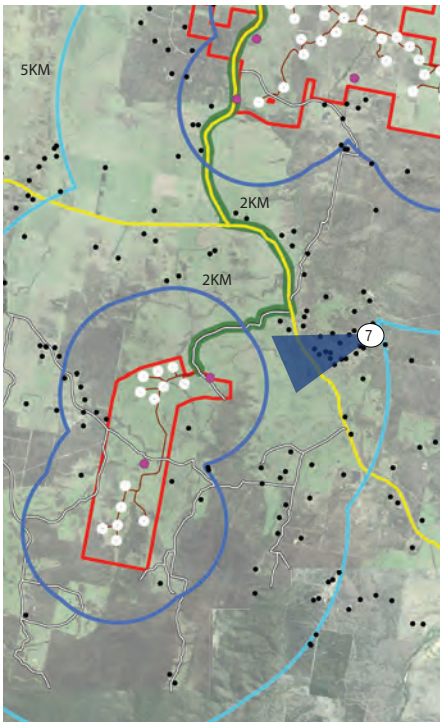
RECEPTOR IDENTIFICATION	RECEPTOR SENSITIVITY	MAGNITUDE				
		DISTANCE	QUANTUM OF VIEW	PERIOD OF VIEW	MAGNITUDE OF CHANGE	SUMMARY OF RATINGS
6	M	M	L	M	L	L

Overall Visual Impact Rating	MODERATE/LOW
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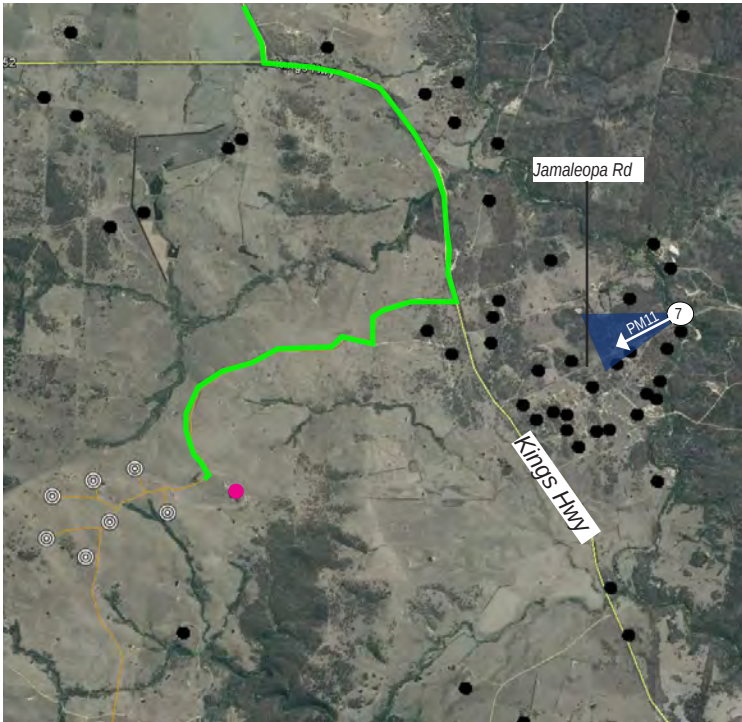
From Table 4.4, using a combination of sensitivity and magnitude ratings.

CLOUSTON associates

PUBLIC RECEPTORS VIEWPOINT 7



Viewpoint location



Area plan

- Dwelling
- Participating landholder dwelling
- Wind Turbine
- Viewpoint location
- ▲ Transmission line corridor
- PM# Photomontage reference - refer Appendix B



Photo 7 - Looking west along Jamaleopa Road

Location	Type	Nearest WTG	Receptors	Associated photomontages
Jamaleopa Road	Minor Road	4.2km	Users of Jamaleopa Road travelling west	PM11

Current view	Expected Visual Impact
As shown in Photo 7, this viewpoint looks west along Jamaleopa Road. The foreground is dominated by the road and small trees which screen nearby properties. An undulating ridgeline is visible in the middle distance.	Two clusters of WTGs will be visible along the ridge in the middle of the view frame, partially screened by vegetation and topography. Although clearly visible on the ridge, the low sensitivity of this minor, lightly trafficked road means that a major impact on visual amenity is not expected.

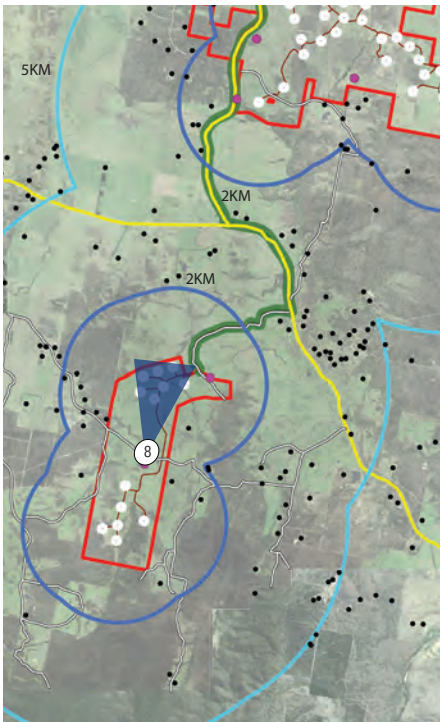
RECEPTOR IDENTIFICATION	RECEPTOR SENSITIVITY	MAGNITUDE				
		DISTANCE	QUANTUM OF VIEW	PERIOD OF VIEW	MAGNITUDE OF CHANGE	SUMMARY OF RATINGS
7	L	M	M	M	M	M

Overall Visual Impact Rating	MODERATE/LOW
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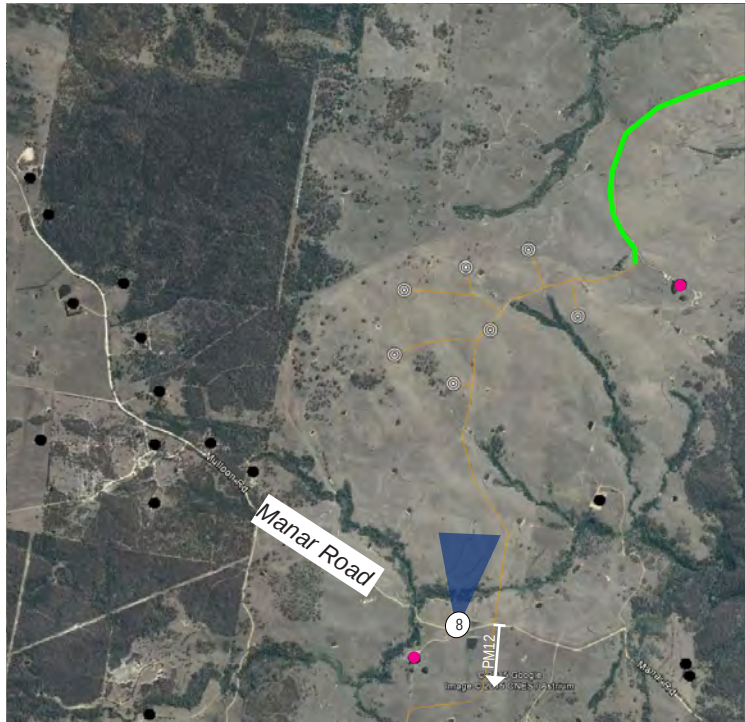
From Table 4.4, using a combination of sensitivity and magnitude ratings.

CLOUSTON associates

PUBLIC RECEPTORS VIEWPOINT 8



Viewpoint location



Area plan

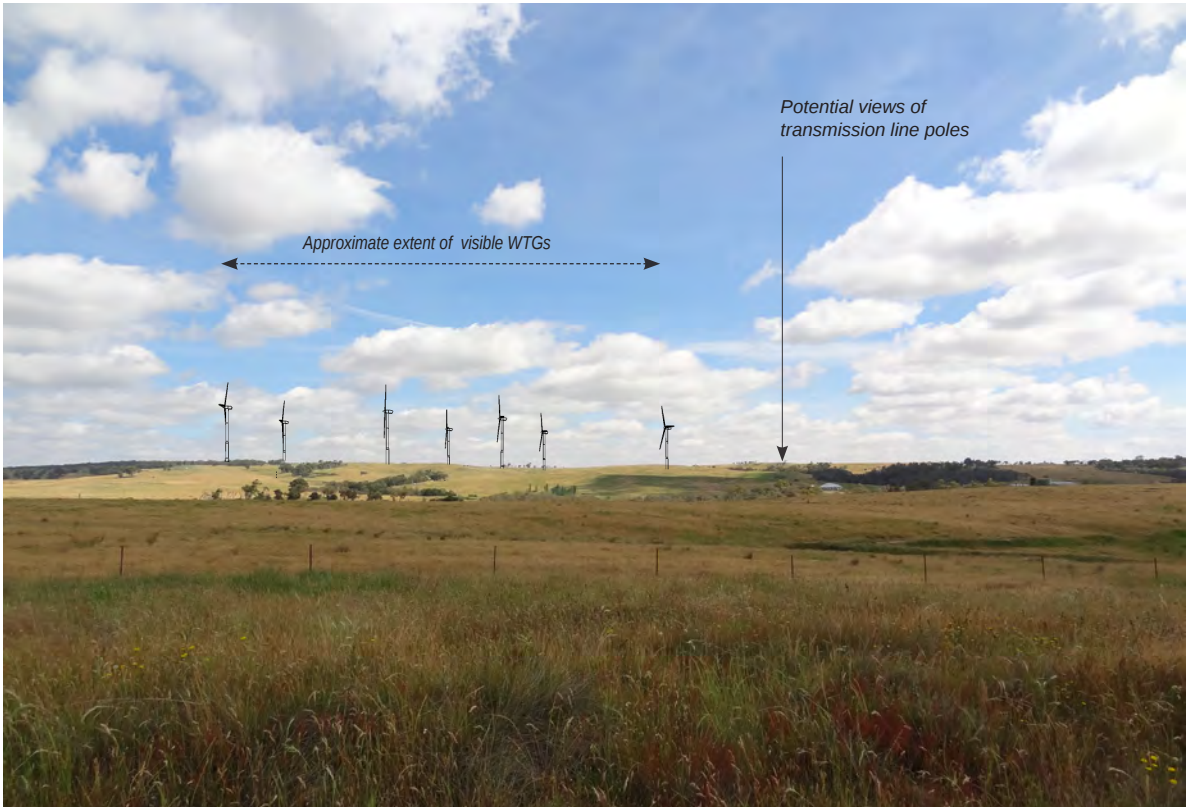


Photo 8 - Looking north from Manar Road

Location	Type	Nearest WTG	Receptors	Associated photomontages
Manar Road	Minor Road	1.4km	Users of Manar Road, looking north	PM12

Current view	Expected Visual Impact
As shown in Photo 8, this viewpoint looks north from Manar Road, an unsealed local road. The foreground and middle ground of the view are dominated by undulating open grassland, stretching up to a ridgeline in the middle distance.	A cluster of 7 WTGs will be visible on the ridgeline in the middle distance. The turbines will be visually prominent against the skyline at a distance of approximately 1.6km. If constructed above ground, several poles associated with the 33kv transmission line may also be visible against the skyline, although they will not be visually intrusive. The low sensitivity of this minor road and short duration of view experienced by receptors has led to a Moderate/Low visual impact rating, despite the proximity of the turbines. It should be noted that 6 WTGs will also be visible to the south of this viewpoint (refer PM12).

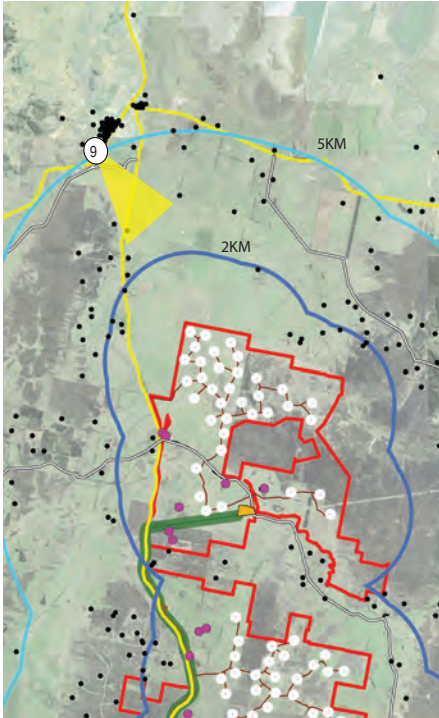
RECEPTOR IDENTIFICATION	RECEPTOR SENSITIVITY	MAGNITUDE				
		DISTANCE	QUANTUM OF VIEW	PERIOD OF VIEW	MAGNITUDE OF CHANGE	SUMMARY OF RATINGS
8	L	H	M	M	H	M

Overall Visual Impact Rating	MODERATE/LOW
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From Table 4.4, using a combination of sensitivity and magnitude ratings.

CLOUSTON associates

PRIVATE RECEPTORS VIEWPOINT 9



Viewpoint location



Area plan

- Dwelling
- Wind Turbine
- Viewpoint location



Photo 9 - Looking east over flat fields from a slightly elevated position off Tarago Road

Location	Type	Nearest WTG	Approx. number of nearby properties	Receptors
Tarago	Dwelling	5km	12 (no reference numbers)	Residents of properties along Tarago Road and on elevated land to the east of Tarago Road.

Current view	Expected Visual Impact
As shown in Photo 9, these properties look east over flat fields from a slightly elevated position. The foreground and middle ground are dominated by undulating open grassland, stretching to low ridgelines in the distance. Minimal built form is visible within the view frame.	Numerous WTGs may be visible stretching across the ridgeline in the middle distance. A second cluster of more distant turbines will also be visible behind the first group, at a distance of over 12km. In clear conditions the WTGs will be apparent against the skyline, although will not dominate the view. Blade movement will be discernible. The lack of current built form within the view frame will make the WTGs more noticeable. Screen planting to the front of some properties will likely filter and block some views of the wind farm from these properties.

RECEPTOR IDENTIFICATION	RECEPTOR SENSITIVITY	MAGNITUDE				
		DISTANCE	QUANTUM OF VIEW	PERIOD OF VIEW	MAGNITUDE OF CHANGE	SUMMARY OF RATINGS
9	M	M	M	M	M	M

Overall Visual Impact Rating	MODERATE*
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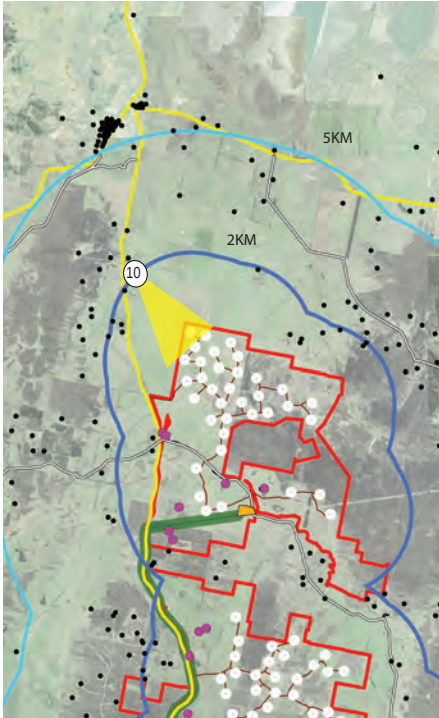
From Table 4.4, using a combination of sensitivity and magnitude ratings.

**Existing screening vegetation may reduce the visual impact on these properties. A worst case scenario rating has been given.*

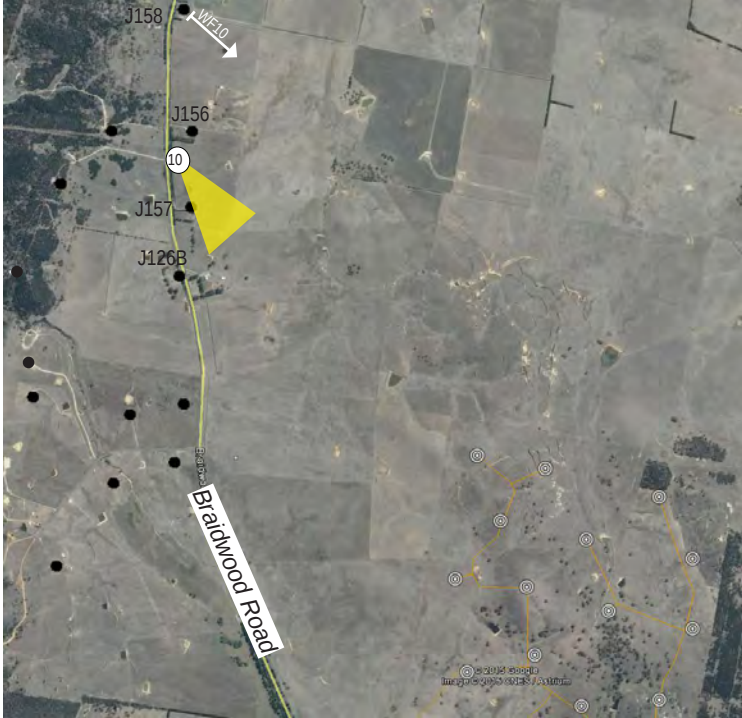
CLOUSTON associates

PRIVATE RECEPTORS

VIEWPOINT 10



Viewpoint location



Area plan



Photo 10 - Looking south east over flat open fields off Braidwood Road

Location	Type	Nearest WTG	Approx. number of nearby properties	Receptors	Associated photomontages/wireframes
Braidwood Road	Dwelling	2.4km	4 (J158, J156, J157, J126B)	Residents of properties to the east of Braidwood Road, north of Boro.	WF10

Current view	Expected Visual Impact
As shown in Photo 10, these properties look south east over flat open fields. The foreground and middle ground are dominated by undulating open grassland, stretching to a low ridgeline in the middle distance. Minimal built form is visible within the view frame.	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. The level of visual impact on individual properties in this location will depend on their orientation and level of screening vegetation present which may potentially reduce the level of visual impact experienced - see Appendix A for a detailed assessment of each dwelling in this location.

RECEPTOR IDENTIFICATION	RECEPTOR SENSITIVITY	MAGNITUDE				
		DISTANCE	QUANTUM OF VIEW	PERIOD OF VIEW	MAGNITUDE OF CHANGE	SUMMARY OF RATINGS
10	H	M	H	M	H	M

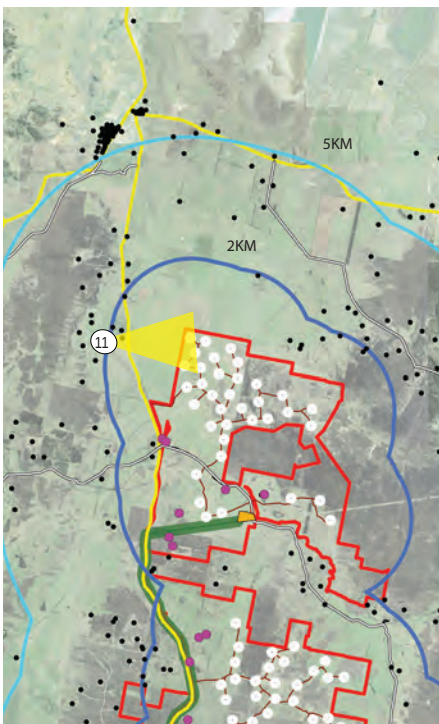
Overall Visual Impact Rating	MODERATE/HIGH*
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From Table 4.4, using a combination of sensitivity and magnitude ratings.

**Existing screening vegetation may reduce the visual impact on these properties. A worst case scenario rating has been given.*

CLOUSTON associates

PRIVATE RECEPTORS VIEWPOINT 11



Viewpoint location



Area plan



Photo 11 - Looking east from an elevated panoramic view off Roseview Road

Location	Type	Nearest WTG	Approx. number of nearby properties	Receptors	Associated photomontages/wireframes
Roseview Road	Dwelling	2.3km	10 (J134, J135, J93, J257, J130, J19, J272, J65, J33_DA, J10)	Residents of properties on elevated land to the west of Braidwood Road, north of Boro.	PM4, PM38, WF1, WF2, WF3

Current view	Expected Visual Impact
As shown in Photo 11, these properties have an elevated panoramic view looking east and south. The foreground and middle ground are dominated by undulating open grassland with stands of trees, stretching to low ridgelines in the distance. Minimal built form is visible within the view frame.	A large cluster of WTGs will be visible to the east, stretching across ridgelines in the 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 on the closer turbines. The WTGs will occupy a large portion of the view frame with a second cluster of more distant turbines will be visible to the south. A high impact on visual amenity is expected. See Appendix A for a detailed assessment of each dwelling in this location.

RECEPTOR IDENTIFICATION	RECEPTOR SENSITIVITY	MAGNITUDE				
		DISTANCE	QUANTUM OF VIEW	PERIOD OF VIEW	MAGNITUDE OF CHANGE	SUMMARY OF RATINGS
11	H	M	H	H	H	H

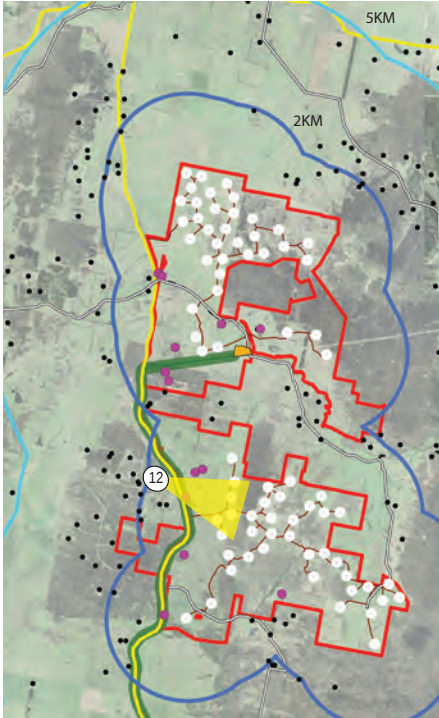
Overall Visual Impact Rating	HIGH
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From Table 4.4, using a combination of sensitivity and magnitude ratings.

CLOUSTON associates

PRIVATE RECEPTORS

VIEWPOINT 12



Viewpoint location



Area plan



Photo 12 - Looking east from an elevated view off Barnet Drive (Kalbilli Close)

Location	Type	Nearest WTG	Approx. number of nearby properties	Receptors	Associated photomontages
Barnet Drive	Dwelling	2.3km	8 (J5, J20, J186A, J186, J85, J181, J43, J58B)	Residents of properties on elevated land to the west of Braidwood Road along Barnet Drive	PM19, PM20, PM41

Current view	Expected Visual Impact
As shown in Photo 12, some of these properties have elevated views looking east. The foreground is dominated by dense tree and shrub planting, partially screening views of the middle and far distance and comprising undulating open grassland stretching to a distant ridgeline.	A large cluster of WTGs will be visible in the middle distance, partially screened by foreground vegetation. The turbines will appear prominent against the skyline and will be an obvious element within the landscape (where visible above the vegetation). Blade movement will be clearly visible on the closer turbines. Several of the properties in this location are surrounded by dense vegetation and so the level of visual impact experienced will depend on their orientation and density of this planting - see Appendix A for a detailed assessment of each dwelling in this location.

