Tchelery Wind Farm project

Technical paper 5A –
Landscape and Visual Impact Assessment

April 2025

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1. Introduction

Neoen proposes to construct and operate the project, a utility scale renewable energy development near Keri Keri in the Riverina Murray region of New South Wales (NSW). The project site is located at 46 Kerri East Road, Moulamein, within Edward River Local Government Area (LGA), shown in Figure 3.1 of the Environmental Impact Statement (EIS). Approval is sought under Division 4.7 of Part 4 State Significant Development of the *Environmental Planning and Assessment Act 1979* (EP&A Act) and Part 9, Division 1 of the *Environmental Protection and Biodiversity Conservation Act 1999* (EPBC Act).

Fully constructed, the project would include up to 74 wind turbine generators (WTGs) providing a total generation capacity of up to 577 megawatts (MW) and up to 350 MW Battery Energy Storage System (BESS) with a maximum energy storage capacity of 1,450 megawatt-hours (MWh). The project would be connected into the National Electricity Market (NEM) through Project EnergyConnect (NSW – Eastern Section) or the existing 220 kilovolt (kV) transmission line (both of which run through the project site) or similar electricity network infrastructure. The project supports the NSW Government's objectives to increase renewable energy generation, storage and investment in the South West REZ under the Electricity Infrastructure Roadmap (Department of Planning, Industry and Environment (DPIE), 2020).

Key features of the project include:

- up to 74 WTGs with a hub height of 170 metres to a maximum tip height of 270 metres (subject to available technology at construction)
- generating capacity of around 577 MW, the final capacity would be determined through the Original Equipment Manufacturer selection process
- a BESS with a maximum energy storage capacity of 1,450 MWh
- temporary ancillary infrastructure, including construction compounds, laydown areas and stockpiles, concrete batching plants and workforce accommodation camp
- permanent ancillary infrastructure, including operation and maintenance (O&M) facility, internal access tracks and hardstands, transmission lines, a 330 kV switchyard, three collector substations and up to six meteorological masts.

The project is being assessed as a State Significant Development (SSD) under Part 4 of the *Environmental Planning & Assessment Act 1979* (Application Number: 59701722). Planning Secretary's Environmental Assessment Requirements (SEARs) for the project issued on 25 July 2023 identified key issues that must be addressed in the EIS. Revised SEARs based on the current project description including the BESS and port to site transport routes were issued by NSW Department of Planning, Housing and Infrastructure (DPHI) on 14 February 2025.

1.1. Assessment requirements

This Landscape and Visual Impact Assessment (LVIA) has been prepared in accordance with the *Wind Energy: Visual Assessment Bulletin for State Significant Wind Energy Development* (DPE, December 2016), referred to hereafter as 'the Bulletin'. It is intended to assist DPHI and the community to understand the potential impacts on landscape character and visual amenity and has been prepared to address items identified in the SEARs (refer to Table 1-1).

The visual assessment process is broken into two main stages in the Bulletin, including:

- Stage 1 Preliminary Environmental Assessment (PEA), using the preliminary assessment tools (prepared in the Project Scoping Report (submitted in June 2023), and summarised in section 5.1)
- Stage 2 Assessment and Determination, requiring preparation of a visual assessment as part of the EIS (this LVIA).

Figure 1-1 shows the steps required for visual assessment in the Bulletin, including 'Prepare EIS', for which this LVIA has been prepared. Table 1-2 shows where the Bulletin Stage 2 requirements have been addressed in this LVIA.

TABLE 1-1 SECRETARY'S ENVIRONMENTAL ASSESSMENT REQUIREMENTS

Reference	Secretary's Environmental Assessment Requirements	Where addressed in this LVIA
Landscape and visual	Including a detailed assessment of the visual impacts of all components of the project (including turbines, transmission lines, substations, and any other ancillary infrastructure in accordance with the NSW Wind Energy: Visual Assessment Bulletin (DPE, 2016), including detailed consideration of:	Project components considered in the assessment are described in LVIA chapter 2
	● potential visual impacts on local residences (including approved developments, lodged development applications and dwelling entitlements);	Refer to LVIA chapter 5
	● cumulative impacts with the proposed Keri Keri Wind Farm, Baldon Wind Farm and Wilan Wind Farm;	Refer to LVIA section 5.6
	● the project design to avoid or mitigate visual impacts; and	Refer to LVIA chapter 6
	● amenity values of any scenic or significant vistas and road corridors in the public domain.	Refer to LVIA chapter 5

TABLE 1-2 KEY REQUIREMENTS OF THE BULLETIN (STAGE 2 ASSESSMENT AND DETERMINATION) AND LVIA RESPONSE

Stage 2 requirement	Where addressed in this LVIA
Assessment of the likely visual impacts including:	
● *"preparation of visual baseline study inputs, including consulting the community on aspects of the baseline study"*	Refer to LVIA chapter 3 and 4
● *"establish visual influences zones from viewpoints using data collected in the baseline study"*	Refer to LVIA section 5.2.2.1
● *"visual performance evaluation requiring application of visual performance objectives to the proposed wind turbine layout."*	Refer to LVIA Table 5-6 and Appendix A

Detailed methodologies for each part of the assessment have been included in the relevant chapters of the LVIA.

FIGURE 1-1 STEPS IN VISUAL ASSESSMENT (SOURCE: THE BULLETIN, DPE, 2016)

1.2. Project study area

An area of eight kilometres from the outermost WTGs has been used as the study area for this assessment. The Bulletin states that this study area is considered to include locations where there would be the potential for the highest impacts on landscape character and visual amenity, because at "*eight kilometres, turbines and objects recede into the background in terms of visibility*" (DPE, 2016, p.9) and the scale of the WTGs is unlikely to dominate the landscape character on areas over eight kilometres away.

2. Project elements

The key visible components of the project are described in Table 2-1. The features of the proposed WTG are shown on Figure 2-1 and the layout of the project and associated infrastructure is shown on Figure 2-2.

TABLE 2-1 KEY PROJECT COMPONENTS

Project element	Description
Project site address	46 Kerri East Road, Moulamein
Project site area	About 288 square kilometres
Construction footprint	About 650.2 hectares
Operational footprint	About 505 hectares
Project site access	• Maude Road (north of Dry Lake Road) • Boorooban-Tchelery Road (west of the project site) • Maude Road (south of the project site).
Wind turbine generators (WTG)	• up to 74 WTGs with a generating capacity of up to 577 megawatts (MW) • maximum hub height of 170 metres • maximum tip height of 270 metres.
Battery energy storage system (BESS)	• up to 395 containers with a total storage capacity of up to 350 MW/1,450 megawatt-hours (MWh) • located within the eastern construction facilities area (described below)
Permanent electrical infrastructure	Connection directly into Project EnergyConnect or the existing 220 kilovolt (kV) transmission line or similar network infrastructure via the following infrastructure: • one switchyard located within the eastern construction facilities area (described below) • up to three collector substations • underground 33 kV transmission lines connecting the WTGs to the collector substations • overhead 33 kV transmission lines connecting the WTGs to the collector substations • overhead and underground 330 kV transmission lines connecting the collector substations to the switchyard.
Operational ancillary facilities	• operation and maintenance (O&M) facility • fibre-optic communication lines between each WTG and the operation and maintenance facility • internal access tracks from the project site entrances to each WTG • up to six meteorological masts.

Construction ancillary facilities	• western construction facilities area, including:
	  ○ construction workforce amenities
	  ○ concrete batching plant
	  ○ laydown area for temporary storage of plant, equipment and materials
	• eastern construction facilities area, including:
	  ○ construction workforce amenities
	  ○ concrete batching plant
	  ○ laydown area for temporary storage of plant, equipment and materials
	• construction compound on Maude Road
	• workforce accommodation camp on Maude Road, south of the project site access location near the intersection with Dry Lake Road
	• access tracks from the site entrances to each WTG.

Visual markers	Visual marker balls, or similar device, may be required by the transmission network provider.

Project element	Description
Lighting	Project lighting may be required: • at the substations and O&M facility • on some WTGs and wind monitoring towers (WMTs) • on some the transmission line structures. • Lighting would be installed at the substations and the O&M facility to enable critical maintenance work to be undertaken safely at night. These lights would be of low intensity and directed downwards in accordance with relevant Australian Standards. The visual impact of project lighting is considered in section 5.3 of this LVIA.
Timing	• construction: 2027-2029 • operation: 2030-2060.
Hours of operation	• construction: seven days per week during both standard and non-standard construction hours (refer to Section 3.4.1.4 in Chapter 3 (Project description) of the EIS) • operation: 24 hours per day, seven days per week.
Workforce	• construction: o estimated daily average: 300 Full-Time Equivalent (FTE) workers o project peak: 530 FTE workers • operation: up to 20 FTE workers.
Public infrastructure work	Modifications and/or upgrades to the road network to facilitate oversize overmass (OSOM) transport to the project site are outlined in Section 3.3.1.7 in Chapter 3 (Project description) of the EIS.

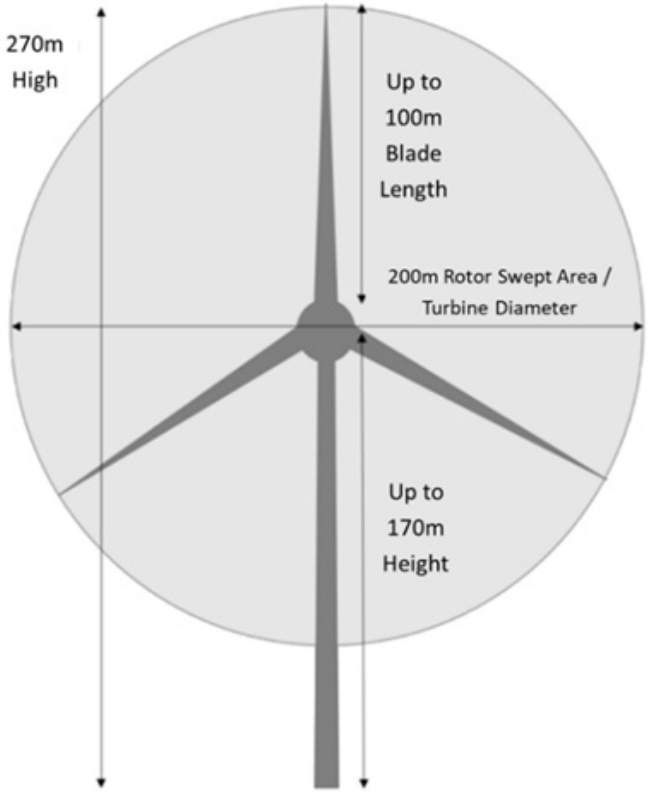
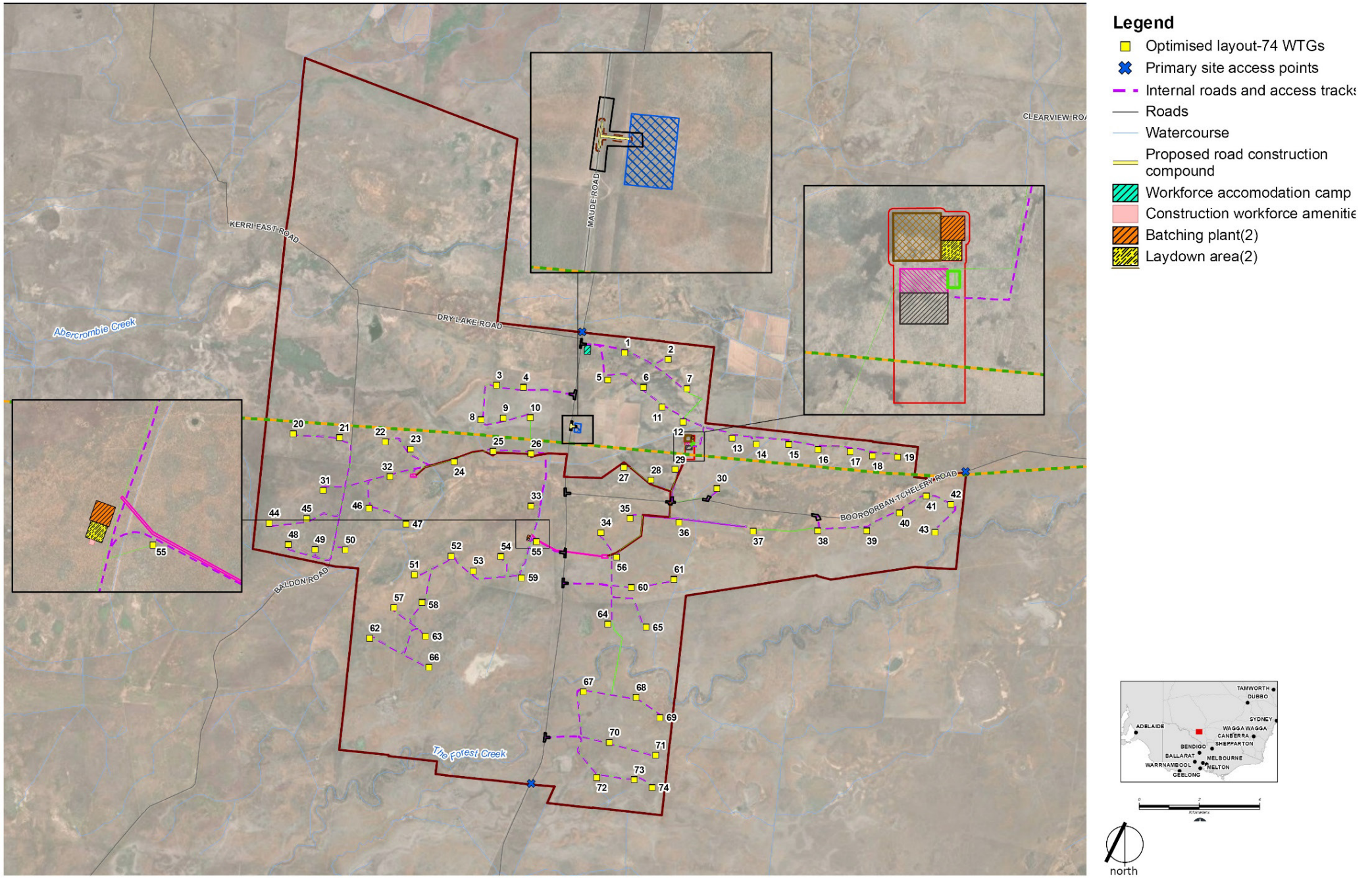


FIGURE 2-1 ELEVATION OF THE PROPOSED WTG FOR THE TCHELERY WIND FARM



Tchelery Wind Farm Landscape and visual impact assessment

Figure 2-2 Project layout

3. Community engagement

Since 2022, a wide-ranging engagement program has been developed to consider the range of stakeholders that may potentially be impacted by or interested in the project. Specific engagement activities that have been undertaken to date for the project include a website, project e-mail and contact number, local media advertising, host landholder consultation, and community information sessions. Visual impact and landscape values were not a key theme emerging from the community engagement. No particular landscape features or vantage points were identified by the local community for further consideration.

Neighbours were visited and photographs of views from their dwellings were taken in 2024. Some properties were visited and assessed due to interest by neighbours although the Bulletin would not require assessment from these locations. This includes St Pauls and Keri East (refer to Figure 4-5 for the location of these dwellings). The potential for visual impact was raised by landholders during these visits. Most of the close neighbours are involved with other renewable energy projects, and the response to this project has generally been favourable and collaborative.

The Bulletin also notes that… "*where a regional survey or study of landscape values has been undertaken, it must be considered*" (p.7). No regional surveys or study of landscape values within or surrounding the project have been found.

4. Visual Baseline Study

The Bulletin states…. "*A visual baseline study must be undertaken to establish the existing landscape and visual conditions. This forms the basis of determining the level of impacts of a proposed wind energy project. The baseline study is prepared and evaluated by the proponent prior to undertaking any visual analysis*" (p.14).

The following sections provide a review of the existing landscape and visual conditions of the project site and surrounding study area.

4.1. Sensitive Land Use Designations

The Bulletin identifies sensitive land use designations as… "*key National and State sensitive land use designations along with potentially sensitive LEP land use zones*" (p.27) such as National Parks and land zoned for residential, environmental and recreational uses. Sensitive land use designations and zones listed in the Bulletin are shown in Table 4-1.

TABLE 4-1 SENSITIVE LAND USE DESIGNATIONS

National and State sensitive land use designation	LEP zones as per the NSW Standard LEP	
World Heritage Areas	RU5 Village	RE2 Private Recreation
National Parks	R1 General Residential	E1 National Parks and Nature Reserves
National Reserve System reserves	R2 Low Density Residential	E2 Environmental Conservation
Coastal Zone (under the former *Coastal Protection Act 1979* (now *Coastal Management Act 2016*)	R3 Medium Density Residential	E3 Environmental Management
Marine estate (under the *Marine Estate Management Act 2014*)	R4 High Density Residential	E4 Environmental Living
Commonwealth Heritage List Sites	R5 Large Lot Residential	W1 Natural Waterways
State Heritage Register Sites	SP3 Tourist	W2 Recreational Waterways
	RE1 Public Recreation	

Source: Source: Wind Energy: Visual Assessment Bulletin, DPE, 2016 (Table 3, p.27)

The project is located in a rural area south of Hay (refer to Figure 4-5). The entire site and land within the eight kilometre study area is zoned RU1 Primary Production, that is not listed in Table 4-1 and therefore not considered to be a sensitive land use designation in the Bulletin (refer to Table 4-1).

4.2. Scenic quality classes

The Bulletin states: "*Scenic quality refers to the relative scenic or aesthetic value of the landscape based on the relative presence or absence of key landscape features known to be associated with community perceptions of high, moderate or low scenic quality. It is both a subjective and complex process undertaken by experts in visual impact assessment, taking into account community values identified in early community consultation*" (p.17).

Table 4-2 lists the scenic quality classes that apply to this assessment, in line with the Bulletin (p.33). These classes have been used to inform the identification of landscape character and key landscape features in the study area, at section 4.3 of this report.

TABLE 4-2 SCENIC QUALITY CLASSES

	High scenic quality	Moderate scenic quality	Low scenic quality
Landform	• Isolated peaks, tabletop hills, cones or escarpments with distinctive form and/or colour contrast that become focal points • Larger areas of distinctive rock outcrops or boulders • Well defined, steep sided valley gorges	• Rounded hills, ridges and peaks which are not visually dominant • Broad shallow valleys • Moderately deep gorges or moderately steep valley walls • Minor rock outcrops	• Large expanses of indistinctly dissected or unbroken landforms that provide little illusion of spatial definition or landmarks with which to orient.
Vegetation	• Strongly defined patterns with combinations of eucalypt forest, naturally appearing openings, streamside vegetation and/or scattered exotics. • Distinctive stands of vegetation that may create unusual forms, colours or textures in comparison to surrounding vegetation.	• Predominantly open forest or woodland combined with some natural openings in patterns that offer some visual relief. • Vegetative stands that exhibit a range of size, form, colour, texture and spacing.	• Extensive areas of similar vegetation, such as grasslands with very limited variation in colour and texture.
Waterforms	• Visually prominent lakes, reservoirs, rivers, streams and swamps.	• Intermittent streams, lakes, rivers, swamps and reservoirs.	• Waterforms absent.

