Dinawan Wind Farm

Scoping Report

Prepared for Spark Renewables Pty Limited

November 2022

Dinawan Wind Farm

Scoping Report

Spark Renewables Pty Limited

E220305 RP2

November 2022

Version	Date	Prepared by	Approved by	Comments
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Executive Summary

Spark Renewables Pty Limited (Spark Renewables) proposes to develop the Dinawan Wind Farm (the project). The project includes the installation, operation, maintenance and decommissioning of up to approximately 250 wind turbine generators (WTGs), as well as a battery energy storage system (BESS) and associated infrastructure. The project will be located about halfway between the towns of Coleambally and Jerilderie and lies within the Murrumbidgee and Edwards River local government areas (LGAs) in New South Wales (NSW).

The project is within the South-West Renewable Energy Zone (REZ) and would connect to the Dinawan Substation, which is proposed to be built by Transgrid as part of the Project EnergyConnect interconnector that will run between Robertstown in South Australia and Wagga Wagga in NSW.

The project is part of the Dinawan Energy Hub, which comprises a hybrid wind and solar farm and BESS, and will be delivered through two separate, but related, State Significant Development (SSD) applications to the NSW Department of Planning and Environment (DPE). This report relates to the Dinawan Wind Farm (the project).

The project investigation area is approximately 39,000 ha and encompasses 370 land parcels. Within the project investigation area, the development corridor is estimated to be around 10,300 ha. The overall disturbance footprint for the project is anticipated to be in the order of 1–2% of the project investigation area. The land within the project investigation area is privately owned and is divided into two distinct sections, an eastern section and western section, which will be connected by an access road and cabling or powerline corridor.

The project will have a generation capacity of up to approximately 1.5 GW. The BESS will have a capacity of up to approximately 300 MW (AC or DC coupled) and will have provision for up to four hours of storage (1,200 MWh). The final layout and capacity of the project will be selected on the basis of environmental constraints identification, outcomes of stakeholder engagement, engineering assessments and design of project infrastructure.

The project aligns with the NSW and Commonwealth Government's objectives for energy security and reliability and emissions reductions. The project will contribute to the Commonwealth Government's plan to reduce Australia's greenhouse gas emissions by 43% by 2030, and net zero emissions by 2050. Once operational, the project could abate approximately 4 million tonnes of greenhouse gases annually and power up to 750,000 NSW households per year.

The project is SSD pursuant to Schedule 1 of *State Environmental Planning Policy (Planning Systems) 2021*. Accordingly, approval for the project is required under Part 4 of the NSW *Environmental Planning and Assessment Act 1979*.

This scoping report has been prepared to support a request for the Secretary's Environmental Assessment Requirements (SEARs) for the project. A preliminary environmental assessment has been carried out and is documented in this report to assist in the identification of matters that will require further assessment in the environmental impact statement (EIS), and the level of assessment that should be carried out for each matter.

This scoping report has been prepared in accordance with *State Significant Development Guidelines – Preparing a Scoping Report* (DPIE 2021a). The aspects identified as requiring detailed assessment in the EIS include visual, biodiversity, Aboriginal heritage, traffic, social and noise and vibration. Aspects requiring standard assessment include historic heritage, land, water, air quality and hazards and risk.

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1 Introduction

1.1 Project overview

Spark Renewables Pty Limited (Spark Renewables) proposes to develop the Dinawan Wind Farm (the project). The project includes the installation, operation, maintenance and decommissioning of up to approximately 250 wind turbine generators (WTGs), as well as a battery energy storage system (BESS) and associated infrastructure. The project will be located about halfway between the towns of Coleambally and Jerilderie and lies within the Murrumbidgee and Edwards River local government areas (LGAs) in New South Wales (NSW). The regional context of the project is shown in Figure 1.1.

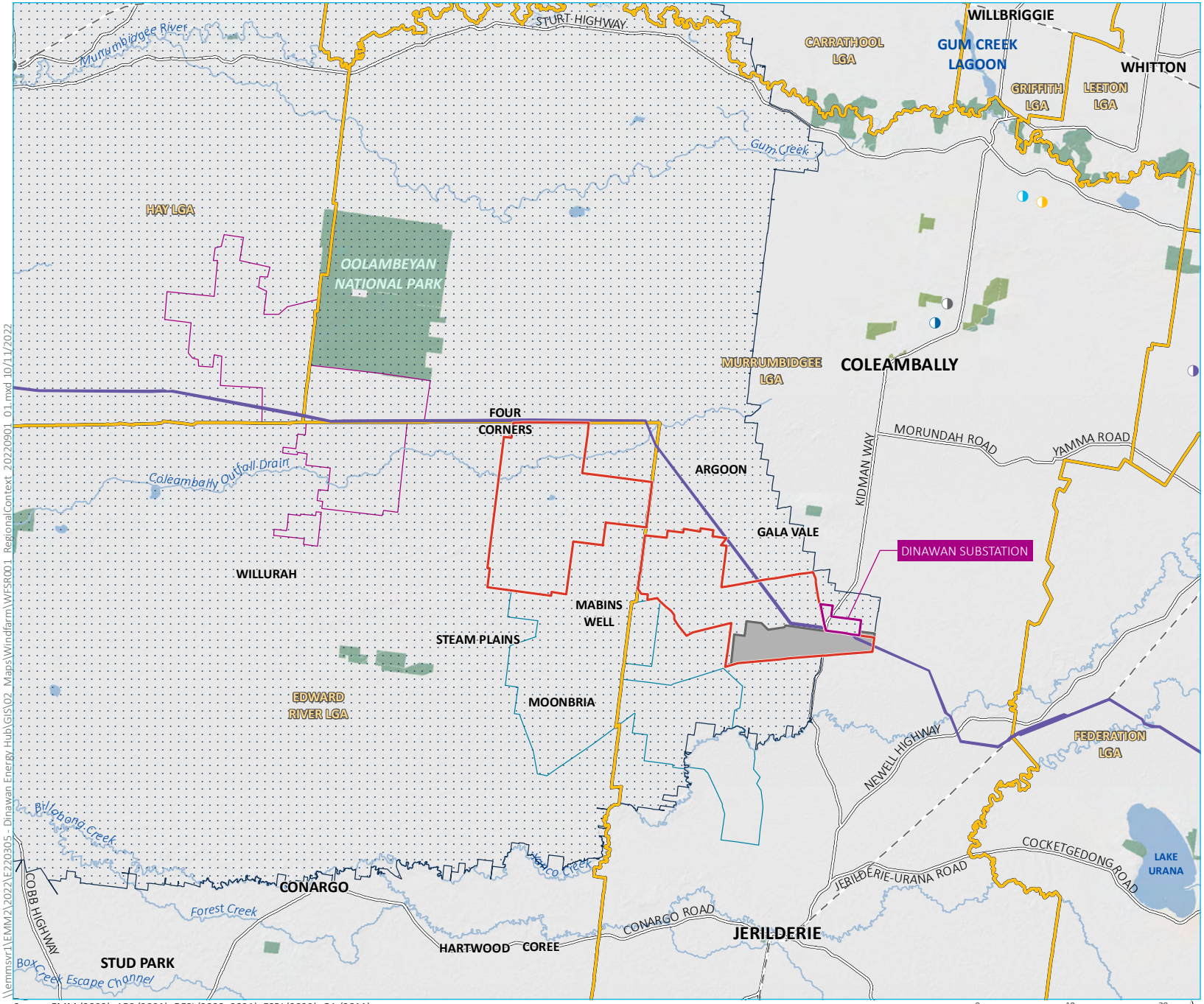
The project is part of the Dinawan Energy Hub (Section 1.3) and is within the South-West Renewable Energy Zone (REZ). The project would connect to the Dinawan Substation, which is proposed to be built by Transgrid as part of the Project EnergyConnect interconnector that will run between Robertstown in South Australia and Wagga Wagga in NSW.

The project will have capacity to generate up to 1.5 GW, which would require up to approximately 250 WTGs. A project investigation area of 46,000 hectares (ha) has been the focus of preliminary baseline investigations. The BESS will have a capacity of up to approximately 300 MW (AC or DC coupled) and will have provision for up to 4 hours of storage (1,200 MWh).

The project will be designed to avoid and minimise impacts where possible. The exact land area to be covered by the project components (ie the development corridor) will be refined as the project design progresses and will be informed by the outcomes of community and stakeholder engagement and the findings of the environmental, social, and economic assessments.

The project is consistent with NSW Government policy for development of renewable energy generation and storage infrastructure. It will assist in meeting NSW and Australian Government emissions reduction targets.

The project is State Significant Development (SSD) pursuant to Schedule 1 of the *State Environmental Planning Policy (Planning Systems) 2021* (Planning Systems SEPP) and approval for the project is required under Part 4, Division 4.7 of the NSW *Environmental Planning and Assessment Act 1979* (EP&A Act).



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Source: EMM (2022); ABS (2021); DFSI (2020, 2021); ESRI (2022); GA (2011)

Regional context

Dinawan Wind Farm
Scoping report
Figure 1.1

EMM
creating opportunities

1.2 The applicant

Spark Renewables is a wholly owned business within the Spark Infrastructure Group (Spark Infrastructure). Spark Infrastructure was founded in 2005 and is an owner of critical energy infrastructure, including generation, transmission and distribution infrastructure across Australia. The objective of Spark Infrastructure is to provide energy system stability, reliability and minimise electricity costs to customers.

Spark Infrastructure was acquired in 2021 by a consortium of global infrastructure investors including KKR and two Canadian pension funds, Ontario Teacher's Pension Plan and the Public Sector Plan. Between them, they manage nearly one trillion dollars of investment funds.

Spark Infrastructure owns interests in $18 billion of electricity network and generation assets across Australia. Spark Infrastructure's investment portfolio comprises regulated electricity transmission and distribution assets in New South Wales (NSW) (TransGrid, 15.01%), Victoria (CitiPower and Powercor, together known as Victoria Power Networks, 49%) and South Australia (SA Power Networks, 49%). These core assets comprise 85% of their investment portfolio.

These assets deliver energy to more than 5 million customers in Victoria, South Australia, NSW and the Australian Capital Territory and transport energy across the National Electricity Market (NEM).

Spark Renewables is a leading developer, long-term owner, and operator of renewable energy projects. The company's portfolio comprises the Bomen Solar Farm, operational since 2020, and Spark Renewables is currently developing in excess of 3 GW of solar, wind, and renewable storage projects across the NEM, including the Dinawan Energy Hub, Mallee Wind Farm and Mates Gully Solar Farm, within NSW.

Details for Spark Renewables are provided in Table 1.1.

Table 1.1 Summary of applicant details

Company name	Spark Renewables Pty Limited (Spark or the Applicant)
ACN	632 860 023
Address	Level 4, 1A Rialto Lane Manly NSW 2095 Australia

1.3 Related development

The project is part of the Dinawan Energy Hub, a hybrid wind and solar farm and BESS within the Murrumbidgee and Edwards River LGAs of NSW. Dinawan Energy Hub has the potential to be up to 2.5 gigawatts (GW) in capacity based on the land available and capacity of the Dinawan Substation. Preliminary resource monitoring indicates that a mix of approximately 70% wind and 30% solar results in a relatively flat, diurnal generation profile.

Dinawan Energy Hub will be delivered through two separate, but related, SSD applications to the NSW Department of Planning and Environment (DPE):

- Dinawan Wind Farm – comprising a large-scale wind development up to 1.5 GW, including a BESS; and
- Dinawan Solar Farm – comprising a large-scale solar development up to 1 GW, including a BESS; and

This scoping report addresses the Dinawan Wind Farm (the project). A separate scoping report addresses the Dinawan Solar Farm.

1.4 Purpose of this report

The project is SSD pursuant to Schedule 1 of the Planning Systems SEPP and approval for the project is required under Part 4, Division 4.7 of the EP&A Act. An SSD application for the project is to be accompanied by an environmental impact statement (EIS).

This scoping report supports a request to DPE for the Secretary's Environmental Assessment Requirements (SEARs) in relation to the project. The SEARs will identify the matters to be assessed in the EIS and the level of assessment required.

This report has been prepared by EMM Consulting Pty Limited (EMM) on behalf of Spark Renewables in accordance with the *State Significant Development Guidelines - Preparing a Scoping Report* (DPIE 2021a) (Scoping Report Guidelines). Other NSW Government SSD technical guidelines have been considered where applicable, as well as the *NSW Wind Energy Guideline for State Significant Wind Energy Development (*DPE 2016a).

This scoping report provides a high-level description of the project, including the project investigation area and its surroundings, the environmental planning pathway for approval and the identification of key potential environmental issues that may be associated with the project.

2 Strategic context

2.1 Site and surrounds

2.1.1 Regional context

The project investigation area is within the Murrumbidgee and Edward River LGAs, approximately 500 km south-west of Sydney and 320 km north of Melbourne. The Sturt Highway, approximately 50 km north of the project investigation area, connects the region to major population centres in NSW, Victoria and South Australia. The Murrumbidgee and Edward River LGAs combined encompass an area of approximately 15,760 square kilometres (km^2) and form part of the NSW Riverina region. The Riverina region is one of the most productive farming regions in Australia producing rice, citrus, grapes and wool. The regional context of the project is shown on Figure 1.1.

i Towns and population centres

The nearest towns to the project investigation area are Coleambally (22 km north) and Jerilderie (30 km south). Other major population centres in the vicinity of the project include Griffith (80 km north) and Wagga Wagga (135 km east).

ii Natural resources

The nearest national parks, nature reserves and state forest areas are:

- Oolambeyan National Park, which borders a portion of the project investigation area in the north-west;
- South-West Woodland Nature Reserves, comprising of:
  - Edgar and Puckawidgee precincts approximately 10 km to the south-west; and
  - Kulki precinct approximately 6 km to the north;
- Murrumbidgee Valley National Park, approximately 29 km to the north-east; and
- Bretts State Forest approximately 24 km to the north-east.

The largest nearby watercourse is Yanco Creek, approximately 6 km south of the project investigation area, which flows south-west toward the Murray River.

iii Renewable energy and other developments

The project is within the South-West REZ, which has an intended network capacity of 2.5 GW, and has been identified as a key location in NSW for the delivery of renewable energy infrastructure. There are a number of operating, approved and proposed renewable energy developments, and infrastructure to facilitate these developments, in the region, summarised in Table 2.1.

Table 2.1 Surrounding renewable developments and infrastructure

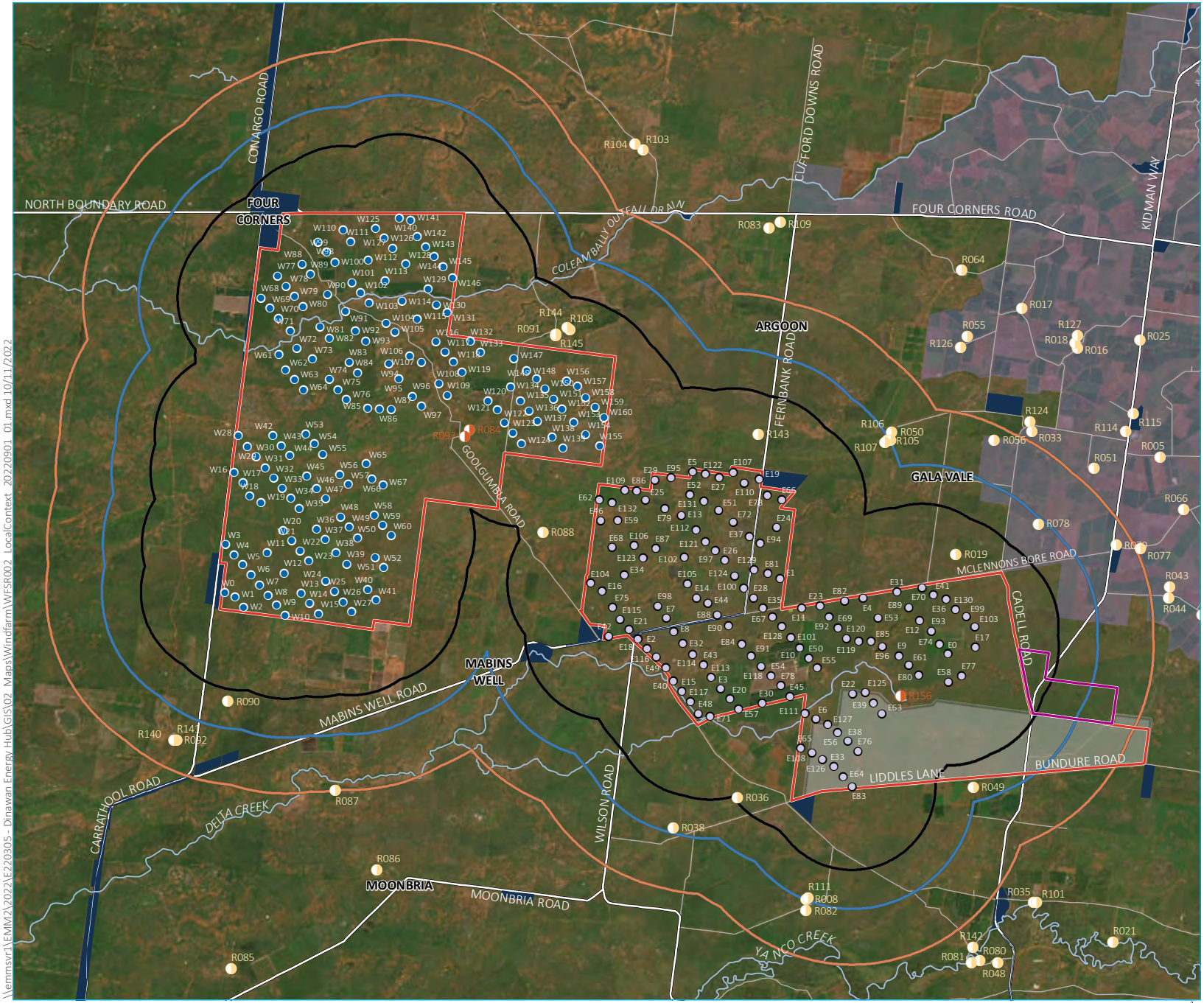
Project	Development type	Proximity to the Dinawan Energy Hub[1]	Status
Project EnergyConnect	Electricity transmission	Adjacent – proposed transmission line and Dinawan Substation adjacent to project investigation area.	Approved – not constructed
Dinawan Solar Farm	Solar farm and BESS	Within – located within the project investigation area and forms part of the Dinawan Energy Hub.	Proposed – EIS in preparation
Yanco Delta Wind Farm	Wind farm	Adjacent – adjoining the project investigation area to the south.	Proposed – EIS in preparation
Bullawah Wind Farm	Wind farm	Nearest boundary approximately 9 km west of the project investigation area.	Proposed – pre-scoping stakeholder engagement
Coleambally Solar Farm	Solar farm	30 km north of the project investigation area.	Operating
Coleambally BESS	BESS	30 km north of the project investigation area.	Proposed – EIS in preparation
Darlington Point Solar Farm	Solar farm and BESS	45 km north of the project investigation area.	Operating (BESS under construction)
Woodland BESS	BESS	45 km north of the project investigation area.	Proposed – EIS in preparation
Yarrabee Solar Farm	Solar farm and BESS	45 km north-east of the project investigation area.	Approved – not constructed
Currawarra Solar Farm	Solar farm	60 km south of the project investigation area.	Approved – not constructed
Tarleigh Park Solar Farm	Solar farm	75 km south-west of the project investigation area.	Approved – not constructed
Baldon Wind Farm	Wind farm	100 km west of the project investigation area.	Proposed – EIS in preparation

1. Distances are measured from closest boundary points based on publicly available information at the time of preparation.

2.1.2 Local context

The project investigation area is west of Kidman Way and the majority is south of Four Corners Road (Figure 2.1). Kidman Way is a regional road linking the Newell Highway (approximately 19 km south of the project investigation area) with the Sturt, Mid-Western, Barrier, Mitchell and Kamilaroi highways.

With a population 1,152, Coleambally is approximately 22 km north of the project investigation area and contains residential, general industrial and forestry land uses. Jerilderie has a population of 922 and is approximately 30 km south of the project investigation area. Like Coleambally, Jerilderie contains residential and general industrial land uses as well as public recreation and infrastructure. The area surrounding both towns is primarily used for agriculture.



KEY

- Project investigation area
- Dinawan Solar Farm
- Wind turbine generator (East)
- Wind turbine generator (West)

Project EnergyConnect (Transgrid)

- Dinawan Substation

Residence

- Associated residence
- Non-associated residence
- Turbine buffer (3.75 km)
- Turbine buffer (5.5 km)
- Turbine buffer (8 km)

Existing environment

- Watercourse (third order and higher)
- Major road
- Minor road
- Coleambally irrigation area
- Travelling stock reserves

Source: EMM (2022); DFSI (2020, 2021); ESRI (2022); GA (2011)

0 5 10 km

GDA2020 MGA Zone 55

N

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Local context

Dinawan Wind Farm
Scoping report
Figure 2.1

EMM creating opportunities

North-east of the project investigation area is the Coleambally Irrigation Area (Figure 2.1), which is run by the Coleambally Irrigation Co-operative Limited and supplies irrigation and drainage services to nearly 500 farms. The Coleambally Irrigation Co-operative Limited area of operations spans across over 400,000 ha including over 300,000 ha which is serviced by the West Coleambally Outfall Channel (also known as Coleambally Outfall Drain). The water supply is from the regulated Murrumbidgee River and access to water is based on the Murrumbidgee Regulated River Water Sharing Plan (2016) (CICL 2021).

Adjacent to the south-eastern extent of the project investigation area is the proposed site of the Dinawan Substation, which forms part of Project EnergyConnect (Figure 2.1). Project EnergyConnect includes the construction and operation of a new high voltage (HV) interconnector between NSW and South Australia, with an additional connection to north-west Victoria. Project EnergyConnect aims to reduce the cost of providing secure and reliable electricity transmission between NSW and South Australia in the near term, while facilitating the longer-term transition of the energy sector across the National Electricity Market (NEM) to low emission energy sources.

The area surrounding the project investigation area is sparsely populated. Based on the indicative WTG layout presented in Figure 2.1, there are:

- eight non-associated residences within 3.75 km of a WTG;
- nine non-associated residences between 3.75 km and 5.5 km of a WTG; and
- eight non-associated residences between 5.5 km and 8 km of a WTG.

No mining tenements within the project investigation area were identified in a search of MinView. The closest is Exploration Lease (EL) 9366, approximately 25 km east of the project investigation area.

2.1.3 Project investigation area

The land within the project investigation area is currently used for sheep and cattle grazing as well as discrete areas irrigated for cropping involving canola, cotton and cereal crops.

The project investigation area is approximately 39,000 ha and encompasses 370 land parcels. The land within the project investigation area is privately owned and is divided into two distinct sections, an eastern section and western section, which will be connected by an access road and cabling or powerline corridor. Within the project investigation area, the development corridor is estimated to be around 10,300 ha. The overall disturbance footprint for the project is anticipated to be in the order of 1–2% of the project investigation area.

Elevation within the project investigation area is approximately 110 m above sea level and is characterised by flat terrain. There are first and second order watercourses mapped within the project investigation area; however, all are ephemeral. The Coleambally Outfall Drain runs through the north-west portion of the project investigation area.

The preferred point of connection to Transgrid's network is via the Dinawan Substation, which forms part of Project EnergyConnect and will be constructed on land adjacent to the solar investigation area. An overhead transmission line will connect the project's on-site substation to the Dinawan Substation.

A summary of the key features of the project investigation area and surrounds is provided in Table 2.2.

Table 2.2 Key features of the project investigation area and surrounds

Aspect	Description
LGA	The project investigation area is within the Murrumbidgee LGA and Edward River LGA.
Land zoning	The project investigation area is zoned RU1 Primary Production under the *Jerilderie Local Environment Plan 2012* (Jerilderie LEP), *Murrumbidgee Local Environment Plan 2013* (Murrumbidgee LEP) and *Conargo Local Environment Plan 2013* (Conargo LEP).
Nearby townships	Coleambally and Jerilderie are within approximately 30 km of the project investigation area.
Landscape	The landscape within the project investigation area is largely flat with some minor drainage depressions that hold water during rainfall and flooding. The Coleambally Outfall Drain passes through the project investigation area.
Land use	Land use within the project investigation area includes agricultural operations (sheep and cattle grazing as well as discrete areas irrigated for cropping involving canola, cotton and cereal crops). There are also scattered rural residential properties.
Site history	The project investigation area is on Wiradjuri Country. The project investigation area forms part of pastoral stations established following European settlement in the area from around the 1850s. In particular, the project investigation area is closely associated with Yanko Station and later the Goolgumbla property.
Land ownership	Land within the project investigation area is privately-owned.
Residences	There are: • eight non-associated residences within 3.75 km of a WTG; • nine non-associated residences between 3.75 km and 5.5 km of a WTG; and • eight non-associated residences between 5.5 km and 8 km of a WTG.
Nearby natural features	• Watercourses, including: Yanco Creek, Coleambally Creek and Delta Creek. • Oolambeyan National Park.
Nearby infrastructure	Kidman Way is a sealed regional road that bisects the project investigation area. It runs from the Newell Highway to the south and north towards Coleambally. Four Corners Road is a sealed road that runs east to west from Kidman Way to Conargo Road. Four Corners Road, Fernbank Road, Carrathool Road, McLennons Bore Road and Goolgumbla Road are unsealed roads within the project investigation area. Coleambally irrigation channel runs through the project investigation area east of Kidman Way and delivers water to irrigated properties within the Coleambally irrigation area.
Surrounding development	The project investigation area is within the South-West REZ. Other renewable energy and transmission developments within close proximity to the project include: • Dinawan Solar Farm (within and adjacent to the project investigation area); • Project EnergyConnect (adjacent to the project investigation area); • Yanco Delta Wind Farm (adjacent to the project investigation area); • Bullawah Wind Farm (adjacent to the project investigation area); • Coleambally BESS (30 km north of the project investigation area); and • Coleambally Solar Farm (30 km north of the project investigation area). Where relevant, cumulative impacts from the project and surrounding developments will be assessed in accordance with the *Cumulative Impact Assessment Guidelines for Significant Projects* (DPIE 2021c). Cumulative impacts are discussed in Section 6.12.

Table 2.2 Key features of the project investigation area and surrounds

Aspect	Description
Planning context	The project area is not within any land identified as: • biophysical strategic agricultural land (BSAL); or • flood planning area. Parts of the project area are mapped as 'environmentally sensitive – biodiversity', 'environmentally sensitive – wetland' and 'environmentally sensitive – groundwater vulnerable' on the Jerilderie, Murrumbidgee and Conargo LEPs. There is a travelling stock reserve within the project investigation area (Figure 2.1).

2.2 Strategic planning framework

An overview of relevant key policies, plans and strategies, and how the project aligns with these, is provided in Table 2.3.

Table 2.3 Alignment with key strategic planning frameworks

Plan, policy or strategy	Description	Alignment with strategic framework
International context		
The Paris Agreement	*The Paris Agreement* is a legally binding international treaty on climate change adopted by 196 parties in 2015. As a signatory to the agreement, the Australian Government has committed to reduce greenhouse gas (GHG) emissions by 26–28% on 2005 levels by 2030.	The project will contribute to meeting Australia's commitments under the Paris Agreement by reducing the NEM's annual GHG emissions. Once operational, the project could abate approximately 4 million tonnes of GHG annually and power up to 750,000 NSW households per year.
National context		
Large-scale Renewable Energy Target	The Australian Government Clean Energy Regulator administers the Large-scale Renewable Energy Target which incentivises investment in renewable energy power stations such as wind and solar farms. The Large-scale Renewable Energy Target of 33,000 GW hours of additional renewable electricity generation was met at the end of January 2021 (Clean Energy Regulator 2021). The annual target will remain at 33,000 GW hours until the scheme ends in 2030.	It is noted that the annual target has been met and will remain at 33,000 GWh until the scheme ends in 2030.

Table 2.3 Alignment with key strategic planning frameworks

Plan, policy or strategy	Description	Alignment with strategic framework
Integrated System Plan 2022	The *Integrated Systems Plan 2022* (ISP 2022) prepared by the Australia Energy Market Operator (AEMO) is an: "Actionable roadmap for eastern Australia's power system to optimise consumer benefits through a transition period of great complexity and uncertainty."	Renewable Energy Zones (REZs) are identified in the ISP 2022 as "high-quality resource areas where clusters of large-scale renewable energy projects can be developed using economies of scale" (AEMO 2022). ISP 2022 identifies that significant investment in the NEM is necessary, requiring a nine-fold increase in utility-scale variable renewable energy (VRE) and that: "much of this resource will be built in renewable energy zones (REZs) that coordinate network and renewable investment, and foster a more holistic approach to regional employment, economic opportunity and community participation." The project will contribute to the development of the South-West REZ.
Net Zero 2050	In October 2021, the Australian government released its *Long-Term Emissions Reduction Plan* to achieve net zero emissions by 2050. The Plan aims at reaching a net zero economy through a technology-based approach, whilst protecting relevant industries, regions and jobs. It is part of an overarching strategy for emission reduction, based on a technology-led approach which includes a Technology Investment Roadmap and its Low Emissions Technology Statements.	The project will reduce GHG emissions associated with energy generation over its operational life. The project will contribute to the Commonwealth Government's plan to reduce Australia's greenhouse gas emissions by 43% by 2030, and net zero emissions by 2050, with 82% of Australia's energy to be derived from renewables by 2030. The incorporation of a BESS into the project will enable the storage of renewable energy to increase market efficiency and enable greater penetration of renewables in the electricity grid. Once operational, the project could abate approximately 4 million tonnes of GHG annually and power up to 750,000 NSW households per year.
State context		
Net Zero Plan Stage 1: 2020–2030 (DPIE 2020a)	The *Net Zero Plan Stage 1 2020–2030* (DPIE 2020a) outlines the NSW Government's plan to grow the economy and create jobs while helping the state to deliver a 35% cut in emissions compared to 2005 levels.	The project contributes to Priority 1 of the Net Zero Plan: "Drive uptake of proven emissions reduction technologies that grow the economy, create new jobs or reduce the cost of living." The project will fall within the South-West REZ. The region has been identified as an ideal location to play a key role in a renewable energy future for NSW due to its good renewable energy resources and opportunity to utilise electricity network infrastructure. The project will utilise these benefits to contribute to the NSW Net Zero Plan.
NSW Electricity Infrastructure Investment Roadmap (DPIE 2020b)	The Electricity Infrastructure Roadmap coordinates investment in transmission, generation, storage and firming infrastructure as ageing coal-fired generation plants retire. The roadmap includes actions that will deliver "whole-of system" benefits. The roadmap sets out a plan to deliver the state's first five REZs in the Central-West Orana, New England, South-West, Hunter-Central Coast, and Illawarra regions.	The project is within the South-West REZ and is ideally placed to contribute to the success of the roadmap. Once operational, the project could power up to 750,000 NSW households per year.

Table 2.3 Alignment with key strategic planning frameworks

Plan, policy or strategy	Description	Alignment with strategic framework
Wind Energy Guideline (DPE 2016a)	The *Wind Energy Guideline* (DPE, 2016a) provides the community, industry and regulators with guidance on the planning framework for the assessment of large-scale wind energy development proposals that are SSD and identifies the key planning considerations relevant to wind energy development in NSW.	Site selection and impact assessment considerations detailed in the guideline have been and will continue to be used to inform the project and will be considered in the EIS.
Local and regional context		
Riverina Murray Regional Plan 2036	The *Riverina Murray Regional Plan 2036* (DPIE 2017) (the Regional Plan) is currently being reviewed to reset priorities and extend its reach to 2041 before being put on exhibition in mid-2022. Direction 11 of Goal 1 of the Regional Plan is to promote the diversification of energy supplies through renewable energy generation. The Regional Plan acknowledges that the region has significant potential for renewable energy industries, with vast open spaces and a strategic advantage in hydro-electric energy generating capacity.	The project directly contributes to Direction 11 of the Regional Plan by: • contributing to the national renewable energy target; • promoting energy security through a more diverse energy mix; • investigating areas within the region with renewable energy potential and ready access to connect with the electricity network; • increasing energy efficiency; and • moving to lower emission energy sources.
Murrumbidgee Council Economic Development Strategy	The *Murrumbidgee Council Economic Development Strategy* (Murrumbidgee EDS) (Murrumbidgee Council 2018) aims to guide economic development activity in the Murrumbidgee LGA. To support its implementation, six strategic themes were identified: • attract new business investment; • support existing business to grow and diversify; • education, training and skills development; • grow the population; • infrastructure; and • develop and promote tourism.	The project will bring new investment opportunities to Murrumbidgee LGA and facilitate the delivery of energy infrastructure to support new development.

