

Rangoon Wind Farm

Preliminary Landscape and
Visual Assessment

ARUP



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Document information	
Report Title	Rangoon Wind Farm
Subtitle	Preliminary Landscape and Visual Impact Assessment
Filename	2020-06-15 Rangoon Wind Farm
Date	12/08/2020

Revision	Date	Details
1	1/06/2020	Draft for internal review
2	3/06/2020	Draft for client review
3	12/06/2020	Draft for internal review
V0	15/06/2020	Final report
V1	26/06/2020	Final report - V1
V2	12/08/2020	Final report - V2

Revision Details		Date
Prepared By	Lucy Johnson	12/06/2020
Reviewed By	Natarsha Lamb	26/06/2020
Approved By	Chris Madigan	12/08/2020

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An aerial photograph of a vast, open landscape. The terrain is covered in green grass with numerous scattered trees of varying sizes. In the distance, rolling hills are visible under a clear sky. A small, dark pond is located in the lower right quadrant of the image. A blue rectangular box is overlaid on the right side of the image, containing the text '01 Introduction' in white.

01

Introduction

Project description

Overview

The project will involve the construction, operation and decommissioning of Rangoon Wind Farm (project). The project comprises two parts, Rangoon Wind Farm South (RWF South) and Rangoon Wind Farm North (RWF North). The project's key components include but are not limited to:

RWF South:

- Wind turbines - up to 4 wind turbines, rated at approximately 5.5-6.5MW each with:
 - Three blades mounted on a tubular steel tower, with a combined height of blade and tower limited to a maximum tip height of 250m; and
 - Adjacent pad mounted turbine transformer, crane hardstand area, cable stays and related turbine lay down area.
- Substation - balance of plant and transmission connection linking the turbines to the existing TransGrid 66kV Guyra to Glen Innes transmission line;

- Electrical Connections – between wind turbines and the on-site substation which will be a combination of underground cable and overhead powerlines linking segments of the site;
- Other associated infrastructure including (but not limited to) site offices, equipment storage facilities, temporary and permanent laydown pads, construction compounds, access tracks to each turbine, security fencing, and permanent monitoring masts.
- Minor road upgrades to enable delivery access for installation and maintenance of wind turbines and related facilities;
- Rock crushing facilities and stockpile sites, concrete batching plant(s) and other construction related facilities;
- Ancillary activities including (but not limited to) materials sourced for construction, ongoing maintenance facilities and decommissioning of the project;
- Drainage, earthworks and vegetation clearing for project works; and
- Boundary adjustment/subdivision if required.

RWF North:

- Wind turbines - up to 21 wind turbines, rated at approximately 5.5-6.5MW each with:
 - Three blades mounted on a tubular steel tower, with a combined height of blade and tower limited to a maximum tip height of 250m; and
 - Adjacent pad mounted turbine transformer, crane hardstand area, cable stays and related turbine lay down area.
- Battery Energy Storage System – energy storage system to be located at the project's substation.
- Substation - balance of plant and transmission connection – linking the turbines to the existing TransGrid 132kV Armidale to Glen Innes transmission line;
- Electrical Connections – between wind turbines, the on-site substation and energy storage system (e.g. battery) which will most likely be a combination of underground cable and overhead powerlines linking segments of the site;
- Other associated infrastructure including (but not limited to) on-site operations building, equipment storage facilities, temporary and permanent laydown pads, construction compounds, access tracks to each turbine, on-site concrete batching plant facilities, on-site quarry, rock crushing facilities and stockpile sites, other construction related facilities, security fencing, and permanent monitoring masts.
- Regional and minor road upgrades to enable delivery access for installation and maintenance of wind turbines and related facilities;
- Ancillary activities including (but not limited to) materials sourced for construction, ongoing maintenance and decommissioning of the project;
- Drainage, earthworks and vegetation clearing for project works; and
- Boundary adjustment/subdivision, if required.

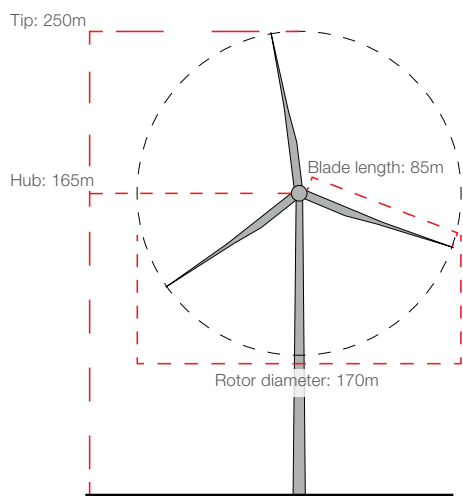


FIGURE 1.1 INDICATIVE TURBINE DIMENSIONS

Legend

- Wind turbine location
- ▭ Regional area
- ▭ Project area boundary
- Electricity transmission line
- Water body
- Road

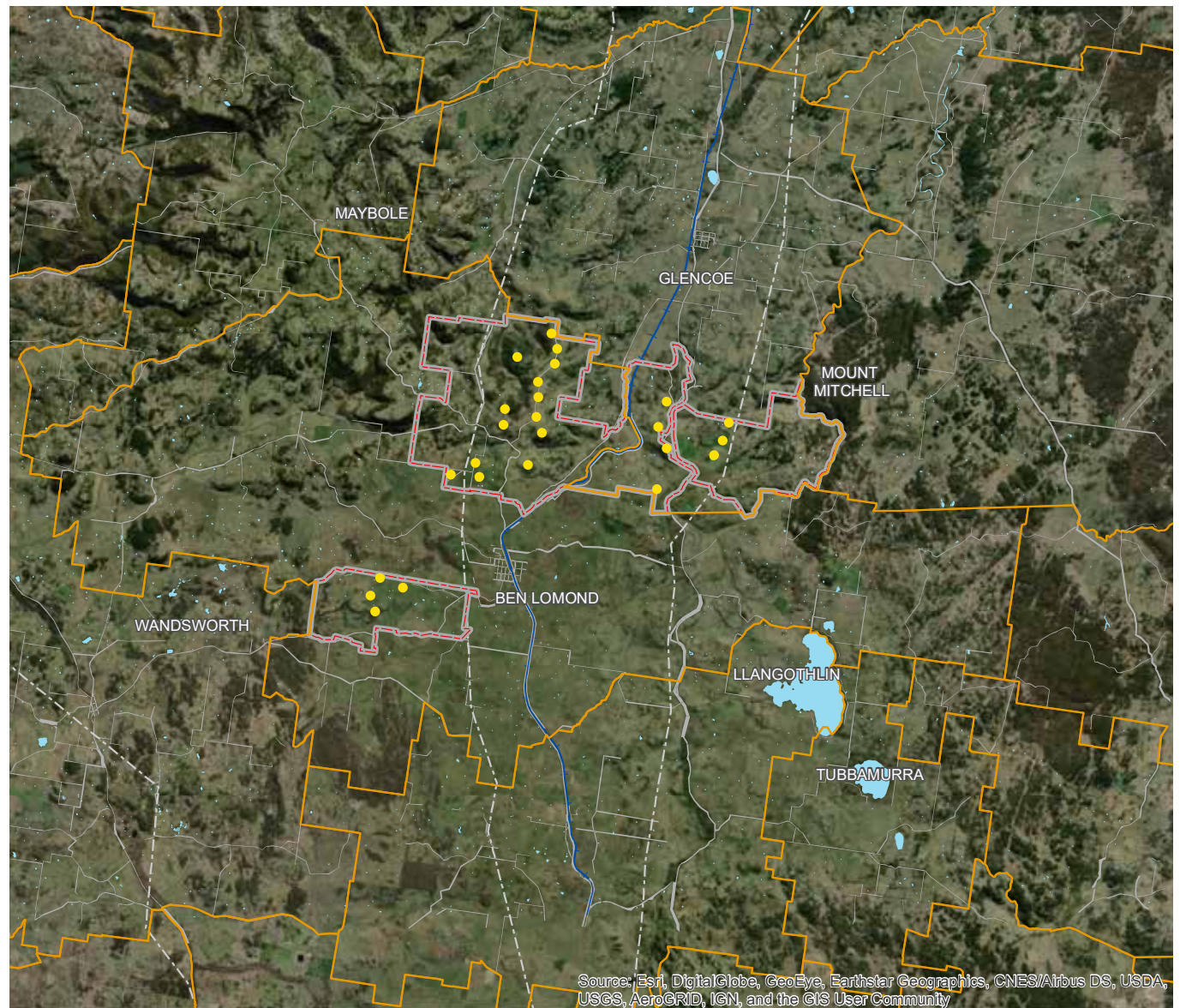
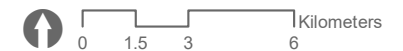


FIGURE 1.2 PROJECT OVERVIEW



Purpose of this report

This report considers the landscape and visual context in which the project will be located, documents a preliminary understanding of the potential impacts and provides a summary of matters which will require further investigation, assessment, management and mitigation as part of a full Environmental Impact Assessment. Detailed consideration has been given to the extent of potential visual impacts to assist the DPI&E in assessing the project and issuing the Secretary's Environmental Assessment Requirements (SEARs)

To inform the Preliminary Landscape and Visual Impact Assessment (PLVIA), EPS has consulted with the community on the project boundary to gather feedback and an understanding of the key landscape features, areas of scenic quality and key public viewpoints. The community feedback has been reflected in this PLVIA.

Background

The Project

The Rangoon Wind Farm (RWF or 'the project') would comprise of the installation of approximately 25 wind turbines, over two sites (north and south), that would supply electricity to the national electricity grid. The location of the turbines is subject to ongoing wind measurements, specialist reports and consideration of community consultation.

To reduce the potential of misleading the community and affected landholders, this preliminary assessment presents information informed by a worst-case scenario, with a focus on a wind farm development boundary, rather than determined turbine locations. This 'worst case' approach ensures a comprehensive assessment of the potential extent of landscape and visual influence, which will inform the finalisation of the wind turbine and infrastructure layout.

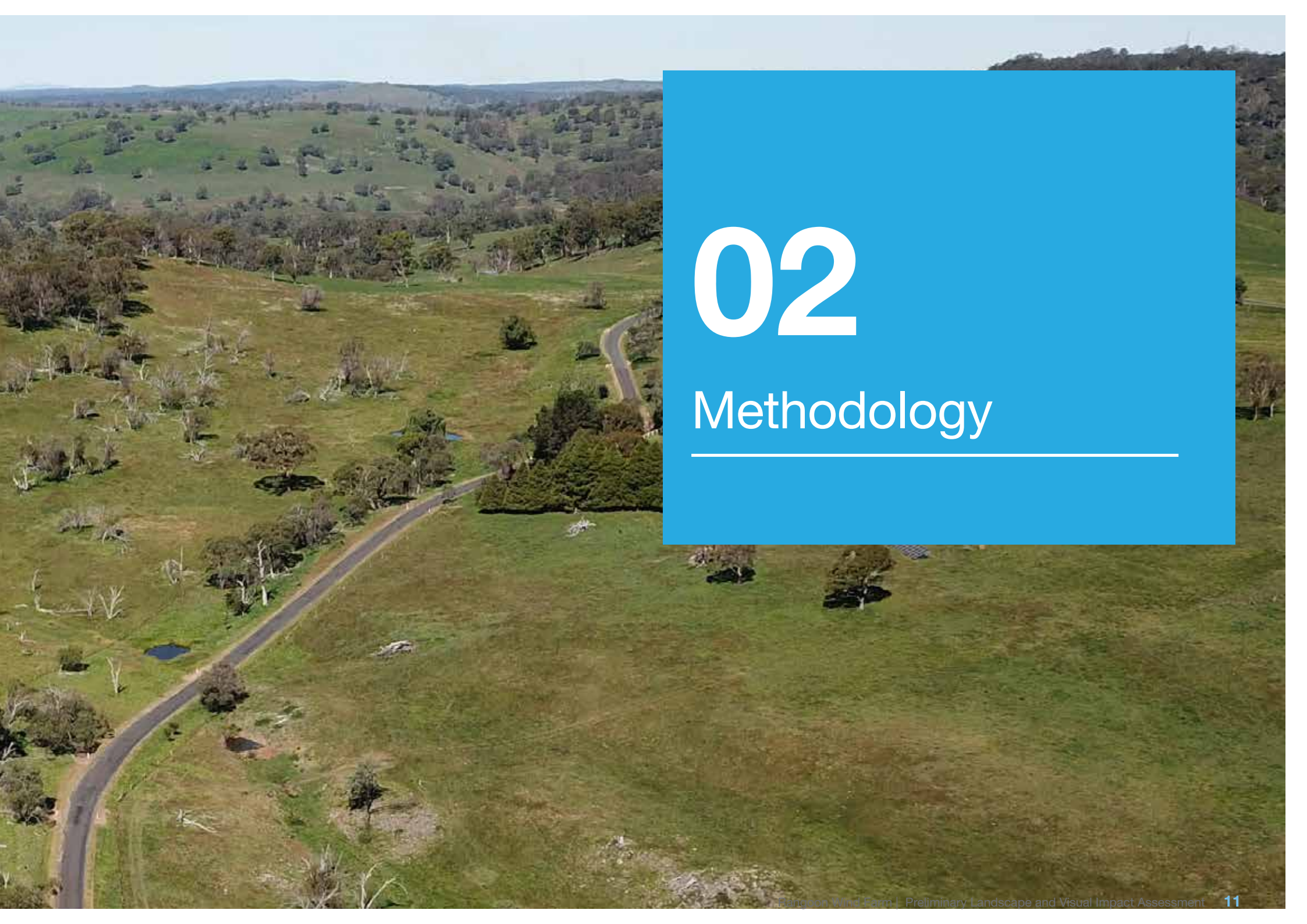
In accordance with the Visual Impact Assessment Bulletin, Wind Energy (DPE, 2016) (VIA Bulletin), the visual study area has been defined through the preparation of a Zone of Theoretical Visual Influence (ZTV) map. The ZTV has been prepared utilising GIS to illustrate the theoretical area from which the RWF would be visible in the landscape.

Report structure

Broadly summarised, the report is structured with reference to the following tasks:

- [Section 01 'Introduction' \(page 6\):](#)
Outlines the purpose of this report and establishes an understanding of the project; namely the location, form and scale of the proposal and the relative physical differences between the current conditions and that which is proposed both during construction and during operation.
- [Section 02 'Methodology' \(page 12\):](#)
Provides the methodology against which the potential impacts are assessed, including the project assumptions and limitations.
- [Section 03 'Context' \(page 18\):](#)
Understands and describes the existing landscape and visual character of the study area, via desktop studies and as a means of establishing a baseline against which impacts associated with the project can be assessed.
- [Section 04 'Baseline analysis' \(page 26\):](#)
An analysis of the local context to determine key areas of sensitivity, landscape character areas and a summary of visual baseline conditions.
- [Section 05 'Preliminary Impacts' \(page 56\):](#)
Provides a preliminary assessment of the identified key landscape character areas and viewpoints. Includes identification of potential impacts associated with the proposal and a summary of further investigation to be undertaken in the full assessment.
- [Section 06 'Cumulative Impacts' \(page 66\):](#)
Provides an identification of key viewpoints within a 8km viewshed of the project and nearby existing or proposed wind farms.
- [Section 07 Summary \(page 76\)](#)
Summary of results
- [Appendices \(page 80\)](#)
Record of maps generated for analysis and impact assessment methodology.



An aerial photograph of a rural landscape. A dark, winding road curves through a green field dotted with small trees and shrubs. In the background, rolling hills are visible under a clear sky. A large blue rectangular overlay is positioned on the right side of the image, containing the page number and title.

02

Methodology

Visual Impact Assessment Bulletin

The VIA Bulletin provides guidance on the assessment of visual impacts that may arise from wind farm projects. The guidance notes that the visual impact will depend upon the characteristics and values of the existing landscape, the extent to which the existing landscape is changed by the project and how these changes will be perceived by individuals and the broader community.

The objectives of the Bulletin are to:

- Provide the community, industry and decision-makers with a framework for visual impact analysis and assessment that is focused on minimising and managing the most significant impacts;
- Facilitate improved wind turbine and ancillary infrastructure siting and design during the pre-lodgement phase of a project, encourage early consideration of visual impacts to minimise conflicts and delays where possible, and provide for a better planning outcome;
- Provide the community and other stakeholders with greater clarity on the process along with an opportunity to integrate community landscape values into the assessment process; and
- Provide greater consistency in assessment by outlining appropriate assessment terminology and methodologies.

LVIA guidelines

LVIA methodology guidelines and policy

The following documents have influenced the methodology for this study and are considered best practice within the industry. They set out a clear and systematic approach in documenting the baseline landscape and visual conditions, potential impacts and mitigation.

The assessment conforms generally with the direction offered by the following guidance documents:

- NSW Wind Energy Visual Assessment Bulletin, 2016 (VIA Bulletin)
- NSW Roads and Maritime Services Practice Note – Guideline for Landscape Character and Visual Impact assessment EIA-N04.
- The Guidance for Landscape and Visual Impact Assessment, Third Edition, 2013, prepared by the Landscape Institute and Institute of Environmental Management & Assessment, UK.
- People and Place principles outlined in the Australian Urban Design Protocol (AUDP) or other ISCA approved equivalent
- Guidance Notes for the Reduction of Obtrusive Light GN01:2011, *Institution of Lighting Professionals*

Report approach

The report approach has been refined based on limitations of travel associated with Covid-19 resulting in this preliminary stage based purely on desktop analysis. The findings of this report are to be validated through site visits during the preparation of the EIS chapter.

In line with the direction and objectives of the VIA Bulletin and best practice in landscape and visual impacts assessment, the Rangoon Wind Farm PLVIA comprises the following stages.

Landscape analysis

- Landscape baseline analysis | An analysis of the local context with a focus on landscape features, including topography, land-use, vegetation cover and a review of designated landscapes
- Landscape Character Assessment | An analysis of the existing landscape features to divide the landscape into broad homogeneous units to assist with determining the preliminary impacts that may result from the project

Visual analysis

- Visual baseline analysis | Desktop analysis to ascertain the visual catchment of the development area through the preparation of Zone of Theoretical Visual Influence (ZTV) mapping.
- Representative viewpoint selection | A review of the ZTV outputs identified dwellings and key viewpoints. Streetview images and previously taken site photographs were analysed, matching with key viewpoints

identified from the ZTV to gain an understanding of the project area in context and gather site information. Representative viewpoints have been identified to illustrate a more complete understanding of the project and potential changes that may arise as a result of the project.

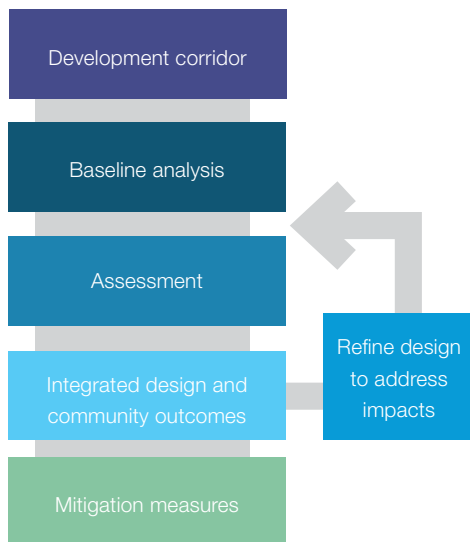
- The potential impacts that have been identified are preliminary and would be subject to detailed investigations during the Environmental Impact Assessment stage.

Cumulative analysis

- Cumulative viewpoint selection | A preliminary analysis of the sources of potential impact from two or more planned, approved or existing wind farms, and the receptors that are within 8km of each.

Summary

The report summary identifies potential landscape and visual impacts, providing gaps in the assessment that are to be further investigated within the Environmental Assessment.



Visual perception

Community perception of wind farms is an important consideration in assessing the landscape and visual impact of a project. This is related to people's perception to renewable energy as well as their reaction to the physical presence of wind turbine infrastructure in the landscape. In the research paper 'Societal acceptance of wind farms: Analysis of four common themes across Australian case studies' Hall, Ashworth and Devine-Wright (2013), seven case studies were examined which identified strong community support for wind farms generally, but local opposition to specific proposals based on four key themes; trust, distributional justice, procedural justice and place attachment. The findings note "a 'silent majority' of rural residents who do not explicitly demonstrate support through media attention or political engagement". However, they note research indicating the impact of visual changes to a place or landscape can significantly influence attitudes towards a wind farm and highlight the sense of attachment of participants to their local landscape, concluding that "such amenity concerns are highly subjective, difficult to quantify and to compensate if at all".

Wilson and Dyke (2015) in their research pre and post-installation community perceptions of wind farm projects: the case of Roskrow Barton, identified the complexity of determining and addressing community attitudes to wind farms noting that "the value that individuals attribute to the countryside varies from person to person depending on experience and memories. Judgement is, thus, subjective with some disliking the appearance of wind farms and

finding them ugly, whereas others only see graceful structures". Their research concluded that (for this example), "although negative perceptions can be found both pre and post-installation, collectively the community have become used to the turbines and that attitudes have generally become more favorable".

Community

The visual impacts associated with wind farm projects is a common underlying concern of nearby residents and the community. To address this concern, and in accordance with the VIA Bulletin, a community consultation process has been undertaken concurrently to establish an understanding of the key landscape features, areas of scenic quality and key public viewpoints valued by the community. These findings have been summarised below.

Significant viewpoints:

- Ebor Falls (c.100km southeast of RWF)

Valued landscape features:

- Mountains, valleys, creeks, ranges, waterfalls, natural beauty and peace & quiet
- Mountain range of Ben Lomond
- View of Mount Kaputar (c.200km west of RWF)

Culturally significant areas:

- Main North rail line and Railway stations
- War Memorial Hall, Ben Lomond
- Wandsworth Community Hall (10030 Guyra Road, Wandsworth)

Community activity when viewing RWF:

- Working outside
- Recreational activities

The feedback received from the community on the specific areas of value has informed the landscape character analysis and has been considered in the selection of representative viewpoints for this assessment. War Memorial Hall Ben Lomond which is approximately 2.6km from the nearest turbine was selected as a representative viewpoint for analysis in this assessment.

The viewpoints suggested (Ebor Falls and Mount Kaputar) are at a distance from the project area in which any potential visual impacts are likely to be negligible. The Ben Lomond mountain range is a notable feature in the background of some viewpoints as further discussed in chapter 4. Views from Wandsworth Community Hall were checked in Google Streetview. While this may be a culturally significant site for the community, it was considered that views of the proposed RWF would not be visible from this site due to the distance (c.16km west) and intervening topography, thus it was not selected as a representative viewpoint for analysis in this assessment.

The assessment associated with these viewpoints takes a 'worst case' approach to inform the design development stage and the ongoing refinement of turbine locations.

Study area

The study area is initially defined through the production of a Zone of Theoretical Visual Influence (ZTV), which illustrates the theoretical area from which the proposal could be visible. This is a helpful tool for providing an overview as the extent to which the proposal elements, would be visible. It is important to note that the ZTV is, by its nature, approximate only and generated to represent a worst case scenario.

For the purpose of this preliminary assessment study area has been concentrated within the 10km buffer from turbines. Within this area the potential effects of the proposal are likely to be more acute for both landscape and visual effects.

The two sets of ZTV mapping for both the visual magnitude and multiple wind turbine parameters, are produced in accordance with the VIA Bulletin, are approached using the follow method.

1. Generation of ZTV maps, showing how much of the turbine is potentially visible within the study area, as illustrated in figure 2-1. These set of ZTV maps are used to identify dwellings and key public viewpoints within 3.3km of the turbine (distance designated by VIA Bulletin Guidelines graph in figure 2-2), and that are within the viewshed, for further detailed assessment.

2. The identified dwellings and key public viewpoints (or agreed selected viewpoints) are then used to generate the ZTV analysis to determine how many of the turbines are visible from the selected viewpoint.

Further detailed assessment and ground-truthing at the visual assessment stage must also consider impacts on these dwellings or key viewpoints.

It should be noted that the outputs of these ZTV maps are limited, and do not take into account the screening effect of intervening vegetation or built form, and therefore provide an exaggerated indication of the theoretical extent of visibility of the wind turbines.

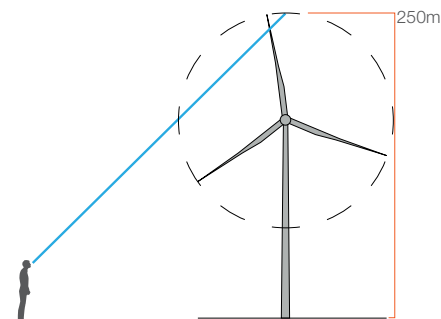


FIGURE 2.1 POTENTIAL VISIBILITY

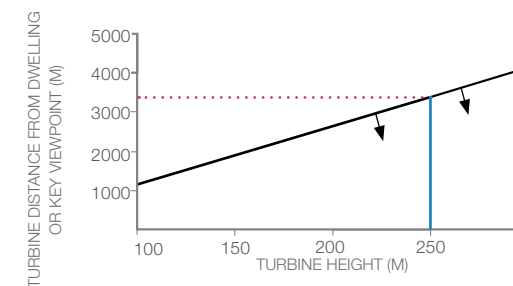


FIGURE 2.2 TOOL INDICATING POTENTIAL VISUAL IMPACTS FOR FURTHER DETAILED CONSIDERATION

“Proposed turbines below the black line must be identified, along with the dwellings or key public viewpoints as part of the request for SEARs.” (source: VIA Bulletin, NSW)

Landscape approach

The ZTV and visual study area is initially analysed and adopted to form the landscape study area, documenting the surrounding landscape context, which subsequently informs the context to the visual analysis. During the landscape assessment stage, the study area is refined to relate the landscape assessment to the direct or indirect change that may arise as a result of the proposal. Beyond the landscape impact study area, impacts arising from the project are considered to be visual in nature, and addressed through the visual assessment.