Source: Wind Energy: Visual Assessment Bulletin, DPE, 2016 (Table 7, p.33)

4.3. Landscape character types and key features

Identification of the existing landscape character types and key landscape features within the study area has been undertaken to support the visual baseline study.

The project area is located within the Riverina Bioregion as delineated in the Interim Biogeographic Regionalisation for Australia (IBRA) Version 7, and within the Murrumbidgee Subregion. Figure 4-5 shows the site location, context and topography in the study area.

Three landscape character types have been identified in the study area, these are:

- Hay open rural plains
- Tchelery undulating pastoral landscape
- Forest Creek rural valley.

The location of these landscape character types is shown in . The character and key features of this landscape is described in the following paragraphs.

A range of landscape character option descriptions are provided in the Bulletin. These are included in Table 4-3.

TABLE 4-3 VIEWER SENSITIVITY LEVEL CLASSIFICATION OF TRAVEL ROUTES AND USE AREAS

Landscape character options	Description
Naturally Evolving	Landscape character expressing the natural evolution of biophysical features and processes, with very limited human intervention.
Natural Appearing	Landscape character that expresses predominantly natural evolution, but also human intervention including cultural features and processes.
Cultural	Landscape character expressing built structures and landscape features that display the dominant attitudes and beliefs of specific human cultures.
Pastoral	Landscape character expressing dominant human created paddocks (pastures) or grasslands and associated structures, reflecting valued historic land uses and lifestyles.
Agricultural	Landscape character expressing dominant agricultural land uses producing food crops and domestic products – cultivated croplands.
Historic	Landscape character expressing valued historic features that represent events and period of human activity in the landscape.
Wind Energy	Landscape character expressing dominant wind energy uses that exert a strong visual influence over the pre-existing character of the landscape primarily in the form of tall wind turbines with moving blades, access roads, substations and supporting infrastructure.
Urban / Rural villages	Landscape character expressing concentrations of human activity, primarily in the form of residential, commercial, industrial, cultural, educational, transportation structures and supporting infrastructure.

The landscape types are illustrated in Figure 4-6 and in the photographs illustrated in Figure 4-1 to Figure 4-3.

The landscape character types are used during the performance evaluation phase to assess to what extent the existing landscape character may potentially be modified by the proposed project.

4.3.1.Landscape Character type 1 - Hay open rural plains

Key features:

- The Hay open rural plains are characterised by large expanses of indistinctly dissected or unbroken landform.
- Waterbodies include farm dams and irrigation channels, as well as some naturally occurring seasonal dry lakes within the floodplain.
- Key landscape features are subtle, including the seasonal dry lakes and areas of native saltbush. This sparsely vegetated landscape, consisting predominantly of large fields used for livestock grazing with some areas of arable farmland, including irrigated and dryland farming. Flat landform and sparse vegetation cover allows expansive views across the flat, rural landscape to the horizon.
- Existing large-scale power infrastructure includes the 220 kV Darlington Point to Balranald transmission lines, as well as the approved Project EnergyConnect transmission lines (under construction).
- RU1 Primary Production zoning, with an objective to… “allow for the development of non-agricultural land uses that are compatible with the character of the zone” (Conargo Local Environmental Plan, 2013).

Landscape character:

- natural appearing
- agricultural
- cultural (minor).

Scenic quality class:

Low

FIGURE 4-1 LANDSCAPE CHARACTER TYPE 1 – HAY OPEN RURAL- REFERENCE PHOTOGRAPHS

4.3.2.Landscape Character type 2 - Tchelery undulating pastures

Key features:

- large expanses of flat to gently undulating landform, slightly elevated above the surrounding rural plains
- waterbodies include farm dams and constructed drainage lines
- key landscape features are subtle, including areas of native saltbush and low native woodland
- existing large-scale power infrastructure includes the 220 kV Darlington Point to Balranald transmission lines, as well as the Project EnergyConnect transmission lines (under construction)
- RU1 Rural Production zoning, with an objective to… "allow for the development of non-agricultural land uses that are compatible with the character of the zone" (Conargo Local Environmental Plan 2013).

Landscape character:

- natural appearing
- agricultural
- cultural (minor).

Scenic quality class:

Low.

FIGURE 4-2 LANDSCAPE CHARACTER TYPE 2 – TCHELERY UNDULATING PASTURES - REFERENCE PHOTOGRAPHS

4.3.3.Landscape Character type 3 - Forest Creek rural valley

Key features:

- narrow creek valley meanders through the Murrumbidgee River rural plains south of Hay
- native vegetation along creek valley offer some visual relief from surrounding plains
- vegetative stands exhibit a range of size, form, colour, texture and spacing, including low Eucalyptus and Acacia woodland.

Landscape character:

- natural appearing
- riverine
- cultural (minor).

Scenic quality class:

Moderate.

FIGURE 4-3 LANDSCAPE CHARACTER TYPE 3 – FOREST CREEK RURAL VALLEY - REFERENCE PHOTOGRAPHS

4.4. Existing nighttime environment

AS4282 (2023) identifies environmental zones which are useful for categorising nighttime landscape settings. This LCVIA uses these environmental zones to describe the existing night-time environment (see Table 4-4).

TABLE 4-4 NIGHTTIME ENVIRONMENTAL ZONES

Environmental zone (from AS4282:2023)	Examples
A0: Intrinsically dark	• UNESCO Starlight Reserve; International Dark-Sky Association Dark Sky Parks, Reserves or Sanctuaries; Major optical observatories • Other accreditations for dark sky places for example astrotourism, heritage value, astronomical importance, wildlife/ecosystem protection • Lighting for safe access may be required
A1: Dark	• Relatively uninhabited rural areas (including terrestrial, marine, aquatic and coastal areas) • Generally roadways without street lighting through rural areas
A2: Low district brightness	• Sparsely inhabited rural and semi-rural areas • Generally roadways without street lighting through suburban, rural or semi-rural areas other than intersections
A3: Medium district brightness	• Suburban areas in towns and cities • Generally roadways with street lighting through suburban, rural or semi-rural areas
A4: High district brightness areas	• Town and city centres and other commercial areas • Residential areas abutting commercial areas • Industrial and port areas • Transport interchanges
TV: High district brightness	• Vicinity of major sport and event stadiums during TV broadcasts

** AS/NZS 4282 is the shared Australian and New Zealand standard establishing requirements for the control of the obtrusive effects from outdoor lighting*

Note: Zones AO and A1 would normally have a minimum area of 50 ha. There may be smaller environmentally sensitive areas.

Figure 4-4 is a light pollution map. It shows light pollution across the geographic area, the main sources of which are the populated towns. The relatively uninhabited rural area of the Tchelery Wind Farm is generally free of light pollution and would be classified as 'A1: Dark' in accordance with Table 4-4.

A discussion on the visual impact of the project on the existing nighttime environment is provided in section 5.6.

FIGURE 4-4 PLAN SHOWING EXISTING NIGHTTIME ENVIRONMENT (SOURCE: LIGHTPOLLUTIONMAP.INFO)

4.5. Other Wind Farm projects

There are a number of approved and proposed renewable energy and electrical infrastructure projects within the broader Riverina region. These projects are listed in Table 4-5.

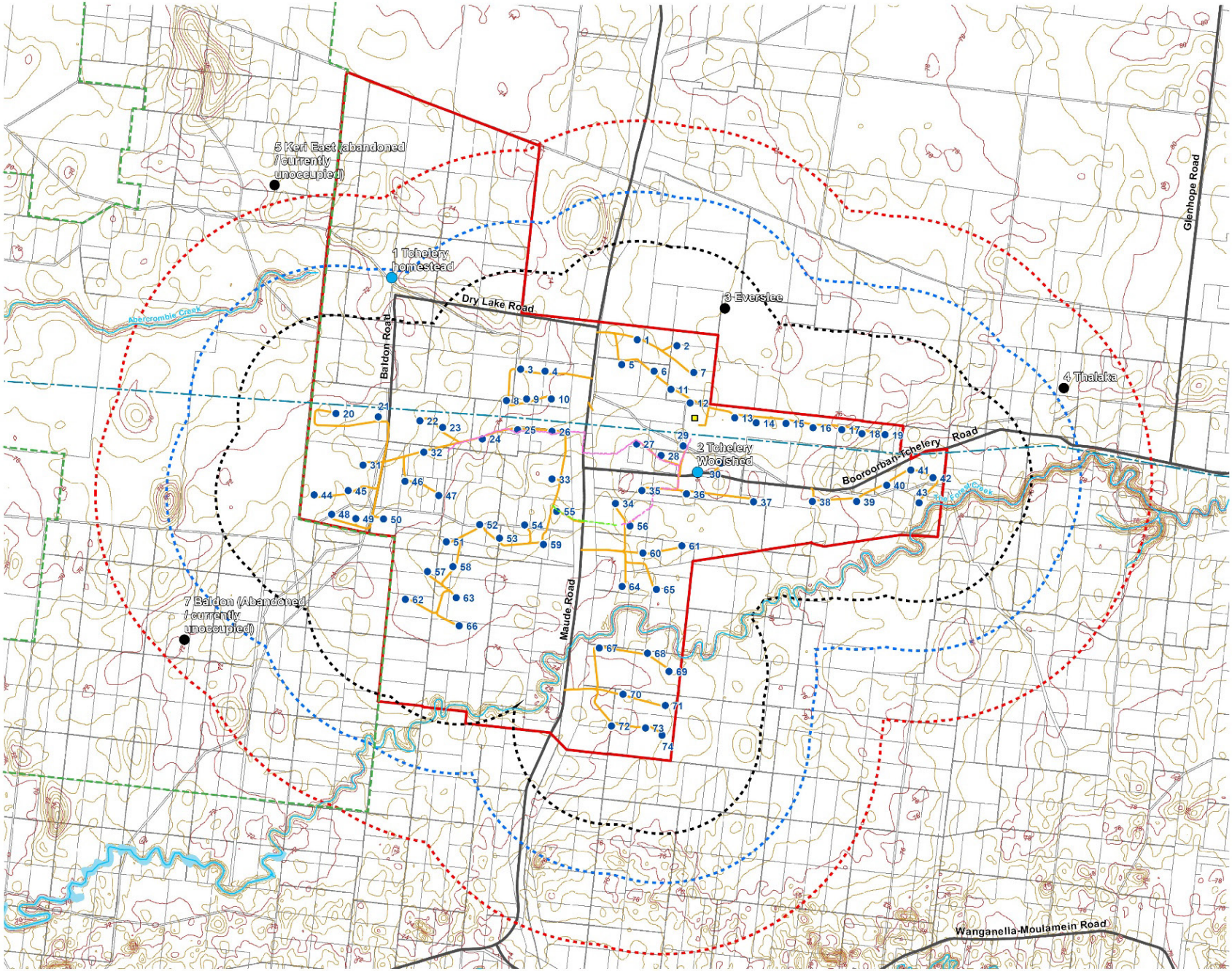
TABLE 4-5 OTHER WIND FARM PROJECTS

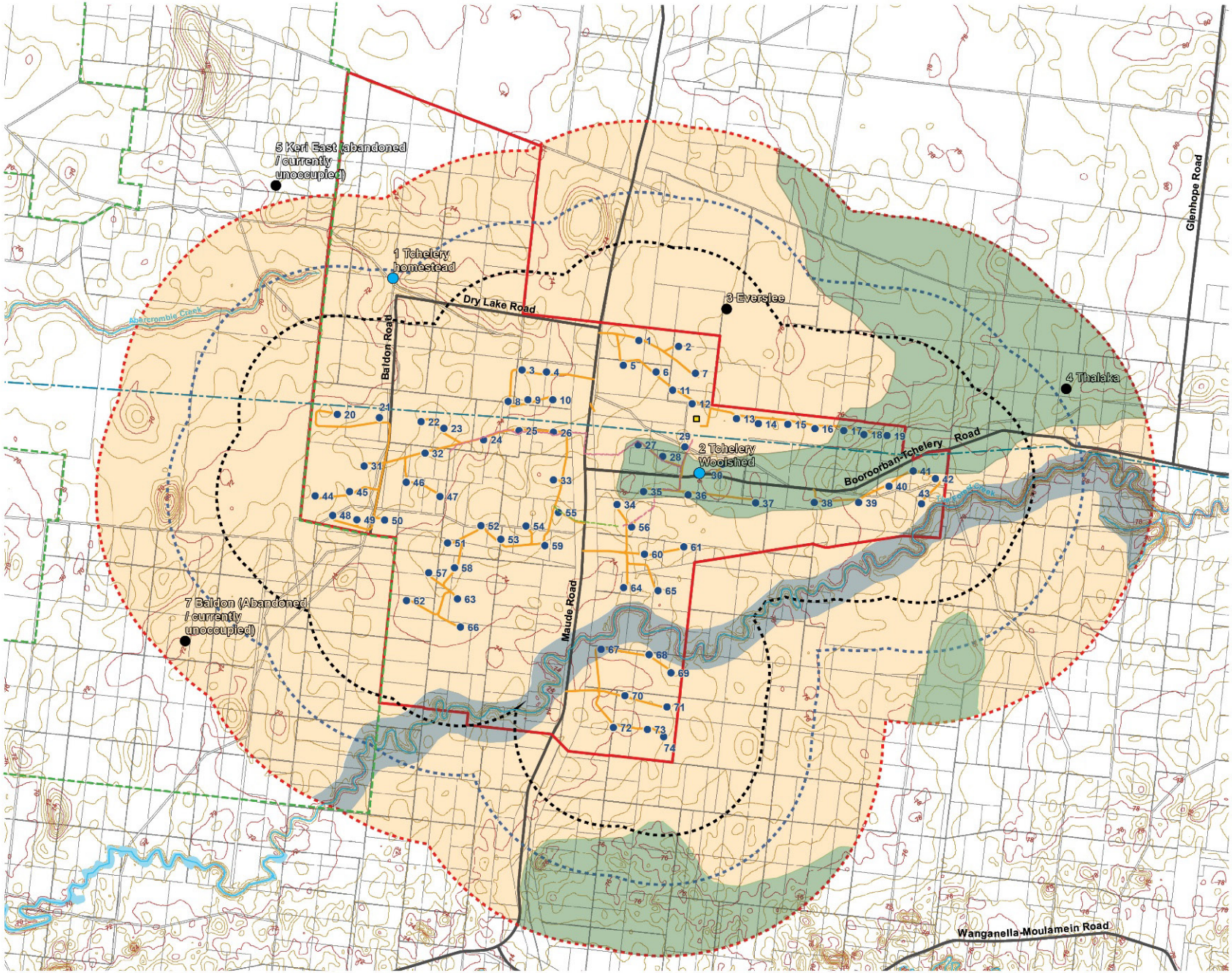
Project	Distance to Tchelery wind farm	Project timeline
Project EnergyConnect (NSW – Eastern Section) (Approved)	Traverses the project	• construction commenced late-2022 (18 months) • planned operation by August 2024
Baldon Wind Farm (Proposed)	Directly west of the project	• construction to commence in Q4 2025 • operation commence in Q2 2029 and • operate for 30 years.
Keri Keri Wind Farm (Proposed)	7.5 kilometres west	• construction expected to start late 2027 • commissioning and operation 2029 • operate for 30 years.
Romani Solar Farm (Proposed)	25 kilometres east	• construction planned for 2025 • operation planned for 2026 • operate for 30 to 40 years.
Abercrombie Wind Farm (Proposed)	25 kilometres north	• construction planned for 2028 • operation planned for 2032 • operate for 35 years.

Project	Distance to Tchelery wind farm	Project timeline
Wilan Wind Farm (Proposed)	35 kilometres northwest	• construction planned for 2024, likely to start 2026 pending DA approval • operation expected by 2029 • operate for 30 years.
Junction River Wind Farm (formerly Burrawong Wind Farm) (Proposed)	40 kilometres west	• construction planned for 2025 • operation by 2029 • operate for 35 years.
West Nyangay Solar Farm (Proposed)	40 kilometres east	• unknown construction and operation timelines.
Booroorban (Saltbush) Wind Farm	50 kilometres east	• construction planned for 2028 • commissioning planned for 2030 • operate for 30-40 years.
Limondale Solar Farm (Operational)	55 kilometres west	• operational since 2021 • operate for 30 years.
Pottinger Wind Farm (Proposed)	60 kilometres east	• construction expected 2026 • operation expected 2027 • operate for up to 35 years.
Wanganella Wind Farm (Proposed)	60 kilometres southeast	• construction planned for 2027 • commissioning planned for 2029 • operational duration unknown.
The Plains Wind Farm (Proposed)	65 kilometres east	• construction planned for 2027 • operation around 2030 • operate for at least 30 years.
The Plains Solar Farm (Proposed)	65 kilometres east	• construction planned for Q4 2026 • operation planned for 2028 • operate for 30 years.
Hay Solar Farm (Approved)	70 kilometres northeast	• development approval issued in 2017 • construction to be completed by 2024 • operate for 30 years.
Sunraysia Solar Farm (Operational)	70 kilometres northwest	• construction complete • operate for 30 years.
Pottinger Solar Farm (Proposed)	70 kilometres east	• construction expected 2026 • operation expected 2028 • operate for up to 50 years.
Balranald Mineral Sands Mine (Approved)	75 kilometres west	• construction and operation commencement unknown • planned to be operational for 9 years followed by 5 years of rehabilitation, closure and decommissioning.

Project	Distance to Tchelery wind farm	Project timeline
Bullawah Wind Farm (Proposed)	80 kilometres east	• construction planned for mid-to-late 2025 and expected to take 48 months • operate for 30 years.
Deniliquin East Battery Energy Storage System (Proposed)	95 kilometres southeast	• construction was planned to begin in 2024 and be completed in 10 to 12 months • operate for 25 years.
Deniliquin Battery Energy Storage System (Proposed)	95 kilometres southeast	• construction planned to begin in March 2027 and take about 12 months • operation planned for March 2028 • operate for 35 years.
Currawarra Solar Farm (Approved)	100 kilometres southeast	• construction was planned for 2018 • operation planned for 2020 • operate for 30 years.
Victoria to NSW interconnector West (Proposed)	45 kilometres southeast	• construction is expected to take 2 years commencing in 2026 • planned to be completed by 2028 and operational in 2029 • operational duration unknown.
Conargo Wind Farm	90 kilometres east	• construction planned to commence in 2027 • operation planned to commence in 2028 or 2029 • operate for 30 years.