RECEPTOR IDENTIFICATION	RECEPTOR SENSITIVITY	MAGNITUDE				
		DISTANCE	QUANTUM OF VIEW	PERIOD OF VIEW	MAGNITUDE OF CHANGE	SUMMARY OF RATINGS
12	H	M	M	H	H	H

Overall Visual Impact Rating	HIGH*
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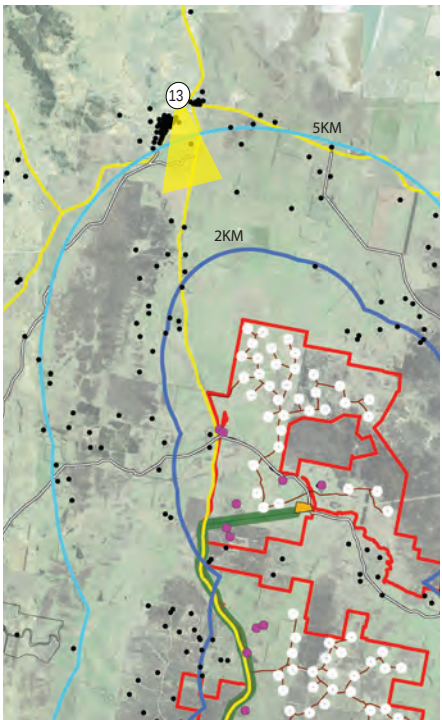
From Table 4.4 using a combination of sensitivity and magnitude ratings.

**Existing screening vegetation may reduce the visual impact on these properties. A worst case scenario rating has been given.*

CLOUSTON associates

PRIVATE RECEPTORS

VIEWPOINT 13



Viewpoint location



Area plan



Photo 13 - Far reaching and elevated panoramic views south from Sherwins Ridge development site

Location	Type	Nearest WTG	Approx. number of nearby properties	Receptors
Sherwins Ridge - Tarago	Approved subdivision	6.2km	20	Future residents

Current view	Expected Visual Impact
As shown in Photo 13, this viewpoint has far reaching and elevated panoramic views south. Built form associated with the village of Tarago is visible in the foreground with grass pasture beyond, stretching to low hills and associated ridge lines in the middle and far distance. Tall mature tree plantings are visible along field boundaries.	Future residents of lots that have views south will have potential visual accessibility to numerous WTGs, stretching across the ridgeline in the middle distance. A second cluster of more distant turbines will also be visible behind the first group, at a distance of over 12km. In clear conditions the WTGs will be apparent above the horizon, standing out against the sky. Due to the large viewing distance, turbines are unlikely to dominate the view, although the number visible will lead to a noticeable change to the visual scene. Blade movement will be discernible on the closer set of turbines. Landscape planting associated with the housing development may screen views of the WTGs from some properties, potentially reducing the level of visual impact experienced.

RECEPTOR IDENTIFICATION	RECEPTOR SENSITIVITY	MAGNITUDE				
		DISTANCE	QUANTUM OF VIEW	PERIOD OF VIEW	MAGNITUDE OF CHANGE	SUMMARY OF RATINGS
13	M	M	H	H	M	M

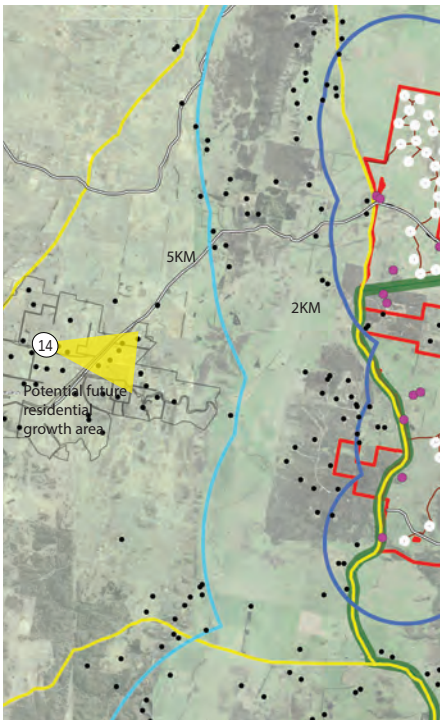
Overall Visual Impact Rating	MODERATE
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From Table 4.4 using a combination of sensitivity and magnitude ratings.

CLOUSTON associates

PRIVATE RECEPTORS

VIEWPOINT 14



Viewpoint location



Area plan

- Dwelling
- Wind Turbine
- Viewpoint location
- PM # Photomontage reference - refer Appendix B



Photo 14 - Looking east from an elevated viewpoint on Mount Fairy Road

Location	Type	Nearest WTG	Approx. number of nearby properties	Receptors	Associated photomontages
Mount Fairy	Dwelling	10.6km	6 (no reference numbers)	Residents of properties either side of Mount Fairy Road	PM8

Current view	Expected Visual Impact
As shown in Photo 14, the properties in this area look east from an elevated viewpoint. Stands of tree planting and open fields are visible in the foreground with undulating and forested ridgelines in the distance. This area has been identified within the draft former Palerang LGA Rural Lands Strategy as an area for future residential development. The density of dwellings may increase in the future, increasing the number of viewers.	The level of visual impact on individual properties will depend on their orientation and quantity of screening vegetation surrounding the property. Where visible, the turbines will occupy a relatively small part of the overall visual scene and will appear as a minor element within a broader landscape. The future residential development of this area will increase the number of receptors with visual accessibility to the wind farm. Visual impacts are likely to increase as dwellings are positioned closer to the WTGs. Increased built form and planting associated with new residential development, however, will likely restrict some views to the JWF from any new dwellings.

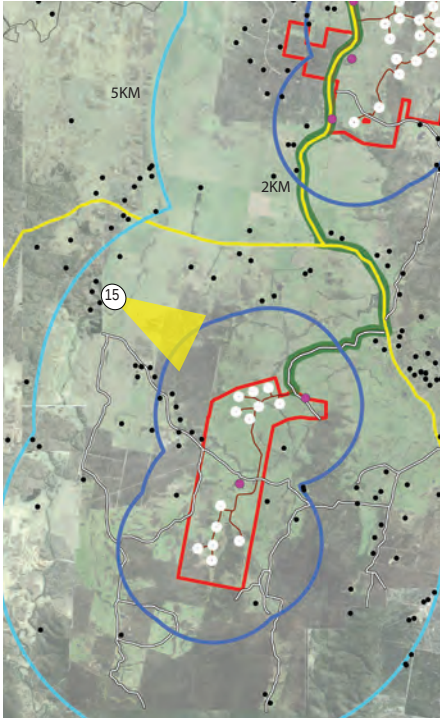
RECEPTOR IDENTIFICATION	RECEPTOR SENSITIVITY	MAGNITUDE				
		DISTANCE	QUANTUM OF VIEW	PERIOD OF VIEW	MAGNITUDE OF CHANGE	SUMMARY OF RATINGS
14	M	L	M	H	L	L

Overall Visual Impact Rating	MODERATE/LOW
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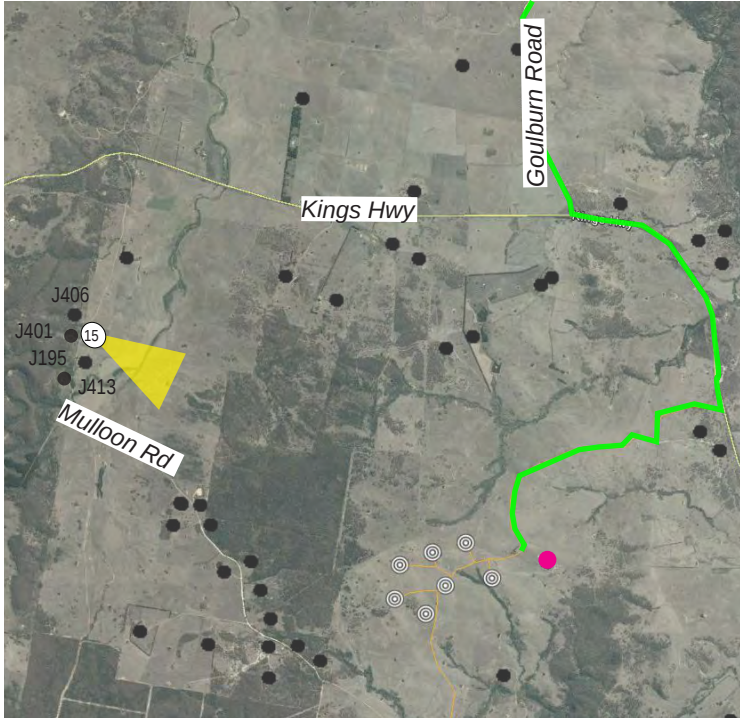
From Table 4.4, using a combination of sensitivity and magnitude ratings.

CLOUSTON associates

PRIVATE RECEPTORS VIEWPOINT 15



Viewpoint location



Area plan

- Dwelling
- Participating landholder dwelling
- Wind Turbine
- Viewpoint location
- Transmission line corridor



Photo 15 - Looking east over a mostly open landscape off Mulloon Road

Location	Type	Nearest WTG	Approx. number of nearby properties	Receptors
Mulloon Road	Dwelling	4km	4 (J406, J401, J195, J413)	Residents of properties either side of Mulloon Road

Current view	Expected Visual Impact
As shown in Photo 15, these properties look east over a mostly open landscape. Undulating grassland and stands of trees dominate the foreground, stretching to a vegetated ridgeline in the middle distance.	Two clusters of WTGs will be visible in the middle distance, partially blocked by the ridgeline. The turbines will be visible against the skyline and will be an obvious element within the landscape. Blade movement will be visible but the turbines will not dominate the field of view. The level of visual impact on individual properties in this location will depend on their orientation and level of screening vegetation present which may potentially reduce the level of visual impact experienced.

RECEPTOR IDENTIFICATION	RECEPTOR SENSITIVITY	MAGNITUDE				
		DISTANCE	QUANTUM OF VIEW	PERIOD OF VIEW	MAGNITUDE OF CHANGE	SUMMARY OF RATINGS
15	M	M	M	H	M	M

Overall Visual Impact Rating	MODERATE*
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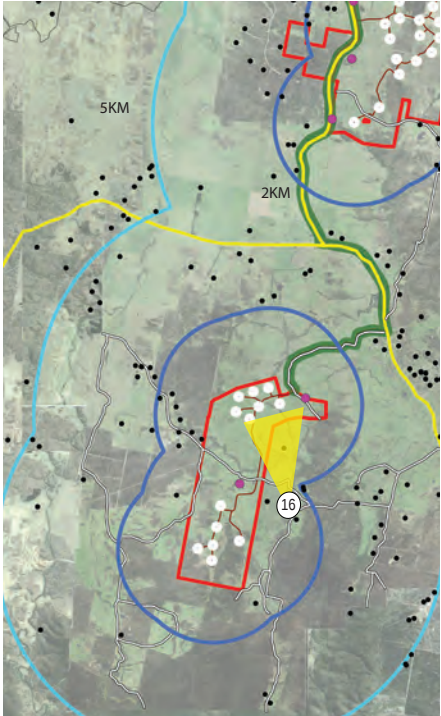
From Table 4.4, using a combination of sensitivity and magnitude ratings.

**Existing screening vegetation may reduce the visual impact on these properties. A worst case scenario rating has been given.*

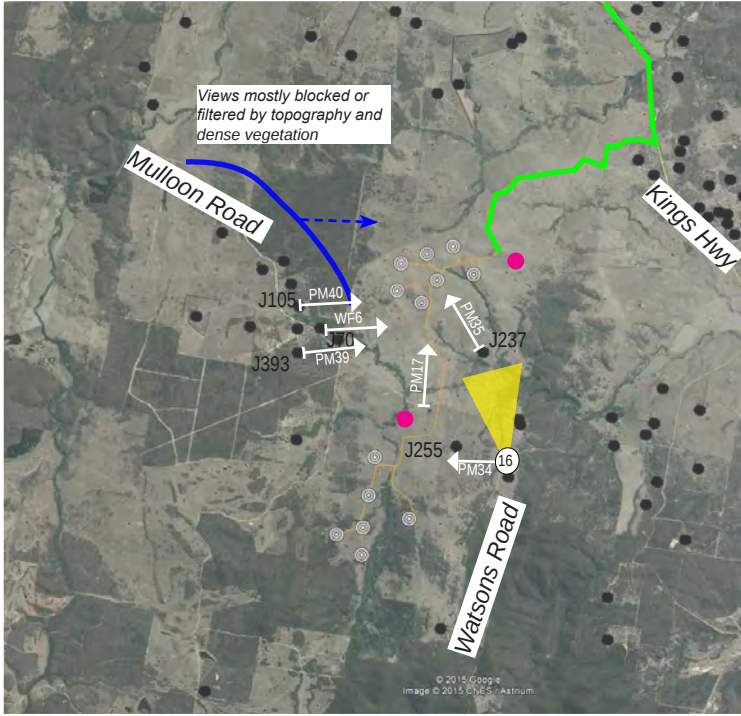
CLOUSTON associates

PRIVATE RECEPTORS

VIEWPOINT 16



Viewpoint location



Area plan

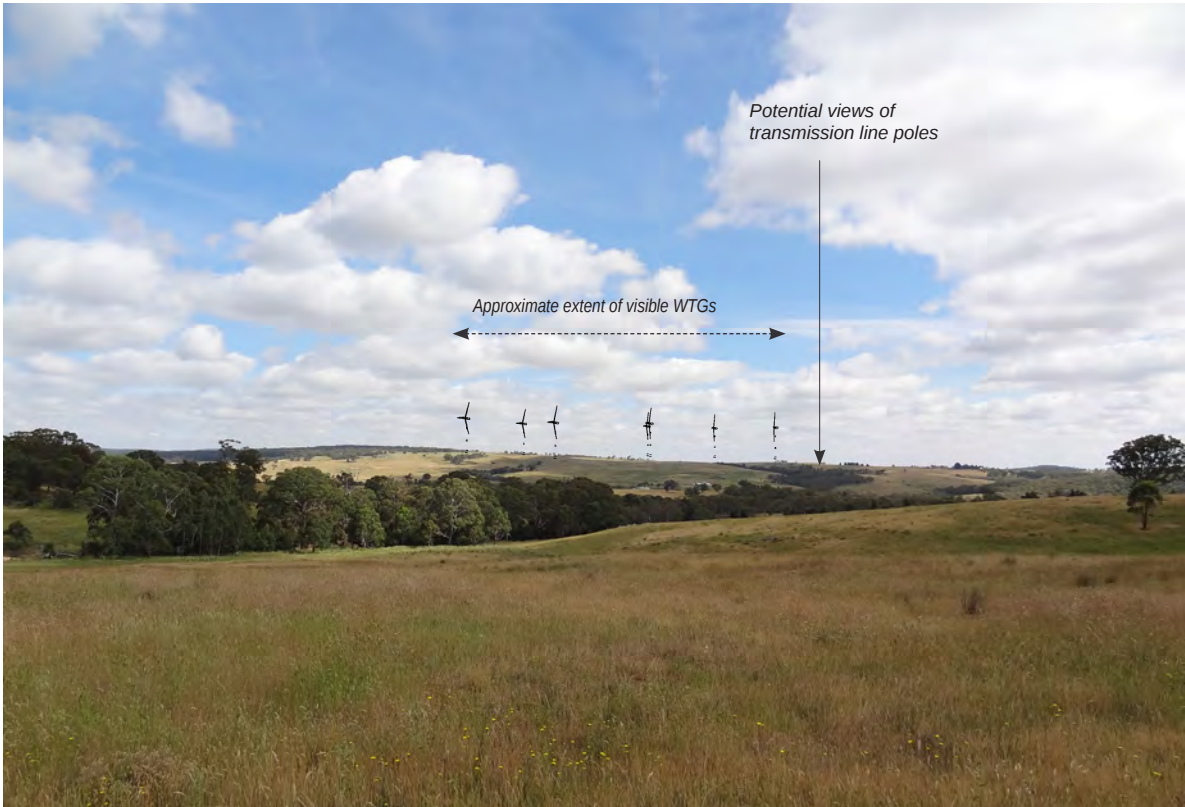


Photo 16 - Looking north over a vegetated valley to a ridgeline in the middle distance off Watsons Road

Location	Type	Nearest WTG	Approx. number of nearby properties	Receptors	Associated photomontages/ wireframes
Watsons/ Mulloon Road	Dwelling	1.3km	5 (J237, J105, J255, J70, J393)	Residents of properties either side of Watsons Road and adjacent to Project Area	PM17, PM34, PM35, PM39, PM40, WF6

Current view	Expected Visual Impact
As shown in Photo 16, these properties look north over a vegetated valley to a ridgeline in the middle distance. Minimal built form is currently visible from this viewpoint.	A cluster of 7 WTGs will be visible in the middle distance, sitting on the ridgeline. The turbines will be prominent against the skyline and will be an obvious element within the landscape. Blade movement will be clearly visible. If constructed above ground, several poles associated with the 33kv transmission line may also be visible against the skyline, although they will not be visually intrusive. 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 - see Appendix A for a detailed assessment of each dwelling in this location.

RECEPTOR IDENTIFICATION	RECEPTOR SENSITIVITY	MAGNITUDE				
		DISTANCE	QUANTUM OF VIEW	PERIOD OF VIEW	MAGNITUDE OF CHANGE	SUMMARY OF RATINGS
16	H	M	M	H	M	M

Overall Visual Impact Rating	MODERATE/HIGH*
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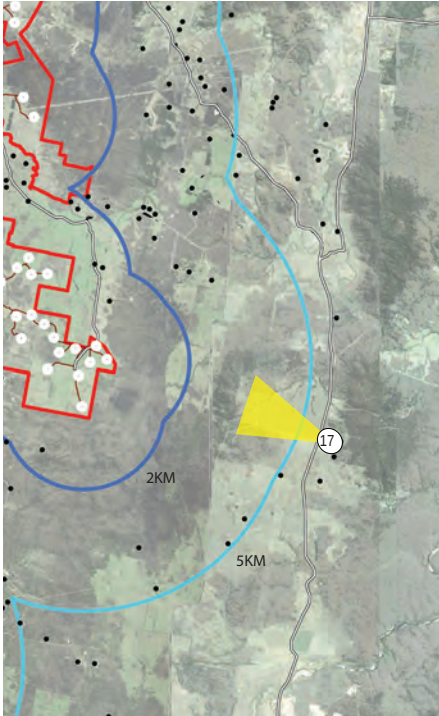
From Table 4.4, using a combination of sensitivity and magnitude ratings.

**Existing screening vegetation and local topography may reduce the visual impact on these properties. A worst case scenario rating has been given.*

CLOUSTON associates

PRIVATE RECEPTORS

VIEWPOINT 17



Viewpoint location



Area plan



Photo 17 - Looking west across open fields to densely vegetated undulating ridges in the middle and far distance off Mayfield Road

Location	Type	Nearest WTG	Approx. number of nearby properties	Receptors	Associated photomontages
Mayfield Road	Dwelling	5.8km	5 (no reference numbers)	Residents of properties either side of Mayfield Road	PM13

Current view	Expected Visual Impact
As shown in Photo 17, these properties look west across open fields to densely vegetated undulating ridges in the middle and far distance. Minimal built form is currently visible from this viewpoint.	A large cluster of WTGs will be visible in the middle distance, partially obscured by the undulating ridgelines. The turbines will be noticeable but not visually intrusive. Blade movement will be visible but the turbines will occupy a relatively small part of the overall visual scene.

RECEPTOR IDENTIFICATION	RECEPTOR SENSITIVITY	MAGNITUDE				
		DISTANCE	QUANTUM OF VIEW	PERIOD OF VIEW	MAGNITUDE OF CHANGE	SUMMARY OF RATINGS
17	M	M	L	H	L	M

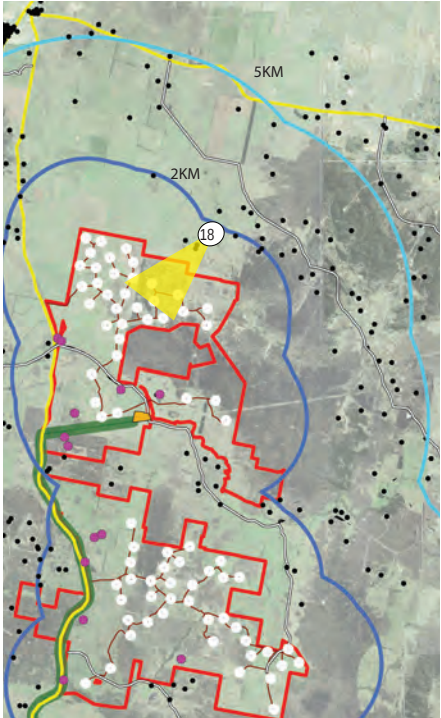
Overall Visual Impact Rating	MODERATE*
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From Table 4.4, using a combination of sensitivity and magnitude ratings.

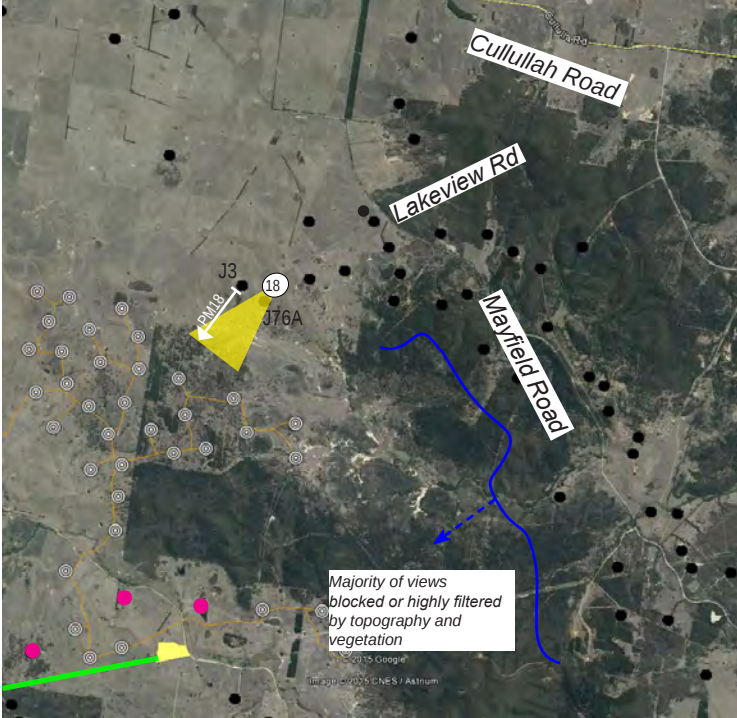
**Existing screening vegetation and local topography may reduce the visual impact on these properties. A worst case scenario rating has been given.*

CLOUSTON associates

PRIVATE RECEPTORS VIEWPOINT 18



Viewpoint location



Area plan



Photo 18 - Elevated and panoramic views to the west and south off Lakeview Road

Location	Type	Nearest WTG	Approx. number of nearby properties	Receptors	Associated photomontages/wireframes
Lakeview Road	Dwelling	1.5km	2 (J3, J76A)	Residents of two properties at the end of Lakeview Road	PM18

Current view	Expected Visual Impact
As shown in Photo 18, these two properties are positioned on a hilltop with elevated and panoramic views to the west and south. Undulating open grassland gives way to vegetated slopes and ridges with distant hills visible on the horizon. Minimal built form is visible within the view frame. Access to the properties was not possible and so photo 18 was taken from the base of a driveway. The outlook from the house is likely to be significantly more expansive than indicated in the photo, with far reaching views to the north, west and south.	A large number of WTGs will be visible in the foreground to the west and south, stretching into the middle distance. A second more distant cluster of turbines will be visible to the south. The closest turbines will appear prominent against the sky and are likely to dominate the field of view, appearing large in scale and visibly tall. Movement of the blades will be obvious. Turbines will appear less noticeable as distance increases. Refer Appendix A for a detailed assessment of each dwelling in this location.