Landscape character assessment

Landscape character can be defined as the aggregate of built, natural and cultural aspects that make up an area and provide a sense of place. It includes all aspects of a tract of land – built, planted and natural topographical and ecological features.

To enable the assessment of impacts on landscape character, Landscape Character Types (LCTs) have been defined for the study area. LCTs are defined as areas having a distinct, recognisable and consistent pattern of elements making one landscape character area different from another.

The overall impact rating of the project on any given LCT is based on themes of magnitude and sensitivity.

Visual approach

Viewpoint selection

Following a thorough desktop study, review of the ZTV plans and site imagery, representative viewpoints with the potential to be visually affected by some element of the proposal are identified and selected for further analysis.

Viewpoints were selected to illustrate:

- A range of receptor types including public and private domain views (residents, motorists and users of public open space)
- A range of view types including elevated, panoramic and filtered views
- A range of viewing distance from the project
- Key or protected views identified within the planning literature.

The ZTV analysis has been approached in three ways:

- ZTV based on the turbine layout, determining the extent of potential visibility from the surrounding landscape within 10km of the site boundary.
- ZTVs from dwelling locations within 3.3 kilometers of any turbine, to determine the potential extent of visibility from each dwelling.

- ZTV to illustrate cumulative analysis of existing, approved and proposed wind turbines located within 8 kilometers of the project.

The overall impact rating of the project on any given viewpoint is based on themes of magnitude and sensitivity.

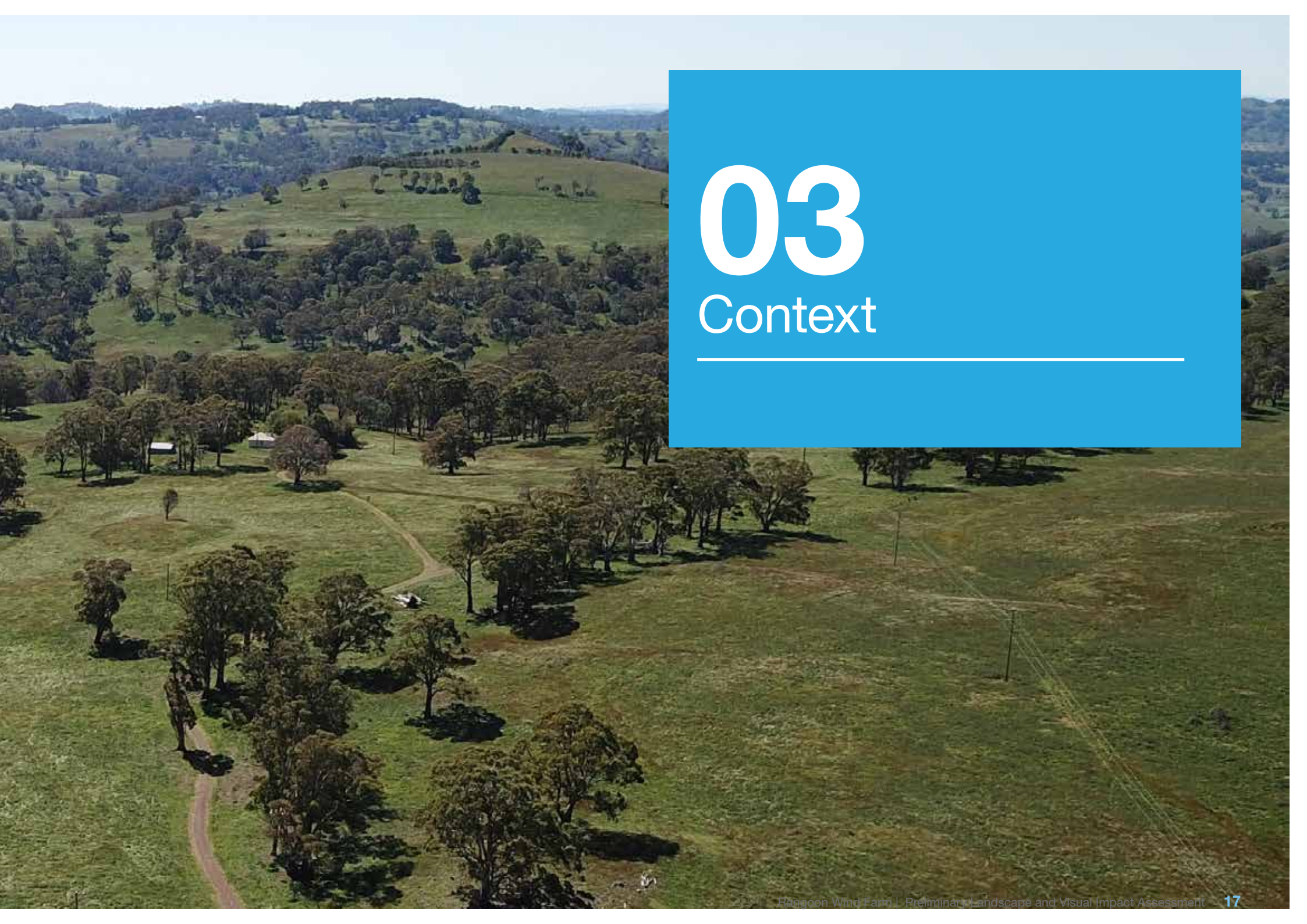
Assumptions and Limitations

Preliminary assessment

This preliminary assessment of potential landscape and visual impacts has been undertaken on the project design as described within the project overview.

Future acknowledgment of additional infrastructure, including the location and design of the hardstand areas, construction compounds, internal access tracks, Battery Energy Storage System (BESS), substations and high voltage overhead powerline, will be subject to detailed investigation and assessment during the Environmental Impact Assessment stage. This assessment does not seek to define the level of significance or impact at this preliminary stage, but identifies areas of potential impact and magnitude of change and provides a summary of matters which will require further investigation, assessment, management and mitigation as part of the full Environmental Impact Assessment.



An aerial photograph of a rural landscape. The terrain is hilly and covered in green grass. There are numerous trees scattered across the landscape, some in small clusters and others isolated. A dirt road or path winds through the lower left portion of the image. In the background, more hills are visible under a clear sky. A blue rectangular overlay is positioned on the right side of the image, containing the text '03 Context' in white.

03

Context

Landscape Context



FIGURE 3.1 SITE CONTEXT



Towns and Settlements

Immediate Site Context

The project is located in the New South Wales (NSW) Tablelands of the New England region approximately 24km south of the town of Glenn Innes and 19km north of Guyra, within the Armidale Council Local Government Area and Glen Innes Severn Local Government Area. The closest settlements within the project area include Glencoe and Ben Lomond.

Glenn Innes

Glenn Innes is a service town to the surrounding rural area, with small peaks and bushland. The population of the town was recorded at just over 6,000 (2016 census). There are a few significant heritage buildings including the Showgrounds, Post and Telegraph Office, and the Railway Station.

Guyra

Guyra is a service town to the surrounding rural area. It is the highest town in the New England Tablelands at 1330 meters above sea level (www.aussietowns.com.au/town/guyra-nsw#), experiencing cold extremes and occasional snow. The population was recorded at 1,983 (2016 census).

Glencoe

Glencoe is located 4km north of RWF North on the New England Highway (A15). It is surrounded by rural agriculture in rolling hills. The population is recorded at 192 (2016 census). It is located on the closed Main North railway line. Village amenities include a post office, tavern and church.

Ben Lomond

Located half way between RWF North and RWF South. At 1,370m above sea level (ASL), it is the highest village in northern NSW and occasionally receives snow fall (citation). The village is located on a disused railway line. The railway station is of heritage significance (NSW heritage register SHR no. 01083), as one of the smallest brick passenger stations constructed in 1884. The village has scattered houses, a public primary school, War Memorial Hall and a cemetery.

Llangothlin

There is a small settlement with several houses, near where Ben Lomond Road meets the New England Highway, 11km north of Guyra. It is 10km south-west of Llangothlin Lake and Little Llangothlin Lake and nature reserve, listed as a RAMSAR site, valuable as a drought refuge for waterbirds (Ciblic and White, 2011). Little Llangothlin Lake is located approximately 9km south of RWF North and 13km east of RWF South.



FIGURE 3.2 MEMORIAL HALL AT BEN LOMOND
(source: wikipedia.org/wiki/Ben_Lomond,_New_South_Wales)



FIGURE 3.3 GLENN INNES TOWN CENTRE
(source: www.aussietowns.com.au/town/glen-innes-nsw)



FIGURE 3.4 BEN LOMOND RAILWAY STATION
(source: www.exploroz.com/forum/110543/sunday-history-photo--nsw)



FIGURE 3.5 GUYRA TOWN CENTRE
(source: https://www.traveller.com.au/lambs-to-the-slaughter-7dha)



FIGURE 3.6 GLENCOE
(source: wikipedia.org/wiki/Ben_Lomond,_New_South_Wales)

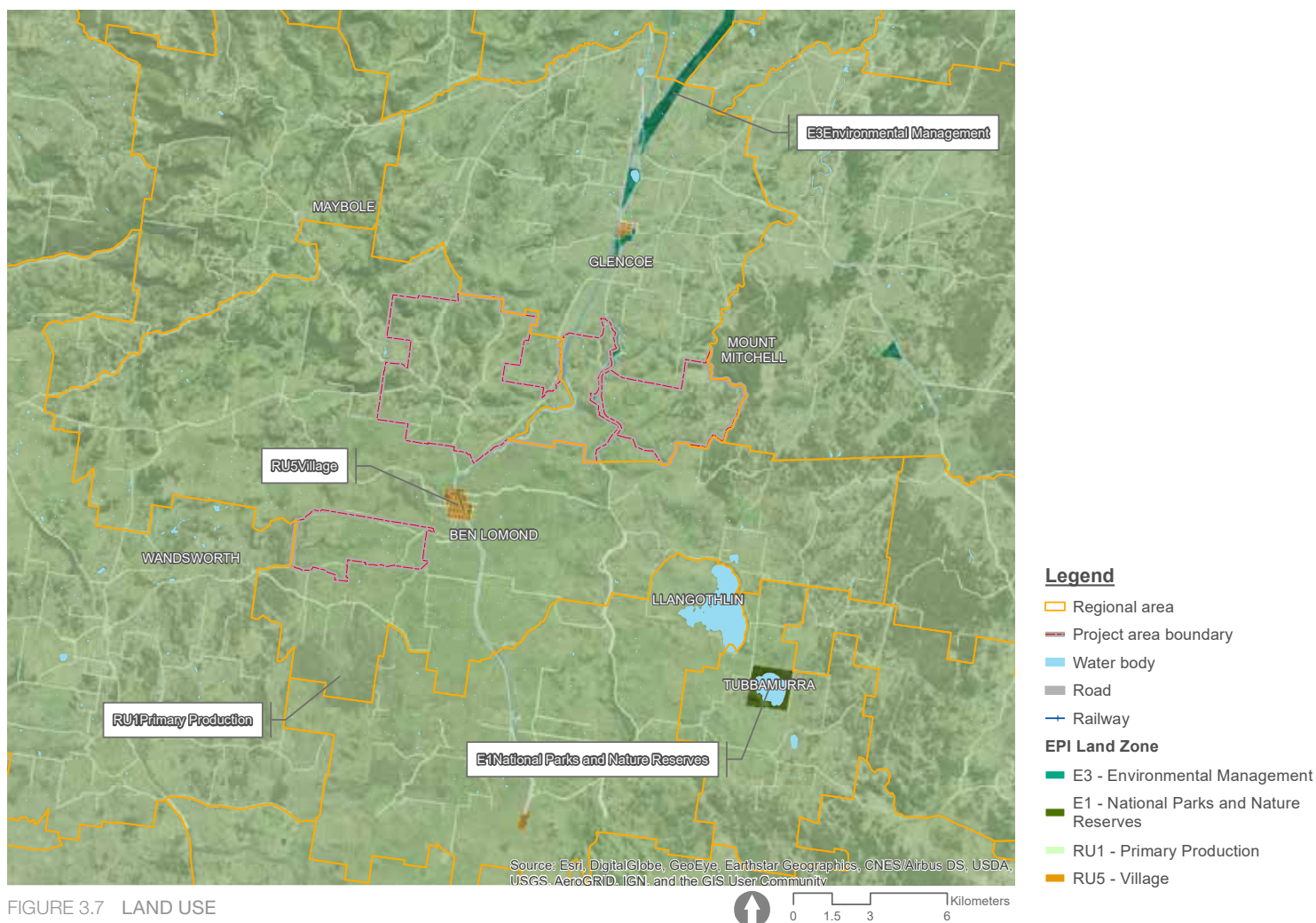


FIGURE 3.7 LAND USE

Land use

The study area falls within the NSW state electorate of Northern Tablelands region and within the Armidale Regional Council and the Glen Innes Severn Shire Council areas.

Under the provisions of the Guyra Local Environmental Plan 2012 (Guyra LEP) and the Glen Innes Severn Local Environmental Plan 2012 (Glen LEP), the subject land is zoned RU1 – Primary Production. Extensive agriculture and forestry are permissible without consent under Zone RU1.

The project study area is situated within RU1 Primary Production which includes grazing and agricultural land use, particularly sheep, cattle and grain farming both within native vegetation and modified pastures. As seen in Figure 3.7, Environmental and Planning land use zone RU1 covers the majority of the study area and the entire extents of the project area boundary (RWF North and RWF South).

The two villages of Ben Lomond and Glencoe, (refer to page 18-19 for further description of the towns) are zoned as RU5 *Village* and Little Llangothlin Nature Reserve is designated as E1 *National Parks and Nature Reserves* land zone (in Tubbamurra region), as it is categorised a RAMSAR listed waterbody with very high ecological and biodiversity value.

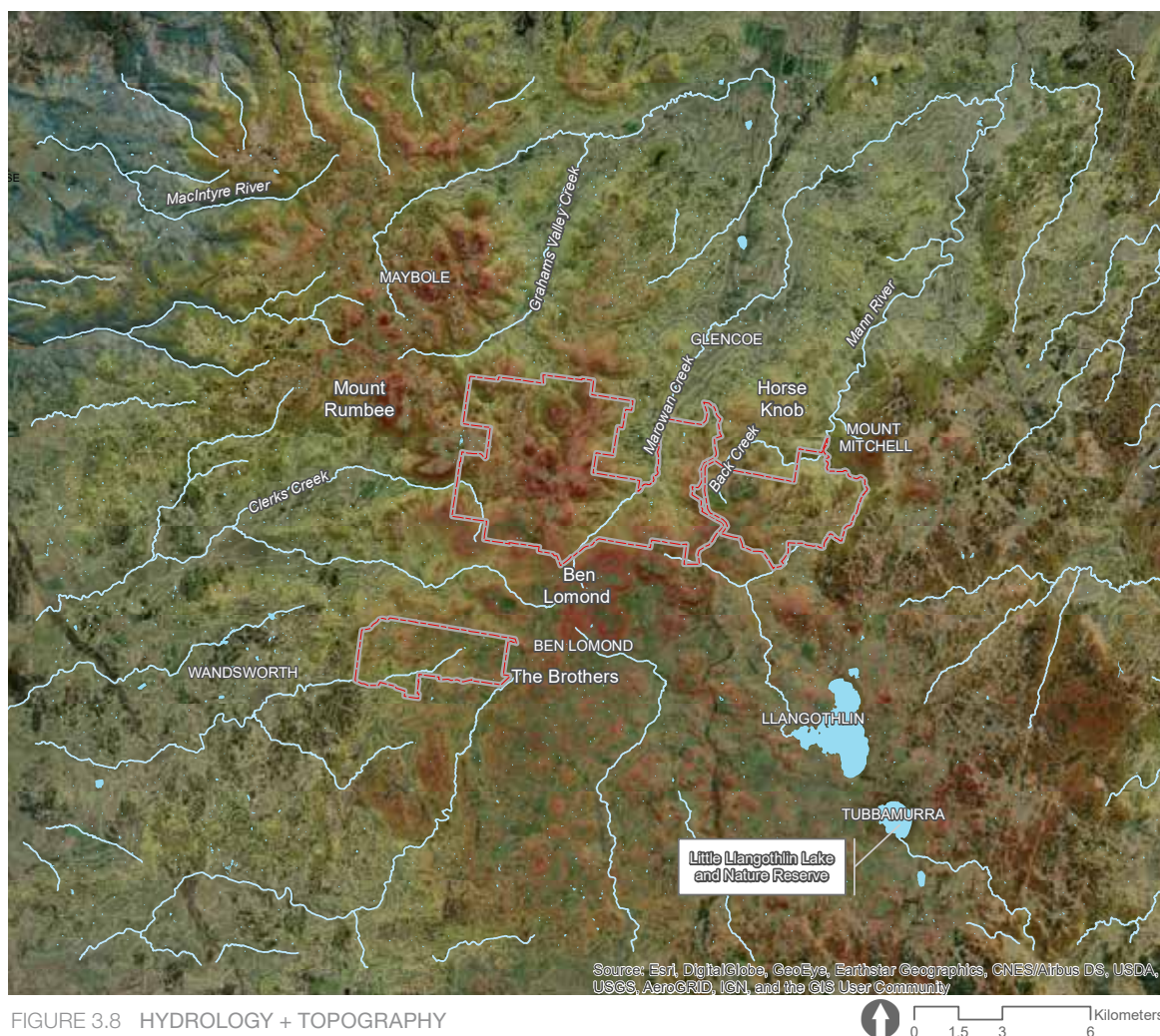


FIGURE 3.8 HYDROLOGY + TOPOGRAPHY

Topography + Hydrology

Topography

The site lies on the New England Range with height ranges of 1,160 – 1,450 meters AHD. The Ben Lomond area is the highest area in northern NSW with dramatic peaks set amongst rolling hills.

- Ben Lomond peak at 1,512 ASL
- The Brothers at 1,499m
- Mount Rumbree at 1,491m ASL
- Horse Knob at 1,330m
- Mount Mitchell at 1,476m ASL

Hydrology

The north section of the site drains mainly west into the MacIntyre and Severn Rivers. The area near Glencoe drains east into the Mann River which rises from Llangothlin Lake and flows north. There are a few small wetlands from streams in lowland catchments including Little Llangothlin Lake and nature reserve.

Streams, including Grahams Valley Creek, Clerks Creek, Marowan Creek, Back Creek, dominate the hydrology falling from this high area.

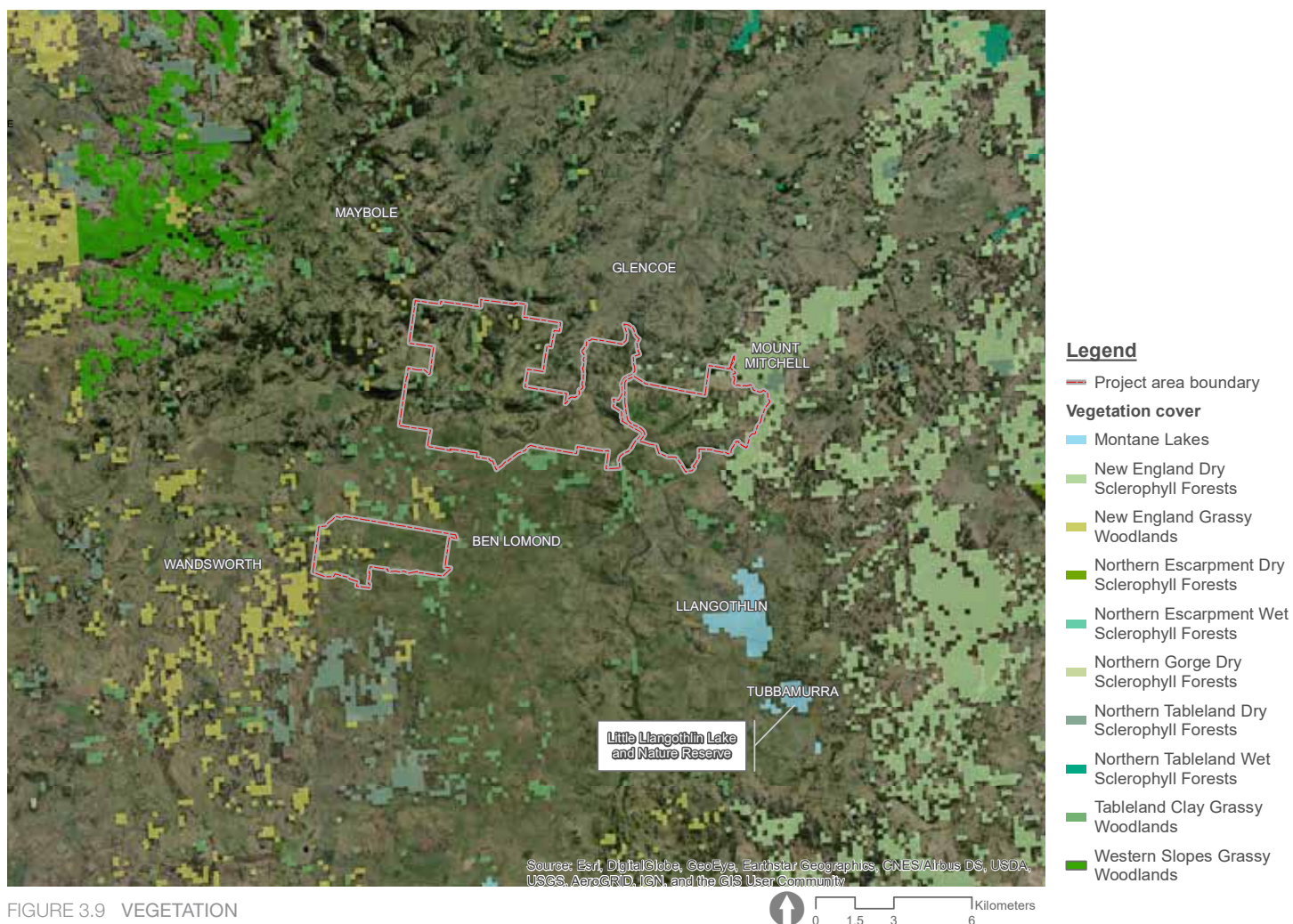


FIGURE 3.9 VEGETATION

Vegetation

Vegetation

The project area is mostly cleared of native vegetation and modified for sheep and cattle grazing. There are patches of Sclerophyll forest and Grassy Woodlands within the project area.

Sclerophyll forests typically include eucalyptus, wattles and banksia species with hard, short and often spiky leaves, which is a condition closely associated with low soil fertility (rather than rainfall/soil moisture).

There are remnant patches of tall open forests composed of Ribbon Gum, Snow Gum, Black Sallee, and Mountain Gum on basalt plateaux.

The project area includes patches of the following Plant Community Types, which are typical to the New England Tablelands.

- New England Grassy Woodland (Common tree species are *Angophora floribunda* (rough-barked apple), *Eucalyptus blakelyi* (Blakelys red gum), *E. bridgesiana* (apple box), *E. caliginosa* (broad-leaved stringybark), *E. laevopinea* (silver-top stringybark), *E. melliodora* (yellow box), and *E. youmanii* (Youmans stringybark))

■ Tableland Clay Grassy Woodlands (Common tree species are *Eucalyptus pauciflora* (white sally), *E. stellulata* (black sally), *E. viminalis* (ribbon gum) and (occasionally) *E. melliodora* (yellow box), *Angophora floribunda* (rough-barked apple), *Eucalyptus dalrympleana subsp. heptantha* (mountain gum) and *E. nova-anglica* (New England peppermint))

■ New England Dry Sclerophyll Forests (Common species are *Eucalyptus acaciiformis* (wattle-leaved peppermint), *E. caliginosa* (broad-leaved stringybark), *E. dalrympleana subsp. heptantha* (mountain gum) and *E. radiata subsp.* (narrow-leaved peppermint), with smaller trees of *Banksia integrifolia var. montana* in the lower canopy).

Exotic trees, namely *Poplar species* are quite common along roadsides and often mark property driveways in the study area.

Northwest of the project area there are larger areas of Northern Escarpment Dry Sclerophyll Forests, which have tall trees (Wattle-leaved peppermint, Broad-leaved stringybark, Diehard Stringybark, New England Blackbutt, Blue Mountain Ash and Narrow-leaved Peppermint), with a prominent shrub and groundcover.

Southeast of the project area, Montane Lakes vegetation is situated within Llangothlin Lake and Little Llangothlin Lake (nature reserve), southeast of the project area. Plant species are adapted to low temperatures and short growing seasons. These lakes are shallow basins with semi-permanent or ephemeral marsh conditions. Species found here are typically sedges and herbs.

Previous flora investigations for parts of the site identified five (5) threatened flora species within 10km of the site, these being *Dichanthium setosum* (Bluegrass), *Eucalyptus camphora ssp. relict*a (Warra Broad-leaved Sally), *Eucalyptus mckieana* (McKie's Stringybark), *Eucalyptus nicholii* (Narrow-leaved Black Peppermint), and *Thesium australe* (Austral Toadflax).



FIGURE 3.10 REMNANT VEGETATION AND POPLARS SEEN FROM STRATHMORE
(source: Non-residence photo record 11 02 08, EPS).



FIGURE 3.12 PASTURES AND REMNANT VEGETATION AT STONEHENGE COTTAGE
(source: Non-residence photo record 11 02 08, EPS).



FIGURE 3.14 POPLARS SEEN FROM STONEHENGE RECREATION GROUND
(source: Non-residence photo record 11 02 08, EPS)



FIGURE 3.11 REMNANT VEGETATION SEEN FROM GLENARA
(source: Non-residence photo record 11 02 08, EPS).



FIGURE 3.13 CLEARED PASTURED SEEN FROM MAYBOLE ROAD
(source: Non-residence photo record 11 02 08, EPS).