A discussion on the cumulative impact of the project with approved and proposed renewable energy and electrical infrastructure projects within the broader Riverina region is provided in section 5.6.


5 Keri East (abandoned / currently unoccupied)
1 Tchelery homestead
3 Eversley
4 Thalaka
2 Tchelery Woolshed
7 Baldon (Abandoned / currently unoccupied)
Dry Lake Road
Baldon Road
Maude Road
Glenhope Road
Booroorban-Tchelery Road
Wanganella-Moulamein Road
Abercrombie Creek
Project site
Proposed turbine
Proposed BESS
Existing 220kV power line
Proposed OHL transmission line 33kV
Proposed OHL transmission line 330kV
Proposed internal road
Dwelling or building associated with proposal
Non-associated dwelling
Contour (2m)
Contour (0.5m)
Proposed Baldon Wind Farm project boundary
Preliminary assessment tool 1 - Visual magnitude thresholds:
3.6 km offset from the proposal
5.4 km offset from the proposal
8km offset from the proposal
north
0 2 4 6
Kilometers


5 Keri East (abandoned / currently unoccupied)
1 Tchelery homestead
3 Eversjee
4 Thalaka
2 Tchelery Woolshed
7 Baldon (Abandoned / currently unoccupied)
Dry Lake Road
Baldon Road
Maude Road
Boorroorban-Tchelery Road
Glenhope Road
Wanganella-Moulamein Road
Project site
Proposed turbine
Proposed BESS
Existing 220kV power line
Proposed OHL transmission line 33kV
Proposed OHL transmission line 330kV
Proposed internal road
Dwelling or building associated with proposal
Non-associated dwelling
Contour (2m)
Contour (0.5m)
Proposed Baldon Wind Farm project boundary
Landscape character units:
1. Hay open rural plains landscape character unit
Tchelery open pastures
Preliminary assessment tool 1 - Visual magnitude thresholds:
3.6 km offset from the proposal
5.4 km offset from the proposal
8km offset from the proposal
north
0 2 4 6
Kilometers

5. Visual impact assessment

5.1. Preliminary assessment

The Wind Farm Bulletin includes several preliminary assessment tools that provide an early indication of where turbines require careful consideration because of potential visual impacts. (p.8).

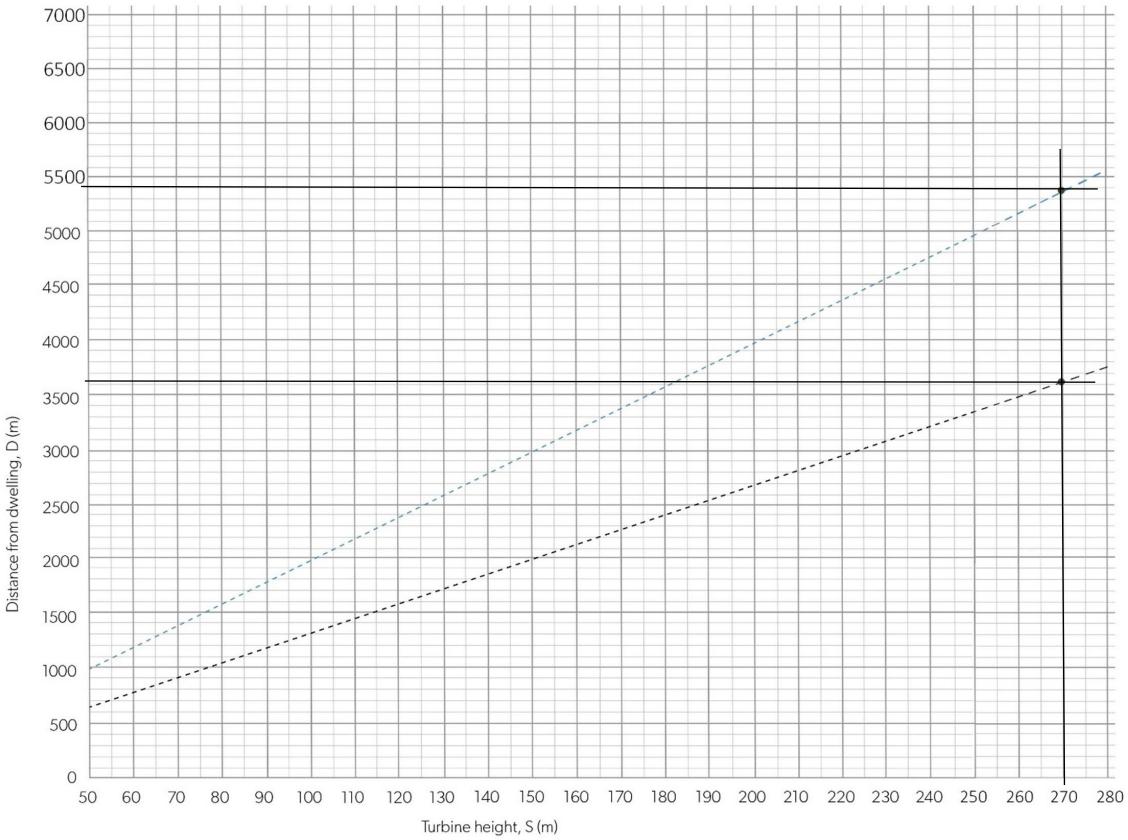
The preliminary assessment involves consideration of two key visual parameters:

- visual magnitude (see section 5.1.1)
- multiple wind turbine tool (see section 5.1.2).

A preliminary assessment was undertaken for the scoping report for this project. However, due to several changes to the project, including a reduction in turbine height, this preliminary assessment has been revised for this report.

5.1.1. Visual Magnitude

The visual magnitude threshold (refer to Figure 5-1) is based on the height of the proposed WTGs to the tip of the blade (270 metres) and distance from dwellings or key public viewpoints. Using the blade tip of 270 metres, this project has a visual magnitude line at 5.4 kilometres and a threshold distance (potentially highly impacted views) of 3.6 kilometres.



Threshold distance line – areas below this line identifies potentially high visual magnitude impacts.

Visual magnitude line – areas below this line provides an indication of where proponents should give detailed consideration to the visual impacts on dwellings or key public viewpoints from turbines

FIGURE 5-1 PRELIMINARY ASSESSMENT TOOL 1

Since the Stage 1 Preliminary Environmental Assessment (PEA) was issued in the Project Scoping Report (submitted in June 2023), the project has reduced in extent and scale, including 74 WTGs (previously 120 WTGs). This change has therefore altered the findings of the PEA, as follows:

- there is now one non-associated dwelling (Dwelling no.3: Everslee, 4026 Maude Road Moulamein)(previously there were four dwellings) within 5.4 kilometres of the project that has the potential to have a high visual impact according to the Bulletin, as shown on Figure 4-5.
- there are two dwellings that are now outside the eight-kilometre study area and do not require assessment, these are:
    - Dwelling no.5: Keri East, 1543 Tchelery Road Moulamein, that are over eight kilometres from the nearest WTG and currently listed as abandoned / currently unoccupied
    - Dwelling no.6: St Pauls, 33251 Sturt Highway Maude, that is over eight kilometres from the nearest WTG and currently listed as abandoned / currently unoccupied.
- there are two dwellings within the eight kilometre study area, as shown on Figure 4-5, that do not require detailed assessment in the Stage 2 assessment, due to the following reasons:
    - Dwelling no.1, Tchelery homestead, that is the dwelling associated with the project
    - Dwelling no.7: Baldon (1543 Tchelery Road, Moulamein), that is over 5.7 kilometres from the nearest WTG and is a caravan.

Therefore, the scope of this assessment is:

- two public viewing locations (Maude and Booroorban-Tchelery Road) within 5.4 kilometres of the project that have the potential to have a high visual impact (consistent with the PEA).
- one non-associated dwelling (Dwelling no.3: Everslee, 4026 Maude Road Moulamein) within 5.4 kilometres of the project.
- one non-associated dwelling (Dwelling no. 4. Thalaka, 3222 Booroorban-Tchelery Road, Booroorban) that is between 5.4 and 8 kilometres of the project.

Community consultation was undertaken with several landholders that are no longer required to be assessed during the scoping phase. Therefore, for some dwellings site photography and an assessment has been undertaken in the interest of maintaining positive relationships with the neighbouring landowners. These dwellings are Dwelling no. 5: Keri East, Dwelling no. 6: St Pauls and Dwelling no.7: Baldon.

The Tchelery Woolshed has not been assessed for visual impacts as it is not a dwelling.

5.1.2.Multiple Wind Turbine Tool

Dwelling no.3: Everslee, that has the potential to have a high visual impact, is located less than 3.6 kilometres from the project and predicted to have views towards WTGs within three or more 60° sectors, including 27 WTGs located less than eight kilometres away and potentially visible.

Both Maude Road and Booroorban-Tchelery Road extend through the project area, and would have views to multiple WTGs, at varying distances, including close-range views, with more than three 60° sectors, for example, at the junction of these roads. To the north, south and east of the project, the number of 60° sectors would reduce, as the project is viewed at greater distances from these roads.

Refer to Appendix A for the analysis of these views and other dwellings and structures both within the eight kilometre study area and visited during neighbour consultation.

5.2.Assessment and determination

5.2.1.Zone of Visual Influence

A zone of visual influence has been prepared to identify the area from which the project is potentially visible. This visibility analysis used a 3D digital terrain model (i.e. a digital graphic representation of elevation data to represent existing landform) and points at the height of the wind farm, to identify the areas from which views to the project may be seen. This visibility is limited to a distance of eight kilometres from the outermost WTGs, as this is the distance at which there is the potential for the project to be prominent in the view.

Figure 5-2 shows the potential visibility of the project. As the project is located in a largely flat landscape, with little intervening vegetation, landform and built form to impede views to the project, the visual catchment mapping has used the full turbine heights of the WTGs (to blade tip) as there was no variation in the visibility of the turbines at different height ranges, as shown in Figure 5-2.

5.2.2.Visual Influence Zones and Visual Performance Evaluation

5.2.2.1. Visual Influence Zones

In line with the Bulletin, three Visual Influence Zones (VIZ) have been used for the project to assess the dwellings and key public viewpoints. Determining the VIZ for each view relies on the data gathered during the baseline study, including:

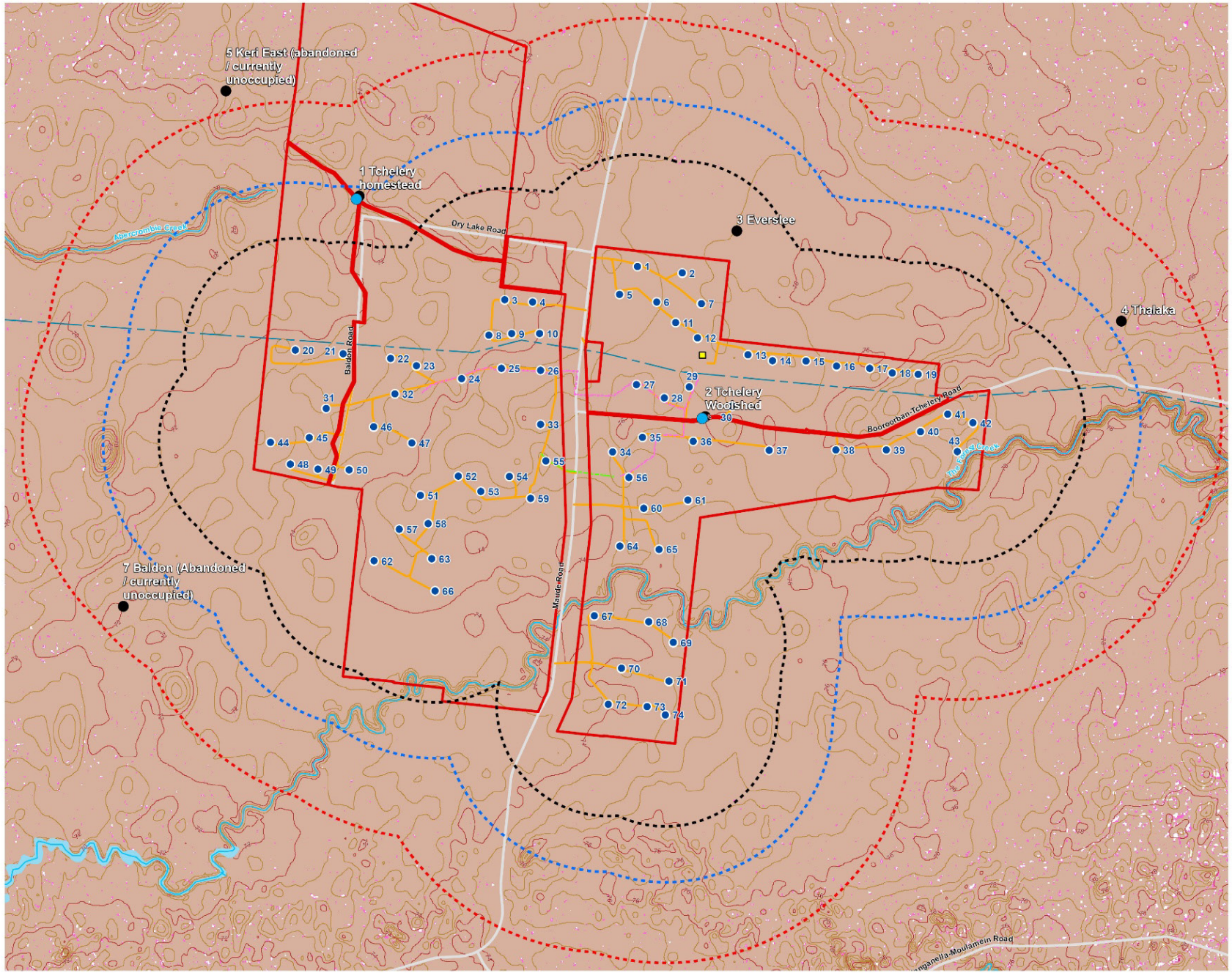
- viewpoint sensitivity levels
- visual distance zones
- scenic quality class.

Viewpoint sensitivity levels

Viewpoints from the public domain and from private dwellings were selected to represent the views to the project from nearby rural areas. The Bulletin states… "*the relative importance of different types of viewpoints will need to be described and ranked into relative levels of scenic concern or "Viewer Sensitivity Levels"* (p.30, Table 5).

The Bulletin further states… "*Viewer sensitivity levels provide a guide for classifying the degree of importance the community or visitors may place on landscapes viewed from public use areas, public travel ways and from private homes and properties*" (p.30, Table 5).

Table 5-1 describes three viewer sensitivity levels that have been used to classify the sensitivity levels of each viewpoint.



Tchelery Wind Farm Landscape and visual impact assessment

Figure 5-2 Zone of Visual Influence plan

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TABLE 5-1 VIEWER SENSITIVITY LEVEL CLASSIFICATION OF TRAVEL ROUTES AND USE AREAS

Viewer sensitivity level	Description
Level 1 Sensitivity (High)	• residential areas and rural villages (defined as land zoned R1, R2, R3, R4, R5 and RU5 in the Standard LEP) • recreation, cultural or scenic sites and viewpoints of National or State significance • any buildings, historic rural homesteads/residences on the State or local Government Heritage List
Level 2 Sensitivity (Moderate)	• rural dwelling • tourist and visitor accommodation (definition in Standard Instrument Local Environmental Plan) • recreation, cultural or scenic sites and viewpoints of regional significance
Level 3 Sensitivity (Low)	• interstate and state passenger rail lines with daily daylight services • state highways, freeways and classified main roads, classified tourist roads • land management roads with occasional recreation traffic • walking tracks of moderate local significance or infrequent recreation usage • other low use and low concern viewpoints and travel routes • navigable waterways

Source: Source: Wind Energy: Visual Assessment Bulletin, DPE, 2016 (Table 5, p.30)

Visual distance zones

The visual distance zones provided in the Bulletin have been used in this assessment. These distance zones are listed in Table 5-2.

TABLE 5-2 VISUAL DISTANCE ZONES

Distance of view	Distance zone	Relative Visual Magnitude and Influence
0 – 500 m	Near Foreground (NF)	Zone of Greatest Visual Influence
500 m – 1 km	Mid Foreground (MF)	
1 – 2 km	Far Foreground (FF)	
2 – 4 km	Near Middleground (NM)	
4 – 8 km	Far Middleground (FM)	
8 – 12 km	Near Background (NB)	
12 – 20 km	Mid Background (MB)	
20 – 32+ km	Far Background (FB)	Zone of Least Visual Influence

Source: Source: Wind Energy: Visual Assessment Bulletin, DPE, 2016 (Table 6, p.31)

Scenic quality class

The scenic quality classes that have been used for this assessment were identified in the Visual Baseline Study and are summarised in Table 5-3.

TABLE 5-3 SCENIC QUALITY CLASSES FOR THE TCHELERY WIND FARM

Landscape character type	Scenic quality class
Hay open rural plains	Low
Tchelery undulating pastures	Low
Forest Creek rural valley	Moderate

5.2.2.2. Photomontages

Photomontages have been prepared to illustrate the expected changes to views as a result of the project. These photomontages assist in confirming the visibility of the project and support the Visual Performance Evaluation.

Photomontages are created using a combination of 3D modelling and photo editing techniques. The process used to prepare these images was as follows:

- photographs were taken with a full frame SLR camera at a 50 mm focal length
- a digital terrain model (DTM) was prepared using contours with five metre intervals (from ELVIS)
- a 3D model of the project was created and accurately located within the terrain model
- a virtual camera was positioned in the digital model using the photograph's GPS location
- the virtual camera was matched using the digital surface model/terrain to align the view
- these modelled views were then rendered, overlayed and edited in photo editing software to insert the rendered model into the photograph
- the final photo editing of the image included vegetation removal, reflections in the water, shadows and alternative water levels.

Visual Influence Zone 1 (VIZ1) is associated with those areas with the highest level of visual significance. VIZ2 would have combinations resulting in a moderate VIZ rating, and VIZ3 is associated with those landscapes with the lowest level of combined significance.

Each Visual Influence Zone has a corresponding set of visual performance objectives that guide the proponent and the consent authority by establishing different visual objectives and levels of landscape protection for the assessment and determination of the project.