Table 2.3 Alignment with key strategic planning frameworks

Plan, policy or strategy	Description	Alignment with strategic framework
Edward River Council Economic Development Strategy 2018–2021	The *Edward River Economic Development Strategy* (Edward River EDS) (Edward River Council 2018a) provides an economic framework to enhance the prosperity of the Edward River LGA through a distinct focus on business growth from strengthening existing businesses, attracting new industry, developing export knowledge, capacity and markets; and growing visitor markets. Actions are focused on forming or strengthening partnerships, allocating or accessing key resources and infrastructure and unlocking opportunities to various markets. Six strategic themes have been identified: • attract new business investment; • support existing businesses to grow; • infrastructure provision; • innovation, education and skills development; • revitalise and activate the CBD; and • market the region.	The project will bring new investment opportunities and facilitate the delivery of energy infrastructure to support new development in the Edward River LGA.
Murrumbidgee Council Local Strategic Planning Statement March 2020	The *Murrumbidgee Local Strategic Planning Statement* (Murrumbidgee Council 2020) is an important and significant step in planning for the future of the Murrumbidgee LGA. It will inform and guide Murrumbidgee Council's decision-making on planning matters and outlines a vision for a thriving and prosperous region over the next 20 years. The Statement sets out specific agenda items that are nominated under one of four broad categories in the built environment, the natural environment, infrastructure and economic growth.	The Statement aims to support projects for renewable energy. The project aligns with this objective and Spark Renewables will continue to engage with Murrumbidgee Council throughout the assessment process.
Murrumbidgee Council Community Strategic Plan 2017–2027	The *Murrumbidgee Council Community Strategic Plan 2017–2027* (Murrumbidgee CSP) (Murrumbidgee Council 2017) aims to prepare a shared vision for the communities over the 10 years to 2027. The five key strategic themes of the Murrumbidgee CSP are: • protecting existing regional natural environment for future generations; • exploring and promoting alternative, sustainable energy sources and practices; • maintaining a balance between growth, development and environmental protection; • welcoming and supporting our business and industries growth, diversity and productivity; and • promoting and supporting a regional economy and growth.	The project will support economic and industrial growth and diversification in the Murrumbidgee LGA and will seek to maximise environmental protection while developing new renewable energy generation and storage potential.

Table 2.3 Alignment with key strategic planning frameworks

Plan, policy or strategy	Description	Alignment with strategic framework
Edward River Council Community Strategic Plan 2018–2030	The *Edward River Council Community Strategic Plan 2018–2030* (Edward River CSP) (Edward River Council, 2018b) identifies the community's main priorities and aspirations for the future and the strategies that will be implemented to achieve the shared vision for the future of the Edward River Local Government Area. The Edward River CSP shared vision is underpinned by five strategic outcomes: • a great place to live; • a prosperous and vibrant economy; • a valued and enhanced natural environment; • a region with quality and sustainable infrastructure; and • a community working together to achieve its potential.	The project will promote local and regional economic growth through the development of renewable energy.

2.3 Project justification

2.3.1 Project benefits

The proposed project location is within the South-West REZ and would form an important part of Australia's response to climate change and Commonwealth and NSW Government commitments in the reduction of GHG emissions from the electricity industry. The project aligns with government objectives for energy security and reliability and will contribute to the continued growth of renewable energy generation and storage capacity.

The project is consistent with the principles of Ecologically Sustainable Development, as defined by Clause 193 of the NSW Environmental Planning and Assessment Regulation 2021, particularly in relation to climate change reduction and intergenerational equity. The project is in the public interest as it meets a demonstrated need and provides public benefits.

The project will:

- contribute to and support the development of the South-West REZ by providing renewable energy generation and storage capacity and improving the security, stability and resilience of the NEM;
- facilitate the shift away from coal-fired power generation, supporting Australia's transition towards clean and renewable sources of energy (with a capacity of up to 1.5 GW and potential to power approximately 750,000 NSW households per year);
- avoid, minimise and mitigate adverse impacts on the environment and community during construction and operation;
- establish a strong network of positive and long-term relationships within the local community and contribute to economic and social growth within the Murrumbidgee and Edward River LGAs and surrounds; and
- provide energy storage for sustainable renewable energy to enable continuous and reliable electricity output as part of a rapidly expanding industry in NSW.

2.3.2 Site suitability

The project investigation area is ideally located for the development of a wind farm and BESS because:

- the project investigation area has a very good wind resource with relatively flat terrain that would mean complex earthworks can be avoided during construction;
- the available wind resource is anti-correlated with the solar resource proposed to be utilised as part of the Dinawan Solar Farm, enabling a more efficient utilisation of the proposed transmission infrastructure;
- the project investigation area is within the South-West REZ, an area nominated for significant investment in renewable energy generation, storage and transmission projects;
- the project investigation area is adjacent to Project EnergyConnect and the proposed Dinawan Substation and can export the electricity generated by the project directly into the grid via Project EnergyConnect;
- the project investigation area connects directly to Kidman Way, an approved B-Double route, with access to the Sturt and Newell highways;
- the land surrounding the project investigation area is sparsely populated;
- the existing agricultural land use within and surrounding the project investigation area is compatible with large-scale renewable energy generation and storage; and
- the construction and operation of a wind farm and BESS is not anticipated to result in significant adverse biophysical, cultural, social or economic impacts.

3 Project description

3.1 Overview

The project includes the installation, operation, maintenance and decommissioning of approximately 250 WTGs, as well as a BESS and associated infrastructure (Figure 3.1). The project will have a generation capacity of up to approximately 1.5 GW. The BESS will have a capacity of up to approximately 300 MW (AC or DC coupled) and will have provision for up to four hours of storage (1,200 MWh).

Project infrastructure will be contained within the development corridor, the area within which infrastructure and WTGs will be placed, providing the necessary flexibility for further detailed design (ie micro-siting) whilst also allowing a detailed environmental assessment process to be completed. The final layout and capacity of the project will be selected on the basis of environmental constraints identification, outcomes of stakeholder engagement, engineering assessments and design of project infrastructure.

3.2 Physical layout and design

The project investigation area is approximately 39,000 ha and encompasses 370 land parcels (provided in Appendix A). The land within the project investigation area is privately-owned and is divided into two distinct sections, an eastern and western section, which will be connected by an access road and cabling or powerline corridor.

The development corridor is approximately 10,300 ha based on the current concept design which will be subject to further design refinement as the project progresses. The proposed disturbance area for the project will be within the development corridor and is anticipated to be in the order of 12% of the project investigation area.

The preferred point of connection to Transgrid's network is via the proposed Dinawan Substation, which forms part of Project EnergyConnect (SSI-9172452) and will be constructed on land adjacent to Kidman Way (Figure 3.1). An overhead transmission line will connect the project's on-site collector substations to the Dinawan Substation.

It is anticipated that the physical layout and design of the project will comprise the following key infrastructure elements:

- Wind turbines – up to 250 (3 blade) WTGs with a height of up to 280 m (uppermost blade tip) and a tower (hub) height of up to 180 m. Each turbine location will also include a hard stand area and a turbine laydown area for assembly. Wind turbines will be connected via network of internal access tracks.
- Battery energy storage system (BESS) – to store and discharge electricity as required with a storage capacity of up to approximately 300 MW (AC or DC coupled)/4 hour.
- Substation and transmission connection - on-site collector substations and overhead powerlines to connect the wind farm and BESS to the electricity transmission network via the proposed Dinawan Substation.
- Electrical connections – a combination of underground cables and overhead powerlines connecting WTGs to the on-site collector substations.
- Operations and maintenance (O&M) facility – including site offices, O&M buildings, amenities, equipment sheds, storage and parking areas.
- Site access and internal access roads – including access points from Kidman Way, Goolgumbla Road and McLennons Bore Road.
- Road upgrades – to facilitate the delivery of WTG components to the development corridor (to be determined).

- Temporary construction infrastructure – to facilitate construction and likely to include on-site concrete batching plants, rock crushing facilities, stockpiles, laydown and storage areas and site offices.
- Temporary and permanent meteorological masts.

Subdivision for the purpose of construction, operation and maintenance of a substation may be required.

An indicative project layout is provided in Figure 3.1. The layout and design will be refined further through the preparation of the EIS for the project. The following sections describe the project design and layout considerations for the key infrastructure elements.

3.2.1 Wind turbines

A wind farm is proposed with a generation capacity of up to approximately 1.5 GW. The project will include the installation of approximately 250 WTGs positioned to maximise the use of the available wind resource.

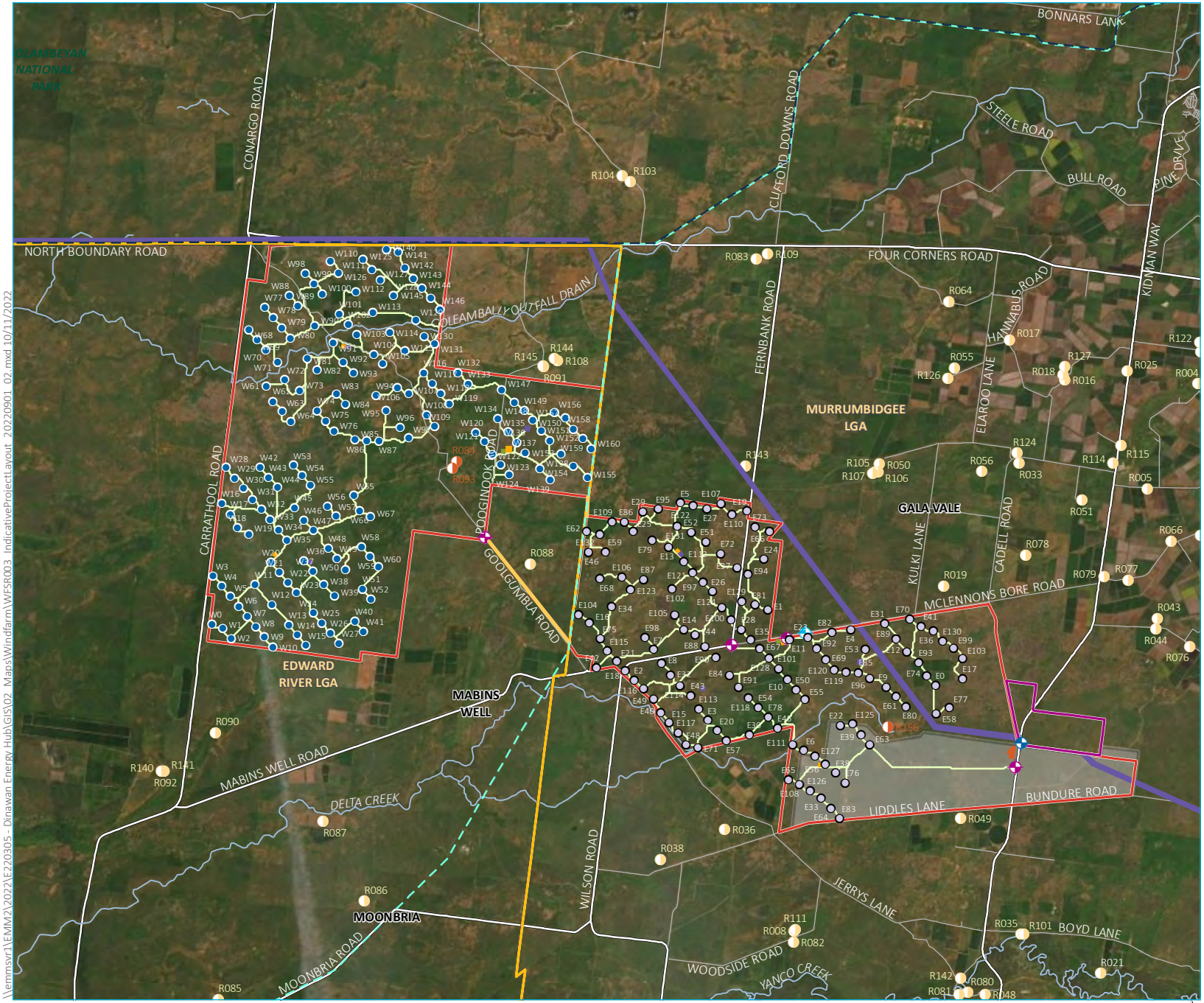
Indicative dimensions for the WTGs and associated infrastructure are:

- maximum height (uppermost blade tip): approximately up to 280 m;
- lowermost blade tip: approximately 50 m;
- rotor diameter (including nacelle): approximately up to 200 m; and
- tower (hub) height: approximately up to 180 m.

The WTGs will have three blades with the rotor and nacelle mounted on a tower with an internal ladder or lift. For each WTG, foundations in the order of 400 m^2 (20 m x 20 m) will be excavated and a hardstand of approximately 5,400 m^2 (ie 90 m x 60 m) will be established.

As shown in Figure 3.1, it is anticipated that WTGs will be installed in two sections, being a western section and an eastern section. The indicative layout in Figure 3.1 includes 161 WTGs in the western section and 131 WTGs in the eastern section; however, it is envisaged that the final number of WTGs will be approximately 250. The final number and placement will be determined as part of the final layout to be assessed in the EIS.

WTGs will be installed at final locations in accordance with the micro-siting restrictions identified in the EIS and will depend on a range of factors including WTG technology, available grid capacity, economies of scale, grid connection and environmental constraints.



KEY

- Project investigation area
- Dinawan Solar Farm

Wind farm infrastructure

- Wind turbine generator (East)
- Wind turbine generator (West)
- Site access point
- Grid connection
- O&M facilities
- Battery energy storage system
- On-site/ collector substations
- Construction compound
- Indicative access road
- Powerline corridor

Project EnergyConnect (Transgrid)

- Dinawan Substation
- Transmission line

Residence

- Associated residence
- Non-associated residence

Existing environment

- Watercourse (third order and higher)
- Major road
- Minor road
- Local government area
- AHIMS registered site

Existing transmission lines

- 132 kV
- 220 kV

Indicative project layout

Source: EMM (2022); DFSI (2020, 2021); ESRI (2022); GA (2011)

0 5 10 km

GDA2020 MGA Zone 55

N

Dinawan Wind Farm
Scoping report
Figure 3.1

EMM creating opportunities

\\emmsvr1\EMM2\2022\E220305 - Dinawan Energy HubGIS\02 Maps\Windfarm\WFSR003 IndicativeProjectLayout 20220901 02.mxd 10/11/2022

3.2.2 Electrical collection system and substations

A network of underground and overhead powerlines will be installed across the development corridor and will connect WTGs to up to five on-site collector substations.

Cabling may be underground or aboveground depending on geotechnical conditions. The eastern and western sections of WTGs will also be connected via an underground or overhead cable, the location of which will be confirmed during further design work. Two indicative alignments for this infrastructure are shown on Figure 3.1. An agreement with the relevant landholder and landholder's consent will be sought prior to lodgement of the EIS.

The on-site collector substations will be constructed within the development corridor to convert the on-site AC reticulated electricity to 330 kV for export to the grid.

Indicative footprints for the on-site collector substations are provided on Figure 3.1 and represent areas of approximately 6 ha each.

Electricity generated by the project will be exported to the grid via a high voltage overhead line network connection (Section 3.2.4).

3.2.3 Battery energy storage system

Renewable energy generation is intermittent in nature and subject to fluctuations in solar and wind availability. Batteries mitigate these natural fluctuations through their ability to store and discharge electricity when required. The BESS will have a capacity of up to approximately 300 MW (AC or DC coupled) and will have provision for up to four hours of storage (1,200 MWh). The BESS will provide both storage as well as firming capacity to the National Electricity Market and assist in grid stability by providing frequency control ancillary services. The BESS will allow for the storage and export of renewable energy within the network so that it can be used during times of peak demand.

The major components of the BESS will comprise:

- batteries – most likely a lithium-ion technology;
- inverters – bi-directional inverters to convert DC current to AC current (when exporting electricity) and vice versa (when importing electricity); and
- transformers – skid-mounted transformers will be installed adjacent to each inverter to step up the voltage to the internal reticulation voltage of the plant.

An indicative footprint for the BESS is provided on Figure 3.1 and represents an area of 16 ha.

Battery modules are the key building block in a utility-scale BESS and are capable of both storing and discharging energy at a rapid rate. Battery modules are installed in racks, then the racks are wired together in strings, and strings of batteries are connected to the inverter stations.

The batteries will either be containerised in self-contained steel enclosures resembling shipping containers or alternatively within a building resembling a large industrial shed. Due to rapidly evolving technology, the final technology choice and battery storage capacity for the project is yet to be confirmed and is subject to final selection and detailed design.

Although adjacent to each other, the wind farm and BESS will be registered as separate generating units in the National Electricity Market and will be developed and operated independently. The wind energy generated from the wind farm would be exported to the grid or used to charge the BESS. When discharging, the BESS would export its electricity to the grid. As such, they are independent and distinct, but related, uses of the development corridor.

3.2.4 Network connection

A high voltage overhead transmission line will connect the on-site collector substations to EnergyConnect's Dinawan Substation. The precise location of the overhead transmission line to connect the project to EnergyConnect's Dinawan Substation has not been determined as this will be confirmed as part of further design works during the preparation of the EIS and following detailed design of EnergyConnect's Dinawan Substation. An indicative grid connection location is shown on Figure 3.1.

EnergyConnect's Dinawan Substation will occupy an area of approximately 8.4 ha and will include line bays, capacitor banks, synchronous condensers, transforms and a range of supporting electrical components.

3.2.5 Supporting infrastructure

Supporting infrastructure will be required during construction and operations and will include:

- temporary construction facilities, including:
  - construction compound(s);
  - site office buildings;
  - concrete batching plants;
  - rock crushing facilities;
  - stockpiles;
  - material storage compounds;
  - laydown areas; and
  - temporary meteorological masts (up to 200 m high);
- a site office and O&M buildings (including offices, amenities and equipment storage sheds) with parking during operations; and
- other associated permanent infrastructure, including:
  - hardstands;
  - permanent meteorological monitoring masts (up to 200 m high);
  - new access tracks;
  - upgrades to existing access tracks; and
  - access points from the public road network.

Indicative locations for temporary construction compounds and the O&M facility are shown on Figure 3.1.

Security fencing will also be installed around the perimeter of the high voltage electrical equipment such as the BESS and on-site and collector substations. Signage will be clearly displayed identifying hazards present within the development corridor.

Lighting, security cameras and weather stations will be installed where necessary for safety, maintenance, and security purposes. Lightning protection is also likely to be provided in key locations.

Landscaping may also be implemented within the development corridor to reduce the visibility of project infrastructure.

3.2.6 Site access

Site access will be via Kidman Way, Goolgumbla Road and McLennons Bore Road. (Figure 3.1). The transport route to the development corridor will be confirmed through the EIS but is expected to comprise vehicle movements originating from:

- north of the project and travelling south along Kidman Way;
- east of the project and travelling west along the Sturt Highway before turning onto Kidman Way; and
- south of the project and travelling north along the Newell Highway before turning onto Kidman Way.

Over-size, over-mass (OSOM) vehicles will require access to the development corridor and the preferred route is the subject of ongoing route analysis. This includes an assessment of a 100 m blade travelling to site from the ports of Geelong, Newcastle or Wollongong. Upgrades to the local and regional road network may be required to facilitate delivery of WTG components to the project.

Subject to detailed design, internal access tracks will also be established to connect the WTGs, on-site collector substations, and other infrastructure areas to the public road network. All internal access tracks will be unsealed. The internal tracks will serve both as access for servicing and maintaining project infrastructure as well as fire trails.

3.3 Activities and uses

3.3.1 Construction

i Overview

Construction of the project is expected to be completed over approximately 36 months (refer Section 3.4). Construction activities will be undertaken during standard day time construction hours (ie 7.00 am to 6.00 pm Monday to Friday and 8.00 am to 1.00 pm Saturday).

Temporary infrastructure required during construction will include temporary construction compounds, site offices, concrete batching plants, rock crushing facilities, stockpile, material storage and laydown areas, temporary meteorological masts and internal access tracks.

Earthworks will be required for the preparation of the development corridor, including turbine foundation excavation, hardstand and access track formation and drainage works.

Where required, additional or improved drainage channels, sediment control ponds and dust control measures will be implemented.

Laydown areas, waste handling, fuel and chemical storage areas will be strategically placed to minimise potential environmental impacts during construction.

ii Workforce

A workforce of approximately 800 personnel will be required on-site during peak construction.

Murrumbidgee Council, Edward River Council and local business owners will be consulted throughout the development and assessment of the project regarding managing potential impacts and opportunities for accommodation of the project's construction workforce.

The construction workforce will be sourced from the local area as far as practicable. Accommodation for non-local construction staff is expected to be through the use of available rental, motel and other accommodation in surrounding townships and regional centres (including Coleambally, Griffith, Deniliquin, Narrandera, Jerilderie and Darlington Point). Potential cumulative impacts on accommodation, infrastructure, and services will be considered in the EIS as part of the social impact assessment.

3.3.2 Operations

The operational lifespan of the project is expected to be in excess of 25–30 years, depending on the nature of WTG technology and energy market demands.

Key activities during operations will be energy generation and energy storage. Once operational, the project will require up to 50 full-time employees. Project operations will be supported by contractor roles for vegetation, weed and pest management, cleaning, equipment calibration and internal road maintenance.

Regular maintenance will be required throughout operations. Site maintenance activities will include management of internal roads, drainage, fencing and vegetation. Additional maintenance of key infrastructure will also be required and will include service, repair or replacement of WTGs or components of the BESS, substations, or switchyard. Grazing may also occur on-site throughout operations.

Light vehicle access will be required throughout operations and occasional heavy vehicles may also be required.

3.3.3 Decommissioning

Once the project reaches the end of its operational life, a decision will be made to either decommission or re-power the facility, subject to approval requirements.

If the project is decommissioned, all aboveground structures built as part of the project will be removed and the site rehabilitated generally to its pre-existing land use, as far as practicable. The disposal and recycling of project infrastructure will be done in accordance with waste management legislation at the time of decommissioning. Whenever possible, efforts will be made to reduce the amount going to landfill in line with best-practice sustainability principles.

If re-powering is proposed, an appropriate stakeholder consultation process will be undertaken, and all necessary approvals will be sought.

3.4 Timing

Project construction is expected to commence in 2025, subject to relevant approvals, and will take approximately 36 months to complete depending on scheduling of the construction works. It is anticipated that the project will be constructed in stages. The exact timing of each stage and the duration of the overlap between stages will be determined during detailed design following project approval. The timeframes assumed as part of the EIS and supporting technical assessments will be indicative only and will reflect a conservative upper limit of potential impacts from the project.

The sequencing of the project will be determined through detailed design, and subject to market demands, and is likely to involve overlap between activities but indicatively will involve the following steps:

- construction of supporting infrastructure and grid connection works;
- construction of wind farm and associated infrastructure;
- construction of BESS and associated infrastructure;
- operation of facility; and
- decommissioning.

The project is expected to be commissioned during 2027–28 and will have an operational life in excess of 25–30 years.

3.5 Alternatives considered

Alternatives to the project have been considered, including alternative locations, alternative project layouts and not proceeding with the project.

3.5.1 Alternative locations

The project investigation area is highly suitable for a wind farm and battery project as identified in Section 2.3.2. Alternative locations for a project of this scale are limited due to the requirements of surface area, topography, proximity to existing and/or proposed energy infrastructure and available network capacity, as well as the need to avoid major townships or areas of high agricultural and biodiversity value.

Alternatives to the project investigation area were considered by Spark Renewables as part of the site identification process, including other potential sites in NSW. The primary constraint in considering locations elsewhere in NSW, including outside of the REZs, is the increasing distance from the transmission network – both existing and planned. Alternatives which are further away from Project EnergyConnect need long transmission lines and easements to connect into the network, which come with additional environmental and social impacts. As such, the selected project investigation area is considered optimal for development of the project.

The project is also ideally located to complement the available solar resource proposed to be utilised as part of the Dinawan Solar Farm.

3.5.2 Alternative project layouts

Environmental and social constraints have, and will continue to be, a key consideration during the refinement of the project layout within the project investigation area. The development corridor and indicative project layout on Figure 3.1 have been the subject of an iterative design process that has been informed by outcomes of preliminary biodiversity and Aboriginal cultural heritage fieldwork, preliminary noise modelling, stakeholder engagement and constraints identification. The development corridor on Figure 3.1 avoids:

- WTG placement in areas of high archaeological sensitivity identified during preliminary archaeological investigations;
- areas of higher biodiversity value (including mapped wetlands and higher condition state Plant Community Type (PCTs));
- mapped wetlands;

- mapped important habitat for Plains Wanderer (to the extent possible);
- WTG placement in Black Box and White Cypress Pine dominated woodland PCTs (to the extent possible);
- areas directly adjacent to Oolambeyan National Park (including a 12 km setback to the closest WTG);
- areas directly adjacent to Kidman Way (including a 3.3 km setback to the closest WTG); and
- agricultural land mapped as land and soil capability (LSC) class 3.

The final development corridor (including WTG placement, grid connection and site access) will be refined as part of the preparation of the EIS and will be informed by the outcomes of technical assessments (including biodiversity, Aboriginal cultural heritage, visual amenity and noise and vibration) and outcomes of engagement with community and regulatory stakeholders.

As part of further design refinements, the following principles will be adopted:

- minimise vegetation clearing (areas of higher conservation value and/or native vegetation will be strategically avoided, where possible);
- maximise use of previously disturbed land (ie land previously modified by agricultural operations, including cleared areas, established access tracks and local roads);
- minimise disturbance (footprints for project infrastructure will be limited to the minimum area required);
- protect significant Aboriginal cultural and historic heritage values (through the identification and evaluation of heritage sites as part of the preparation of the Aboriginal cultural and historic heritage assessments);
- minimise direct and indirect impacts on neighbouring landholders (locating infrastructure away from nearby residences and adjoining properties, where possible); and
- a flexible approach to design (responding to identified environmental impacts and constraints).

3.5.3 Do nothing

The ‘do nothing’ scenario would allow for the continued use of the project investigation area for agricultural production; however, it would also forego the project benefits listed in Section 2.3.1, which include contributions to the development of the South-West REZ and supporting Australia’s transition towards clean and renewable sources of energy. In addition, the local area and broader region would not realise the economic benefits to local and regional communities provided by direct employment opportunities and flow-on effects.

4 Statutory context

The key relevant statutory requirements for the project having regard to the EP&A Act, other NSW and Commonwealth legislation, and environmental planning instruments are summarised in Table 4.1. This table has been set out in accordance with the Scoping Report Guidelines and *State Significant Development - Preparing an Environmental Impact Statement* (DPIE 2021d) (EIS Guidelines), to cover the following:

- power to grant approval (ie approval pathway);
- permissibility;
- consistent approvals;
- Commonwealth approvals;
- approvals not required (pursuant to Section 4.41 of the EP&A Act); and
- mandatory matters for consideration.

Detailed consideration of relevant statutory requirements will be provided in the EIS.

Table 4.1 Statutory context

Approval	Requirement
Power to grant approval	
EP&A Act and Planning Systems SEPP	Part 4 of the EP&A Act relates to development assessment and consent; Part 4, Division 4.7 relates to the assessment of development deemed to be significant to the State (or SSD). Section 4.36(2) of the EP&A Act states that a: *...State environmental planning policy may declare any development, or any class or description of development, to be State significant development.* The Planning Systems SEPP identifies development that is SSD. Section 2.6(1) of the Planning Systems SEPP states: *(1) Development is declared to be State significant development for the purposes of the Act if:* *(a) the development on the land concerned is, by the operation of an environmental planning instrument, not permissible without development consent under Part 4 of the Act, and* *(b) the development is specified in Schedule 1 and 2.* The project meets both these requirements; it requires development consent, and is a development specified in Schedule 1 of the Planning Systems SEPP. Schedule 1 of the Planning Systems SEPP defines the following as SSD: *Electricity generating works and heat or co-generation* *Development for the purpose of electricity generating works or heat or their co-generation (using any energy source, including gas, coal, biofuel, waste, hydro, wave, solar or wind power) that:* *(a) has a capital investment value of more than $30 million.* The project is development for the purpose of electricity generation and will have a capital investment value of more than $30 million. The capital investment value for the project is estimated to be in the order of $2.8 billion. Consequently, the project is SSD.

Table 4.1 Statutory context

Approval	Requirement
Permissibility	
State Environmental Planning Policy (Transport and Infrastructure) 2021	Under Section 2.36 (1) of *State Environmental Planning Policy (Transport and Infrastructure) 2021*, development for the purpose of electricity generating works, such as the project, may be carried out by any person with consent on any land in a prescribed rural, industrial or special use zone. The project is within a rural land use zone, RU1 Primary Production. Development for the purpose of electricity generating works is therefore permissible with consent.
Consistent approvals	
Overview	Section 4.42 of the EP&A Act outlines that the approvals listed below cannot be refused if necessary for carrying out an approved SSD and are to be consistent with the terms of the development consent for the SSD.
An environment protection licence under Part 3 of the NSW *Protection of the Environment Operations Act 1997* (POEO Act)	The POEO Act regulates pollution to the environment and requires licences for environment protection including waste, air, water and noise pollution control. Section 48 of the POEO Act requires an environment protection licence (EPL) to undertake scheduled activities at any premises. Scheduled activities are defined in Schedule 1 of the POEO Act and include wind farms. An EPL will be sought in relation to the construction and operation of the project.
An approval under Section 138 of the NSW *Roads Act 1993*	Under Section 138 or Part 9, Division 3 of the *Roads Act 1993*, a person must not undertake any works that impact on a road, including connecting a road (whether public or private) to a classified road, without approval of the relevant authority, being either Transport for NSW or local council, depending upon the classification of the road. The interaction of the project with the local and regional road network will be addressed in the EIS. Should road upgrades or works within a designated road corridor be required, approval will be sought from the relevant authority.
Commonwealth approvals	
Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act)	The EPBC Act aims to protect matters of national environmental significance (MNES). If an action will, or is likely to, have a significant impact on any MNES, it is deemed to be a 'controlled action' and requires approval from the Commonwealth Environment Minister or the Minister's delegate. A search of the Commonwealth Protected Matters Search Tool indicates that there are no World Heritage Properties or National heritage places within the vicinity of the project investigation area. There is potential for Commonwealth listed threatened ecological communities, threatened species and migratory species to occur within the project investigation area. Field surveys will be undertaken to determine whether the plant community types (PCTs) identified within the project investigation area are representative of threatened ecological communities listed under the EPBC Act and whether threatened species habitat is present. The outcomes of these survey will be used to determine whether a referral to the Commonwealth Department of Climate Change, Energy, the Environment and Water is required.
Native Title Act 1993	The Commonwealth *Native Title Act 1993* recognises and protects native title rights in Australia. It allows a native title determination application (native title claim) to be made for land or waters where native title has not been validly extinguished, for example, extinguished by the grant of freehold title to land. Claimants whose native title claims have been registered have the right to negotiate about some future acts, such as mining or granting of a lease over the land covered by their native title claim. Where a native title claim is not registered, a development can proceed through mediation and determination processes, though claimants will not be able to participate in future act negotiations. There are no current native title claims relevant to the project investigation area.
Civil Aviation Regulation 1988	Reporting of tall structures is required under the Civil Aviation Regulations 1988. A detailed assessment in accordance with the regulations and consultation with the relevant agencies will be undertaken as part of the preparation of the EIS. Engagement with relevant agencies including the Civil Aviation Safety Authority and Air Services Australia will be undertaken.

Table 4.1 Statutory context

Approval	Requirement
Heavy Vehicle National Law	Approvals will be required for the transport of wind turbines and associated infrastructure by OSOM vehicles. The requirements for such OSOM transport will be assessed via a route analysis study as part of the EIS.
Approvals not required	
Overview	Section 4.41 of the EP&A outlines the following approvals, permits etc are not required for an approved SSD.
Fisheries Management Act 1994	A permit under the *Fisheries Management Act 1994* to block fish passage or dredge or carry out reclamation work on water land will not be required pursuant to Section 4.41 of the EP&A Act. The project may require work in water land to facilitate the upgrade of road crossings or establish new crossings of mapped watercourses within the project investigation area. These works will be undertaken in accordance with NSW DPI *Policies and Guidelines on Fish-Friendly Waterway Crossings* (undated), *Policy and Guidelines for Fish Habitat Conservation and Management* (DPI 2013), and NSW *Guidelines for Controlled Activities*.
Heritage Act 1977	An approval under Part 4, or an excavation permit under Section 139, of *the Heritage Act 1977* will not be required pursuant to Section 4.41 of the EP&A Act. Notwithstanding, there are no listed heritage items within the project investigation area.
National Parks and Wildlife Act 1979	An Aboriginal heritage impact permit under Section 90 of the *National Parks and Wildlife Act 1974* will not be required pursuant to Section 4.41 of the EP&A Act. There is potential for Aboriginal sites to occur within the project investigation area. Any Aboriginal heritage sites identified within the project investigation area will be avoided as far as practicable during the design process.
Rural Fires Act 1997	A bushfire safety authority under Section 100B of the *Rural Fires Act 1997* will not be required pursuant to Section 4.41 of the EP&A Act. A bushfire assessment in accordance with NSW Rural Fire Service (2019) *Planning for Bushfire Protection* will be carried out to inform the EIS.
Water Management Act 2000	A water use approval under Section 89, a water management work approval under Section 90 or an activity approval (other than an aquifer interference approval) under Section 91 of the *Water Management Act 2000* will not be required pursuant to Section 4.41 of the EP&A Act. Construction work near or within watercourses may be required. These works will be carried out in accordance with relevant guidelines for controlled activities.
Mandatory considerations – Considerations under EP&A Act and EP&A Regulation	
Section 1.3 of the EP&A Act	Relevant objectives of the EP&A Act are: *a) to promote the social and economic welfare of the community and a better environment by the proper management, development and conservation of the State's natural and other resources,* *b) to facilitate ecologically sustainable development by integrating relevant economic, environmental and social considerations in decision-making about environmental planning and assessment,* *c) to promote the orderly and economic use and development of land,* *d) to protect the environment, including the conservation of threatened and other species of native animals and plants, ecological communities and their habitats,* *e) to promote the sustainable management of built and cultural heritage (including Aboriginal cultural heritage),* *f) to promote good design and amenity of the built environment,* *g) to provide increased opportunity for community participation in environmental planning and assessment.* The above will be considered in the EIS.