FIGURE 3.15 REMNANT VEGETATION
(source: Non-residence photo record 11 02 08, EPS)



An aerial photograph of a vast, rolling landscape. The terrain is covered in green grass, interspersed with numerous small, dark green trees. In the background, a larger hill rises under a clear blue sky. A semi-transparent blue rectangle is overlaid on the right side of the image, containing the section header.

04

Baseline analysis

Landscape character

Landscape character assessment seeks to divide the landscape into distinct, broadly homogeneous units with defining characteristics. In this way each character type should be distinct from an adjoining area which will be defined by a different set of key parameters.

The Landscape Character Types (LCT) identified as part of this assessment have been derived from a review of planning policy, GIS baseline analysis and site photography investigations. The extent of character area analysis is informed by an understanding of potential perceived area of change that may arise from the project. This process included a review of the physical extent of the project and visual analysis, discussed in further detail on the proceeding pages, Visual Baseline.

In order to complete the landscape and visual baseline to inform the PLVIA the LCT study area adopts a 10km buffer in order to document the surrounding context to the site and assist with the selection of the viewpoint locations.

The study area is refined further during the assessment stage to evaluate the direct or indirect impacts as a result of the proposal.

Three (3) distinct LCTs have been defined, as illustrated in Figure 4.1. The LCTs include:

LCT1: Towns & settlements

LCT2: Agricultural tablelands

LCT3: Bushland and reserves

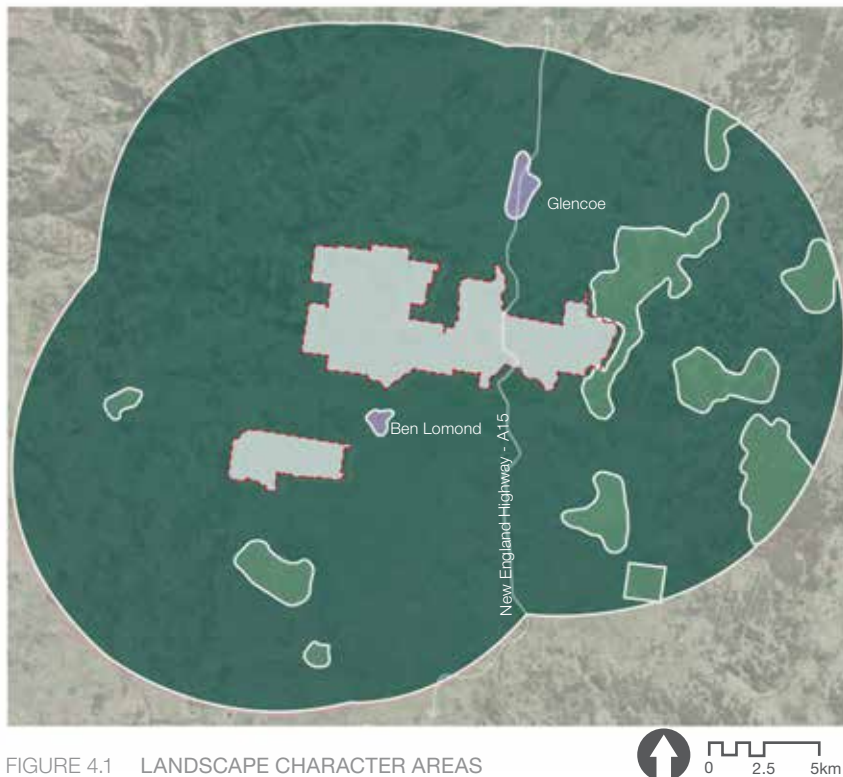
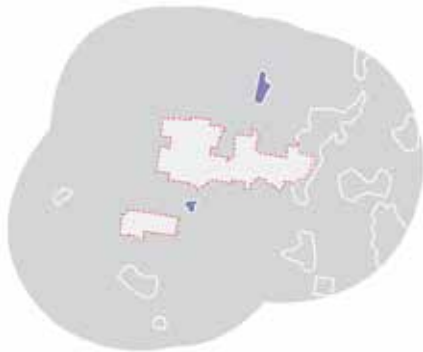


FIGURE 4.1 LANDSCAPE CHARACTER AREAS

Legend

- Project area
- Towns and settlements
- Agricultural tablelands
- Bushland and reserves



LCT1: Towns & settlements

This LCT is concentrated within the two villages located within the wider study area Glencoe (north of the project area boundary) and Ben Lomond (situated between RWF North and RWF South project area boundaries). It can be defined by its homogeneous, large plots of rural land and residential properties. Buildings and dwellings across the LCT are characterised as rural living properties and single story dwellings with associated agricultural infrastructure such as sheds.

The northern patch of LCT 1 (Glencoe village centre, seen in Figure 4.3) is relatively low-lying with the south-eastern edge of the typology defined by the meandering Marowan Creek. Vegetation cover is scattered across the LCT within both private and public parcels of land. Vegetation cover increases in density lining the waterway corridor and acts as a defined southern edge to the LCT.

The centre of Glencoe is not distinguishable with a few public amenities or shops, however the tavern on the New England Highway is a local gathering spot.

The southern patch of LCT 1 (Ben Lomond village centre, seen in Figure 4.2) is situated on higher terrain and is enclosed by rising topography to the north, south, west and east as Moredun Creek traverses through the LCT and between the associated elevated crests.

The centre of Ben Lomond is not distinguishable with few public amenities and no shops. The main street appears to be Old Ben Lomond Road which runs parallel with the old railway line and is where the community hall is located.

Vegetation cover is characterised as 'grassy woodlands' and is denser along both waterway and road corridors. Vegetation cover is scattered intermittently across the southern portion of this LCT.



FIGURE 4.2 BEN LOMOND (source: GoogleEarth).



FIGURE 4.3 GLENCOE (source: GoogleEarth).



LCT2: Agricultural tablelands

This LCT encompasses the majority of the study area and includes the entire extent of the immediate project area boundary. The LCT is characterised by predominately cleared parcels of land modified for agricultural and grazing (particularly sheep and cattle) practices. The LCT mosaic is punctured by both LCT1 and LCT3 and is divided by the New England Highway corridor that extends north to south across the study area. It includes large plots of rural land with a coherent pattern of features, rural residential buildings, agricultural structures and farm dams.

The terrain is undulating with elevational peaks or 'highland areas' experienced in the western and southern portions of the project area reaching to a height of 1490-1500m. Mountain peaks of the surrounding area include; Mount Rumbie and Cooks Mountain to the west and Ben Lomond (mountain peak) directly south of the project area extents.

The terrain descends towards the north and west of the study area traversed by tributaries that converge with Mann River, Marowan Creek, Williams Creek and Beardy Waters.

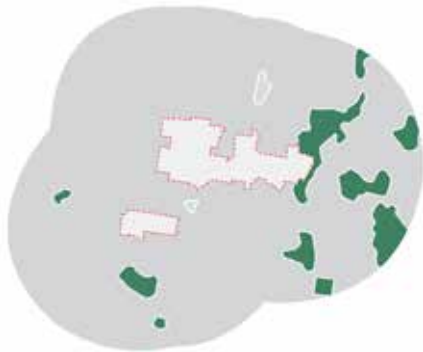
Intermittent vegetation is scattered across the productive landscape with denser tree cover concentrated on the south-western aspect of the elevational peaks. The remnant vegetation is characterised by tall, open Eucalyptus forests consisting of predominately Ribbon and Snow Gum species.



FIGURE 4.4 AGRICULTURAL FIELDS
(source: Google Streetview - Old Ben Lomond Road).



FIGURE 4.5 NATIVE PASTURE
(source: Google Streetview - 4751 New England Highway).



LCT3: Bushland and reserves

This LCT is dispersed across the study area with areas concentrated on the eastern and south-western regions of the study area. It is characterised by densely forested bushland and environmentally protected areas within the study area. While this LCT is not experienced within the immediate site extents, it defines the eastern edge of the project area boundary.

To the east, the topography begins to rise towards Mount Mitchell and the Warra National Park (located outside of this study area). The elevation reaches a height of 1400m and begins to plateau on approach to the Llangothlin Lake and Little Llangothlin Nature Reserve in the south-eastern extents of the study area.

Little Llangothlin Nature Reserve is a RAMSAR Convention listed wetland and protected nature reserve. The lagoons (including Billy Bung Lagoon) includes high-altitude freshwater and is considered to be of very high ecological, biodiversity, cultural and recreational value.

The reserve includes a publicly accessible picnic area and walking circuit. Wetland species such as sedges and grassy woodlands define the boundary of the water bodies. The densely covered areas of forest are characterised as native dry sclerophyll species. Mann River defines the western edge of the largest patch of LCT3 while Sara River intersects the LCT, before converging with Cockatoo Creek, creating a patchwork of LCTs.



FIGURE 4.6 LITTLE LAKE LLANGOTHLIN RESERVE
(source: nationalparks.nsw.gov.au/visit-a-park/parks/little-llangothlin-nature-reserve).



FIGURE 4.7 WARRA NATIONAL PARK
(source: nationalparks.nsw.gov.au/visit-a-park/parks).



FIGURE 4.8 BUSHLAND (source: GoogleEarth).

Visual baseline

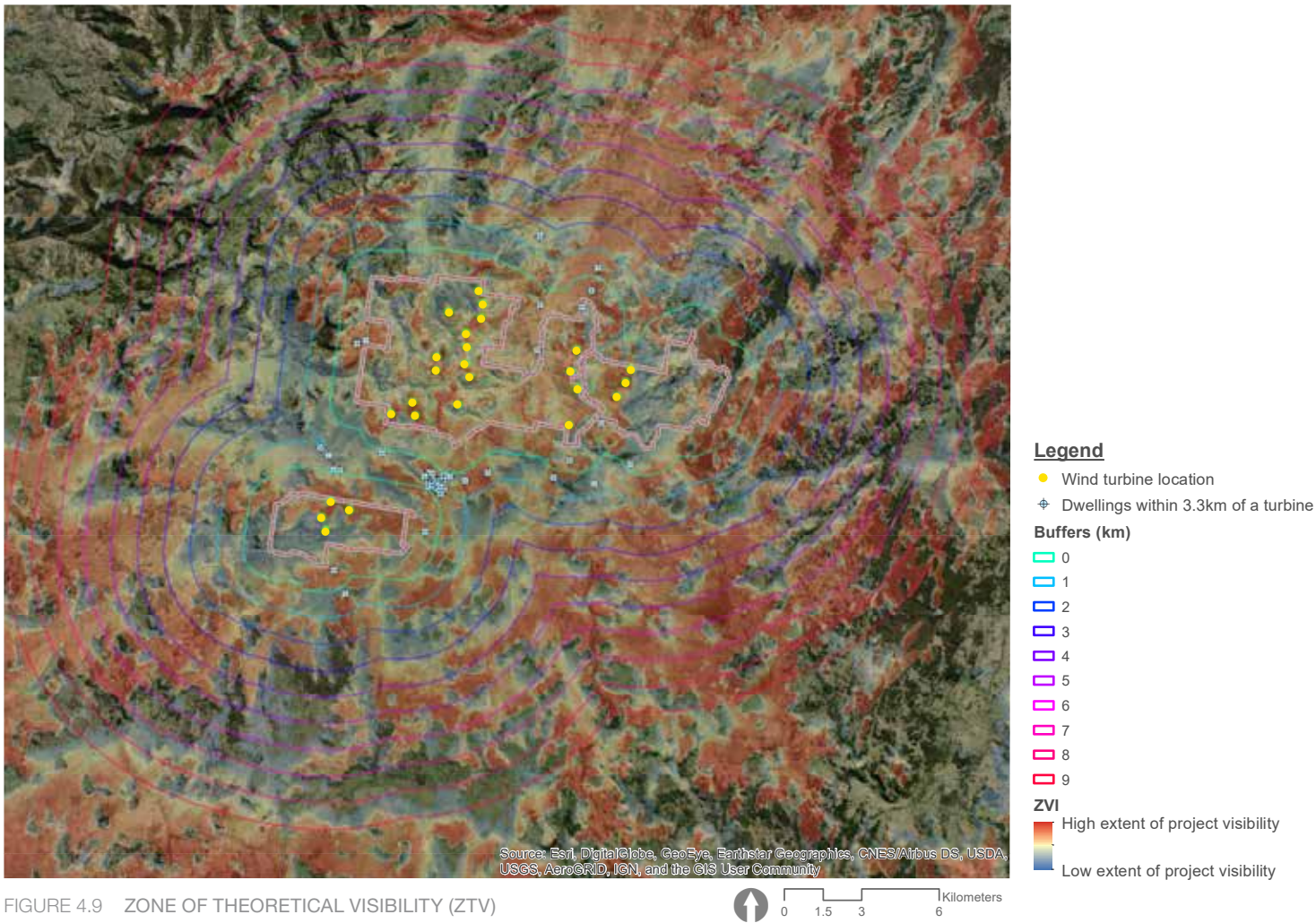


FIGURE 4.9 ZONE OF THEORETICAL VISIBILITY (ZTV)

Visual Catchment

The ZTV (refer to Figure 4.9) has been analysed to identify a preliminary representation of the likely 'worst case' visual envelope of the wind turbine layout, within a 10km radius of the site boundary. In interpreting the ZTV, the following issues must be considered:

- It takes account of the topographic constraints on the view and does not include land cover factors such as the presence of buildings and vegetation. As it only uses the landform it is considered a worst-case scenario of potential extents of visibility;
- It does not take into account the effect of distance. Generally, the greater the distance from the wind farm, the lower the impact, as the development will take up a smaller portion of the view and atmospheric conditions reduce the prominence of the project within the view;
- The ZTV identifies increased visibility due to altitude and ridgelines, as well as decreased visibility caused by intervening topography.

The ZTV is used to guide the selection of representative viewpoints.

Visual Receptors

In accordance with VIA Bulletin guidance, receptors within 3.3km of the RWF turbines have been identified and an analysis of potential visual impacts on these receptors have been included in this PLVIA. Figure 4.10 identifies 51 receptors within 3.3km of any RWF turbine.

ZTV mapping from each of these receptors is in Appendix A. Refer to Chapter 5 for the summary of findings (Table 2) and preliminary impacts.

Legend

-  Project area boundary
-  3.3km turbine buffer
-  Wind turbine location (250m height)
-  Dwellings within 3.3km of a turbine
-  Representative viewpoints
-  Dwellings not within 3.3km of a turbine

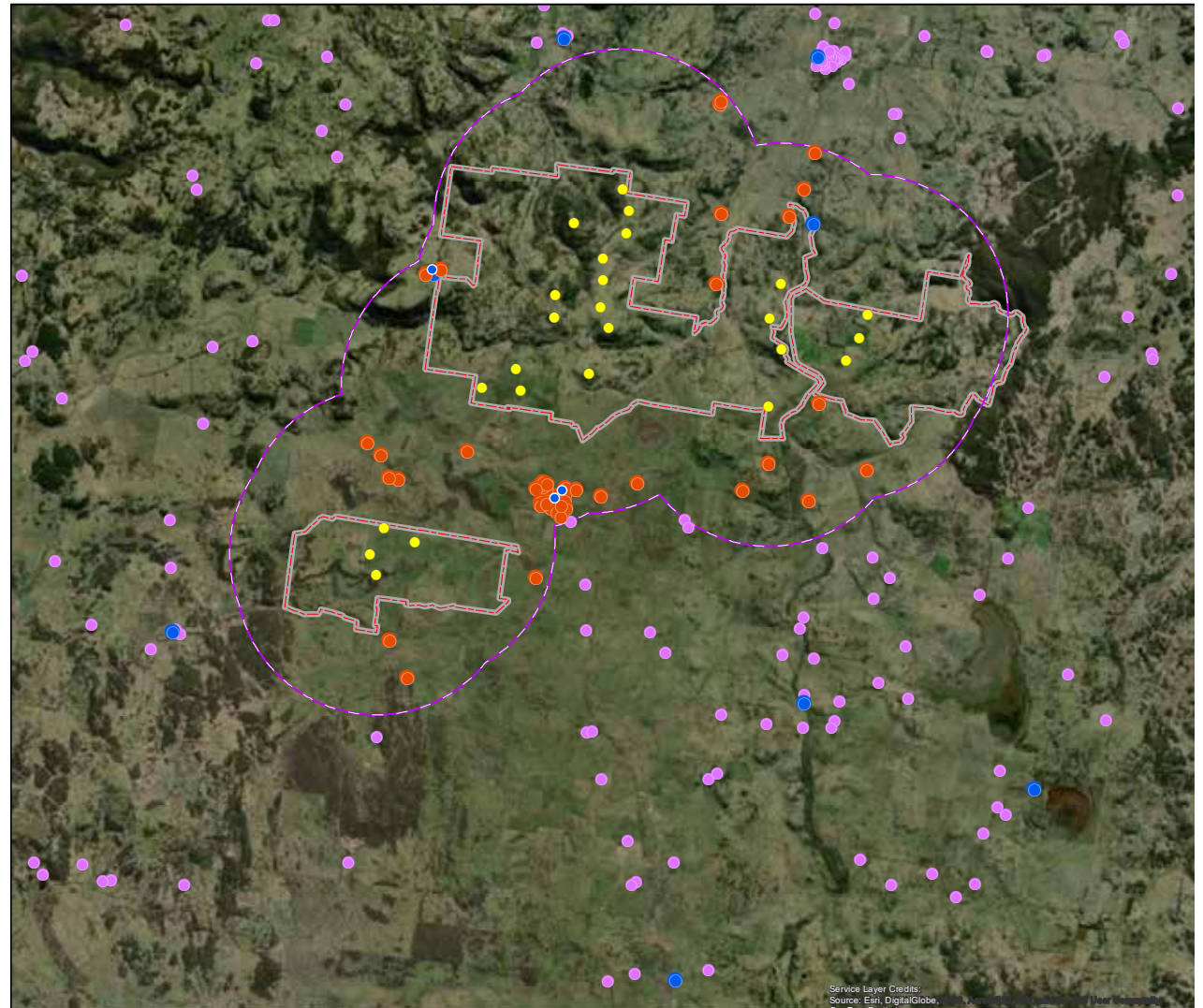
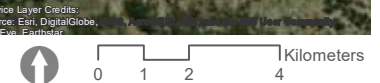
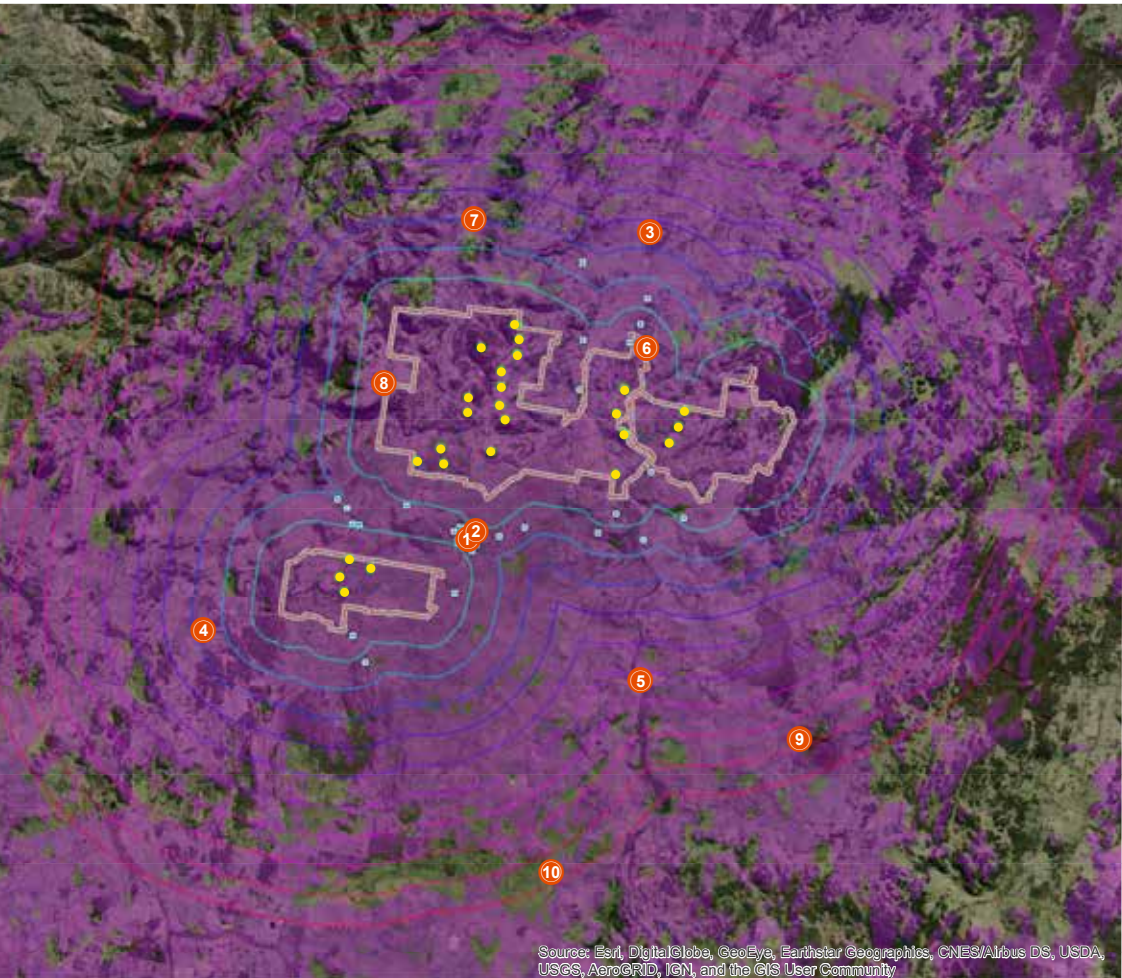


FIGURE 4.10 RECEPTORS WITHIN 3.3KM OF PROPOSED RWF TURBINES



Representative viewpoints



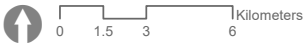
- 1 Viewpoint 1 - Ben Lomond War Memorial Hall
- 2 Viewpoint 2 - Ben Lomond primary school
- 3 Viewpoint 3 - Glencoe Tavern, New England Highway
- 4 Viewpoint 4 - Wandsworth Road
- 5 Viewpoint 5 - Ryanda Creek Road and New England Highway
- 6 Viewpoint 6 - New England Highway roadside rest area
- 7 Viewpoint 7 - Grahams Valley Road
- 8 Viewpoint 8 - Maybole Road
- 9 Viewpoint 9 - Little Llangothlin Lake picnic area
- 10 Viewpoint 10 - Ben Lomond Road near New England Highway

Legend

- Viewpoints
- Wind turbine location
- Dwellings within 3.3km of a turbine
- Project area boundary
- Potential extent of visibility
- Project boundary bands

- 0
- 1
- 2
- 3
- 4
- 5
- 6
- 7
- 8
- 9

FIGURE 4.11 STUDY AREA AND VIEWPOINT LOCATION PLAN



Representative Viewpoints

A total of 10 representative public viewpoints have been identified within the PLVIA study area and are identified within Figure 4.11.

These viewpoints were selected based upon a four-stage process:

- identification within the ZTV (figure 4.9),
- desktop studies identifying places of significance or within close vicinity of potential sensitive receptors,
- feedback from the community consultation, and
- viewpoints that are publicly accessible.

Viewsheds have been generated to inform the analysis for the key infrastructure elements associated with the project (refer to Figures 4.12-4.31). Photographs, descriptions and impact assessment for each follow.

The ZTV maps produced are generated to depict visibility of turbines from the viewpoints at the following points:

- at ground level
- at the tip of the blade, 250m above ground level

This information illustrates whether the turbines are visible but does not distinguish how much of the turbine is visible. For those viewpoints where visible turbines are within 3.3km, we have run viewsheds at representative viewpoints to illustrate the extent of turbines visible (refer to Appendix B). This further analysis is for the purpose of determining the magnitude of visual change. The extent of turbine visibility is to be further analysed during the EIS study.

All viewpoints are accompanied by a panoramic photo that is representative of the viewpoint location and is used to provide an understanding of the baseline visual conditions. In the absence of a site visit, the photos have been sourced from previous studies and Google Streetview.

The viewpoints are illustrated on the proceeding pages and are accompanied by a description of the design elements that have the potential to change the existing visual composition (magnitude of change) and the potential impacts that may arise.