5.2.2.3. Determining Visual Influence Zones (VIZ)

The Visual Influence Zones identified in the Bulletin are VIZ1, VIZ2 and VIZ3. To identify the VIZ, the sensitivity level, distance zone and scenic quality class combinations provided in Table 5-4 have been used. Each of the Visual Influence Zones has a corresponding performance outcome.

TABLE 5-4 VISUAL INFLUENCE ZONES BASED ON VIEW SENSITIVITY LEVEL, DISTANCE ZONES AND SCENIC QUALITY CLASS COMBINATIONS

Viewer Sensitivity Level – Distance Zone	Scenic Quality Class		
	High	Moderate	Low
Level 1 Viewpoints			
Near Foreground 0 – 500 m	VIZ1	VIZ1	VIZ1
Mid Foreground 500 m – 1 km	VIZ1	VIZ1	VIZ1
Far Foreground 1 – 2 km	VIZ1	VIZ1	VIZ1
Near Middleground 2 – 4 km	VIZ1	VIZ2	VIZ2
Far Middleground 4 – 8 km	VIZ2	VIZ2	VIZ2
Near Background 8 – 12 km	VIZ2	VIZ2	VIZ2
Mid Background 12 – 20 km	VIZ2	VIZ2	VIZ3
Far Background 20 – 32+ km	VIZ2	VIZ2	VIZ3
Level 2 Viewpoints			
Near Foreground 0 – 500 m	VIZ1	VIZ1	VIZ1
Mid Foreground 500 m – 1 km	VIZ1	VIZ1	VIZ1
Far Foreground 1 – 2 km	VIZ1	VIZ1	VIZ2
Near Middleground 2 – 4 km	VIZ2	VIZ2	VIZ2
Far Middleground 4 – 8 km	VIZ2	VIZ2	VIZ3
Near Background 8 – 12 km	VIZ2	VIZ3	VIZ3
Mid Background 12 – 20 km	VIZ2	VIZ3	VIZ3
Far Background 20 – 32+km	VIZ3	VIZ3	VIZ3
Level 3 Viewpoints			
Near Foreground 0 – 500 m	VIZ1	VIZ1	VIZ2
Mid Foreground 500 m – 1 km	VIZ2	VIZ2	VIZ2
Far Foreground 1 – 2 km	VIZ2	VIZ2	VIZ3
Near Middleground 2 – 4 km	VIZ2	VIZ3	VIZ3
Far Middleground 4 – 8 km	VIZ2	VIZ3	VIZ3
Near Background 8 – 12 km	VIZ3	VIZ3	VIZ3
Mid Background 12 – 20 km	VIZ3	VIZ3	VIZ3
Far Background 20 – 32+ km	VIZ3	VIZ3	VIZ3
Areas Not Visible	VIZ3	VIZ3	VIZ3

Note:

- *Column 1 codes represent a combination of the viewer sensitivity level (1-high, 2-moderate, 3-low) and the distance zones.*
- *Columns 2 – 4 indicate visual influence zones varying by row according to the combination of viewer.*

Source: Source: Wind Energy: Visual Assessment Bulletin, DPE, 2016 (Table 8, p.36)

For the Tchelery Wind Farm project the visual influence zone for each dwelling and public viewpoint is described in Table 5-5.

TABLE 5-5 VISUAL INFLUENCE ZONE ANALYSIS

Representative view location (and other proximate dwellings)	Viewpoint sensitivity level	Visual distance zone (distance to nearest WTG)	Scenic quality class	Visual influence zone
3. Everslee, 4026 Maude Road Moulamein	Level 2, rural dwelling	2.2km (WTG No.2) Near middleground	Low	VIZ2
4. Thalaka, 3222 Booroorban-Tchelery Road, Booroorban	Level 2, rural dwelling	5.8 km (WTG No.42) Far middleground	Low	VIZ3
5. Keri East, 1543 Tchelery Road, Moulamein	Level 2, rural dwelling	8.36 km (WTG No.20) Near background	Low	VIZ3
6. St Pauls, 33251 Sturt Highway, Maude	Level 2, rural dwelling	14.5 km (WTG No.3) Mid background	Low	VIZ3
7. Baldon, 1543 Tchelery Road, Moulamein (caravan)	Level 2, rural dwelling	7 km (WTG No.48) Far middleground	Low	VIZ3
A. View from Maude Road, Maude	Level 3, road	1.38 km (WTG No.33) Far foreground	Low	VIZ3
B. View from Booroorban-Tchelery Road, Maude	Level 3, road	0.75 km (WTG No.36) Mid foreground	Low	VIZ2

Appendix A includes an assessment of private and public domain views to the project. This assessment includes the visual influence zone analysis and visual performance evaluation.

A summary of the viewpoint visual performance objectives analysis is contained in Table 5-6.

TABLE 5-6 VISUAL PERFORMANCE OBJECTIVES RESULTS

Representative view location (and other proximate dwellings)	Visual performance objectives				
	Visual magnitude	Landscape Scenic Integrity	Key Feature Disruption	Ancillary infrastructure	Multiple Wind Turbine Effects
3. Everslee, 4026 Maude Road Moulamein	N	Y	Y	Y	Mitigation considered
4. Thalaka, 3222 Booroorban-Tchelery Road, Booroorban	Y	N/A	N/A	Y	Y
5. Keri East, 1543 Tchelery Road, Moulamein	Y	N/A	N/A	Y	Y
6. St Pauls, 33251 Sturt Highway, Maude	Y	N/A	N/A	Y	Y
7. Baldon, 1543 Tchelery Road, Moulamein (caravan)	Y	N/A	N/A	Y	Y
A. View from Maude Road, Maude	N	N/A	N/A	Y	Mitigation considered
B. View from Booroorban-Tchelery Road, Maude	N	N/A	N/A	Y	Mitigation considered

Key:
Y – Complies
N – Does not comply

5.3. Impact on the nighttime environment

The project would introduce new lighting sources into the existing dark nighttime environment.

Lighting associated with the substations and the O&M facility would not be a source of permanent nighttime light. This lighting would only operate in an emergency to enable critical maintenance work to be undertaken safely at night. When on, the lights would be of low intensity and directed downward.

Lighting installed on select WTGs (those at the highest elevations and around the project perimeter) would be on continuously at night for aviation safety. Although the light installed would be low intensity, these new light sources would result in a change to the dark sky at night.

The Bulletin objective for aviation hazard lighting states: *Aviation hazard lighting (AHL) must meet the requirements of Australian Standard AS 4282 – 1997* [now 2023] *and any prescribed or notified CASA requirement. Shield all AHL within two kilometres from any dwellings. Avoid strobe lighting* (DPE, 2016).

Australian Standard AS 4282 – 2023 (section 1.1, AS4282-2023) states it does not apply to lighting for aviation safety. Regardless, lighting principles from AS 4282 – 2023 would be applied where relevant, lighting would be installed at the lowest intensity to suit the purpose, and strobe lighting is not proposed. Any prescribed or notified CASA requirements would be applied.

Additional mitigation measures to reduce nighttime impact are included in section 6.3.

5.4. Impacts of ancillary infrastructure

The project includes ancillary infrastructure associated with WTGs, including:

- Battery energy storage system (BESS)
- Permanent electrical infrastructure (330 kilovolt (kV) transmission line, 33 kV transmission lines connecting the WTGs, switchyard and collector substations
- Operational ancillary facilities, including operation and maintenance (O&M) facility and meteorological masts.

Compared with the scale of the WTGs, these elements are far smaller, have a smaller potential visual effect. In particular, the BESS is set back from all surrounding roads and residential receivers and view to these components of the project would be limited.

Of note, the O&M facility and BESS would be set back from both Maude Road and Booroorban-Tchelery Road, further reducing their visual scale in views from these roads. The BESS and O&M facility are included in the photomontage and visual assessment from viewpoint B, View from Booroorban-Tchelery Road.

The transmission lines would be seen together with the WGTs in views from Maude Road and Booroorban-Tchelery Road, where they would cross the landscape. These structures would contribute to the changes in character to views, shown in the photomontages and described in public viewpoint A, View from Maude Road, Maude and public viewpoint B, View from Booroorban-Tchelery Road.

5.5. Temporary visual impacts during construction

During construction there would be temporary construction facilities, including the:

- Western construction facilities area, including construction workforce amenities, concrete batching plant, laydown areas
- Eastern construction facilities area, including construction workforce amenities, concrete batching plant, laydown areas
- Construction compound and workforce accommodation camp on Maude Road.

There would be views to the western construction facilities area and construction compound and workforce accommodation camp on Maude Road, from Maude Road. The western construction facilities area would be set back from Maude Road, reducing the scale of the facilities in views from the road. The construction compound and workforce accommodation compound, however, would be located adjacent to Maude Road. Both of these facilities would be largely unobstructed by landform and vegetation, and would contrast with the character of the existing views along Maude Road.

The Eastern construction facilities area, however, would be less visible, and likely to be visible in the background of views from both Maude Road and Booroorban-Tchelery Road. This distance would reducing the visual scale of this facility. During construction, installation of the project elements would gradually transform views, to include the WGTs. With this construction, there would also be large equipment and heavy vehicles used for transport and construction of the project infrastructure. These visual impacts would temporary, and likely to be greater in scale than the operational works due to the construction activities, equipment, and construction support facilities.

5.6. Cumulative impact assessment

Approved and proposed renewable energy and electrical infrastructure projects within the broader Riverina region are listed in Table 4-5. Most of these projects, due to their distance from the project, would be unlikely to have any direct visual connection with the Tchelery Wind Farm.

However, the following is noted in relation to potential cumulative visual effects:

- Baldon wind farm (Prepare EIS stage) is located immediately west of the project, on an adjoining property at Keri Keri, including up to 162 WTGs with a maximum tip height of 300 metres. The project site extends north, extending across the Sturt Highway, as shown on Figure 4-5. This project would not be viewed from the dwelling at Everslee (No.3), (refer to Appendix A) that is the only dwelling that has the potential for high visual impacts due to the Tchelery Wind Farm.
- Project EnergyConnect (NSW – Eastern Section) (Approved) passes through the project. There would be views to this transmission line from Maude Roads and Booroorban-Tchelery Road, however, it is not within eight kilometres of the dwelling at Everslee (No.3).

Figure 4-5 illustrates the indicative location of the proposed Baldon wind farm that may include views toward WTGs within eight kilometres of WTGs of the project.

6. Ability to avoid, mitigate or offset the impacts of the project

This section summarises the ability to avoid, mitigate or offset the impacts of the project on visual amenity based on the assessment in Section 6 above.

6.1. How potential impacts have been avoided or minimised

To minimise the potential visual impacts of the project the following has been incorporated into the project:

- maximised distance from private dwellings
- BESS has been setback from Booroorban-Tchelery Road and Maude Road
- connecting transmission lines between WTGs located underground
- location of connection infrastructure near the existing 220 kV lines and away from private dwelling views
- lighting would be installed in accordance with AS 4282 – 2023, be of low intensity and directed downward, and prescribed or notified CASA requirements would be applied.

6.2. Requirements for additional mitigation

Following the assessment of public and private views against the visual performance objectives (refer to Appendix A) three views require the consideration of further mitigation. A summary of the response to the mitigation and management options contained in the Bulletin are shown in Table 6-1.

TABLE 6-1 VISUAL PERFORMANCE OBJECTIVES RESULTS

Representative view location (and other proximate dwellings)	Mitigation and management options	Response
3. Everslee, 4026 Maude Road Moulamein	Consider screening WTGs between the WTGs and the dwelling .	Screening (between the WTGs (particularly those located between the blue and black line) and the dwelling) will be provided to the landholder in accordance with the Bulletin if agreed.
4. Thalaka, 3222 Booroorban-Tchelery Road, Booroorban	No performance objectives provided in the Bulletin.	N/A
5. Keri East, 1543 Tchelery Road, Moulamein	No performance objectives provided in the Bulletin.	N/A
6. St Pauls, 33251 Sturt Highway, Maude	No performance objectives provided in the Bulletin.	N/A
7. Baldon, 1543 Tchelery Road, Moulamein (caravan)	No performance objectives provided in the Bulletin.	N/A
A. View from Maude Road, Maude	Consider screening WTGs between the blue line and the black line.	Screening vegetation along Maude Road would not be consistent with the character of the landscape and is not proposed.
B. View from Booroorban-Tchelery Road, Maude	Consider screening WTGs between the blue line and the black line.	Screening vegetation along Booroorban-Tchelery Road would not be consistent with the character of the landscape and is not proposed.

6.3. Proposed additional mitigation measures

The application of good practice during construction and operation of the project would further minimise impacts. Generally, the minimisation of vegetation clearance, the siting of the wind farm infrastructure and new screening vegetation, are the main opportunities for mitigation of visual impacts.

The following mitigation measures should be considered to further reduce the potential visual impacts identified in this assessment (refer to Table 6-2).

TABLE 6-2 MITIGATION MEASURES

ID.	Mitigation measure
LV1	Screening vegetation will be provided for Dwelling No. 3 (Everslee) 4026 Maude Road Moulamein, between the dwelling and the wind turbine generators to supplement the existing intervening vegetation if agreed.
LV1	Lighting at temporary construction compounds and the temporary workforce accommodation camp will be designed and operated in accordance with Australian and New Zealand Standard AS/NZS 4282:2023 Control of the obtrusive effects of outdoor lighting.
LV2	Any operational lighting at the BESS will be designed in accordance with Australian and New Zealand Standard AS/NZS 4282:2023 Control of the obtrusive effects of outdoor lighting, be minimised and use sensors were practicable to minimise light spill and skyglow.
LV3	To reduce the visual impact on the existing dark sky from permanent lighting installed at select WTMs, the following measures are recommended: • Apply lighting principles from the *National Light Pollution Guidelines for Wildlife* (Australian Government Department of Climate Change, Energy, the Environment and Water, 2023), summarised as: 1. only add artificial light for specific and defined purposes, and only in the required location and for the specified duration 2. use smart control technology for better controlled and targeted artificial light management 3. light only the intended object or area – keep lights close to the ground, directed and shielded 4. use light intensity appropriate for the activity (only the minimum number and intensity of lights to meet the lighting objectives) 5. use non-reflective, dark-coloured surfaces 6. use lights with reduced or filtered-out blue, violet and ultraviolet wavelengths. Install Australian Dark Sky Alliance approved light fittings where possible.

7. References

Australian Dark Sky Alliance *ADSA Approved Lighting* https://www.australasiandarkskyalliance.org/adsa-approved (accessed 26 March 2025)

Australian Government Department of Climate Change, Energy, the Environment and Water, 2023, *National Light Pollution Guidelines for Wildlife*.

Australian Institute of Landscape Architects Queensland, 2018, *Guidance Note for Landscape and Visual Assessment*, URL: https://www.aila.org.au/common/Uploaded%20files/_AILA/Resource%20library/Guidance%20Note%20for%20LA%20-2018.pdf (accessed 04/12/2024).

Landscape Institute and Institute of Environmental Management & Assessment, 2013, Guidelines for Landscape and Visual Impact Assessment, Third Edition.

NSW Department of Environment, 2016, Wind Energy: Visual Assessment Bulletin for State Significant Wind Energy Development

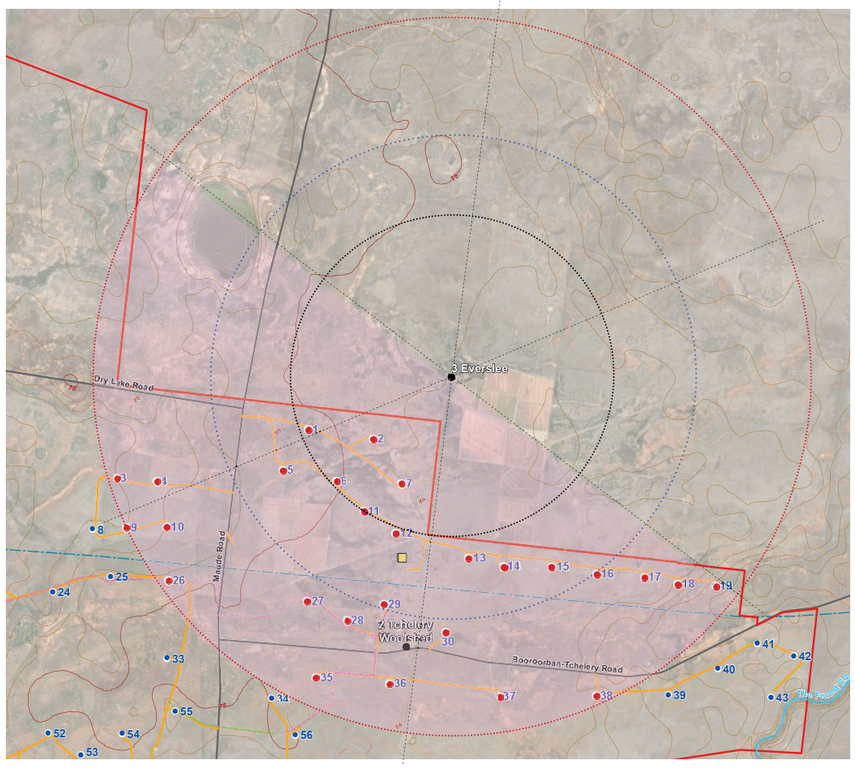
NSW Department of Planning, Housing and Infrastructure, 2024, *NSW Wind Energy Guideline*

Standards Australia Committee, 2023, AS/NZS 4282 Control of the obtrusive effects of outdoor lighting.