RECEPTOR IDENTIFICATION	RECEPTOR SENSITIVITY	MAGNITUDE				
		DISTANCE	QUANTUM OF VIEW	PERIOD OF VIEW	MAGNITUDE OF CHANGE	SUMMARY OF RATINGS
18	II	II	II	II	II	II

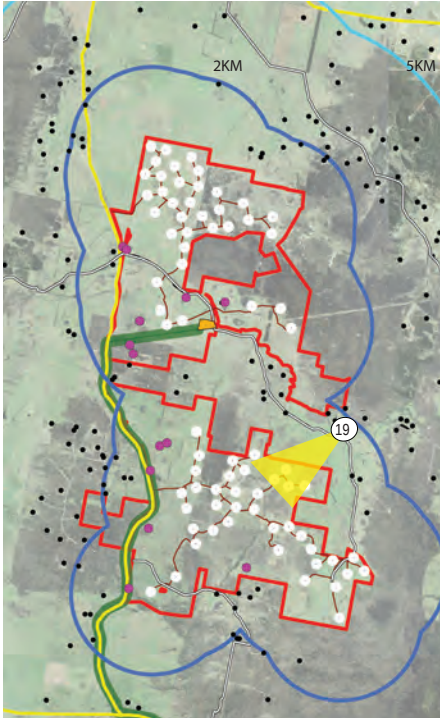
Overall Visual Impact Rating	HIGH
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From Table 4.4, using a combination of sensitivity and magnitude ratings.

CLOUSTON associates

PRIVATE RECEPTORS

VIEWPOINT 19



Viewpoint location



Area plan



Photo 19 - Looking south west over open farmland off Lower Boro Road

Location	Type	Nearest WTG	Approx. number of nearby properties	Receptors	Associated photomontages/wireframes
Lower Boro Road	Dwelling	1.5km	8 (J145, J146, J142, J147, J141, J174A, J174B, J162_TBB)	Residents of properties on both sides of Lower Boro Road	PM24, PM25, PM26, PM32, PM33, WF5

Current view	Expected Visual Impact
As shown in Photo 19, these properties look south west over open farmland. Stands of trees are visible in the foreground and on a low ridge in the middle distance. This view is representative of several properties in the area, some of which have views to the north as well, depending on local topography and vegetation patterns.	A series of WTGs will be visible to the south east, stretching along the ridgeline in the middle distance. Some of the turbines will be obscured by vegetation or partially obscured behind the ridge. The closest turbines will appear prominent against the skyline and will be an obvious element within the landscape. Blade movement will be clearly visible. The level of visual impact on individual properties in this location will depend on their orientation and level of screening vegetation present. Some properties may also have views of a group of turbines to the north as well as the southeast. Refer Appendix A for a detailed assessment of each dwelling in this location.

RECEPTOR IDENTIFICATION	RECEPTOR SENSITIVITY	MAGNITUDE				
		DISTANCE	QUANTUM OF VIEW	PERIOD OF VIEW	MAGNITUDE OF CHANGE	SUMMARY OF RATINGS
19	H	M	M	H	M	M

Overall Visual Impact Rating	MODERATE/HIGH*
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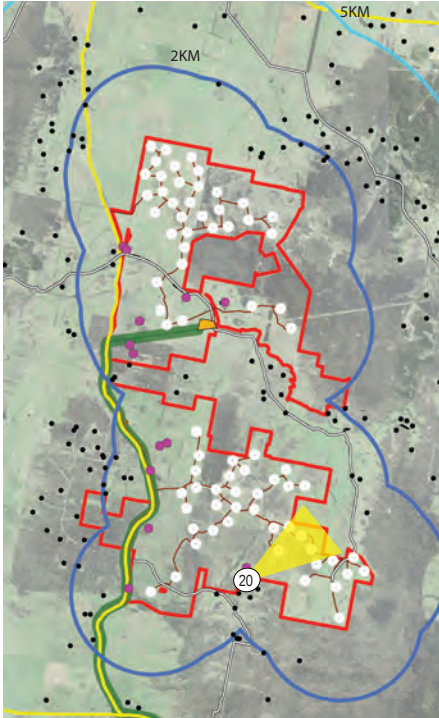
From Table 4.4, using a combination of sensitivity and magnitude ratings.

**Existing screening vegetation and local topography may reduce the visual impact on these properties. A worst case scenario rating has been given.*

CLOUSTON associates

PRIVATE RECEPTORS

VIEWPOINT 20



Viewpoint location



Area plan



Photo 20 - Looking north east over open fields and dense stands of trees in proximity to Duckfield Road

Location	Type	Nearest WTG	Approx. number of nearby properties	Receptors	Associated photomontages
Duckfield Road	Dwelling	1.2km	5 (J226, J208, J217, J216, J247)	Residents of properties on rural lanes to the east of Goulburn Road	PM28, PM29, PM30, PM37, PM36

Current view	Expected Visual Impact
As shown in Photo 20, these properties look north east over open fields and dense stands of trees. The ground rises to a low, vegetated ridgeline in the middle distance.	A series of WTGs will be visible to the east and north, stretching along the ridgeline in the middle distance. Some of the turbines will be obscured by foreground vegetation. The closest turbines will appear prominent against the skyline and will be an obvious element within the landscape. Blade movement will be clearly visible. 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. Refer Appendix A for a detailed assessment of each dwelling in this location.

RECEPTOR IDENTIFICATION	RECEPTOR SENSITIVITY	MAGNITUDE				
		DISTANCE	QUANTUM OF VIEW	PERIOD OF VIEW	MAGNITUDE OF CHANGE	SUMMARY OF RATINGS
20	H	H	M	H	M	M

Overall Visual Impact Rating	MODERATE/HIGH*
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From Table 4.4, using a combination of sensitivity and magnitude ratings.

**Existing screening vegetation and local topography may reduce the visual impact on these properties. A worst case scenario rating has been given.*

4.8 VISUAL IMPACT SUMMARY - REPRESENTATIVE VIEWPOINTS

From the analysis of representative visual receptors in the foregoing section, the summary of worst case unmitigated qualitative and quantitative visual impacts of the Project on the selected representative viewpoints are provided below. For predicted mitigated visual impact ratings please refer to Appendix A.

Receptor Identification	Receptor Type	Location	Receptor Sensitivity	MAGNITUDE					Overall Impact Rating
				Distance	Quantum of View	Period of View	Magnitude of Change	Summary of Magnitude Ratings	

Public Receptors

1	Public open space	Tarago	M	M	M	M	M	M	MODERATE
2	Main Road	Cullulla Road	L	M	L	M	L	L	LOW
3	Main Road	Braidwood Road	M	H	M	M	H	H	MODERATE/HIGH
4	Minor Road	Lower Boro Road	L	H	M	M	H	M	MODERATE/LOW
5	Main Road	Goulburn Road	M	H	M	M	H	H	MODERATE/HIGH
6	Main Road	Kings Highway	M	M	L	M	L	L	MODERATE/LOW
7	Minor Road	Jamaleopa Road	L	M	M	M	M	M	MODERATE/LOW
8	Minor Road	Manar Road	L	H	M	M	H	M	MODERATE/LOW

Private Receptors

9	Dwelling	Properties along Tarago Road	M	M	M	M	M	M	MODERATE*
10	Dwelling	Properties to the east of Braidwood Road	H	M	H	M	H	M	MODERATE/HIGH*
11	Dwelling	Properties off Roseview Road	H	M	H	H	H	H	HIGH
12	Dwelling	Properties to west of Braidwood Road along Barnet Drive	H	M	M	H	H	H	HIGH*
13	Dwelling	Sherwin Ridge - future subdivision within Tarago	M	M	H	H	M	M	MODERATE
14	Dwelling	Properties either side of Mount Fairy Road	M	L	M	H	L	L	MODERATE/LOW
15	Dwelling	Properties either side of Mulloon Road	M	M	M	H	M	M	MODERATE*
16	Dwelling	Properties either side of Watsons Road	H	M	M	H	M	M	MODERATE/HIGH*
17	Dwelling	Properties either side of Mayfield Road	M	M	L	H	L	M	MODERATE*
18	Dwelling	Properties at the end of Lakeview Road	H	H	H	H	H	H	HIGH
19	Dwelling	Properties either side of Lower Boro Road	H	M	M	H	M	M	MODERATE/HIGH*
20	Dwelling	Properties either side Duckfield Road	H	H	M	H	M	M	MODERATE/HIGH*

Table 4.7 - Summary of visual impacts of the Project across the study area

* Existing screening vegetation and local topography may reduce the visual impact on these properties. A worst case scenario rating has been given.

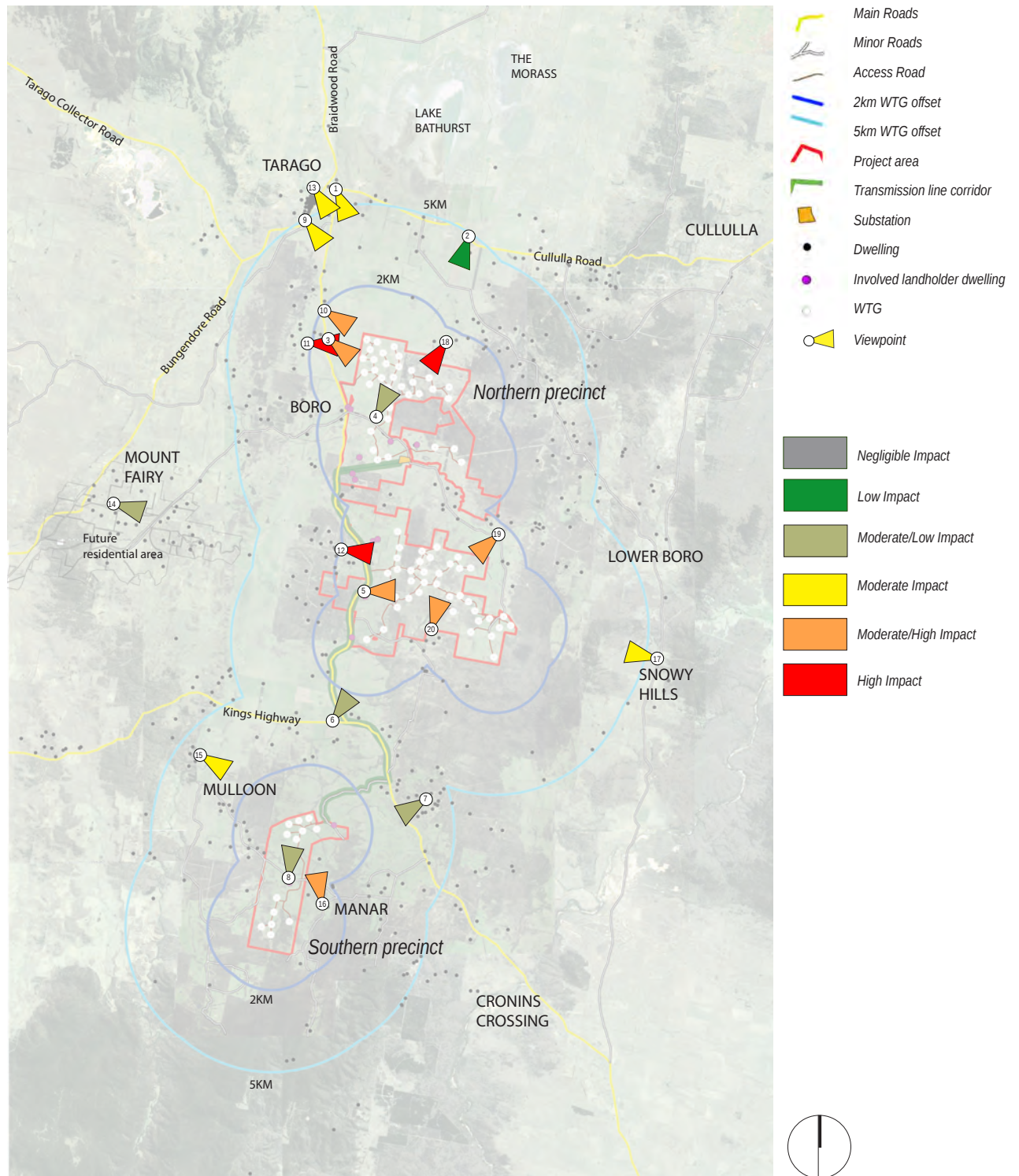


Figure 4.7 - Summary of visual impacts of the Project across the study area

4.8.1 Representative Public Viewpoints

The visual impacts of the Project on the representative public viewpoints studied range from Low to Moderate/High (refer Table 4.7 and Figure 4.7).

Impact ratings include:

- Low - 1 viewpoint
- Moderate - 1 viewpoint
- Moderate/Low - 4 viewpoints
- Moderate/High - 2 viewpoints

The low visual sensitivity of the minor roads that traverse the study area (including Jamaleopa Road, Lower Boro Road and Manar Road) has reduced the level of visual impact experienced from these locations. The roads are lightly-trafficked and mostly used for accessing remote properties. Despite many of the turbines being in close proximity to these minor roads, their functional nature and the relatively short duration of views experienced by motorists means that a significant impact is not expected.

The greatest visual impact within the public realm (Moderate/High) has been recorded on the main road that runs directly through the study area to the west of the PA, Braidwood/Goulburn Road (viewpoints 3 and 5). The road passes in close proximity to many of the turbine clusters and has a higher sensitivity due to its increased traffic and importance as a major route. The visual amenity of the driving experience may be affected by the turbines and transmission line viewed along the road corridor. It should be noted that the preference is for an underground transmission line that will have negligible associated visual impact. The northern turbine precinct will be highly visible from open sections of the road corridor.

The other main road within the study area is the Kings Highway, running east to west (viewpoint 6). Despite being a highly trafficked road, the visual impact of the Project is rated as Moderate/Low due to its distance from the turbines. The WTGs will appear as small elements from the road within a broader, panoramic view frame and are unlikely to be visually intrusive.

Visually sensitive public open space within the study area is limited to a small sports field associated with the township of Tarago. The sporting facility is located over 5km from the turbines, bounded by tall vegetation and unlikely to have views of the wind farm.

4.8.2 Representative Private Viewpoints

The visual impacts of the Project on the representative private viewpoints studied range from Moderate/Low to High (refer Table 4.7 and Figure 4.7).

Impact ratings include:

- Moderate/Low - 1 viewpoints
- Moderate - 4 viewpoints
- Moderate/High - 4 viewpoints
- High - 3 viewpoints

Visual impacts related to the Project are shown to extend across the study area, with the highest impacts concentrated within a 5km offset of the WTGs. The highest visual impacts are likely to be experienced by dwellings on elevated terrain to the west (Roseview Road - viewpoint 11) and east (Lakeview Road - viewpoint 18) of the northern precinct with panoramic views to multiple WTGs available. Numerous turbines will appear as dominant components within the view frame, with blade movement clearly visible.

The greatest concentration of dwellings affected by High visual impacts is located within the Roseview Road locality. In this location there is minimal screening vegetation present and extensive panoramic views available to the east. Several elevated properties off Barnet Drive will also experience High visual impacts when looking east, although increased vegetation within this locality will act to filter/block some of these views.

Several dwellings to the west and south of the northern precinct are located within 2km of WTGs and will have associated Moderate/High impacts. These include dwellings off Lower Boro Road (viewpoint 19) and Duckfield Road (viewpoint 20). The viewing angle from these locations is generally less elevated and vegetation is more likely to partially filter views.

It should be noted that some dwellings at the western end of Lower Boro Road may have views on both sides from WTGs associated with the northern precinct. Moderate/High impacts are also expected on several properties to the east of Braidwood Road with level views of WTGs (viewpoint 10).

The southern precinct has the lowest density of properties, restricting Moderate/High impacts to a small number of properties that have direct views of these WTGs (viewpoint 16). Although fewer in number than other precincts, the WTGs will still appear as large scale elements within the landscape.

The most southern group of turbines within this precinct has very low visual accessibility. Properties off Jamaleopa Road generally do not have views towards both groups of southern turbines.

At a greater offset from the PA, slightly elevated views to numerous WTGs may be available from dwellings along Tarago Road in proximity to Tarago village (viewpoint 9). Vegetation is, however, likely to filter some of these views, reducing the level of expected impact on some properties in this location.

Beyond a viewing distance of approximately 5.5km, visual impacts associated with the Project tend to reduce to Moderate/Low to Low, as the turbines become more indistinct and form a smaller part of the overall view frame. Vegetation and topography are more likely to filter and block these longer distance views. The localities of Mount Fairy and Snowy Hills have relatively limited visual accessibility to the JWF (viewpoints 14 and 17). Where direct views are available, the WTGs will generally be a small component within the wider view frame.

Beyond an offset of approximately 6-7km from the PA, the JWF has a highly limited visual catchment due to surrounding topography that partially encloses the study area, blocking views to WTGs from this distance.

4.9 VISUAL IMPACT SUMMARY - DWELLINGS WITHIN 3KM OFFSET FROM A TURBINE

Appendix A provides a detailed assessment of the expected unmitigated and mitigated visual impacts on all dwellings within 3km of a WTG. Initially, a desktop assessment on these dwellings was undertaken. A site visit was then undertaken to establish a validated impact rating on each dwelling rated as receiving a Moderate/High to High desktop unmitigated visual impact.

Where access to a dwelling was unavailable, an assessment was taken from the closest publicly accessible location with views to that dwelling. If visual accessibility was not available or the desktop assessment could not estimate the expected visual impact (eg. where screening vegetation height was unknown), a worst case scenario rating has been given. It should be noted, therefore, that this detailed assessment is conservative and some visual impact ratings may in reality be less than recorded due to local topography and the presence of screening vegetation.

As shown in Figure 4.10, of the 140 total dwellings within 3km of a WTG, 47 (34%) have recorded unmitigated Negligible to Moderate/Low visual impacts, 34 (24%) have recorded unmitigated Moderate impacts and 59 (42%) have recorded unmitigated Moderate/High to High impacts.

Generally, the closer the proximity of a dwelling to the Project, the higher the expected visual impact. This is demonstrated in Figure 4.8 and 4.9 showing approximately 60% of dwellings within 2km of the nearest WTG experiencing unmitigated Moderate/High or High visual impacts, reducing to 27% of dwellings within 2-3km. As viewing distance increases, turbines become less distinct and prominent within the view frame and blade movement becomes less obvious.

The highest unmitigated visual impacts are experienced by properties that are located on elevated ground with panoramic views over the surrounding rural landscape. The lack of tall built form within the study area acts to increase the visual prominence of the turbines from these locations. The extensive linear spread of WTGs over multiple precincts (northern and southern) increases the proportion of the field of view occupied by WTGs. Some elevated dwellings will have views over both turbine precincts.

Local vegetation and topography can significantly alter the visual impact experienced by individual properties, even those in close proximity to turbines. Many dwellings are surrounded by vegetation in the form of garden planting, woodland or tall shelter belts. These filter or block views of WTGs and have reduced the visual impact rating from the main part of a dwelling for many properties.

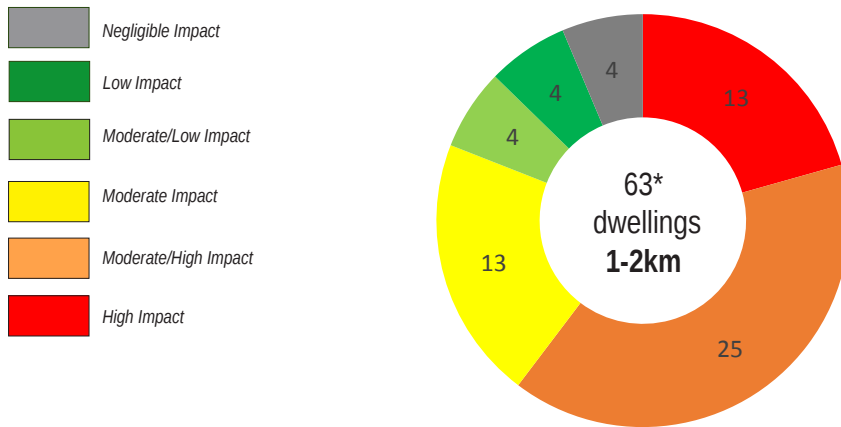


Figure 4.8 - Summary of unmitigated visual impacts of the Project on individually assessed dwellings between 1-2km from nearest WTG** (refer Appendix A for further details)

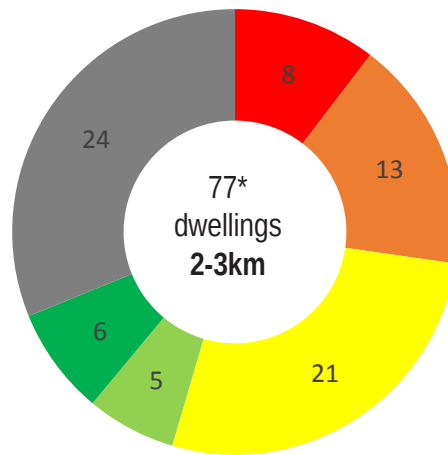
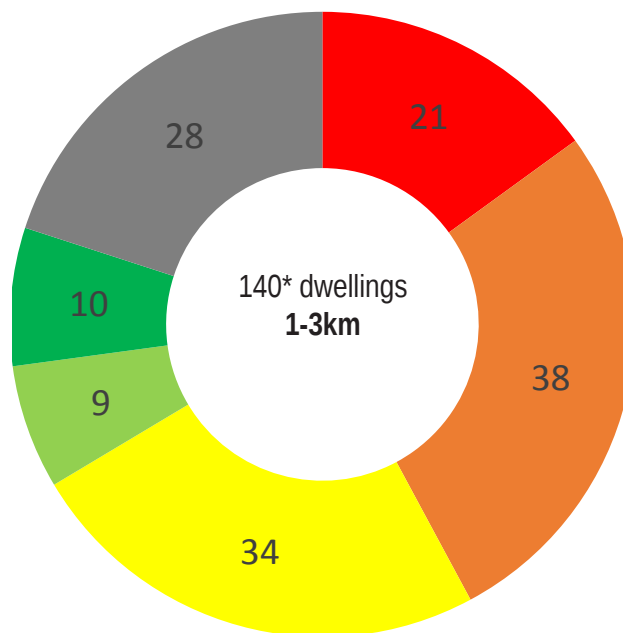


Figure 4.9 - Summary of unmitigated visual impacts of the Project on individually assessed dwellings between 2-3km from nearest WTG** (refer Appendix A for further details)



* the number of dwellings listed includes multiple dwellings belonging to one owner

**the detailed assessment is conservative and some visual impact ratings may in reality be less than recorded due to local topography and screening vegetation

Figure 4.10 - Overall summary of unmitigated visual impacts of the Project on individually assessed dwellings between 1-3km from nearest WTG** (refer Appendix A for further details)

4.10 ELECTRICAL WORKS

The Project will involve the construction of a substation and transmission line connection to an existing TransGrid 330 kV transmission network, which passes through the PA.