Table 4.1 Statutory context

Approval	Requirement
Section 4.15 of the EP&A Act	Pursuant to Section 4.15 of the EP&A Act, the consent authority must consider the following relevant matters for consideration: • relevant environmental planning instruments for the project including: – *State Environmental Planning Policy (Biodiversity and Conservation) 2021*; – *State Environmental Planning Policy (Resilience and Hazards) 2021*; – *State Environmental Planning Policy (Transport and Infrastructure) 2021*; and – other local environmental planning instruments; • relevant development control plans; • the likely impacts of that development, including environmental impacts on both the natural and built environments, and social and economic impacts in the locality; • the suitability of the site for the development; and • the public interest. The above will be considered in the EIS.
Section 190 of the EP&A Regulation	Section 190 of the NSW Environmental Planning and Assessment Regulation 2021 (EP&A Regulation) provides requirements for the form of EIS: 1. An environmental impact statement must contain the following information— a) the name, address and professional qualifications of the person who prepared the statement, b) the name and address of the responsible person (the applicant), c) the address of the land: – to which the development application relates, or – on which the activity or infrastructure to which the statement relates will be carried out, d) a description of the development, activity or infrastructure, e) an assessment by the person who prepared the statement of the environmental impact of the development, activity or infrastructure, dealing with the matters referred to in this Division. 2. The person preparing the statement must have regard to— a) for State significant development—the State Significant Development Guidelines, or b) for State significant infrastructure—the State Significant Infrastructure Guidelines. 3. An environmental impact statement must also contain a declaration by the person who prepared the statement of the following— a) the statement has been prepared in accordance with this Division, and b) the statement contains all available information that is relevant to the environmental assessment of the development, activity or infrastructure, and c) the information contained in the statement is not false or misleading.

Table 4.1 Statutory context

Approval	Requirement
Section 192 of the EP&A Regulation	Section 192 of the EP&A Regulation provides requirements for the content of EIS: (1) An environmental impact statement must contain the following— a) a summary of the EIS, b) a statement of the objectives of the development, activity or infrastructure, c) an analysis of feasible alternatives to the carrying out the development, activity or infrastructure, having regard to its objectives, including the consequences of not carrying out the development, activity or infrastructure, d) an analysis of the development, activity or infrastructure, including: i) a full description of the development, activity or infrastructure, and ii) a general description of the environment likely to be affected by the development, activity or infrastructure and a detailed description of the aspects of the environment that are likely to be significantly affected, and iii) the likely impact on the environment of the development, activity or infrastructure, and iv) a full description of the measures to mitigate adverse effects of the development, activity or infrastructure on the environment, and v) a list of the approvals that must be obtained under another Act or law before the development, activity or infrastructure may lawfully be carried out, e) a compilation, in a single section of the EIS, of the measures referred to in paragraph (d)(iv), f) the reasons justifying the carrying out of the development, activity or infrastructure, considering biophysical, economic and social factors, including the principles of ecologically sustainable development set out in section 193.
Mandatory considerations – Considerations under other legislation	
Biodiversity Conservation Act 2016 (BC Act)	The likely impact of the project on biodiversity values will be assessed in a biodiversity development assessment report (BDAR). The Minister for Planning may (but is not required to) further consider under the NSW *Biodiversity Conservation Act 2016* the likely impact of the project on biodiversity values.
Mandatory considerations – Environmental planning instruments	
State Environmental Planning Policy (Resilience and Hazards) 2021 – Section 3.7	The EIS will consider the following relevant departmental guidelines: • *Applying State Environmental Planning Policy No. 33 Hazardous and Offensive Development*; • Hazardous Industry Planning Advisory Papers (HIPAP) No. 3 – Risk Assessment; and • HIPAP No. 12 – Hazards.
State Environmental Planning Policy (Resilience and Hazards) 2021 – Section 4.6	The EIS will consider the potential for the project to impact on contaminated land.
Jerilderie LEP Murrumbidgee LEP Conargo LEP	The EIS will consider the relevant objectives and land uses for RU1 zone under the relevant LEPs.
Mandatory considerations – development control plans	
In accordance with Section 2.10 of the Planning Systems SEPP, development control plans do not apply to SSD and are not a relevant consideration for the project.	

5 Engagement

5.1 Community and stakeholder engagement objectives

As a developer and long-term owner of the proposed project, Spark Renewables has a key objective of giving back to the community in the most effective and strategically beneficial ways possible, through ongoing local investment, support for services, and benefit sharing.

Spark Renewables' key objectives for engagement with stakeholders and the community are to:

- Deliver an honest, innovative, flexible and transparent community engagement process.
- Engage with, and inform, local residents, the broader community and other stakeholders about the project, its benefits and potential impacts by providing timely and ongoing access to project information.
- Develop relationships with the community and other stakeholders to facilitate positive outcomes through the project for the community.

Spark Renewables' approach to the engagement undertaken to date, and the engagement principles to be followed during the preparation of the EIS will be undertaken in accordance with the following guidelines:

- *Undertaking Engagement Guidelines for State Significant Project* (DPIE 2021d);
- *Social Impact Assessment Guideline for State Significant Projects* (DPIE 2021e) (SIA Guideline); and
- *Aboriginal Cultural Heritage Consultation Requirements for Proponents* (DECCW 2010a).

5.2 Spark Renewables engagement commitment

Spark Renewables is a signatory to the Clean Energy Council's Community Engagement Best Practice Charter for Renewable Energy Developments. This is a voluntary set of commitments that will be upheld when developing, constructing and operating projects.

Spark Renewables is committed to engaging respectfully with the communities in which it plans and operates projects, to be sensitive to environmental and cultural values and to make a positive contribution to the regions in which it operates.

Spark Renewables upholds the following commitments of the Best Practice Charter for Community Engagement:

1. To engage respectfully with the local community, including Traditional Owners of the land, to seek their views and input before submitting a development application and finalising the design of the project.
2. To provide timely information and be accessible and responsive in addressing the local community's feedback and concerns throughout the life of the project.
3. To be sensitive to areas of high biodiversity, cultural and landscape value in the design and operation of projects.
4. To minimise impacts on highly productive agricultural land and explore opportunities to integrate agricultural production.
5. To consult the community on the potential visual, noise, traffic and other impacts of the project, and on the mitigation options.
6. To support the local economy by providing local employment and procurement opportunities.

7. To offer communities the opportunity to share in the benefits of the project, and consult with them on the options available, including the relevant governance arrangements.

8. A commitment to using the project to support educational and tourism opportunities where appropriate.

9. To demonstrate responsible land stewardship over the life of the project and welcome opportunities to enhance the ecological, cultural and/or agricultural value of the land.

10. During the life of the project, to recycle waste materials where feasible and commit to responsible decommissioning or refurbishment/repowering of the site at the end of the project's life.

5.3 Scoping phase consultation

Spark Renewables has a high-level framework for the delivery of communication and engagement throughout the planning and assessment process for each stage of the project, which is dynamic and evolves based on stakeholder and community feedback. Engagement for Dinawan Energy Hub commenced in 2021 and continues in 2022, and has included:

- briefing letters;
- letterbox drops, phone calls and emails;
- community newsletter distribution;
- community information sessions;
- face-to-face meetings and briefings;
- a community values survey;
- media releases;
- Spark Renewables website launch; and
- advertisements in local news media and social media channels.

Further detail is provided on engagement with community and regulatory stakeholders in the following sections.

5.3.1 Local community stakeholder consultation

Engagement with the local community, including landowners, neighbours, Traditional Owners and local businesses, is summarised in Table 5.1. Initial engagement focussed on residences and landowners within 5 km of the project investigation area, through phone calls, letter box drops and emails, coupled with broader engagement in the form of media releases, advertising and distribution of newsletters, leading up to two community information sessions held in December 2021. Further engagement in 2022 during the scoping phase has included briefing meetings with Traditional Owners, business groups and neighbouring landowners.

Table 5.1 Engagement with community stakeholders

Method	Timing	Purpose	Stakeholders
Media release	15 July 2021	To announce the intent of Dinawan Energy Hub and purpose to the industry, investors and marketplace and stakeholders broadly Public link: https://sparkrenewables.com/wp-content/uploads/2021/10/Spark-Renewables_media-release-proposed-Dinawan-Energy-Hub-Project-Final.pdf	All Investors Industry Media (limited)
Launch Spark Renewables website	30 September 2021	To provide a comprehensive online portal for Spark Renewables and its projects. Project website: www.dinawanenergyhub.com.au	All
Phone calls, emails and letterbox drop	w/c 18 October 2021	To deliver project overview, discuss the Dinawan Energy Hub and promote drop-in sessions. Informational newsletters delivered to 25 residences within a 5 km radius of the project investigation area. Calls made to those residences whose phone numbers were publicly available. Emails to nearby residences, and the relevant stakeholders and organisations whose email addresses were publicly available.	Project neighbours Resident distribution area
Media release and Community Newsletter 1	21 October 2021	To announce the Dinawan Energy Hub consultation sessions to the community, provide links to website, contact information and high-level timelines for the stages. Media release: https://sparkrenewables.com/wp-content/uploads/2021/10/Dinawan-Energy-Hub-Media-Release.pdf Community newsletter 1: https://sparkrenewables.com/wp-content/uploads/2021/10/DEH-Newsletter-Number-1.pdf	Media Community Businesses
Briefing letters & distribute media release	29 October 2021	To provide an update on Dinawan Energy Hub consultation program and overview (links to website, contact information and high-level timeline).	Industry (ICN) Business leaders
Advertisements published in newspapers and radio	22 November – 6 December 2021	To promote drop-in sessions to community. These included: • One week campaign across 4 radio stations (Triple M, HIIT, Edge FM, 2QN). Announcements ran 3 times a day and there was a phone interview with the project manager. • A one-off ad placement (1/6 pager) in The South Riverina. • A digital banner ad in The South Riverina (4 weeks). • A one-off classified in The Griffith Area News.	Media Community
Website Social media Newsletters	November, December 2021	To provide updates on Dinawan Energy Hub and share notes and feedback received from community received during scoping. Continuous update to the project website and Spark Renewables' Instagram account with posts and stories.	Community

Table 5.1 Engagement with community stakeholders

Method	Timing	Purpose	Stakeholders
Community information drop-in sessions 1 and 2	7–8 December 2021	To provide the community with an overview of the Dinawan Energy Hub and seek initial input. Valuable conversations were had with many members of the community, neighbours to the project, farming businesses and local organisations such as Coleambally Irrigation Co-operative, as well as with members of the Murrumbidgee Council. There were six information posters on display, detailed maps and community perceptions survey (published on project website at https://sparkrenewables.com/dinawan-news/dinawan-energy-hub-initial-community-consultation-sessions/). Community perception surveys: https://www.surveymonkey.com/r/WNJ6RRH	Community Businesses
Briefing meetings	May – June 2022	Project briefing and introduction/update: • 19 May 2022 presentation to Lions Club; • 20 May 2022 meeting with Wiradjuri Elders; and • 8 June 2022 meeting with EnergyCo.	Business groups Traditional Owners Industry
Phone calls and face to face meetings	September 2022	Project briefing and update ahead of submission of Scoping Report.	Neighbouring landholders

i Feedback from the community

The community information sessions held at Coleambally on 7 December 2021 and Jerilderie on 8 December 2021 were key opportunities for the Spark Renewables project team to engage face to face with the local community to introduce the project and provide opportunities for the community to ask questions, as well as provide valuable feedback to the project team on important values of the local area and concerns or areas of interest about the project. There were six information posters on display, detailed project maps, community perception surveys, information documents and four Spark Renewables staff members on hand to talk to community members.

The sessions were attended by 13 individuals at Coleambally and 15 individuals at Jerilderie. Valuable conversations were had with many members of the community, neighbours to the project, farming businesses and local organisations such as Coleambally Irrigation Co-operative, as well as with members of Murrumbidgee Council. Generally, feedback from community members was positive. Many of the questions from the community surrounded the timing of the project, technology and mitigation of impacts. Importantly, community members asked about project-specific information, such as the technology to be implemented or exact location of WTGs, and were pleased to hear that, given the early stages of project development, these details are still in development and will be decided with continual community input.

Key issues of concern relating to the project raised by community members included:

- biodiversity impacts (due to loss of native flora and fauna);
- fire risk (particularly in the context of recent fires at a nearby operating renewable development and concerns about fires relating to the BESS);
- increased workforce and concerns regarding accommodation and housing of workers;

- traffic and road safety during construction; and
- long-term decommissioning and land rehabilitation plans.

Discussions with a number of community members revolved around community issues currently experienced in the local area, how addressing these would be readily supported and strategically beneficial, and ideas for how such improvements could be achieved. Answers were consistent from individuals across both sessions. These included:

- Improved telecommunications, as there are many wide ranging 'black spots' with no mobile or radio signal. This has been a long-standing issue in the community posing risk to safety, such as communicating emergencies on roads or on farming operations.
- Access to an electricity benefit sharing scheme, offering lower prices for electricity to community members.
- A benefit sharing fund that will invest strategically into the community over the long-term.
- Many community members also said they would be happy to see increased employment opportunities in the area, and some offered their services both in construction and throughout the project development.

At these sessions, Spark Renewables aimed to provide clarity on misconceptions about perceived project impacts and provide as much detail as possible at this stage to ensure transparent communication. This is important to Spark Renewables to ensure the foundation for a meaningful relationship with community members is established. Many of the concerns raised were also discussed in the FAQ brochures provided to community members to increase transparency.

ii Community values survey

An optional survey was offered to attendees at the community information sessions. Of the 28 attendees, 14 responded to the survey assessing potential project benefits, concerns, and community values. Most respondents lived locally in rural localities and the townships of Coleambally and Jerilderie.

The highest proportion of benefits, concerns and values selected from a list of possible options by respondents is presented in Table 5.2.

Table 5.2 Community values survey outcomes - benefits, concerns and local values

Aspect	Proportion of respondents
Benefits of the project	• Investment in local community – 71% • Road upgrades, and better access to the Rural Fire Service – 62% • Clean energy generation – 54% • Employment opportunities – 46%
Concerns about the project	• Risk of fire – 57% • Potential impacts to native flora and fauna – 46% • Traffic and road safety – 23% • Visual impacts – 23% • Land use – 23%
Values of the local and regional area	• Farming land – 38% • Landscape – 23% • Native flora and fauna – 23%

Information gathered both directly from community members and through the surveys assessing community values and perceived benefits and impacts, has been invaluable to the development process in shaping an understanding of what can be achieved and what Spark Renewables can do to support the community's experience with the project.

iii Feedback from neighbouring landholders

Spark Renewables have met with neighbouring landholders to introduce the project and provide opportunities for them to ask questions, as well as provide valuable feedback to the project team on important values of the local area and concerns or areas of interest about the project. To date, concerns have been raised with regards to:

- bush fire risk and potential impacts to methods for firefighting; and
- impacts on biodiversity (including clearing of Weeping Myall woodlands).

A bushfire hazard assessment will be prepared to identify potential hazards and risks associated with bushfires and to demonstrate compliance with *Planning for Bush Fire Protection* (RFS 2019).

The biodiversity assessment approach is described in Section 6.2.3. Impacts on biodiversity (including clearing) will be avoided wherever possible, with unavoidable residual impacts offset.

A number of neighbouring landholders have registered their interest in providing accommodation for the project's construction workforce.

As part of the site selection process, Spark Renewables has selected a project investigation area that minimises the number of close residential receivers. While there are a low number of close residential receivers for a project of this scale, it is acknowledged that the project has the potential for high visual impacts on some non-associated residences. As part of the EIS, Spark Renewables will:

- prioritise consultation with affected stakeholders;
- revise the WTG layout to minimise impacts (where possible); and
- develop mitigation strategies for residual impacts with input from affected residents and specialists (with a priority on neighbour agreements).

5.3.2 Government and regulatory stakeholders

A summary of engagement during the scoping phase with government and regulatory stakeholders is provided in Table 5.3.

Table 5.3 Engagement with government and regulatory stakeholders

Method	Timing	Purpose	Stakeholders
Briefing letters	14 July 2021	To provide an overview of Dinawan Energy Hub, process and timeline.	Murrumbidgee Council State MP Federal MP NSW Energy Minister AEMO CEO
Media release	15 July 2021	To announce the intent of Dinawan Energy Hub and purpose to the industry, investors and marketplace and stakeholders broadly. Public link: https://sparkrenewables.com/wp-content/uploads/2021/10/Spark-Renewables_media-release-proposed-Dinawan-Energy-Hub-Project-Final.pdf	All
Launch Spark Renewables website	30 September 2021	To provide a comprehensive online portal for Spark Renewables and its projects. Project website: www.dinawanenergyhub.com.au	All
Briefing meetings	October 2021 – May 2022	To seek input into Scoping Report, specifically the identification of perceived and real impacts.	Murrumbidgee Council (presentation 25 October 2021) Edward River Council (phone call - 27 October 2021) Transgrid (presentation 23 November 2021) State MP Federal MP
Briefing letters and distribute media release	29 October 2021	To provide an update on Dinawan Energy Hub consultation program and overview (links to website, contact information and high-level timeline).	Murrumbidgee and Edward River council staff State MP Federal MP Industry (ICN) Business leaders
Meeting	21 December 2021	Meeting to discuss Spark Renewables upcoming projects (including Dinawan Energy Hub).	DPE
Meeting	7 September 2022	Scoping meeting with DPE.	DPE
Meeting	20–21 September 2022	Project briefing and update.	Edward River Council Murrumbidgee Council

5.4 EIS phase consultation

During the preparation of the EIS, Spark Renewables will consult with relevant local, State and Commonwealth Government authorities, infrastructure and service providers, community groups, Traditional Owners, neighbours and affected landowners. Spark Renewables is committed to genuine and consistent engagement with the local community and stakeholders to support the building of strong relationships with stakeholders, foster existing connections, and establish a socially sustainable project.

Aboriginal stakeholders will be identified and consulted with during the preparation of the EIS in accordance with the *Aboriginal Cultural Heritage Consultation Requirements for Proponents* (DECCW, 2010a), and the recently released *First Nations Guidelines* (Office of Energy and Climate Change 2022).

Electricity infrastructure owners, including Transgrid, will be consulted with in relation to activities impacting the transmission network and connection requirements to the Dinawan Substation.

Consultation during the development of the EIS will aim to:

- proactively inform, consult and involve stakeholders using clear and consistent key messages;
- continue to collaborate with key stakeholders to identify potential issues, impacts, opportunities and benefits;
- communicate the progress of the project and key findings or outcomes of assessments;
- enable stakeholders to have input into the preparation of the EIS, project planning, investigate opportunities for visual treatment and identify opportunities for benefit sharing; and
- implement response and feedback strategies to address stakeholder concerns and use these to inform the evolution of the project.

A range of tools and methods will be used to communicate and engage with the community and other stakeholders during preparation of the EIS, with examples provided in Table 5.4. Issues raised during engagement will be documented by the project team to inform the project design, environmental assessment and the preparation of the EIS.

Table 5.4 Engagement tools and methods during preparation of the EIS

Engagement methods	Detail
Advertising	Advertising in local media to advise of upcoming consultation opportunities and provide project updates.
Briefings	Formal letters or meetings with key stakeholders including landowners, MPs, Councillors and council staff to provide updates on the project.
Community contact cards	Business-size card provided to specialists and contractors to give to community stakeholders if approached.
Door-knocking	Project representatives go door to door to speak with impacted landowners and neighbours and/or provide them with project briefings and information.
Drop-in sessions	Multi-hour time periods when stakeholders can drop in to speak to the project team, view documents and plans and ask questions.
Email inbox	A dedicated project inbox info@dinawanenergyhub.com for managing community and stakeholder correspondence.
Letterbox drops or unaddressed mail	General information about the project delivered by the project team or Australia Post.
Letters	Addressed mail containing information, clarification, responses or requests to a particular household, business or individual.
Media releases/statements	Proactive or responsive media statements or announcements provided to the media and other key stakeholders to provide updates, address concerns and clarify information.
Meetings	One-on-one or small group meetings to discuss project issues and concerns in more detail.

Table 5.4 Engagement tools and methods during preparation of the EIS

Engagement methods	Detail
Newsletters	Regular project information distributed by email or in hard copy to registered stakeholders.
Phone line	A dedicated number for stakeholders to contact Spark Renewables. The number is 1300 271 419.
Photography	Photos, composites, concept and artist imagery can help illustrate processes and make technical information more accessible.
Pop-up stalls	An engagement booth/stall set up at community events, shopping centres and key locations to intercept and engage stakeholders.
Presentations	Presentations about the project delivered to a group of interested persons, club or committee on request or by invitation.
Site tours	An escorted tour of the project investigation area to understand how the project is located geospatially and fits in to the surrounding environment.
Surveys	Online or offline surveys to obtain input and feedback on project decision-making.
Social media	Online social connection platforms used to share project information and interact with stakeholders.
Website	Updates to the existing website including descriptions of the project, company information, frequently asked questions, plans, maps, media releases and contact information.
Workshops	A structured method working with groups of stakeholders to identify and suggest solutions for project issues and concerns.

6 Proposed assessment of impacts

A preliminary environmental assessment has been carried out to identify matters requiring further assessment in the EIS and the level of assessment that should be carried out. In accordance with the Scoping Report Guidelines (DPIE 2021a), the following factors have been considered in the identification of matters needing further assessment for the project:

- the scale and nature of the likely impact of the project and the sensitivity of the receiving environment;
- whether the project is likely to generate cumulative impacts with other relevant future projects in the area; and
- the ability to avoid, minimise and/or offset the impacts of the project, to the extent known at the scoping phase.

The following sections of this chapter present the identified matters requiring further assessment and the proposed approach to the respective assessments. In addition to the preliminary environmental assessment presented herein preliminary technical studies have been carried out for the key issues of visual amenity, social and noise and vibration, as well as the results of preliminary biodiversity and heritage surveys and investigations. These preliminary technical studies have been commenced to ensure that the values of the project investigation area and surrounds are taken into consideration early in the planning and design of the project. Measures implemented through the scoping phase to avoid and minimise impacts are also described.

Matters have been categorised as per the categories identified in the Scoping Report Guidelines (DPIE 2021a). A scoping summary table in accordance with the Scoping Report Guideline is included in Appendix B. Also, in accordance with the Scoping Report Guideline, the level of assessment identified for each matter is presented in Table 6.1.

Table 6.1 Level of assessment required in EIS

Level of assessment	Aspect
Detailed	Visual
	Biodiversity
	Aboriginal heritage
	Traffic
	Social
	Noise and vibration
Standard	Historic heritage
	Land
	Water
	Air quality
	Hazards and risk

6.1 Visual

A preliminary visual impact assessment (PVIA) has been prepared by Moir Landscape Architecture Pty Ltd (Appendix C) in accordance with the *NSW Wind Energy: Visual Assessment Bulletin* (the Bulletin) (DPE 2016b).

For the purposes of the PVIA, the study area encompasses the development corridor, plus an approximately 15 km buffer from the closest WTG (due to the flat terrain surrounding the development corridor).

6.1.1 Existing environment

i Landscape features

The closest notable landmarks to the project investigation area include Coleambally township, Oolambeyan National Park (including Oolambeyan Homestead Picnic Area), Yanco Creek Rest Area (near Yanco Bridge) and small rural properties (such as Argoon, Steam Plains and Moonbria). No elevated vantage points have been identified within the study area.

Four Corners Road, Fernbank Road, Carrathool Road and McLennons Bore Road serve as important access corridors within the project investigation area and connect to Kidman Way and the Sturt Highway.

For the purposes of the PVIA, the study area has been broken up into five landscape character units (LCUs):

- grassy woodlands – views from this LCU are contained by the dense vegetation that defines the landscape;
- seasonal water corridors – views from this LCU are likely to be limited due to minor topographical changes and dense vegetation cover;
- swamps and floodplains – views from this LCU are likely to be limited due to the flat, low-lying character and patchy to dense tree cover;
- grassy plains – views from this LCU are generally open and expansive due to the flat topography and lack of obtrusive elements; and
- Yanco Creek environs – the vegetation and topographic character helps contain views within the extent of this LCU.

The preliminary LCUs are shown on Figure 10 of Appendix C.

ii Outcomes of engagement

As discussed in Chapter 5, community feedback and community values surveys have been distributed. The community values survey includes questions on the scenic value of different landscape features and asks respondents to identify what they consider to be the best landscape features within the study area and surrounds. Landscape features with the highest reported scenic value to date are rivers/creeks, followed by grazing land, townships, historic features, bushland and hills/ridgelines. Specific landscape features within the study area and surrounds that have been identified by the local community as of the highest value have included agricultural land, creeklines (including Yanco Creek), native vegetation and native grass and shrublands. Where possible, these features have been mapped in the PVIA.

6.1.2 Potential impacts

To assist in defining the visual catchment for the project, a preliminary visual analysis has been completed using two key visual parameters, visual magnitude (based on the height of the proposed WTGs) and the multiple wind turbine tool (which provides an indication of potential cumulative impacts). Using the visual catchment area, a zone of visual influence has been defined to illustrate the visibility of the WTGs within the visual catchment.

i Visual magnitude

The Bulletin (DPE 2016b) provides guidance on separation distances between WTGs and dwellings and key public viewpoints and the potential magnitude of visual impact. The visual magnitude thresholds on Plate 6.1 have been determined based on the proposed maximum height of the WTGs (ie 280 m) and identifies the 'black line' (3.75 km) and 'blue line' (5.5 km) of visual magnitude. For the purposes of the PVIA, the visual magnitude thresholds have been based on a 2D assessment of the project alone (ie does not consider topography, vegetation or other potential screening factors).

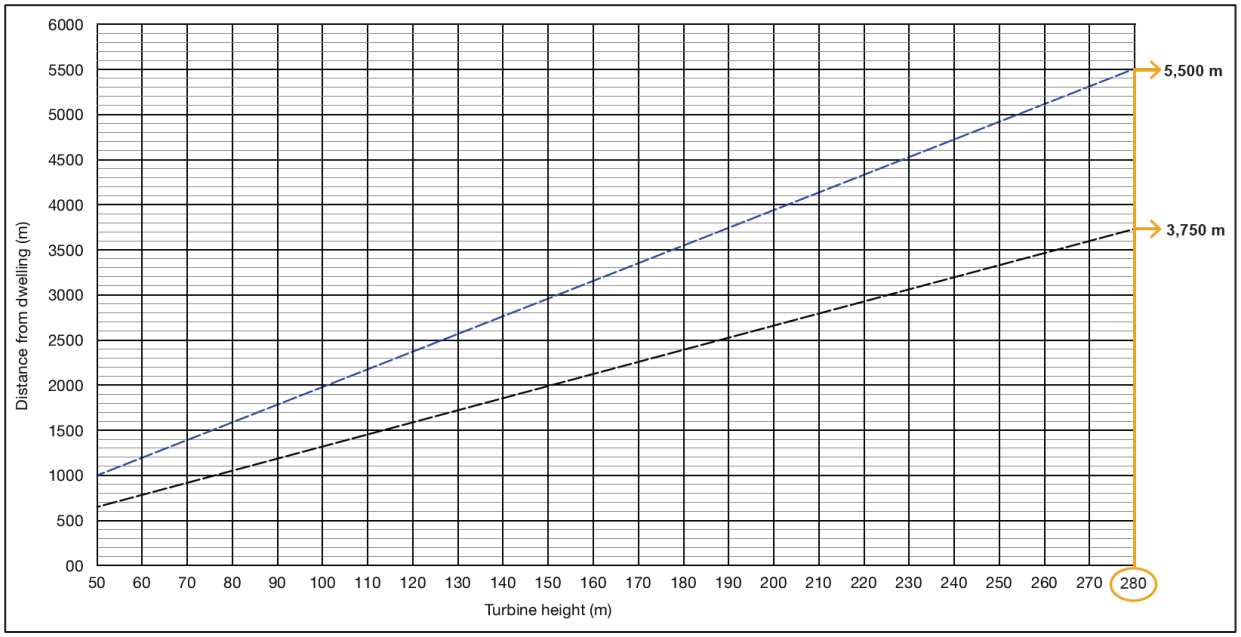


Plate 6.1 Visual magnitude thresholds for the project

Source: Adapted from *NSW Wind Energy: Visual Assessment Bulletin* (DPE 2016b).

In accordance with the Bulletin (DPE 2016b), WTGs within the black line (ie within 3.75 km of a dwelling or key public viewpoint) should be identified as part of the PVIA as these WTGs may result in significant visual impacts. Based on the flat topography within the project investigation area and surrounds, non-associated residences up to 8 km from the closest WTG have been identified as part of the PVIA.

The 3.75 km (black line), 5.5 km (blue line) and 8 km (orange line) buffers that form the visual magnitude threshold are shown on Figure 2.1. There are:

- eight non-associated residences within 3.75 km of a WTG (within the 'black line' of visual magnitude as specified in the Bulletin);
- eight non-associated residences between 3.75 km and 5.5 km of a WTG (within the 'blue line' of visual magnitude as specified in the Bulletin); and
- eight non-associated residences between 5.5 km and 8 km of a WTG (within the orange line).

No key public viewpoints have been identified within 8 km of a WTG.

The preliminary site assessment performed as part of the PVIA identified that existing vegetation is likely to reduce visibility from all non-associated residences within the black line (3.75 km) and blue line (5.5 km). The degree to which vegetation screening reduces visibility of the project will be confirmed as part of the detailed assessment within the LVIA. Preliminary assessments from representative locations within 5.5 km of the closest WTGs have been completed in Appendix A of the PVIA (Appendix C).

ii Multiple wind turbine tool

The multiple wind turbine tool provides a preliminary indication of potential cumulative impacts arising from the project and neighbouring wind farm developments. To determine whether a dwelling may be impacted by multiple WTGs, the area surrounding each dwelling is broken up into six, 60° view sectors and sectors within which a WTG is proposed, approved or already operational are identified (denoted by blue shading in Plate 6.2).

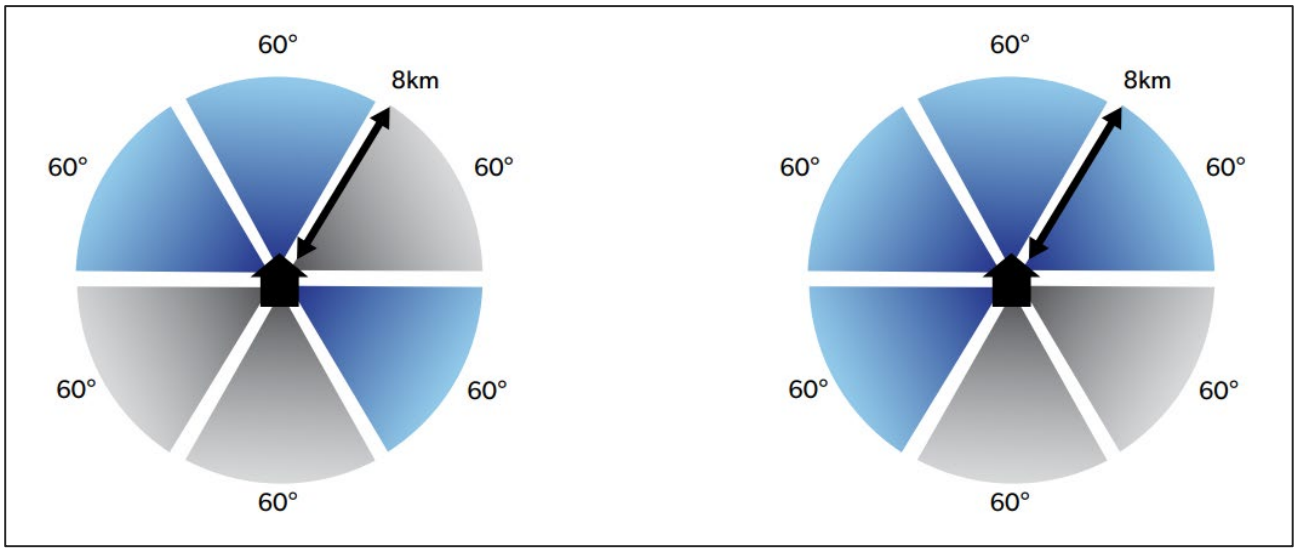


Plate 6.2 Example of view sectors surrounding a dwelling

Source: *NSW Wind Energy: Visual Assessment Bulletin* (DPE 2016b).

As part of the PVIA, the potential visibility of WTGs within 8 km of a dwelling or key public viewpoint has been assessed using the multiple wind turbine tool. As noted above, no key public viewpoints have been identified within 8 km of a WTG. The assessment identified a total of 25 non-associated residences that will view WTGs associated with the project. Of these, 12 non-associated residences are predicted to have views of WTGs in three or more 60° sectors. The remaining 13 non-associated residences are predicted to have views of WTGs within one or two 60° sectors, which is considered an acceptable level in accordance with the Bulletin (DPE 2016b).

Non-associated residences in the central and southern parts of the study area have the potential to view WTGs associated with both the project and the Yanco Delta Wind Farm. There are eight non-associated residences within 8 km of WTGs for both projects. Of these, one non-associated residence was assessed to have views in up to two 60° sectors, which is considered an acceptable level in accordance with the Bulletin (DPE 2016b). The remaining seven non-associated residences are likely to have views in three or more 60° sectors.

Non-associated residences identified using the multiple wind turbine tool are summarised in Table 6.2.