Appendix A – Detailed viewpoint assessment

3. Everslee, 4026 Maude Road, Moulamein

Preliminary assessment



Project site

Proposed internal road

Existing 220kV power line

Dwelling

Preliminary assessment tool 1 - Visual magnitude thresholds:

3.6 km offset

5.4 km offset

8.0 km offset

Preliminary assessment tool 2 - Indicating multiple wind turbines:

60° sector with turbine(s) le

Turbine(s) less than 8km rom dwelling visib

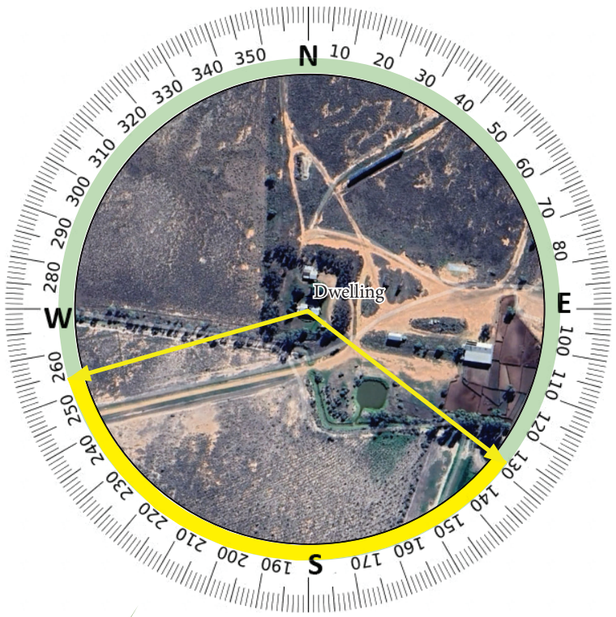
Turbine(s) more than 8km rom dwelling f

north

f

Detailed assessment - Visual performance evaluation (VIZ2)

Visual performance objectives	Visual influence zone objectives	Response
Visual magnitude	Manage impacts as far as practicable, justify residual impacts, and describe proposed mitigation measures below the black line. Consider screening between the blue line and the black line.	• WTGs potentially visible: » Five WTGs located below the black line (<3.6km from the dwelling) » Six WTGs and BESS located between the black and blue lines (3.6 – 5.4 km from the dwelling) » 16 WTGs located between blue and red lines (5.4 – 8 km from the dwelling). • Vegetation around the dwelling would provide some screening.
Landscape Scenic Integrity	Wind turbines should not cause significant modification of the visual catchment. Turbines may be visually apparent and could become a major element in the landscape but should not dominate the existing visual catchment.	• The wind turbines do not cause significant modification of nor dominate the visual catchment. • The wind turbines will become a major element in the visual catchment from the driveway, but would not dominate the visual catchment. From the dwelling the turbine visibility is reduced and the turbines would be less prominent.
Key Feature Disruption	Minimise impact of wind turbines or ancillary facilities that result in the removal or visual alteration/disruption of identified key landscape features. This includes any major or visually significant landform, waterform, vegetation or cultural features that have visual prominence or are focal points	• The visible wind turbines will not result in the removal or visual alteration of key landscape features, cultural features or focal points in the landscape.
Multiple Wind Turbine Effects	Avoid views to the proposed, existing and approved turbines within eight kilometres from Level 1 and Level 2 viewpoints, exceeding the following thresholds, or provide detailed justification: • Level 1 (high sensitivity) – wind turbines visible within the effective horizontal views of two or more 60° sectors • Level 2 (moderate sensitivity) – wind turbines visible within the effective horizontal views in three or more 60° sectors.	• Rural dwelling with Level 2 (moderate sensitivity). • When taking into consideration the intervening vegetation and landform, WTGs would be visible within the effective horizontal views in two 60° sectors within 8 kilometres (refer to photomontage on page A-3). This meets the threshold identified by the Bulletin.
Ancillary electrical infrastructure	• No performance objectives provided in the Bulletin.	• Ancillary electrical infrastructure including, the BESS substations, internal electrical reticulation and transmission lines will not be visible from the dwelling.
Mitigation and management options	• No performance objectives provided in the Bulletin.	• Screening (between the blue line and the black line) will be offered to the landowner in accordance with the Bulletin.



Detailed assessment - Visual Impact Zone identification

Viewpoint summary	
Nearest WTG	Around 2.2 km (WTG No.2)
Potential number of visible 60° Sectors	3
Viewer sensitivity level:	Level 2 Sensitivity (rural dwelling)
Distance zone:	Near Middleground (WTGs min. 2-4 km away)
Scenic quality class:	Low
Visual impact zone	VIZ2

WTGs within 8km

No WTGs within 8km

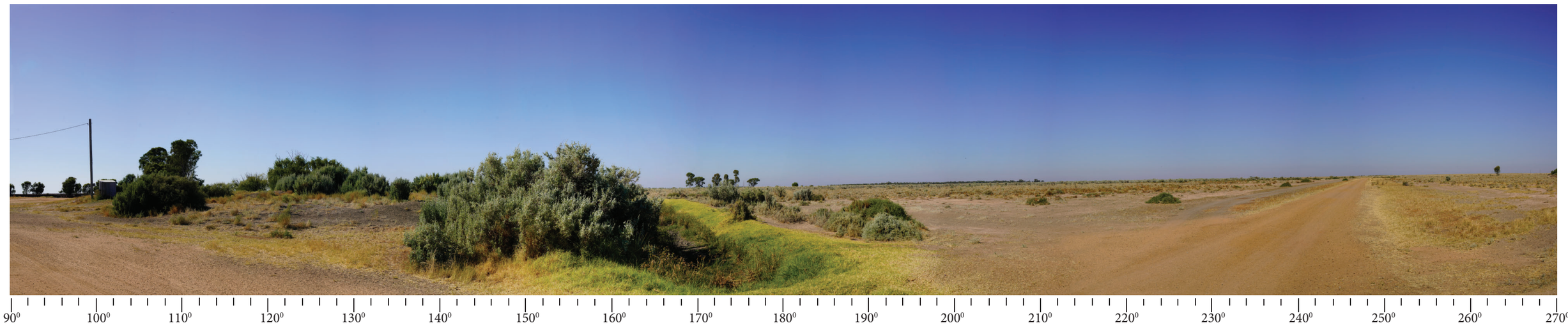
3. Everslee, 288 Dry Lake Road, Moulamein

Photograph location plan

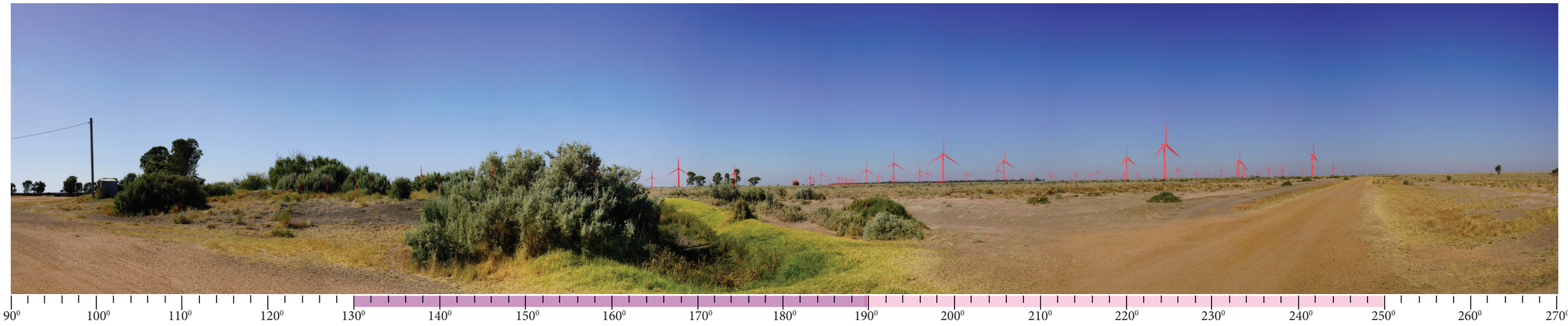
A. View showing dwelling and existing surrounding vegetation

B. View south from garden area south of dwelling

3. Everslee, 288 Dry Lake Road, Moulamein

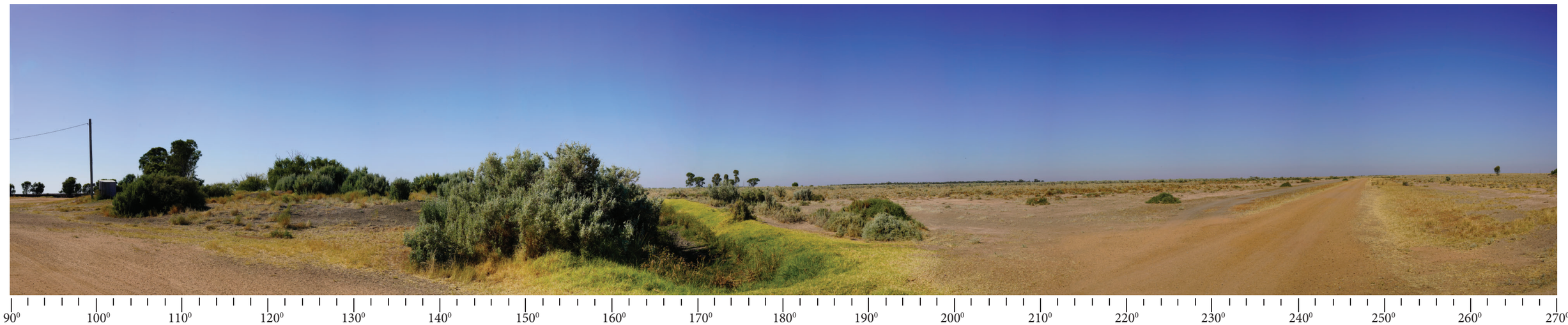


A. Existing view south from driveway

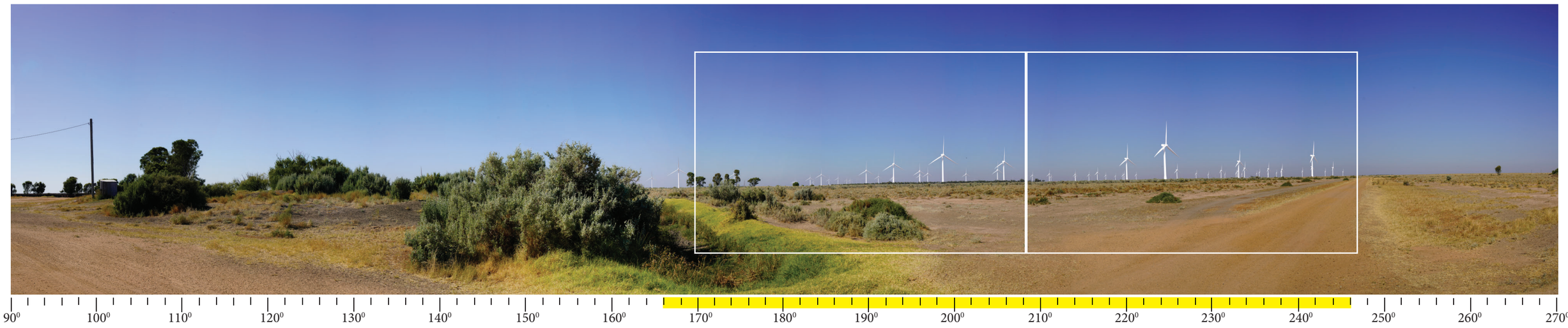


Photomontage showing proposal highlighted in silhouette

3. Everslee, 288 Dry Lake Road, Moulamein



A. Existing view south from driveway



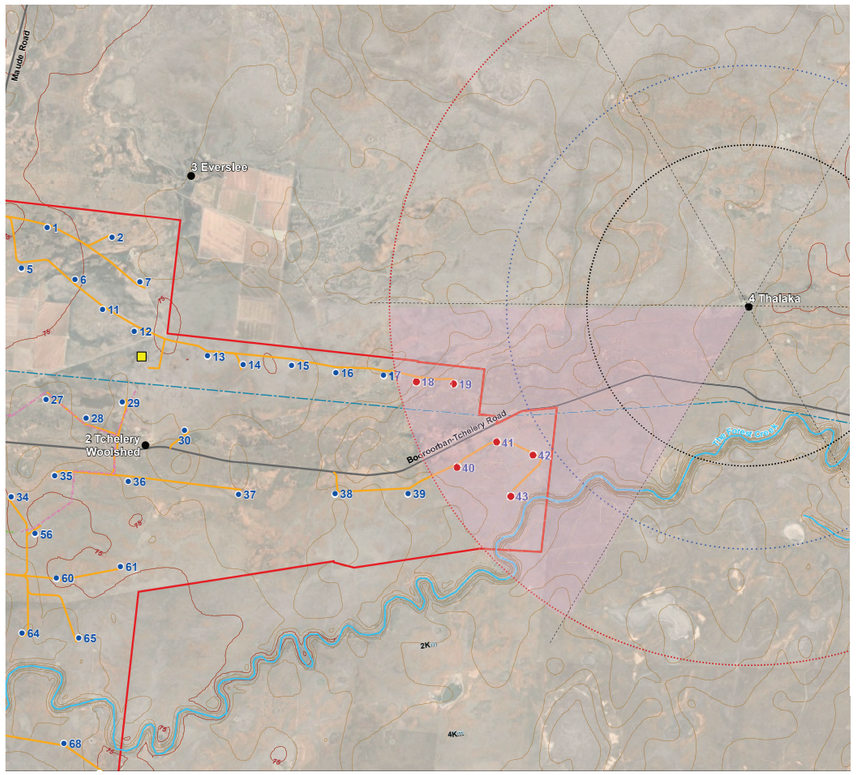
Photomontage showing indicative location of the proposal

50mm focal length

50mm focal length

4. Thalaka, 3222 Booroorban-Tchelery Road, Booroorban

Preliminary assessment



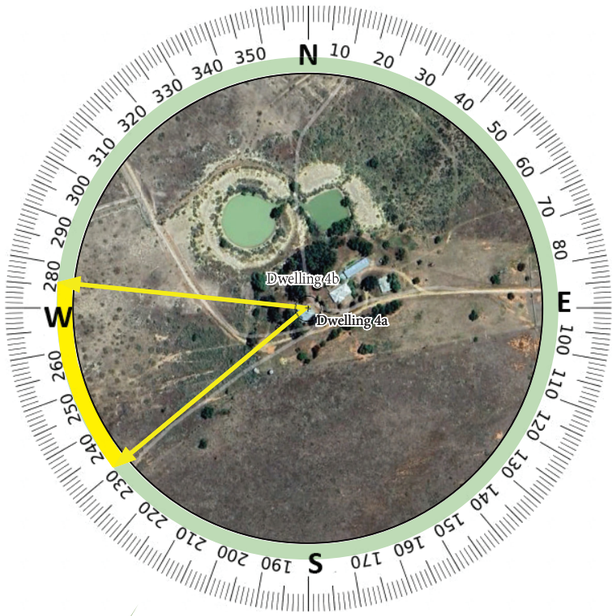
Project site
Proposed internal road
Existing 220kV power line
Dwelling

Preliminary assessment tool 1 - Visual magnitude thresholds:

3.6 km offset
5.4 km offset
8.0 km offset

Preliminary assessment tool 2 - Indicating multiple wind turbines:

0 sector with turbine(s) le
Turbine(s) less than 8km rom dwelling
60 visib
Turbine(s) more than 8km rom dwelling
f
north
f



Viewpoint summary	
Nearest WTG	Around 5.8 km (WTG No.42)
Potential number of visible 60⁰ Sectors	1
Viewer sensitivity level:	Level 2 Sensitivity (rural dwelling)
Distance zone:	Far Middleground (WTGs min. 4-8 km away)
Scenic quality class:	Low
Visual impact zone	VIZ3

WTGs within 8km
No WTGs within 8km

Detailed assessment - Visual performance evaluation - VIZ3

Visual performance objectives	Visual influence zone objectives	Response
Visual magnitude	Consider screening below the black line.	• WTGs potentially visible: » Closest WTG (42) is located around 5.8km from dwelling (Far middleground). » Six WTGs located between the blue and red lines (5.4 – 8 km from the dwelling). • Vegetation around the dwelling would provide some screening. • No WTGs visible below the black or blue lines, therefore no screening required for this visual performance objective.
Landscape Scenic Integrity	No Visual Performance objective applies.	• N/A
Key Feature Disruption	No Visual Performance objective applies.	• N/A
Multiple Wind Turbine Effects	Avoid views to the proposed, existing and approved turbines within eight kilometres from Level 1 and Level 2 viewpoints, exceeding the following thresholds, or provide detailed justifica tion: • Level 1 (high sensitivity) – wind turbines visible within the effecti ve horizontal views of two or more 60° sectors • Level 2 (moderate sensitivity) – wind turbines visible within the effecti ve horizontal views in three or more 60° sectors.	• Rural dwelling with Level 2 (moderate sensitivity). • WTGs would be visible within one 60° sector within 8 kilometres (refer to photomontage on page A-10). Th is meets the threshold identified by the Bulletin.
Ancillary electrical infrastructure	• No performance objectives are provided in the Bulletin.	• Ancillary electrical infrastructure including, the BESS substations, internal electrical reticulation and transmission lines will not be visible from the dwelling.
Mitigation and management options:	• No performance objectives are provided in the Bulletin.	• No mitigation required.