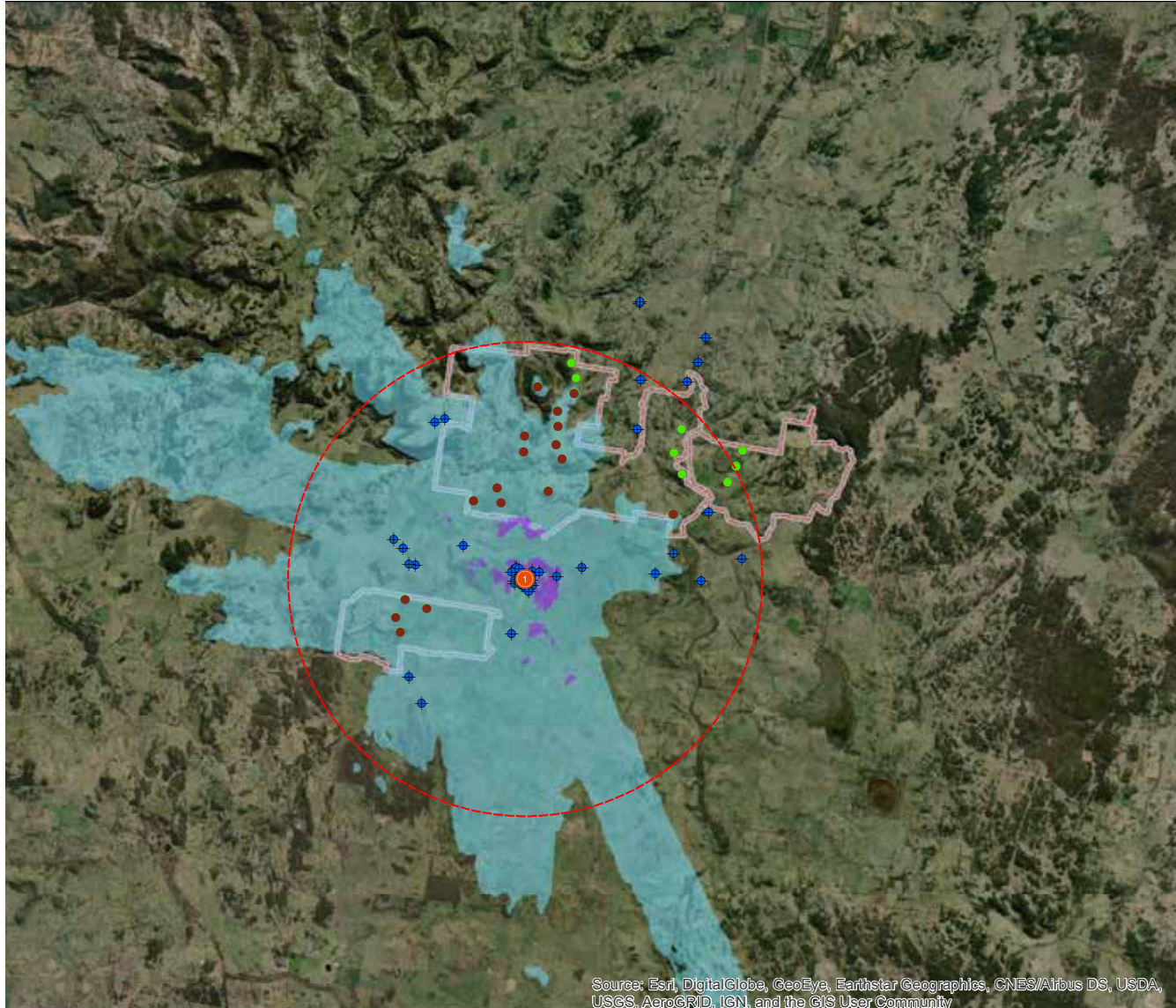


FIGURE 4.12 VIEWPOINT 1

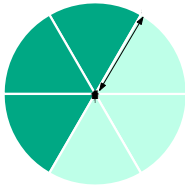
Representative Viewpoint 1 War Memorial Hall, Ben Lomond

The viewshed represents the land where a 250m tall turbine could theoretically be visible from the representative viewpoint.

Number of turbines potentially visible from VP1: 16

- 0 no. turbines visible from ground level up
- 9 no. with full extent of blades visible
- 3 no. visible from the hub upwards
- 4 no. tips of blades visible

60 degree sectors in which wind turbines are potentially visible within 8km from the representative viewpoint.



Legend

- Viewpoints
- 8km Buffer
- Wind turbine location
- Wind turbine location within viewshed
- Dwellings within 3.3km of a turbine
- Ground level viewshed
- Turbine viewshed
- Project area boundary

Viewpoint 1 - War Memorial Hall, Ben Lomond



FIGURE 4.13 VIEWPOINT 1 - BEN LOMOND (source: Google Earth Street View)

Viewpoint selection

- Representative of views from the village of Ben Lomond.
- Viewpoint is approximately 2.6km distance to the nearest turbine.

Visual baseline description

- The view is directed north towards RWF North along Ben Lomond Road.
- Roadside vegetation along the road corridor obstructs views towards the west of the viewpoint.
- The view to the north east looks out across an open, low-lying to gently undulating grassed fields with Ben Lomond hilltop to the north-east.

Potential impacts

- 13 turbines are anticipated to be visible from the RWF North site (looking north). Of these, six (6) will have the full blades visible and two (2) will be visible from the hub upwards. The blades are likely to be prominent with the view above the hill tops and between vegetation.
- Although not captured in the representative image, it is anticipated that views towards RWF South (4 turbines) would also be visible to the south of this view. Three (3) will have the full blades visible and one (1) will be visible from the hub upwards.
- The closest proposed visible turbine is a relatively short distance at 2.6km away, with the full blades visible.
- Turbines have the potential to be visible across 180 degrees of the existing view.

- RWF North and RWF South are likely to be viewed as separate wind farms from this view.

Further investigation

- Detailed assessment of the screening value of intervening vegetation through the preparation of a photomontage.
- ZTV mapping to determine extent of turbine visible from this viewpoint.
- Site visit required to ground truth existing visual conditions.
- Cumulative impacts from RWF North and RWF South.

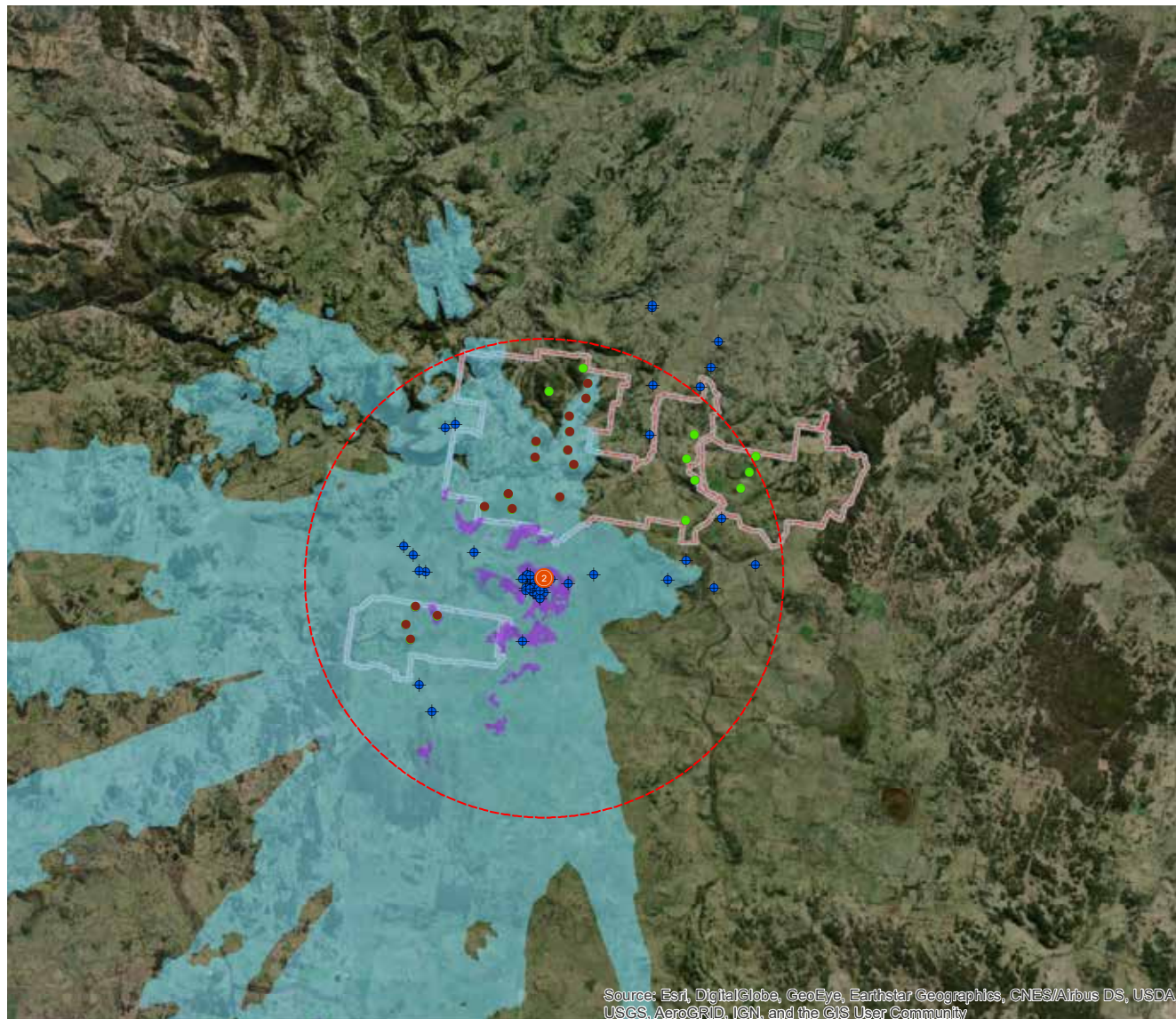


FIGURE 4.14 VIEWPOINT 2

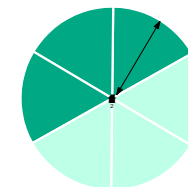
Representative Viewpoint 2 Ben Lomond Primary School

Turbine viewshed represents the land where a 250m tall turbine could theoretically be visible from the representative viewpoint.

Number of turbines potentially visible from VP2: 16

- 1 no. turbines visible from ground level up
- 9 no. with full extent of blades visible
- 2 no. visible from the hub upwards
- 4 no. tips of blades visible

60 degree sectors in which wind turbines are potentially visible within 8km from the representative viewpoint.



Legend

- Viewpoints
- 8km Buffer
- Wind turbine location
- Wind turbine location within viewshed
- Dwellings within 3.3km of a turbine
- Ground level viewshed
- Turbine viewshed
- Project area boundary

Viewpoint 2 - Ben Lomond Primary School



FIGURE 4.15 VIEWPOINT 2 - OLD BEN LOMOND ROAD (source: Google Earth Street View)

Viewpoint selection

- Representative of views from the Ben Lomond Primary School and nearby dwellings.
- Viewpoint is approximately 2.5km distance to the nearest turbine.
- The view is directed north towards the RWF North across farm land.

Visual baseline description

- The view is directed north towards RWF North from Ben Lomond Road.
- Roadside vegetation along the road corridor obstructs views towards the south and west of the site.
- View across agricultural parcels with intermittent trees planted in the foreground and background of the view.
- Topographical rise in elevation to the east of the view blocks direct views across pastoral landscape.

Potential impacts

- 12 turbines are anticipated to be visible from the RWF North site (looking north). Of these, six (6) will have the full blades visible and two (2) will be visible from the hub upwards. The blades are likely to be prominent above the hill tops and between vegetation.
- Although not captured in the representative image, it is anticipated that views towards RWF South (4 turbines) would also be visible to the south of this view with one (1) turbine potentially seen from the ground up and three (3) the full extent of blades.
- Turbines have the potential to be visible across 180 degrees of the existing view.
- RWF North and RWF South are likely to be viewed as separate wind farms from this view.

Further investigation

- Detailed assessment of the screening value of intervening vegetation through the preparation of a photomontage.
- ZTV mapping to determine extent of turbine visible from this viewpoint.
- Site visit required to ground truth existing visual conditions.
- Cumulative impacts from RWF North and RWF South.

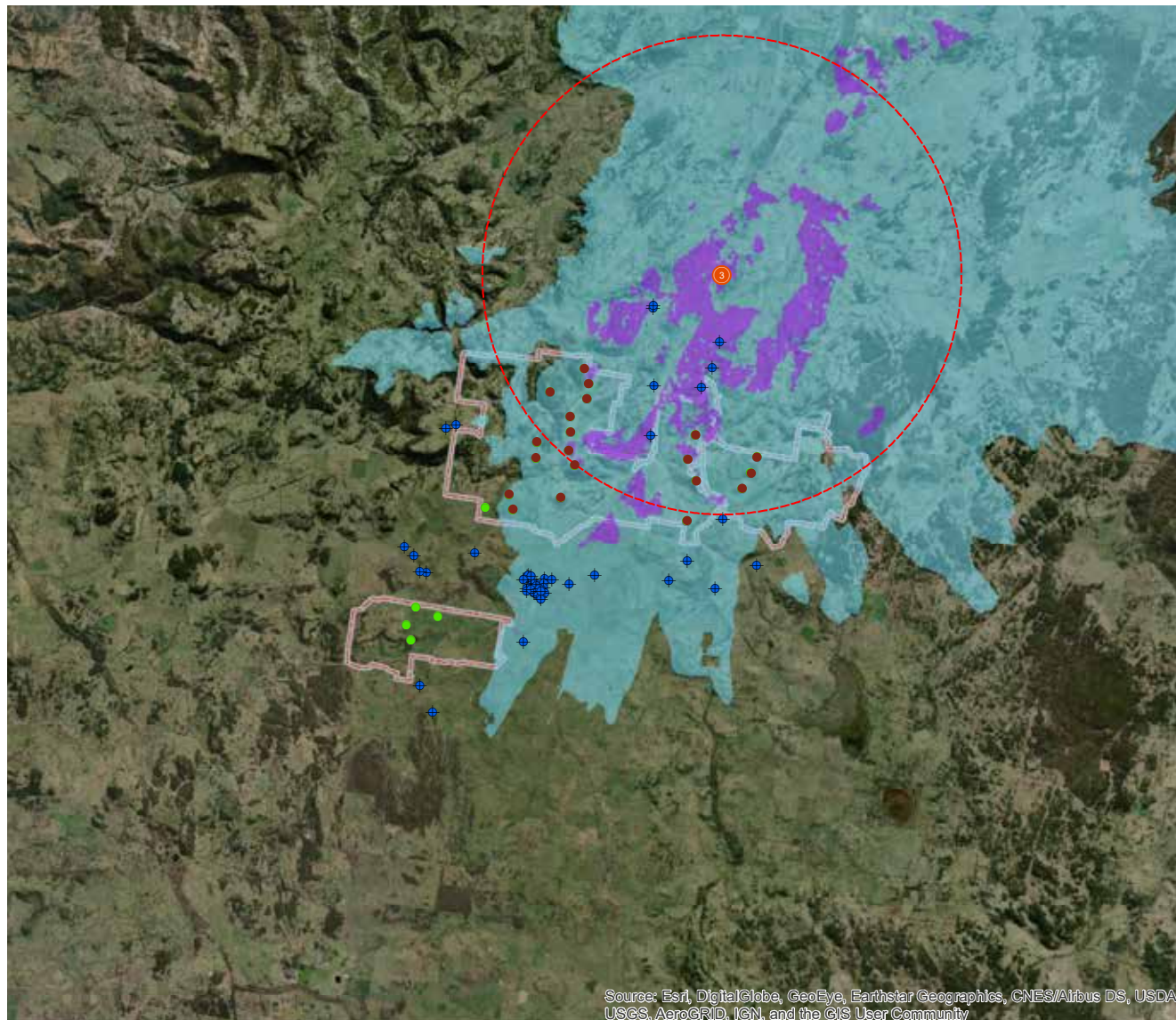
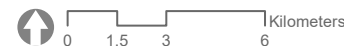


FIGURE 4.16 VIEWPOINT 3



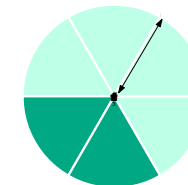
Representative Viewpoint 3 Glencoe Tavern, New England Highway

Turbine viewshed represents the land where a 250m tall turbine could theoretically be visible from the representative viewpoint.

Number of turbines potentially visible from VP3: 20

- 14 no. of these turbines are within an 8km radius
- 4 no. turbines visible from ground level up (within 8km)
- 16 no. turbines visible at tip of blades

60 degree sectors in which wind turbines are potentially visible within 8km from the representative viewpoint.



Legend

- Viewpoints
- 8km Buffer
- Wind turbine location
- Wind turbine location within viewshed
- Dwellings within 3.3km of a turbine
- Ground level viewshed
- Turbine viewshed
- Project area boundary

Viewpoint 3 - Glencoe Tavern, New England Highway



FIGURE 4.17 NEW ENGLAND HIGHWAY, GLENCOE (source: Google Earth Street View)

Viewpoint selection

- Representative of views from The Red Lion Tavern, Glencoe considered to be a local landmark.
- Viewpoint is approximately 5.4km distance to the nearest turbine.
- The view is representative of Glencoe village and surrounding residential properties.

Visual baseline description

- The view is directed south along New England Highway and towards the RWF North.
- Intermittent road-side planting adjacent to the New England Highway intermittently screens views towards the tavern and filters views further south.
- Planting along the boundary of residential properties, seen in the mid-ground, assist in screening direct views towards the site.
- Looking south-west, views open up across the undulating plains and towards rising terrain.

Potential impacts

- 20 turbines are anticipated to be visible intermittently between roadside vegetation, from the RWF North site (looking south) from the viewpoint location. Four turbines potentially being seen from the ground level to blade tip.
- No turbines are expected to be visible from the RWF South site.
- Turbines have the potential to be visible across 120 degrees of the existing view.

Further investigation

- Site visit required to ground truth existing visual conditions and selection of viewpoint location demonstrating worse-case views.

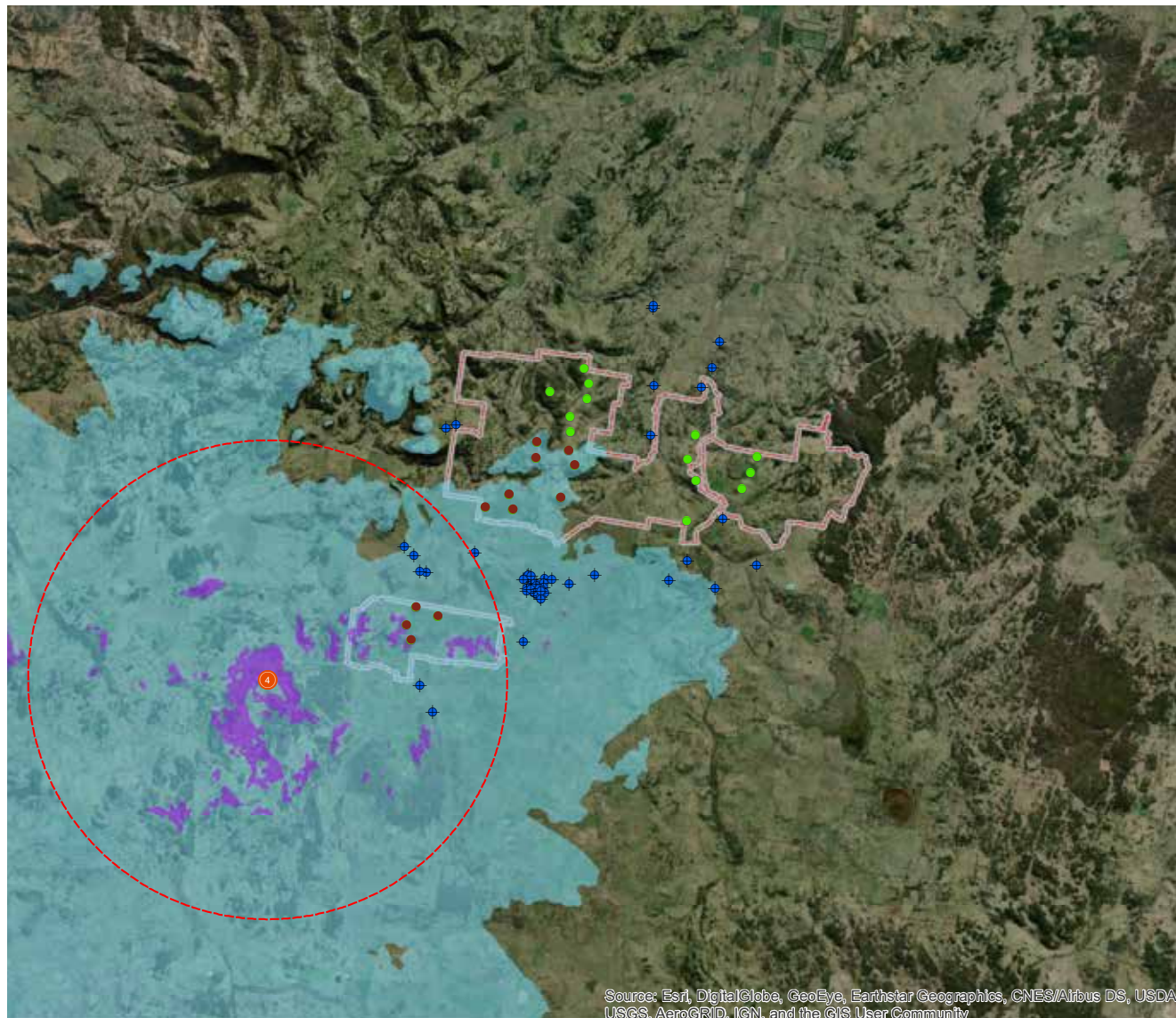
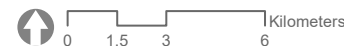


FIGURE 4.18 VIEWPOINT 4



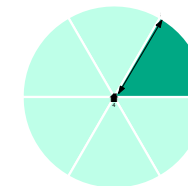
Representative Viewpoint 4 Wandsworth Road

Turbine viewshed represents the land where a 250m tall turbine could theoretically be visible from the representative viewpoint.

Number of turbines potentially visible from VP4: 12

- 4 no. of these turbines are within an 8km radius
- 2 no. turbines visible from ground level (within 8km)
- 10 no. turbines visible at tip of blades, with 8 of these outside of an 8km radius

60 degree sectors in which wind turbines are potentially visible within 8km from the representative viewpoint.



Legend

- Viewpoints
- 8km Buffer
- Wind turbine location
- Wind turbine location within viewshed
- ◆ Dwellings within 3.3km of a turbine
- Ground level viewshed
- Turbine viewshed
- Project area boundary

Viewpoint 4 - Wandsworth Road



FIGURE 4.19 **Wandsworth Road** (source: Google Earth Street View)

Viewpoint selection

- Representative of views from residential receptors along Wandsworth Road.
- Viewpoint is approximately 5km distance to the nearest turbine.
- The view is directed north-east towards the RWF South site.

Visual baseline description

- The view is directed east along Wandsworth Road towards the Ben Lomond range.
- View from a local road corridor across the low-lying, agricultural plains.
- Scattered patches of vegetation and dense road-side corridor screen planting are viewed in the foreground .
- Backdrop of dense vegetation is experienced from this view blocking direct views towards the RWF South site boundary.

Potential impacts

- 12 turbines are potentially visible from both the RWF North site and RWF South site (looking north-east) from the viewpoint location.
- 2 turbines potentially viewed from the ground up from the RWF South-site, although the bases are likely screened by existing vegetation.
- Turbines anticipated to be visible above mature vegetation/dense woodland area. Potential for turbines to appear overlapping and clustered in the view, potentially resulting in visual discord should turbines be moving at varying speeds.
- Turbines have the potential to be visible across 60 degrees of the existing view.

- RWF North and RWF South are likely to be viewed as one and not separate wind farms from this view.

Further investigation

- Site visit required to ground truth existing visual conditions.
- Detailed assessment of the screening value of intervening vegetation through the preparation of a photomontage.
- ZTV mapping to determine extent of turbines visible from this viewpoint.

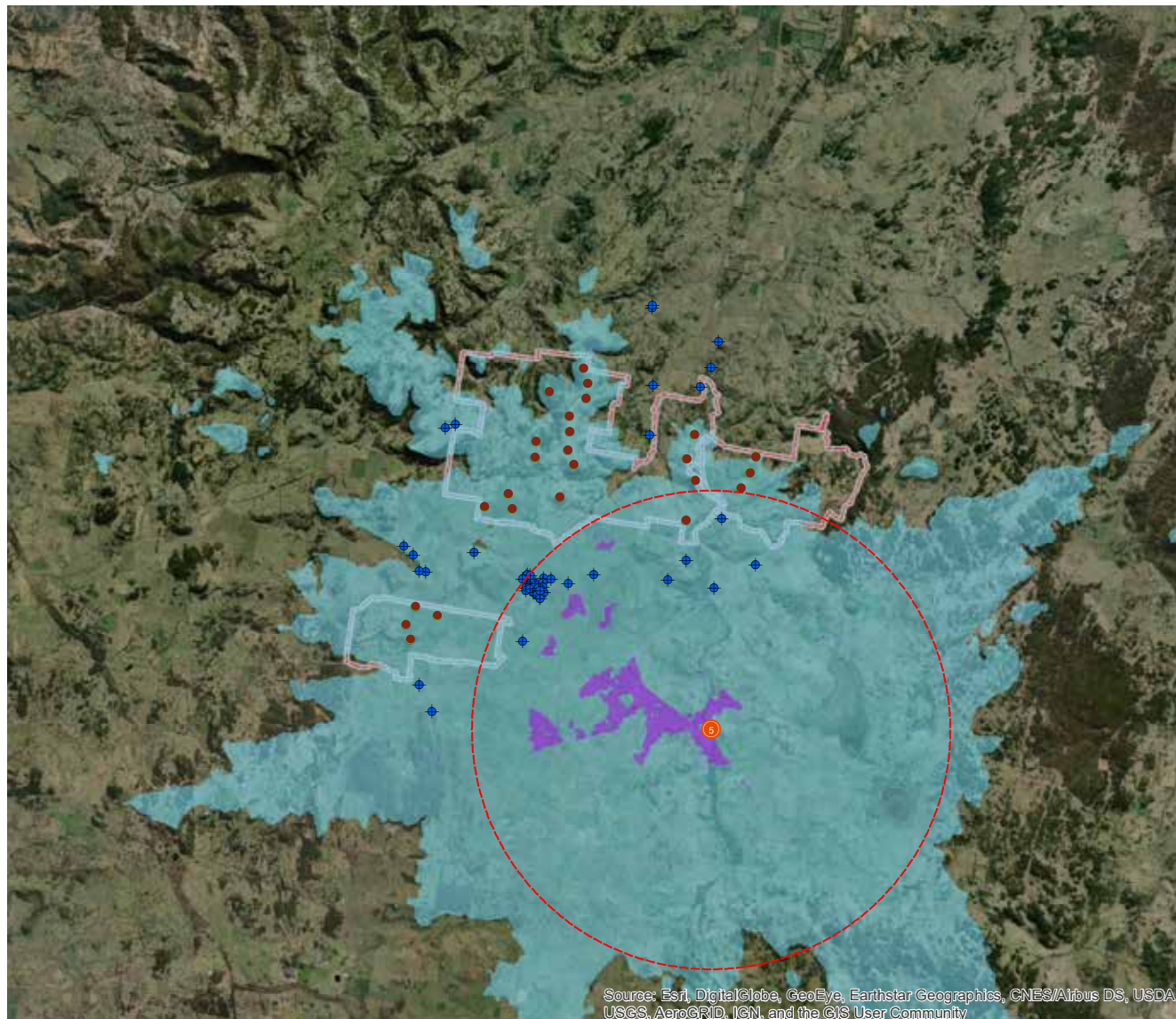
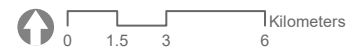


FIGURE 4.20 VIEWPOINT 5



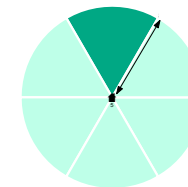
Representative Viewpoint 5 Ryanda Creek Road & New England Highway

Turbine viewshed represents the land where a 250m tall turbine could theoretically be visible from the representative viewpoint.