Table 6.2 Non-associated residences and potential view sectors

Dwelling ID	Distance to closest proposed WTG	Number of 60° sectors (project only)	Number of 60° sectors (cumulative)
R050	5.8 km (project)	Two (up to 120°)	Two (up to 120°)
R105	5.4 KM (project)	Two (up to 120°)	Two (up to 120°)
R106	5.8 km (project)	Two (up to 120°)	Two (up to 120°)
R107	5.2 km (project)	Two (up to 120°)	Two (up to 120°)
R056	7.4 km (project)	One (up to 60°)	One (up to 60°)
R078	5.2 KM (project)	One (up to 60°)	One (up to 60°)
R079	7.3 km (project)	One (up to 60°)	One (up to 60°)
R090	4.3 km (project)	Two (up to 120°)	Two (up to 120°)
R140	6.7 km (project)	One (up to 60°)	One (up to 60°)
R141	6.7 km (project)	One (up to 60°)	One (up to 60°)
R092	6.7 km (project)	One (up to 60°)	One (up to 60°)
R019	2 km (project)	Two (up to 120°)	Two (up to 120°)
R049	4.9 km (project)	Two (up to 120°)	Two (up to 120°)
R091	2.1 km (project)	Three (up to 180°)	Three (up to 180°)
R145	2.1 km (project)	Three (up to 180°)	Three (up to 180°)
R144	2.3 km (project)	Three (up to 180°)	Three (up to 180°)
R108	2.3 km (project)	Three (up to 180°)	Three (up to 180°)
R143	1.9 km (project)	Three (up to 180°)	Three (up to 180°)
R087[1]	2.7 km (Yanco Delta)	One (up to 60°)	Three (up to 180°)
R008[1]	2.6 km (Yanco Delta)	One (up to 60°)	Four (up to 240°)
R111[1]	2.6 km (Yanco Delta)	One (up to 60°)	Four (up to 240°)
R082[1]	2.4 km (Yanco Delta)	One (up to 60°)	Four (up to 240°)
R036	2.7 km (Yanco Delta)	Three (up to 180°)	Five (up to 300°)
R088[1]	2.2 km (Yanco Delta)	Five (up to 300°)	Six (up to 360°)
R038	1 km (Yanco Delta)	Two (up to 120°)	Six (up to 360°)

Notes: 1. Involved landowner for Yanco Delta Wind Farm.

The Yanco Creek Rest Area is 9 km from the nearest WTG (Figure 6.1). A preliminary assessment of potential visual impacts on this viewpoint has been completed in Appendix B of the PVIA (Appendix C). Due to the flat terrain, there may be views of WTGs north-west of this viewpoint; however, views will be filtered and screened by established vegetation.

iii Preliminary zone of visual influence

The zone of visual influence defines the theoretical visibility of the proposed WTGs based on the blade tip height (ie 280 m) and a bare earth surface (ie a landscape without screening, structures or vegetation). It represents a worst-case scenario and does not consider intervening elements (such as vegetation and existing structures) that may effectively screen or obstruct views of the proposed WTGs.

The zone of visual influence is shown on Figure 15 of Appendix C and illustrates the theoretical visibility of the proposed WTGs. Due to the relatively flat topography, the majority of WTGs associated with the project are likely to be visible from most areas around the project investigation area. Based on topography alone, views to the majority of WTGs associated with the project are likely to be available for all dwellings within 8 km of the WTGs.

iv Viewpoint analysis

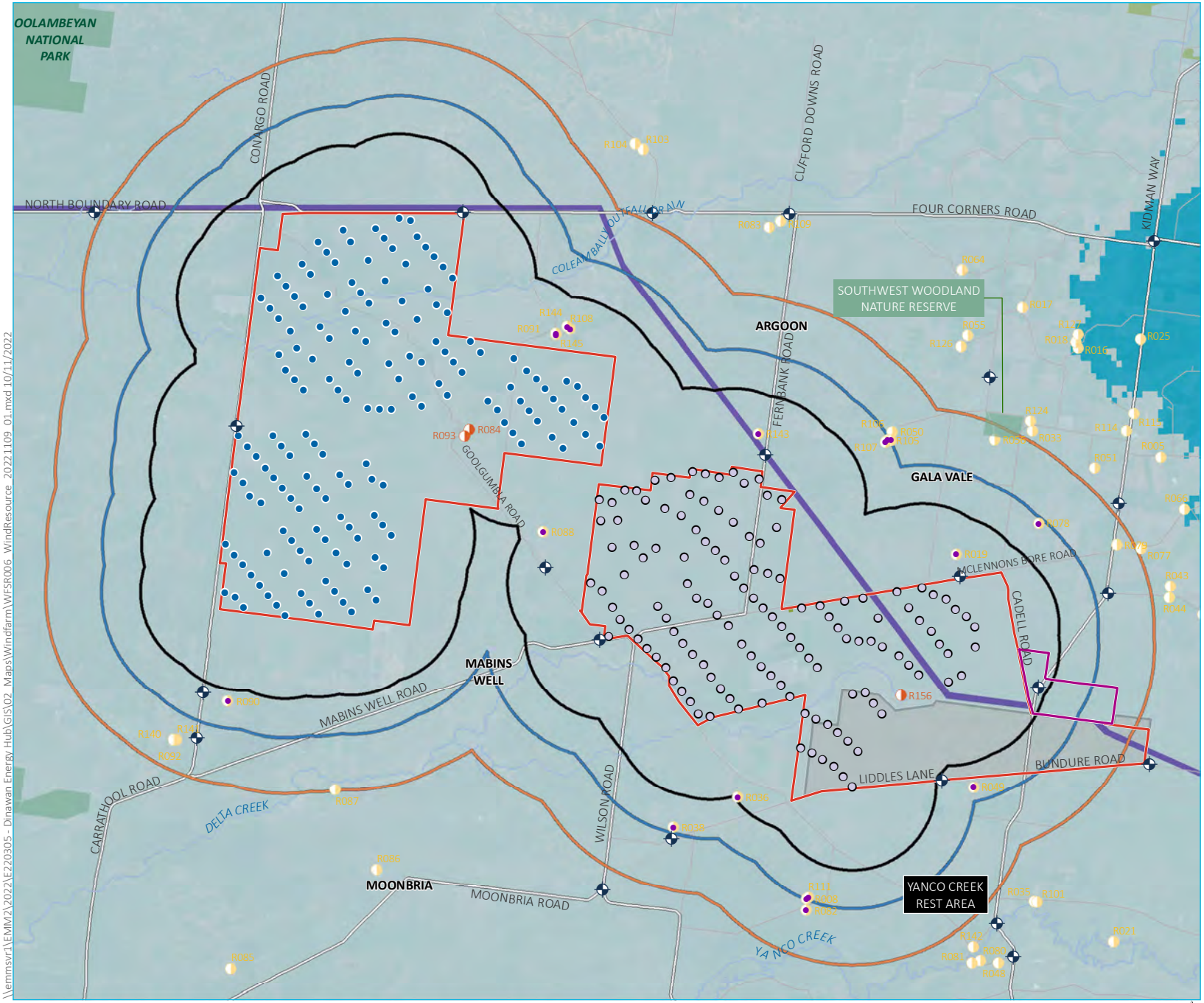
Detailed site investigations have commenced to ground truth the outcomes of the preliminary assessment tools. Preliminary viewpoint analyses have been completed from 25 public locations (Figure 6.1), which were selected to illustrate the landscape character throughout the study area and provide a preliminary assessment of the potential visibility of the project. Based on the outcomes of the preliminary viewpoint analyses, it is considered likely that existing intervening vegetation surrounding non-associated residences is likely to reduce views of WTGs from a number of locations.

6.1.3 Assessment approach

A landscape and visual impact assessment (LVIA) will be prepared in accordance with the Bulletin (DPE 2016b). The LVIA will include:

- preparation of visual study inputs, including consulting the community on aspects of the study and providing an overview of landscape values as identified by the community;
- development of the visual baseline study, including regional and local context, landscape character of the project investigation area and scenic quality class ratings;
- preliminary assessment tools developed as part of the PVIA;
- zone of visual influence figures, including further detailed assessment from areas identified as having potential visibility in the PVIA;
- viewpoint analysis including detailed assessment and rating of key viewpoints within the visual catchment;
- detailed dwelling assessments from non-associated residences;
- a cumulative visual impact assessment of the project and neighbouring renewable energy developments;
- ground truthing, photography and photomontages of the project; and
- a description of the proposed mitigation measures to reduce visual impacts.

The LVIA will also include a shadow flicker and blade glint assessment. Where required, recommendations will be provided to reduce potential shadow flicker and blade glint impacts (eg landscape screening, non-reflective paint and turbine control).



KEY

- Project investigation area
- Dinawan Solar Farm
- Wind turbine generator (East)
- Wind turbine generator (West)
- Preliminary dwelling assessment locations
- Preliminary viewpoint location

Wind speed (meters per second)

- 8.0 - 8.5
- 8.5 - 9.0

Project EnergyConnect (Transgrid)

- Dinawan Substation
- Transmission line

Residence

- Associated residence
- Non-associated residence
- Turbine buffer (3.75 km)
- Turbine buffer (5.5 km)
- Turbine buffer (8 km)

Existing environment

- Watercourse (third order and higher)
- Major road
- Minor road
- NPWS reserve
- State forest

Preliminary viewpoint locations

Dinawan Wind Farm
Scoping report
Figure 6.1

EMM
creating opportunities

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As part of the site selection process, Spark Renewables has selected a project investigation area that minimises the number of close residential receivers. While there are a low number of close residential receivers for a project of this scale, it is acknowledged that the project has the potential for high visual impacts on some non-associated residences. As part of the LVIA and EIS, Spark Renewables will:

- prioritise consultation with affected stakeholders;
- revise the WTG layout to minimise impacts (where possible); and
- develop mitigation strategies for residual impacts with input from affected residents and specialists (with a priority on neighbour agreements).

6.2 Biodiversity

Preliminary biodiversity assessments have been undertaken for the project by Biosis Pty Ltd (Biosis) to inform the scoping and design of the project. A desktop assessment was undertaken in 2021 (Biosis 2021) followed by preliminary site investigations including rapid assessments of native vegetation and fauna habitat types across the project investigation area (Biosis 2022). Vegetation and habitat mapping have also been undertaken within the project investigation area.

6.2.1 Existing environment

The project investigation area is within the Riverina Interim Biogeographic Regionalisation for Australia (IBRA) region and the Murrumbidgee IBRA subregion between Jerilderie and Coleambally. The project investigation area is a flat, lowland plain with heavy-textured grey, brown and red clays. It is made up of multiple rural properties most of which are subject to light to moderate grazing with sheep and cattle, with small areas of irrigated and dryland cropping. The project investigation area is largely covered with native vegetation.

Biodiversity assessment methods to establish the existing environment have included:

- collection of floristic data via 20 m x 20 m floristic plots to validate grassland/chenopod shrubland plant community types (PCT) mapping and test PCTs against threatened ecological community (TEC) diagnostic characteristics and condition thresholds;
- broad-scale mapping of PCT extent and condition and consideration of the presence of derived and natural grassland communities;
- collection of preliminary species lists;
- driving through and inspecting PCT mapping and undertaking broad-scale validation;
- identifying potential WTG placement opportunities in areas of treeless and derived native vegetation;
- locating potential biodiversity offset sites within the project investigation area; and
- winter surveys for bird utilisation studies.

Vegetation mapping and threatened species habitat values are likely to be subject to refinement following collection of further data given the scale of the project investigation area and rapid nature of preliminary assessments.

i Plant community type mapping and threatened ecological communities

Desktop mapping and analysis confirmed 25 potential PCTs occur within the project investigation area, including four TECs in a natural and modified state (EES 2017). Preliminary on-site investigations have identified 12 PCTs within the project investigation area. These PCTs fit broadly into a range of vegetation classes from floodplain shrublands and woodlands, riverine sandhills and Weeping Myall woodlands to diverse native grasslands and chenopod communities. The PCTs within the development corridor, including those that represent EPBC Act or BC Act listed TECs, are summarised according to their broad vegetation classification in Table 6.3 and shown in Figure 6.2.

Table 6.3 Plant community types mapped in the development corridor and associated threatened ecological communities

Broad vegetation classification	PCTs	BC Act	EPBC Act
Black Box dominated woodlands	PCT 13 – Black Box – Lignum woodland wetland of the inner floodplains in the semi-arid (warm) climate zone PCT 16 – Black Box grassy open woodland wetland of rarely flooded depressions in south western NSW PCT 17 – Lignum shrubland wetland of the semi-arid (warm) plains	-	-
Riverine sandhill woodlands	PCT 28 – White Cypress Pine open woodland of sand plains, prior streams and dunes mainly of the semi-arid (warm) climate zone	Sandhill Pine Woodland in the Riverina, Murray-Darling Depression and NSW South Western Slopes bioregions (endangered)	-
Riverine plain grassland	PCT 24 – Canegrass swamp tall grassland wetland of drainage depressions, lakes and pans of the inland plains PCT 44 – Forb-rich Speargrass – Windmill Grass – White Top grassland of the Riverina Bioregion PCT 46 – Curly Windmill Grass – speargrass – wallaby grass grassland on alluvial clay and loam on the Hay Plain, Riverina Bioregion	-	-
	PCT 45 – Plains Grass grassland on alluvial mainly clay soils in the Riverina Bioregion and NSW South Western Slopes	-	Natural Grasslands of the Murray Valley Plains (critically endangered)
Chenopod dominated shrubland	PCT 164 – Cotton Bush open shrubland of the semi-arid (warm) zone	-	-
Weeping Myall woodland	PCT 26 – Weeping Myall open woodland of the Riverina Bioregion and NSW South Western Slopes Bioregion	Myall Woodland in the Darling Riverine Plains, Brigalow Belt South, Cobar Peneplain, Murray-Darling Depression, Riverina and NSW South Western Slopes bioregions (endangered)	Weeping Myall Woodlands (endangered)

The development corridor is mostly covered in native derived grassland from PCT 26, intact or modified PCT 26, as well as other woodland (Black box and White Cypress Pine) and wetland vegetation, except for defined areas of irrigated and dryland agricultural development.

Preliminary rapid field assessment indicates vegetation is broadly consistent with State Vegetation Type Map for the Riverina (EES 2017) in terms of their presence; however, boundaries are often inaccurate, including the following observations:

- Some native grasslands that have been mapped primarily as PCT 44 are instead derived from PCT 26 and have been re-mapped accordingly.
- Some areas mapped as PCT 28 and PCT 19 are mapped incorrectly and are treed patches of PCT 26. Conversely, some areas of PCT 26 have also been mapped incorrectly and are in fact PCT 28. These have been refined during field verification.
- Some areas mapped as PCT 44, PCT 46 and PCT 164 have had refined boundaries and extent through detailed mapping following field verification.

Three TECs were observed to be potentially occurring within the development corridor including:

- Natural Grasslands of the Murray Valley Plains ('critically endangered', EPBC Act);
- Weeping Myall Woodlands ('endangered', BC Act and EPBC Act), associated with PCT 26; and
- Sandhill Pine Woodland in the Riverina, Murray-Darling Depression and NSW South Western Slopes bioregions ('endangered', BC Act listed), associated with PCT 28.

Grasslands are a combination of naturally occurring grasslands (PCT 45) and grasslands derived (PCT 44 and PCT 46) from Weeping Myall Woodland (PCT 26) which occurs extensively throughout the project investigation area. The natural tree cover may have been historically cleared or died out and only the native ground layer vegetation remains (eg grasses, sedges, forbs and small shrubs). This grassland vegetation now supports livestock grazing (ie native pasture).

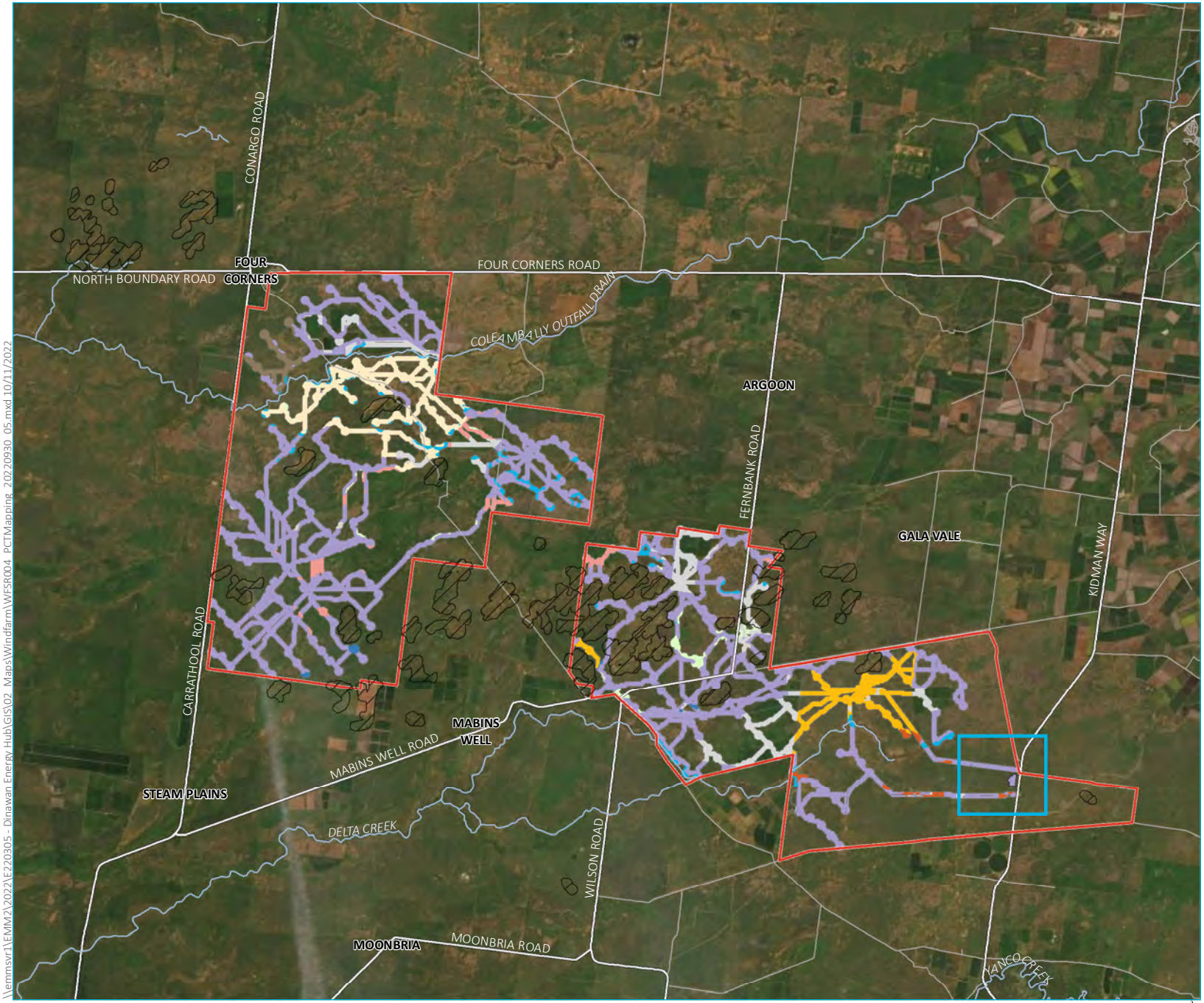
Weeping Myall Woodlands is listed as 'endangered' under the EPBC Act and BC Act. The community occurs in small pockets throughout the inland alluvial plains west of the Great Dividing Range in NSW and Queensland and is dominated by Weeping Myall (*Acacia pendula*).

Intact Weeping Myall woodlands (represented by PCT 26) typically occur on fertile clay soils with moderate to extensive gilgai that are subject to seasonal waterlogging. Weeping Myall patches can also include areas of adjacent derived grassland within 10 m of the dripline of a patch (TSSC 2009).

It was determined that treed patches of Weeping Myall woodland and immediately adjacent derived grasslands (within 10 m the treed dripline) would meet the EPBC Act definition. The BC Act does not contain key diagnostics or condition thresholds for this community but instead relies on a general description of the community and a list of characteristic plant species. The Weeping Myall treed patches also meet the general description of the BC Act definition.

Determining more accurate boundaries, and hence being able to accurately assign native grassland vegetation to a derived or natural condition state will be an important part of the detailed field studies for the BDAR.

Patches of Black box woodland also occur within the development corridor along drainage lines and as small discreet patches. These areas are generally in moderate condition and often used as congregating areas for cattle or have been subjected to thinning of woody vegetation, effecting groundcover and midstorey diversity. These patches contain multiple hollow bearing trees. Additionally, patches dominated by White Cypress Pine occur on sandy loam soils of prior streams and sand plains; however, are generally in low to moderate condition, depending on grazing regimes and land use patterns respective to individual properties.



KEY

- Project investigation area
- Indicative development corridor
- Battery energy storage system
- Plains Wanderer - Mapped Important Habitat (includes 100 m buffer)

Existing environment

- Watercourse (third order and higher)
- Rail line
- Major road
- Minor road

Plant community type (PCT) mapping

- PCT 13 | Black Box Lignum Woodland
- PCT 16 | Black Box grassy open woodland
- PCT 17 | Lignum shrubland wetland
- PCT 24 | Canegrass tall grassland
- PCT 26 | Weeping Myall
- PCT 28 | White Pine Woodland
- PCT 44 | Forb-rich Speargrass grassland
- PCT 45 | Plains Grass grassland on alluvial clays
- PCT 46 | Riverine Curly Windmill Grassland
- PCT 164 | Cotton Bush derived shrubland
- Category 1 - Exempt land (non-native)

Plant community types

Source: EMM (2022); DFSI (2020, 2021); ESRI (2022); GA (2011)

0 5 10 km

GDA2020 MGA Zone 55

N

Dinawan Wind Farm
Scoping report
Figure 6.2

EMM creating opportunities

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Natural wetlands occur in drainage basins and along shallow gradient drainage lines throughout project investigation area. These wetlands are attributable to PCT 17. Artificial wetlands such as dams and channels also occur through the area. PCT 17 is not associated with any TECs.

ii Threatened flora and fauna

Background searches identified 16 threatened flora species and 51 threatened fauna species recorded (EES 2021) or predicted to occur (Commonwealth of Australia 2021) within 50 km of the project investigation area.

The project investigation area includes threatened wetland bird habitat, woodland habitat for threatened microbats, extensive habitat for threatened and non-threatened raptors, threatened woodland and grassland vegetation communities and potentially threatened flora populations.

Eleven threatened flora species and 16 threatened fauna species were considered to have a medium or higher likelihood of occurrence across the project investigation area and development corridor. Threatened flora that are known or predicted to occur with a medium or greater likelihood of occurrence include:

- Claypan Daisy (*Brachyscome muelleroides*);
- Lanky Buttons (*Leptorhynchos orientalis*);
- Chariot Wheels (*Maireana cheelii*);
- Sand-hill Spider Orchid (*Caladenia arenaria*);
- Winged Peppercress (*Lepidium monoplocoides*);
- Turnip Copperburr (*Sclerolaena napiformis*);
- Slender Darling Pea (*Swainsona murrayana*);
- Red Darling Pea (*Swainsona plagiotropis*);
- Silky Swainson-pea (*Swainsona sericea*);
- Spear Grass (*Austrostipa wakoolica*); and
- Austral Pillwort (*Pilularia novae-hollandiae*).

Threatened fauna that are known or predicted to occur with a medium or greater likelihood of occurrence, as well as those with a high turbine collision risk include:

- Inland Forest Bat (*Vespadelus baverstocki*);
- Dusky Woodswallow (*Artamus cyanopterus cyanopterus*);
- Superb Parrot (*Polytelis swainsonii*);
- Black Falcon (*Falco subniger*);
- Little Eagle (*Hieraaetus morphnoides*);
- Little Pied Bat (*Chalinolobus picatus*);
- Spotted Harrier (*Circus assimilis*);

- White-throated Needletail (*Hirundapus caudacutus*);
- Square-tailed Kite (*Lophoictinia isura*);
- Major Mitchell's Cockatoo (*Lophochroa leadbeateri*);
- Yellow-bellied Sheathtail-bat (*Saccolaimus flaviventris*);
- Fork-tailed Swift (*Apus pacificus*);
- Latham's Snipe (*Gallinago hardwickii*);
- Plains Wanderer (*Pedionomus torquatus*);
- Southern Bell Frog (*Litoria reniformis*); and
- Australasian Bittern (*Botaurus poiciloptilus*) (movement patterns only).

The presence of woodland and scattered trees, especially along ephemeral drainage lines, is likely to provide habitat for woodland birds such as the Superb Parrot and Grey-crowned Babbler but may reduce the extent of possible habitat for Plains Wanderer, which tends to avoid wooded areas. Open areas of native grassland (natural and derived) may support Plains Wanderer where optimal percentage cover occurs, as well as providing foraging habitat for raptors such as the Spotted Harrier and Black Falcon. Important mapped areas for Plains Wanderer occur within the general locality; however, have been buffered as 'no go' areas during preliminary constraints assessments and wind turbine layout design.

Sloane's Froglet has been recorded from near Coleambally to the north and to the south of the project near Berrigan. Investigation of the habitat within the project investigation area has determined habitat is generally sub optimal within the development corridor, with seasonally flooded grassy/sedge drainage lines, farm dams and artificial drains and channels generally lacking vegetation required for refuge. Southern Bell Frog may require consideration, particularly where the Coleambally Outfall Drain passes through the development corridor.

Bird utilisation surveys commenced in winter 2022 and are required to gather representative, quantitative data on the activity of bird species of concern across the development corridor and broader locality that can be replicated across multiple seasons and during construction and operation of the project. Baseline surveys for bat activity will also be undertaken at various heights; however, due to limitations in effectively modelling bat collision risk with the Collison Risk Model (CRM), a qualitative risk assessment using a risk matrix will be completed as part of the BDAR.

Further targeted surveys will be undertaken in accordance with the BAM during the preparation of the BDAR to determine the presence of threatened species as well as impact avoidance, mitigation and offset obligations, if required.

6.2.2 Potential impacts

Biodiversity values will be a key constraint considered throughout the design development to avoid and minimise impacts as far as practical. High level constraints have been identified to minimise potential impacts and allow for avoidance of remnant vegetation, TECs and threatened species habitat. Locating WTGs and associated infrastructure within areas of moderate and low constraint will result in fewer impacts to biodiversity. Avoidance strategies to minimise impacts to biodiversity and inform preliminary design have included:

- setback around national parks estate;
- constraint buffers around certain mapped NSW wetlands;

- constraint buffers from mapped Plains Wanderer Important Habitat Areas;
- constraint buffers around treed watercourses;
- avoidance of EPBC and BC Act listed TECs as far as practicable; and
- avoiding or minimising the placement of WTGs directly within or within 300 m of Black Box and White Cypress Pine dominated woodland PCTS (considered more likely to provide habitat for woodland birds and microbats at risk of collision with turbines) as far as practicable.

i Construction

Impacts on native vegetation, native fauna and terrestrial ecosystems are likely to occur as a result of the project. The construction of WTG infrastructure, access roads and associated facilities for the operation of the project will require clearing of vegetation and some reshaping of the topography and landscape. These activities may result in a direct and long-term impact on the occurrence, extent and coverage of native vegetation, including threatened species and ecological communities. Indirect impacts including the loss of feeding, refuge and breeding habitat for native fauna, particularly threatened fauna, may also occur, including habitat fragmentation and the loss of habitat connectivity.

Direct and indirect impacts during construction may include clearing, sedimentation, dust deposition, erosion, weed introduction and/or spread, vehicle/machinery strike, light and noise pollution, shading and vibration from the movement of equipment and vehicles. Cumulative impacts may also occur in the context of development in the broader South-West REZ area, including the Dinawan Solar Farm and other surrounding renewable energy developments.

Sedentary species, including Plains Wanderer and threatened flora, are more likely able to be avoided early in the project design or assessed thoroughly to confirm impacts.

ii Operation

Operational impacts are primarily associated with the risk of turbine collision and barrier effects to threatened and protected bird and bat species. Threatened species most at risk are considered to be those with potential for ongoing population impacts once the project is operational, such as:

- raptors that may manoeuvre close to turbine blades to prey on carrion below. These species are at low density in the landscape and removal of even one breeding pair may be significant at a local level;
- flocking birds (eg Major Mitchell's Cockatoo);
- migrating or nomadic waterbirds, which may be less able to manoeuvre around operational turbine blades and may also effect breeding viability, inclusive of large colonial nesting events; and
- resident or colonial roosting bats that may fly within the rotor swept area.

Generally, most woodland birds and bats forage and move within canopies and lower than turbine height and are considered a lower risk of impact.

Migratory and nomadic species (such as Australasian Bittern) represent an increased risk as one movement through the operational wind farm may have a local population-level impact on the species. Threatened species, such as the Dusky Woodswallow, and more common species such as Wedge-tailed Eagles and Kestrels, may appear in significant numbers at times during optimal environmental conditions.

Collision risk can be minimised during project design by avoiding areas of highest constraint and including setbacks and buffers from national parks estate, mapped wetland areas and woodland PCTs likely to contain habitat for microbats.

6.2.3 Assessment approach

The project is SSD, triggering entry into the Biodiversity Offset Scheme (BOS). Field surveys and a BDAR will be required to address the BC Act, including the BAM, and EPBC Act. The BDAR will be prepared in accordance with the BAM detailing the project and the associated biodiversity values, how the project has avoided and minimised impacts to biodiversity, and an impact assessment for those residual impacts that could not be avoided. This will include an impact assessment in accordance with the EPBC Act and *Fisheries Management Act 1994* (FM Act).

The approach for the BDAR will be based on avoiding and minimising impacts, with unavoidable residual impacts offset through the BOS. A referral in relation to MNES under the EPBC Act may be required do address potential impacts to TECs and nationally threatened species. MNES will be assessed within the BDAR as a streamlined assessment under the Commonwealth/NSW Bilateral Agreement.

A desktop report and preliminary field assessments have been completed; however, detailed field assessment, data analysis and reporting as part of the scope of the BDAR will include:

- A review and update if required of background searches including:
  - NSW BioNet Atlas of NSW Wildlife for BC Act listed threatened entities;
  - review of the Protected Matters Search Tool for EPBC Act MNES; and
  - relevant LEPs and SEPPs.
- Formalise a detailed land category assessment (LCA) with a review of land categorisation under the *Local Land Services Act 2013* (LLS Act). This would clarify the native vegetation management and land use regime and where applicable to do so, the potential for land to be mapped as Category 1 exempt land. Land mapped or determined as Category 1 exempt can be excluded from the BAM and is not required to be assessed, with exception to prescribed impacts. The LCA does not remove the requirement to address matters under the EPBC Act.
- Establishment of a BAM Calculator project for the current assessment to determine the requirements for threatened species survey.
- Field investigation in accordance with the BAM, including floristic plot surveys and targeted searches for threatened flora and fauna species.
- Identification of any impact avoidance, mitigation and offset measures necessary for the project.
- Undertake analysis of field data to determine impacts to threatened species and native vegetation and calculate any offset requirement in accordance with the BAM.
- If required, engage species experts, as required, where field surveys could not sufficiently determine the presence/absence of candidate species credit species, due to constraints such as seasonal survey restrictions or requirements for replicate surveys follow weather events etc.

- Bird and bat utilisation surveys (BBUS), operational risk assessments and collision risk modelling (CRM) will be undertaken to inform potential operational risk of the wind farm and to support ecological assessments required under the BC Act, inclusive of Section 8.3.5 of the BAM and the EPBC Act. This information will be used to inform a Bird and Bat Adaptive Management Plan (BBAMP) that will be required as a condition of approval. This will be prepared to provide an overall strategy for managing and mitigating any significant bird and bat strikes arising from the operation of the project.

6.3 Aboriginal heritage

6.3.1 Existing environment

The project investigation area is within the Riverina Bioregion (Eardley 1999) which consists of mainly fluvial clays, silts and sands. The Murrumbidgee and Murray rivers are the major hydrological systems in the bioregion and the project investigation area is between the Murrumbidgee River and Yanco Creek, a major creek system in the local area. The region is generally flat owing to its origin as a shallow embayment of the Southern Ocean (Austral Archaeology 2021).

Austral Archaeology (2021) reported that surface features of the plains are a result of the evolution of river systems through the Pleistocene and Holocene (Martin & Pardoe 2011). The Murrumbidgee region is characterised by extensive fluvial deposits with low source bordering dunes and sand dunes created by ancient rivers. Austral Archaeology (2021) indicates that the main Murrumbidgee channel and floodplain was significantly larger during the late Pleistocene; this has implications for the distribution of Aboriginal heritage sites which were occupied prior to the Holocene. Paleo-channels (or prior streams) are a landscape feature which should also be considered when predicting the location of Aboriginal heritage sites. The Coleambally paleo-system is the oldest in the region with thermoluminescence dating the system to between 105,000 and 80,000 years before present (BP) (Martin & Pardoe 2011). This system pre-dates the known human occupation of Australia; however the system had streams and tributaries in flow during the period of human occupation. The Yanco paleo-system, also associated with the project investigation area, flowed between 20,000 and 13,000 years BP, and the incised nature of the channel indicates this was a major and powerful river during this period (Austral Archaeology 2021).

Lakes and lunettes are also a major surface feature of the region and a likely location for Aboriginal heritage sites. Lakes and lunettes in the region vary significantly in size, however all have a distinctive round or 'kidney' shape. Lakes were formed when water accumulated on the plain and wave action then created deeper basins. Most water in the region was ephemeral and a combination of wave and wind action created lunettes (source bordering dunes) on the edges of the lakes (Austral Archaeology 2021).

The project investigation area is within the boundary of the Griffith and Cummeragunja Local Aboriginal Land Councils. A search of the NSW Native Title Vision website indicates that there are no determined or registered Native Title claim or Indigenous Land Use Agreements that exist over the project investigation area.

An extensive search of the Aboriginal Heritage Information Management System (AHIMS) database was conducted on 11 August 2021 (Client service ID: 612882). The search identified 82 Aboriginal archaeological sites within a 50 km search area approximately centred on the project investigation area (Table 6.4). There is one AHIMS registered site, an artefact, within the project investigation area (AHIMS #55-1-0052). The mapping coordinates recorded for these sites were checked for consistency with their descriptions and location on maps from Aboriginal heritage reports, where available. These descriptions and maps were relied upon where notable discrepancies occurred.