4.10.1 Substation

A typical arrangement for a wind farm substation is illustrated overleaf in Image 4.1. The substation is of a relatively small scale and will be located in a remote, sparsely populated setting off Lower Boro Road. Several of the nearest properties are participating landowners. The substation is expected to have a minimal visual impact if sited and screened appropriately.

4.10.2 Transmission Line

The preference for the transmission line (in discussion with RMS and TransGrid) is to be constructed below ground. If this is the case, there will be negligible associated visual impacts. The following analysis is only relevant for an above ground option.

If constructed above ground, the 33 kV transmission line is likely to consist of the following elements (refer Image 4.2):

- single tapered timber or steel poles up to 15m high with a 200m separation distance
- aluminium conductors
- an aerial earth wire and communications link.

The transmission line will be visible running alongside an approximately 13km section of Goulburn Road and Kings Highway. These roads are scenic and have frequent expansive views over the surrounding landscape. There is little built form or electrical infrastructure of a similar scale visible alongside the road corridors.

The visual impact on motorists is likely to be Moderate/Low to Moderate, increasing in areas where views from the road are far reaching and many poles may be seen in succession. The poles are likely to be visually prominent from a viewing distance of up to 1km, beyond which the views would have a greater tendency to be screened by undulating landform and screening vegetation, as well as becoming much less noticeable within the wider landscape.

A section of the transmission line crosses open grassland alongside Manor Road. This area is sparsely populated/accessed with very few visual receptors. The visual impact of the transmission line in this location is expected to be Low.

4.10.3 Transmission Line Cumulative Impact

If constructed above ground, the transmission line will be visible alongside the proposed WTGs from certain sections of Goulburn Road and Kings Highway. In these locations there is likely to be a cumulative visual impact, especially where multiple WTGs are visible across the landscape. Motorists are likely to have a greater sense of change in the visual scene, with multiple new types of infrastructure visible, leading to a degrading of the rural context.

4.10.4 Transmission Line Pole Type

If constructed above ground, the careful selection of pole type can potentially reduce the level of visual impact experienced (see Section 6 of this report for a more detailed discussion of mitigation options):

Considerations should be given to:

- poles with a lower height - a lower pole will be less visible
- poles with a reduced diameter - a slimmer pole will be less visible
- material - a timber pole is likely to reduce the amount of reflection and offer a more neutral colour compared to steel, assisting the poles to blend into their surrounding context



Image 4.1 - Typical wind farm substation layout - Source: www.poweng.net



Image 4.2 - Example of similar transmission line poles alongside a road corridor - Source: <https://www.ausgrid.com.au/>

4.11 CONSTRUCTION IMPACTS

Potential additional visual impacts may occur during the construction phases of the Project. The key construction activities that will be visible from areas surrounding the proposed wind farm include:

- ongoing detailed site assessment including sub-surface geotechnical investigations
- various civil works to upgrade local roads and access points
- construction facilities, including portable structures and laydown areas
- construction and directional signage
- mobilisation of rock crushing and temporary mobile concrete batching plant
- excavation, earthworks and vegetation clearing
- various construction activities including erection of wind turbines, monitoring masts and substation with associated electrical infrastructure works (refer Image 4.3).

The majority of construction activities are temporary in nature and for the most part restricted to discrete areas within the study area. The cranes and concrete batching plant are likely to be the most visible construction elements but unlikely to result in a level of visual impact greater than the completed WTGs due to their relatively lower height. The short duration of construction will limit these impacts to several months.



Image 4.3 - Typical WTG construction - Source: www.poweng.net

4.12 NIGHTTIME LIGHTING

The aeronautical impact assessment completed for the Project did not recommend obstacle lighting. CASA has however indicated their preference for select WTGs to be lit with two steady red low intensity lights at night.

The aeronautical impact assessment provided an obstacle lighting plan that could be considered for the Project in the event that obstacle lighting is required (for example, by CASA). The obstacle lighting plan provided for two red low intensity obstacle lights on 47 of the 88 WTGs. This obstacle lighting plan has been considered here to identify potential unmitigated impacts at night.

CASA also suggested investigating the use of radar activated lighting that would only switch on lights when flights are within a 5km range of a turbine. This would reduce the duration of night lighting operation significantly ie. the time that night lighting would be active, potentially leading to negligible night time visual impacts for public and private receptors.

Potential visual impacts associated with traditional obstacle marking and lighting at night time have not been extensively researched or tested in New South Wales, although some site investigations have been carried out at existing wind farms in Victoria. Investigations have generally concluded that although night time lighting mounted on wind turbines may be visible for a number of kilometres from the wind farm, the actual intensity of the lighting appears no greater than other sources of night time lighting, including vehicle head and tail lights (refer Image 4.4).

Appendix B contains night time photomontages that illustrate the potential visual impacts of red low intensity obstacle lights from various public and private viewpoints across the study area.

4.12.1 Existing Light Sources

A small number of existing night time light sources occurs within the JWF viewshed including residential and general lighting around townships such as Tarago. Localised lighting is associated with a small number of dispersed homesteads but lighting is not visually prominent and does not emit any significant illumination beyond immediate areas surrounding residential and agricultural buildings. Lights from vehicles travelling along the local roads provide dynamic and temporary sources of light.

4.12.2 Potential Light Sources

The main potential light sources associated with the Project will include:

- night lights of control and auxiliary buildings
- night time obstacle lights mounted on selected wind turbines - refer Figure 4.11 - 4.13.

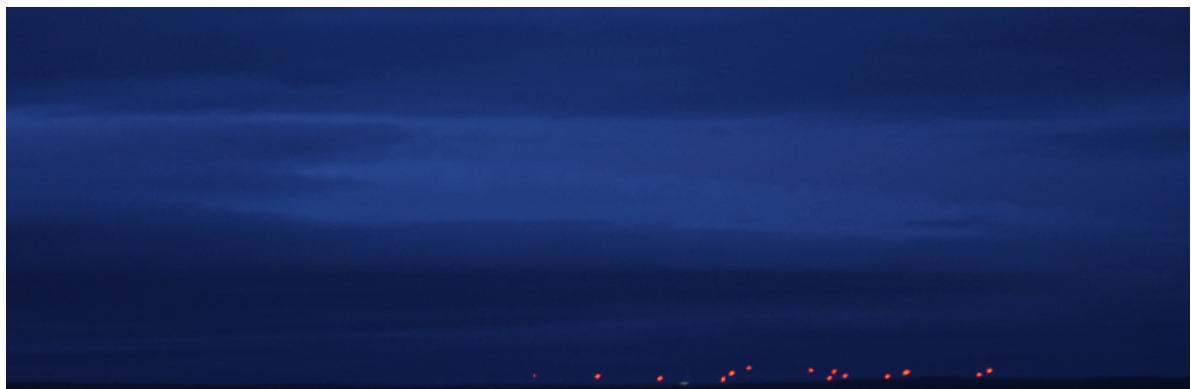


Image 4.4 - A cluster of lit turbines - Source: www.poweng.net

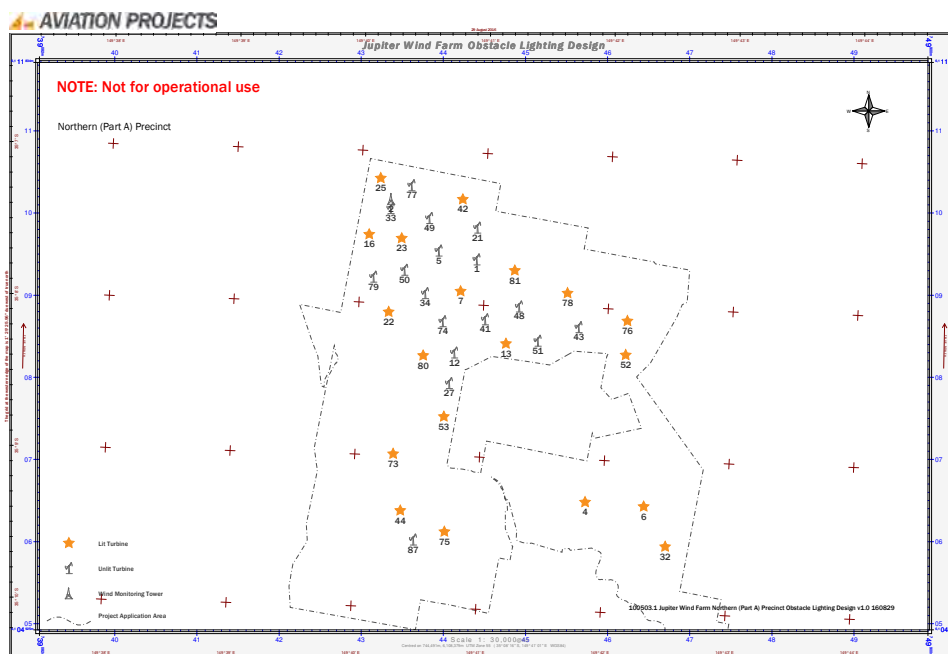


Figure 4.11 - Northern Region A - Lighting layout Source: Aviation Projects

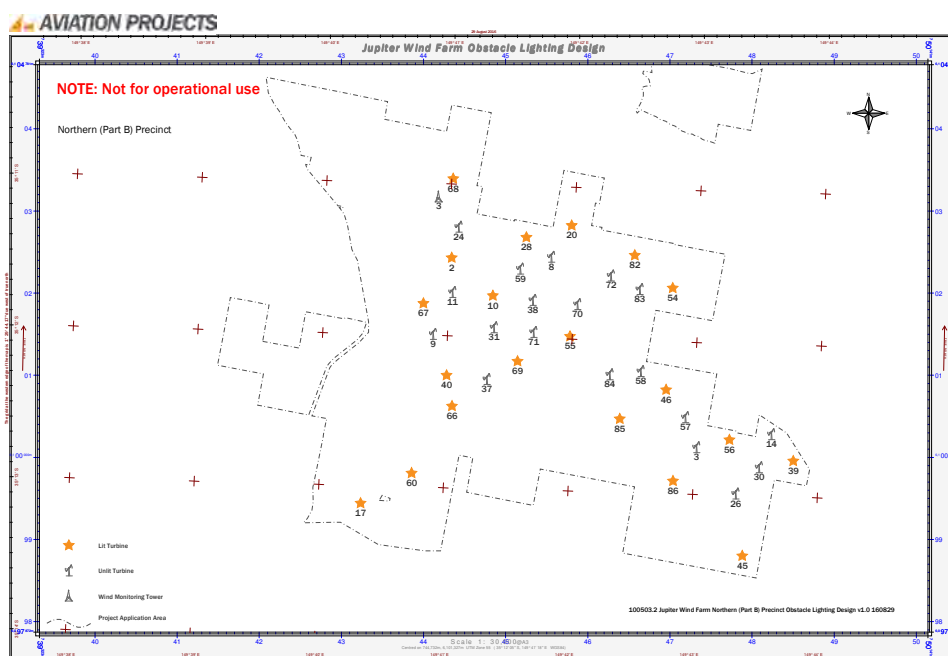


Figure 4.12 - Northern Region B - Lighting layout Source: Aviation Projects

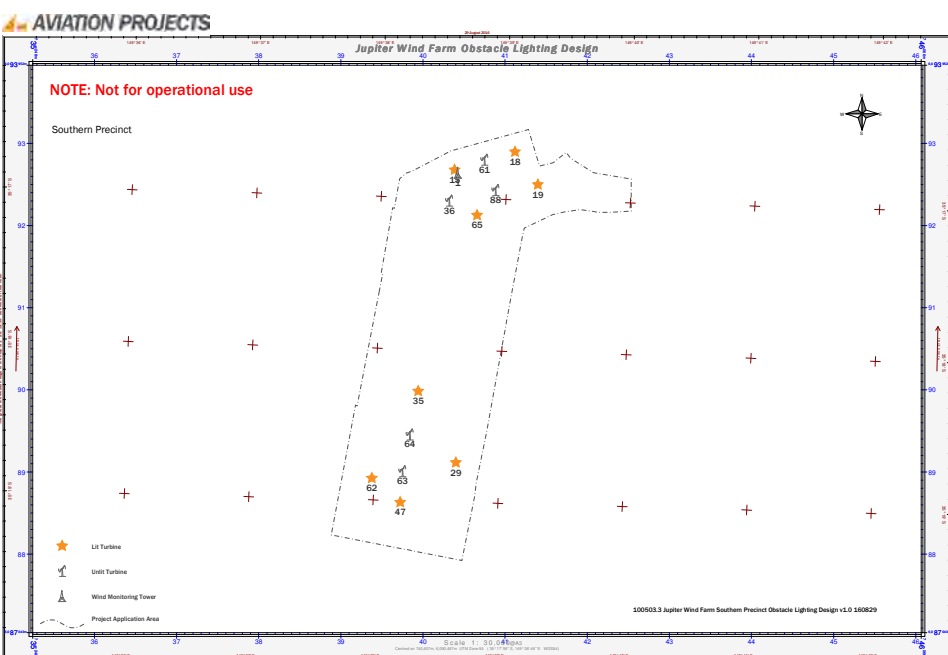


Figure 4.13 - Southern Region - Lighting layout Source: Aviation Projects

4.12.3 Northern Precinct (Region A)

Of the 36 WTGs within the northern precinct region A, 19 may be lit. This section of the wind farm has the highest visual accessibility with views from the north (Tarago) and elevated views from the east and west. The greatest visibility of night lighting would be available to dwellings on raised topography to the west (Roseview Road) and east (Lakeview Road) such as property J3 (night photomontage 18B).

These dwellings may have clear views of multiple turbine lights, discernible in an otherwise mostly dark sky. The northern region B turbine lights may also be visible from some locations within this part of the study area. The use of low intensity lighting will assist in reducing the level of potential impact experienced and the implementation of radar activated lighting would diminish any night time visual impacts to negligible.

Night lighting on numerous WTGs will be visible to motorists on Goulburn Road, although a low visual impact is expected on motorists due to the presence of other existing light sources such as car headlights combined with a shorter duration of view and lower receptor sensitivity.

4.12.4 Northern Precinct (Region B)

Of the 39 WTGs within the northern precinct region B, 20 may be lit. This section of the wind farm is visually accessible from dwellings to the north, south and west, as well as locations along Goulburn Road.

The greatest visibility of night lighting would be available to dwellings on elevated ground to the west with panoramic views over multiple turbines, as well as dwellings to the south in close proximity to the WTGs such as J208 (night photomontage 28B) and J247 (night photomontage 37B). These dwellings will have clear views of the turbine lights, discernible in an otherwise mostly dark sky. Some dwellings may also have views towards the northern region turbines as well. The use of low intensity lighting will assist in reducing the level of impact experienced and the implementation of radar activated lighting would diminish any night time visual impacts to negligible.

A low visual impact is expected from Goulburn Road and Kings Highway due to the presence of other light sources such as car headlights as well as the shorter duration of view and reduced receptor sensitivity.

4.12.5 Southern Precinct

Of the 13 WTGs within the southern region, 8 may be lit. This section of the study area has the lowest density of residential receptors, reducing the overall visual impact associated with night lighting. Some dwellings with direct, unobstructed views of the turbines such as J237 (night photomontage 25B) and J255 (night photomontage 17B) will have clear views of the turbine lights. These lights will be discernible in an otherwise mostly dark sky. The use of low intensity lighting will assist in reducing the level of impact experienced and the implementation of radar activated lighting would diminish any night time visual impacts to negligible.

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4.12.6 Night Lighting Summary

Night time impacts are generally less severe than day time impacts due to the reduced number of viewers, reduced viewing duration and lack of visual context (ie. the majority of view is obscured by darkness). The limited amount of existing light sources in the area will, however, increase the perceptibility of any WTG lighting, if implemented. Impacts are likely to be greatest during dusk when the WTG structures are visible as well as the obstacle light and concentrated in the winter months when days are shortest and the lighting will be noticeable for longer.

Public Receptors

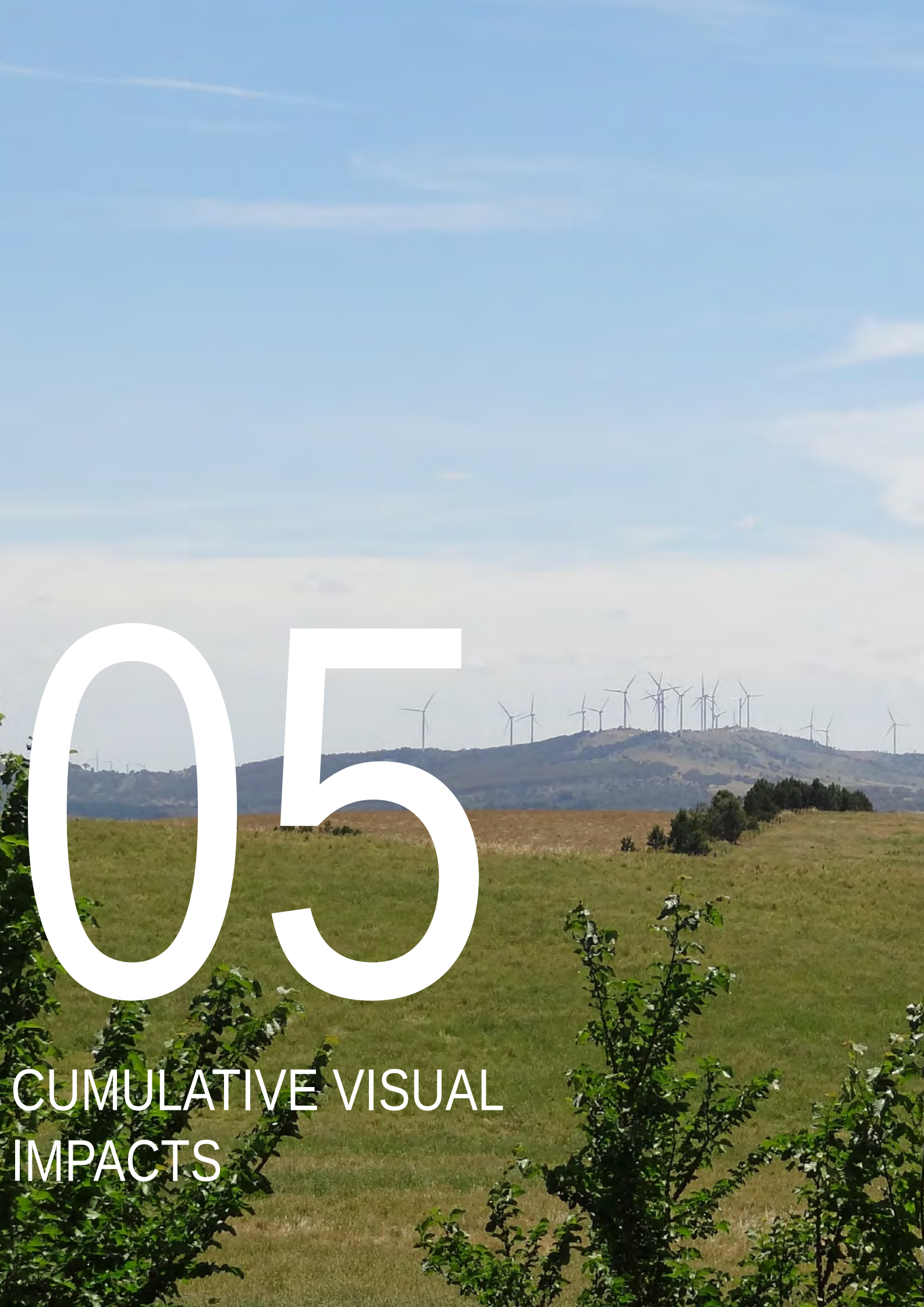
Lighting associated with JWF is unlikely to have a significant visual impact on any public view locations. Whilst obstacle lighting will be visible to motorists travelling along local roads, the duration of visibility would tend to be short and the sensitivity of receptors lower as the focus of motorists is on driving.

Private Receptors

WTG lighting may impact residents across the study area, where visual accessibility to lit turbines is available. Impacts will be highest where dwellings have panoramic views over multiple turbines. From these viewpoints, clusters of lights will be visible receding into the distance.

Depending on the radar technology considered and implemented during detailed design of the Project, it may be possible to activate select lights within the various precincts/regions depending on the flight path and flight proximity to select areas/ WTGs. The implementation of radar activated lighting would likely diminish any night time visual impacts for public and private receptors to negligible.

Its potential use for the Project would be discussed and agreed with relevant authorities (CASA etc) prior to being incorporated into the design.

A landscape photograph showing a green field in the foreground, a line of wind turbines on a distant hill, and a blue sky with light clouds. The number '05' is overlaid in large white font.

05

CUMULATIVE VISUAL
IMPACTS

5.0 CUMULATIVE IMPACTS

5.1 DEFINITION

Cumulative impacts can be defined as the additional changes caused by a proposed development in conjunction with other similar developments or as the combined impact of a set of developments, taken together.

The cumulative impact of wind farm development on landscape and visual amenity is a product of:

- the distance between individual wind farms (or turbines)
- the distance over which they are visible
- the overall character of the landscape and its sensitivity to wind farms
- the siting and design of the wind farms themselves

5.2 ASSESSMENT OF CUMULATIVE VISUAL IMPACTS

Cumulative effects on visual amenity can be caused by 'combined visibility' and/or 'sequential visibility':

5.2.1 Combined Visibility

Combined visibility occurs where the observer is able to see two or more developments from one viewpoint. Assessment considers the combined effect of all wind farms which are (or would be) visible from relevant viewpoints. Combined visibility may either be in combination (where several wind farms are within the observer's arc of vision at the same time) or in succession (where the observer has to turn to see the various wind farms).