Number of turbines potentially visible from VP5: 25

- 1 no. of these turbines are within an 8km radius
- 0 no. turbines visible from ground level
- 25 no. turbines visible at tip of blades, with only 1 of these within 8km radius

60 degree sectors in which wind turbines are potentially visible within 8km from the representative viewpoint.



Legend

- Viewpoints
- ⬡ 8km Buffer
- Wind turbine location
- Wind turbine location within viewshed
- ◆ Dwellings within 3.3km of a turbine
- Ground level viewshed
- Turbine viewshed
- Project area boundary

Viewpoint 5 - Ryanda Creek Road and New England Highway



FIGURE 4.21 **New England Highway** (source: Google Earth Street View)

Viewpoint selection

- Representative views from residential properties from the corner of Ryanda Road and New England Highway.
- Viewpoint is approximately 7km distance to the nearest turbine.
- The view is directed north-west towards both the RWF North and south site.

Visual baseline description

- View looking north across New England Highway.
- Dense patch of planting in the east (right, in the view) adjacent to the highway corridor and along the perimeter of the property boundary.
- Intermittent planting viewed on the western side of the highway with views opening up through the gaps across the expansive pastoral landscape.

Potential impacts

- 25 turbines are anticipated to be visible from the RWF North-site and 4 turbines from the RWF South site (looking north - north-west) from the viewpoint location.
- The nearest turbine would be situated approximately 7km to the north.
- Views would be limited or filtered where mature vegetation encloses property boundaries, as illustrated to the right of the representative viewpoint image.
- Turbines have the potential to be visible across 60 degrees of the existing view.

Further investigation

- Site visit required to ground truth existing visual conditions.

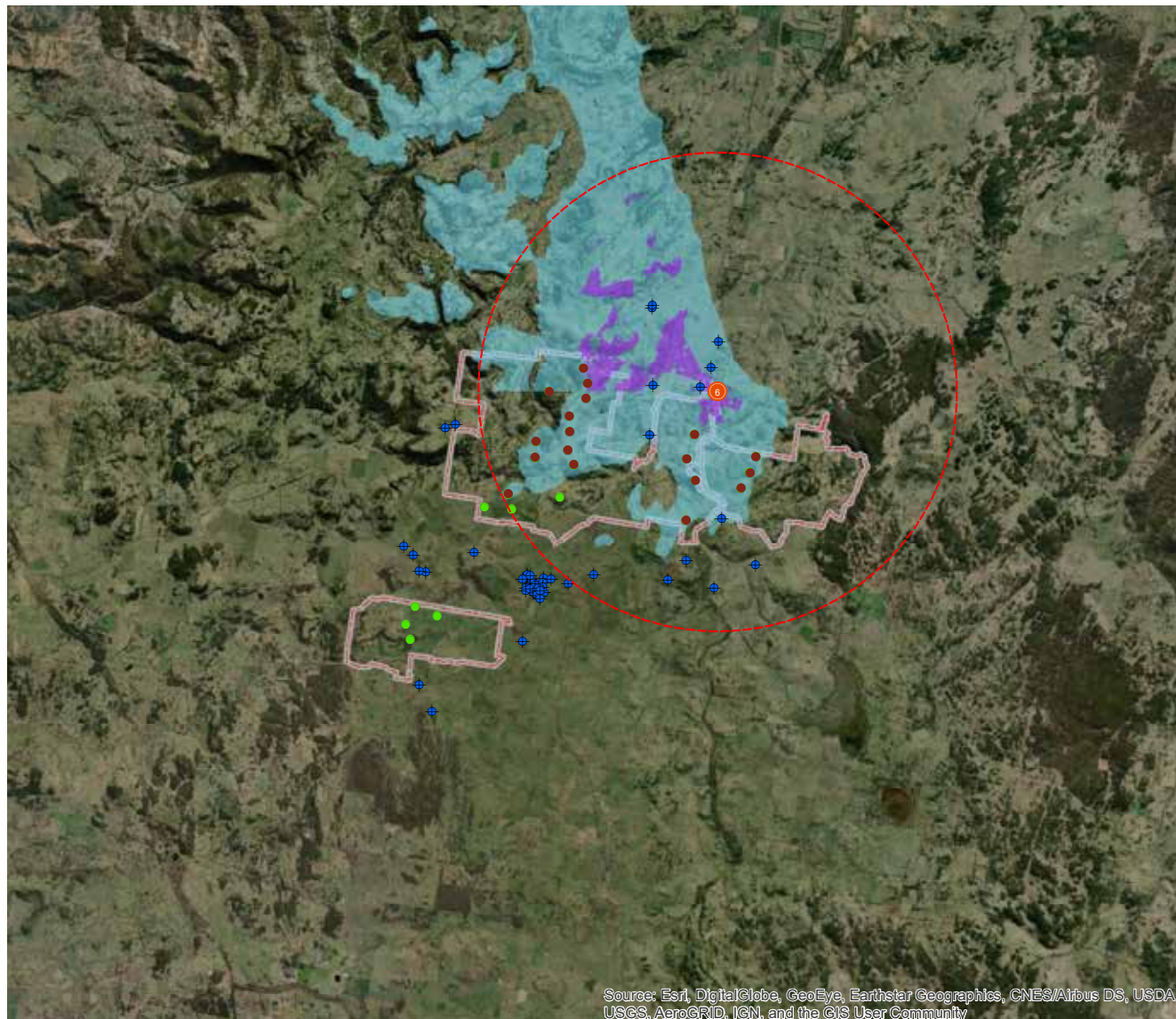
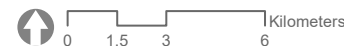


FIGURE 4.22 VIEWPOINT 6



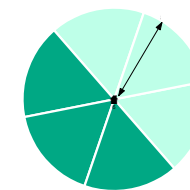
Representative Viewpoint 6 New England Highway roadside rest area

Turbine viewshed represents the land where a 250m tall turbine could theoretically be visible from the representative viewpoint.

Number of turbines potentially visible from VP6: 18

- 0 no. turbines visible from ground level up (100%)
- 7 no. with full extent of blades visible (68%)
- 6 no. visible from the hub upwards (34%)
- 5 no. tips of blades visible (<10%)

60 degree sectors in which wind turbines are potentially visible within 8km from the representative viewpoint.



Legend

- Viewpoints
- 8km Buffer
- Wind turbine location
- Wind turbine location within viewshed
- Dwellings within 3.3km of a turbine
- Ground level viewshed
- Turbine viewshed
- Project area boundary

Viewpoint 6 - New England Highway roadside rest area



FIGURE 4.23 **New England Highway** (source: Google Earth Street View)

Viewpoint selection

- Representative of views from road users from the roadside rest area situated along the New England Highway .
- Viewpoint is approximately 1.6km distance to the nearest turbine.
- The view is directed south and southwest towards both the RWF North and South sites.

Visual baseline description

- View from the New England Highway looking south to southwest with the roadside rest area located to the right of the view.
- The tall trees either side of the road screen views outside of the corridor.
- The topography rises to the left (east) of the view and falls away to the right (west).
- The horizon towards RWF North is glimpsed between trees to the right (west).

Potential impacts

- 18 turbines are potentially visible from the RWF North-site (looking north to northwest), if visible through vegetation.
- Seven (7) turbines with potential to view the full extent of blades, if visible through vegetation.
- Turbines have the potential to be visible across 180 degrees of the existing view.

Further investigation

- Site visit required to ground truth existing visual conditions.

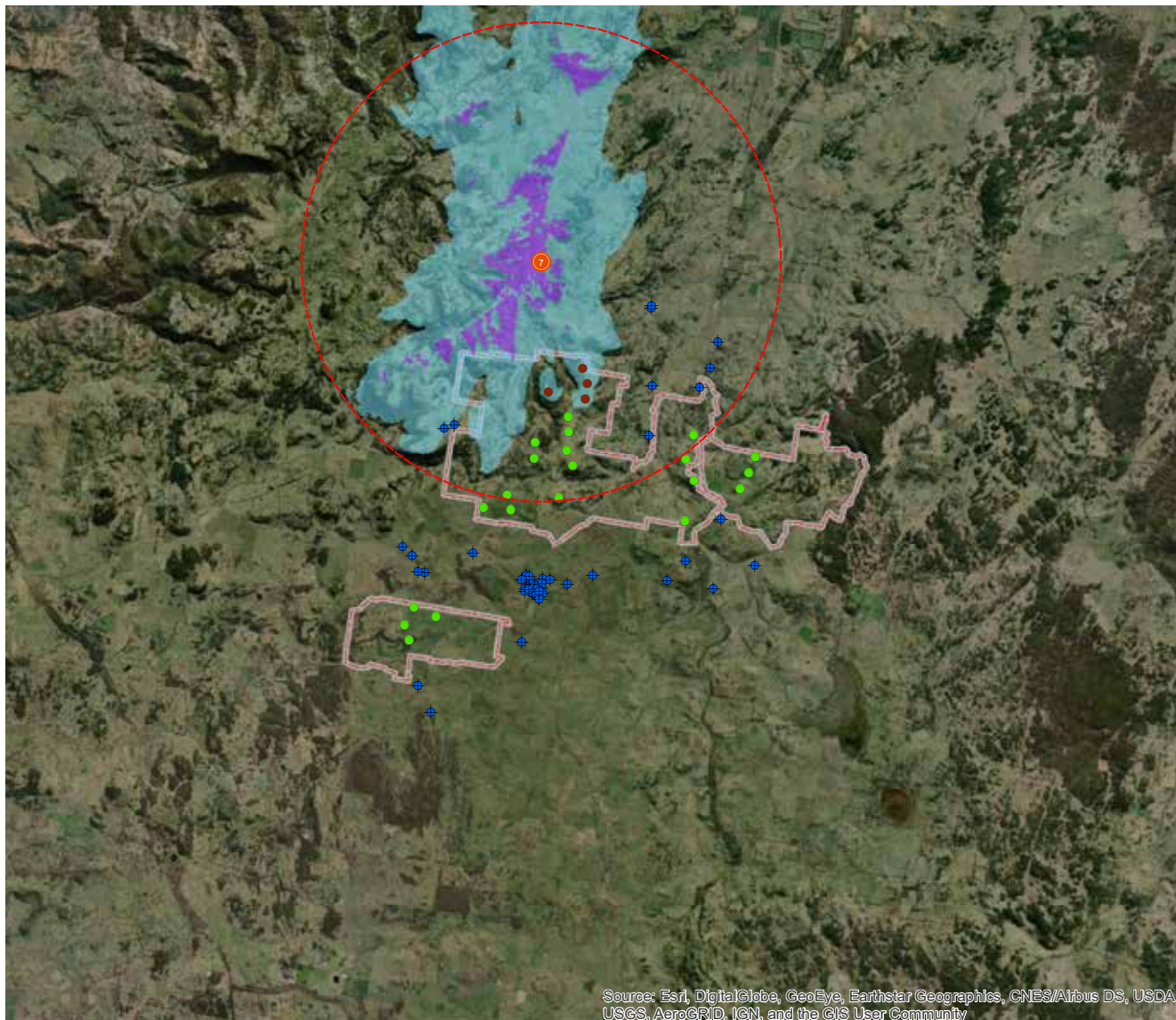


FIGURE 4.24 VIEWPOINT 7

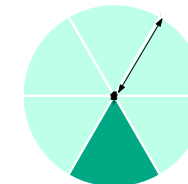
Representative Viewpoint 7 Grahams Valley Road

Turbine viewshed represents the land where a 250m tall turbine could theoretically be visible from the representative viewpoint.

Number of turbines potentially visible from VP7: 4

- 4 no. of these turbines are within an 8km radius
- 0 no. turbines visible from ground level
- 4 no. turbines visible at tip of blades

60 degree sectors in which wind turbines are potentially visible within 8km from the representative viewpoint.



Legend

- Viewpoints
- 8km Buffer
- Wind turbine location
- Wind turbine location within viewshed
- Dwellings within 3.3km of a turbine
- Ground level viewshed
- Turbine viewshed
- Project area boundary

Viewpoint 7 - Grahams Valley Road



FIGURE 4.25 **Grahams Valley Road** (source: Non-residence photo record 11.02.08 (ID 48616),EPS, panorama 7)

Viewpoint selection

- Representative of views from residential properties along a local road corridor
- Viewpoint is approximately 3.8km distance to the nearest turbine
- The view is directed south towards both the RWF North and south site

Visual baseline description

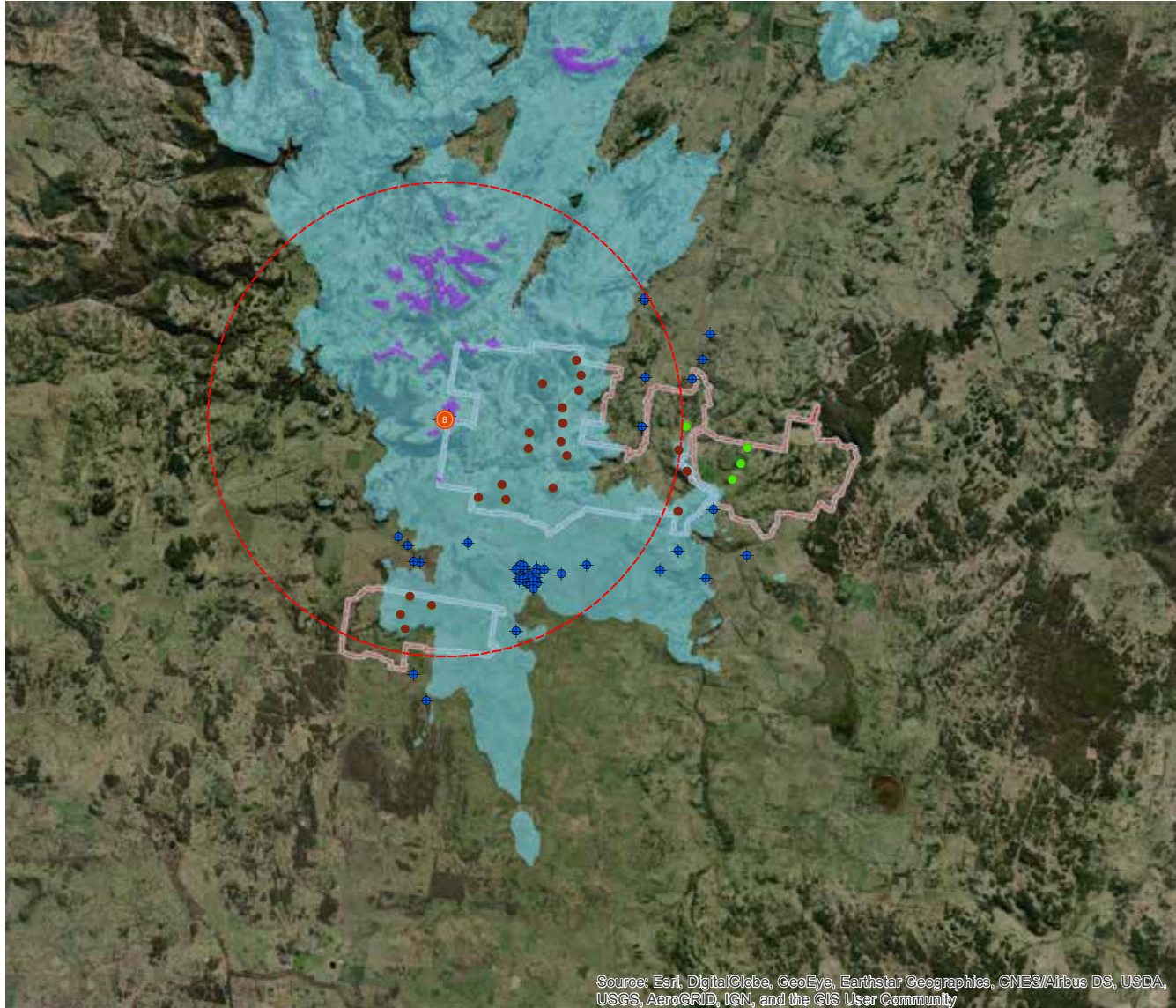
- View from Grahams Valley Road across undulating terrain (looking south) with vegetated mountain tops
- Existing dirt-track road meanders across the road between steeper topography seen to the east and west (left and right of the view)
- Densely forested mountain is viewed as backdrop to the view

Potential impacts

- Four (4) turbines are anticipated to be visible from the RWF North-site (looking south) from the viewpoint location, at a relatively close range from 3.8km distance away.
- No turbines are expected to be visible from the RWF South site
- Turbines have the potential to be visible across 60 degrees of the existing view

Further investigation

- Site visit required to ground truth existing visual conditions



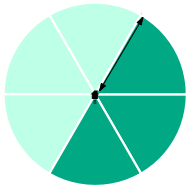
Representative Viewpoint 8 Maybole Road

Turbine viewshed represents the land where a 250m tall turbine could theoretically be visible from the representative viewpoint.

Number of turbines potentially visible from VP8: 21

- 0 no. turbines visible from ground level up (100%)
- 11 no. with full extent of blades visible (68%)
- 6 no. visible from the hub upwards (34%)
- 4 no. tips of blades visible (<10%)

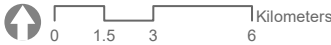
60 degree sectors in which wind turbines are potentially visible within 8km from the representative viewpoint.



Legend

- Viewpoints
- 8km Buffer
- Wind turbine location
- Wind turbine location within viewshed
- Dwellings within 3.3km of a turbine
- Ground level viewshed
- Turbine viewshed
- Project area boundary

FIGURE 4.26 VIEWPOINT 8



Viewpoint 8 - Maybole Road



FIGURE 4.27 **Maybole Road** (source: Non-residence photo record 11.02.08 (ID 48616),EPS, photo Q)

Viewpoint selection

- Representative of views from residential properties along a local road corridor.
- Viewpoint is approximately 2.8km distance to the nearest turbine and located on the western boundary of the RWF North site.
- The view is directed south and east towards both the RWF North and south site.

Visual baseline description

- View down Maybole Road corridor (looking east).
- Rising topography with vegetated mountain top viewed to the east (foreground of the view) creates a sense of enclosure and limits expansive views.
- Mature vegetation viewed north and south (left and right of the road corridor) limiting views across the undulating landscape.

Potential impacts

- 17 turbines are potentially seen from this viewpoint, if visible through existing vegetation to the right and over the hilltop in the background of this view. Of these, 11 will have the full blades visible and three (3) will be visible from the hub to tip of blade.
- Four (4) turbines are potentially visible behind intervening vegetation, from the RWF South site (looking south), with three (3) of these visible from the hub to tip of blade.
- The existing vegetation and topography screens views outside of the road corridor however it is may be possible to view turbines would along the top of the hill.
- Turbines have the potential to be visible across 180 degrees of the existing view.

Further investigation

- Analysis of cumulative impacts from RWF North and RWF South.
- Site visit required to ground truth existing visual conditions.

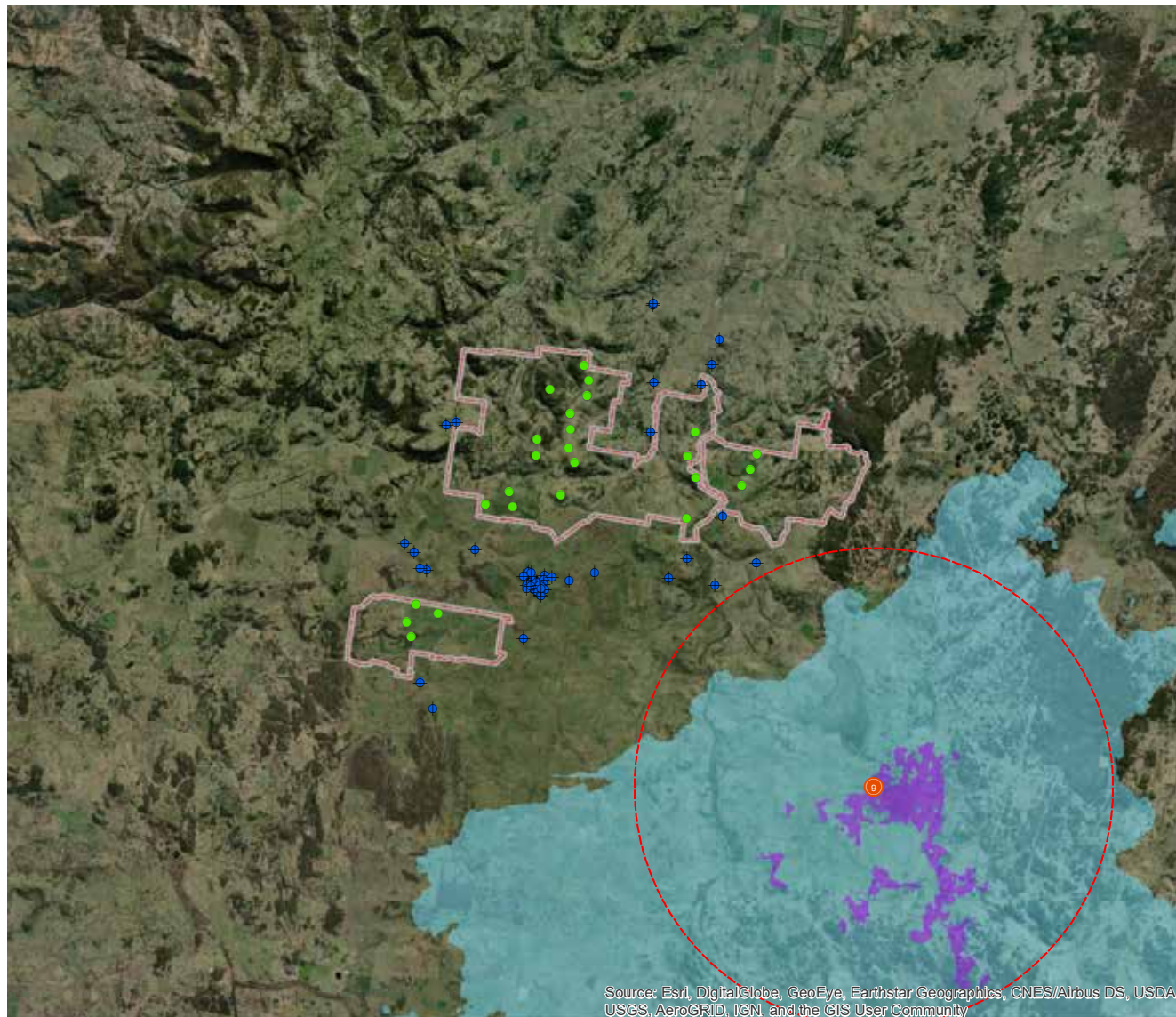
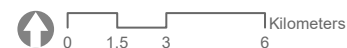


FIGURE 4.28 VIEWPOINT 9



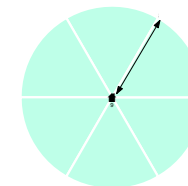
Representative Viewpoint 9 Little Langothlin Lake reserve area

Turbine viewshed represents the land where a 250m tall turbine could theoretically be visible from the representative viewpoint.

Number of turbines potentially visible from VP9: 0

- 0 no. turbines visible from ground level
- 0 no. turbines visible at tip of blades

60 degree sectors in which wind turbines are potentially visible within 8km from the representative viewpoint.



Legend

- Viewpoints
- ⬡ 8km Buffer
- Wind turbine location
- Wind turbine location within viewshed
- ⬢ Dwellings within 3.3km of a turbine
- Ground level viewshed
- Turbine viewshed
- Project area boundary

Viewpoint 9 - Little Langothlin Lake reserve area



FIGURE 4.29 **Little Langothlin Nature Reserve** (source: www.nationalparks.nsw.gov.au, Lagoon Circuit walking track, photo 4 by Rob Cleary)

Viewpoint selection

- Representative of views from Little Langothlin Nature Reserve picnic area and Langothlin recreational trail.
- Designated site (Ramsar Convention wetlands and nature reserve) with high ecological and recreational value.
- Viewpoint is approximately 11km distance to the nearest turbine.
- The view is directed north-west towards both the RWF North and south site.

Visual baseline description

- View looking northwest towards Ben Lomond range in the background.
- Open expansive views focused inward to the lake and foreshore.
- Views to the mid and back ground are limited by intervening vegetation.

Potential impacts

- The view towards turbines is not anticipated to be achievable from this location due to the intervening topography.

Further investigation

- Site visit required to ground truth existing visual conditions and locate key viewpoints from the lake foreshore.