Table 6.4 Summary of AHIMS site types within approximately 50 km of the project investigation area

Site type	Number of sites	Percentage of total
Hearth	38	46
Modified tree (carved or scarred)	21	26
Artefact	9	11
Aboriginal resource and gathering	8	10
Earth mound	4	5
Burial	1	1
Potential archaeological deposits (PADs)	1	1
Total	**82**	**100%**

6.3.2 Potential impacts

Construction of the project has the potential to impact known and currently unidentified Aboriginal heritage sites. While the ground surface impact of wind turbines is usually confined to the pad of each individual turbine and the installation of cables linking turbines to centralised points, additional roads or tracks to access each turbine will need to be constructed.

The potential for other archaeological site types and intangible cultural sites to occur within the project investigation area will be established through further archaeological investigation and consultation with Registered Aboriginal Parties (RAPs), which will also provide valuable information on the cultural heritage values of the project investigation area and broader region.

Spark Renewables will seek to avoid impacts to Aboriginal heritage sites wherever possible. Due to the nature of wind farm infrastructure, impacts to Aboriginal heritage sites can often be avoided with careful consideration of project design. Initial predictive modelling indicates Aboriginal heritage sites are most likely to occur in proximity to current or past waterways; avoidance of these features, if possible, could reduce impacts to Aboriginal heritage sites. Any impacts and mitigation and management measures will be defined in the EIS in consultation with the RAPs.

6.3.3 Assessment approach

A detailed Aboriginal cultural heritage assessment (ACHA) will be prepared for the project in accordance with relevant regulations and guidelines, including:

- *Guide to Investigating, Assessing and Reporting on Aboriginal Cultural Heritage in NSW* (OEH 2011);
- *Aboriginal Cultural Heritage Consultation Requirements for Proponents* (DECCW, 2010a); and
- *Code of Practice for Archaeological Investigation of Aboriginal Objects in New South Wales* (DECCW 2010b).

The ACHA will include consultation with the local Aboriginal community, review of existing information, development of a predictive model, on-site investigations, description of cultural materials and their significance, potential impacts and recommendations for the project usually in the form of mitigation measures.

The ACHA will include the following key components:

- Identification of Aboriginal cultural heritage values relevant to the project investigation area through background research, predictive modelling, consultation with Aboriginal stakeholders and archaeological field investigations. Archaeological survey will be undertaken by archaeologists and representatives of the local Aboriginal community. Potential project constraints identified during the survey will inform potential refinement of the development corridor to minimise impacts to Aboriginal heritage values. Measures will be developed to avoid and mitigate potential impacts to Aboriginal cultural heritage, as required. The findings of the background research and surveys will inform the need for further archaeological assessment (such as test excavation).
- Assessment of the significance of Aboriginal objects, sites and locations identified in the course of the archaeological investigations and through Aboriginal community consultation.
- Assessment of the impact of the project on identified Aboriginal cultural heritage values.
- Provision of appropriate management measures for potentially impacted Aboriginal cultural heritage values in response to their assessed significance.

6.4 Traffic

6.4.1 Existing environment

Access to the project will be via Kidman Way, Goolgumbla Road and McLennons Bore Road. Kidman Way (route B87) is a fully sealed state highway running generally north-south from Bourke at its northern terminus and Jerilderie at its southern terminus. Kidman Way connects the project to other highways, notably the Sturt Highway (national route A20) to the north which connects NSW and South Australia, and the Newell Highway (national route A39) to the south, which provides an important connection between Queensland and Victoria through central NSW. McLennons Bore Road Goolgumbla Road are local roads providing access from the local and regional road network.

The transport route to the project will be confirmed during the preparation of the EIS but is expected to comprise vehicle movements originating from:

- north of the project and travelling south along Kidman Way;
- east of the project travelling west along the Sturt Highway before turning onto Kidman Way; and
- south of the project travelling north along the Newell Highway before turning onto Kidman Way.

Over-size, over-mass (OSOM) vehicles will require access to the project and the preferred route will be subject to more detailed route analysis. This includes an assessment of a 100 m blade travelling to site from the ports of Geelong, Wollongong and/or Newcastle. Upgrades to the local and regional road network may be required to facilitate delivery of WTG components to the project.

Subject to detailed design, internal access tracks will also be established to connect the WTGs, collector substations and other infrastructure areas to the public road network. All internal access tracks will be unsealed. The internal tracks will serve both as access for servicing and maintaining project infrastructure as well as fire trails.

6.4.2 Potential impacts

The project will generate traffic during construction related to the movement of construction workers and the delivery of materials, plant and equipment. OSOM vehicles will be required for the transport of oversized infrastructure and project components to the project. Construction traffic generation has the potential to impact on intersection performance and traffic volume capacity on the surrounding network and along key transport routes for the movement of infrastructure from ports to the project.

Operational traffic generation will be minimal with some daily light vehicle movements and heavy vehicle deliveries only as required.

6.4.3 Assessment approach

Engagement with Transport for NSW (TfNSW) and relevant local council/s and the Victorian Department of Transport (where relevant for transport from Victoria) will be required to identify any existing road safety concerns and ensure any potential deficiencies are clearly understood and assessed. Proposed new access points from the public road network will be required for project construction access. Ongoing road maintenance requirements and any potential need for localised upgrades to mitigate traffic impacts during construction will also need to be considered. Should upgrades be required, these will form part of the development application and will be detailed in the EIS (including assessment of impacts to biodiversity and Aboriginal cultural heritage). Road upgrade requirements will be determined in consultation with the relevant road authority.

A traffic impact assessment will be carried out to investigate potential impacts associated with the project. The traffic impact assessment will include:

- projections of traffic volumes (both light and heavy vehicles) and transport routes during construction and operation;
- assessment of the potential traffic impacts of the project on road network function, including intersection performance, site access arrangements, and road safety, including school bus routes and cyclist safety;
- assessment of the capacity and condition of the existing road network to accommodate the type and volume of traffic generated by the project (including OSOM vehicles, cover mass vehicles and escorted deliveries) during construction and operation, with any potential cumulative impacts from other projects in the area being considered; and
- provide details of measures to manage potential impacts, including a schedule of required road upgrades, road maintenance contributions, and other traffic control measures, developed in consultation with the relevant road authority.

The assessment of traffic and access impacts will be prepared using the following guidelines, policies and design requirements:

- *Guide to Traffic Generating Developments* (RTA 2002);
- *Austroads Guides to Road Design* (various publications);
- *Austroads Guides to Traffic Management* (various publications);
- Australian Standard AS 2890 Parts 1 and 2; and
- *Australian Code for Dangerous Goods Transport*.

6.5 Social

A social impact assessment (SIA) scoping report has been prepared to support this scoping report (Appendix D).

6.5.1 Existing environment

The project is within a sparsely populated area which encompasses the localities of Coleambally, Gala Vale, Mabins Well and Bundure, and lies within the Murrumbidgee and Edward River LGAs.

The local study area for the SIA includes all land within the project investigation area along with a 5 km buffer area around the periphery, recognising that direct project-related impacts may also be experienced by those living in close proximity to the project investigation area. Social baseline characterisation utilised data generated by the Australian Bureau of Statistics (ABS) at the Statistical Area 1 (SA1) geographical classification. Four SA1 areas have been included in the local study area.

Surrounding townships are likely to be primary sources of labour, goods and services which will support the project and subsequently experience social impacts and benefits. Nearby regional communities considered relevant to the SIA include:

- Griffith;
- Deniliquin;
- Wagga Wagga;
- Coleambally;
- Jerilderie; and
- Hay.

The regional study area encompasses:

- Murrumbidgee LGA; and
- Edward River LGA.

Both LGAs will experience some direct and indirect impacts, mostly related to workforce accommodation, local procurement opportunities and employment.

The local study area has a combined total population of 886, while the regional study area has a population of 11,809 (ABS 2021). Agriculture is the primary industry of employment within the local study area and is an important source of employment within the broader region.

Wagga Wagga is the largest centre in the surrounding area with a population of 56,974. This is followed by Griffith, with a population of 20,569. Other nearby regional communities of Deniliquin (7,038), Coleambally (1,152) and Jerilderie (922) have considerably smaller populations.

6.5.2 Potential impacts

Potential social impacts and benefits identified as part of the SIA scoping report include:

- impacts to livelihood (such as the potential for lowered agricultural productivity caused by disruption to farming and potential biosecurity and weed risk due to increased vehicle activity);
- health and wellbeing impacts (such as increased noise and public safety issues due to trucks and increased vehicle movements);
- impacts to access and surroundings (such as changes to the landscape due to the construction and operation of the project);
- impacts on culture and community (such as from potential loss of heritage and changes in the community due to a new workforce entering the area);
- increased opportunities for employment and occupational training;
- economic in-flows to the local community; and
- opportunities for diversification of landholder income.

The project will look to initiate measures that maximise positive impacts and benefits (such as utilising local workforce and supplies), in addition to other mitigation measures to manage potential negative impacts.

6.5.3 Assessment approach

Potential social impacts and benefits will be assessed in accordance with the requirements of the *Social Impact Assessment Guideline for State Significant Projects* (DPIE 2021f) and will utilise the risk assessment matrix presented in the *Technical Supplement Social Impact Assessment Guideline for State Significant Projects* (DPIE 2021g). The SIA will be led by a suitably qualified Social Scientist.

The identification of social impacts will be informed by community and stakeholder engagement activities, as well as SIA field study activities, and will be conducted in an integrated manner to ensure consistency, reduce duplication, and allow for management of consultation fatigue. In addition, findings from the technical assessments will be considered to understand the consequences to the community and existing research and previous SIAs will inform the identification of the social impacts.

6.6 Noise and vibration

A preliminary noise impact assessment has been prepared in accordance with the *NSW Wind Energy: Noise Assessment Bulletin* (DPE 2016c) by Echo Acoustic Consulting Pty Ltd to support this scoping report (Appendix E).

An existing, market-ready WTG with verified maximum equivalent noise levels was required to inform the preliminary noise impact assessment. The preliminary noise impact assessment has therefore been based on the Siemens Gamesa SG6.6 170 WTG with a hub height of up to 180 m and a rotor diameter of 170 m.

The assessment has conservatively considered the cumulative effect of 292 WTGs operating concurrently within the project investigation area. As noted in Section 3.2.1, the indicative layout in Figure 3.1 includes 161 WTGs in the western section and 131 WTGs in the eastern section; however, it is envisaged that the final number of WTGs will be approximately 250. The final number and placement will be determined as part of the final layout to be assessed in the EIS.

6.6.1 Existing environment

Land use within the project investigation area and surrounds is predominantly agricultural. Given the project's rural setting, background noise at nearby sensitive receptors is likely to be low and characterised by agricultural equipment and machinery associated with agricultural production activities, vehicle movements along the local roads and natural sounds (livestock, birds, insects, etc).

The *NSW Wind Energy: Noise Assessment Bulletin* (DPE 2016c) provides a baseline noise criterion of 35 dB(A) at non-associated residences. At associated residences, the Bulletin enables an increase above the baseline noise criterion of 35 dB(A), subject to a formal agreement and ensuring that the landowner is appropriately informed and understands the agreed noise levels.

6.6.2 Potential impacts

Noise impacts from the project during construction will include noise generated by preparatory earthworks, delivery and assembly of infrastructure, construction of the BESS, on-site collector substations and grid connection works and operation of light and heavy vehicles.

Operational noise impacts will include the operation of the WTGs, on-site collector substations and BESS. The location of noise-generating infrastructure within the development corridor will be determined with consideration to noise impacts on surrounding residences.

Noise prediction contours (Figure 2) and predicted noise levels (Table 4) are provided in Appendix E. The preliminary noise assessment concludes that the 35 dB(A) baseline criterion can be achieved at all non-associated residences.

Noise levels at associated residences are above the 35 dB(A) baseline criterion; however associated residences can establish a noise criterion higher than the 35 dB(A) baseline value under the Bulletin, which will be the subject of a formal agreement between the Dinawan Energy Hub and each associated landowner.

6.6.3 Assessment approach

A noise and vibration impact assessment will be prepared and will consider relevant noise impacts to local receptors within the vicinity of the project and cumulative impacts with surrounding developments. The assessment will include:

- identification of noise sources and relevant noise outputs of construction equipment and infrastructure proposed by the project; and
- noise modelling and assessment, taking into consideration the following:
  - predictive modelling;
  - noise mitigation strategies; and
  - potential construction activity, road traffic noise and operational noise impacts.

The assessment will also reflect any changes to the candidate WTG, the warranted sound power levels, the need for adjustment for uncertainty margins, and/or the layout that arises during the detailed design stage of the project. The assessment will consider the presence of excessive low frequency noise and tonality as special noise characteristics.

The assessment will be prepared in accordance with the:

- *NSW Wind Energy: Noise Assessment Bulletin* (DPE 2016c);
- *Interim Construction Noise Guideline* (DECC 2009);
- *Noise Policy for Industry* (EPA 2017);
- *Road Noise Policy* (DECCW 2011); and
- *Assessing Vibration: A Technical Guideline* (DEC 2006).

Specific community engagement is proposed with surrounding landholders in relation to noise and vibration. A road traffic noise assessment will also be included to assess noise impacts associated with project-related vehicle movements along the local road network during the construction phase of the project.

The potential for cumulative noise impacts with the Dinawan Solar Farm, Project EnergyConnect's Dinawan Substation, Yanco Delta Wind Farm and Bullawah Wind Farm will be considered as the project design evolves and will be assessed in the EIS.

6.7 Historic heritage

6.7.1 Existing environment

Statutory registers were reviewed including the National Heritage List (NHL), the Commonwealth Heritage List (CHL), the State Heritage Register (SHR), the Section 170 Register (s170) and Schedule 5 of the following environmental planning instruments:

- *Murrumbidgee Local Environmental Plan 2013*;
- *Conargo Local Environmental Plan 2013*; and
- *Jerilderie Local Environmental Plan 2012*.

Non-statutory registers reviewed as a part of this assessment include the National Trust of Australia, NSW (NT) and the Register of the National Estate (RNE).

No items of National, State or local heritage significance have been identified. There are no items of heritage significance located in relative proximity to the project investigation area (under 10 km).

While no statutory-listed sites have been identified, the project investigation area is in the Murrumbidgee and Murray Historic Regions. The *Regional Histories of NSW* document prepared by the Heritage Office in 1996 notes that both regions have a long pastoral and farming history dating from the first European settlement in 1829 in the Murrumbidgee Valley (Heritage Office 1996, p133) and in c.1835 in the Albury area (Heritage Office 1996, p 149). Therefore, there is potential throughout the project investigation area for existing built heritage as well as archaeological remnants that have previously been unidentified including:

- homesteads;
- cottages;
- stockyards;

- camps and huts; and
- infrastructure associated with the pastoral landscape including dams, fencing, pastoral tracks and roadways.

In conjunction, the project investigation area includes various cultural landscapes that are indicative of the character of both the Murrumbidgee and Murray Historic Regions including;

- areas of historic plantings;
- large water bodies;
- pastoral fields; and
- areas with a high concentration of built heritage situated within a specific landscape type.

The project investigation area forms part of numerous blocks of land which were allocated to pastoral stations established following European settlement in the area from the 1850s onwards (Austral Archaeology 2021). In particular, the project investigation area is closely associated with Yanko Station and later the Goolgumbla property. Individuals with a link to the project investigation area include the Wilson family, predominantly renowned pastoralist and politician Sir Samuel Wilson, and his relative Samuel McCaughey, a man who was famous for the quality of his livestock and who was instrumental in introducing new irrigation techniques to the Riverina. McCaughey was also responsible for the invention of a type of earth scoop known as the 'Tumbling Tommy', which became a common sight on farms across Australia even into the 20th century. It is possible that archaeological evidence relating to McCaughey's irrigation schemes or his engineering activity may be present within the project investigation area.

Preliminary research by Austral Archaeology (2021) noted that various structures are likely to have once existed within the project investigation area including a woolshed as well as other pastoral and farming infrastructure, although the location of these structures are currently unknown.

6.7.2 Potential impacts

Due to the overall size of the project investigation area, it is likely that historic heritage sites as described above would be identified through both a more detailed desktop analysis and physical inspection. Construction of the project has the potential to impact currently unidentified historic heritage sites, however the level of direct and cumulative impacts cannot be established at this stage in the project.

Spark Renewables will seek to avoid impacts to historic heritage sites wherever possible. Any impacts and mitigation and management measures will be identified in the EIS.

6.7.3 Assessment approach

A historical heritage assessment of built, archaeological and landscape values and a statement of heritage impact (technical report) will be prepared as part of the EIS. The assessment will include more detailed desktop research and consultation, which will also provide valuable information on the historical heritage values of the project investigation area and broader region. An inspection of the project investigation area may also be required, should the desktop analysis yield information that clearly suggests the presence of historical sites.

The technical report will also consider the wider region to determine the potential for historical finds to be present in the project investigation area and if so, assess the potential significance of the finds and provide recommendations for the appropriate management of any finds.

6.8 Land

6.8.1 Existing environment

Regional land and soil mapping data has been reviewed with a focus on the indicative development corridor (Table 6.5). Land and soil capability across the project investigation area is shown on Figure 6.3.

Table 6.5 Land and soil characteristics

Soil landscapes[1]	Great soil group	Australian soil classification (ASC)	Inherent soil fertility	Land soil capability (LSC) class	Area (ha)[1]
Coleambally variant a	Red Brown Earths (RBE)	Chromosols	Moderate	6	303
Coleambally variant b	Siliceous Sands (SS)	Rudosols	Low	6	855
Jerilderie	Grey, Brown and Red Clays (GC, BC and RC)	Vertosols	Moderate	4	8,803
Niemur River	Grey, Brown and Red Clays (GC, BC and RC)	Vertosols	Moderate	6	296

1. Soil and land resource mapping is unavailable for the entire development corridor, therefore the area (ha) of soil landscapes has been assumed based on the extent of the associated ASC, LSC and other inputs across the development corridor.

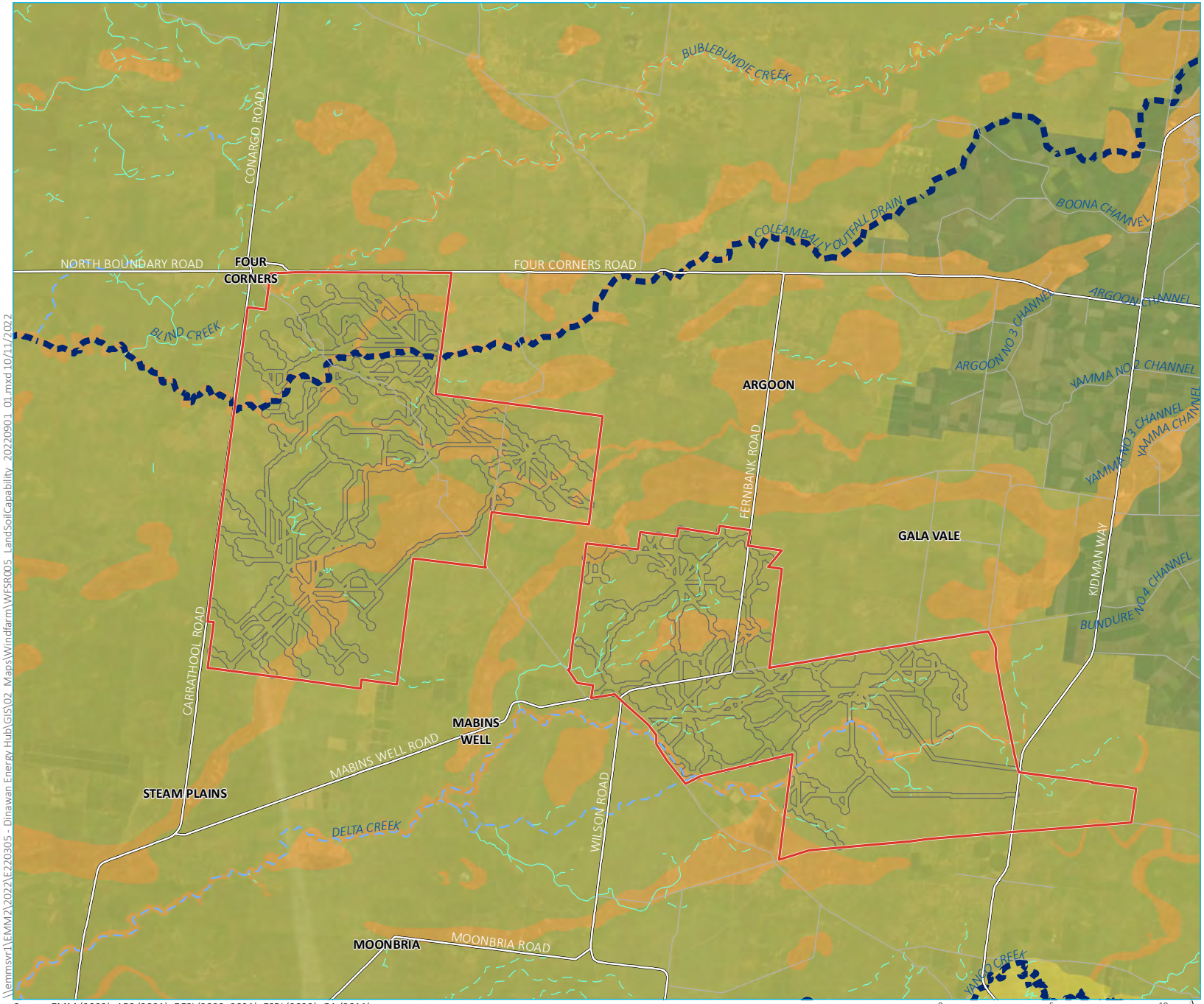
The indicative development corridor is dominated by the presence of cracking clay Vertosols associated predominantly with the stagnant alluvial Jerilderie soil and land resource (SLR) area whilst small areas of alluvial Vertosols are found associated with the Niemur River SLR. Minor areas of texture-contrast Chromosols and poorly developed Rudosols are present, associated with the aeolian Coleambally SLR variants.

LSC is consistent across the SLR and ASC associations. The Jerilderie Vertosols are classed as LSC Class 4, moderate capability land with moderate to high limitations for high impact land uses, restricting land use to cropping with restricted cultivation, pasture cropping, grazing and some horticulture. The Niemur River Vertosols and Coleambally SLR variants Chromosols and Rudosols are LSC Class 6, low capability land with very high limitations for high impact land uses, restricting land use to low-impact land uses such as grazing, forestry and nature conservation (OEH 2012).

Modelled inherent soil fertility is similarly consistent, with the Vertosols of the Jerilderie and Niemur River SLR and the Chromosols of Coleambally variant a being moderate soil fertility, soils with low to moderate fertilities that usually require fertiliser and/or have some physical restrictions for arable use. The Rudosols of Coleambally variant b have low soil fertility, soils which, due to their poor physical and/or chemical status, only support limited plant growth. The maximum agricultural use of these soils is sparse grazing (Charman 1978).

The development corridor and broader project investigation area is not mapped as Biophysical Strategic Agricultural Land (BSAL).

There are no acid sulfate soils (ASS) or potential acid sulphate soils mapped within the development corridor. Acid sulfate soils can occur in conducive alluvial environments and may be present in the project investigation area.



KEY

- Project investigation area
- Indicative development corridor

Existing environment

- Rail line
- Major road
- Minor road

Strahler stream order

- 1st order
- 2nd order
- 3rd order
- 9th order

Land and soil capability

- 3 - Moderate limitations
- 4 - Moderate to severe limitations
- 5 - Severe limitations
- 6 - Very severe limitations

Source: EMM (2022); ABS (2021); DFSI (2020, 2021); ESRI (2022); GA (2011)

0 5 10 km

GDA2020 MGA Zone 55

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Land and soil capability

Dinawan Wind Farm
Scoping report
Figure 6.3

EMM
creating opportunities

6.8.2 Potential impacts

i Construction

Soil disturbance during construction may result in:

- topsoil and subsoil impacts (eg degradation and loss of topsoil, compaction of soil through vehicle movement and poor reinstatement and soil inversion or mixing resulting in changes in constraints such as salinity and sodicity within the soil profile);
- disturbance and form changes affecting natural surface drainage;
- erosion and sedimentation, particularly during clearance and soil exposure activities resulting in:
  - on-site impacts (such as erosion of constructed landforms); or
  - off-site impacts (such as eutrophication of downstream waters);
- increased dust generation.

These impacts could result in reduction of soil quality that could be deleterious to agricultural productivity and land use after rehabilitation if not suitably managed or mitigated.

Decreasing soil quality or volumes during construction could result in limitations to rehabilitation from loss or degradation of soil materials that are needed to reinstate the soils in a suitable condition.

Any negative impact to soil characteristics presents a risk of harm to the land and soil capability and productivity of the project investigation area post-rehabilitation.

ii Operations

Once constructed, the land within the development corridor will not be able to be used for the same intensity of agricultural production; however, there are opportunities to co-locate agricultural land uses, such as grazing, to maintain a level of agricultural productivity. Inappropriate management of soils could result in negative impacts to soil characteristics, which may impact the land and soil capability and agricultural productivity of the development corridor post-rehabilitation.

Erosion during operations may result in hazards associated with erosion gullies and tunnelling (due to dispersive subsoils and non-cohesive sands in areas) and accumulated sediments, uncontrolled water and dust.

6.8.3 Assessment approach

A land, soil and erosion assessment will be prepared as part of the EIS and will include:

- a description of the biophysical environment (including soil landscapes and LSC class);
- a detailed erosion hazard analysis (including site inspection and opportunistic soil sampling to identify site-specific issues and soil characteristics relevant to erosion and sediment control);
- an impact assessment of the project on soil types, LSC class and agricultural productivity;
- completion of a Land Use Conflict Risk Assessment in accordance with the Department of Industry's *Land Use Conflict Risk Assessment Guide*; and
- recommendations for site decommissioning and rehabilitation to restore disturbed land back to agriculture.

6.9 Water

6.9.1 Existing environment

The project is within the lower Murrumbidgee River Catchment in southern NSW which drains a total area of around 84,000 km^2. The Murrumbidgee River Catchment flows in a south-westerly direction from its headwaters in Kosciuszko National Park to the floodplains at the western end of the valley where the project is situated. More locally, the project is situated between two waterways, Yanco Creek to the south, and Cooinbil Creek to the north. Yanco Creek is a major perennial waterway which flows south-west toward the Murray River.

To the west of the project is Coleambally Creek and Delta Creek. Coleambally Creek is a minor waterway that is part of the Coleambally Outfall Drain. Delta Creek is a minor, ephemeral waterway which also drains in a south-westerly direction during significant rainfall, although does not connect to any downstream major channel unless the area is flooded.

The project investigation area is largely flat with some minor drainage depressions that hold water during rainfall and flooding, and flow in a south-westerly direction. Several minor topographic depressions on the floodplain hold water for longer, creating scattered swamp environments within the project investigation area.

There are first and second order watercourses mapped within the project investigation area; however, all are ephemeral (Figure 6.3).

Parts of the project investigation area are identified as 'groundwater vulnerable' and 'wetland' on the Jerilderie, Murrumbidgee and Conargo LEPs. Clauses of the LEPs require the consent authority to consider potential impacts on groundwater dependent ecosystems and wetlands prior to determining a development application.

6.9.2 Potential impacts

The construction of the project has the potential to result in the following impacts to water resources in the absence of suitable controls:

- ground disturbance during bulk earthworks and other site activities could lead to exposure of soils and potential erosion and mobilisation of sediment into receiving watercourses;
- contamination of surface waters or groundwater as a result of accidental spillage of materials such as fuel, lubricants, herbicides and other chemicals used to support construction activities;
- disturbance of watercourses (eg through construction of creek crossings) and associated riparian zones to support construction activities (including clearing, bulk earthworks and civil works, installation of infrastructure and site establishment);
- partial blockage or redirection of floodwaters and downstream impacts as a result of poorly considered construction activities; and
- demand for water during construction.

Operation has the potential to result in the following impacts to water resources in the absence of suitable controls:

- demand for water for land management purposes;
- potential ongoing erosion of soils and mobilisation of sediment into receiving watercourses;

- contamination of surface water or groundwater as a result of accidental spillage of materials such as fuel, lubricants, herbicides and other chemicals used to support site activities, or through poor site and vegetation management practices; and
- partial blockage or redirection of floodwaters and downstream impacts as a result of poorly considered permanent facilities.

It is anticipated that design refinement will enable the project to avoid the most significant watercourses, riparian corridors and other sensitive receptors. Specific design considerations and mitigation measures may be recommended to minimise potential impacts within and along drainage lines. Roads and services that require watercourse crossings will be designed and constructed in accordance with relevant regulations and best practice design and construction methods.

The project is not likely to impact groundwater during construction, operation, or decommissioning due to the limited amount of subsurface disturbance activities required during the installation and decommissioning of project infrastructure.

6.9.3 Assessment approach

A water resources assessment will be prepared and will include a review of the existing water environment, an assessment of the water impacts and a description of any proposed mitigation and management measures. The water resources assessment will include:

- complete site characterisation including mapping to effectively characterise surface water features, groundwater features and relevant water users;
- the likely impacts of the project (including flooding) on surface water and groundwater resources, drainage channels, wetlands, riparian land, farm dams, groundwater dependent ecosystems and acid sulfate soils, related infrastructure, adjacent licensed water users and basic landholder rights, and measures proposed to monitor, reduce and mitigate these impacts;
- a qualitative review and assessment of the likely risks and impacts of the project on flooding and floodplain areas using available flood data and mapping;
- a review of the relevant regulatory requirements (eg Water Sharing Plans) of relevance to the catchment and groundwater sources in which the project is located;
- consideration of water requirements and supply arrangements for construction and operation; and
- erosion and sediment control measures that would be implemented to mitigate any impacts in accordance with *Managing Urban Stormwater: Soils & Construction* (Landcom 2004).

6.10 Air quality

6.10.1 Existing environment

Land use within the project investigation area and surrounds is primarily agricultural, which is likely to influence local and regional air quality. Existing sources of air pollution within a local setting are limited and typically comprise dust and vehicle and machinery exhaust emissions associated with agricultural production and local roads. Wood smoke from bushfires and rural residences can also be a source of particulates.

6.10.2 Potential impacts

The project is not anticipated to generate significant air quality impacts during construction or operation. Dust may be generated during construction due to an increase in exposed areas following site preparation works and from construction traffic movements on unsealed roads. This dust generation is expected to be localised, unlikely to have significant impacts at nearby receivers, and able to be easily mitigated through implementation of standard management measures.

No significant dust generation is expected during operations given exposed areas will have been rehabilitated.

Minor levels of dust may be generated during decommissioning as a result of structures being removed, areas being temporarily exposed and rehabilitation works. This will only occur for a short duration before rehabilitation of exposed areas has been established.

6.10.3 Assessment approach

A quantitative air quality assessment with dispersion modelling is not considered warranted given risk of air quality impacts is low and will not extend beyond the construction phase of the project.

Impacts to neighbouring sensitive receptors (human and ecological) from construction dust emissions (including the potential for cumulative emissions due to the possible concurrent construction of the project with the Dinawan Solar Farm, Project EnergyConnect, Yanco Delta Wind Farm and Bullawah Wind Farm) will be assessed using a qualitative impact assessment approach.

6.11 Hazards and risk

6.11.1 Aviation safety

The EIS will consider potential interactions between the proposed WTGs and local air services (including safety hazards associated with intrusion of airspace and impacts on navigation instruments).

There is an aircraft landing area within the project investigation area. There are small aerodromes and runways surrounding the project investigation area, the closest of which are approximately 3.8 km north-east and 7 km south of the project investigation area. Additional aviation activities associated with agricultural operations (eg aerial spraying and pest management) may also occur within and adjacent to the project investigation area.

An aviation impact assessment will be prepared and will assess potential impacts on aviation activities (including aerodromes, air routes, airspace and navigation/radar) and provide aviation safety advice in respect of relevant requirements of air safety regulations and procedures (including consultation with relevant aviation agencies). The assessment will be undertaken in accordance with:

- Civil Aviation Safety Regulations 1998;
- guidance material from the Civil Aviation Safety Authority;
- *National Airports Safeguarding Framework Guideline D: Managing the Risk to Aviation Safety of Wind Turbine Installations (Wind Farms)/Wind Monitoring Towers* (DITRDC 2012); and
- specific requirements as advised by Airservices Australia.

6.11.2 Bushfire

Part of the project investigation area is mapped as bushfire prone land. The project has the potential to be exposed to bushfire risk from grasslands and areas of dense vegetation within and adjacent to the project investigation area. There is also a risk of a fire starting within the project investigation area and spreading to neighbouring properties. A bushfire hazard assessment will be prepared to identify potential hazards and risks associated with bushfires and to demonstrate compliance with *Planning for Bush Fire Protection* (RFS 2019).

6.11.3 Health

The National Health and Medical Research Council's (NHMRC) (2015) *NHMRC Statement: Evidence on Wind Farms and Human Health* refers to the higher likelihood of health impacts from wind farms at a distances of less than 1.5 km. The project will have limited interaction with non-associated residences at these sorts of distances from WTGs, with the closest non-associated residences approximately 2 km from a WTG (Figure 2.1). Nonetheless, a qualitative assessment of health impacts will be undertaken within the EIS and will include consideration of the outcomes of the noise and vibration assessment. Risks associated with human exposure to electromagnetic fields will be addressed as part of a preliminary hazard analysis (PHA) included in the EIS (Section 6.11.6).

6.11.4 Telecommunications

A number of Australian Communications and Media Authority communication sites and links have been identified within and adjacent to the project investigation area. The EIS will consider potential interactions between the proposed WTGs and nearby telecommunication services (including point to point microwave links, meteorological radars, mobile voice-based communications, wireless and satellite internet services, broadcast and digital radio and broadcast, digital and satellite television). A telecommunications assessment will be prepared and will assess potential impacts on telecommunication services. Where impacts are identified, recommendations will be provided to mitigate and manage impacts.