5.2.2 Sequential Visibility

Sequential visibility occurs when the observer has to move to another viewpoint to see different developments. Sequential impacts are assessed for travel along regularly-used routes like major roads, railway lines or popular paths etc. Sequential impacts can range from frequently sequential (the features appear regularly and with short time lapses between) to occasionally sequential (long time lapses between appearances) depending on speed of travel and distance between the viewpoints.

5.3 OTHER WIND FARMS WITHIN THE AREA

The Department of Planning and Environment (DP&E) identifies three wind farms within the Goulburn Mulwaree and former Palerang LGAs that are already operational, approved or proposed; refer Figure 5.1, 5.2 and Table 5.1. Two operational and one approved wind farm are found to be within a 20km offset from the JWF PA. Wind farms outside this distance have been excluded from the assessment due to the very low visibility of turbines beyond a 20km visual catchment.

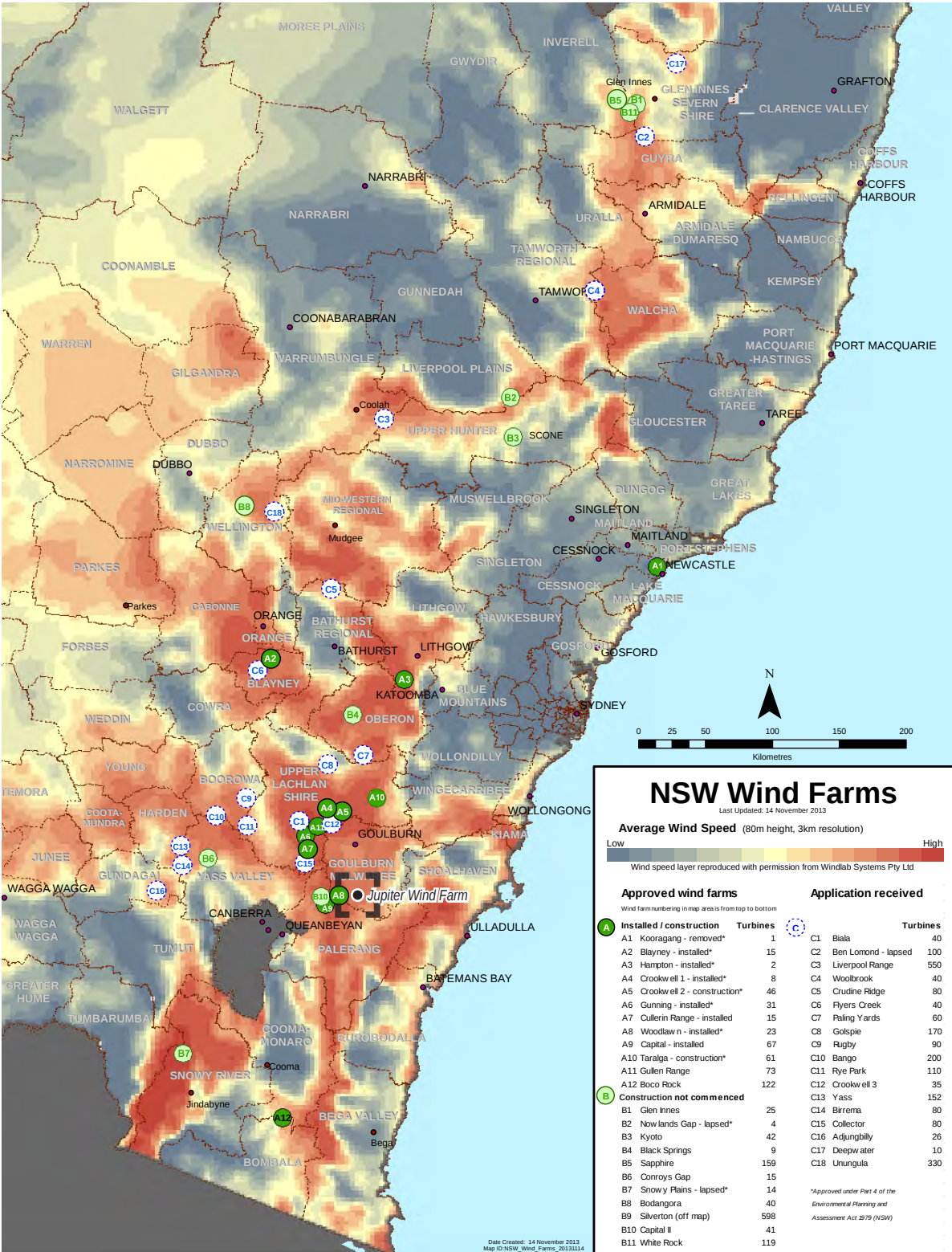


Figure 5.1 - Wind farm developments within NSW



Figure 5.2 - Wind farm developments within 20km of JWF

Name	Status	Number of WTGS	Distance to JWF (nearest turbine)
Woodlawn	Operational	23	8.5km
Capital I	Operational	67	12.2km
Capital II	Approved	41	12.2km

Table 5.1 - Wind farm developments within 20km of JWF

5.4 COMBINED AND SEQUENTIAL VISIBILITY

There is the potential for the JWF WTGs to be visible either combined or sequentially with the Capital I, Capital II (approved) and Woodlawn wind farms from a very limited number of viewpoints.

Capital I and Capital II (approved) -12.2km, 108 WTGs total		
VIEW TYPE	COMBINED VISIBILITY	SEQUENTIAL VISIBILITY
Public	The JWF and Capital I and II (when constructed) wind farms will not be visible together due to the elevated ridgeline that runs along the western edge of the Project Area. This elevated topography will block any combined views of the two wind farms.	Low frequency sequential views will potentially occur for motorists travelling along Tarago Road, Mount Fairy Road (refer Image 5.1) and the Kings Highway (refer Image 5.2).
Private	The JWF and Capital wind farms will not be visible together due to the elevated ridgeline that runs near the western boundary of the Project area. This topography will block any combined views of the two wind farms.	Not applicable

Table 5.2 - Expected cumulative impact with Capital I and Capital II wind farm developments

WOODLAWN - 8.5km, 23 WTGs		
VIEW TYPE	COMBINED VISIBILITY	SEQUENTIAL VISIBILITY
Public	The JWF and Woodlawn wind farms may be visible together from a limited number of public viewpoints to the north of the study area. These include sections of Lumley Road east of Tarago (refer Image 5.3 and 5.4). At a distance of 10km, only a Moderate/Low cumulative increase in visual impact is expected from this road.	Low frequency sequential views will potentially occur for motorists travelling along Braidwood Road and Tarago Road. These will occur at gaps in the elevated ridge that is located between the two wind farms.
Private	The JWF and Woodlawn wind farms may be visible together from a very limited number of private viewpoints to the north east of the study area. These include properties off Lumley Road that occupy elevated positions. At a distance of 10km, a Moderate/Low cumulative increase in visual impact is expected for these properties. The elevated ridge line that runs between the two wind farms assists in blocking views of Woodlawn from lower positions within the landscape.	Not applicable

Table 5.3 - Expected cumulative impact with Woodlawn wind farm development



Image 5.1 - View of Capital wind farm from Mount Fairy Road, looking west

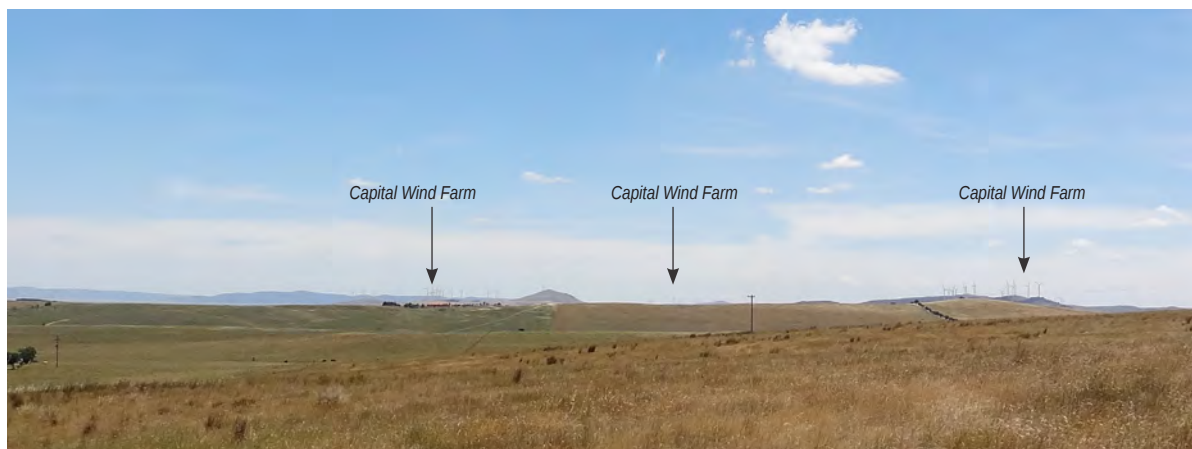


Image 5.2 - View of Capital wind farm from Kings Highway, looking north from near Bungendore

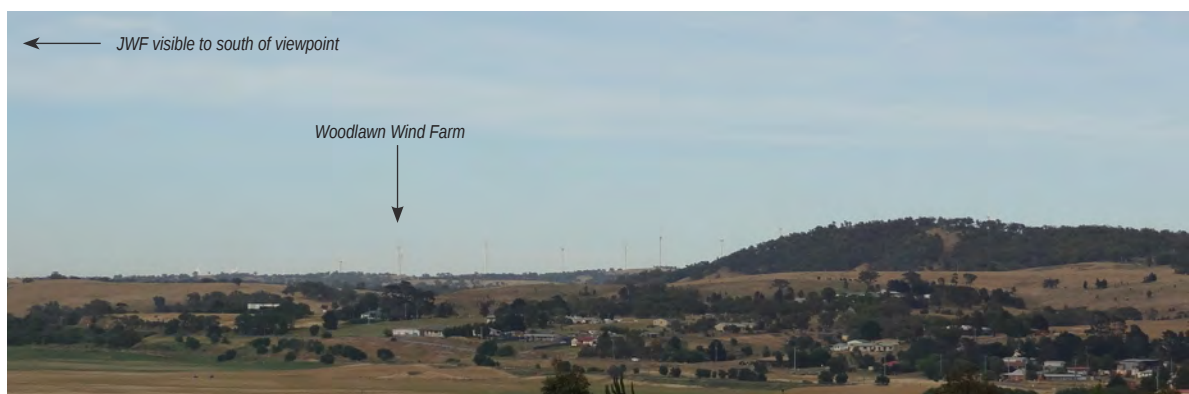


Image 5.3 - View of Woodlawn wind farm from Lumley Road, looking west towards Tarago

5.5 CUMULATIVE VISUAL IMPACT SUMMARY

There will be opportunities for combined views of JWF and the Woodlawn wind farm from a limited number of residential dwellings and local roads in the north east of the study area. Visibility towards Capital and Woodlawn are restricted in the majority of locations within the study area by tree cover and undulating landform. The relatively small size of the Woodlawn wind farm (23 WTGs) will also minimise potential for significant cumulative visual impact.

Sequential views of JWF, Capital and Woodlawn wind farms will occur for motorists travelling along several roads that traverse the study area including Tarago Road, Mount Fairy Road, Braidwood Road and the Kings Highway.

The roads follow the low undulating nature of a landform typical across much of the NSW Southern Tablelands, where views may extend over regional areas from high points and ridge lines or be contained and compartmentalised by rising or sloping landforms together with timbered and vegetated areas.

The extent and overall sequential visibility of turbines will be influenced by the direction of travel relative to the alignment of wind turbines as well as the relatively short travel time along the road network alongside and between the wind farm turbines.

This LCVIA has determined that the JWF is unlikely to result in any significant combined or sequential cumulative visual impacts within the immediate study area resulting from associated views towards other wind farm developments within the study area. The JWF will, however, increase the perceived density of wind farm development within this section of the Southern Tablelands.

Motorists travelling longer distances through the Southern Tablelands, including tourists, are likely to encounter several wind farm developments of which the JWF will be a major component. The large north to south geographical spread of the JWF will contribute to the perceived wind farm density within the region.

The re-occurrence of wind farms within a region has the ability to alter the perception of the overall visual and landscape character, irrespective of being viewed in a single viewshed. The Southern Tablelands region has experienced a steady increase in wind farm developments in recent years. As wind farm developments prevail, it is important to determine whether the cumulative effect of wind farms and other major infrastructure within the region would combine to become the dominant visual element, altering the perception of the general landscape character of the region.



Image 5.4 -Zoomed view of Woodlawn wind farm from Lumley Road, looking west towards Tarago

A large, white, sans-serif number '06' is positioned on the left side of the page. It is overlaid on a background image of a grassy field under a blue sky. The number is the primary visual element in the upper half of the page.

06

MITIGATION ASSESSMENT

6.0 MITIGATION MEASURES

The SEARs require that '*consideration of the feasibility and effectiveness of the proposed mitigation measures is undertaken for all non-associated residences within 3km of a proposed turbine where significant visual impacts are predicted*'. Appendix A provides a spreadsheet that summarises the mitigated visual impacts for all existing and proposed (DA approved) dwellings within 3km offset from the JWF WTGs predicted as having Moderate/High to High unmitigated visual impacts.

The mitigation method utilised for this assessment is vegetative screening which is further discussed within this section of the report.

6.1 FORMS OF MITIGATION

The purpose of mitigation is to avoid, reduce, or where possible remedy or offset any significant adverse effects on the environment arising from the proposed development. Effective mitigation measures for any form of potential visual impact are those that entail:

- Avoidance
- Reduction
- Alleviation

In accordance with the requirements of the SEARs, Table 6.1 summarises the mitigation recommendations and rates the likely feasibility, reliability and effectiveness of these options.

6.1.1 Avoidance

The Project has been subject to significant analysis and wind turbine location is a key aspect to the functioning of the wind farm. Avoidance measures have not been considered applicable in this report.

6.1.2 Reduction

The principal forms of reduction are associated with refinements and modifications that address the siting and scale of built form. This may reduce the visual prominence of the wind turbines and associated structures by minimising the visual contrast between the wind turbines and the landscape in which they are viewed. It is considered that the visual impacts of any micro-siting of turbines would be extremely minor to negligible.

6.1.3 Alleviation

Options to alleviate impacts are usually associated with detailed design features such as materials, finishes and reflectivity.

6.2 PROJECT ELEMENTS

6.2.1 Wind turbines

The design of the turbine structures has been highly refined to maximise their efficiency. The height of the supporting towers and dimensions of the rotors are defined by engineering efficiency and design criteria. Consequently, modification of the turbine design to mitigate potential visual impacts is not considered a realistic option. The only option would be a smaller turbine model or fewer turbines, which may impact functionality of the wind farm.

Colour Choice

Colour choice can provide an opportunity to reduce visual contrast between the turbine structures and the background against which they are viewed. Visual contrast can be reduced by using an off white or grey colour for the turbines where a portion of the structure is viewed against the sky as well as a different colour for those portions viewed against a background of landscape. Any final colour selection would, however, be subject to the availability of turbine models on the market at the time.

Screen Planting

The potential visual impact of the Project from specific view locations could be mitigated by planting vegetation close to the view location. For instance, tree or large shrub planting close to a dwelling can screen potential views to individual or groups of turbines. Similarly roadside tree planting can screen potential views of turbines from particular sections of road.

The location and design of screen planting used as a mitigation measure is site specific and requires detailed analysis of potential views and consultation with surrounding landowners during the detailed design phase. Planting vegetation would not provide effective mitigation in all circumstances and can reduce the extent of existing desirable views available from dwellings and public areas.

Screen Planting Effectiveness

It is important to acknowledge the following key points regarding screen planting:

- the species and type of vegetation used will directly impact effectiveness. Dense foliage and branch structure will screen views better than thinner branches and fewer leaves. Denser plantings would, however, also block more light leading to greater over shadowing - refer Image 6.1 and 6.2
- evergreen species will screen views throughout the year whilst deciduous trees will allow filtered views during winter months
- trees can take many years/decades to reach maturity. Planting should be of advanced stock to create an instant screening effect
- quick growing hedges may offer a better screening outcome than trees
- screen planting will be more effective where it bolsters existing planting to fill in gaps
- screen planting tends to be less effective on elevated dwellings with panoramic views. In these situations the large view frame requires a much greater quantity of screen planting, increasing the potential for plant failure
- screen planting mitigation is often of a highly local nature and can remove parts of the view that may still be considered desirable.



Image 6.1 - Native Eucalypts have a branching canopy that allows filtered views through the trunks



Image 6.2 - Conifers form a dense screen that blocks views effectively and are a common form of wind break within the region

Figures 6.1 and 6.2 overleaf illustrate two varied situations where screen planting could be applied. Figure 6.1 indicates an effective outcome whereby the planting of several 10m native trees in proximity to the dwelling blocks views to a small number of turbines previously visible. It should be noted that views to the turbines may still be available from other locations within the property.

Figure 6.2 illustrates a less successful outcome due to the elevated nature of the dwelling, panoramic view and visibility of numerous turbines covering a larger portion of the view frame. Although 10m tree planting may obscure or filter views of many of the turbines, several are still likely to be visible through gaps in planting such as in proximity to the driveway.

Numerous additional mitigation photomontages and wireframes have been produced within Appendix B to give a comparative illustration of visual impacts before and after screening through the planting of native vegetation. The images show tree and shrub planting in proximity to the dwelling, overlaid on the pre mitigation wireframe or photomontage. Trees are shown at approximately 10m in height.

It should be noted that these images are indicative only, many factors can impact the growth rate of vegetation and the screening effect is often of a localised nature.

6.2.2 Access roads

The potential visual impacts of vehicular tracks providing access for construction and maintenance can be mitigated by;

- minimising the extent of cut and fill in the track construction by following existing farm tracks
- revegetating disturbed soil areas immediately after completion of construction works with local native vegetation
- using local materials as much as possible in track construction to minimise colour contrast.

6.2.3 Substation

The potential visual impacts of the substation can be mitigated by;

- locating the substation to take advantage of natural topographical screening
- ensuring that materials are non-reflective and colours assist with blending facility with local context
- planting additional screening vegetation.

6.2.4 Transmission line

The preferred option is for the transmission line to run underground. If constructed above ground, the potential visual impacts of the 33kv transmission line can be mitigated by;

- careful and considered access route selection process to avoid sensitive view locations and loss of existing vegetation where possible
- selecting pole positions in strategic locations to minimise potential visual impact (e.g. avoiding skyline views) and to provide a maximum setback from residential dwellings and road corridors
- selecting a pole design that has a simple and non-bulky form to minimise visual impact
- selecting suitable component materials with low reflective properties
- selecting suitable storage areas for materials or plant with minimum visibility from dwellings and roads with screening where necessary
- designing for strategic tree or shrub planting between view locations and the powerline if required.

SCREEN PLANTING EXAMPLE A

Greater Effectiveness

Location: J393, Mulloon Road

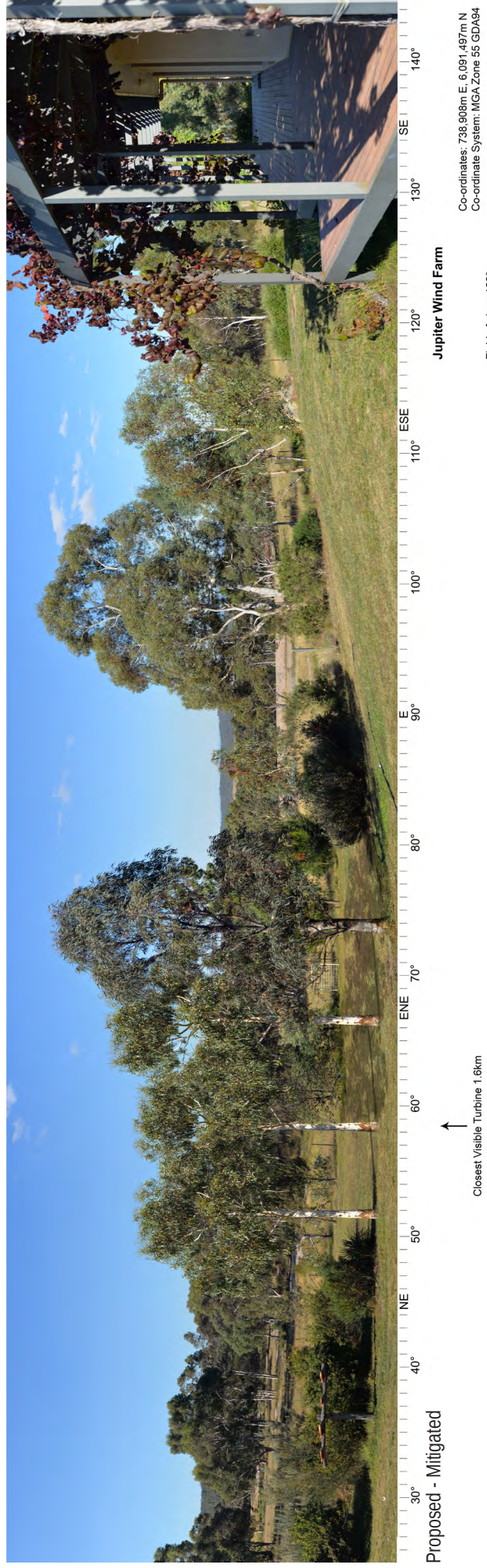
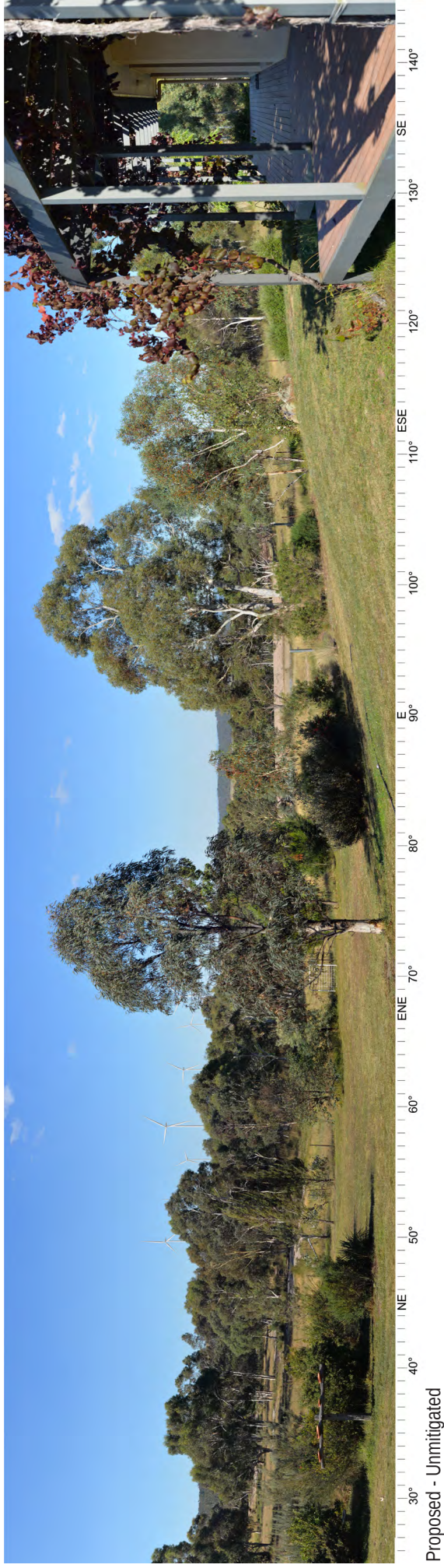


Figure 6.1 - Example of effective mitigation screen planting in proximity to a residential dwelling (tree planting shown at approximately 10m height)
To gain a perceptually accurate view of the photomontages they will need to be printed and viewed at A1/A0 sized sheets and held at arms length.