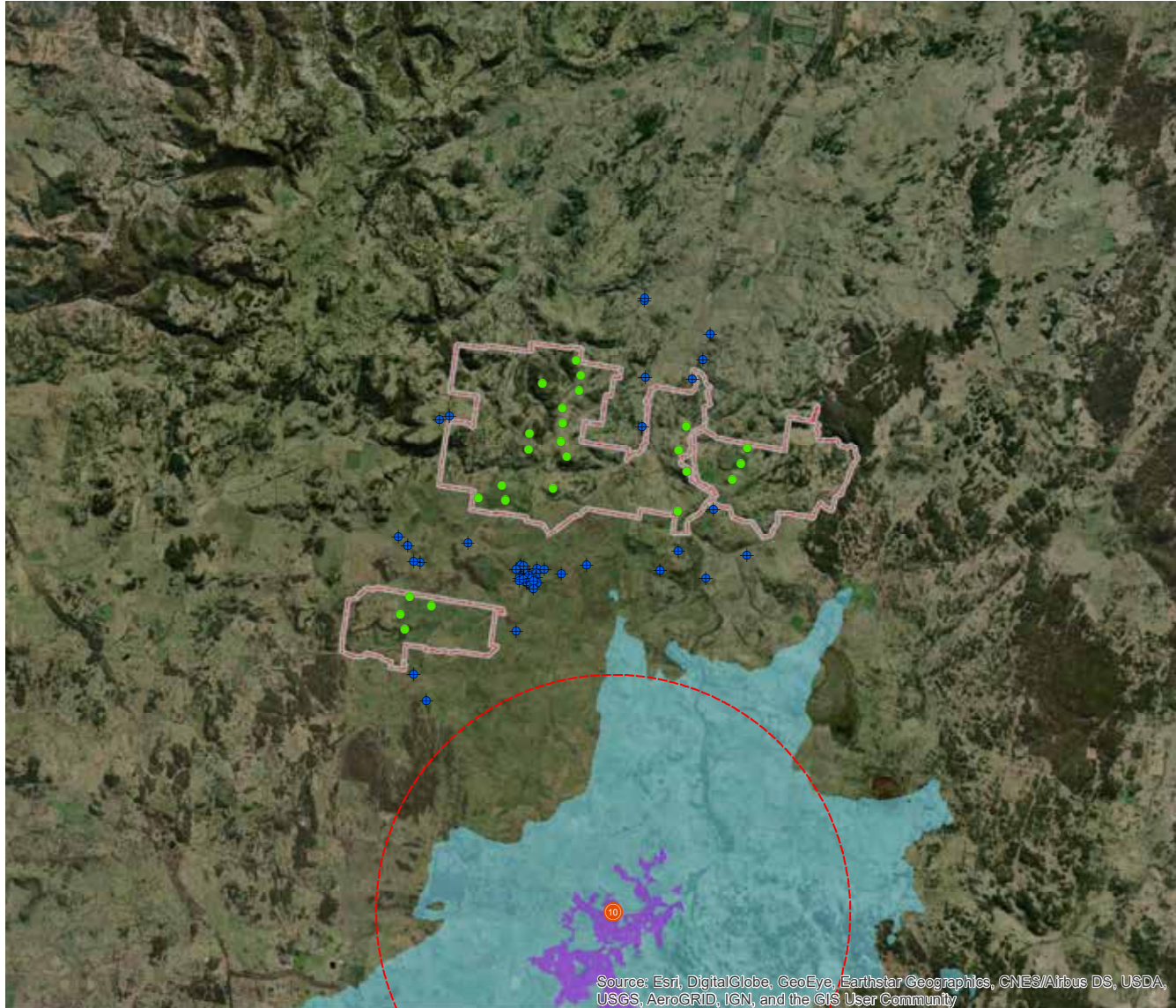


FIGURE 4.30 VIEWPOINT 10

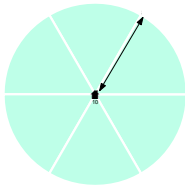
Representative Viewpoint 10 Ben Lomond Road near New England Highway

Turbine viewshed represents the land where a 250m tall turbine could theoretically be visible 8km from the representative viewpoint.

Number of turbines potentially visible from VP10: 0

- 0 no. turbines visible from ground level
- 0 no. turbines visible at tip of blades

60 degree sectors in which wind turbines are potentially visible within 8km from the representative viewpoint.



Legend

- Viewpoints
- 8km Buffer
- Wind turbine location
- Wind turbine location within viewshed
- ⊕ Dwellings within 3.3km of a turbine
- Ground level viewshed
- Turbine viewshed
- Project area boundary

Viewpoint 10 - Ben Lomond Road near New England Highway



FIGURE 4.31 **Ben Lomond Road** (source: Google Earth Street View)

Viewpoint selection

- Representative views from residential properties in close proximity to the viewpoint location.
- Viewpoint is approximately 11.8km distance to the nearest turbine.
- The view is directed north towards both the RWF North and south sites.

Visual baseline description

- Views across gently undulating grazing and pastoral landscape.
- Topography rises to the west with tree cover along the crest (left of the view). Localised undulating terrain towards the north prevents direct views towards the RWF South site.
- Mature vegetation is clustered and scattered across the landscape filtering views towards the north and viewpoint horizon.

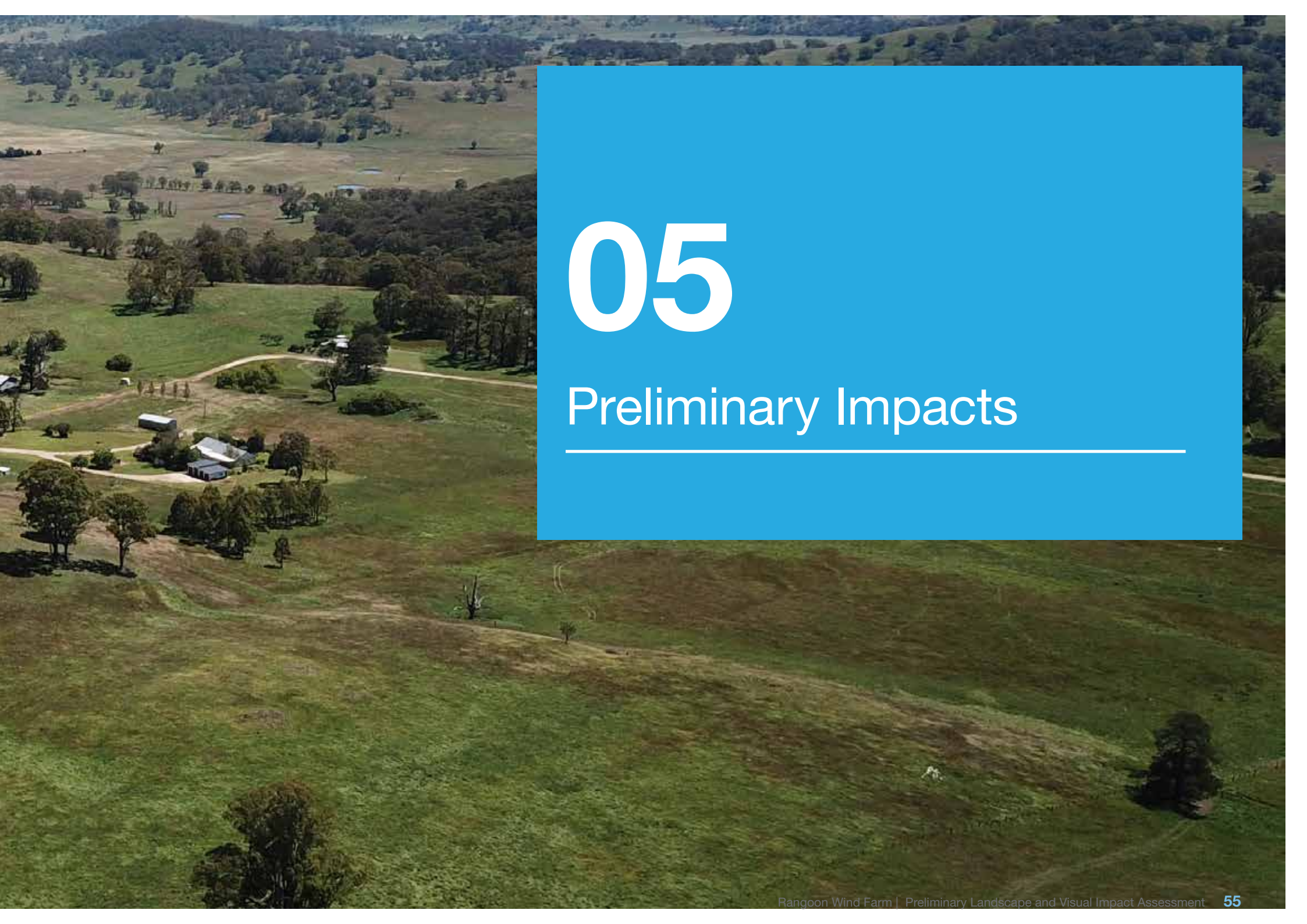
Potential impacts

- The view towards turbines is not anticipated to be achievable from this location due to the intervening topography.

Further investigation

- Site visit required to ground truth existing visual conditions.
- Selection of best location in relation to nearby dwellings with the potential to view the proposal.





05

Preliminary Impacts

Potential landscape impacts

This section documents a preliminary understanding of the potential change that may arise and provides a summary of matters which will require further investigation, assessment, management and mitigation as part of the full EIS.

The project is located with LCT 2 Agricultural tablelands. Due to visual influence dictated by the height of the turbines, there is a potential for landscape impacts to adjacent LCTs.

The potential for impacts arising on these Landscape Character Types have been considered from Day 1 of operation.

Refer to Appendix D for impact assessment methodology.

Further investigation:

- During the EIS stage, careful consideration will be given to the siting and design of the turbines and associated infrastructure.
- Site visit required to ground truth existing landscape conditions.

LCT 1: Towns and settlements

There are no wind farm infrastructure proposed within this LCT and potential effects are likely to be visual.

The sensitivity of the LCT is considered to be Low due to the following:

- low residential numbers and village is considered to not be a primary tourist destination.
- There are no specific planning controls attributing special value to this landscape.

The magnitude of change is considered to be Low due to the following:

- Wind turbines within RWF are likely to be visible from within this LCT and the potential to indirectly influence views of the surrounding landscape within LCT 2.

The Low sensitivity and Low magnitude of change would result in a [Low landscape impact](#).

LCT 2: Agricultural tablelands

Turbines located within this LCT have the potential to become the dominant visual feature in the landscape. There is the potential for vegetation removal resulting in a direct impact. Vegetation removal has the potential to increase with the provision of access roads and additional infrastructure.

The sensitivity of the LCT is considered to be Low due to the following:

- Whilst it is not considered to be of any specific scenic value, some receptors likely place value upon its openness and typically low built form density.
- There are no specific planning controls attributing special value to this landscape.

The magnitude of change is considered to be Medium due to the following:

- The height of the wind turbines will result in them being visible from a large area. It is considered however that this ZTV is a relative small portion of what is a widely distributed and expansive LCT.

The Low sensitivity and Medium magnitude of change would result in a [Moderate landscape impact](#).

LCT 3: Bushland and reserves

This LCT offers a high degree of perceived naturalness, remoteness and inaccessibility. There are no wind farm infrastructure proposed within bushland and reserve areas.

The sensitivity of the LCT is considered to be Medium due to the following:

- A moderately valued landscape with some regional importance.

The magnitude of change is considered to be Negligible due to the following:

- The proposal is at a distance from the LCT in which the changes are likely to be barely perceptible.

The Medium sensitivity and Negligible magnitude of change would result in a [Negligible landscape impact](#).

Potential visual impacts

This section documents a preliminary understanding of the potential visual change that may arise as a result of the proposal and provides a summary of matters which will require further investigation.

Visual impacts are determined through the sensitivity of the view, the elements that have the potential to change or influence the view (magnitude of change) and the potential impacts that may arise, are discussed.

Refer to Appendix D for impact assessment methodology.

The potential for impacts arising on these representative viewpoints have been considered from Day 1 of operation.

PRELIMINARY IMPACTS: REPRESENTATIVE VIEWPOINTS

Table 1 summarises the ZTV findings, determining the extent of potential visibility from representative viewpoints, based on the proposed turbine layout. The locations of the viewpoints are identified in Chapter 4, Figure 4.11.

Further analysis of the turbine visibility extent is demonstrated in Appendix B. This is carried out for representative viewpoint 1, 2, 6 and 8 which are within 3.3km of a turbine and more likely to have higher visual magnitude of change.

60 degree sectors refers to the number of 60 degree sectors in which there are visible turbines in an 8km radius.

TABLE .1 VISUAL ASSESSMENT - REPRESENTATIVE VIEWPOINTS

Viewpoint Number/ Receptor ID	Distance to nearest turbine (m)	Nearest turbine ID	No. turbines visible at the tip of blades	No. turbines visible from ground to blade tip	Number of 60degree sectors	Turbines potentially visible ID numbers
VP 1	2691	MELRNG12	16	0	3	MELW 1-4 MELRNG 3-14
VP 2	2544	MELRNG12	16	1	3	MELW 1-4 MELRNG 2-3,5-14
VP 3	5414	MELRNG15	16	4	2	MELRNG 1-13, 14-21
VP 4	4962	MELW4	10	2	1	MELW 1-4 MELRNG 7-14
VP 5	7047	MELRNG21	25	0	1	MELW 1-4 MELRNG 1-21
VP 6	1615	MELRNG15	18	0	3	MELRNG 1-10, 13, 15-21
VP 7	3812	MELRNG1	4	0	1	MELRNG 1-4
VP 8	2877	MELRNG7	21	0	3	MELW 1-4 MELRNG 1-14, 16- 17, 21
VP 9	10963	MELRNG21	0	0	0	
VP 10	11852	MELW4	0	0	0	



Viewpoint 1 - War Memorial Hall, Ben Lomond

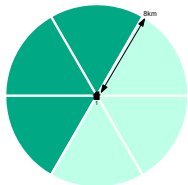
Visual sensitivity - Low

- Experienced predominantly by local residents and workers

Magnitude of change - High

- Visibility of turbines at 180 degrees at viewpoint
- Turbines viewed at relatively close range in background of view

Based on a low visual sensitivity and medium magnitude of change, the overall impact for this preliminary assessment are of a **Moderate visual impact**.



60 degree sectors in which wind turbines are potentially visible within 8km from the representative viewpoint.



Viewpoint 2 - Ben Lomond Primary School

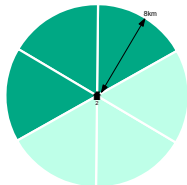
Visual sensitivity - Low

- Experienced predominantly by local residents and workers

Magnitude of change - High

- Visibility of turbines covering 180 degrees of viewpoint
- Turbines viewed at relatively close range in background of view

Based on a low visual sensitivity and medium magnitude of change, the overall impact for this preliminary assessment are of a **Moderate visual impact**.



Viewpoint 3 - Glencoe Tavern, New England Highway

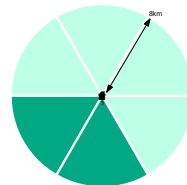
Visual sensitivity - Low

- Experienced predominantly by local residents and workers, with some visitors traveling on the highway

Magnitude of change - Low

- Experienced for a short duration
- Visibility of turbines covering 120 degrees of viewpoint at a medium distance but only up to four turbines with the potential to be viewed from the ground up, between intervening vegetation

Based on a low visual sensitivity and low magnitude of change, the overall impact for this preliminary assessment are of a **Low visual impact**.



Viewpoint 4 - Wandsworth Road

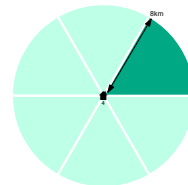
Visual sensitivity - Low

- Experienced predominantly by local residents and workers

Magnitude of change - Low

- Visibility of turbines covering 60 degrees of viewpoint at a medium distance away and with only up to two turbines having the potential to be viewed from the ground up, between intervening vegetation

Based on a low visual sensitivity and low magnitude of change, the overall impact for this preliminary assessment are of a **Low visual impact**.





Viewpoint 5 - Ryanda Creek Road and New England Highway

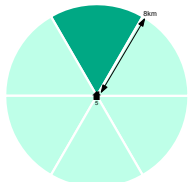
Visual sensitivity - Low

- Experienced predominantly by local residents and workers, with some visitors traveling on the highway

Magnitude of change - Low

- Visibility of turbines covering 60 degrees of viewpoint at a medium distance away and only the tips of turbines likely to be visible.

Based on a low visual sensitivity and low magnitude of change, the overall impact for this preliminary assessment are of a **Low visual impact**.



60 degree sectors in which wind turbines are potentially visible within 8km from the representative viewpoint.



Viewpoint 6 - New England Highway roadside rest area

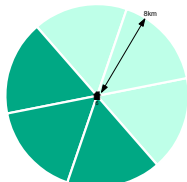
Visual sensitivity - Low

- Experienced predominantly by local residents and workers, with some visitors traveling on the highway

Magnitude of change - Low

- Visibility of turbines covering 180 degrees of viewpoint at a medium distance away. A large proportion of the turbines are potentially visible although these are mostly screened by intervening vegetation.

Based on a low visual sensitivity and low magnitude of change, the overall impact for this preliminary assessment are of a **Low visual impact**.



Viewpoint 7 - Grahams Valley Road

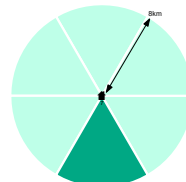
Visual sensitivity - Low

- Experienced predominantly by local residents and workers, with some visitors traveling on the highway

Magnitude of change - Low

- Visibility of turbines covering 60 degrees of viewpoint at a medium distance away and only the tips of four (4) turbines likely to be visible.

Based on a low visual sensitivity and low magnitude of change, the overall impact for this preliminary assessment are of a **Low visual impact**.



Viewpoint 8 - Maybole Road

Visual sensitivity - Low

- Experienced predominantly by local residents and workers

Magnitude of change - Moderate

- Visibility of turbines covering 180 degrees of viewpoint although there is the potential for the turbines to be screened by existing vegetation. Views towards turbines are potentially achievable between trees with the closet turbine being less than 3km way.

Based on a low visual sensitivity and moderate magnitude of change, the overall impact for this preliminary assessment are of a **Low-Moderate visual impact**.





Viewpoint 9 - Little Langothlin Lake reserve

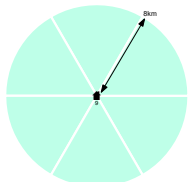
Visual sensitivity - Medium

- Experienced predominantly by locals and occasional nature reserve visitors or birdwatchers.
- Location of regional significance (RAMSAR listed wetland)

Magnitude of change - Negligible

- The RWF turbines are likely to be barely perceptible from this viewpoint, being at a distance greater than 8km from the closest turbine.

Based on a medium visual sensitivity and negligible magnitude of change, the overall impact for this preliminary assessment are of a [Negligible visual impact](#).



60 degree sectors in which wind turbines are potentially visible within 8km from the representative viewpoint.



Viewpoint 10 - Ben Lomond Road near New England Highway

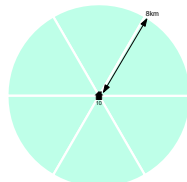
Visual sensitivity - Low

- Experienced predominantly by local residents and workers

Magnitude of change - Negligible

- The RWF turbines are likely to be barely perceptible from this viewpoint, being at a distance greater than 8km from the closest turbine.

Based on a low visual sensitivity and negligible magnitude of change, the overall impact for this preliminary assessment are of a [Negligible visual impact](#).



PRELIMINARY IMPACTS: RECEPTORS WITHIN 3.3KM OF A TURBINE

Table 2 summarises the ZTV findings, determining the extent of potential visibility from receptors within 3.3km of any proposed turbine. The location of the receptors are indicated in Chapter 4, Figure 4.10 and the ZTV maps of all the below receptors are within Appendix A.

Within table 2, the number of 60 degree sectors illustrates the extent of visibility with regards to degrees, for example 2 sectors illustrates that turbines have the potential to be visible across 120 degrees and 3 sectors illustrates that views would be experienced across 180 degrees. Where 3 or more sectors are highlighted, further detailed analysis will be undertaken during the EIS stage.

TABLE .2 VISUAL ASSESSMENT - DWELLINGS WITHIN 3.3KM

Viewpoint Number/ Receptor ID	Distance to nearest turbine (m)	Nearest turbine ID	No. turbines visible at the tip of blades	No. turbines visible from ground to blade tip	Number of 60degree sectors	Turbines potentially visible ID numbers
101	2953	MELRNG14	9	8	3	MELW 1-3 MELRNG 1-14
102	2617	MELRNG20	4	0	1	MELRNG 18-21
103	2301	MELRNG15	15	4	2	MELRNG 1-11, 13,15-21
104	1347	MELRNG21	16	0	2	MELRNG 1-6, 9-11, 15-21
105	1194	MELRNG20	12	0	3	MELRNG 9-14, 16-21
106	2749	MELRNG7	18	0	3	MELW 1-4 MELRNG 1-14

Viewpoint Number/ Receptor ID	Distance to nearest turbine (m)	Nearest turbine ID	No. turbines visible at the tip of blades	No. turbines visible from ground to blade tip	Number of 60degree sectors	Turbines potentially visible ID numbers
107	1565	MELW4	7	1	1	MELW 1-4 MELRNG 11-14
108	2981	MELW3	14	0	2	MELW 1-4 MELRNG 5-14
109	2156	MELRNG15	17	1	3	MELRNG 1-11, 15-21
110	1584	MELRNG15	17	2	3	MELRNG 1-13, 15-20
111	1476	MELRNG16	12	1	4	MELRNG 1-6, 9-10, 15-18, 21
201	1546	MELRNG14	13	0	2	MELW 1-4 MELRNG 6-14
202	2533	MELRNG12	14	1	3	MELW 1-4 MELRNG 3, 5-14
203	1729	MELW1	5	0	2	MELW 1-4 MELRNG 14
204	2824	MELRNG11	17	1	2	MELRNG 1, 3-14, 16-17, 19-21
205	2082	MELRNG21	19	3	3	MELW 3,MELRNG 1-21
206	2059	MELW1	7	0	2	MELW 1-4 MELRNG 12-14

Viewpoint Number/ Receptor ID	Distance to nearest turbine (m)	Nearest turbine ID	No. turbines visible at the tip of blades	No. turbines visible from ground to blade tip	Number of 60degree sectors	Turbines potentially visible ID numbers
207	2864	MELRNG12	20	0	3	MELW 1-4MELRNG 1-14, 16, 21
208	1206	MELW1	10	0	2	MELW 1-3 MELRNG 8-14
210	2613	MELRNG12	16	0	2	MELW 1-4 MELRNG 3-14
211	2668	MELRNG12	15	1	2	MELW 1-4 MELRNG 2-3, 5-14
212	3191	MELRNG15	12	4	2	MELRNG 1-11, 15-17 20-21
213	2428	MELRNG21	7	0	1	MELRNG 15-21
214	2898	MELRNG11	13	7	3	MELW 1-4 MELRNG 2-14, 17, 21
215	2681	MELRNG12	9	1	2	MELW 1-4 MELRNG 7-8,11-14,
216	2806	MELRNG12	18	0	3	MELW 1-4 MELRNG 2-14, 21
217	2692	MELRNG12	16	0	2	MELW 1-4 MELRNG 3-14
218	2651	MELRNG12	16	0	2	MELW 1-4 MELRNG 3-14

Viewpoint Number/ Receptor ID	Distance to nearest turbine (m)	Nearest turbine ID	No. turbines visible at the tip of blades	No. turbines visible from ground to blade tip	Number of 60degree sectors	Turbines potentially visible ID numbers
219	2693	MELRNG12	17	0	3	MELW 1-4 MELRNG 3-14, 21
220	2563	MELRNG12	15	0	2	MELW 1-4 MELRNG 4-14
221	2405	MELRNG12	18	0	3	MELW 1-4 MELRNG 3-16
222	2321	MELRNG12	19	0	3	MELW 1-4 MELRNG 3-17
223	2269	MELRNG12	20	0	3	MELW 1-4 MELRNG 3-17,21
224	2234	MELRNG12	19	1	3	MELW 1-4 MELRNG 3-17, 21
225	2290	MELRNG12	17	1	3	MELW 1-4 MELRNG 4-17
226	2967	MELRNG12	18	0	2	MELW 1-4 MELRNG 1-14
227	2877	MELRNG12	18	0	3	MELW 1-4 MELRNG 2-14, 21
228	2354	MELRNG12	17	0	3	MELW 1-4 MELRNG 5-6,8-17, 21
229	2661	MELRNG12	17	0	2	MELW 1-4 MELRNG 2-14

Viewpoint Number/ Receptor ID	Distance to nearest turbine (m)	Nearest turbine ID	No. turbines visible at the tip of blades	No. turbines visible from ground to blade tip	Number of 60degree sectors	Turbines potentially visible ID numbers
230	2758	MELRNG12	17	0	3	MELW 1-3 MELRNG 2-14, 21
231	2734	MELRNG12	17	0	3	MELW 1-4 MELRNG 3-14, 21
232	1192	MELW1	9	0	2	MELW 1-4 MELRNG 10-14
233	2836	MELRNG12	18	0	3	MELW 1-4 MELRNG 2-14, 21
234	2775	MELRNG12	17	0	3	MELW 1-4 MELRNG 3-14, 21
235	2986	MELRNG12	19	0	3	MELW 1-4 MELRNG 1-14, 21
236	3085	MELRNG12	18	0	2	MELW 1-4 MELRNG 1-14
237	3124	MELRNG12	18	0	2	MELW 1-4 MELRNG 1-14
238	2883	MELRNG12	18	0	3	MELW 1-4 MELRNG 2-14, 21
241	2523	MELW4	4	0	1	MELW 1-4
302	3052	MELRNG1	13	0	2	MELRNG 1-3, 5,6, 9-11, 15-17, 20-21
310	3117	MELRNG1	12	0	2	MELRNG 1-3, 5-6, 9-11, 15-17, 21