6.11.5 Blade throw

A blade throw risk assessment will be completed as part of the EIS and will assess the likelihood of blade throw and calculate typical blade throw distances in order to determine appropriate separation distances between WTGs, non-associated residences and property boundaries. The assessment will also determine appropriate separation distances between WTGs and BESS infrastructure. Management measures will be recommended, such as regular inspections of WTGs, to mitigate blade throw risk.

6.11.6 Preliminary hazard analysis

A preliminary risk screening will be completed in accordance with State Environmental Planning Policy (Resilience and Hazards) 2021 (Resilience and Hazards SEPP). A PHA will also be prepared in accordance with *Hazardous Industry Planning Advisory Paper No. 6 Hazard Analysis* (DoP 2011a) and *Multi-level Risk Assessment* (DoP 2011b). The PHA will consider all recent standards and codes and verify separation distances to on-site and off-site receptors to prevent fire propagation and compliance with *Hazardous Industry Advisory Paper No. 4 Risk Criteria for Land Use Safety Planning* (DoP 2011c).

The PHA will address the fire risks associated with the BESS and supporting infrastructure and demonstrate that the proposed BESS capacity will be able to fit within the land area designated for the BESS considering separation distances between:

- BESS sub-units (ie racks, modules, enclosures, etc) ensuring that a fire from a sub-unit does not propagate to neighbouring sub-units; and
- the BESS and other on-site or off-site receptors, ensuring fire safety.

Exposure to electromagnetic fields will also be assessed against the International Commission on Non-Ionizing Radiation Protection (1998) *Guidelines for Limiting Exposure to Time-varying Electric, Magnetic and Electromagnetic Fields*.

6.12 Cumulative impacts

The project will contribute to the overall development of the South-West REZ. Other proposed, approved, under construction and operational renewable energy developments within and in the vicinity of the South-West REZ and the project are summarised in Table 2.1.

As shown in Figure 1.1, there are multiple renewable energy generation and transmission projects proposed in the vicinity of the project investigation area with the proposed Yanko Delta Wind Farm, Project EnergyConnect, Bullawah Wind Farm and the Dinawan Solar Farm adjoining or within close proximity to the project investigation area. Further, it is anticipated that there will be additional renewable energy generation, storage and transmission projects proposed in the vicinity of the project that are not publicly known at the time of preparing this report.

The project may generate cumulative impacts in conjunction with surrounding projects during both construction and operation. These impacts may include cumulative traffic, construction and operational noise, visual, social (including workforce and accommodation capacity), and biodiversity impacts. However, there may also be a cumulative benefit to local communities from the project and other developments in the region through the generation of jobs during construction and ongoing operation, particularly under the South-West REZ, and contribution to local economies associated with the purchase of local goods and services.

The EIS will carry out a cumulative assessment in accordance with the *Cumulative Impact Assessment Guidelines for State Significant Projects* (DPIE 2021c). The following matters will require consideration:

- visual amenity;
- biodiversity;
- Aboriginal and historic heritage;
- traffic;
- social;
- land; and
- noise and vibration.

Further consideration of potential cumulative impacts for projects within 100 km of the project investigation area and the proposed assessment approach is provided in Table 6.6.

Table 6.6 Cumulative impact assessment scoping summary table

Project	Distance to project	Project status	Indicative timing/overlap	Potential cumulative impacts
Dinawan Solar Farm – includes construction and operation of 1 GW solar farm and BESS on approximately 2,300 ha.	0 km	Proposed – EIS in preparation.	18–24-month construction and operations overlap (assumes concurrent construction).	• Visual amenity – Detailed assessment – further assessment required to determine cumulative visual amenity impacts. • Biodiversity – Detailed assessment – further assessment required to determine cumulative biodiversity impacts. • Aboriginal and historic heritage – Standard assessment of impacts on Aboriginal and historic cultural landscapes. • Traffic – Detailed assessment – cumulative impacts on local and regional road network will require assessment. • Social – Detailed assessment – cumulative impacts on local population, accommodation and goods and services will require assessment. • Land – Standard assessment – cumulative impacts on regional agricultural productivity will be assessed. • Noise and vibration – Detailed assessment – cumulative construction, operational and road traffic noise will require assessment.
Project EnergyConnect – includes construction and operation of 330 kV and 500 kV transmission line and Dinawan Substation.	0 km	Approved – not constructed	24-month construction unlikely to overlap. Operations overlap.	• Visual amenity – Detailed assessment – further assessment required to determine cumulative visual amenity impacts. • Biodiversity – Standard assessment of impacts on biodiversity. • Aboriginal and historic heritage– Standard assessment of impacts on Aboriginal and historic cultural landscapes. • Traffic – Detailed assessment – cumulative impacts on local and regional road network will require assessment if concurrent construction assumed to occur. • Social – Detailed assessment – cumulative impacts on local population, accommodation and goods and services will require assessment if concurrent construction assumed to occur. • Land – Standard assessment – cumulative impacts on regional agricultural productivity will be assessed. • Noise and vibration – Standard assessment – closest residence to Dinawan Substation is approximately 4 km away, therefore cumulative construction and operational noise impacts are considered unlikely.
Yanco Delta Wind Farm – includes construciton and operation of 1.5 GW wind farm, including approximately 225 WTGs across 24,000 ha.	0 km (south)	Proposed – EIS in preparation	36-month construction and operations overlap.	• Visual amenity – Detailed assessment – further assessment required to determine cumulative visual amenity impacts. • Biodiversity – Standard assessment of impacts on biodiversity. • Aboriginal and historic heritage– Standard assessment of impacts on Aboriginal and historic cultural landscapes. • Traffic – Detailed assessment – cumulative impacts on local and regional road network will require assessment. • Social – Detailed assessment – cumulative impacts on local population, accommodation and goods and services will require assessment. • Land – Standard assessment – cumulative impacts on regional agricultural productivity will be assessed. • Noise and vibration – Detailed assessment – cumulative construction, operational and road traffic noise will require assessment.

Table 6.6 Cumulative impact assessment scoping summary table

Project	Distance to project	Project status	Indicative timing/overlap	Potential cumulative impacts
Bullawah Wind Farm – includes construction and operation of 1 GW wind farm, including approximately 170 WTGs across 33,000 ha.	9 km (west)	Proposed – pre-scoping stakeholder engagement	Length of construction unknown; however, assume both construction and operations overlap.	• Visual amenity – Detailed assessment – further assessment required to determine cumulative visual amenity impacts. • Biodiversity – Standard assessment of impacts on biodiversity. • Aboriginal and historic heritage– Standard assessment of impacts on Aboriginal and historic cultural landscapes. • Traffic – Detailed assessment – cumulative impacts on local and regional road network will require assessment. • Social – Detailed assessment – cumulative impacts on local population, accommodation and goods and services will require assessment. • Land – Standard assessment – cumulative impacts on regional agricultural productivity will be assessed. • Noise and vibration – Detailed assessment – cumulative construction, operational and road traffic noise will require assessment.
Coleambally BESS – includes construction and operation of 100 MW capacity BESS across 4 ha.	30 km (north)	Proposed – EIS in preparation	12-month construction unlikely to overlap. Operations overlap.	• Visual amenity – No potential overlap in impacts. • Biodiversity – No potential overlap in impacts. • Aboriginal and historic heritage– No potential overlap in impacts. • Traffic – Detailed assessment – cumulative impacts on regional road network will require assessment if concurrent construction assumed to occur. • Social – Detailed assessment – cumulative impacts on local population, accommodation and goods and services will require assessment if concurrent construction assumed to occur. • Land – Standard assessment – cumulative impacts on regional agricultural productivity will be assessed. • Noise and vibration – No potential overlap in impacts.
Coleambally Solar Farm – 150 MW solar farm constructed on 570 ha formerly used to support irrigation cropping.	30 km (north)	Operating	No construction overlap. Operations overlap.	• Visual amenity – No potential overlap in impacts. • Biodiversity – No potential overlap in impacts. • Aboriginal and historic heritage – No potential overlap in impacts. • Traffic – vehicle movements during operations are minimal; therefore negligible potential overlap in traffic impacts. • Social – employment during operations is considered minimal; therefore negligible potential overlap in social impacts. • Land – Standard assessment – cumulative impacts on regional agricultural productivity will be assessed. • Noise and vibration – No potential overlap in impacts.

Table 6.6 Cumulative impact assessment scoping summary table

Project	Distance to project	Project status	Indicative timing/overlap	Potential cumulative impacts
Darlington Point Solar Farm – 275 MW solar farm (constructed) and 200 MW BESS (under construction) on 1,042 ha formerly used for grazing.	45 km (north)	Operating	No construction overlap with solar farm and overlap with BESS construction unlikely. Operations overlap.	• Visual amenity – No potential overlap in impacts. • Biodiversity – No potential overlap in impacts. • Aboriginal and historic heritage – No potential overlap in impacts. • Traffic – vehicle movements during operations are minimal; therefore negligible potential overlap in traffic impacts. It is assumed construction of the BESS will be completed prior to the commencement of project construction. • Social – employment during operations is considered minimal; therefore negligible potential overlap in social impacts. It is assumed construction of the BESS will be completed prior to the commencement of project construction. • Land – Standard assessment – cumulative impacts on regional agricultural productivity will be assessed. • Noise and vibration – No potential overlap in impacts.
Woodland BESS – includes construction and operation of 200 MW BESS across 16 ha.	45 km (north)	Proposed – EIS in preparation	12-month construction unlikely to overlap. Operations overlap.	• Visual amenity – No potential overlap in impacts. • Biodiversity – No potential overlap in impacts. • Aboriginal and historic heritage– No potential overlap in impacts. • Traffic – Standard assessment – cumulative impacts on regional road network will require assessment if concurrent construction assumed to occur. • Social – Standard assessment – cumulative impacts on local population, accommodation and goods and services will require assessment if concurrent construction assumed to occur. • Land – Standard assessment – cumulative impacts on regional agricultural productivity will be assessed. • Noise and vibration – No potential overlap in impacts.
Yarrabee Solar Farm – includes construction and operation of 900 MW solar farm and BESS on approximately 2,600 ha	45 km (north-east)	Approved – not constructed	Proposed to be constructed in 18 month stages, which may overlap with the project. Operations overlap.	• Visual amenity – No potential overlap in impacts. • Biodiversity – No potential overlap in impacts. • Aboriginal and historic heritage– No potential overlap in impacts. • Traffic – Standard assessment – cumulative impacts on regional road network will require assessment if concurrent construction assumed to occur. • Social – Standard assessment – cumulative impacts on local population, accommodation and goods and services will require assessment if concurrent construction assumed to occur. • Land – Standard assessment – cumulative impacts on regional agricultural productivity will be assessed. • Noise and vibration – No potential overlap in impacts.

Table 6.6 Cumulative impact assessment scoping summary table

Project	Distance to project	Project status	Indicative timing/overlap	Potential cumulative impacts
Currawarra Solar Farm – includes construction and operation of 195 MW solar farm and BESS on approximately 472 ha.	60 km (south)	Approved – not constructed	18-month construction unlikely to overlap. Operations overlap.	• Visual amenity – No potential overlap in impacts. • Biodiversity – No potential overlap in impacts. • Aboriginal and historic heritage – No potential overlap in impacts. • Traffic – Standard assessment – Low risk of cumulative traffic impacts due to distance from the project (limited to cumulative use of regional road network if concurrent construction occurs). • Social – Standard assessment – cumulative impacts on local population, accommodation and goods and services will require assessment if concurrent construction assumed to occur. • Land – Standard assessment – cumulative impacts on regional agricultural productivity will be assessed. • Noise and vibration – No potential overlap in impacts.
Tarleigh Park Solar Farm – includes construction and operation of 90 MW solar farm and BESS on approximarely 250 ha.	75 km (south)	Approved – not constructed	12-month construction unlikely to overlap. Operations overlap.	• Visual amenity – No potential overlap in impacts. • Biodiversity – No potential overlap in impacts. • Aboriginal and historic heritage – No potential overlap in impacts. • Traffic – Standard assessment – Low risk of cumulative traffic impacts due to distance from the project (limited to cumulative use of regional road network if concurrent construction occurs). • Social – Standard assessment – Low risk of cumulative social impacts due to distance from the project – if not constructed at time of assessment, standard assessment may be required. • Land – Standard assessment – cumulative impacts on regional agricultural productivity will be assessed. • Noise and vibration – No potential overlap in impacts.
Baldon Wind Farm – includes construction and operation of 1 GW wind farm, including approximately 162 WTGs across approximately 42,000 ha.	100 km (west)	Proposed – EIS in preparation	36-month construction and operations overlap.	• Visual amenity – No potential overlap in impacts. • Biodiversity – No potential overlap in impacts. • Aboriginal and historic heritage – No potential overlap in impacts. • Traffic – Standard assessment – Low risk of cumulative traffic impacts due to distance from the project (limited to cumulative use of regional road network if concurrent construction occurs). • Social – Standard assessment – Low risk of cumulative social impacts due to distance from the project (limited to cumulative use of available workforce and accommodation in regional centres). • Land – Standard assessment – cumulative impacts on regional agricultural productivity will be assessed. • Noise and vibration – No potential overlap in impacts.

References

ABS (Australian Bureau of Statistics) 2021, *Census of Population and Housing: Quickstats.*

AEMO (Australian Energy Market Operator) 2022, *2022 Integrated System Plan*

Austral Archaeology 2021, *Heritage sensitivity advice for Dinawan Energy Hub*, unpublished, prepared for Spark Renewables.

Biosis 2021, *Dinawan Energy Hub biodiversity constraints and opportunities assessment. Letter to John Zammit,* Spark Renewables, dated 22 September 2021. Biosis Project no. 35786.

Biosis 2022, *Outcomes of preliminary field assessments of biodiversity values and impacts, Dinawan Energy Hub. Letter to Will Stone*, Spark Renewables, Dated 29 April 2022. Biosis Project no. 35786

Charman PEV, 1978, *Soils of New South Wales – their characterization, classification and conservation*, Technical Handbook 1, Soil Conservation Service of New South Wales, Sydney.

Clean Energy Regulator 2021, *2020 Annual Statement - Large-scale renewable energy target met*

CICL (Coleambally Irrigation Co-operative Limited) 2021, *Coleambally Irrigation Area*. Accessed August 2022 from https://www.colyirr.com.au/coleambally-irrigation-area

DECC (Department of Environment and Climate Change) 2009, *Interim Construction Noise Guideline*

DECCW (Department of Environment and Climate Change and Water) 2011, *Road Noise Policy*

DECCW (Department of Environment and Climate Change and Water) 2010a, *Aboriginal Cultural Heritage Consultation Requirements for Proponents*.

DECCW (Department of Environment and Climate Change and Water) 2010b, *Code of Practice for Archaeological Investigation of Aboriginal Objects in New South Wales*

DEC (Department of Environment and Conservation) 2006, *Assessing vibration: a technical guideline*

DITRDC (Department of Infrastructure, Transport, Regional Development and Communications) 2012, *National Airports Safeguarding Framework Guideline D: Managing the Risk to Aviation Safety of Wind Turbine Installations (Wind Farms)/Wind Monitoring Towers*.

DoP (Department of Planning) 2011a, *Hazardous Industry Planning Advisory Paper No. 6 – Guideline for Hazard Analysis.*

DoP (Department of Planning) 2011b, *Assessment Guideline – Multi-level Risk Assessment*.

DoP (Department of Planning) 2011c, *Hazardous Industry Advisory Paper No. 4 Risk Criteria for Land Use Safety Planning*.

DPE (Department of Planning and Environment) 2016a, *Wind Energy Guideline for State significant wind energy development.*

DPE (Department of Planning and Environment) 2016b, *Wind Energy: Visual Assessment Bulletin For State significant wind energy development.*

DPE (Department of Planning and Environment) 2016c, *Wind Energy: Wind Noise Assessment Bulletin For State significant wind energy development*

DPI (Department of Primary Industry) 2013, *Policy and Guidelines for Fish Habitat Conservation and Management*

DPIE (Department of Planning, Industry and Environment) 2017, *Riverina Murray Regional Plan 2036*

DPIE (Department of Planning, Industry and Environment) 2020a, *The Net Zero Plan Stage 1 2020-2030*

DPIE (Department of Planning, Industry and Environment) 2020b, *NSW Electricity Infrastructure Roadmap, Building an Energy Superpower Detailed Report*

DPIE (Department of Planning, Industry and Environment) 2020c, *Biodiversity Assessment Method*

DPIE (Department of Planning, Industry and Environment) 2020d, *Surveying Threatened Plants and their Habitats: NSW Survey Guide for the Biodiversity Assessment Method*

DPIE (Department of Planning, Industry and Environment) 2020e, *NSW Survey Guide for Threatened Frogs*

DPIE (Department of Planning, Industry and Environment) 2021a, *State significant development guidelines - preparing a scoping report: Appendix A to the state significant development guidelines.*

DPIE (Department of Planning, Industry and Environment) 2021b, *Draft Large-Scale Solar Energy Guideline.*

DPIE (Department of Planning, Industry and Environment) 2021c, *Cumulative Impact Assessment Guideline for State Significant Projects.*

DPIE (Department of Planning, Industry and Environment) 2021d, *State significant development guidelines – preparing an environmental impact statement*

DPIE (Department of Planning, Industry and Environment) 2021e *Undertaking Engagement Guidelines for State Significant Project*

DPIE (Department of Planning, Industry and Environment) 2021f *Social Impact Assessment Guideline for State Significant Projects*

DPIE (Department of Planning, Industry and Environment) 2021g *Technical Supplement: Social Impact Assessment Guideline for State Significant Projects*

Eardley, K.A. 1999. *A foundation for conservation in the Riverina Bioregion*. Unpublished report to NSW NP&WS, Sydney.

Edward River Council 2018a, *Edward River Council Economic Development Strategy 2018-2021*, Edward River Council.

Edward River Council 2018b, *Edward River Council Community Strategic Plan 2018-2030*, Edward River Council.

EES 2021. BioNet the website for the Atlas of NSW Wildlife.

EES 2017. Riverina Regional Native Vegetation Map Version v1.0 - VIS_ID 4469.

EPA (Environment Protection Authority) 2017, *Noise Policy for Industry.*

Heritage Office 1996, *Regional Histories of NSW*. Sydney: Heritage Office and Department of Urban Affairs and Planning

ICNIRP (International Commission on Non-Ionizing Radiation Protection) 1998, *Guidelines for limiting exposure to Time-varying Electric, Magnetic and Electromagnetic Fields*

Landcom 2004, *Managing urban stormwater: soils and construction*, Volume 1, 4th Edition March 2004 Government of NSW

Martin, S and Pardoe, C. 2011, *Murrumbidgee Province Heritage Study*. AACAI.

Murrumbidgee Council 2017, *Murrumbidgee Council Community Strategic Plan 2017-2027*, Murrumbidgee Council.

Murrumbidgee Council 2018, *Murrumbidgee Council Economic Development Strategy*, Murrumbidgee Council.

Murrumbidgee Council 2020, *Murrumbidgee Council Local Strategic Planning Statement 2020*, Murrumbidgee Council.

NHMRC (National Health and Medical Research Council) 2015, *NHMRC Statement: Evidence on Wind Farms and Human Health.*

OEH (Office of Environment and Heritage) 2011, *Guide to Investigating, Assessing and Reporting on Aboriginal Cultural Heritage in New South Wales*

OEH (Office of Environment and Heritage) 2012, *The land and soil capability assessment scheme, second approximation: A general rural land evaluation system for New South Wales*. Office of Environment & Heritage, Government of NSW.

RFS (Rural Fire Service) 2019, *Planning for Bushfire Protection*

RTA (Roads and Traffic Authority) 2002, *Guide to Traffic Generating Developments Version 2.2.*

TSSC (Threatened Species Scientific Committee) 2009, *Commonwealth Listing Advice on Weeping Myall Woodlands.* Department of the Environment, Water, Heritage and the Arts. Available from: http://www.environment.gov.au/biodiversity/threatened/communities/pubs/98-listing-advice.pdf. In effect under the EPBC Act from 07-Jan-2009.

Abbreviations

ABS	Australian Bureau of Statistics
ACHA	Aboriginal Cultural Heritage Assessment
AHIMS	Aboriginal Heritage Information Management System
ASC	Australian soil classification
BAM	*Biodiversity Assessment Method*
BC Act	NSW *Biodiversity Conservation Act 2016*
BDAR	Biodiversity Development Assessment Report
BESS	battery energy storage system
BP	before present
BSAL	Biophysical Strategic Agricultural Land
CEEC	critically endangered ecological community
CIV	capital investment value
DPE	Department of Planning and Environment
EEC	endangered ecological community
EIS	Environmental Impact Statement
EMM	EMM Consulting Pty Limited
EPA	NSW Environment Protection Authority
EPL	environment protection licence
EP&A Act	NSW *Environmental Planning and Assessment Act 1979*
EPBC Act	Commonwealth *Environment Protection and Biodiversity Conservation Act 1999*
GHG	greenhouse gas
GW	gigawatt
ha	hectares
HV	high voltage
IBRA	Interim Biogeographic Regionalisation for Australia
ICNG	NSW *Interim Construction Noise Guideline*
km	kilometre
km^2	square kilometre
kV	kilovolt
LCA	land category assessment
LCU	landscape character units
LEP	Local Environmental Plan

LGA	Local Government Area
LSC	land and soil capability
LVIA	landscape and visual impact assessment
MNES	Matters of national environmental significance
MW	Megawatt
NEM	National Energy Market
NSW	New South Wales
O&M	operations and maintenance
OSOM	Over-size, over-mass
PCT	plant community type
PCU	power conversion unit
PHA	preliminary hazard analysis
PMST	Commonwealth Protected Matters Search Tool
POEO Act	NSW *Protection of the Environment Operations Act 1997*
PV	photovoltaic
PVIA	preliminary visual impact assessment
RAPs	Registered Aboriginal Party
SEARs	Secretary's Environmental Assessment Requirements
SEPP	State environmental planning policy
SIA	Social impact assessment
SLR	soil and land resource
SSD	State Significant Development
TEC	threatened ecological community
TfNSW	Transport for NSW
WTG	wind turbine generator

Appendix A

Cadastral lots within project investigation area

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Table A.1 Cadastral lots within project investigation area

Lot	DP
1	593484
14	756418
147	756418
36	756418
148	756418
3	756418
8	756418
A	100260
28	756418
8	756291
44	756265
48	756265
26	756265
27	756265
51	756265
60	756265
17	756265
50	756265
63	756334
1	756334
66	756334
76	756299
29	756299
28	756299
22	756265
23	756265
19	756265
31	756291
72	756291
43	756291
2	756291

Table A.1 Cadastral lots within project investigation area

Lot	DP
17	756291
70	756291
3	756291
41	756291
60	756291
8	532988
127	756418
130	756418
134	756418
135	756418
140	756418
141	756418
144	756418
64	756459
63	756459
62	756459
61	756459
60	756459
59	756459
53	756459
58	756459
100	756444
101	756444
102	756444
37	756444
36	756444
41	756444
143	756418
113	739677
112	739677
111	739677

Table A.1 Cadastral lots within project investigation area

Lot	DP
123	756418
139	756418
136	756418
49	756444
48	756444
42	756444
47	756444
46	756444
29	756444
28	756444
27	756444
103	756444
104	756444
105	756444
106	756444
107	756444
108	756444
26	756444
24	756444
16	756444
15	756444
32	756444
33	756444
34	756444
35	756444
38	756444
39	756444
40	756444
31	756444
30	756444
45	756444

Table A.1 Cadastral lots within project investigation area

Lot	DP
44	756444
43	756444
142	756418
126	756418
125	756418
137	756418
124	756418
34	756418
128	756418
44	756396
10	113903
41	756396
39	756396
52	756459
56	756459
7	113903
4	44554
54	756396
110	756444
125	756444
22A	756444
19	756444
18	756444
13	756444
111	756444
112	756444
20A	756444
12	756444
109	756444
23	756444
17	756444

Table A.1 Cadastral lots within project investigation area

Lot	DP
14	756444
5	594041
133	756396
113	756444
55	756396
3	593483
21A	756444
11	756444
57	756459
114	756444
134	756396
40	756396
1	532988
2	532988
8	113903
3	532988
4	532988
5	532988
6	532988
6	113903
7	532988
9	113903
6	594041
43	756396
7005	1050527
35	756418
146	756418
4	593483
30	756418
17	756418
22	756418

Table A.1 Cadastral lots within project investigation area

Lot	DP
32	756418
31	756418
59	756334
5	756418
4	756418
6	756418
15	756418
7	756418
16	756418
29	756418
23	756418
B	100260
42	756265
41	756265
36	756265
3	756265
31	756265
1	756257
9	756257
10	756257
11	756257
1	756265
40	756265
43	756265
37	756265
35	756265
32	756265
33	756265
34	756265
30	756265
29	756265

Table A.1 Cadastral lots within project investigation area

Lot	DP
2	756257
8	756257
12	756257
52	756291
51	756291
38	756265
39	756265
17	756257
18	756257
7	756257
13	756257
15	756257
23	756257
16	756257
20	756257
19	756257
3	756257
6	756257
14	756257
4	756257
56	756265
53	756265
52	756265
21	756257
5	756257
46	756265
57	756265
2	756265
54	756265
15	756291
55	756291

Table A.1 Cadastral lots within project investigation area

Lot	DP
22	756257
69	756291
64	756291
63	756291
58	756265
62	756265
47	756265
28	756265
25	756265
24	756265
21	756265
20	756265
7	756291
6	756291
16	756291
14	756291
15	756265
5	756291
4	756291
49	756265
45	756265
61	756265
68	756291
59	756265
65	756291
16	756265
77	756265
32	756291
44	756291
48	756291
49	756291

Table A.1 Cadastral lots within project investigation area

Lot	DP
1	756291
37	756291
35	756291
34	756291
46	756291
39	756291
40	756291
38	756291
36	756291
55	756265
59	756291
56	756291
47	756291
33	756291
45	756291
54	756291
50	756291
53	756291
58	756291
57	756291
11	756291
12	756291
10	756291
9	756291
19	756291
21	756291
26	756291
29	756291
30	756291
67	756291
23	756291

Table A.1 Cadastral lots within project investigation area

Lot	DP
24	756291
42	756291
22	756291
18	756291
13	756299
12	756299
11	756299
20	756299
39	756299
14	756299
21	756299
30	756299
32	756299
35	756299
36	756299
24	756299
23	756299
22	756299
19	756299
42	756299
43	756299
33	756299
34	756299
41	756299
37	756299
67	756299
40	756299
66	756299
18	756265
31	756299
27	756299

Table A.1 Cadastral lots within project investigation area

Lot	DP
25	756418
154	756418
26	756418
153	756418
84	756450
58	756450
41	756450
11	756418
20	756418
33	756418
12	756418
18	756418
107	568083
19	756418
27	756418
13	756418
152	756418
21	756418
10	756418
9	756418
2	756418
1	756418
62	756334
39	756334
67	756334
3	756334
2	756334
26	756334
25	756334
38	756334
61	756291

Table A.1 Cadastral lots within project investigation area

Lot	DP
62	756291
66	756291
1	48568
71	756291
2	733637
1	706781
101	246957
1	113903
7	594041
129	756418
131	756418
132	756418
133	756418
24	756257
42	756396
45	756396
46	756396
47	756396
48	756396
7303	1159319
4	1245394
1	1244278
2	1244278
3	1244278
1	1252143
2	1252143
1	1245394
2	1245394
3	1245394

Appendix B
Scoping summary table

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B.1 Scoping summary table

Level of assessment	Matter	Cumulative impact assessment	Engagement	Relevant policies and guidelines	Scoping report reference
Detailed	Visual	Yes	Specific	• *Guidelines for Landscape and Visual Impact Assessment* (United Kingdom Landscape Institute of Environmental Management and Assessment 2013). • *Wind Energy: Visual Assessment Bulletin AB 01 for State Significant Wind Energy Development* (DPE 2016). • *Guidance Note for Landscape and Visual Assessment* (Australian Institute of Landscape Architects 2018).	Section 6.1
	Biodiversity	Yes	General	• *Biodiversity Assessment Method* (DPIE 2020c). • *Threatened Biodiversity Survey and Assessment: Guidelines for Developments and Activities* (DEC 2004). • *Surveying Threatened Plants and their Habitats: NSW Survey Guide for the Biodiversity Assessment Method* (DPIE 2020d). • *Species Credit Threatened Bats and their Habitats* (OEH 2018). • *NSW Survey Guide for Threatened Frogs* (DPIE 2020e). • *Commonwealth EPBC 1.1 Significant Impact Guidelines – Matters of National Environmental Significance* (Commonwealth of Australia, 2013). • *Commonwealth Department of the Environment – Survey Guidelines for Nationally Threatened Species* (various).	Section 6.2
	Aboriginal heritage	Yes	Specific	• *Guide to Investigating, Assessing and Reporting on Aboriginal Cultural Heritage in NSW* (OEH 2011). • *Aboriginal Cultural Heritage Consultation Requirements for Proponents* (DECCW 2010). • *Code of Practice for Archaeological Investigation of Aboriginal Objects in New South Wales* (DECCW 2010).	Section 6.3
	Traffic	Yes	General	• *Guide to Traffic Generating Developments* (RTA 2002). • *Austroads Guides to Road Design* (various publications). • *Austroads Guides to Traffic Management* (various publications). • Australian Standard AS 2890 Parts 1 and 2. • Australian Code for Dangerous Goods Transport.	Section 6.4

Level of assessment	Matter	Cumulative impact assessment	Engagement	Relevant policies and guidelines	Scoping report reference
	Social	Yes	Specific	• *Social Impact Assessment Guideline for State Significant Projects 2021* (DPIE 2021).	Section 6.5
	Noise and vibration	Yes	General	• *NSW Interim Construction Noise Guideline* (DECC 2009). • NSW Noise Policy for Industry (EPA 2017). • NSW Road Noise Policy (DECCW 2011). • *Assessing Vibration: A Technical Guideline* (DECC 2006). • *NSW Wind Energy: Noise Assessment Bulletin* (DPE 2016c).	Section 6.6
Standard	Historic heritage	Yes	General	• The principal articles of The Burra Charter – *The Australia ICOMOS Charter for Places of Cultural Significance* (ICOMOS 2013). • *Statements of Heritage Impact* (Heritage Office 1996). • *Investigating Heritage Significance Draft Guideline* (Heritage Office 2004). • *Assessing Heritage Significance* (Heritage Office 2001). • *Assessing Significance for Historical Archaeological Sites and 'Relics'* (Heritage Branch Department of Planning 2009).	Section 6.7
	Land	Yes	General	• *Land Use Conflict Risk Assessment Guideline* (DPI 2011). • *Best Practice Erosion and Sediment Control* (IECA 2008).	Section 6.8
	Water	No	General	• *Managing Urban Stormwater: Soils and Construction Volume 1* (Landcom 2004). • *Managing Urban Stormwater: Soils and Construction Volume 2* (DECC 2008). • *Australian and New Zealand Guidelines for Fresh and Marine Water Quality* (ANZECC/ARMCANZ 2000). • *Guidelines for Instream Works on Waterfront Land* (NOW 2012). • *Guidelines for Riparian Corridors on Waterfront Land* (NOW 2012). • *Guidelines for Watercourse Crossings on Waterfront Land* (NOW 2012).	Section 6.9
	Air quality	No	General	N/A	Section 6.10
	Hazards and risk	No	General	• Hazardous Industry Planning Advisory Paper No. 6 – *Guideline for Hazard Analysis* (DoP, 2011a). • Multi-Level Risk Assessment (DoP, 2011b). • *Hazardous and Offensive Development Application Guidelines: Applying SEPP 33* (DoP 2011).	Section 6.11

Appendix C
Preliminary visual impact assessment

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Dinawan Energy Hub Wind Farm

Preliminary Visual Impact Assessment

moir
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Preliminary Visual Impact Assessment

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1.0 Introduction

1.1 Introduction

Moir Landscape Architecture (Moir LA) has been commissioned by EMM Consulting Pty Ltd on behalf of Spark Renewables to prepare a Preliminary Visual Impact Assessment (PVIA) for the proposed Dinawan Energy Hub project. The energy hub will comprise of a hybrid wind and solar farm and battery energy storage system (BESS). This assessment discusses the preliminary visual impacts associated with the Dinawan Energy Hub Wind Farm which is referred to hereafter as 'the Project'.

The PVIA for the Project has been prepared in accordance with the *Wind Energy: Visual Assessment Bulletin December 2016* (referred to hereafter as 'the Bulletin'). The PVIA will form part of the Scoping Report seeking the Secretary's Environmental Assessment Requirements (SEARs) . The PVIA includes an assessment of all aspects of the Project including project activities and associated infrastructure.

1.2 Relevant Experience

The Bulletin states: *the proponent is expected to engage professionals from relevant natural resource management and design professions (for example environmental planners, geographers, landscape architects, or other visual resource specialists), with demonstrated experience and capabilities in visual assessment to carry out a wind energy project visual assessment*.

Moir LA is a professional design practice and consultancy specialising in the areas of Landscape Architecture, Urban Design and Landscape and Visual Impact Assessment. Our team has extensive experience in undertaking Landscape and Visual Impact Assessments for large-scale infrastructure and renewable energy projects. In the context of our experience and with guidance from the Guideline and the Technical Supplement we have developed methodologies to ensure a comprehensive and qualitative assessment of the Project.