SCREEN PLANTING EXAMPLE B

Lower Effectiveness

Location: J3, Lakeview Road

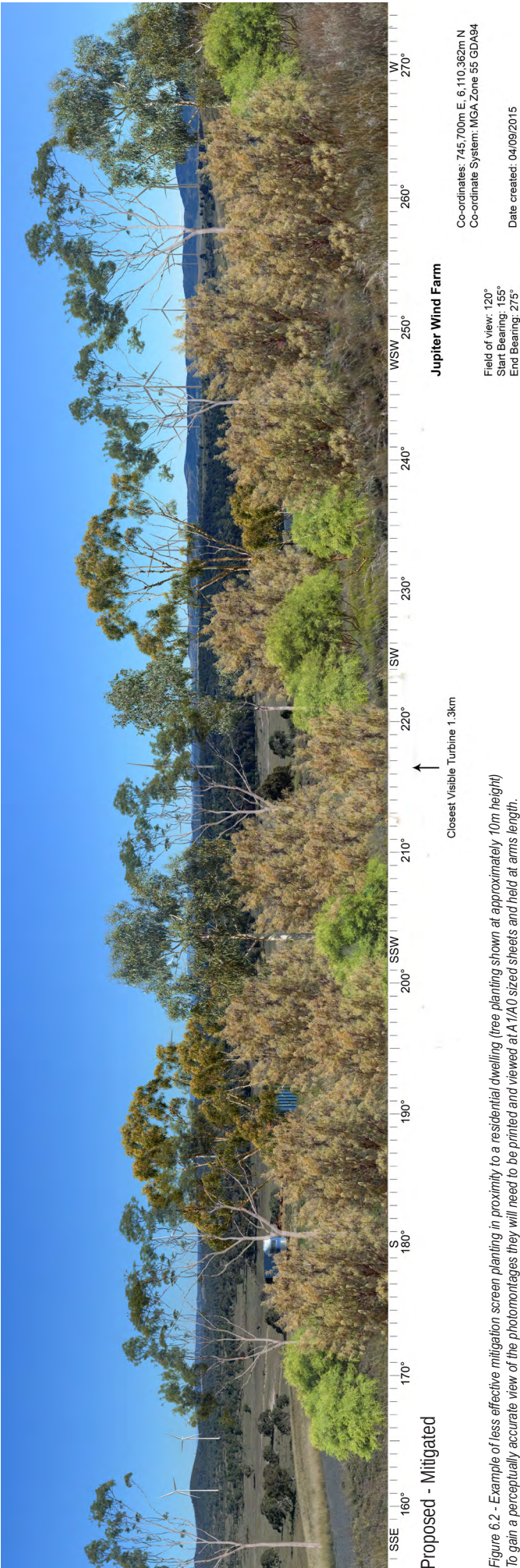
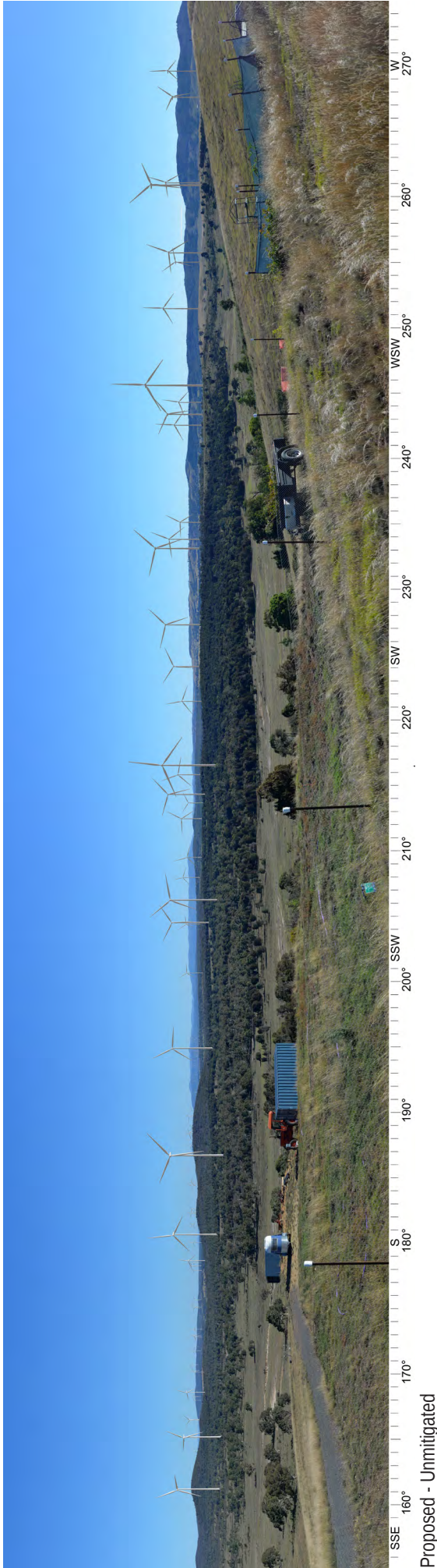


Figure 6.2 - Example of less effective mitigation screen planting in proximity to a residential dwelling (tree planting shown at approximately 10m height)
To gain a perceptually accurate view of the photomontages they will need to be printed and viewed at A1/A0 sized sheets and held at arms length.

Project Element	Mitigation Measure	Feasibility	Effectiveness
WTGs	Consider colour options for turbines	High	Moderate/Low
WTGs	Avoid use of advertising, signs or logos mounted on turbine structures, except those required for safety purposes	High	Moderate/Low
WTGs	Consider options for planting screening vegetation in vicinity of nearby dwellings and along roadsides to screen potential views of turbines. This should be done in consultation with landowners.	High	Low to High depending on field of view, topography, existing vegetation etc.
Transmission Line	Considered route to avoid sensitive view locations and loss of existing vegetation where possible	Low	High
Transmission Line	Select strategic locations for poles to minimise potential visual impact and to provide a maximum setback from residential dwellings and road corridors	Low	High
Transmission Line	Select suitable component materials with low reflective properties	High	Moderate
Transmission Line	Select a pole design that minimises visual impact	High	High
Transmission Line	Design for strategic tree or shrub planting between view locations and the powerline if required	Moderate	Moderate
Substation	Site substation to take advantage of natural topographical screening	Moderate	High
Substation	Ensure materials are non-reflective and colours assist with blending facility with local context	High	Moderate
Access roads	Minimise cut and fill for site tracks and revegetate disturbed soils as soon as possible after construction	High	Moderate
Access roads	Use local materials as much as possible in track construction to minimise colour contrast	High	Moderate
All	Maximise revegetation of disturbed areas to ensure effective cover is achieved	High	Moderate
All	Restrict the height of stockpiles to minimise visibility from outside the site	High	Moderate
All	Select storage areas for materials or plant with minimum visibility from dwellings and roads with screening where necessary	High	High

Table 6.1 - Summary of mitigation recommendations

6.3 RESIDUAL IMPACTS

WTGs are by their nature tall and visually prominent. The turbine design and location is limited by functional requirements and minor changes such as colour choice and reflectivity are unlikely to change the visual impact enough to alter any impact ratings recorded within this report.

New screen planting around affected dwellings would likely reduce some of the visual impact ratings recorded within this report. The predicted indicative residual impacts on High and Moderate/High rated dwellings within 3km offset of a WTG, after screen planting has been implemented, are indicated in Figure 6.3 and 6.4 and discussed further within Appendix A.

The location and design of screen planting used as a mitigation measure is site specific and requires detailed analysis of potential views and consultation with surrounding landowners during the detailed design phase. This solution may be effective for some landowners based on the location of their dwelling.

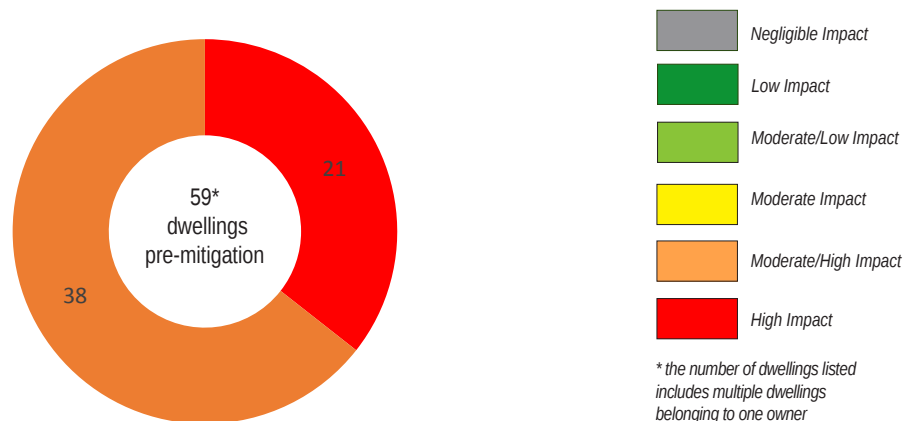


Figure 6.3 - Number of dwellings within 3km offset of WTGs predicted to be affected by High or Moderate/High visual impacts pre mitigation

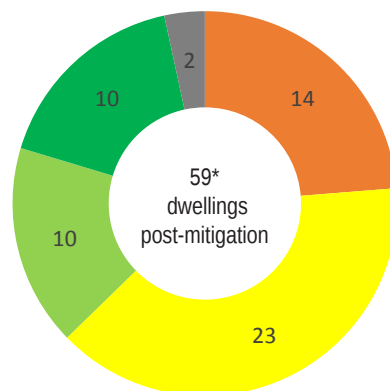


Figure 6.4 - Predicted residual visual impact on same dwellings post mitigation (screen planting of vegetation at mature height)



07

CONCLUSION

7.0 CONCLUSION

7.0 CONCLUSIONS

A comprehensive LCVIA of the Project and the surrounding area has been conducted. Using best practice methodology, the assessment has identified and evaluated landscape character, distance zones, viewer sensitivity, representative viewpoints and visual impact on all dwellings within 3km offset of a turbine. Cumulative impacts have also been assessed along with a mitigation feasibility study for all dwellings within 3km of a WTG.

In summary, this assessment concludes that:

7.1 Landscape Character

- the landscape character of the study area is typical of the Southern Tablelands with undulating hillsides, large swathes of native woodland, creeks, elevated ridge lines and a low density of rural development.
- limited impacts are expected on the character of the rural road network due to their low sensitivity to change
- Woodland Areas are similarly lightly affected with their structural and spatial quality remaining largely intact
- a Moderate impact is expected on the character of the major Braidwood/Goulburn road corridor
- the Project is likely to alter some of the distinguishable landscape characteristics of the Rural Development and Undulating Grassland landscape zones in close proximity to WTGs
- the WTGs will create a strong contrast in the undulating grassland as a result of their large scale, vertical lines and lack of visual integration
- the prominent height of the turbines will be the most discernible element of the Project within the landscape

7.2 Wind Turbine Visual Impacts

- Negligible to Moderate/Low visual impacts are predicted to affect approximately 47 (34%) dwellings within 3km of the WTGs
- Moderate visual impacts are predicted to affect approximately 34 (24%) dwellings within 3km of the WTGs
- Moderate/High and High visual impacts are predicted to affect approximately 59 (42%) dwellings within 3km of the WTGs
- the greatest visual impacts are experienced by dwellings on elevated terrain to the east and west of the northern turbine precincts from where views of multiple turbines may be available
- the extensive north/south geographical spread of WTGs increases the number of viewers affected
- there is a limited quantum of public open space within the study area from which views of the WTGs might be available
- Moderate/High impacts on public viewpoints are limited to motorists using sections of Goulburn/Braidwood Road
- the level of impact generally reduces as viewing distance increases
- dense stands of tree planting, windbreaks and garden plantings (associated with individual properties) block or filter many views towards the Project from habitable areas of dwellings
- there is a relatively low density of residential viewer locations surrounding the southern precinct turbine cluster, with Moderate/High and High visual impacts limited to a small number of dwellings within 2km of these turbines
- the JWF is unlikely to have a major impact on the character of Tarago village, although views to multiple WTGs may be available from some dwellings on Tarago Road and the new subdivision of Sherwins Ridge
- the visual catchment beyond 6-7km offset from the PA is highly constrained by topography and vegetation, blocking the majority of views to turbine clusters from beyond this distance.

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7.3 Ancillary Structure Visual Impacts

- the preferred option for the transmission line is to be constructed underground
- if constructed above ground, the poles associated with the 33kv transmission line are likely to have Moderate visual impacts on a 13km section of Goulburn Road and Kings Highway, with a greatest visual impact occurring when combined with views of the WTGs
- ancillary structures such as the access roads, temporary concrete batching plants and substation are unlikely to result in any significant additional visual impact for surrounding residential or public view locations.

7.4 Night Lighting Visual Impacts

- night time impacts are generally less severe than day time impacts due to the reduced number of viewers, reduced viewing duration and lack of visual context (ie. the majority of view is obscured by darkness)
- there is a limited number of existing light sources within the JWF visual catchment, increasing the visibility of any new light source
- the greatest night time impacts may be experienced by dwellings on elevated terrain to the east and west of the northern turbine precincts from where views of multiple turbine lights will be available
- night lighting will have limited visual impacts on motorists
- the use of low intensity lighting will assist in reducing the level of impact experienced
- the implementation of radar activated lighting would likely diminish any night time visual impacts to negligible.

7.5 Cumulative Visual Impacts

- the JWF is unlikely to result in any significant combined or sequential cumulative visual impacts resulting from associated views towards Capital and Woodlawn wind farm developments within the study area
- the JWF may, however, increase the perceived density of wind farm development within this section of the Southern Tablelands
- the re-occurrence of wind farms within a region has the ability to alter the perception of the overall visual and landscape character
- as wind farm developments prevail, it is important to determine whether the cumulative effect of wind farms and other major infrastructure within the region would combine to become the dominant visual element, altering the perception of the general landscape character of the region.

7.6 Mitigation

- WTGs are by their nature tall and visually prominent. The turbine design and location is limited by functional requirements and minor changes such as colour choice and reflectivity are unlikely to change the visual impact enough to alter any impact ratings recorded within this report
- new screen planting around affected dwellings would likely reduce some of the visual impact ratings recorded within this report. This solution may be effective for some landowners based on the location of their dwelling
- whilst screening planting can be highly effective in blocking or filtering views, the impact is often of a highly local nature and can remove parts of the view that may still be considered desirable. The extent and nature of appropriate mitigation measures for private receptors would be subject to consultation and agreement with individual property owners.



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A large, bold, white letter 'A' is superimposed over the left side of the image. The background is a landscape photograph showing a dry, open field with scattered trees and small buildings in the distance under a clear blue sky. A body of water is visible in the foreground on the right.

A

APPENDIX

DETAILED ASSESSMENT OF DWELLINGS WITHIN
3KM OFFSET OF A TURBINE

APPENDIX A

DETAILED ASSESSMENT OF DWELLINGS WITHIN 3KM OFFSET OF A TURBINE

A.1 SPREADSHEET SUMMARY

The following spreadsheet summarises the unmitigated and mitigated visual impacts on all existing and proposed (DA approved) dwellings within 3km offset from the JWF WTGs.

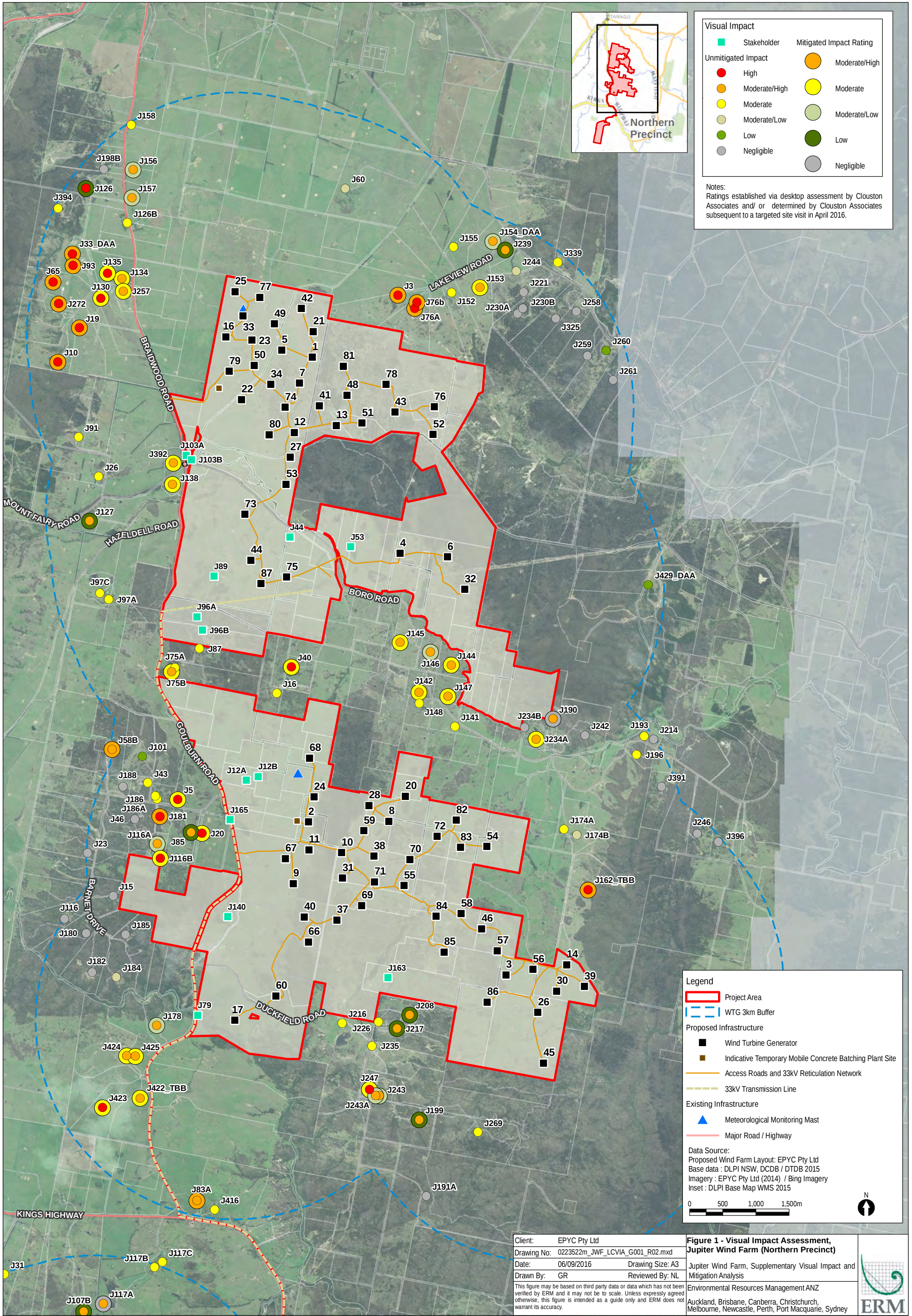
Initially, a desktop visual assessment was undertaken on these dwellings, before a site visit established, where possible, a validated impact rating on each dwelling rated as receiving a Moderate/High to High visual impact within the desktop study.

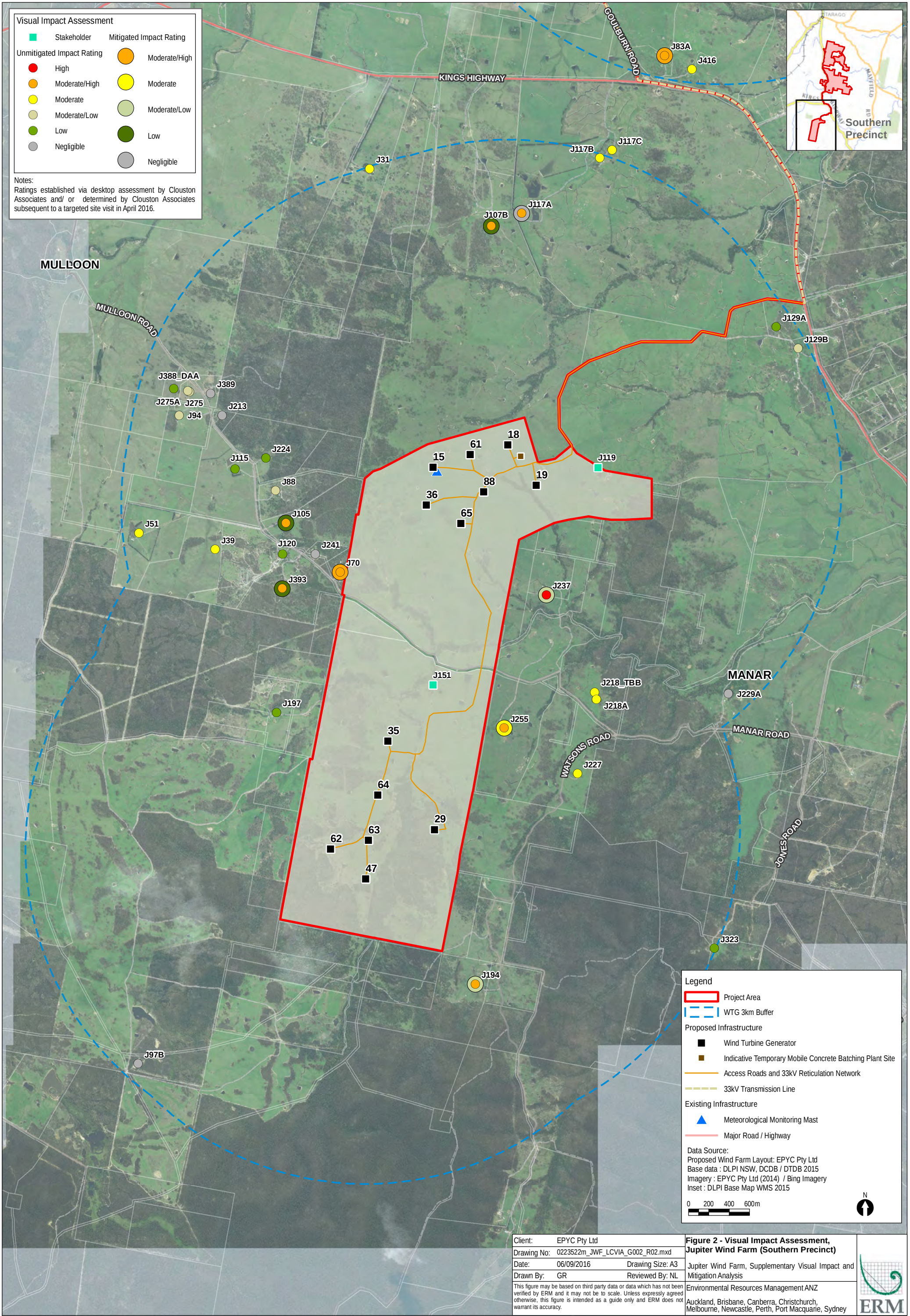
Where access to a dwelling was unavailable, an assessment was taken from the closest publicly accessible location with views to that dwelling. If visual accessibility was not available or the desktop assessment could not estimate the expected visual impact (eg. where vegetation height was unknown), a worst case scenario rating has been given. It should be noted, therefore, that this detailed assessment is conservative and some visual impact ratings may in reality be less than recorded due to local topography and the presence of screening vegetation.