There are 51 non-associative receptors identified that are within 3.3km of a proposed turbine. 25 of these receptors have the potential for turbines to be visible in three (3) or more 60degree sector, including:

Receptor 101

- Turbines have the potential to be visible across 180 degrees of the existing view
- 2953m to nearest turbine (MELRNG14)
- 17 turbines visible at the tips, 8 turbines visible from the ground up

Receptor 105

- Turbines have the potential to be visible across 180 degrees of the existing view
- 1194m to nearest turbine (MELRNG20)
- 12 turbines visible in the tips, 0 turbines visible from the ground up

Receptor 106

- Turbines have the potential to be visible across 180 degrees of the existing view
- 2749m to nearest turbine (MELRNG7)
- 18 turbines visible at the tips, 0 turbine visible from the ground up

Receptor 109

- Turbines have the potential to be visible across 180 degrees of the existing view
- 2156m to nearest turbine (MELRNG15)
- 17 turbines visible at the tips, 1 turbine visible from the ground up

Receptor 110

- Turbines have the potential to be visible across 180 degrees of the existing view
- 1584m to nearest turbine (MELRNG16)
- 17 turbines visible at the tips, 2 turbine visible from the ground up

Receptor 111

- Turbines have the potential to be visible across 240 degrees of the existing view
- 1476m to nearest turbine (MELRNG16)
- 12 turbines visible at the tips, 1 turbine visible from the ground up

Receptor 202

- Turbines have the potential to be visible across 180 degrees of the existing view
- 2533m to nearest turbine (MELRNG12)
- 14 turbines visible at the tips, 1 turbine visible from the ground up

Receptor 205

- Turbines have the potential to be visible across 180 degrees of the existing view
- 2082m to nearest turbine (MELRNG21)
- 19 turbines visible at the tips, 3 turbine visible from the ground up

Receptor 207

- Turbines have the potential to be visible across 180 degrees of the existing view
- 2864m to nearest turbine (MELRNG12)
- 20 turbines visible at the tips, 0 turbine visible from the ground up

Receptor 214

- Turbines have the potential to be visible across 180 degrees of the existing view
- 2898m to nearest turbine (MELRNG11)
- 13 turbines visible at the tips, 7 turbine visible from the ground up

Receptor 216

- Turbines have the potential to be visible across 180 degrees of the existing view
- 2086m to nearest turbine (MELRNG12)
- 18 turbines visible at the tips, 0 turbine visible from the ground up

Receptor 219

- Turbines have the potential to be visible across 180 degrees of the existing view
- 2693m to nearest turbine (MELRNG12)
- 17 turbines visible at the tips, 0 turbine visible from the ground up

Receptor 221

- Turbines have the potential to be visible across 180 degrees of the existing view
- 2405m to nearest turbine (MELRNG12)
- 18 turbines visible at the tips, 0 turbine visible from the ground up

Receptor 222

- Turbines have the potential to be visible across 180 degrees of the existing view
- 2321m to nearest turbine (MELRNG12)
- 19 turbines visible at the tips, 0 turbine visible from the ground up

Receptor 223

- Turbines have the potential to be visible across 180 degrees of the existing view
- 2269m to nearest turbine (MELRNG12)
- 20 turbines visible at the tips, 0 turbine visible from the ground up

Receptor 224

- Turbines have the potential to be visible across 180 degrees of the existing view
- 2234m to nearest turbine (MELRNG12)
- 19 turbines visible at the tips, 1 turbine visible from the ground up

Receptor 225

- Turbines have the potential to be visible across 180 degrees of the existing view
- 2290m to nearest turbine (MELRNG12)
- 17 turbines visible at the tips, 1 turbine visible from the ground up

Receptor 227

- Turbines have the potential to be visible across 180 degrees of the existing view
- 2877m to nearest turbine (MELRNG12)
- 18 turbines visible at the tips, 0 turbine visible from the ground up

Receptor 228

- Turbines have the potential to be visible across 180 degrees of the existing view
- 2354m to nearest turbine (MELRNG12)
- 17 turbines visible at the tips, 0 turbine visible from the ground up

Receptor 230

- Turbines have the potential to be visible across 180 degrees of the existing view
- 2758m to nearest turbine (MELRNG12)
- 17 turbines visible at the tips, 0 turbine visible from the ground up

Receptor 231

- Turbines have the potential to be visible across 180 degrees of the existing view
- 2734m to nearest turbine (MELRNG12)
- 17 turbines visible at the tips, 0 turbine visible from the ground up

Receptor 233

- Turbines have the potential to be visible across 180 degrees of the existing view
- 2836m to nearest turbine (MELRNG12)
- 18 turbines visible at the tips, 0 turbine visible from the ground up

Receptor 234

- Turbines have the potential to be visible across 180 degrees of the existing view
- 2775m to nearest turbine (MELRNG12)
- 17 turbines visible at the tips, 0 turbine visible from the ground up

Receptor 235

- Turbines have the potential to be visible across 180 degrees of the existing view
- 2986m to nearest turbine (MELRNG12)
- 19 turbines visible at the tips, 0 turbine visible from the ground up

Receptor 238

- Turbines have the potential to be visible across 180 degrees of the existing view
- 2883m to nearest turbine (MELRNG12)
- 18 turbines visible at the tips, 0 turbine visible from the ground up

When modelling the 60 degree sector views, the initial analysis model does include vegetation or the built environment and as figure 5.1 illustrates, 17 of the 25 properties that may experience 3 or more 60 degree sector views are clustered within the village of Ben Lomond. Viewpoint 1 (War Memorial Hall) and Viewpoint 2 (Ben Lomond Primary School) illustrate typical views from this location.

Additionally, the following 13 receptors have the potential of viewing the full height of 1 or more turbines within 3.3km proximity.

- Receptor 101: 8 turbines
- Receptor 103: 4 turbines
- Receptor 107: 1 turbines
- Receptor 109: 1 turbines
- Receptor 110: 2 turbines
- Receptor 202: 1 turbines
- Receptor 204: 1 turbines
- Receptor 205: 3 turbines
- Receptor 211: 1 turbines
- Receptor 214: 7 turbines
- Receptor 215: 1 turbines
- Receptor 224: 1 turbines
- Receptor 225: 1 turbines

Further investigation:

During the EIS stage, based on the proposed turbine layout, the receptors identified are to be further investigated to determine existing ground conditions and extent of turbine visibility.

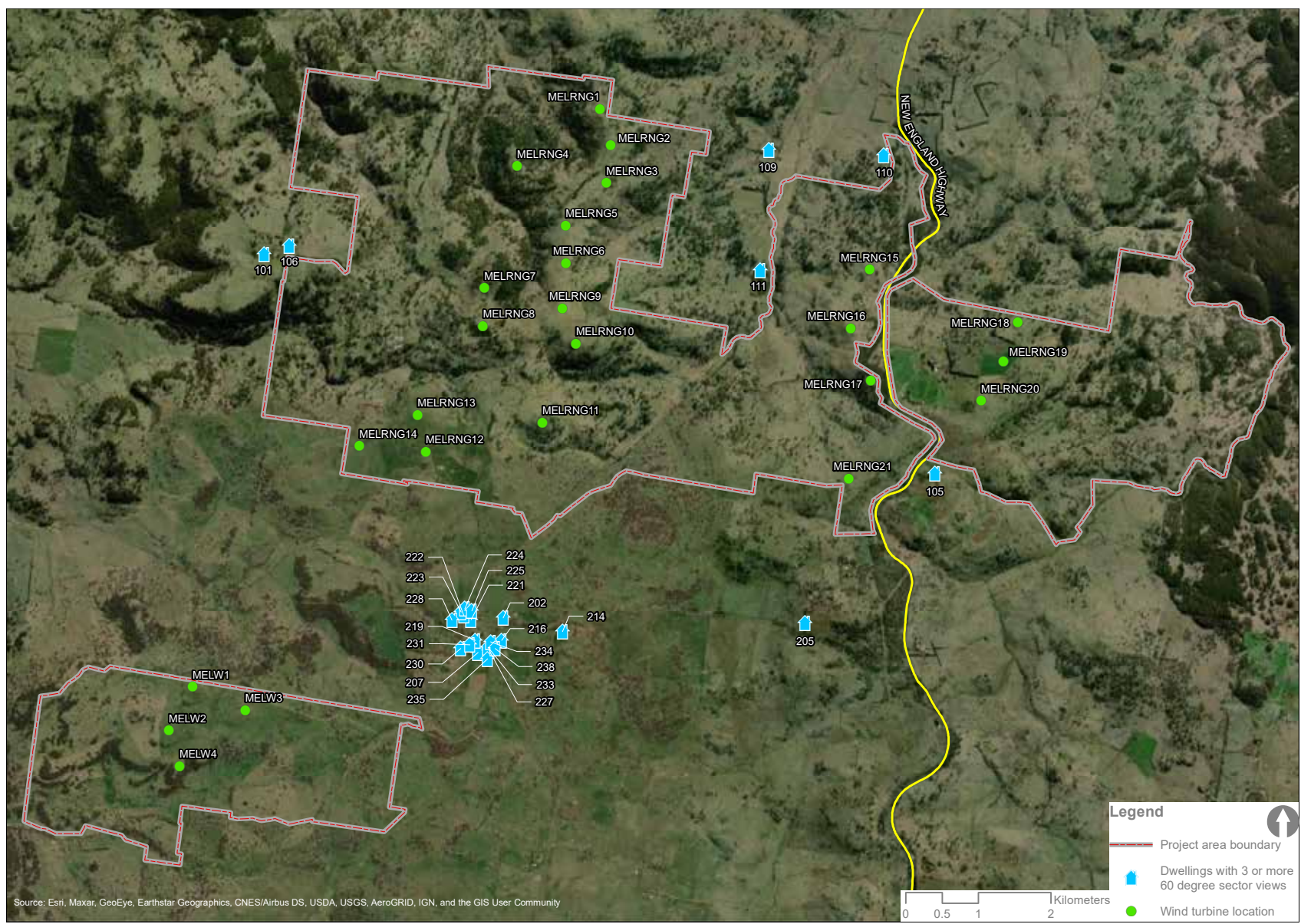


FIGURE 5.1

PRELIMINARY IMPACTS: RECEPTORS WITHIN 3.3KM AND 8KM

In accordance with the visual Bulletin, and following a meeting with the Department of Planning and Environment (17/08/2020), a total of 111 properties have been analysed between 3.3km and 8km from the project boundary.

Similar to the 3.3km study (refer to page 61), the purpose of this study is to map the number of 60° sectors that would be occupied by turbines for each property, with a focus on determining properties with views towards turbines within three or more sectors.

As illustrated in Table 3, no properties are anticipated to experience views towards three or more sectors within this area. 45 properties would experience views towards two sectors and 58 are anticipated to experience views to turbines within 1 sector.

TABLE .3 ADDITIONAL STATS

Viewpoint Number/ Receptor ID	Distance to nearest turbine (m)	Nearest turbine ID	Number of visible turbines	Number of 60 degree sectors	Visible turbine ID numbers
209	4539	MELW3	1	1	MELRNG21
239	3318	MELRNG12	18	2	MELW4, MELW3, MELW2, MELW1, MELRNG14, MELRNG13, MELRNG12, MELRNG11, MELRNG10, MELRNG9, MELRNG8, MELRNG7, MELRNG6, MELRNG5, MELRNG4, MELRNG3, MELRNG2, MELRNG1
240	4142	MELW3	6	1	MELRNG11, MELRNG10, MELRNG9, MELRNG21, MELRNG17, MELRNG16
301	3584	MELRNG21	10	2	MELRNG21, MELRNG20, MELRNG19, MELRNG18, MELRNG17, MELRNG16, MELRNG15, MELRNG11, MELRNG10, MELRNG9
303	5516	MELRNG20	5	1	MELRNG16, MELRNG21, MELRNG20, MELRNG19, MELRNG18
304	3819	MELW4	0	0	
305	3998	MELRNG1	12	1	MELRNG13, MELRNG11, MELRNG10, MELRNG9, MELRNG8, MELRNG7, MELRNG6, MELRNG5, MELRNG4, MELRNG3, MELRNG2, MELRNG1
306	5793	MELRNG4	1	1	MELRNG1
307	4893	MELW4	4	1	MELW4, MELW3, MELW2, MELW1
308	3419	MELRNG21	14	2	MELRNG3, MELRNG2, MELRNG21, MELRNG20, MELRNG19, MELRNG18, MELRNG17, MELRNG16, MELRNG15, MELRNG11, MELRNG10, MELRNG9, MELRNG8, MELRNG7
309	5755	MELRNG18	7	1	MELRNG21, MELRNG20, MELRNG19, MELRNG18, MELRNG17, MELRNG16, MELRNG15
311	6054	MELRNG4	12	1	MELRNG14, MELRNG13, MELRNG12, MELRNG9, MELRNG8, MELRNG7, MELRNG6, MELRNG5, MELRNG4, MELRNG3, MELRNG2, MELRNG1
312	3333	MELRNG21	14	2	MELRNG3, MELRNG21, MELRNG20, MELRNG19, MELRNG18, MELRNG17, MELRNG16, MELRNG15, MELRNG13, MELRNG11, MELRNG10, MELRNG9, MELRNG8, MELRNG7
313	4222	MELRNG18	9	1	MELRNG17, MELRNG16, MELRNG15, MELRNG6, MELRNG5, MELRNG4, MELRNG3, MELRNG2, MELRNG1
314	4778	MELW2	5	1	MELW4, MELW3, MELW2, MELW1, MELRNG14

Viewpoint Number/ Receptor ID	Distance to nearest turbine (m)	Nearest turbine ID	Number of visible turbines	Number of 60 degree sectors	Visible turbine ID numbers
315	4702	MELW2	4	1	MELW4, MELW3, MELW2, MELW1
316	4823	MELW4	4	1	MELW4, MELW3, MELW2, MELW1
317	4340	MELRNG21	8	1	MELRNG21, MELRNG20, MELRNG19, MELRNG18, MELRNG17, MELRNG16, MELRNG15, MELRNG11
318	6736	MELRNG18	3	1	MELRNG20, MELRNG19, MELRNG18
319	6112	MELRNG18	0	0	
401	7000	MELRNG4	4	1	MELRNG7, MELRNG4, MELRNG2, MELRNG1
402	4755	MELRNG18	12	2	MELRNG20, MELRNG19, MELRNG18, MELRNG17, MELRNG16, MELRNG15, MELRNG6, MELRNG5, MELRNG4, MELRNG3, MELRNG2, MELRNG1
403	6789	MELRNG18	3	1	MELRNG20, MELRNG19, MELRNG18
404	6030	MELRNG20	2	1	MELRNG20, MELRNG19
405	3829	MELRNG1	4	1	MELRNG4, MELRNG3, MELRNG2, MELRNG1
406	4958	MELRNG21	7	1	MELRNG21, MELRNG20, MELRNG19, MELRNG18, MELRNG17, MELRNG16, MELRNG15
407	5594	MELRNG15	13	2	MELRNG20, MELRNG19, MELRNG18, MELRNG17, MELRNG16, MELRNG15, MELRNG9, MELRNG6, MELRNG5, MELRNG4, MELRNG3, MELRNG2, MELRNG1
408	5330	MELRNG15	13	2	MELRNG20, MELRNG19, MELRNG18, MELRNG17, MELRNG16, MELRNG15, MELRNG9, MELRNG6, MELRNG5, MELRNG4, MELRNG3, MELRNG2, MELRNG1
409	6321	MELRNG4	10	1	MELRNG13, MELRNG9, MELRNG8, MELRNG7, MELRNG6, MELRNG5, MELRNG4, MELRNG3, MELRNG2, MELRNG1
410	5588	MELW4	4	1	MELW4, MELW3, MELW2, MELW1
411	6111	MELW3	1	1	MELW3
412	5676	MELRNG15	12	2	MELRNG20, MELRNG19, MELRNG18, MELRNG17, MELRNG16, MELRNG15, MELRNG6, MELRNG5, MELRNG4, MELRNG3, MELRNG2, MELRNG1
413	5162	MELRNG21	7	1	MELRNG21, MELRNG20, MELRNG19, MELRNG18, MELRNG17, MELRNG16, MELRNG15
414	4952	MELRNG15	14	2	MELRNG21, MELRNG20, MELRNG19, MELRNG18, MELRNG17, MELRNG16, MELRNG15, MELRNG9, MELRNG6, MELRNG5, MELRNG4, MELRNG3, MELRNG2, MELRNG1
415	4901	MELW1	7	2	MELW4, MELW3, MELW2, MELW1, MELRNG14, MELRNG13, MELRNG12
416	5590	MELRNG15	12	2	MELRNG20, MELRNG19, MELRNG18, MELRNG17, MELRNG16, MELRNG15, MELRNG6, MELRNG5, MELRNG4, MELRNG3, MELRNG2, MELRNG1
417	4773	MELRNG18	13	2	MELRNG21, MELRNG20, MELRNG19, MELRNG18, MELRNG17, MELRNG16, MELRNG15, MELRNG6, MELRNG5, MELRNG4, MELRNG3, MELRNG2, MELRNG1

Viewpoint Number/ Receptor ID	Distance to nearest turbine (m)	Nearest turbine ID	Number of visible turbines	Number of 60 degree sectors	Visible turbine ID numbers
418	5403	MELRNG15	13	2	MELRNG20, MELRNG19, MELRNG18, MELRNG17, MELRNG16, MELRNG15, MELRNG9, MELRNG6, MELRNG5, MELRNG4, MELRNG3, MELRNG2, MELRNG1
419	3929	MELRNG1	4	1	MELRNG4, MELRNG3, MELRNG2, MELRNG1
420	4708	MELRNG1	10	1	MELRNG10, MELRNG9, MELRNG8, MELRNG7, MELRNG6, MELRNG5, MELRNG4, MELRNG3, MELRNG2, MELRNG1
421	6040	MELW3	0	0	
422	7201	MELRNG18	3	1	MELRNG20, MELRNG19, MELRNG18
423	5551	MELRNG15	13	2	MELRNG20, MELRNG19, MELRNG18, MELRNG17, MELRNG16, MELRNG15, MELRNG9, MELRNG6, MELRNG5, MELRNG4, MELRNG3, MELRNG2, MELRNG1
424	5520	MELRNG15	13	2	MELRNG20, MELRNG19, MELRNG18, MELRNG17, MELRNG16, MELRNG15, MELRNG9, MELRNG6, MELRNG5, MELRNG4, MELRNG3, MELRNG2, MELRNG1
425	5594	MELRNG15	12	2	MELRNG20, MELRNG19, MELRNG18, MELRNG17, MELRNG16, MELRNG15, MELRNG6, MELRNG5, MELRNG4, MELRNG3, MELRNG2, MELRNG1
426	5572	MELRNG15	12	2	MELRNG20, MELRNG19, MELRNG18, MELRNG17, MELRNG16, MELRNG15, MELRNG6, MELRNG5, MELRNG4, MELRNG3, MELRNG2, MELRNG1
427	5572	MELRNG15	12	2	MELRNG20, MELRNG19, MELRNG18, MELRNG17, MELRNG16, MELRNG15, MELRNG6, MELRNG5, MELRNG4, MELRNG3, MELRNG2, MELRNG1
428	5653	MELRNG15	12	2	MELRNG20, MELRNG19, MELRNG18, MELRNG17, MELRNG16, MELRNG15, MELRNG6, MELRNG5, MELRNG4, MELRNG3, MELRNG2, MELRNG1
429	5444	MELRNG15	12	2	MELRNG20, MELRNG19, MELRNG18, MELRNG17, MELRNG16, MELRNG15, MELRNG6, MELRNG5, MELRNG4, MELRNG3, MELRNG2, MELRNG1
430	5414	MELRNG15	12	2	MELRNG20, MELRNG19, MELRNG18, MELRNG17, MELRNG16, MELRNG15, MELRNG6, MELRNG5, MELRNG4, MELRNG3, MELRNG2, MELRNG1
431	5355	MELRNG15	13	2	MELRNG20, MELRNG19, MELRNG18, MELRNG17, MELRNG16, MELRNG15, MELRNG9, MELRNG6, MELRNG5, MELRNG4, MELRNG3, MELRNG2, MELRNG1
432	5411	MELRNG15	12	2	MELRNG20, MELRNG19, MELRNG18, MELRNG17, MELRNG16, MELRNG15, MELRNG6, MELRNG5, MELRNG4, MELRNG3, MELRNG2, MELRNG1
433	5483	MELRNG15	12	2	MELRNG20, MELRNG19, MELRNG18, MELRNG17, MELRNG16, MELRNG15, MELRNG6, MELRNG5, MELRNG4, MELRNG3, MELRNG2, MELRNG1
434	5483	MELRNG15	12	2	MELRNG20, MELRNG19, MELRNG18, MELRNG17, MELRNG16, MELRNG15, MELRNG6, MELRNG5, MELRNG4, MELRNG3, MELRNG2, MELRNG1

Viewpoint Number/ Receptor ID	Distance to nearest turbine (m)	Nearest turbine ID	Number of visible turbines	Number of 60 degree sectors	Visible turbine ID numbers
435	5482	MELRNG15	12	2	MELRNG20, MELRNG19, MELRNG18, MELRNG17, MELRNG16, MELRNG15, MELRNG6, MELRNG5, MELRNG4, MELRNG3, MELRNG2, MELRNG1
436	5408	MELRNG15	13	2	MELRNG20, MELRNG19, MELRNG18, MELRNG17, MELRNG16, MELRNG15, MELRNG9, MELRNG6, MELRNG5, MELRNG4, MELRNG3, MELRNG2, MELRNG1
437	5414	MELRNG15	13	2	MELRNG20, MELRNG19, MELRNG18, MELRNG17, MELRNG16, MELRNG15, MELRNG9, MELRNG6, MELRNG5, MELRNG4, MELRNG3, MELRNG2, MELRNG1
438	5469	MELRNG15	13	2	MELRNG20, MELRNG19, MELRNG18, MELRNG17, MELRNG16, MELRNG15, MELRNG9, MELRNG6, MELRNG5, MELRNG4, MELRNG3, MELRNG2, MELRNG1
439	5464	MELRNG15	13	2	MELRNG20, MELRNG19, MELRNG18, MELRNG17, MELRNG16, MELRNG15, MELRNG9, MELRNG6, MELRNG5, MELRNG4, MELRNG3, MELRNG2, MELRNG1
440	5461	MELRNG15	13	2	MELRNG20, MELRNG19, MELRNG18, MELRNG17, MELRNG16, MELRNG15, MELRNG9, MELRNG6, MELRNG5, MELRNG4, MELRNG3, MELRNG2, MELRNG1
441	5389	MELRNG15	13	2	MELRNG20, MELRNG19, MELRNG18, MELRNG17, MELRNG16, MELRNG15, MELRNG9, MELRNG6, MELRNG5, MELRNG4, MELRNG3, MELRNG2, MELRNG1
442	5321	MELRNG15	13	2	MELRNG20, MELRNG19, MELRNG18, MELRNG17, MELRNG16, MELRNG15, MELRNG9, MELRNG6, MELRNG5, MELRNG4, MELRNG3, MELRNG2, MELRNG1
443	5244	MELRNG15	13	2	MELRNG20, MELRNG19, MELRNG18, MELRNG17, MELRNG16, MELRNG15, MELRNG9, MELRNG6, MELRNG5, MELRNG4, MELRNG3, MELRNG2, MELRNG1
444	5164	MELRNG15	14	2	MELRNG20, MELRNG19, MELRNG18, MELRNG17, MELRNG16, MELRNG15, MELRNG10, MELRNG9, MELRNG6, MELRNG5, MELRNG4, MELRNG3, MELRNG2, MELRNG1
445	5251	MELRNG15	14	2	MELRNG20, MELRNG19, MELRNG18, MELRNG17, MELRNG16, MELRNG15, MELRNG10, MELRNG9, MELRNG6, MELRNG5, MELRNG4, MELRNG3, MELRNG2, MELRNG1
446	5223	MELRNG15	14	2	MELRNG20, MELRNG19, MELRNG18, MELRNG17, MELRNG16, MELRNG15, MELRNG10, MELRNG9, MELRNG6, MELRNG5, MELRNG4, MELRNG3, MELRNG2, MELRNG1
447	5244	MELRNG15	14	2	MELRNG20, MELRNG19, MELRNG18, MELRNG17, MELRNG16, MELRNG15, MELRNG10, MELRNG9, MELRNG6, MELRNG5, MELRNG4, MELRNG3, MELRNG2, MELRNG1
448	5284	MELRNG15	14	2	MELRNG20, MELRNG19, MELRNG18, MELRNG17, MELRNG16, MELRNG15, MELRNG10, MELRNG9, MELRNG6, MELRNG5, MELRNG4, MELRNG3, MELRNG2, MELRNG1
449	5173	MELRNG15	14	2	MELRNG20, MELRNG19, MELRNG18, MELRNG17, MELRNG16, MELRNG15, MELRNG10, MELRNG9, MELRNG6, MELRNG5, MELRNG4, MELRNG3, MELRNG2, MELRNG1
450	5933	MELW3	13	2	MELRNG10, MELRNG9, MELRNG8, MELW3, MELW2, MELW1, MELRNG21, MELRNG17, MELRNG16, MELRNG14, MELRNG13, MELRNG12, MELRNG11