Recent experience includes the preparation of Preliminary Visual Impact Assessments and Landscape and Visual Impact Assessments for the following Wind Energy Projects:

- *Uungula Wind Farm LVIA (Wellington, NSW)*
- *Hills of Gold Wind Farm LVIA (Nundle, NSW)*
- *Thunderbolt Energy Hub Stage 1 (Kentucky, NSW)*
- *Valley of the Winds Wind Farm LVIA (Coolah, NSW)*
- *Jeremiah Wind Farm PVIA (Gundagai, NSW)*
- *Burrawong Wind Farm PVIA (Balranald, NSW)*
- *Barneys Reef Wind Farm PVIA (Gulgong, NSW)*
- *Winterbourne Wind Farm LVIA (Walcha, NSW)*
- *Keri Keri Energy Park PVIA (Balranald, NSW)*
- *Paling Yards Wind Farm PVIA (Paling Yards, NSW)*

1.3 Overview of Preliminary Visual Impact Assessment

The purpose of this Preliminary Visual Impact Assessment (PVIA) is to provide a preliminary assessment of the potential visual impacts of the Project and has been prepared in accordance with the *Wind Energy: Visual Assessment Bulletin December 2016*.

The visual assessment process is broken into two main stages (see ***Figure 1***):

Phase 1: Preliminary Environmental Assessment and
Phase 2: Environmental Impact Statement

This PVIA forms apart of *Phase 1: Preliminary Environmental Assessment* to be submitted to DPE together with the Scoping Report for the request for SEARs.

The requirements of Stage 1: Preliminary Environmental Assessment are as follows:

At the Preliminary Environmental Assessment stage, a process consisting of community consultation regarding key landscape values and application of preliminary assessment tools has been developed. The tools include consideration of the potential impact of the proposals on dwellings and key public viewpoints.

The preliminary assessment tools have been designed to assist proponents to drive better outcomes. They will assist in identifying early in the process the locations where wind turbines may have impacts that warrant further consideration. This in turn provides an opportunity to refine the proposed wind turbine layout to avoid or minimise impacts, or justify the proposed design prior to lodgement of the application.

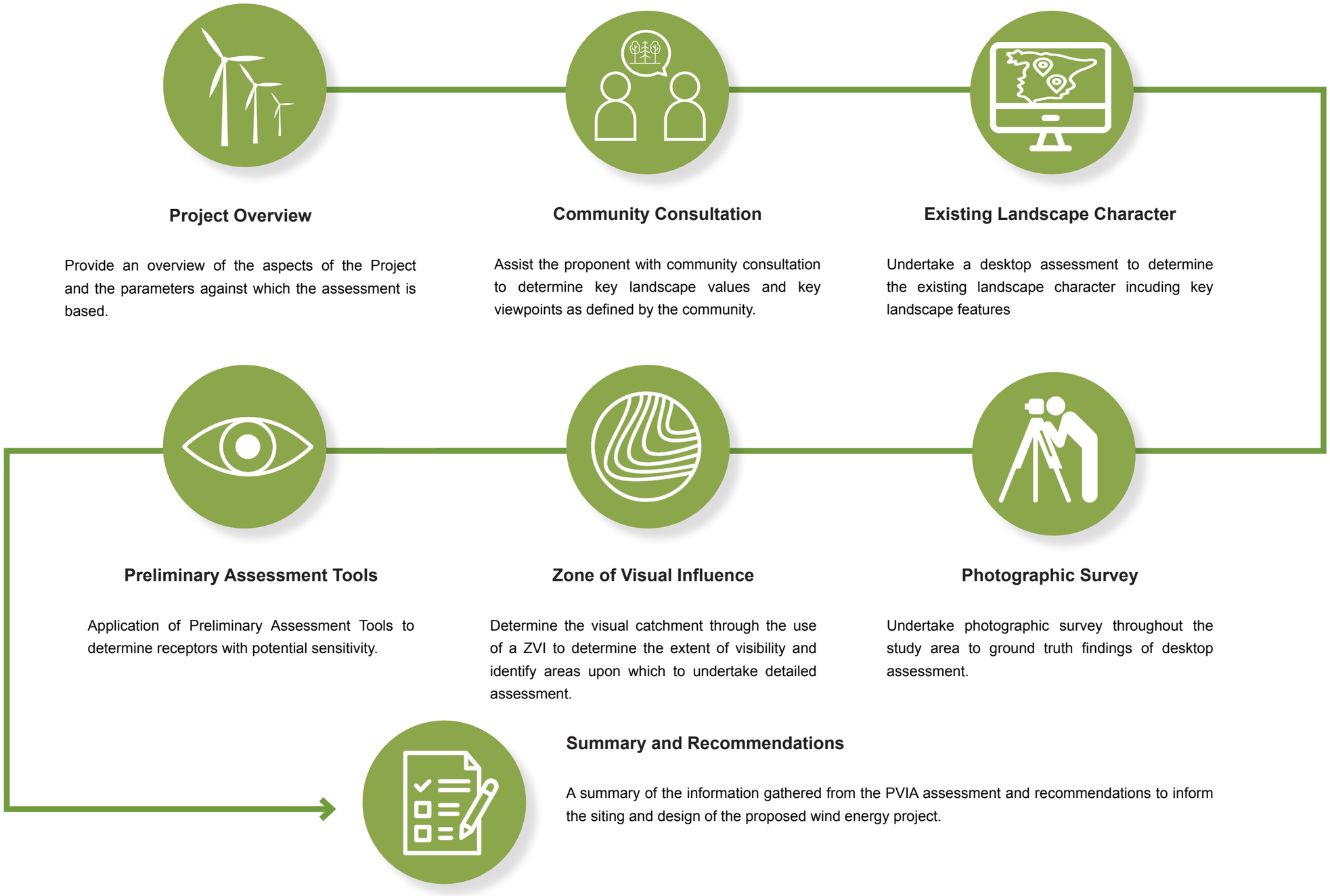
Proponents will be required to submit, with the request for SEARs, a Preliminary Environmental Assessment that includes a map with key information, results of community consultation and the application of the preliminary assessment tools. This will form the basis for the issue of the SEARs that will identify the matters that must be addressed in the EIS.

Figure 1 Steps in Visual Impact Assessment (Source: Wind Energy Assessment Bulletin, 2016)

2.0 Study Method

2.1 Study Method

The following process has been undertaken to develop this PVIA:



The following process has been undertaken to develop this PVIA:

Desktop Assessment:

- Application of Preliminary Assessment Tools to determine receptors with potential sensitivity.
- Preparation of a preliminary Zone of Visual Influence (ZVI) to establish a theoretical zone of visibility of the Project.
- Identification of key viewpoints and landscape features using available mapping and background documents.

Site Inspection:

Photographic survey work for the assessment was undertaken in July 2022 to carry out a preliminary assessment of the existing landscape character from publicly accessible land within the Study Area (as defined in **Section 3.3**). The findings of the site inspection have been included in the PVIA and will form the basis for discussion with the community in the EIS Phase of the Project.

Community Consultation:

Community consultation has been undertaken through the scoping phase of the Project. Results of the community consultation have also been utilised to gain perspective on the landscape values held by the community to inform the PVIA.

Community consultation will be continued through the EIS phase of the Project.

2.2 Report Structure

The following table provides an overview of the requirements of the Bulletin and where these have been addressed in the PVIA:

Preliminary Visual Impact Assessment Report Structure:	
PVIA Report:	**Bulletin Requirements:**
Refer to Section 3.0: Project Overview	
Refer to Section 4.0: Community Consultation	*Undertake community consultation to establish key landscape features valued by the community, key viewpoints in the area (both public and private) along with information about the relative scenic quality of the area.*
Section 5.0 : Existing Landscape Character	*Production of a map detailing key landscape features (informed by community consultation and any ground-truthing undertaken), the preliminary wind turbine layout, the location of dwellings and key public viewpoints, and an overlay of the wind resource.*
Section 6.0: Preliminary Assessment Tools	*Results of the preliminary assessment tools for both the visual magnitude and multiple wind turbine parameters.*
Section 7.0: Preliminary Dwelling and Viewpoint Assessment	*All key public viewpoints and individual dwellings within the visual catchment should be identified and assessed.*
Section 8.0: Cumulative Visual Impacts	
Section 9.0: Preliminary Zone of Visual Influence	*The use of Geographic Information Systems (GIS) to facilitate the application of the tools will streamline the evaluation phase of a project during the pre-lodgement stage. Most GIS systems can establish the theoretical 'zone of visual influence' of the proposal (the area from which the proposal is theoretically visible or the 'visual catchment').*
Section 10.0: Summary and Recommendations	

Table 1 Overview of Report Structure

3.0 Project Overview

3.1 Regional Context

The Project is located approximately 50 km southwest of Darlington Point in south-west NSW between the towns of Coleambally and Jerilderie. The western part of the Project sits within the Edward River Council LGA and the eastern part sits within the Murrumbidgee Council LGA. The Project can be accessed via Kidman Way, Goolgumbla Road and McLennons Bore Road (refer to **Figure 2**).

The Project is located within the South-West Renewable Energy Zone (REZ). The NSW Government has finalized the geographical extent of this REZ and has highlighted that an abundance of high quality wind and solar resources are available in the area. The Project is located adjacent to the proposed site of the Dinawan Substation, which forms part of Project EnergyConnect. Project EnergyConnect includes the construction and operation of a new high voltage (HV) interconnector between NSW and South Australia, with an additional connection to north-west Victoria (Energy NSW, 2022). The Project would connect to the proposed Dinawan Substation, and is therefore strategically located in a broad area identified as suitable for renewable energy developments.

The Project is in the preliminary stages of design and Moir LA will provide input and recommendations in regard to visual impacts to assist in refining of the design layout.

3.2 The Project Investigation Area

The Project Investigation Area encompasses approximately 38,824 ha. These properties are primarily utilised for sheep and cattle grazing. The preliminary layout for the Project (refer to **Figure 2** and **3**) will be subject to further review and refinement as the environmental and social impact assessment progresses.

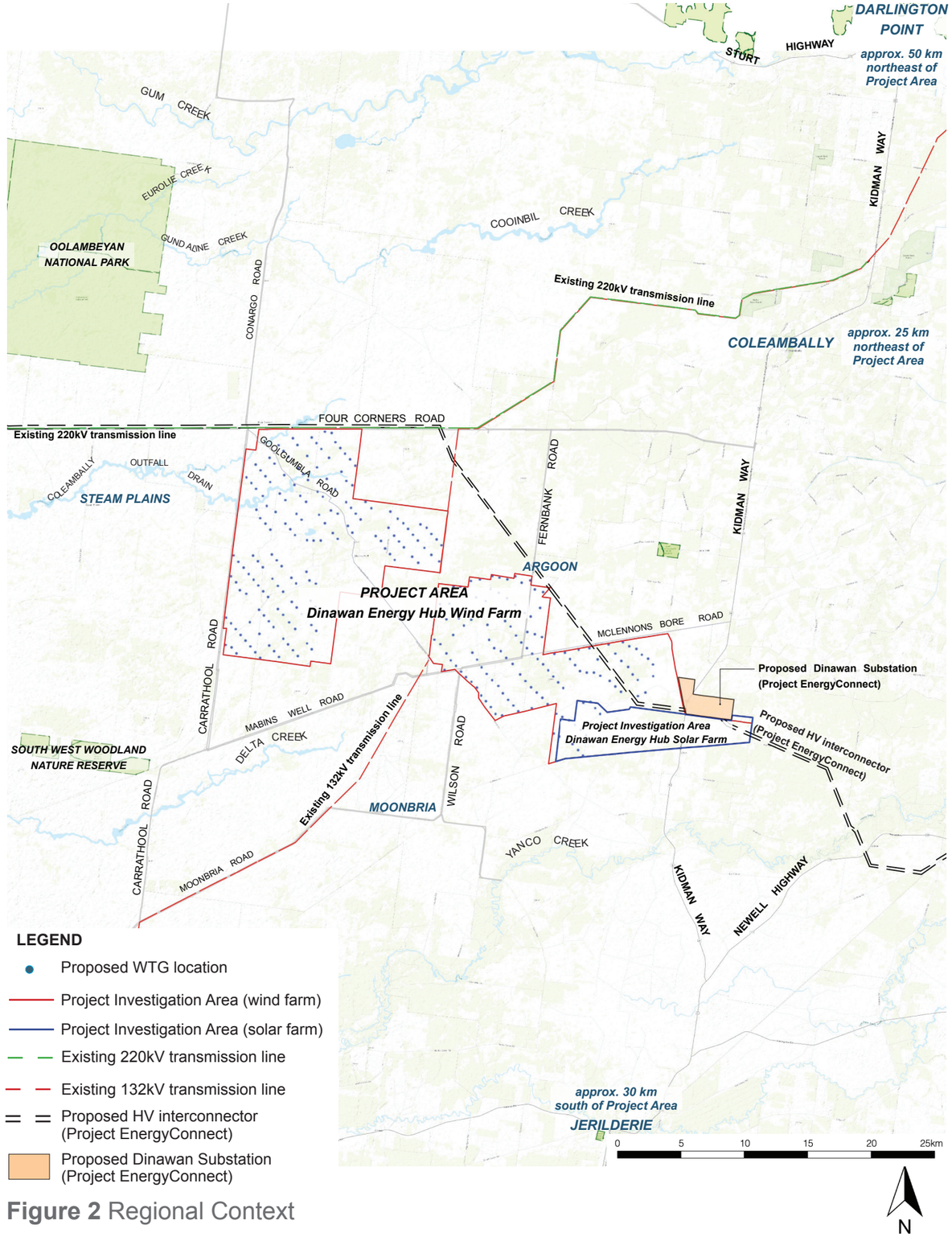


Figure 2 Regional Context

3.3 The Study Area

The Study Area is generally defined as the land up to 15,000 m from the nearest turbine. Closest landmarks include the town of Coleambally, Oolambeyan National Park, Yanco Creek Rest Area near Yanco Bridge and small rural properties such as Argoon, Steam Plains and Moonbria as shown in **Figure 2** and **Figure 3**.

3.4 The Project

The Project includes the construction and operation of up to 250 wind turbine generators (WTGs) spread across an area of up to 38,824 ha with a maximum capacity of 1.5GW. The indicative layout in **Figure 3** includes 161 WTGs in the western section and 131 WTGs in the eastern section. However, it is expected that the final number of WTGs will be up to 250. Associated infrastructure includes the potential installation of a 300MW/4 hr battery energy storage system (BESS) to allow for the capture and storage of dispatchable energy. It also includes operation and maintenance buildings, internal access roads, civil works and electrical infrastructure (including on-site substations/switching stations) required to connect to the existing electricity transmission network.

As mentioned earlier, the Dinawan Energy Hub Solar Farm is proposed on land within the south-eastern extent of the project investigation area. The Dinawan Energy Hub Solar Farm is subject to a separate SSD application and PVIA.

The preferred point of connection to Transgrid's network is via the proposed Dinawan Substation, which forms part of Project EnergyConnect. The location of the overhead transmission line to connect the project to EnergyConnect's Dinawan Substation has not been determined but will be confirmed as part of further design works during the preparation of the EIS.

The preliminary layout for the Project (refer to **Figure 3**) has been prepared to avoid remnant vegetation, threatened ecological communities and threatened species habitats as far as practicable. This preliminary layout will be progressively refined during the EIS phase of the Project, having regard to the physical and environmental constraints of the site and the key landscape values of the Study Area. **Figure 3** also includes the locations of involved and non-associated residences mapped from aerial photographs. These locations are subject to further ground-truthing.

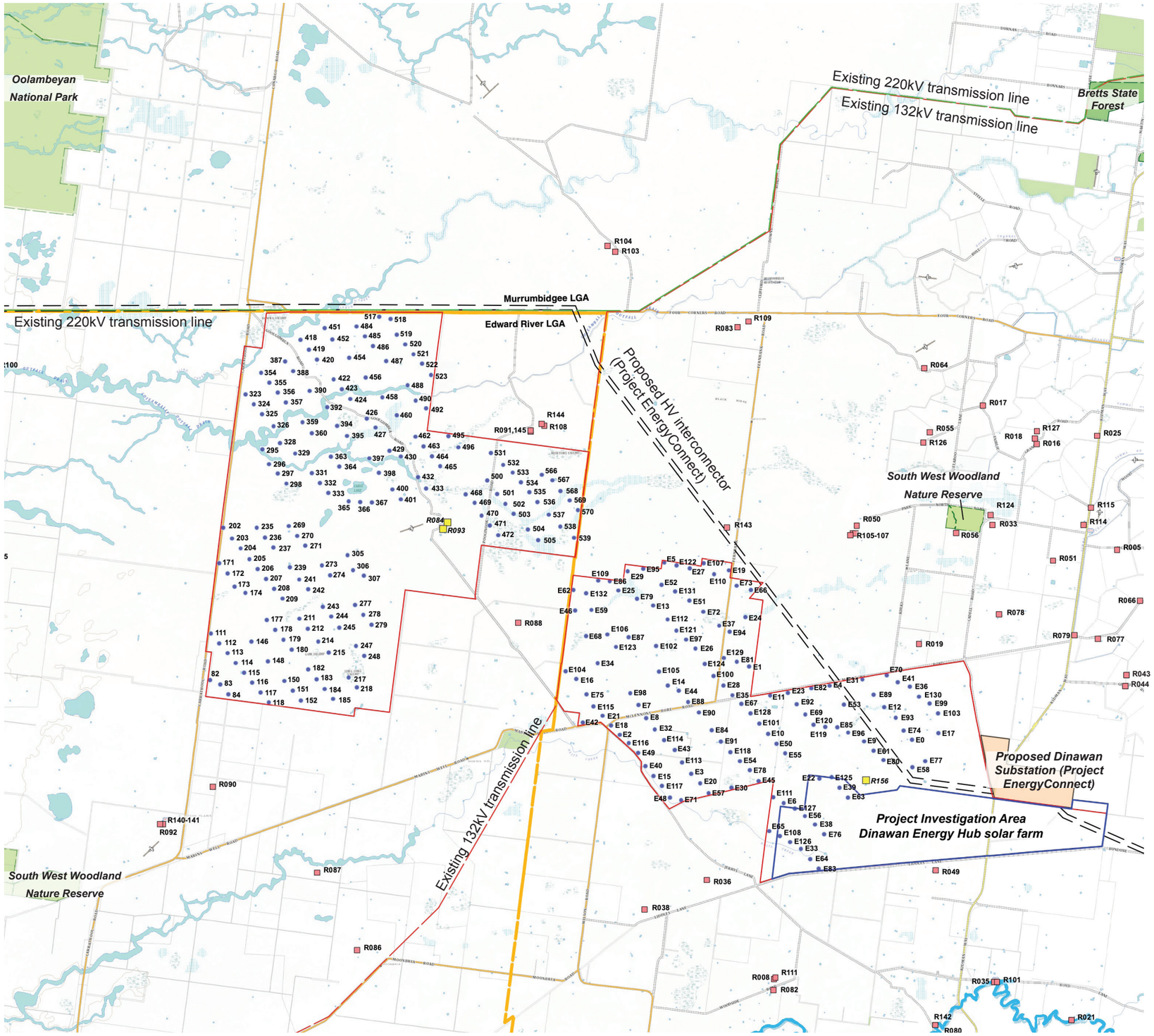
Key components of the Project include:

- up to approximately 250 (3 blade steel) wind turbines with a total maximum height (tip height) of 280m AGL.
- Power infrastructure providing connection to the proposed Dinawan Substation, i.e., on-site substations/ switchyards.
- Internal electrical reticulation network, access roads and upgrades to existing access roads and access points from public roads.
- Temporary and permanent meteorological monitoring masts.
- Temporary infrastructure including construction compound and site office buildings, storage areas and concrete batching plants.
- Hardstand and laydown areas used for wind turbine installation and storage of wind turbine components.
- Operation and maintenance building
- A single grid-scale BESS.

The proposed infrastructure would be contained within the Project Investigation Area including all turbine rotor sweep paths. The proposed layout will allow for micro-siting and will be subject to further detailed design as the environmental and social impact assessments progress.

Project Layout

Proposed Dinawan Energy Hub Wind Farm



LEGEND

- Project Investigation Area
- Project Investigation Area (Dinawan Energy Hub Solar Farm)
- 84 Potential 280 m Turbine Location
- R001 Associated residences
- R008 Non-associated residences
- Existing 220kV transmission line
- Existing 132kV transmission line
- Proposed HV interconnector (Project EnergyConnect)
- Proposed Dinawan Substation (Project EnergyConnect)
- Main Road
- Minor Road
- National Park / Nature Reserve
- State Forest
- LGA Boundary

N

0 2 4 6 8 10km

Figure 3 Project Layout (Map Source: Six Maps)

4.0 Community Consultation

4.1 Overview of Community Consultation Process

In accordance with the Visual Assessment Bulletin: *community consultation at this early stage may be broad, but should include discussions about the proposed project area, likely corridors of development, or preliminary turbine layouts and must involve people from the visual catchment.*

The purpose of community consultation undertaken in the preparation of the LVIA is to:

- Establish key landscape features
- Defined areas of scenic quality; and
- Identify key public viewpoints valued by that community.

Community engagement will continue through the development of the EIS and present the community with further opportunities to provide input into the Visual Baseline Study of the LVIA.

4.2 Results of Community Consultation

Understanding of the community perception towards the proposed development is an intrinsic component of the Landscape and Visual Impact Assessment process. A CSIRO study published in 2012: *Exploring community acceptance of rural wind farms in Australia* provides a snapshot of community acceptance levels regarding Australian wind farms from a variety of stakeholder perspectives. It found levels of acceptance among the public are highly subjective and can differ depending on location, local context and place attachment.

In accordance with the Bulletin ongoing community consultation has been undertaken by the Proponent through face-to-face meetings and a community survey distributed to both involved and non-involved landholders and interest groups between November 2021 and May 2022. The survey was also placed on the Project website.

As of August 2022, a total of 14 surveys had been completed.

4.2.1 Landscape Features and Values

In addition to a review of existing landscape maps and detailed field work undertaken by Moir LA (see Section 5.0) the community consultation questionnaire asked respondents to identify key landscape features of importance to them. There were seven (7) responses to the question: ***"What would you consider to be the best landscape features in the area?"***

Key landscape features identified by the community include:

- Farming activities
- Creeklines and native vegetation
- The Yanco Creek and its environs
- Billabong Creek System
- Country with remnant native species
- Grasses and shrublands of the Western Riverina
- Rangeland native grasses

4.2.2 Key Public Viewpoints

Of the 14 responses, three (3) responses were given to the question: ***"What would you consider to be the best lookout spots in the area?"***

- "*Creeklines"*
- *"There are no high vantage points in my area. Beauty is in the eye of the beholder"*
- "*The Black Ranges"*

Key viewpoints and specific locations have been mapped in Section 5.0 of this PVIA. Additional consultation and further detailed assessment of these features and viewpoints will be undertaken during the EIS phase.

4.3 Community Values

Community values are highly subjective and can differ depending on location, local context and place attachment. The results of specific questions will assist in the identifying key areas of concern and ensuring the LVIA prepared for the EIS provides a comprehensive assessment taking into account landscape values held by the community.

The question ***'what do you value most about your local area?'*** was asked to gain an understanding of the respondents connection to the local area. The majority of respondents identified 'farming' as a key value, followed by 'landscape' and 'native flora and fauna' (see **Figure 4**).

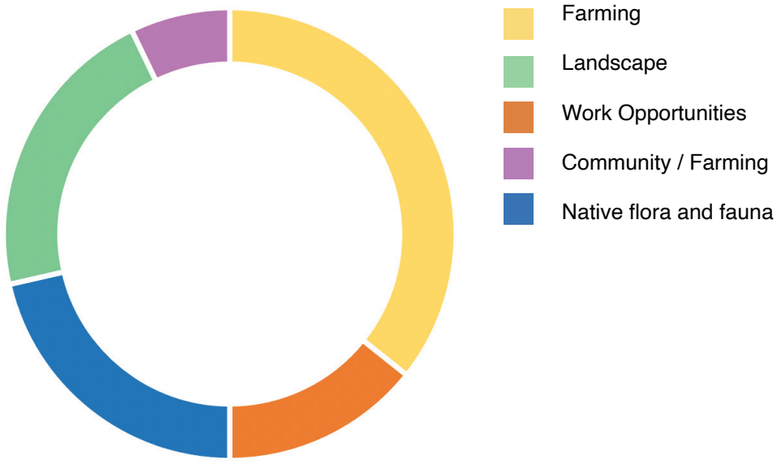


Figure 4 Community Values

4.4 Landscape Scenic Values

As apart of the questionnaire, the respondents were asked to rate the value they associate with landscape features. The respondents gave moderate to high ratings to the scenic value of most landscape options (see **Figure 5**). Further responses will be gathered during preparation of the EIS to assist in informing the Scenic Quality Rating of Landscape Character Units.

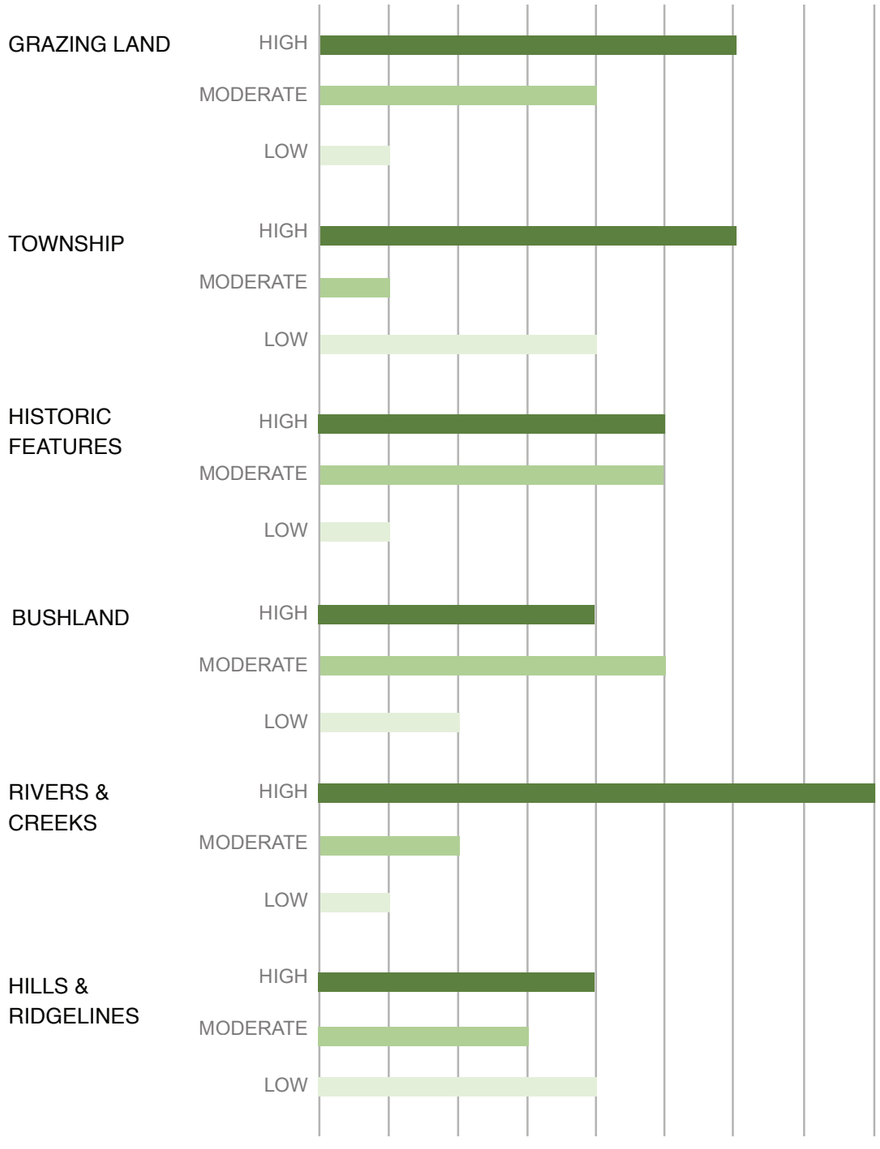


Figure 5 Landscape Scenic Values

5.0 Existing Landscape Character

5.1 Overview of Bioregion

The Project sits within the Riverina Bioregion (see **Figure 6**) in south west NSW. The landscape is characterised by Murrumbidgee Depression and Scalded Plains with channels and floodplains.

Topography is generally flat with minor undulations occurring in channels and floodplains of textured contrast soils (Walker, 1991). Mosaics of red, brown and yellow sandy soils as well as grey cracking and reddish clays are prominent in the region (NPWS, 2003). The broader character of the plains is defined by saltbush varieties, speargrass, forbs and copperburrs. Vegetation communities in drainage channels and swamps include annual saltbush (*Atriplex spp.*), nitre goosefoot (*Chenopodium nitrariaceum*) and clumps of rosewood (*Heterodendrum oleifolium*), myall (*Acacia pendula*) (Walker, 1991; Environment NSW, 2011). A detailed description of this character is included in the following section of this report. ***Images 1 - 2*** illustrate the typical character of the landscape within the Study Area.

Image 1 *Typical character of vegetation within the Project Investigation Area defined by patchy to dense clumps of mid-storey and taller canopy species.*

Image 2 *Character around Moonbria Road and southern parts of the Project Investigation Area is defined by vast tracts of scrubby groundcovers and scattered trees.*

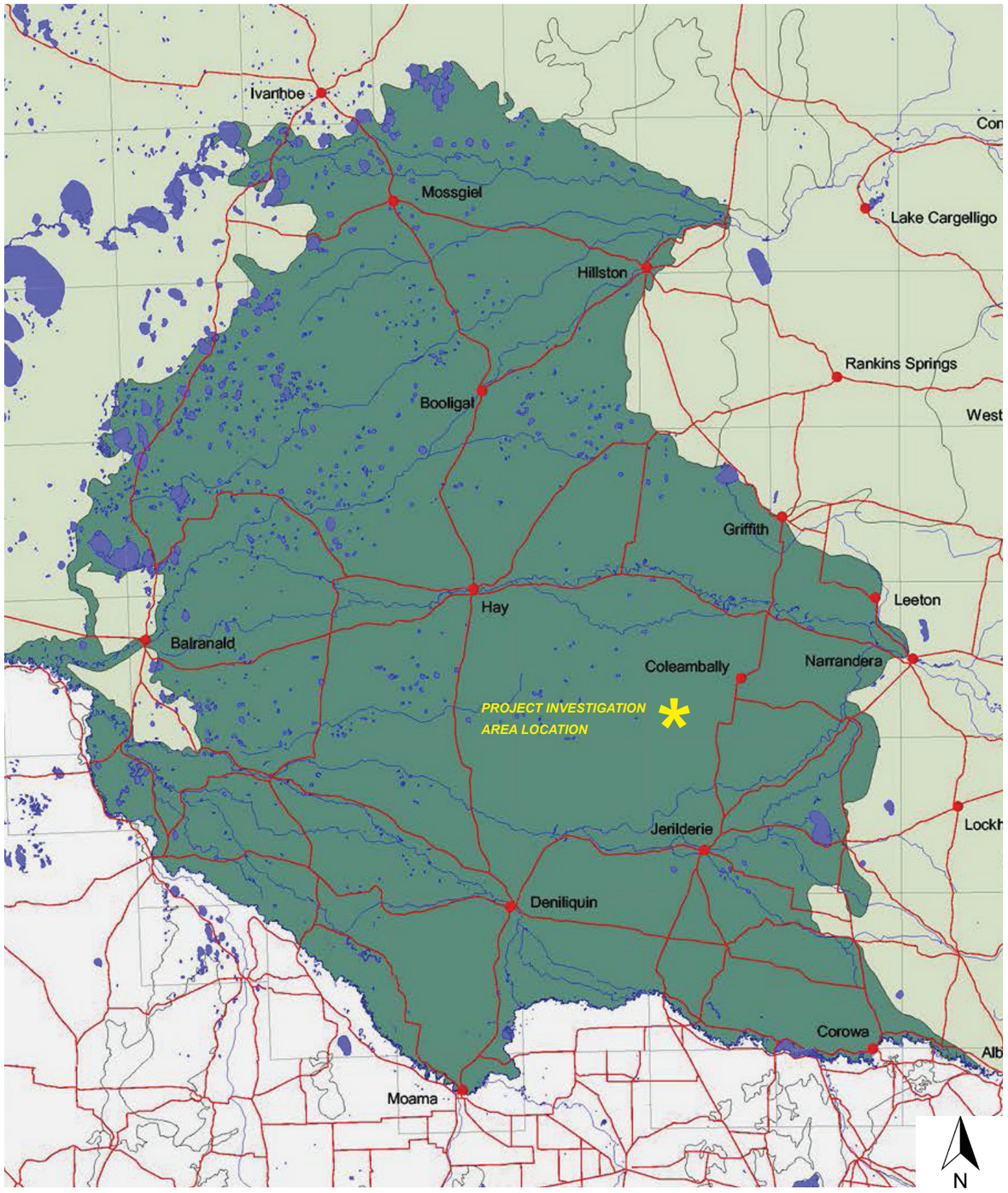


Figure 6 NSW Riverina Bioregion (Source: NPWS, 2016)

5.2 Land Use

5.2.1 Land Use Zoning

The western part of the Project Investigation Area is located within the extents of Edward River Council and the eastern part in Murrumbidgee Council. The Edward River Council utilises three different Local Environment Plans (LEPs) of which Conargo LEP 2013 is applicable to the Project. The Murrumbidgee Council utilises both the Murrumbidgee LEP 2013 and Jerilderie LEP 2012 in its administration. The following gives an overview of the main land use zones within the Study Area (see **Figure 7**):

RU1 - Primary Production

The Project Investigation Area and majority of the surrounding land is zoned *RU1 - Primary Production*. Generally, the objectives of all LEPs relevant to the Project Investigation Area and to visual impact assessment are as follows:

- *To encourage diversity in primary industry enterprises and systems appropriate for the area.*
- *To provide opportunities for employment-generating development that adds value to local agricultural production and integrates with tourism.*
- *To allow the development of contemporary non-agricultural land uses that are compatible with the character of the zone.*

C1 - National Parks and Nature Reserves

Oolambeyan National Park falls within the extents of land that is categorised as *C1- National Parks and Nature Reserves.* The National Park is located within the extents of Murrumbidgee Council. The nearest turbine is approximately 10 km southeast of the National Park. No development is proposed within the boundaries of the National Park.