Participating landholders are shown in the spreadsheet but have been excluded from the assessment.

The following text provides a description of the principle columns within the spreadsheet:

Column Heading	Explanation
Dwelling ID	Dwelling identification number - refer accompanying map.
Class	Distance band from wind farm.
Dwelling Status	Whether a dwelling is existing or has an approved DA.
Photomontage/Wireframe reference	Reference number of any accompanying photomontage or wireframe (Refer Appendix B).
Assessment method	How the dwelling has been assessed. If visited, the date the dwelling was inspected, whether access was granted and where the dwelling was assessed from (ie. closest publicly accessible location or from the dwelling itself). If access was not possible, the dwelling was either assessed from the photomontage/wireframe or by a desktop study using mapping and 3d data. A site visit was only undertaken for dwellings identified as having a Moderate/High to High visual impact rating during the desktop assessment.
Visual context	A brief description of the nature of the view from the dwelling including factors such elevation, orientation, field of view and surrounding vegetation.
Visual Impact Rating (Pre Mitigation) * denotes a desktop assessment ** denotes an assessment from the road	The predicted visual impact rating for the dwelling. Where access was not granted and the dwelling was not visible from the road, a worst case scenario rating has been given.
Mitigation Effectiveness and Feasibility	The likely effectiveness and feasibility of screening vegetation in reducing the expected visual impact of the Project.
Expected Visual Impact Rating (Post Mitigation)	An indicative rating of the expected visual impact post implementation of screening vegetation. This assumes that planting has matured and does not take into account land owner opinion on mitigation acceptability.





Dwelling ID (* DA Approved or under construction)	Class	MGA55 Easting	MGA55 Northing	Nearest WTG	Distance to Nearest WTG (metres, m)	Photomontage / Wireframe reference R = Representative	Visual Context	Expected Visual Impact Rating (Pre Mitigation) * denotes desktop study **denotes assessed from road	Mitigation Effectiveness and Feasibility (Screening Vegetation)	Expected Visual Impact Rating (Post Mitigation) * denotes desktop study **denotes assessed from road	Consultation visual and benefit sharing. October 15 to 1 September 16 L=Letter/Post P=Phone call M=Met face to face E=Email
J10	Dwelling 2 - 3km	740571	6109368	16	2555	R PM4	Direct and open views of numerous turbines to the east.	High**	Moderate/Low - due to panoramic nature of view, any screen planting would need to be extensive. Planting would need to be in close proximity to the eastern façade of the dwelling and to a height of 10m+. Any screening would diminish the panoramic nature of the existing view.	Moderate/High**	E,E,M,L,E,E,E,E
J101	Dwelling 2 - 3km	741845	6103423	68	2519	NA	Topography and surrounding trees likely to block views towards all but the tips of several turbines.	Low*			L,
J105	Dwelling 1 - 2km	738940	6092132	36	1391	PM40	Dwelling sits on slightly elevated terrain. May have direct views over tops of trees to both groups of southern turbines in the south east. Existing dwelling oriented north south with vegetation to the north and south. Photomontage was taken from an area away from the dwelling in view of the proposed windfarm as requested by the landowner	Moderate/High	Moderate/High - tall tree planting (10m) planted in close proximity to the eastern and south eastern edges of the property would likely be effective in screening visible WTGs.	Low	E,P,L,E
J107	Dwelling 2 - 3km	740958	6095052	18	2159	R PM10	Property on slightly elevated terrain. Screening vegetation likely to block/filter views to southern turbines. Direct but distant views likely north to numerous WTGs.	Moderate/High**	High - bolstering existing vegetation surrounding property would be likely to screen the majority of WTGs visible from this dwelling.	Low**	L,
J115	Dwelling 1 - 2km	738440	6092661	36	1914	PM23	Dense screening vegetation present to south and west of property. Windbreak trees block views to the southern group of WTGs. Filtered views of the eastern group visible above the tree line.	Low			E,P, P, M, L
J116	Dwelling 2 - 3km	740672	6100974	17	2986	NA	Surrounded by dense tree planting. Highly unlikely to have views to WTGs.	Negligible*			L,L,L
J116A	Dwelling 1 - 2km	742069	6102101	67	1942	NA	Screening vegetation to north and east of property likely to block views to northern WTGs and filter views to the east. Several WTGs likely visible to south east through gap in trees.	Moderate/High*	Moderate - due to panoramic nature of view, any screen planting would need to be extensive. Planting would need to be in close proximity to the dwelling to a height of approx. 10m.	Moderate/Low*	P,E,P,P,P,P,P,M,P, L
J116B	Dwelling 1 - 2km	742116	6101885	67	1883	R J20	Vegetation within nearby fields likely to block views north although direct and open views likely to numerous WTGs in the east.	High**	Moderate/Low - any screening vegetation would need to be extensive due to elevated nature of dwelling and panoramic nature of view.	Moderate**	E,P,P,E,L,E,P
J117-(J24A)	Dwelling 2 - 3km	741257	6095174	18	2279	R PM10	Property on elevated terrain. Screen vegetation likely to block views to southern turbines. Potential views to distant WTGS in the north although planting on a nearby ridge may block these.	Moderate/High*	High - bolstering existing vegetation surrounding property would be likely to screen the majority of WTGs visible from this dwelling.	Negligible*	E,E,E
J117-(J24B)	Dwelling 2 - 3km	742025	6095719	18	2961	R PM10	Property on elevated terrain, surrounded by tree planting. Vegetation likely to filter/block views to more distant northern turbines. Potential filtered views to southern WTGS.	Moderate*			E,E,E
J117-(J24C)	Dwelling 2 - 3km	742146	6095797	18	3073	R PM10	Property on elevated terrain, surrounded by tree planting. Vegetation likely to filter/block views to more distant northern turbines. Potential filtered views to southern WTGS.	Moderate*			E,E,E
J120	Dwelling 1 - 2km	738906	6091824	36	1494	NA	The property is surrounded by dense tree planting that is likely to block views of the southern WTGs.	Low*			E, E,E, M,E,L ,E
J126	Dwelling 2 - 3km	740993	6111981	25	2732	R PM4	Dense screening to north and south although eastern views open. Elevated position will lead to direct panoramic views over WTGs.	High**	Moderate/High - 7m high screen planting to the south eastern corner of the property likely to be effective in screening views towards WTGs. There will be a slight reduction in panoramic nature of view although the majority of view to north east will remain unchanged.	Low**	E,P,P,E,L,E,P
J126B	Dwelling 1 - 2km	741615	6111462	25	1927	R PM3	Screening vegetation on opposite side of road from property likely to filter majority of views of turbines to the east	Moderate*			L
J127	Dwelling 2 - 3km	741047	6106970	73	2344	NA	Screening vegetation to the north of dwelling likely to block views to WTGs in the north. Direct views of several WTGs likely to the east.	Moderate/High**	Moderate/High - tree planting to approx. 10m to eastern façade of dwelling likely to screen visible WTGs.	Low**	L
J129A	Dwelling 2 - 3km	743758	6094060	19	2826	NA	Surrounded by screening vegetation. Unlikely to be views out from property to WTGs.	Low*			P,P,P,E,P,P,M,L
J129B	Dwelling 2 - 3km	743973	6093846	19	2903	NA	Surrounded by screening vegetation. Potential heavily filtered views to WTGs in west.	Moderate/Low*			P,P,P,E,P,P,M,L
J130	Dwelling 1 - 2km	741215	6110328	16	1972	R PM38	Direct and open views of numerous turbines to the east.	High**	Moderate - due to panoramic nature of view, any screen planting would need to be extensive. Planting would need to be in close proximity to the eastern façade of the dwelling and to a height of 7m+. Any screening would diminish the panoramic nature of the existing view.	Moderate**	E,E,E,P,P,E,E,P

J134	Dwelling 1 - 2km	741536	6110624	25	1715	R PM38	Property is orientated north/south. Direct and open views of numerous turbines will be visible to the south and east - partially from the dwelling and from the surrounding open space.	Moderate/High**	Moderate - due to panoramic nature of view, any screen planting would need to be extensive. Planting would need to be in close proximity to the eastern façade of the dwelling and to a height of 7m+. Any screening would diminish the panoramic nature of the existing view.	Moderate**	E,L,E, P,P,P,P
J135	Dwelling 1 - 2km	741319	6110706	25	1941	WF2	Direct and open views of numerous turbines to the east.	High	Moderate/Low - due to panoramic nature of view, any screen planting would need to be extensive. Planting would need to be in close proximity to the eastern façade of the dwelling and to a height of 10m+. Any screening would diminish the panoramic nature of the existing view.	Moderate	P,P,P,L,M
J138	Dwelling 1 - 2km	742295	6107519	73	1182	NA	Dense line of trees along Braidwood Rd/Goulburn Rd likely to screen base of WTGs although tops of numerous turbines still likely to be visible above tree line to the east.	Moderate/High**	Moderate - Extensive screen planting in close proximity to the east of the dwelling would likely screen views towards turbines. The planting would need to be approximately 10m high.	Moderate**	E, E, E, E, M,L ,E,E,P,P,P,P, E, P, M
J141	Dwelling 1 - 2km	746551	6103871	20	1285	PM33	Dense screening vegetation to east of property. Partial views of turbines to north and south with some parts of WTGs blocked by undulating topography and vegetation.	Moderate**			E,P,E,E, L,E,E,E
J142	Dwelling 1 - 2km	746010	6104388	20	1577	PM24	Limited screening vegetation surrounding property. Clear views of turbines to north with southern turbines blocked by undulating topography.	Moderate/High**	Moderate - due to panoramic nature of view, any screen planting would need to be extensive. Planting would need to be in close proximity to the dwelling to a height of approx. 7m.	Moderate**	M, M, L
J144	Dwelling 1 - 2km	746494	6104799	32	1159	R PM24 & PM33	Limited screening vegetation surrounding property. Views of turbines to north and south, partially filtered by vegetation and blocked by undulating topography.	Moderate/High**	Moderate - due to panoramic nature of view, any screen planting would need to be extensive. Planting would need to be in close proximity to the dwelling to a height of approx. 7m.	Moderate**	P,P,L,L,L
J145	Dwelling 1 - 2km	745726	6105138	32	1262	WF5	Tree planting to north and south of property likely to screen some views of WTGs. Filtered views likely through breaks in vegetation to north and south as well as more direct views of several WTGs to the north east on a nearby ridge.	Moderate/High	Moderate - due to panoramic nature of view, any screen planting would need to be extensive. Planting would need to be in close proximity to both the north and east facades of the dwelling. This would fully enclose the property in planting, reducing the visual impact but diminishing the panoramic nature of the view.	Moderate	L,L,L
J146	Dwelling 1 - 2km	746184	6104994	32	1078	R PM24 & PM33	Property surrounded by dense screen planting on east and west. Individual trees to north and south allowing filtered views through to turbines.	Moderate/High*	Moderate/High - bolstering existing vegetation with tall (10m+) trees in existing gaps would likely screen the majority of WTGs visible.	Moderate/Low*	P,M,L
J147	Dwelling 1 - 2km	746447	6104325	20	1632	R PM24 & PM33	Very little screening vegetation present. Clear views likely available to numerous turbines north and south, partially blocked by undulating topography and filtered by distant vegetation.	Moderate/High**	Moderate - due to panoramic nature of view, any screen planting would need to be extensive. Planting would need to be in close proximity to the dwelling to a height of approx. 7m.	Moderate**	L,L
J148	Dwelling 1 - 2km	746014	6104219	20	1410	PM25	Some screening vegetation present concentrated to north and south. Filtered views, mainly of southern turbines. Many WTGS partially blocked by undulating topography.	Moderate			E,E,P,L, P,M,P,L,E
J15	Dwelling 2 - 3km	741405	6101319	17	2621	NA	Vegetation and topography likely to block all views of WTGs to the east.	Negligible*			L
J152	Dwelling 1 - 2km	746501	6110413	78	1701	R WF8	Screening vegetation located to the south and west of this property, some distance from the dwelling. Likely to filter the majority of views although some direct views may be available through gaps in trees.	Moderate*			P,L,L,L
J153	Dwelling 1 - 2km	746929	6110488	76	1926	R WF8	Limited screening vegetation in proximity to property. Some individual tree planting will filter views although direct views of numerous WTGs expected.	Moderate/High**	Moderate - due to panoramic nature of view, any screen planting would need to be extensive. Planting would need to be in close proximity to southern facade of dwelling.	Moderate**	E, E, P, E, NL, E,E,E,P,E,E,E,E,E,E,P, E,E, E, E, E, P
J154_DAA*	Dwelling 2 - 3km	747123	6111182	76	2645	WF7	Very limited screening vegetation present. Numerous WTGs likely visible to the south, partially screened by undulating topography. Main living area will be orientated south.	Moderate/High	Moderate - due to panoramic nature of view, any screen planting would need to be extensive. Planting would need to be approx. 5m+ high to obscure WTGs. Any screen planting would diminish the panoramic nature of the existing view.	Moderate/Low	M,M,L,P, M
J155	Dwelling 2 - 3km	746531	6111097	78	2306	R WF7	Dwelling orientated to north with no windows on southern façade. Undulating topography and a long line of nearby windbreak trees likely to block views to the south west. Potential clear views of several turbines to the south east from open space.	Moderate**			L,
J156	Dwelling 2 - 3km	741703	6112262	25	2394	R PM3 & WF10	Open and direct views to the east. Numerous turbines visible on an elevated ridge in the mid distance.	Moderate/High**	Moderate - Planting would need to be in close proximity to the eastern façade of the dwelling and to a height of 10m+. Screening would diminish the panoramic nature of the existing view but likely screen views of visible WTGs..	Moderate/Low**	E,E,P,E,E,L,E,E
J157	Dwelling 2 - 3km	741685	6111844	25	2104	R PM3 & WF10	Open and direct views to the east. Numerous turbines visible on an elevated ridge in the mid distance.	Moderate/High**	Moderate - Planting would need to be in close proximity to the eastern façade of the dwelling and to a height of 10m+. Screening would diminish the panoramic nature of the existing view but likely screen views of visible WTGs..	Moderate/Low**	P, L,L

J158	Dwelling 2 - 3km	741673	6112940	25	2962	WF10	Little screening vegetation present. Small trees (4m) in nearby paddock to south. Clear views available to south east from yard although views from existing dwelling mostly blocked by nearby built form. There is a proposed dwelling on the north east corner of property to be orientated east. This dwelling would experience a lower visual impact.	Moderate	Moderate/Low - some potential to screen base of WTGs with planting in paddock although the elevated nature of the turbines means that the trees would need to be very close to the dwelling and tall - 15m+.		L,L,P, P,P, M
J16	Dwelling 1 - 2km	743867	6104375	68	1097	R PM21	Abundant tree planting surrounding property with more distant groups of trees also providing screening. Heavily filtered views likely to southern and northern groups of WTGs.	Moderate**			P,P,L,L
J162_TBB*	Dwelling 1 - 2km	748557	6101408	14	1169	PM26	This location sits on elevated terrain and is likely to have far reaching and panoramic views over multiple turbines to the north west. Vegetation on top of a nearby ridgeline blocks views of turbines further to the west. Dwelling orientation is currently unknown so a worst case scenario rating has been given.	High	Low - screen planting unlikely to be effective due to elevated nature of dwelling and steepness of terrain surrounding property. Trees would need to be in very close proximity to dwelling and 15m+ to fully screen turbines. Any screening would consequently diminish existing panoramic view.	Moderate/High	P,P,L,L
J174A	Dwelling 1 - 2km	748193	6102321	54	1186	NA	Dense line of windbreak trees will screen majority of views west. Several turbines may be visible through a gap in trees looking south.	Moderate*			L,L,L
J174B	Dwelling 1 - 2km	748387	6102234	54	1362	NA	Screening vegetation surrounding the property is likely to filter/block views of WTGs to the west.	Moderate/Low*			E,P,E,L,E,E
J178	Dwelling 1 - 2km	742061	6099366	17	1177	R PM9 RPM16	Some screening vegetation and built form to north and east of dwelling may filter/block views to some turbines, although closest WTGs still likely to be visible.	Moderate/High*	Moderate/High - bolstering existing vegetation with tall (10m+) trees in existing gaps to north and east of dwelling would likely screen the majority of WTGs visible.	Moderate/Low*	E,E,P,E,E,E,L,E
J180	Dwelling 2 - 3km	740996	6100757	17	2596	NA	Surrounded by dense woodland. Views Highly unlikely.	Negligible*			L,
J181	Dwelling 1 - 2km	742108	6102518	67	1996	R PM19 & 20	No screening vegetation in close proximity to dwelling. Direct and open views likely to WTGs in the east.	High**	Low - any screening vegetation would need to be tall and extensive due to elevated nature of dwelling and panoramic view.	Moderate/High**	E,P,L,E,E,E,E,M
J182	Dwelling 2 - 3km	741088	6100167	17	2266	NA	Surrounded by dense woodland. Views Highly unlikely.	Negligible*			L,
J184	Dwelling 1 - 2km	741451	6100095	17	1900	NA	Surrounded by dense woodland. Views unlikely although some filtered views of WTGs through trees may be possible.	Moderate/Low*			2015 - P, P, P, M, P, P P,P,M,P,L, M, P, L
J185	Dwelling 2 - 3km	741591	6100736	17	2092	NA	Surrounded by dense woodland. Views Highly unlikely.	Negligible*			L,
J186	Dwelling 2 - 3km	742063	6102778	67	2134	R PM19	Some screening vegetation surrounding property although heavily filtered views likely towards eastern turbines.	Moderate*			P,M,M,L
J186a	Dwelling 2 - 3km	742040	6102828	67	2177	R PM19	Some screening vegetation surrounding property although heavily filtered views likely towards eastern turbines.	Moderate*			P,M,M,L
J188	Dwelling 2 - 3km	741550	6102968	67	2680	NA	Dense woodland and elevated topography surrounding dwelling likely to block all views to turbines.	Negligible*			L,
J19	Dwelling 2 - 3km	740894	6109882	16	2209	R PM4	Direct and open views of numerous turbines to the east.	High**	Moderate/Low - due to panoramic nature of view, screen planting would need to be extensive. Planting would need to be in close proximity to the eastern façade of the dwelling and to a height of 7m+. Screening would diminish the panoramic nature of the existing view.	Moderate/High**	E,M,L,E,E
J190	Dwelling 2 - 3km	748027	6103988	82	2107	NA	Surrounded by dense woodland which is likely to block/filter views towards turbines. Views of tops of multiple WTGs may be available depending on height of surrounding vegetation.	Moderate/High*	High - bolstering existing planting to approx. 6m height will effectively screen views of WTGs.	Negligible*	L,L
J191	Dwelling 2 - 3km	746118	6096795	45	2672	NA	Surrounded by dense woodland. Highly unlikely to have any views to WTGs.	Negligible*			L,E
J193	Dwelling 2 - 3km	749399	6103723	54	2888	NA	Property surrounded by groups of trees. This vegetation and undulating topography likely to block the majority of WTGs although filtered views may be available down the valley to some turbines.	Moderate*			L
J194	Dwelling 1 - 2km	740800	6087598	47	1491	PM22	Several WTGs visible in close proximity to the dwelling, partially screened by foreground vegetation in the northwest. Numerous more distant WTGs to the northeast (12km) clearly visible.	Moderate/High	Moderate/High - potential for screening vegetation in close proximity to dwelling, filling in gaps in existing planting. Screening would need to be tall (12m+) and would consequently reduce panoramic nature of existing view.	Moderate/Low	L,L,L
J196	Dwelling 2 - 3km	749286	6103448	54	2642	NA	Property sits on an elevated position, surrounded by dense woodland. Views likely to the west over several WTGs, partial filtered by foreground vegetation.	Moderate			L,P
J197	Dwelling 1 - 2km	738848	6090268	35	1130	PM27	Surrounded by dense tree planting. Majority of WTG views blocked to the north and south east.	Low			L,L,L
J198	Dwelling 2 - 3km	741265	6112270	25	2702	NA	Topography and elevation likely to block all views towards WTGs.	Negligible*			L
J199	Dwelling 2 - 3km	746012	6097947	86	2044	R PM37 & 42	Property situated on elevated terrain. Surrounded by woodland that may to block the majority of views towards turbines.	Moderate/High*	Moderate/High - tree planting to northern façade of dwelling likely to screen visible WTGs.	Low*	L