4. Thalaka, 3222 Booroorban-Tchelery Road, Booroorban

Dwelling 4a

Photograph location plan

A. View north showing dwelling 4a and surrounding vegetation

A. View east from driveway showing vegetation west of dwelling 4a

A. Panoramic view south west from driveway showing approximate location of proposal

4. Thalaka, 3222 Booroorban-Tchelery Road, Booroorban

Dwelling 4b

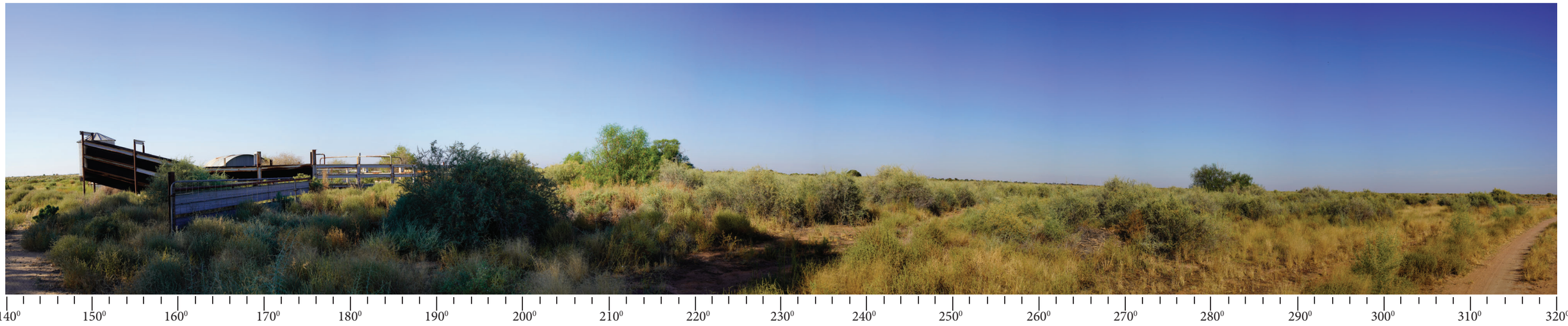
Photograph location plan

C. View north showing dwelling 4b and surrounding vegetation

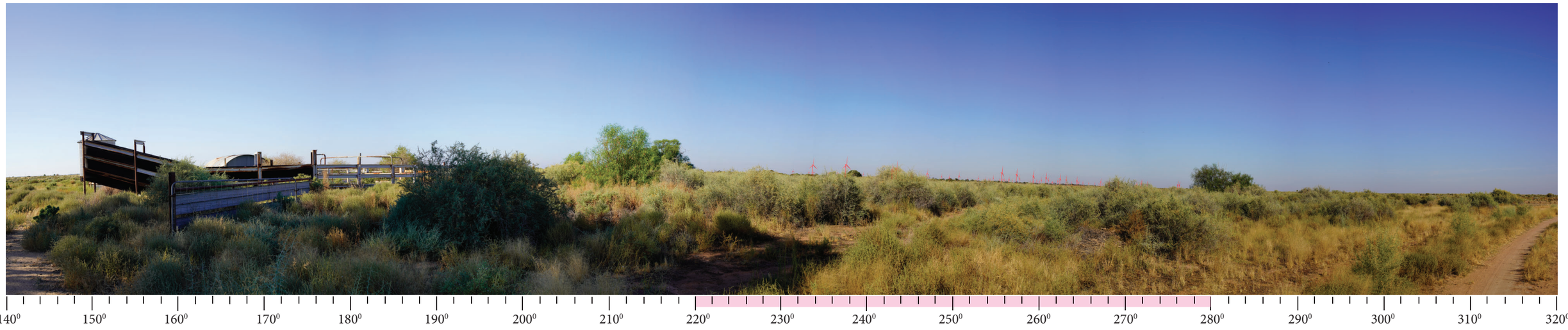
C. View north from driveway showing vegetation west of dwelling 4b

C. Panoramic view south from driveway

4. Thalaka, 3222 Booroorban-Tchelery Road, Booroorban

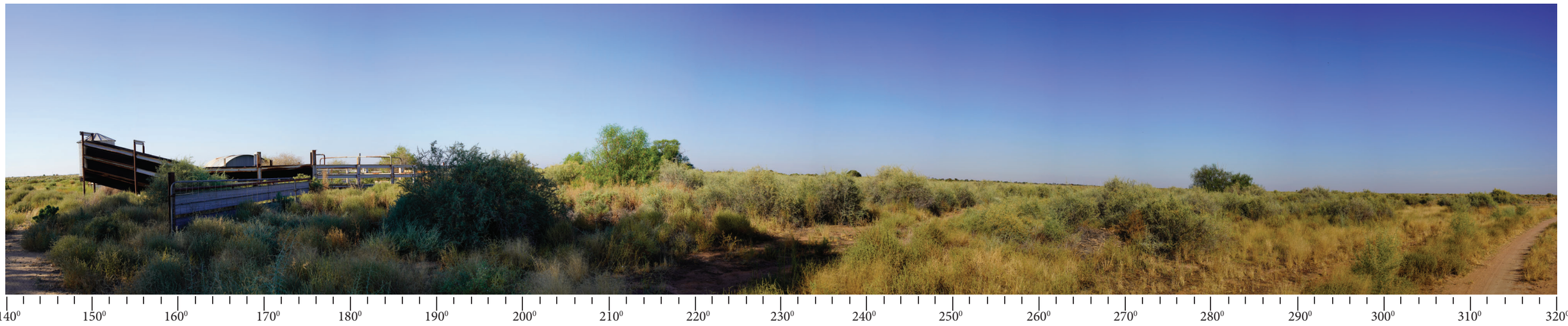


B. Existing view south from driveway

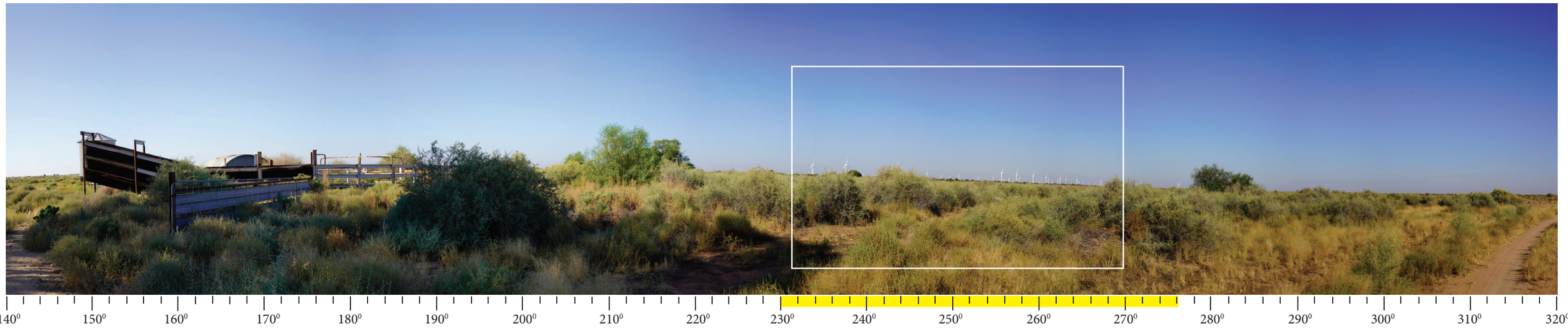


Photomontage showing proposal highlighted in silhouette

4. Thalaka, 3222 Booroorban-Tchelery Road, Booroorban



B. Existing view south from driveway

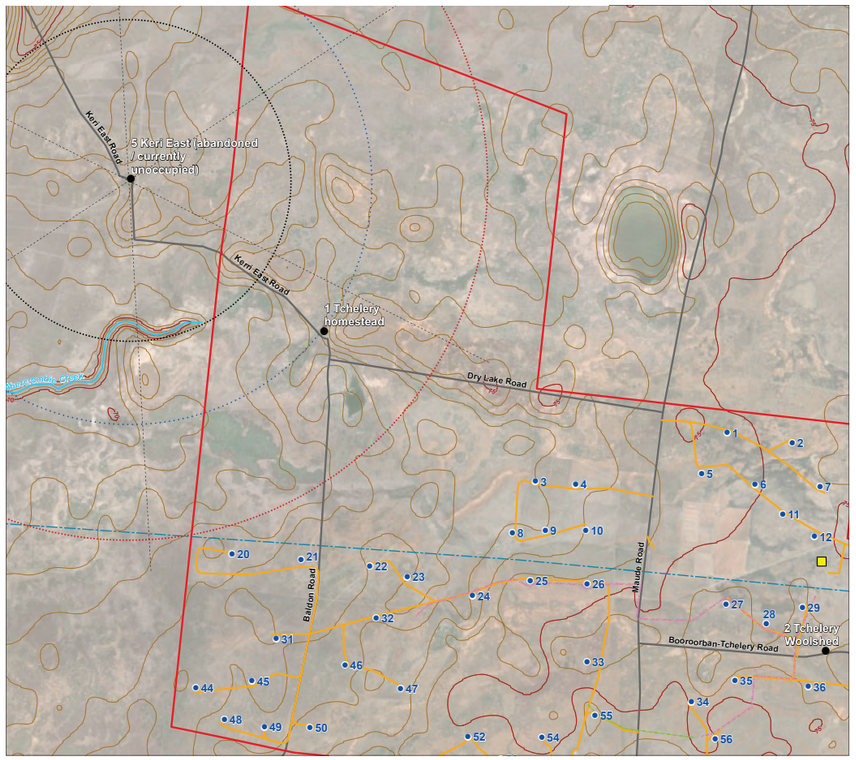


Photomontage showing indicative location of the proposal

50mm focal length

5. Keri East, 1543 Tchelery Road, Moulamein (Currently unoccupied)

Application of preliminary assessment tools



Project site
Proposed internal road
Existing 220kV power line
Dwelling

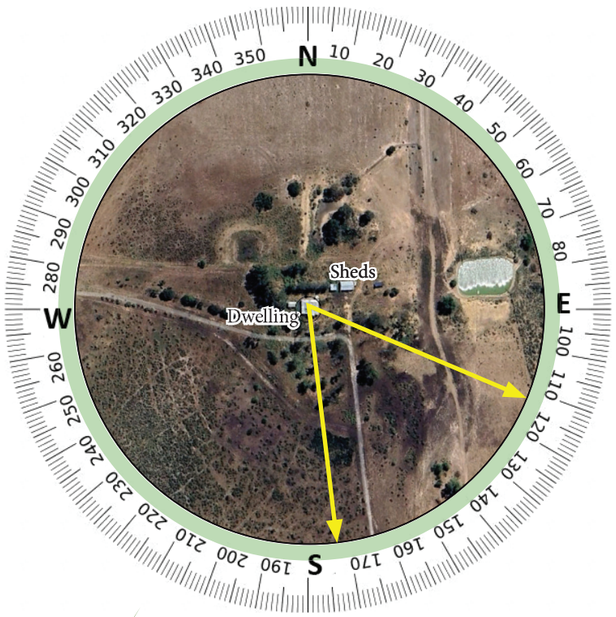
Preliminary assessment tool 1 - Visual magnitude thresholds:

3.6 km offset
5.4 km offset
8.0 km offset

Preliminary assessment tool 2 - Indicating multiple wind turbines:

60° sector with turbine(s) visible
Turbine(s) less than 8km from dwelling
Turbine(s) more than 8km from dwelling

north



Viewpoint summary	
Nearest WTG	Around 8.36 km (WTG No.20)
Potential number of visible 60° Sectors	0
Viewer sensitivity level:	Level 2 Sensitivity (rural dwelling)
Distance zone:	Near Background (WTGs min. 8-12 km away)
Scenic quality class:	Low
Visual impact zone	VIZ3

WTGs within 8km
No WTGs within 8km

Detailed assessment - Visual performance evaluation - VIZ3

Visual performance objectives	Visual influence zone objectives	Response
Visual magnitude	• Consider screening below the black line.	• Closest WTG (20) is located around 8.6 km (Near Background) from dwelling • No WTGs located below the black or blue lines, therefore no screening required to meet this visual performance objective. • Vegetation around the dwelling provides some screening.
Landscape Scenic Integrity	• No Visual Performance objective applies.	• N/A
Key Feature Disruption	• No Visual Performance objective applies.	• N/A
Multiple Wind Turbine Effects	Avoid views to the proposed, existing and approved turbines within eight kilometres from Level 1 and Level 2 viewpoints, exceeding the following thresholds, or provide detailed justification: • Level 1 (high sensitivity) – wind turbines visible within the effective horizontal views of two or more 60° sectors • Level 2 (moderate sensitivity) – wind turbines visible within the effective horizontal views in three or more 60° sectors.	• Rural dwelling with Level 2 (moderate sensitivity). • WTGs would not be visible within any 60° sector within 8 kilometres. This meets the threshold identified by the Bulletin. • No mitigation required to meet this performance objective.
Ancillary electrical infrastructure	• No performance objectives are provided in the Bulletin.	• Ancillary electrical infrastructure including, the BESS substations, internal electrical reticulation and transmission lines will not be visible from the dwelling.
Mitigation and management options:	• No performance objectives are provided in the Bulletin.	• No mitigation required.

5. Keri East, 1543 Tchelery Road, Moulamein (Currently unoccupied)

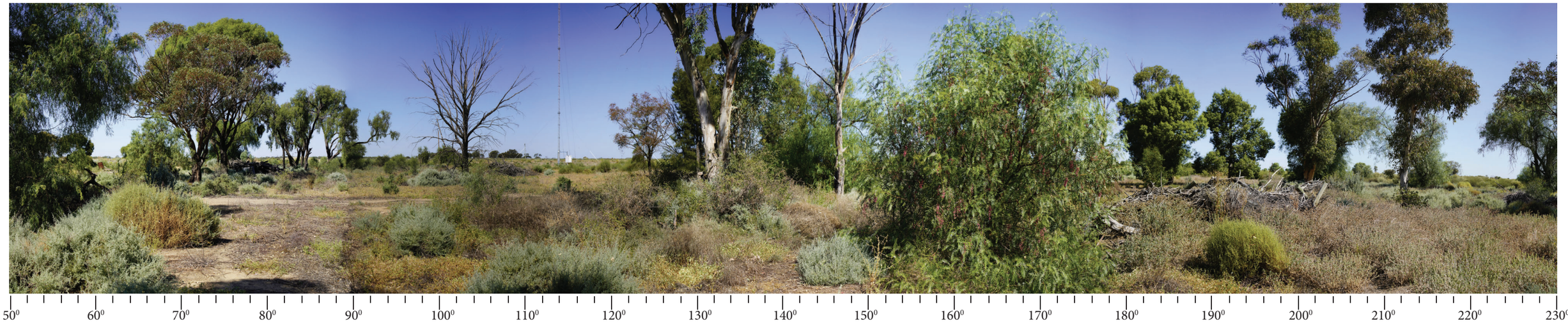
Photograph location plan

A. View west showing dwelling and surrounding vegetation

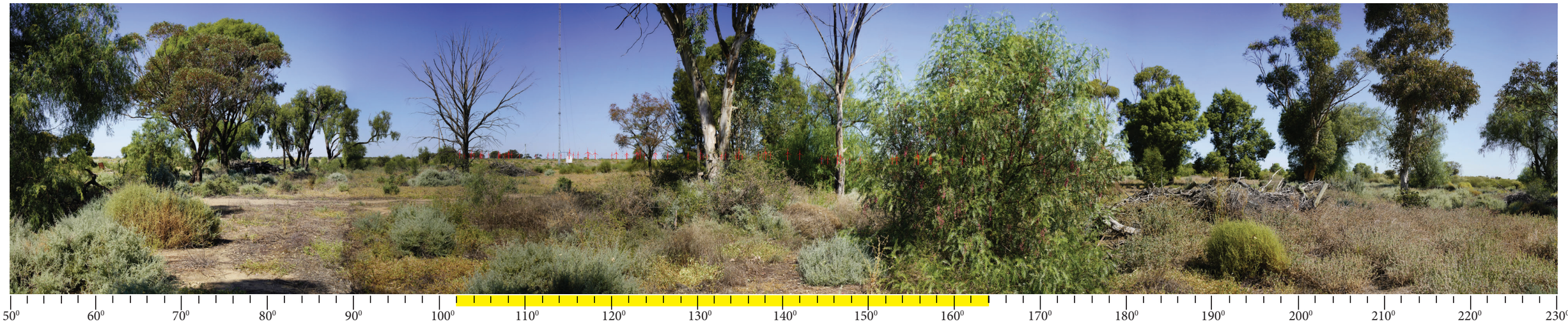
A. View west showing dwellings and adjacent shed

B. Panoramic view south east from driveway

5. Keri East, 1543 Tchelery Road, Moulamein (Currently unoccupied)

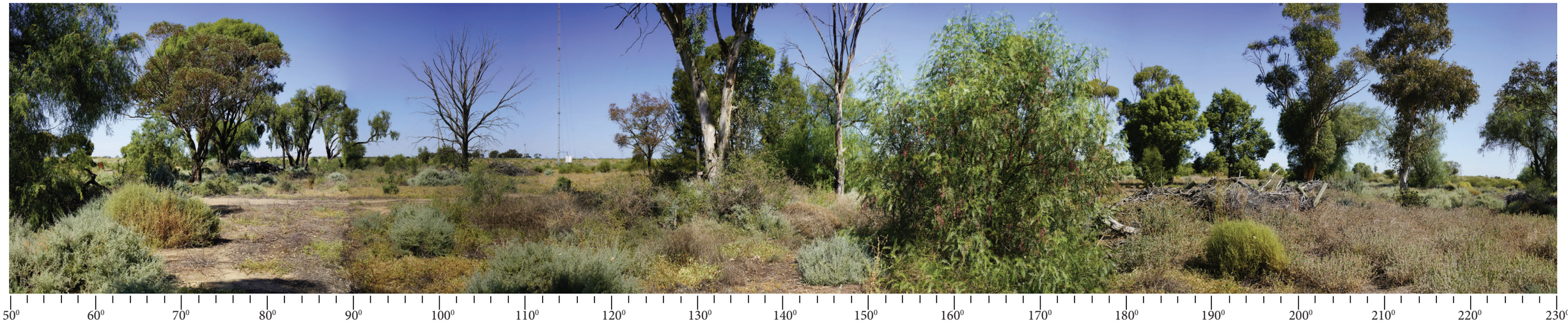


Existing view south east

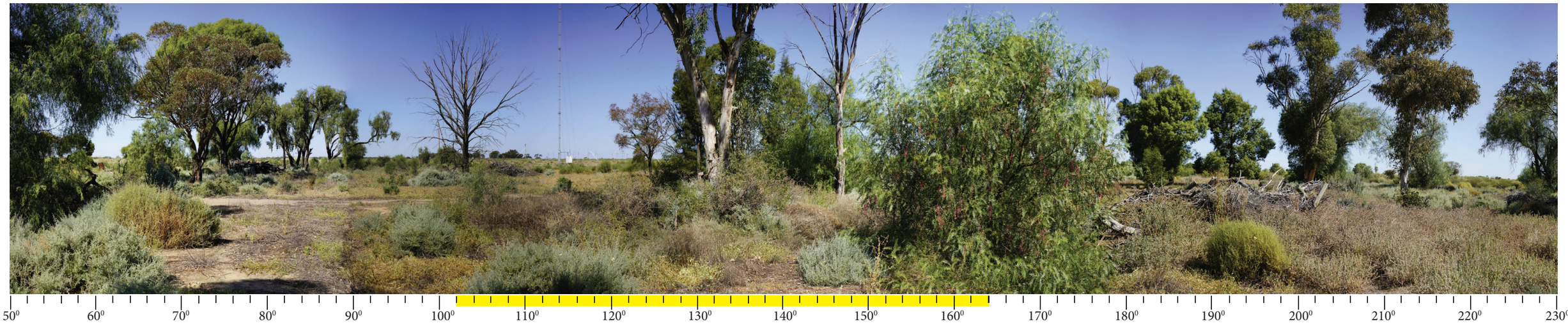


Photomontage showing proposal highlighted in silhouette

5. Keri East, 1543 Tchelery Road, Moulamein (abandoned / currently unoccupied)



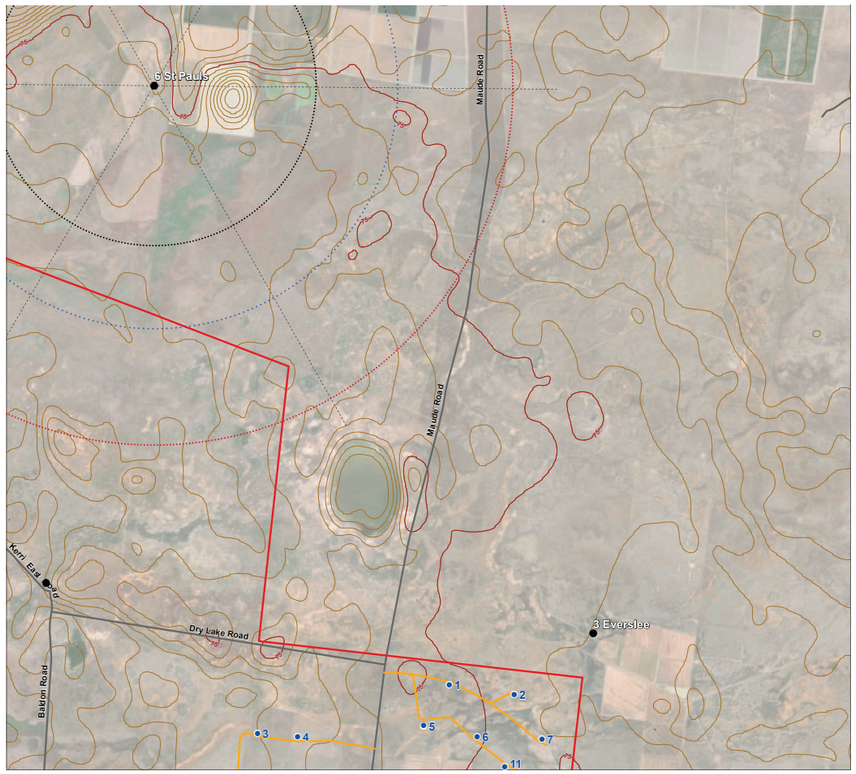
Existing view south from driveway



Photomontage showing indicative location of the proposal

6. St Pauls, 33251 Sturt Highway, Maude

Preliminary assessment



Project site
Proposed internal road
Existing 220kV power line
Dwelling

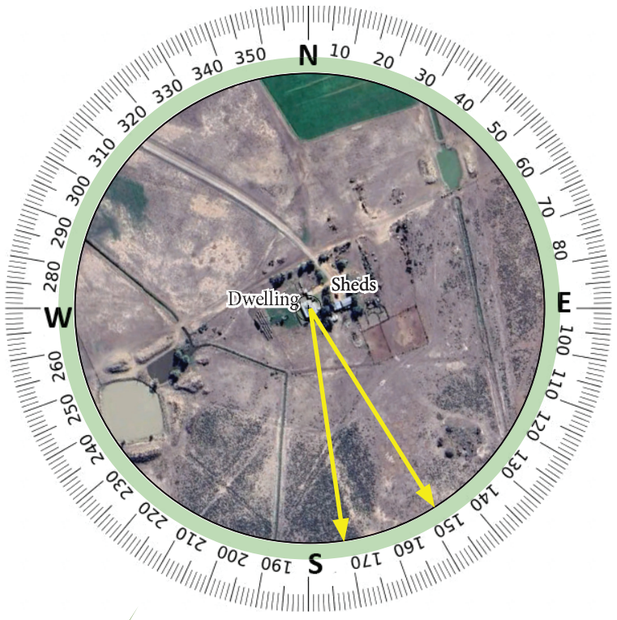
Preliminary assessment tool 1 - Visual magnitude thresholds:

3.6 km offset
5.4 km offset
8.0 km offset

Preliminary assessment tool 2 - Indicating multiple wind turbines:

60° sector with turbine(s) visible
Turbine(s) less than 8km from dwelling
Turbine(s) more than 8km from dwelling

north



Viewpoint summary	
Nearest WTG	Around 14.5 km (WTG No.3)
Potential number of visible 60° Sectors	0
Viewer sensitivity level:	Level 2 Sensitivity (rural dwelling)
Distance zone:	Mid Background (WTGs min. 12-20 km away)
Scenic quality class:	Low
Visual impact zone	VIZ3

WTGs within 8km
No WTGs within 8km

Detailed assessment - Visual performance evaluation - VIZ3

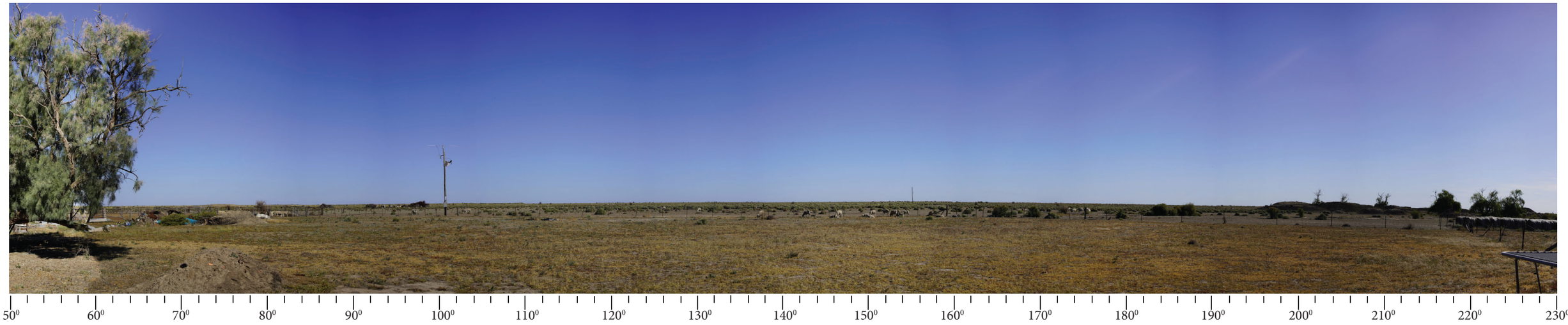
Visual performance objective	Visual influence zone objective	Response
Visual magnitude	• Consider screening below the black line.	• Closest WTG (3) is located around 14.5 km (Mid Background) from dwelling • No WTGs located below black or blue lines, therefore no screening required to meet this visual performance objective. • Vegetation around the dwelling would provide some screening.
Landscape Scenic Integrity	• No Visual Performance objective applies.	• N/A
Key Feature Disruption	• No Visual Performance objective applies.	• N/A
Multiple Wind Turbine Effects	Avoid views to the proposed, existing and approved turbines within eight kilometres from Level 1 and Level 2 viewpoints, exceeding the following thresholds, or provide detailed justification: • Level 1 (high sensitivity) – wind turbines visible within the effective horizontal views of two or more 60° sectors • Level 2 (moderate sensitivity) – wind turbines visible within the effective horizontal views in three or more 60° sectors.	• Rural dwelling with Level 2 (moderate sensitivity). • No WTGs within 8 kilometres, therefore no 60° sectors would be impacted. • No need mitigation required to meet this performance objective.
Ancillary electrical infrastructure	• No performance objectives are provided in the Bulletin.	• Ancillary electrical infrastructure including BESS, substations, internal electrical reticulation and transmission lines will not be visible from the dwelling.
Mitigation and management options:	• No performance objectives are provided in the Bulletin.	• No mitigation required.

6. St Pauls, 33251 Sturt Highway, Maude

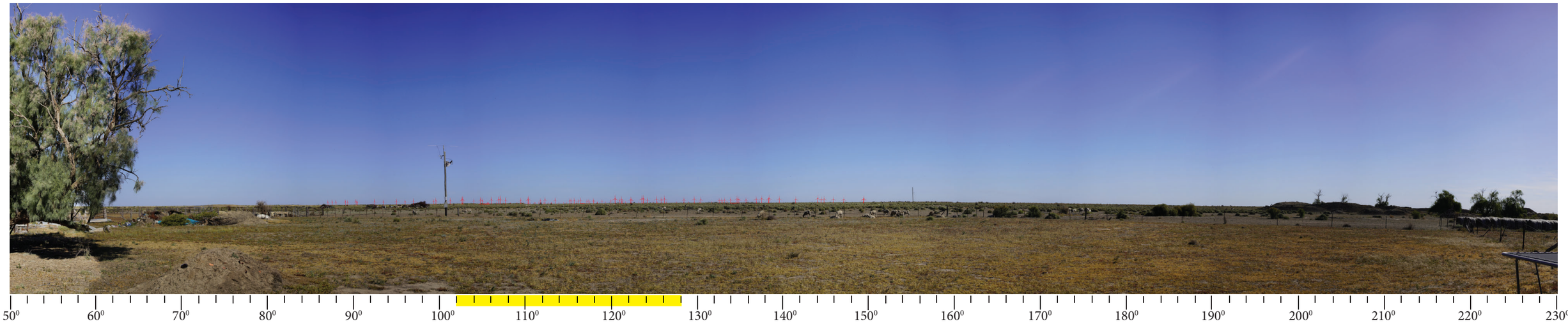
Photograph location plan

A. View south east from garden area south of dwelling

6. St Pauls, 33251 Sturt Highway, Maude



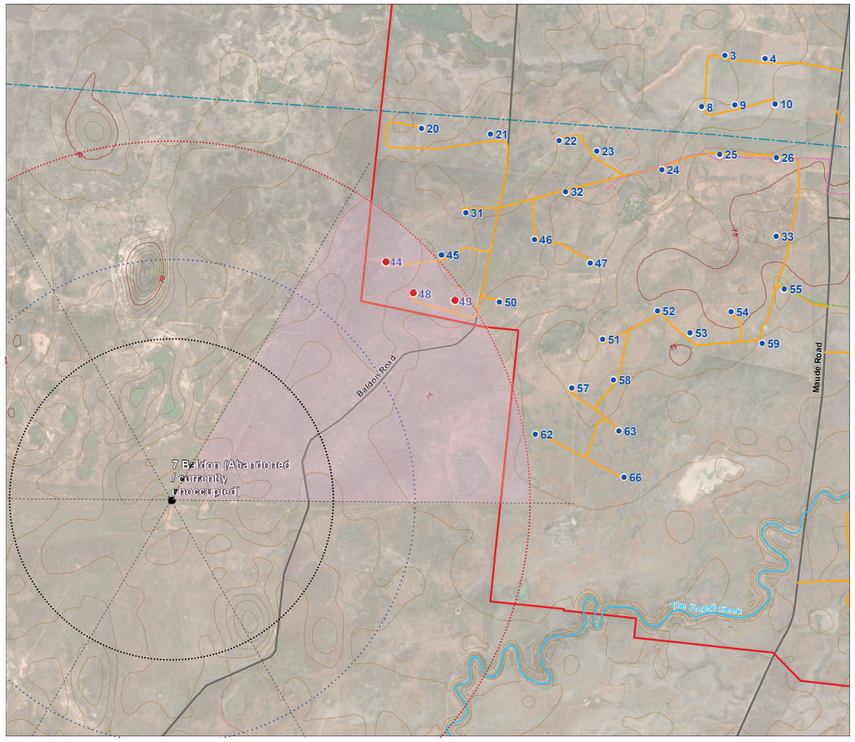
Existing view



Photomontage showing proposal highlighted in silhouette

7. Baldon, 1543 Tchelery Road, Moulamein (caravan)

Preliminary assessment



Project site
Proposed internal road
Existing 220kV power line
Dwelling

Preliminary assessment tool 1 - Visual magnitude thresholds:

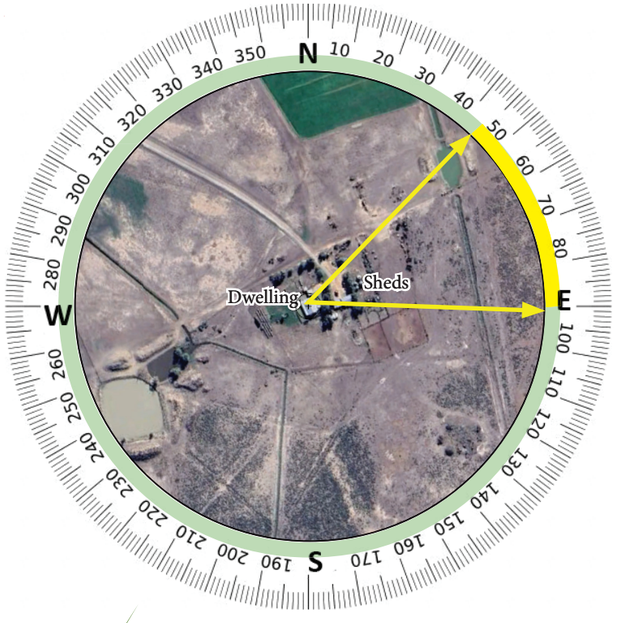
3.6 km offset
5.4 km offset
8.0 km offset

Preliminary assessment tool 2 - Indicating multiple wind turbines:

60° sector with turbine(s) le
Turbine(s) less than 8km rom dwelling visib
Turbine(s) more than 8km rom dwelling f

north

f



Viewpoint summary	
Nearest WTG	Around 7 km (WTG No.48)
Potential number of visible 60° Sectors	1
Viewer sensitivity level:	Level 2 Sensitivity (rural dwelling)
Distance zone:	Far Middleground (WTGs 4-8 km away)
Scenic quality class:	Low
Visual impact zone	VIZ3

WTGs within 8km
No WTGs within 8km

Detailed assessment - Visual performance evaluation - VIZ3

Visual performance objectives	Visual influence zone objectives	Response
Visual magnitude	• Consider screening below the black line.	• Closest WTG (no.48) is located around 7 km (Far Middleground) from dwelling. • No WTGs located below black or blue lines, therefore no screening required to meet this visual performance objective. • Vegetation around the dwelling would provide some screening.
Landscape Scenic Integrity	• No Visual Performance objective applies.	• N/A
Key Feature Disruption	• No Visual Performance objective applies.	• N/A
Multiple Wind Turbine Effects	Avoid views to the proposed, existing and approved turbines within eight kilometres from Level 1 and Level 2 viewpoints, exceeding the following thresholds, or provide detailed justifica tion: • Level 1 (high sensitivity) – wind turbines visible within the effecti ve horizontal views of two or more 60° sectors • Level 2 (moderate sensitivity) – wind turbines visible within the effecti ve horizontal views in three or more 60° sectors.	• Rural dwelling with Level 2 (moderate sensitivity). • WTGs would be visible in one 60° sector within 8 kilometres. • No mitigation required to meet this performance objective.
Ancillary electrical infrastructure	• No performance objectives are provided in the Bulletin.	• Ancillary electrical infrastructure including BESS, substations, internal electrical reticulation and transmission lines will not be visible from the dwelling.
Mitigation and management options:	• No performance objectives are provided in the Bulletin.	• No mitigation required.

7. Baldon, 1543 Tchelery Road, Moulamein (caravan)

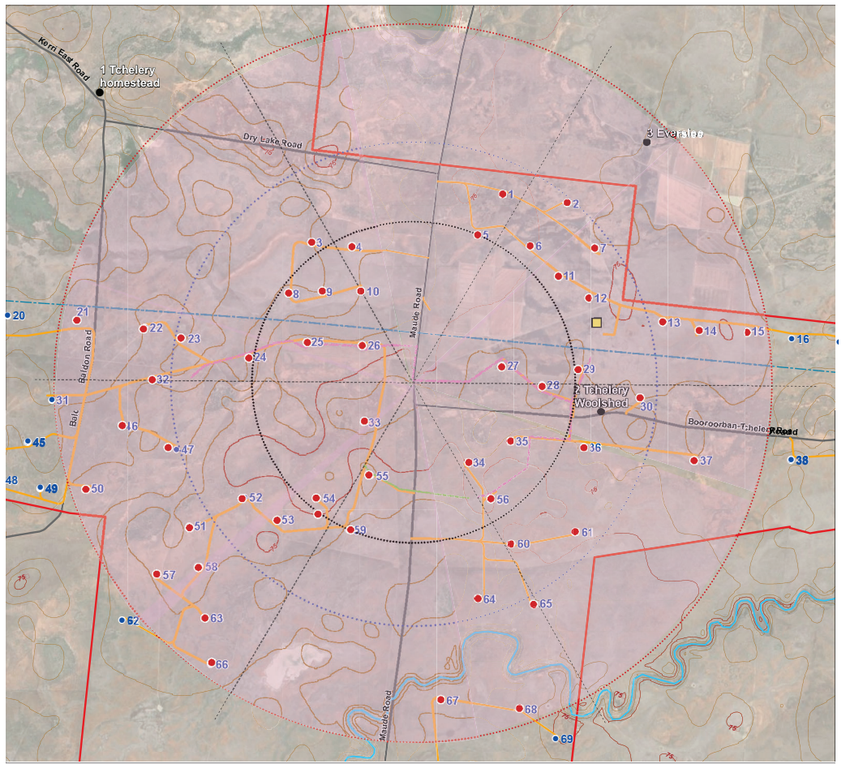
Photograph location plan

A. View west showing caravan and surrounding vegetation

A. Panoramic view north east from outside caravan

A. View from Maude Road, Maude

Preliminary assessment



Project site
Proposed internal road
Existing 220kV power line
Dwelling

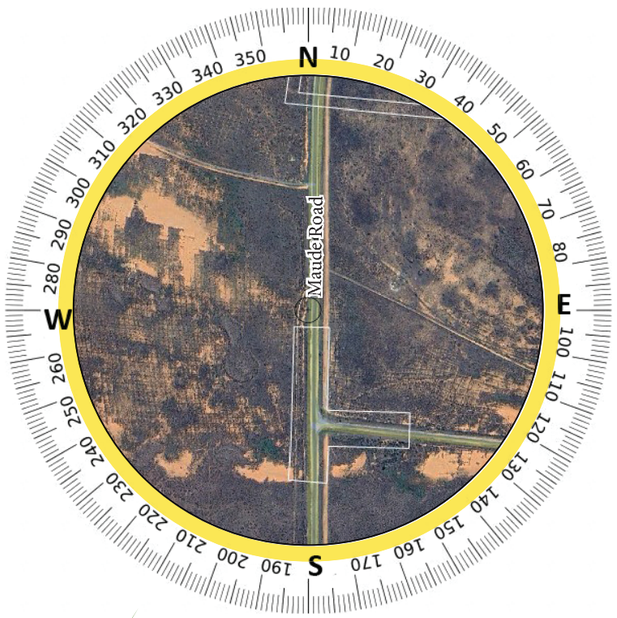
Preliminary assessment tool 1 - Visual magnitude thresholds:

3.6 km off set
5.4 km off set
8.0 km off set

Preliminary assessment tool 2 - Indicating multiple wind turbines:

60° sector with turbine(s) visible
Turbine(s) less than 8km from dwelling
Turbine(s) more than 8km from dwelling

north



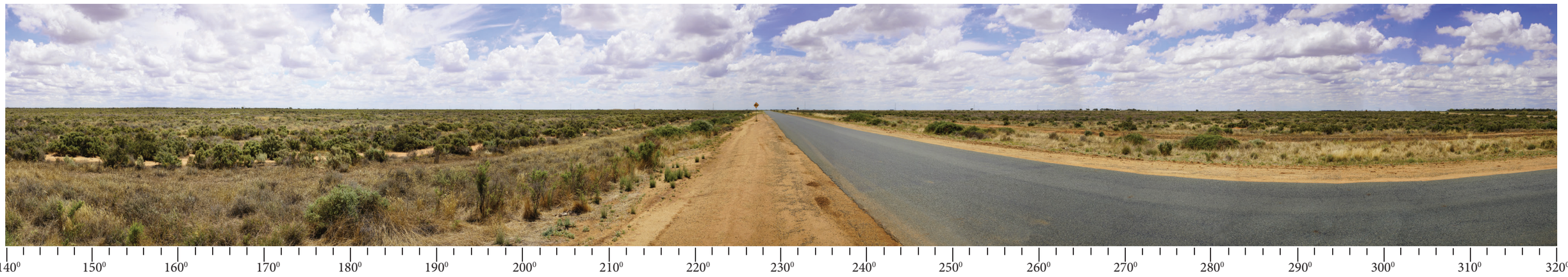
Viewpoint summary	
Nearest WTG	Around 1.38 km (WTG No.33)
Potential number of visible 60° Sectors	6
Viewer sensitivity level:	Level 3 Sensitivity (road)
Distance zone:	Far Foreground (WTGs min. 1-2 km away)
Scenic quality class:	Low
Visual impact zone	VIZ3

WTGs within 8km
No WTGs within 8km

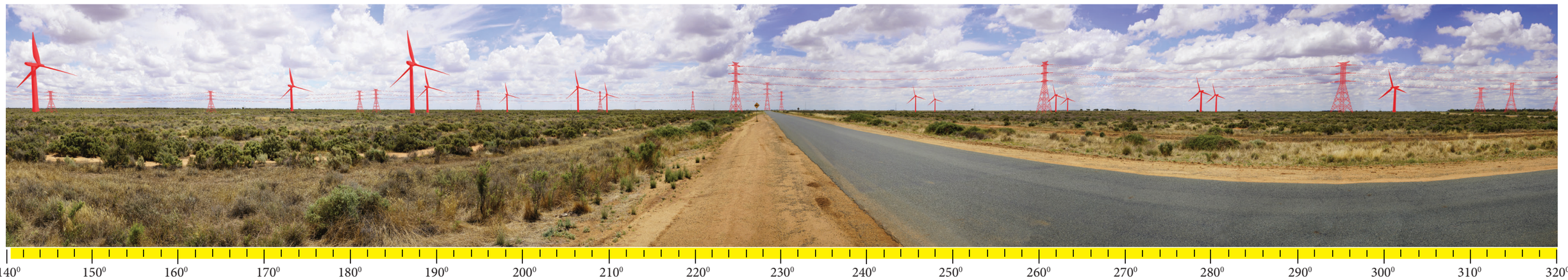
Detailed assessment - Visual performance evaluation - VIZ3

Visual performance objectives	Visual influence zone objectives	Response
Visual magnitude	• Consider screening below the black line.	• WTGs potentially visible: » Closest WTG (33) is located around 1.2km (Mid Background) from the road. » 18 WTGs located below black line. • The landscape is characterised by open plains. There are no trees providing screening on the roadside in this area. • Maude Road passes through the site adjacent to turbines for about 15km, offering similar views along this length. • To screen the WTGs below the black line would require screening vegetation along both sides of Maude Road for about 18km (including 3.6 kilometres north and south of the nearest WTGs). This would be inconsitent with the character of views from Maude Road and is not considered appropriate in this setting.
Landscape Scenic Integrity	• No Visual Performance objective applies.	• N/A
Key Feature Disruption	• No Visual Performance objective applies.	• N/A
Multiple Wind Turbine Effects	No performance objective provided in the Bullitin for Level 3 (low) sensitivity views.	• WTGs would theoretically be visible in all six 60° sectors within 8 kilometres. • As this is a view from the road passing through the site, there would effectively be views from three 60° sectors within 8km from north or southbound vehicles. This view is experiened for a short duration from moving vehicles.
Ancillary electrical infrastructure	• No performance objectives are provided in the Bulletin.	• The proposed 330kV transmission line would be visible across the view. This includes the transmission lines in the west of the view (right), they would span Maude Road in the foreground, be aligned parallel to Maude Road as they continue north, and then extending west in the middle to background of the view.
Mitigation and management options	• No performance objectives are provided in the Bulletin.	• No mitigation is proposed.Introducing screening vegetation would not be appropriate for the character of the surrounding landscape.

A. View from Maude Road, Maude



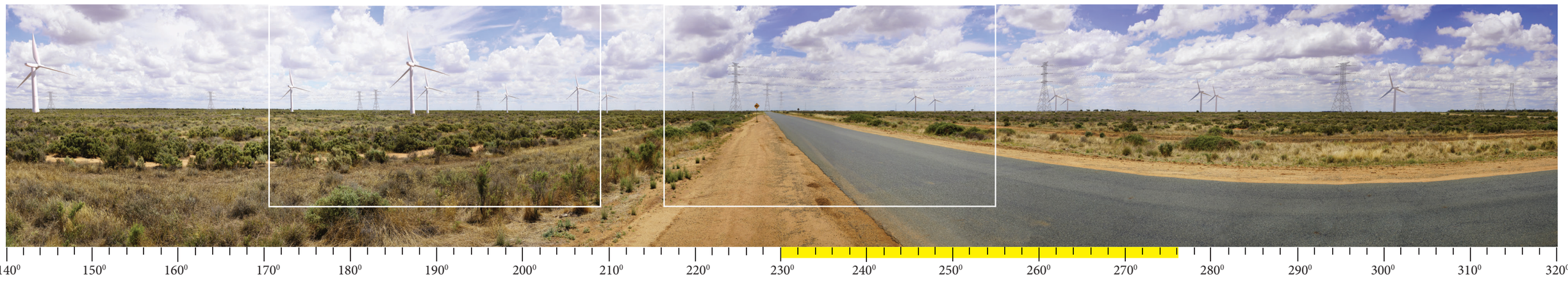
B. Existing view south from driveway



Photomontage showing proposal highlighted in silhouette

A. View from Maude Road, Maude

B. Existing view south from driveway



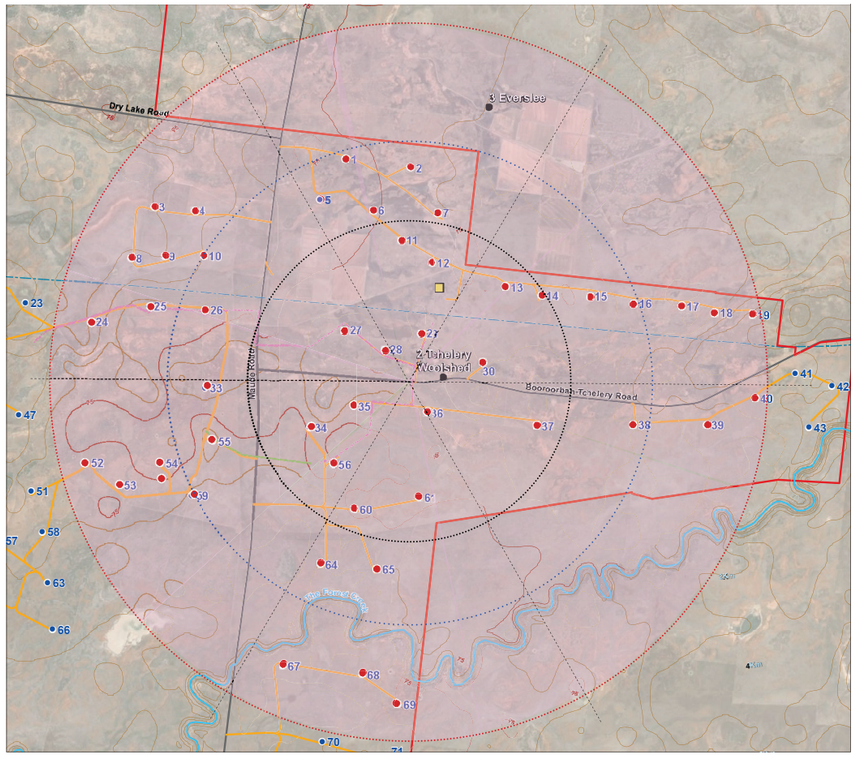
Photomontage showing indicative location of the proposal

50mm focal length

50mm focal length

B. View from Booroorban-Tchelery Road, Maude

Preliminary assessment



Project site
Proposed internal road
Existing 220kV power line
Structure

Preliminary assessment tool 1 - Visual magnitude thresholds:

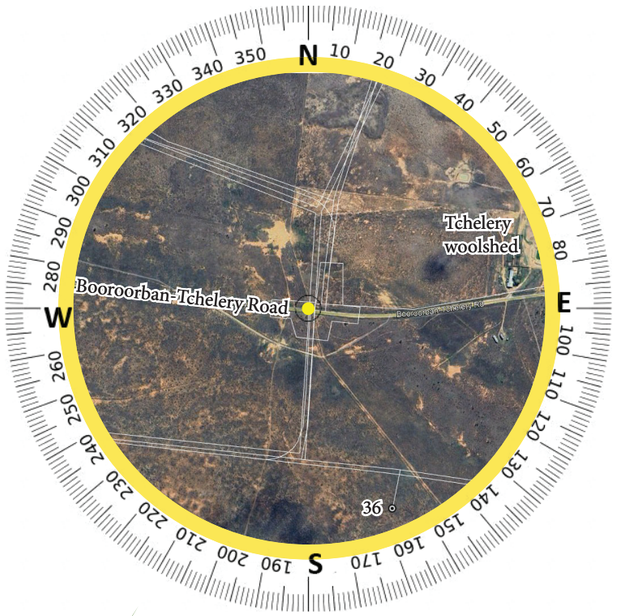
3.6 km offset
5.4 km offset
8.0 km offset

Preliminary assessment tool 2 - Indicating multiple wind turbines:

^{0} sector with turbine(s) visible
Turbine(s) less than 8km from dwelling
Turbine(s) more than 8km from dwelling

north

f



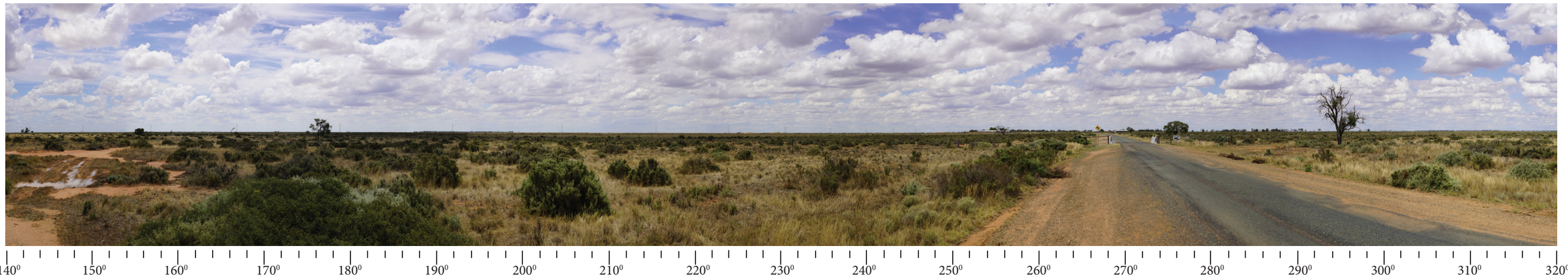
Viewpoint summary	
Nearest WTG	Around 0.75 km (WTG No.36)
Potential number of visible 60^{0} Sectors	6
Viewer sensitivity level:	Level 3 Sensitivity (Low) Low use road
Distance zone:	Mid Foreground (WTGs min. 500 - 1km)
Scenic quality class:	Low
Visual impact zone	VIZ2

WTGs within 8km
No WTGs within 8km

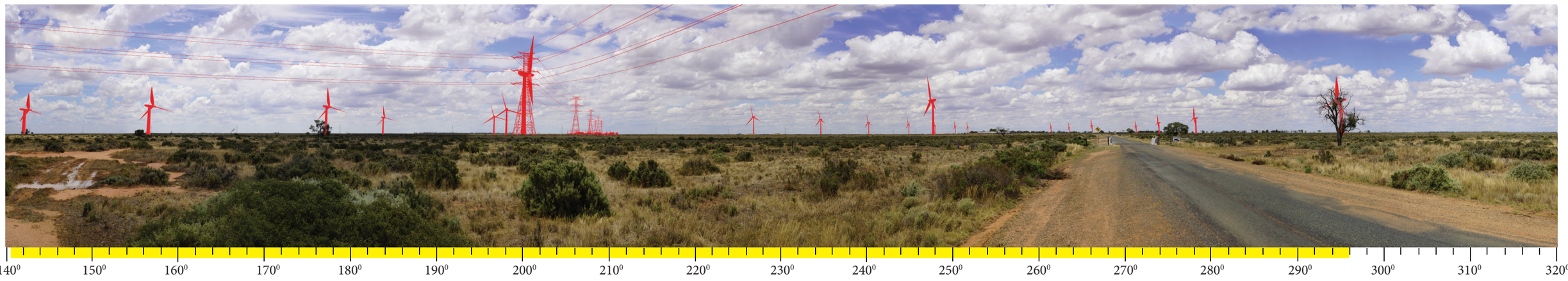
Detailed assessment - Visual performance evaluation - VIZ2

Visual performance objectives	Visual influence zone objectives	Response
Visual magnitude	Manage impacts as far as practicable, justify residual impacts, and describe proposed mitigation measures below the black line. Consider screening between the blue line and the black line.	• WTGs potentially visible: » 15 WTGs and BESS located below the black line (<3.6km from the dwelling) » 14 WTGs located between the black and blue lines (3.6 – 5.4km from the dwelling) • Boorboorban-Tchelery Road passes through the site. This location is the point where it is closest to WTGs. • The landscape is characterised by open plains with grasses and ground covers. There are no trees providing screening on the roadside in this area. • To screen the WTGs between the blue and black line would require screening vegetation along both sides of this road. This would be inconsistent with the character of views from Boorboorban-Tchelery Road and is not considered appropriate in this setting.
Landscape Scenic Integrity	Wind turbines should not cause significant modification of the visual catchment. Turbines may be visually apparent and could become a major element in the landscape but should not dominate the existing visual catchment.	• The wind turbines do not cause significant modification because, while they occupy a broad visual catchment from this road and contrast with the flat landscape, this view is appreciated for a short duration, moving through the landscape when passing through the site. • The wind turbines will become a major element in the visual catchment but would not dominate the visual catchment as most of the turbines are located between the blue and red line, and in the background.
Key Feature Disruption	Minimise impact of wind turbines or ancillary facilities that result in the removal or visual alteration/disruption of identified key landscape features. This includes any major or visually significant landform, waterform, vegetation or cultural features that have visual prominence or are focal points	• The visible wind turbines, transmission lines and BESS will not result in the removal or visual alteration of key landscape features, cultural features or focal points in the landscape.
Multiple Wind Turbine Effects	No performance objective provided in the Bullitin for Level 3 sensitivity (low) views.	• Low use road Level 3 sensitivity (low). • WTGs would be visible within six 60° sectors within 8km (refer to photomontage on page A-27). This meets the threshold identified by the Bulletin.
Ancillary electrical infrastructure	No performance objectives provided in the Bulletin.	• Ancillary electrical infrastructure including, the BESS substations, internal electrical reticulation and transmission line will not be visible from the dwelling.
Mitigation and management options	No performance objectives provided in the Bulletin.	• To screen the WTGs below the black line would require screening vegetation along both sides of Maude Road for some 23km (including 3.8 kilometres north and south of the nearest WTGs).

B. View from Booroorban-Tchelery Road, Maude

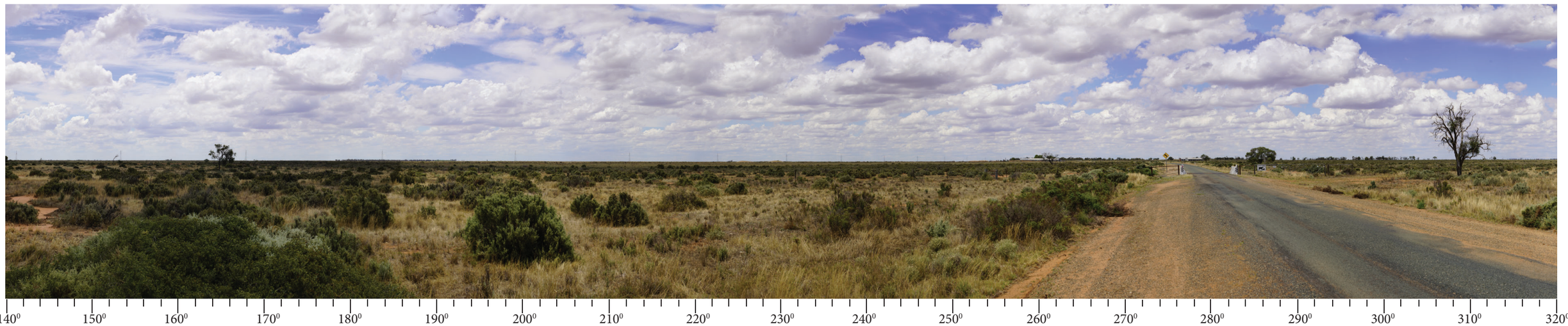


B. Existing view south from driveway

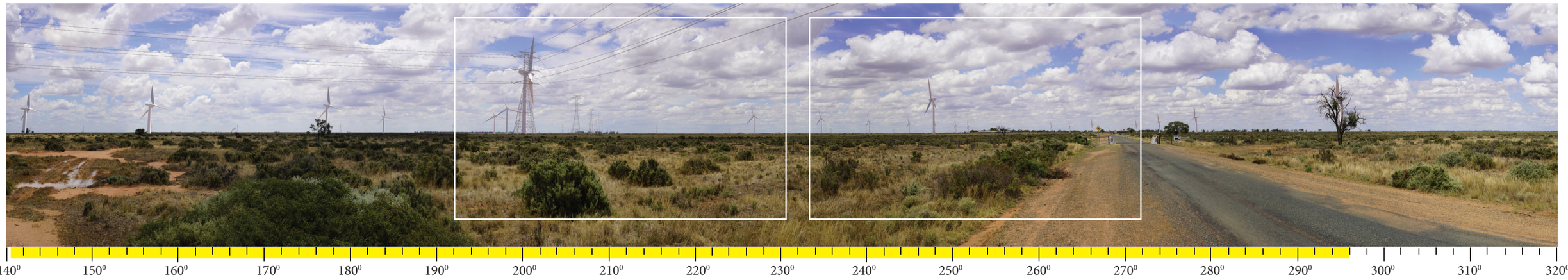


Photomontage showing proposal highlighted in silhouette

B. View from Booroorban-Tchelery Road, Maude



B. Existing view south from driveway



Photomontage showing indicative location of the proposal

50mm focal length

50mm focal length