Viewpoint Number/ Receptor ID	Distance to nearest turbine (m)	Nearest turbine ID	Number of visible turbines	Number of 60 degree sectors	Visible turbine ID numbers
501	7815	MELRNG18	0	0	
502	5383	MELW1	2	1	MELRNG8, MELRNG7
503	7103	MELW3	4	1	MELW4, MELW3, MELW2, MELW1
504	5039	MELRNG21	8	2	MELRNG21, MELRNG20, MELRNG19, MELRNG18, MELRNG17, MELRNG16, MELRNG15, MELRNG11
505	6291	MELRNG21	9	2	MELRNG17, MELW3, MELW1, MELRNG21, MELRNG14, MELRNG13, MELRNG12, MELRNG11, MELRNG10
506	6787	MELRNG18	4	1	MELRNG20, MELRNG19, MELRNG18, MELRNG15
507	5779	MELRNG1	6	1	MELRNG6, MELRNG5, MELRNG4, MELRNG3, MELRNG2, MELRNG1
508	6354	MELRNG20	5	1	MELRNG21, MELRNG20, MELRNG19, MELRNG18, MELRNG17
509	6515	MELRNG21	5	1	MELRNG21, MELRNG20, MELRNG19, MELRNG18, MELRNG17
510	6251	MELRNG15	9	1	MELRNG20, MELRNG17, MELRNG16, MELRNG15, MELRNG5, MELRNG4, MELRNG3, MELRNG2, MELRNG1
511	5295	MELRNG21	4	1	MELRNG21, MELRNG20, MELRNG17, MELRNG16
512	5859	MELW1	5	1	MELW4, MELW2, MELRNG14, MELRNG13, MELRNG12
513	6756	MELW2	4	1	MELW4, MELW3, MELW2, MELW1
514	6787	MELRNG18	4	1	MELRNG20, MELRNG19, MELRNG18, MELRNG15
515	6117	MELRNG1	11	2	MELRNG19, MELRNG18, MELRNG17, MELRNG16, MELRNG15, MELRNG6, MELRNG5, MELRNG4, MELRNG3, MELRNG2, MELRNG1
601	7558	MELRNG1	3	1	MELRNG15, MELRNG2, MELRNG1
602	6226	MELRNG1	1	1	MELRNG4
603	7636	MELRNG21	1	1	MELRNG21
605	6675	MELRNG18	6	2	MELRNG20, MELRNG19, MELRNG18, MELRNG16, MELRNG15, MELRNG1
607	7348	MELRNG18	2	1	MELRNG19, MELRNG18
608	7348	MELRNG21	1	1	MELRNG21
609	7011	MELRNG21	2	1	MELRNG21, MELRNG20
611	6797	MELW4	0	0	
612	7411	MELW2	3	1	MELW4, MELW2, MELW1
613	6035	MELRNG21	4	1	MELRNG21, MELRNG20, MELRNG19, MELRNG17
614	5734	MELRNG1	6	1	MELRNG6, MELRNG5, MELRNG4, MELRNG3, MELRNG2, MELRNG1
615	7394	MELRNG18	2	1	MELRNG19, MELRNG18

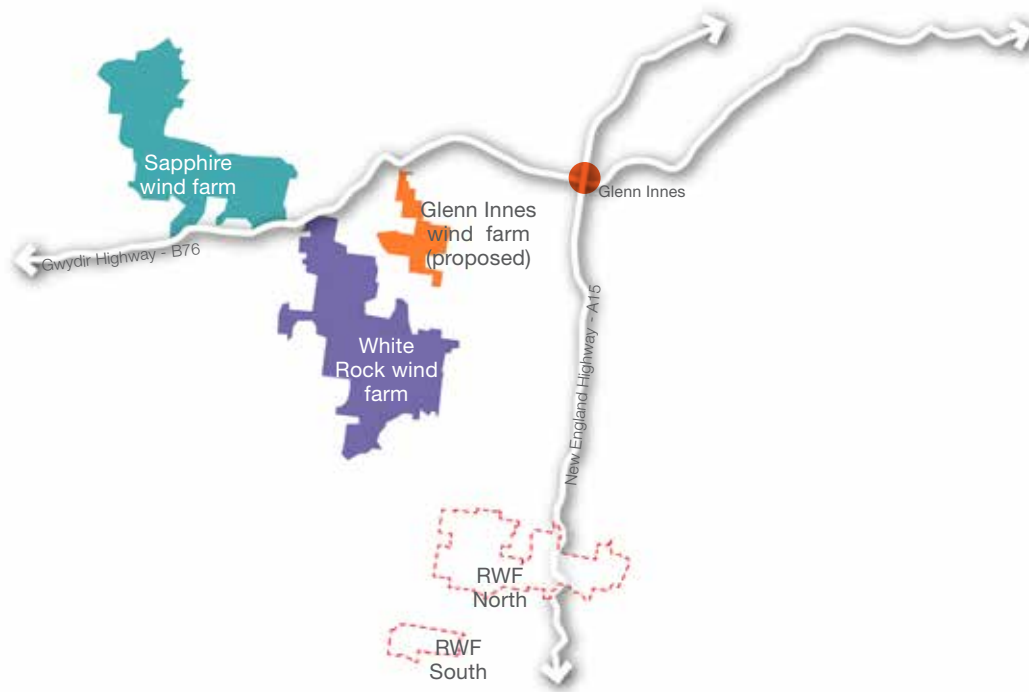
Viewpoint Number/ Receptor ID	Distance to nearest turbine (m)	Nearest turbine ID	Number of visible turbines	Number of 60 degree sectors	Visible turbine ID numbers
616	7197	MELRNG15	5	1	MELRNG18, MELRNG15, MELRNG3, MELRNG2, MELRNG1
617	7673	MELRNG1	3	1	MELRNG15, MELRNG2, MELRNG1
619	5868	MELRNG21	5	1	MELRNG21, MELRNG20, MELRNG19, MELRNG17, MELRNG16
704	7630	MELRNG21	1	1	MELRNG21
709	7901	MELRNG1	1	1	MELRNG1
711	7717	MELRNG21	1	1	MELRNG21
712	7483	MELRNG21	1	1	MELRNG21
716	7886	MELRNG15	1	1	MELRNG15
719	7157	MELRNG21	1	1	MELRNG21
728	6859	MELRNG21	2	1	MELRNG21, MELRNG20
729	7588	MELRNG21	0	0	
730	7910	MELRNG1	2	1	MELRNG15, MELRNG1
805	7534	MELRNG1	0	0	
811	7983	MELRNG1	0	0	



06

Cumulative Impacts

Cumulative analysis



There are two existing wind farms in the vicinity of RWF including Sapphire and White Rock wind farms (WF). Only White Rock is within the 10km study area of RWF North. Glen Innes WF is not constructed and there is no known timeframe for construction.

The main cumulative impact of multiple wind farm developments for the region is likely to be related to the combined visual impact of the wind farms at locations where more than one wind farm is visible. The Sapphire and Glen Innes Wind Farm sites that are at least 15 to 20 kilometers away are sufficiently separate that many intermediate viewing points will be toward the White Rock wind farm.

The intermediate area is sparsely settled with hilly terrain that may limit views in some directions and views to a wind farm to the north or south if available, may be at distances of more than 10 kilometers. At a spacing of 15 to 20 kilometers the cumulative visual impact of the two wind farms, if both are developed, are expected to have some degree of capacity to absorb the changes. The development of up to four wind farms (including the two (2) existing), in the New England Tablelands would mean that wind

turbines will become a more common element of some parts of the New England regional landscapes.

Approach

Cumulative analysis has been run to identify those dwellings and significant viewpoints, within a distance of eight (8) kilometers from either RWF North or White Rock Wind Farm, in accordance with VIA Bulletin guidance. There have been 16 receptors identified (figure 6.1) which are likely to have both wind farms visible and within 8km.

Further viewsheds have been run from each of the 16 receptors to determine the extent in which wind turbines are viewed (refer Appendix C). The base information for White Rock wind farm is taken from the approved upgrade to White Rock Stage 2, including:

- turbines at 200m height
- turbine layout as 'White Rock Wind Stage 2, MOD 6 - Environmental Assessment Report', 2018, by Goldwind Capital (Aust.) Pty Ltd

Further investigation

Due to the separation of wind farm locations RWF North and RWF South, cumulative impacts could be experienced by a number of receptors situated in the village of Ben Lomond and nearby area. There is the potential for receptors in this area to feel surrounded by wind turbines.

Preliminary cumulative impacts from Ben Lomond village are discussed within representative viewpoints 1 & 2 (refer chapter 4).

This cumulative analysis has not been included in this study and is a recommendation for further investigation in the EIS.

Refer Appendix C for Cumulative analysis mapping. Preliminary impact are identified in the following pages, highlighting those receptors where turbines within 8km are visible in three or more 60 degree sectors.

Legend

-  Project area boundary
-  Wind turbine locator (250m)
-  White Rock turbine locations (200m AGL)
-  Dwellings within 8km of both wind farms
-  All dwellings
-  8km buffers

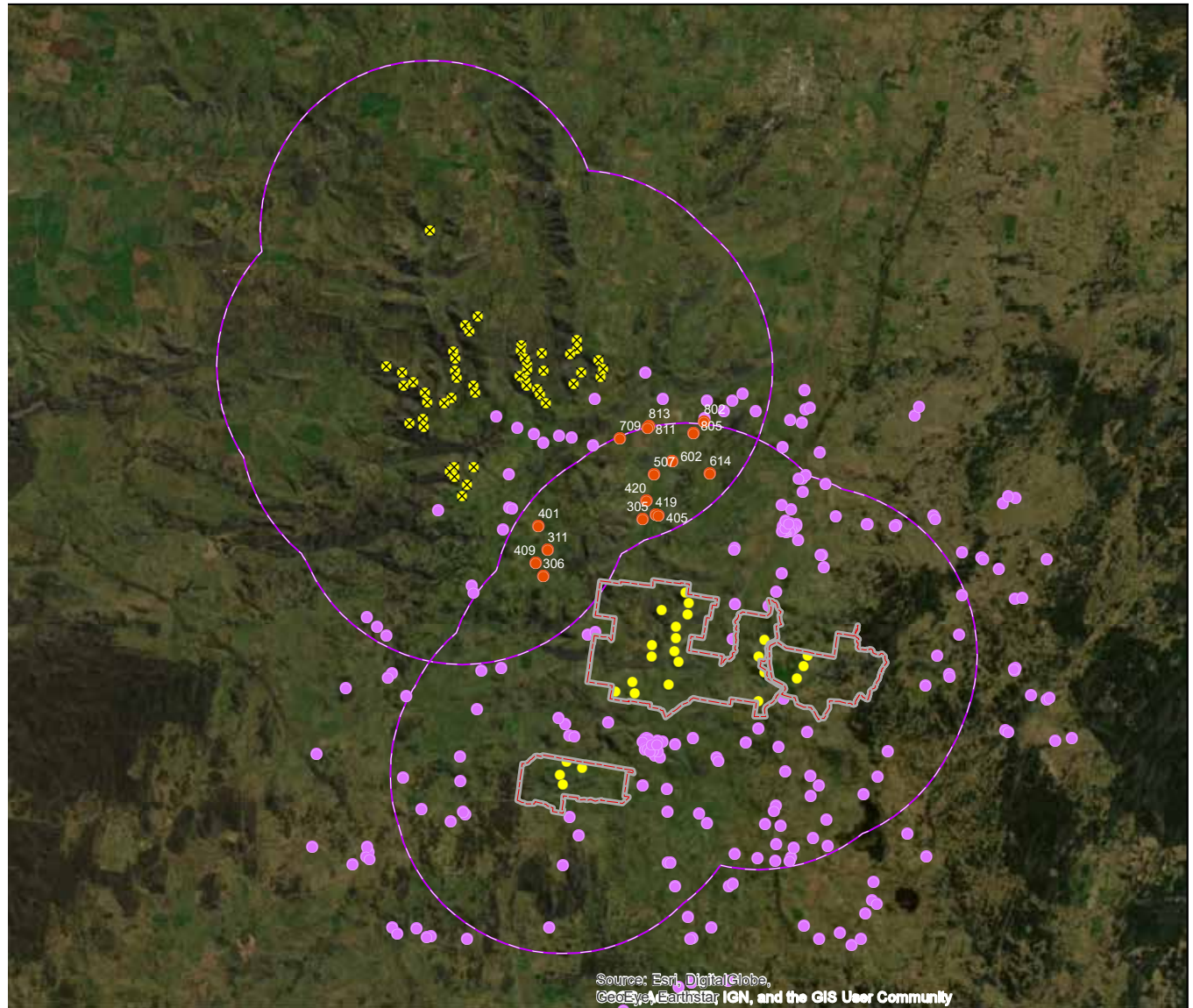


FIGURE 6.1 RECEPTORS WITHIN 8KM OF TWO OR MORE WIND

Potential cumulative impacts

Table 4 summarises the ZTV findings determining the extent of potential visibility from receptors within 8km of any proposed turbine from with White Rock WF (200m to blade tip) stage 2 or RWF North. The location of the receptors are indicated in Figure 5.1 and the ZTV maps of the tabled receptors are within Appendix C.

TABLE .4 CUMULATIVE ASSESSMENT - DWELLINGS WITHIN 8KM

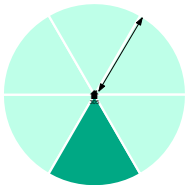
Viewpoint Number/ Receptor ID	Distance to nearest turbine (m)	Nearest turbine ID	Total Number of visible turbines across both schemes	Number of partially visible turbines in Rangoon Wind Farm	Number of fully visible turbines in Rangoon Wind Farm	Number of partially visible turbines in White Rock Wind Farm	Number of fully visible turbines in White Rock Wind Farm	Number of 60degree sectors	Visible Turbines within RWF-North
305	3998	MELRNG1	12	12	0	0	0	1	MELRNG 1-11, 11
306	5402	139 (WRWF)	1	1	0	0	0	1	MELRNG 1
311	4788	139 (WRWF)	23	5	7	6	5	3	MELRNG 1-9, 12-12
401	3882	139 (WRWF)	29	4	0	22	3	3	MELRNG 1,2,4,6
405	3828	MELRNG1	9	4	0	5	0	2	MELRNG 1-3
409	4720	139 (WRWF)	14	10	0	4	0	2	MELRNG 1-9,12
419	3928	MELRNG1	9	4	0	5	0	2	MELRNG 1-4
420	4708	MELRNG1	16	10	0	6	0	2	MELRNG 1-10
507	5258	135 (WRWF)	6	6	0	0	0	1	MELRNG 1-6
602	5247	135 (WRWF)	1	1	0	0	0	1	MELRNG 3
614	5733	MELRNG1	11	6	0	5	0	2	MELRNG 1-5
709	3072	135 (WRWF)	6	5	0	1	0	3	MELRNG 0
802	5349	135 (WRWF)	10	0	0	10	0	1	None visible
805	5126	135 (WRWF)	8	0	0	8	0	1	None visible
811	3286	135 (WRWF)	2	0	0	2	0	1	None visible
813	3278	135 (WRWF)	0	0	0	0	0	1	None visible

Receptor 305

The viewpoint is located along the hilltops and has far reaching views into the surrounding area to the north, south and east.

Potential impacts

- White Rock stage 2 turbines are not likely to be viewed within 8km of this viewpoint.
- There is the potential to view 12 turbines within RWF North to the south of this viewpoint. Two of these turbines have the potential to view from the ground to the tip. The closest turbine will be approximately 4km distance away.



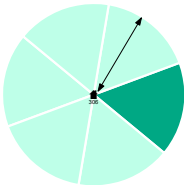
60 degree sectors in which wind turbines are potentially visible within 8km from the representative viewpoint.

Receptor 306

The viewpoint is located along the hilltops and has far reaching views into the surrounding area to the north, south and east.

Potential impacts

- White Rock stage 2 turbines are not likely to be viewed within 8km of this viewpoint.
- There is the potential to view one (1) turbine within RWF North to the east of this viewpoint. This turbine will be approximately 5.4km distance away.

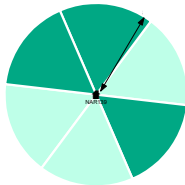


Receptor 311

The viewpoint is located along the hilltops and has far reaching views into the surrounding area.

Potential impacts

- Approximately 11 White Rock turbines are visible within 8km of this viewpoint.
- There is the potential to view 12 turbines within 8km of RWF North to the southeast of this viewpoint.

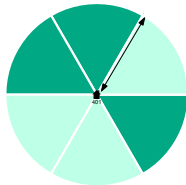


Receptor 401

The viewpoint is located along the hilltops and has far reaching views into the surrounding area.

Potential impacts

- Approximately 25 turbines are potentially visible within 8km of White Rock stage 2, to the north and northwest of this viewpoint.
- There is the potential to partially view four (4) turbines within 8km from RWF North, southeast of this viewpoint. The closest turbine will be approximately 3.8km distance away.

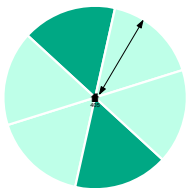


Receptor 405

The viewpoint is located along the hilltops and has far reaching views into the surrounding area.

Potential impacts

- Approximately five (5) turbines are potentially visible within 8km of White Rock stage 2, to the northwest of this viewpoint.
- There is the potential to partially view four (4) turbines within 8km from RWF North, southeast of this viewpoint. The closest turbine will be approximately 3.8km distance away.



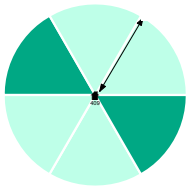
60 degree sectors in which wind turbines are potentially visible within 8km from the representative viewpoint.

Receptor 409

The viewpoint is located along the hilltops and has far reaching views into the surrounding area.

Potential impacts

- Approximately four (4) turbines are potentially visible within 8km of White Rock stage 2, to the northwest of this viewpoint.
- There is the potential to partially view 10 turbines within 8km from RWF North, southeast of this viewpoint. The closest turbine will be approximately 4.7km distance away.

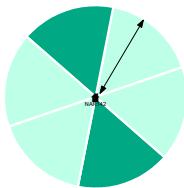


Receptor 419

The viewpoint is located along the hilltops and has far reaching views to the north and south.

Potential impacts

- Approximately five (5) turbines within the east of White Rock stage 2, are likely to be seen to the northwest of this viewpoint.
- There is the potential to view four (4) turbines within RWF North to the south of this viewpoint.

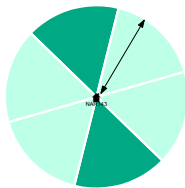


Receptor 420

The viewpoint is located along the hilltops and has far reaching views into the surrounding area to the east and west.

Potential impacts

- The ZTV mapping indicates six (6) turbines within the southeast of White Rock stage 2, are likely to be seen to the northwest of this viewpoint.
- There is the potential to view 10 turbines within RWF North to the south of this viewpoint. Two (2) of these turbines have the potential to be viewed from the ground to the tip of blades.

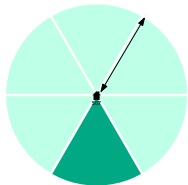


Receptor 507

The viewpoint is located along the hilltops and has far reaching views into the surrounding area.

Potential impacts

- White Rock stage 2 turbines are not likely to be viewed within 8km of this viewpoint.
- There is the potential to view six (6) turbines from RWF North, within 8km south of this viewpoint. The closest turbine will be approximately 5.2km distance away.



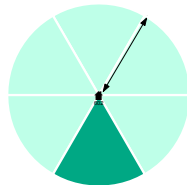
60 degree sectors in which wind turbines are potentially visible within 8km from the representative viewpoint.

Receptor 602

The viewpoint is located along the hilltops and has far reaching views to the surrounding area.

Potential impacts

- White Rock stage 2 turbines are not likely to be viewed within 8km of this viewpoint.
- There is the potential to view one (1) turbine within RWF North to the south of this viewpoint.

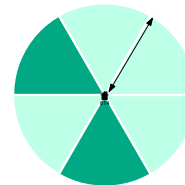


Receptor 614

The viewpoint is located along the hilltops and has far reaching views into the surrounding area to the east and west.

Potential impacts

- The ZTV mapping indicates five (5) turbines within the White Rock stage 2, are likely to be visible within 8km northwest of this viewpoint.
- There is the potential to view six (6) turbines from RWF North, within 8km south of this viewpoint.

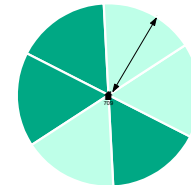


Receptor 709

The viewpoint is located along the hilltops and has far reaching views to the north and south.

Potential impacts

- Approximately one (1) turbine is potentially visible within 8km of White Rock stage 2 for this viewpoint.
- There is the potential to view five (5) turbines within RWF North to the southeast of this viewpoint.

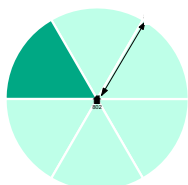


Receptor 802

The viewpoint is located along the hilltops and has far reaching views into the surrounding area.

Potential impacts

- The ZTV mapping indicates visibility of 10 turbines within 8km of eastern White Rock stage 2, to be seen to the northwest of this viewpoint.
- Views of the RWF are unlikely to be seen within 8km from this viewpoint, likely due to intervening topography.



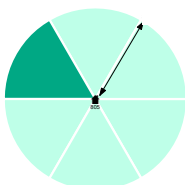
60 degree sectors in which wind turbines are potentially visible within 8km from the representative viewpoint.

Receptor 805

The viewpoint is located along the hilltops and has far reaching views.

Potential impacts

- Approximately eight (8) turbines within the east of White Rock stage 2, within 8km northwest of this viewpoint.
- Views of the RWF are unlikely to be seen within 8km from this viewpoint.

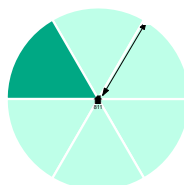


Receptor 811

The viewpoint is located along the hilltops and has far reaching views.

Potential impacts

- Approximately two (2) turbines within the east of White Rock stage 2 would be visible
- Views of the RWF are unlikely to be seen from this viewpoint, likely due to intervening topography.

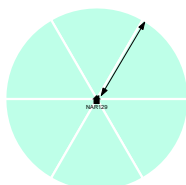


Receptor 813

The viewpoint is located along the hilltops and has far reaching views to the north and south.

Potential impacts

- Turbines within White Rock stage 2 at 200m height are unlikely to be seen within 8km from this viewpoint, likely due to intervening topography.
- Views of the RWF are unlikely to be seen from this viewpoint, likely due to intervening topography.



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07

Summary

Summary of Results

Landscape Character Impacts

There are no planning overlays within the study area designating protection to any of the landscape character types.

- Towns & Settlements: The Low sensitivity and Low magnitude of change would result in a [Low landscape impact](#).
- Agricultural Tablelands: The Low sensitivity and Medium magnitude of change would result in a [Moderate landscape impact](#).
- Bushland Reserves: The Medium sensitivity and Negligible magnitude of change would result in a [Negligible landscape impact](#).

Further investigation:

- During the EIS stage, careful consideration is to be given to the siting and design of the turbines and associated infrastructure.
- A site visit is required to ground truth existing landscape conditions.

Visual Impacts

Of the ten (10) representative viewpoints, the preliminary assessment has identified that the visual impacts as experienced in the two (2) Ben Lomond representative viewpoints are likely to have a Moderate visual impact with Maybole Road anticipated to experience a Low-Moderate impact. The village is in close proximity to proposed wind turbines which have the potential to be prominent within the view.

Other viewpoints are likely to be of low or negligible ratings. The reason for this is likely due to the undulating topography of the area, coupled with intervening vegetation within these viewpoints that screens visibility of proposed wind turbines. However, this assumption has been drawn from a desk study analysis and will need to be confirmed on-site during the EIS stage.

Four (4) of the representative viewpoints have the potential to view turbines in three or more 60degree sectors.

- Viewpoint 1 - War Memorial Hall, Ben Lomond
- Viewpoint 2 - Ben Lomond Primary School
- Viewpoint 6 - New England Highway roadside rest area
- Viewpoint 8 - Maybole Road

There are 51 non-associative receptors (residential dwellings) identified that are within

3.3km of a proposed turbine. 25 of these receptors have the potential for turbines to be visible in three (3) or more 60degree sectors, including:

- Receptor 101
- Receptor 105
- Receptor 106
- Receptor 109
- Receptor 110
- Receptor 111
- Receptor 202
- Receptor 205
- Receptor 207
- Receptor 214
- Receptor 216
- Receptor 219
- Receptor 221
- Receptor 222
- Receptor 223
- Receptor 224

- Receptor 225
- Receptor 227
- Receptor 228
- Receptor 230
- Receptor 231
- Receptor 233
- Receptor 234
- Receptor 235
- Receptor 238

Additionally, 13 receptors have the potential of viewing the full height of 1 or more turbines within a 3.3km proximity, including:

- Receptor 101
- Receptor 103
- Receptor 107
- Receptor 109
- Receptor 110
- Receptor 202
- Receptor 204
- Receptor 205

- Receptor 211
- Receptor 214
- Receptor 215
- Receptor 224
- Receptor 225

Further investigation:

- During the EIS stage, based on the proposed turbine layout, the receptors identified are to be further investigated to determine existing ground conditions and extent of turbines visible.
- Further ZTV analysis to determine the degree to which a turbine can be viewed from selective viewpoints, including:
 - Visibility of full turbine height from ground level
 - Visibility of the entire swept path of the wind turbine
 - Visibility of from turbine hub to blade tip.

Cumulative Impacts

There are 16 non-associated receptors with a potential to experience cumulative impacts of two or more wind farms within a distance of 8km. The cumulative analysis identifies that three (3) of these receptors have the potential to view wind turbines in three or more visible 60 degree sectors.

- Receptor 401
- Receptor 709
- Receptor 311

Further investigation:

- The cumulative analysis from receptors within Ben Lomond has not been included in this study and is a recommendation for further investigation in the EIS stage.
- Site visit required to ground truth existing landscape conditions of identified receptors.

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Rangoon Wind Farm

Preliminary Landscape and
Visual Impact Assessment

August 2020