J20	Dwelling 1 - 2km	742740	6102263	67	1316	PM20	Little screening vegetation around property. Direct and open views towards numerous WTGS in east and north.	High**	Moderate/Low - potential for screening vegetation in close proximity to dwelling. Screening would need to be tall (11m+) and extensive due to the number of WTGs visible and the wide view frame.	Moderate**	2015 - P 2016 - P,P,P,M,P, L
J208	Dwelling 1 - 2km	745869	6099526	85	1079	PM28	Main outdoor living area located to south of dwelling. Screening vegetation in surrounding fields likely to filter some views of WTGs to north and east, although direct views of multiple turbines will be available from dwelling and garden.	Moderate/High	Moderate/High - bolstering existing vegetation with tall (12m+) trees in close proximity to the northern façade of this dwelling would be likely to screen the majority of WTGs visible. Trees could also be planted on the nearby ridgeline to assist in screening views towards base of turbines.	Low	P, P, P, P, E, E, M, P, 2016 -P,P,M,E, P, P,M, P, P, L, E,E,E,E,E,E,E
J213	Dwelling 2 - 3km	738312	6093187	15	2137	NA	Surrounded by dense tree planting. Topography and vegetation likely to block all views of southern turbines to the east and south.	Negligible*			L
J214	Dwelling 2 - 3km	749543	6103681	54	2984	NA	Property surrounded by groups of trees. Vegetation and undulating topography block views to WTGs.	Negligible*			L
J216	Dwelling 1 - 2km	744854	6099403	60	1079	PM29	Property surrounded by screening vegetation to north, east and south which are likely to block/heavily filter views. Two WTGs likely to be visible through gap in vegetation to west.	Moderate			2015 - P, P, E, P 2016 -P,E,P,P,E,P,P,M,L
J217	Dwelling 1 - 2km	745680	6099319	85	1353	PM30	Limited screening vegetation to property although scattered trees within surrounding fields will partially filter views of WTGs to north.	Moderate/High	High - bolstering existing vegetation with tall (12m+) trees in close proximity to the northern façade of this dwelling would be likely to screen the majority of WTGs visible. Trees could also be planted on the nearby ridgeline to assist in screening views towards base of turbines.	Low	P, M 2016 -E, E, E, E, E, M, P, L, E, E
J218_TBB*	Dwelling 2 - 3km	741974	6090465	29	2071	PM 31	This site has screening vegetation to the west filtering views of the south west WTGs. Open views may be available to WTGs in the north, partially screened by foreground vegetation.	Moderate**			E,L,P
J218A	Dwelling 2 - 3km	741992	6090396	29	2041	PM31	This dwelling is surrounded by some screening vegetation, filtering views of WTGs to the north and south west. Some turbines will be visible through gaps in the trees.	Moderate			E,L,P
J221	Dwelling 2 - 3km	747589	6110421	76	2194	NA	Property surrounded by dense screening vegetation and elevated topography. Highly unlikely to have views towards WTGs.	Negligible*			P,P,P,L
J224	Dwelling 1 - 2km	738743	6092769	36	1644	NA	Surrounded by dense tree planting. Topography and vegetation likely to block all views of southern turbines to the east and south.	Low*			P,P,P,P,P,M,P,L
J226	Dwelling 1 - 2km	745401	6099419	85	1443	R PM30	Dense tree planting along the road will block views to the west. Views of WTGS likely to the north and east, heavily filtered by vegetation surrounding the dwelling.	Moderate**			P,E,E,E,L,E
J227	Dwelling 1 - 2km	741806	6089667	29	1508	PM34	Property in an elevate position. Several trees to west of property will partial screen views of WTGs to south although clear views of WTGs to north. Dwelling has limited windows although WTGs visible from open space surrounding dwelling.	Moderate**			2016 - E,L,P,P,P,E
J229	Dwelling 2 - 3km	743290	6090453	19	2786	NA	Property surrounded by screening vegetation. Planting and topography should block all views of WTGs.	Negligible*			L
J23	Dwelling 2 - 3km	741018	6101963	67	2982	NA	Dense woodland and topography likely to screen all views east to WTGs.	Negligible*			L
J230A	Dwelling 1 - 2km	747497	6110096	76	1886	NA	Property surrounded by dense woodland. Topography and vegetation likely to block all views of WTGs.	Negligible*			L,L
J230B	Dwelling 1 - 2km	747576	6110176	76	1998	NA	Property surrounded by dense woodland. Topography and vegetation likely to block all views of WTGs.	Negligible*			L,L
J234A	Dwelling 1 - 2km	747774	6103681	82	1710	PM32	Property sits on elevated slope. Dense vegetation along nearby creek will filter some views of the base of WTGs to south although much of the turbines may be still be visible. Topography blocks views north.	Moderate/High**	Moderate - extensive 10m height trees planted in close proximity to the dwelling would likely be effective in screening the majority of visible WTGs.	Moderate**	2015 - E, E, 2016 - E, E, E, E, E, L, E, E, E,
J234B	Dwelling 1 - 2km	747601	6103861	82	1735	NA	Property surrounded by dense woodland and unlikely to have views of WTGs to the south.	Negligible*			E,E,E,E,E,E,E,E,E,E
J235	Dwelling 1 - 2km	745302	6099055	60	1632	R PM30	Dwelling orientate east/west with few windows. Screening vegetation in surrounding fields likely to heavily filter views of WTGs to north and east.	Moderate**			P,L,P,M,P,L
J237	Dwelling 1 - 2km	741499	6091426	19	1079	PM35	No screening vegetation around property. Direct views of WTGs to north and potential views to tops of WTGs in the south, above the tree line.	High	Moderate/High - tall tree planting (10m) planted in close proximity to the northern and southern edges of the property would likely be effective in screening the majority of visible WTGs.	Moderate/Low	P,P,E,P,P,P,M,P,P,P,E
J239	Dwelling 2 - 3km	747310	6111056	76	2597	WF8	Some screening vegetation to north west of dwelling. Dwelling orientated north/south so unlikely to be views from habitable areas. Numerous WTGs likely visible to the south from open space, partially screened by undulating topography and built form.	Moderate/High	Moderate/High - Approx. 7m high screen planting to the south of property would link with existing vegetation and likely screen all views of visible WTGs.	Low	L
J241	Dwelling 1 - 2km	739229	6091823	36	1193	NA	Dwelling surrounded by very dense tree planting. No views of WTGs.	Negligible			M,P,L,L
J242	Dwelling 2 - 3km	748511	6103740	54	2233	NA	Property surrounded by woodland and unlikely to have views to WTGs in the south. Elevated topography blocks views to norther turbines.	Negligible*			L, L

J243	Dwelling 2 - 3km	745411	6098303	86	2155	PM36	Little screening vegetation to the north of this property. Views likely over numerous WTGs to the north, partially screened by vegetation.	Moderate/High**	Moderate - due to panoramic nature of view, extensive screen planting would be required to north of property to reduce visual impact. Planting would need to be approx. 10m high.	Moderate/Low**	E,E,E,E,E,E,M,L,E
J243A	Dwelling 2 - 3km	745358	6098308	60	2126	PM36	Little screening vegetation to the north of this property. Views likely over numerous WTGs to the north, partially screened by vegetation.	Moderate/High**	Moderate - due to panoramic nature of view, extensive screen planting would be required to north of property to reduce visual impact. Planting would need to be approx. 10m high.	Moderate/Low**	E,E,E,E,E,E,M,L,E
J244	Dwelling 2 - 3km	747474	6110737	76	2390	NA	Views to south west blocked by dense line of windbreak trees. Potential views to south east towards several turbines.	Moderate/Low*			L
J246	Dwelling 2 - 3km	750199	6102261	14	2785	NA	Surrounded by dense woodland and undulating topography. Highly unlikely to have views to WTGs.	Negligible*			L
J247	Dwelling 1 - 2km	745265	6098403	60	1992	PM37	Dwelling sits on an elevated position with panoramic views. Little screening vegetation to the north of this property. Views likely over numerous WTGs to the north.	High	Moderate - due to panoramic nature of view, extensive screen planting would be required to north of property to reduce visual impact. Planting would need to be approx. 6m high.	Moderate	P,P,P,P,P,L,
J255	Dwelling 1 - 2km	741085	6090116	35	1149	PM17	Little screening vegetation exists around this property and direct views likely available to 7 turbines on a ridge in the middle of the view.	Moderate/High**	Moderate - potential to screen turbines with tall planting in close proximity to the northern façade of the dwelling.	Moderate**	E,E,E,L
J257	Dwelling 1 - 2km	741556	6110433	25	1684	PM38	Direct and open views of numerous turbines to the east.	Moderate/High**	Moderate - due to panoramic nature of view, any screen planting would need to be extensive. Planting would need to be in close proximity to the eastern façade of the dwelling and to a height of 7m+. Any screening would diminish the panoramic nature of the existing view.	Moderate**	P,P,P,E,E,E,E,M,L,E,E,E,E
J258	Dwelling 2 - 3km	748378	6110125	76	2574	NA	Elevated topography and vegetation likely to block all views of WTGs.	Negligible*			L, L
J259	Dwelling 2 - 3km	748543	6109461	76	2427	NA	Despite sitting on elevated topography. Dense woodland surrounding the dwelling will block views towards WTGs.	Negligible*			L
J26	Dwelling 2 - 3km	741183	6107638	73	2277	NA	Property surrounded by dense tree planting which is likely to screen views to the east. Site inspection needed to verify.	Moderate*			E,E,P,M,L
J260	Dwelling 2 - 3km	748830	6109539	76	2724	NA	Topography and screening vegetation will block views to close WTGs in the east. Some distant turbines may be visible to the south,	Low*			L,P,E
J261	Dwelling 2 - 3km	748934	6109094	76	2722	NA	Topography and surrounding dense woodland likely to block all views of WTGs.	Negligible*			E,L
J269	Dwelling 1 - 2km	746899	6097757	45	1435	PM42	Property on elevated terrain. Surrounded by woodland which blocks and filters the majority of views towards WTGs. Several partial turbines visible through gaps in vegetation.	Moderate			P,E, P,P, E, E, P,P,L
J272	Dwelling 2 - 3km	740583	6110244	16	2565	WF3	Elevated dwelling with no screening vegetation. Direct and open views of numerous turbines to the east.	High	Low - due to elevated nature of view, a long line of vegetation in close proximity to the east façade of the dwelling would be needed at a height of 7m+ . This may screen turbines, although would consequently diminish the panoramic nature of the view.	Moderate/High	E,E,E,E,M,L,E,E,E,M
J275	Dwelling 2 - 3km	737992	6093419	15	2507	NA	Minimal screen planting surrounding property however topography will block views to the east. Filtered views may be available to the southern most group of 6 turbines.	Moderate/Low*			L
J275a	Dwelling 2 - 3km	737976	6093431	15	2526	NA	Minimal screen planting surrounding property however topography will block views to the east. Filtered views may be available to the southern most group of 6 turbines.	Moderate/Low*			L
J3	Dwelling 1 - 2km	745692	6110374	81	1351	PM18	Property on elevated terrain with sweeping panoramic views over landscape. Numerous turbines visible.	High	Low - screen planting unlikely to be effective due to elevated nature of dwelling, extensiveness of view frame and steepness of terrain surrounding property. Trees would need to be in very close proximity to dwelling and 10m+ to fully screen turbines. Any screening would consequently diminish existing panoramic view.	Moderate/High	P, P, E, E, M, P, E 2016 - E,E,E,M,P, L, E, P, E
J31	Dwelling 2 - 3km	739764	6095613	61	2977	NA	Screening vegetation likely to block views to the south. Direct views may be available to numerous distant turbines in the north.	Moderate*			L
J323	Dwelling 2 - 3km	743150	6087949	29	2985	NA	Topography and screening vegetation block views west. Distant WTGs may be visible to the north (13km)	Low*			L
J325	Dwelling 2 - 3km	748072	6110022	76	2265	NA	Topography and screening vegetation likely to block all views of WTGs.	Negligible*			L, L
J33_DAA*	Dwelling 2 - 3km	740791	6110997	25	2514	WF1	Proposed dwelling to be orientated east. Direct and open views of numerous turbines to the east.	High	Low - due to panoramic nature of view, any screen planting would need to be extensive. Planting would need to be in close proximity to the eastern façade of the dwelling and to a height of 10m+. Screening would diminish the panoramic nature of the existing view.	Moderate/High	L
J339	Dwelling 2 - 3km	748099	6110871	76	2865	NA	Vegetation along Mayfield Road likely to block all but the tops of WTGs in the south and west.	Moderate*			E,E,E,E,L,E,E,E,E,M

J388_DAA*	Dwelling 2 - 3km	737837	6093453	15	2666	NA	Densely vegetated ridgelines to the east and south of this future dwelling are Highly likely to block views towards the majority of WTGs. The very tips of several WTGs may be visible above the tree line, although a negative impact on visual amenity is not expected.	Low*			N/A
J389(J380A)	Dwelling 2 - 3km	738200	6093403	15	2304	NA	Surrounded by dense tree planting. Topography and vegetation likely to block all views of southern turbines to the east and south.	Negligible*			L
J39	Dwelling 2 - 3km	738244	6091869	36	2122	R PM40	No screening vegetation present around property itself although nearby tree line may screen views of WTG bases to east and south.	Moderate*			L
J391	Dwelling 2 - 3km	749662	6102960	54	2775	NA	Undulating topography will block all views of WTGs.	Negligible*			L
J392-(J189)	Dwelling 1 - 2km	742308	6107841	73	1327	NA	Dense line of trees along Braidwood Road likely to screen base of WTGs although tops of numerous turbines likely to be visible to the east.	Moderate/High**	Moderate - Extensive screen planting in close proximity to the east of the dwelling would likely screen views towards turbines. The planting would need to be approximately 10m high.	Moderate**	L,L,L
J393-(J92)	Dwelling 1 - 2km	738904	6091486	36	1636	PM39	Dense vegetation surrounds this dwelling. This is likely to block views of WTGs to the south east, however the 7 turbines to the north east are likely to be visible above the tree line.	Moderate/High	High - several trees planted in close proximity to the north eastern façade of the dwelling would be likely to screen views towards these WTGs.	Low	E,E,P,E,P,E,L,E, P
J394	Dwelling 2 - 3km	740575	6111681	25	2945	NA	Property located on elevated land with sweeping views east. Dense tree planting on a nearby ridgeline may screen/filter views of WTG bases although tops of some turbines may still be visible.	Moderate			L,L,P,M,E
J396-(J205)	Dwelling 2 - 3km	750518	6102128	14	2933	NA	Surrounded by dense woodland and undulating topography. Highly unlikely to have views to WTGs.	Negligible*			L
J40	Dwelling 1 - 2km	744089	6104771	87	1335	PM21	Screening vegetation only present to the south of property. Direct views of northern WTGs Highly likely.	High**	Moderate - due to panoramic nature of view, any screen planting would need to be extensive. Planting would need to be approx. 8m+ high to obscure WTGs. Any screening would diminish the panoramic nature of the existing view.	Moderate**	2015 - P,E,E,E,P 2016 - P, M,E, E, P, E, L, P, P, P, E, E, E, E, P, E, E, P, E
J416-(J83)	Dwelling 2 - 3km	742930	6096592	17	2867	R WF9	Limited screening vegetation surrounding property. Topography will block views to the south. Direct views of multiple distant WTGs potentially visible to north.	Moderate*			L
J422	Dwelling 1 - 2km	741808	6110265	17	1846	R WF4 & PM16	This location is slightly elevated with no screening vegetation. Views to numerous turbines will be available to the east along a ridgeline in the mid distance. The base of these turbines may be obscured by tree planting along Goulburn Road.	Moderate/High**	Moderate - due to panoramic nature of view, any screen planting would need to be extensive. Planting would need to be approx. 7m high to obscure WTGs. Any screening would diminish the panoramic nature of the existing view.	Moderate**	L,L,L,L
J423	Dwelling 2 - 3km	741244	6098128	17	2386	WF4	This property sits on an elevated position with no surrounding screening vegetation. Panoramic and far reaching views will be available over numerous turbines to the north.	High	Moderate - due to panoramic nature of view, any screen planting would need to be extensive. Planting would need to be approx. 7m high to obscure WTGs. Any screening would diminish the panoramic nature of the existing view.	Moderate	L,P,M,L,E, P
J424	Dwelling 1 - 2km	745980	6110265	17	1715	R WF4 & PM16	Minimal screening vegetation present. Views towards numerous turbines may be available in the north east, partially obscured by foreground topography.	Moderate/High**	Moderate - due to panoramic nature of view, any screen planting would need to be extensive. Planting would need to be approx. 7m high to obscure WTGs. Any screening would diminish the panoramic nature of the existing view.	Moderate**	P,E,E,E,M,P,L,E,E
J425	Dwelling 1 - 2km	741737	6098901	17	1593	R WF4 & PM16	No screening vegetation present. Views towards numerous turbines may be available in the north east, partially obscured by foreground topography.	Moderate/High**	Moderate - due to panoramic nature of view, any screen planting would need to be extensive. Planting would need to be approx. 7m high to obscure WTGs. Any screening would diminish the panoramic nature of the existing view.	Moderate**	L,L
J429_DAA*	Dwelling 2 - 3km	749464	6106005	32	2763	NA	Topography and screening vegetation likely to block all but the very tips of several WTGs.	Low*			L,L
J43	Dwelling 2 - 3km	741925	6103019	67	2367	NA	Dense vegetation within the garden will screen/heavily filter views of WTG's from the dwelling and outdoor seating area. Partially filtered views available from very eastern end of garden.	Moderate**			E,E,E,M,L,E
J46	Dwelling 2 - 3km	741729	6102476	67	2347	NA	Surrounded by woodland - Highly unlikely to have views of WTGs.	Negligible*			L
J5	Dwelling 1 - 2km	742375	6102772	67	1853	PM19	Screening vegetation present to north, south and west although open and direct views will be available to WTGs to the east.	High**	Moderate/Low - This dwelling has an extensive view frame that will make screening difficult. Tall trees in proximity to the eastern façade may screen some of the WTGs but will also diminish the panoramic nature of the existing view.	Moderate**	E,E,E,E,M,E,L,E,E,E,E,E,E,E,E,E
J51	Dwelling 2 - 3km	737495	6092032	36	2839	R PM40	Property on slightly elevated terrain. No screening vegetation around property itself although nearby tree line may screen views towards bases of WTG to east and south.	Moderate*			L
J58B	Dwelling 2 - 3km	741388	6103527	68	2978	PM41	Property elevated above tree line with panoramic distant views. Some additional tress soon to be removed for new deck installation. Foreground vegetation may obscure base of turbines although tops of numerous WTGs will be visible above the tree line.	Moderate/High	Low - screen planting unlikely to be effective due to elevated nature of dwelling and steepness of terrain surrounding property. Trees would need to be in very close proximity to dwelling and 15m+ to fully screen turbines. Any screening would consequently diminish existing panoramic view.	Moderate/High	L,L,E (x15), M
J60	Dwelling 1 - 2km	744900	6111980	42	1926	NA	This property sits behind a slight topographical rise. This, combined with tree planting on this hill is likely to block or filter the majority of views towards south towards WTGs.	Moderate/Low*			L,L,L

J65	Dwelling 2 - 3km	740496	6110573	16	2731	R WF3	Direct and open views of numerous turbines to the east.	High**	Low - due to panoramic nature of view, any screen planting would need to be extensive. Planting would need to be in close proximity to the eastern façade of the dwelling and to a height of 10m+. Any screening would diminish the panoramic nature of the existing view.	Moderate/High**	E,E,L,E,E,E
J70	Dwelling 1 - 2km	739472	6091650	36	1072	WF6	No windows on existing dwelling so the impact will be from open space only. Proposed dwelling to the north of current dwelling likely to have views of 7 WTGs on ridgeline to north, standing out above the tree line.	Moderate/High	Low - screen planting unlikely to be effective due to elevated nature of WTGs. Trees would need to be 20m to fully screen turbines.	Moderate/High	P,M,P,M,P,P,E,E,E
J75A	Dwelling 1 - 2km	742333	6104756	87	1816	R WF12	Surrounded by tree planting on all sides. Elevated position may allow some filtered views to turbines in the north and east.	Moderate*			J75- P J428 - L,L,E,E,E,E,E,E
J75B	Dwelling 1 - 2km	742283	6104697	87	1893	R WF12	Vegetation is likely to block views to northern turbines although eastern WTGs may be directly visible.	Moderate/High*	Moderate - due to panoramic nature of view, any screen planting would need to be extensive. Planting would need to be approx. 7m high to obscure WTGs. Any screening would diminish the panoramic nature of the existing view.	Moderate*	L,L,E,E,E,E,E,E
J76	Dwelling 1 - 2km	745945	6110174	78	1225	R PM18	Little vegetation near dwelling. Elevated position will afford panoramic and direct views of multiple WTGs.	High**	Low - screen planting unlikely to be effective due to elevated nature of dwelling, extensiveness of view frame and steepness of terrain surrounding property. Trees would need to be in very close proximity to dwelling and 10m+ to fully screen turbines. Any screening would consequently diminish existing panoramic view.	Moderate/High**	L,L
J76b*	Dwelling 1 - 2km	745980	6110265	78	1323	R PM18	Little vegetation near dwelling. Elevated position will afford panoramic and direct views of multiple WTGs. Orientation of dwelling is unknown and so a worst case scenario impact rating has been given.	High**	Low - screen planting unlikely to be effective due to elevated nature of dwelling, extensiveness of view frame and steepness of terrain surrounding property. Trees would need to be in very close proximity to dwelling and 10m+ to fully screen turbines. Any screening would consequently diminish existing panoramic view.	Moderate/High**	L,L
J83A	Dwelling 2 - 3km	742663.0	6096728.0	17	2775	WF9	Property on elevated terrain with far reaching views. Dwelling orientated to the north. Limited screening vegetation surrounding property. Topography will block most views of WTGs to south. Direct views of multiple WTGs visible to north.	Moderate/High	Low - due to panoramic nature of view, any screen planting would need to be extensive. Planting would need to be in close proximity to the northern façade of the dwelling and be to a height of 10m+. Any screening would diminish the panoramic nature of the existing view.	Moderate/High	L,L,E,E,E,E,E,M,E
J85	Dwelling 1 - 2km	742574	6102275	67	1479	R PM20	Property surrounded by screening vegetation which may block or filter majority of views towards turbines.	Moderate/High*	High - bolstering existing vegetation surrounding property would be likely to screen the majority of WTGs visible from this dwelling.	Low*	L,L,L
J87	Dwelling 1 - 2km	742702	6105043	87	1353	WF12	Property on elevated terrain. Surrounded by dense groups of tree planting that will block or filter the majority of views to WTGs in the north and east. Several WTGs will be partially visible above the tree line.	Moderate			P,P,L, Property Sold, J439 - P,M
J88	Dwelling 1 - 2km	738838	6092449	36	1489	NA	Surrounded by tree planting. Topography and vegetation likely to block most views of southern turbines to the east and south.	Moderate/Low*			P, L,L,L,L
J91	Dwelling 2 - 3km	740881	6108236	79	2476	WF11	Dwelling orientated north/south. Some clear views to ridgeline from lawn area at back of property. Tree planting to east of property likely to filter views of eastern WTGs on ridgeline. Direct views of more distant WTGs likely through a break in vegetation to the south east.	Moderate			M,M,L,M
J93	Dwelling 2 - 3km	740797	6110817	25	2474	R WF1	Direct and open views of numerous turbines to the east.	High**	Moderate/Low - due to panoramic nature of view, any screen planting would need to be extensive. Planting would need to be in close proximity to the eastern façade of the dwelling and to a height of 10m+. Any screening would diminish the panoramic nature of the existing view.	Moderate/High**	E,E,M,L,E
J94	Dwelling 2 - 3km	737890	6093189	15	2549	NA	Minimal screen planting surrounding property. Filtered views may be available to the southern most group of 6 turbines.	Moderate/Low*			L
J97A	Dwelling 2 - 3km	741336	6105789	44	2221	NA	Some screening vegetation surrounds dwelling although a view corridor is available to the north east, potentially allowing direct views of several WTGs.	Moderate*			L
J97B	Dwelling 2 - 3km	737487	6086813	62	2837	NA	Surrounded by dense woodland. Highly unlikely to have views of WTGs.	Negligible*			L
J97C	Dwelling 2 - 3km	741204	6105879	44	2327	NA	Dwelling surrounded by tree planting which will block or filter views to the east. WTGs may be visible through vegetation.	Moderate*			L