According to the Oolambeyan National Park Plan of Management, the region is characterised by *'expansive horizons of the Hay Plains which are one of the flattest in the world (...) and a sample of riverine plain geomorphological features of Quarternary age such as prior streams, ancestral rivers, sand dunes and level alluvial plains'* (NPWS, 2014a). The National Park's landscape, biological, and cultural values are as follows (NPWS, 2014a; NPWS, 2000):

• *The area is known for nationally threatened plains-wanderer and extensive native grasslands known to provide habitat to species specific to this region. Rich biodiversity presented in the National Park includes ephemeral wetlands of canegrass, the slender Darling pea, and the plains-wanderer and superb parrot which are threatened animal species.*

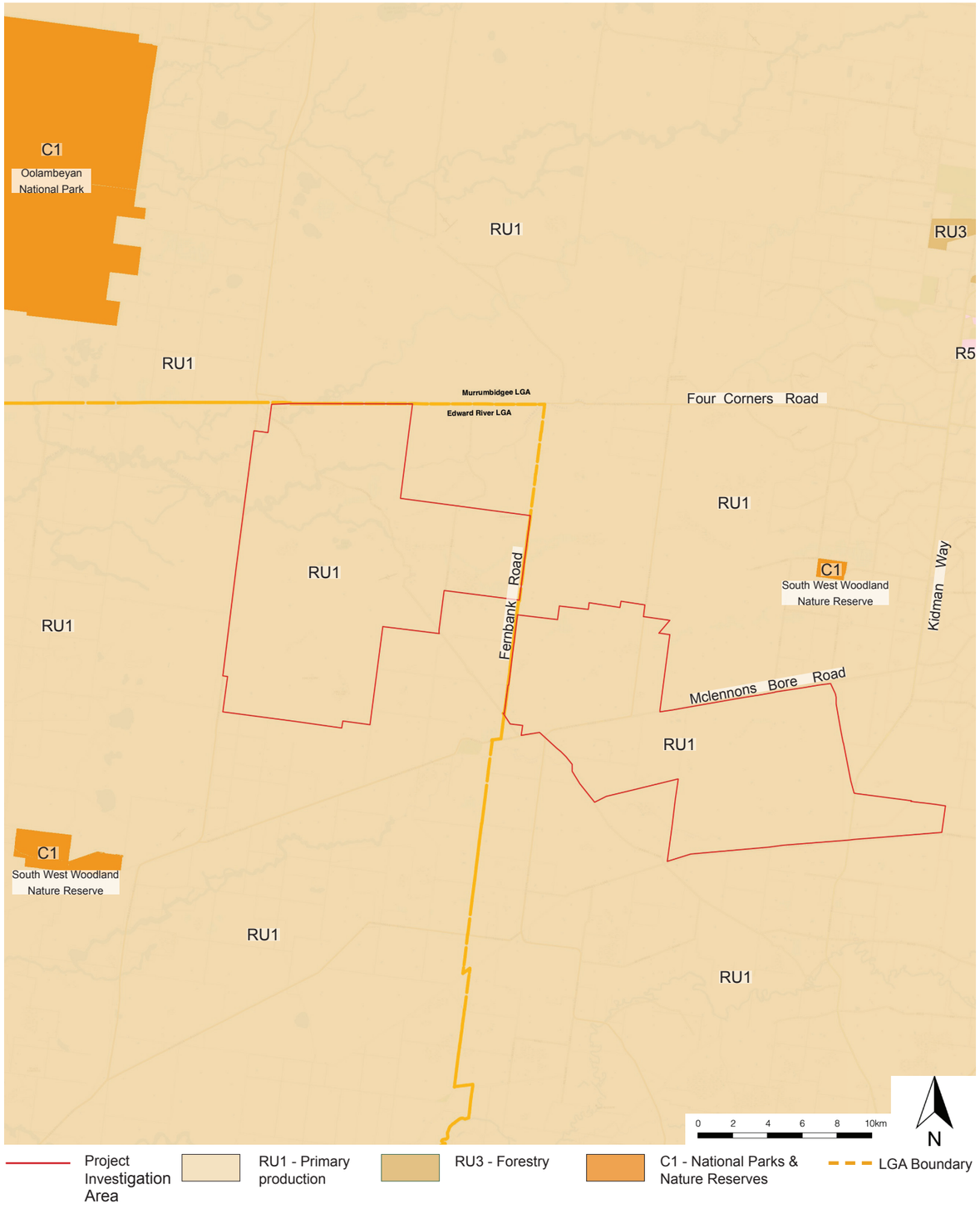


Figure 7 Land Use Zoning (Source: NPWS, Environment NSW 2016)

• *Prominent and endangered ecological communities include Weeping Myall Woodland communities and Sandhill Pine Woodland communities.*

• *The area also presents itself as a rare sample of riverine plain geomorphological features of Quaternary Age with open plains, swamps, slowly draining linear depressions and gently undulating sand ridges.*

• *A number of Aboriginal sites and places, campsites, burial sites, scarred trees, hearths and stone artefacts have been detected within the extents of the Park. The National Park also presents an example of a former merino stud property of western Riverina, a homestead, shearing shed and associated infrastructure.*

The South West Woodland Nature Reserve is located approximately 10 km east of the Project Area. It is categorised as *C1-National Parks and Nature Reserve*s. The South West Woodland Nature Reserve Statement of Management Intent outlines that the reserve protects endangered ecological communities such as the Inland Grey Box Woodland and Sandhill Pine Woodlands (NPWS, 2014b).

5.2.2 Land Use

Land use within and around the Project Investigation Area is predominantly classified under agricultural production activities. Lots within the Project Investigation Area are currently used as grazing pastures (native and modified vegetation), irrigated cropping and dryland cropping (see **Figure 8**). The largest land parcel dedicated to minimal use corresponds to the extents of Oolambeyan National Park. Few tracts of lands to the west and east correspond to the South West Woodland Nature Reserve.

The flat landform is generally characterised by swamps and slow draining channels with clay-rich soils that are suitable for agricultural activity. Water channels such as the Coleambally Outfall Drain, Cooinbil Creek and Delta Creek are seasonal and exhibit vegetation characteristics that are unique to the Riverina region.

Four Corners Road, Fernbank Road, Carrathool Road and Mclennons Bore Road serve as important access corridors. These connect to Kidman Way and Sturt Highway which provide connections to the towns such as Coleambally, Darlington Point and Hay.

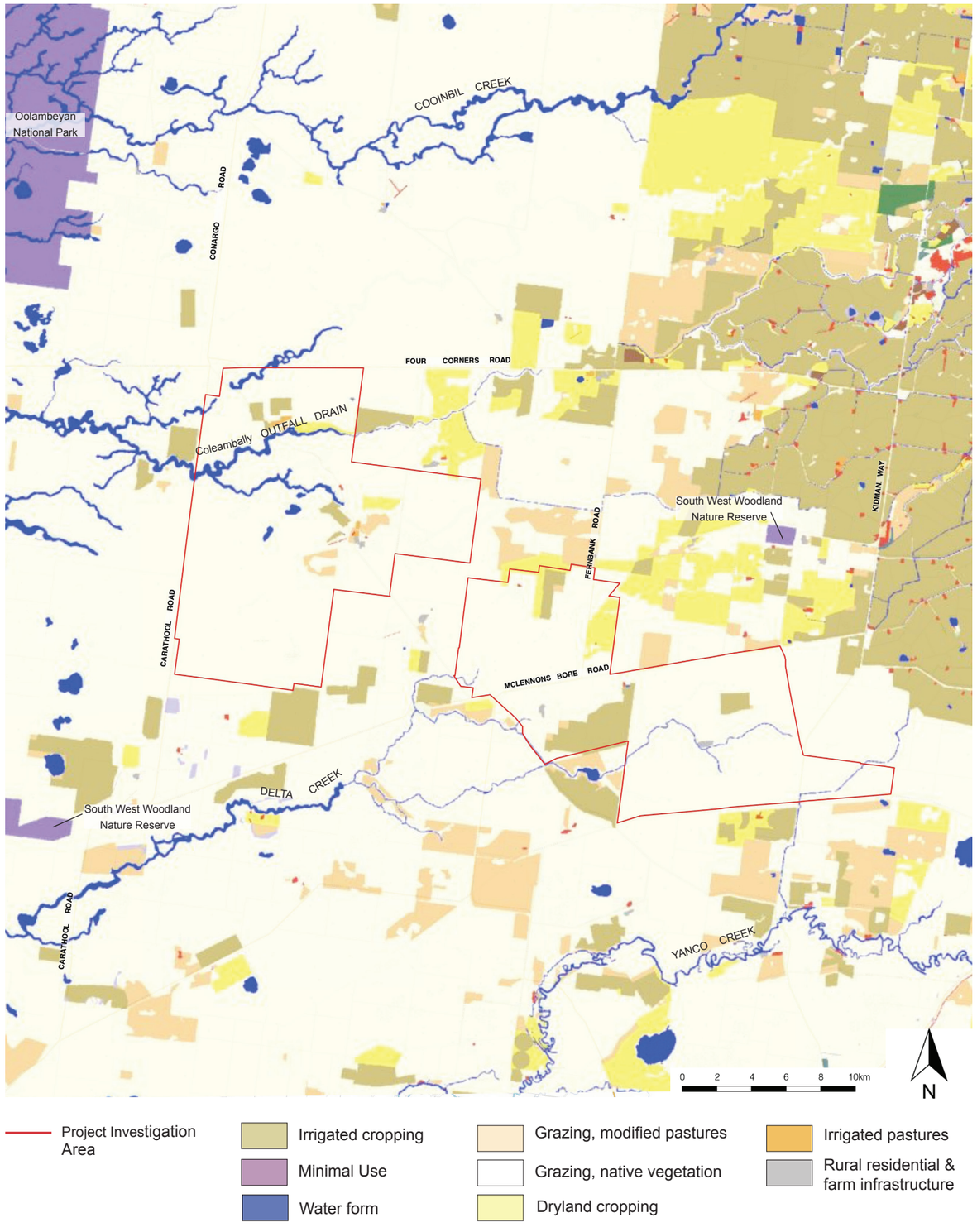


Figure 8 Land Use (Source: NPWS, Environment NSW 2016)

5.3 Key Landscape Features & Viewpoints

The Bulletin states: *proponents must identify key landscape features, dwelling locations and key public viewpoints*. The following section provides an overview of the key features identified within and around the Study Area. Refer to **Figure 9.**

Geology and Landform

The region is made up of fine-textured Quaternary alluvium and aeolian sandplains which are open, planar made of loamy calcareous red earths, solonized brown soils and sandy red-texture contrast soils (Walker, 1991). Some areas constitute floodplains made up of red and brown texture-contrast soils and grey cracking clays which present opportunities for agricultural activity (Walker, 1991). Many areas within the Oolambeyan National Park and surrounds comprise of depressions that form shallow drainage corridors, swamps and pans with stagnant to slow moving water (NPWS, 2014a). The landform is extensively flat with low relief and presents itself as one of the flattest tracks of land in the world (Environment NSW, 2011; NPWS, 2014a).

Vegetation Character

The Project Investigation Area is characterised by grassy and semi-arid woodlands of Grey Box-White Cypress Pine and Yellow Box especially around the eastern and western sides of the Project Area. Prevalent species include the Weeping Myall (*Acacia pendula*). Other areas are defined by clumps of rosewood (*Heterodendrum oleifolium*) and belah (*Casuarina cristata*) along with dense bluebushes (Maireana spp.), scattered shrubs, grasses, copperburrs (*Sclerolaen*a spp.) and forbs (Environment NSW, 2011). The National Park is predominantly characterised by grasslands, semi-arid woodlands with grassy and shrubby vegetation character (NPWS, 2006). Drainage channels and floodplains in the region are seasonal and characterised by bluebushes (*Maireana* spp.), old man saltbush (*Artiplex nummularia*), grasses, copperburrs and forbs (Walker, 1991). The vegetation associated with Delta Creek, Coleambally Outfall Drain and Yanco Creek acts as landmarks within the flat, scrubby landscape. Scattered stands of nitre goosefoot (*Chenopodium nitrariaceum*), lignum, myall and dillon bush are also visible in dry lakes and swamps (NPWS, 2006; NPWS, 2014a).

Yanco Creek, which is located on the southern side of the Project Area, is characterised by large tracts of willows that were planted for shade and bank stabilisation. These have spread from the stream edge to the creek's natural flood plain (Doody and Benyon, 2011).

Creeks, Drainage Corridors and Swamps

The low relief plains present clay-rich soils within and around the Oolambeyan National Park and the Project Area. A number of swamps and slow draining depressions have been identified in their surrounds. The creeks, drains and swamps form a part of the overall Murrumbidgee drainage system and flooding is generally restricted due to the regulated river flows of the Murrumbidgee River (NPWS, 2014a; NPWS 2014b). Significant hydrological features in close proximity to the Project Investigation Area include Coleambally Outfall Drain, Delta Creek, Yanco Creek, Jung Jung Swamp, Gum Swamp and Lagoon. Coleambally Outfall Drain generally runs east-west for approximately 70 km and acts as a refuge for excess water in the greater Murrumbidgee floodplain. It is located in the north western section of the Project Area. Delta Creek runs along the central part of the Project Area. These creek corridors are typified by hummocks of bluebushes, dillonbush, nitre goosefoot and sparse saltbushes, grasses and forbs (Walker, 1991). The abundance of clay-rich soils in these areas creates opportunities for grazing for both native and introduced animals as identified in region's prevalent land uses.

National Park and Nature Reserve

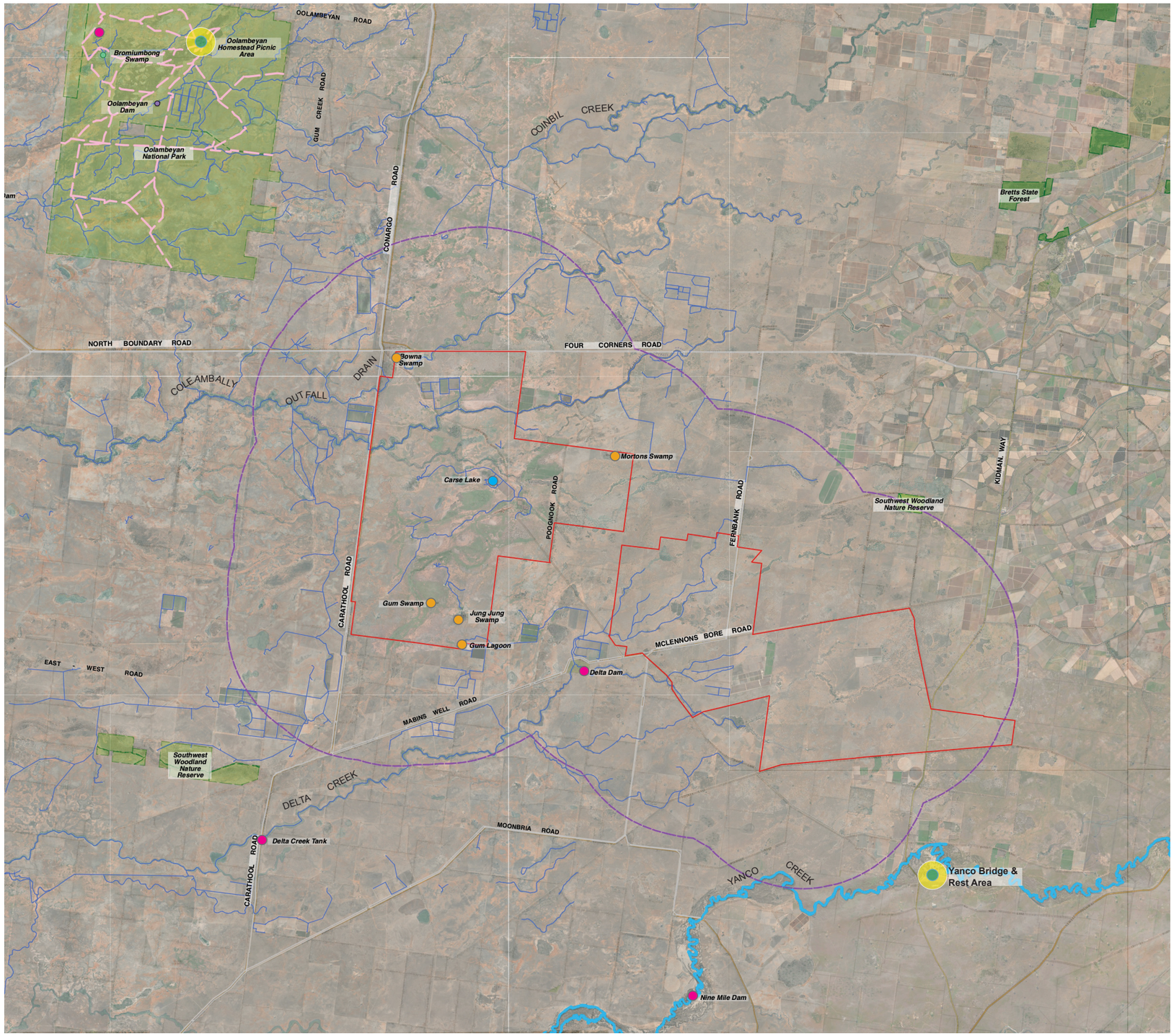
Significant ecological, cultural and historic associations have been identified for the Oolambeyan National Park which is located northeast of the Project Area. The region also has significant historic and cultural associations such as Aboriginal sites, hearths, and stone artefacts along with colonial associations such as a former merino stud property of the western Riverina (NPWS, 2014a). Although the Park's prominent hydrological features have been modified and regulated especially in the eastern parts, it boasts a variety of biodiversity and landscape values which make it a unique representation of the Hay Plains character in south-west NSW.

South West Woodland Nature Reserve is characterized by fragmented parcels of woodlands that are spread across areas closer to Coleambally and Steam Plains. The Reserve protects a number of significant endangered ecological communities and is known for educational and recreational associations such as bushwalking, birdwatching and research (NPWS, 2014b).

Recreation Associations and Points of Interest

Key viewpoint locations within the Study Area include an informal rest area near Yanco Bridge crossing on Yanco Creek.

Other points of interest include the Oolambeyan Homestead Picnic Area which is located approximately 23 km north west of the Project. It comprises of a cricket pitch, an orchard, shearing and ram shed complexes that are surrounded by Sandhill Pine Woodlands (NPWS, 2014a). An assessment of potential impacts on a representative viewpoint has been included in **Appendix B**.



Existing Landscape Features

Proposed Dinawan Energy Hub Wind Farm

LEGEND

- Project Investigation Area
- Main Road
- 8,000 m from nearest turbine
- National Park
- Key viewing locations
- Swamps and Lagoons
- Dams
- Lakes
- Walking and vehicular access tracks
- Rivers, creeks and channels

N

0 2 4 6 8 10km

Figure 9 Existing Landscape Features (Map Source: ESRI Aerial Imagery)

5.4 Preliminary Landscape Character Units and Scenic Quality Rating

The Bulletin states: *the baseline study inputs, including key landscape features and sensitive land use designations, should lead to the identification of Scenic Quality Classes. 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*.

In accordance with the Bulletin, a Scenic Quality 'frame of reference' has been formulated by Moir Landscape Architecture (**Table 2**) utilising *An approach to landscape sensitivity assessment* by Natural England (Tudor, 2019). The preliminary frame of reference developed for the Project is in keeping with the example frame of reference provided in the Bulletin.

Each category of the 'frame of reference' has been quantified for each Landscape Character Unit to determine a Scenic Quality Rating of **low**, **moderate** or **high.** The resulting *Scenic Quality Rating* is used during the EIS phase to assist in defining the Visual Influence Zones in accordance with the Bulletin.

SCENIC QUALITY RATING		
Description	LOW	MODERATE / HIGH
Landform	- Flat Topography - Absence of Landscape Features - Open, broad extents of spaces	- Diversity in Topographical Range - Unique Landscape Features - Intimate spaces
Waterforms	- Absence of Water	- Presence of Water - Visually prominent lakes, reservoirs, rivers streams and swamps.
Vegetation	- Absence of vegetation - Lack of diversity - Land cleared of endemic vegetation - Low level of connection between vegetation and landscape / topography	- Abundant vegetation - High diversity - High retention of endemic vegetation. - High level of connectivity between natural landscape and landforms.
Human Influence	- High population. - High density in settlement - High presence of Infrastructure - High levels of landscape modification	- Low / dispersed population - No settlement - Absence of infrastructure - Landscape in natural state
Activity	- High levels of traffic movement - Presence of freight and passenger transport networks - Presence of production or industry.	- Low traffic movement - Absence of freight and passenger transport - Absence of production or industry
Rarity	- Typical landscape within a local and regional context	- Unique combination of landscape features in a local and regional context
Relationship with Adjoining Landscapes	- Low visible connection with adjoining landscapes - Low variability between adjoining landscapes. - Landscape features do not contribute to amenity from adjoining landscapes	- High visibility with adjoining landscapes. - High variability and contrast with adjoining landscapes - Landscape features contribute significantly to amenity of adjoining landscapes

Table 2 Scenic Quality Class Frame of Reference

5.5 Preliminary Landscape Character Units

The Bulletin states: *the baseline study inputs, including key landscape features and sensitive land use designations, should lead to the identification of Scenic Quality Classes. 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.*

An assessment of existing land use and landscape features suggests that the Project Investigation Area and its surrounds exhibit a strong agricultural history of grazing and cropping along with ecological associations of Yanco Creek, Delta Creek and Coleambally Outfall Drain. A number of Landscape Character typologies exist within the Study Area (refer to ***Figure 8***). As apart of the Preliminary Landscape Character Assessment, a total of five (5) key landscape typologies referred to hereafter as Landscape Character Units (LCUs) have been identified.

Table 3 provides an overview of the LCUs and preliminary Scenic Quality Ratings applied. These ratings have been developed using a standard frame of reference provided in the Bulletin. The LCUs and Scenic Quality Ratings will be refined in the EIS Phase of the Project to reflect input provided by the community during ongoing consultation.

Table 4 provides a brief overview of the potential visibility of the Project from each of the LCUs.

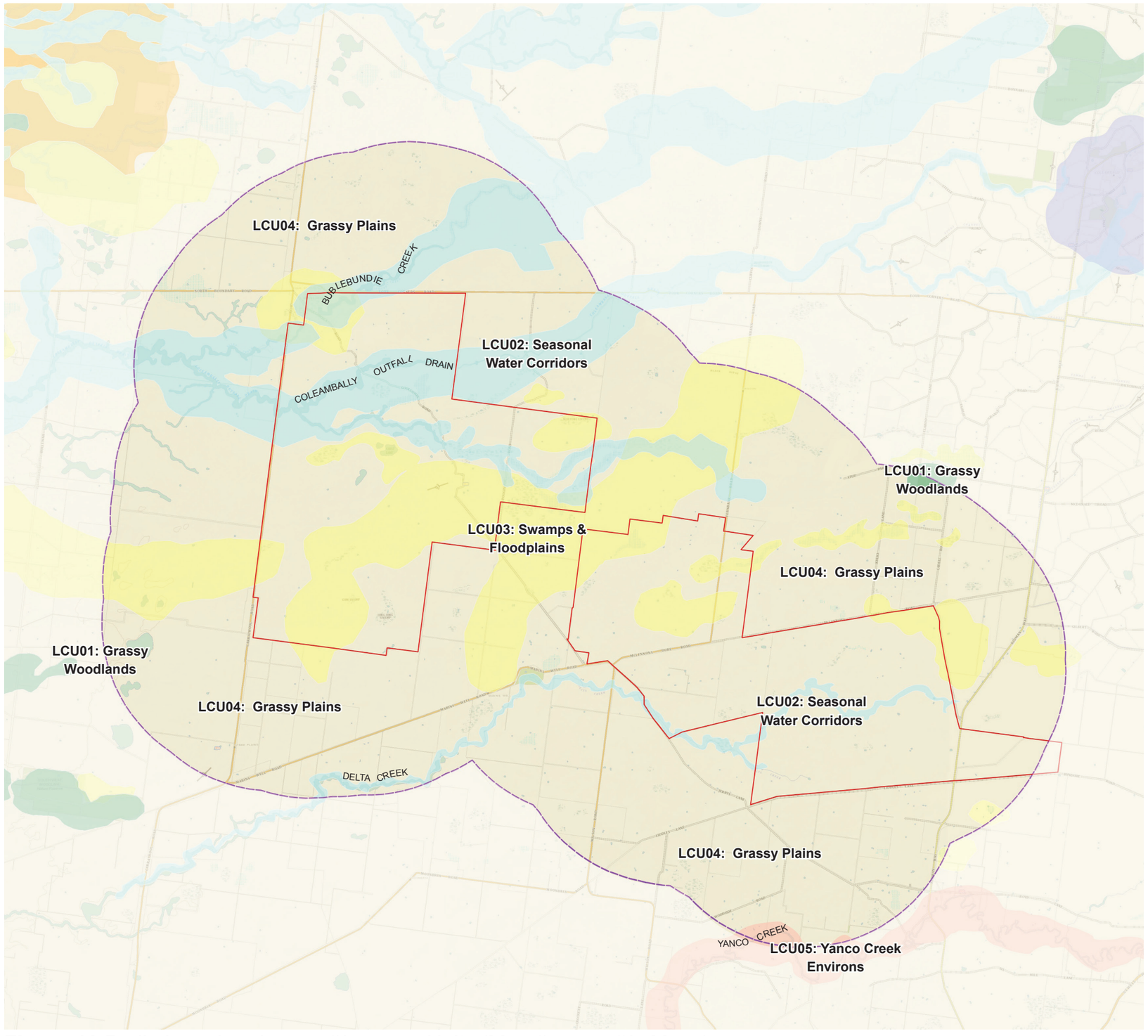
Landscape Character Units

LCU:	Name:	General Character:	Preliminary Scenic Quality Rating:
LCU01	**Grassy Woodlands**	*Comprises of dense woodlands of grey box-white cypress pine and yellow box trees that are spread across the extents of South West Woodland Nature Reserve and other vegetated areas in close proximity.*	**Moderate**
LCU02	**Seasonal Water Corridors**	*Moderately vegetated seasonal creeks and drainage channels that run east-west. Embankments are generally shallow to moderately steep. Some areas are characterized by minor depressions.*	**Moderate**
LCU03	**Swamps and Floodplains**	*Flat, sub-circular, shallow depressions characterized by grasses, forbs and patchy to dense tree cover. These also act as wildlife refuges because they hold overflows from the creeks and drainage corridors.*	**Low**
LCU04	**Grassy Plains**	*Clear, flat expanses of land used for grazing or cropping. Most prominent character of the region with minor to no elevation changes.*	**Low**
LCU05	**Yanco Creek Environs**	*Defined by the extents of Yanco Creek and associated vegetation. Comprises of dense population of willow trees and gently undulating embankments.*	**Moderate**

Table 3 Overview of Preliminary Landscape Character Units

Preliminary Landscape Character Units

Proposed Dinawan Energy Hub Wind Farm



LEGEND

- Project Investigation Area
- Main Road
- Minor Road
- 8,000 m from nearest turbine
- LCU01: Grassy Woodlands
- LCU02: Seasonal Water Corridors
- LCU03: Swamps and Floodplains
- LCU04: Grassy Plains
- LCU05: Yanco Creek Environs

N

0 2 4 6 8 10km

Figure 10 Preliminary Landscape Character Units (Map Source: Six Maps)

LCU01: Grassy Woodlands

This LCU is characterised by dense woodlands of grey box, white cypress pine and yellow box canopies with grasses as understorey vegetation on a generally flat topography with minor undulations. This character exists in areas within and around South West Woodland Nature Reserve on the western and eastern sides of the Project Area. Grassy understorey generally comprises of saltbush and speargrass varieties.

Scenic quality rating: Moderate

See Images 3 and 4.

Image 3

Oolambeyan National Park's grasslands characterised by tracts of cottonbush and grasses on flat topography.

Image 4

Remnant tracts of semi-arid woodlands and grassy understorey as seen around the eastern side of the National Park.

LCU02: Seasonal Water Corridors

The Seasonal Water Corridors LCU is defined by flat to gently undulating vegetation corridors that carry seasonal water flows. They are characterised by shallow depressions or minor to moderate elevation changes that are covered with speargrass, forbs and saltbush, and clumps of nitre goosefoot, rosewood, belahs and myall communities. The density of trees varies in different locations. These also act as important wildlife refuges and distribute water across the region to support agricultural activity.

Scenic quality rating: Moderate

See Images 5 and 6.

Image 5

Typical view of the Coleambally Outfall Drain channel. Vegetation and topographic character are predominant distinguishing factors.

Image 6

View of Delta Creek channel characterised by clumps of belah trees, myall. rosewood, grasses and forbs in gently sloping to flat tracts of lands.

LCU03: Swamps and Floodplains

The LCU is defined by flat, shallow sub-circular depressions that occasionally accommodate excess flows from the seasonal water corridors. Characterised by dry, red-brown earths and grassy understorey vegetation. Canopy species generally comprise of mid and tall canopy cover such as nitre goosefoot, myall, belah and ocassionally white box communities.

Scenic quality rating: Low

See Images 7 and 8.

Image 7

Generally flat parcels with minor undulations. Characterized by red-brown earths and sparse to dense clumps of tree cover and grassy understorey.

Image 8

Stands of trees associated with Gum Swamp and Jung Jung Swamp spread across a generally flat topography and grassy understorey.

LCU04: Grassy Plains

The Grassy Plains LCU is defined by vast, open land parcels that are utilised for native as well as modified grazing pastures and cropping areas (irrigated and dry). The LCU constitutes as one of the predominant characters of the region. It comprises of open plains with isolated stands of trees and vast extents of saltbush varieties, speargrass and forbs. The vast and expansiveness is defined by the flat, planar topographic character.

Scenic quality rating: Low

See Images 9 and 10.

Image 9

Large, open expanses of scrubby plant communities with isolated stands of trees over flat land parcels define the LCU's typical character.

Image 10

Open, expansive and flat land parcels typically covered with saltbush and speargrass communities.

LCU05: Yanco Creek Environs

Yanco Creek watercourse is defined by dense clumps of willow trees that populate gently undulating embankments. The creek forms a part of the overall Murrumbidgee floodplain and is an important landscape feature. Vegetation associated with the creek acts as a landmark in an otherwise flat, treeless landscape. The creek carries water through most seasons as acts as an important wildlife corridor.

Scenic quality rating: Moderate

See Images 11 and 12.

Image 11

Yanco Creek environs defined by dense tree cover and grey-brown cracking clays. Embankments are predominantly populated with willow trees for stabilisation.

Image 12

Surrounds of Yanco Creek - densely vegetated with willow, belah and myall communities.

Landscape Character Units

LCU:	Name:	Preliminary Visual Impact Assessment
LCU01	**Grassy Woodlands**	Views from this LCU are often contained by the dense vegetation that defines the landscape. Despite the generally flat topographic character, dense woodlands will help limit views towards the Project. It is likely that areas within and around South West Woodland Nature Reserve will not have extensive views of the Project.
LCU02	**Seasonal Water Corridors**	The LCU's vegetation character acts as an effective visual barrier. Views from within the LCU are likely to be limited due to minor topographical changes and the dense vegetation cover. The vegetation also plays an important role in limiting views from dwellings that are in close proximity.
LCU03	**Swamps and Floodplains**	Views of the Project from the Swamps and Floodplains LCU are likely to be filtered or limited from most locations. The flat, low-lying character and patchy to dense tree cover will help limit views from certain viewing locations. It is likely that views of the Project will be available but filtered.
LCU04	**Grassy Plains**	This is also the most prominent character around the central and southern parts of the Project Area. Isolated dwellings are scattered across grassy plains but majority of these dwellings are surrounded by dense vegetation and/or structures. Views are generally open and expansive due to the flat topography and lack of obtrusive elements. Views of Project are likely to be clear and open.
LCU05	**Yanco Creek Environs**	The vegetation and topographic character helps in containing views within the extents of the LCU. It also helps in filtering or limiting views for dwellings located on the southern side of the creek. It is likely that views of the Project will be limited and may not be available in some areas within the LCU.

Table 4 Overview of Preliminary Visual Impact Assessment of LCUs

6.0 Preliminary Assessment Tools

6.1 Overview of Preliminary Assessment Tools

To assist in defining the visual catchment, preliminary assessment tools have been developed in the Bulletin. In accordance with the Bulletin, the purpose of the preliminary assessment tools are: *to provide an early indication of where turbines require careful consideration because of potential visual impacts. The tools apply to both dwellings and key public viewpoints in the study area. The tools provide an early indication of where placement of turbines will require further assessment and justification, and where consultation with potentially affected landowners needs to be focused – including discussions for landholder agreements.*

The preliminary assessment tools involve analysis of two key visual parameters:

1. Visual Magnitude (**Refer to Section 6.2**)
2. Multiple Wind Turbine Tool (**Refer to Section 6.4**)

Once defined, the Bulletin states: *Further assessment and justification for placement of turbines located in these sensitive areas in the EIS will be required, along with a description of mitigation and management measures being employed to reduce impacts. This assessment may identify that factors such as topography, relative distance and existing vegetation may minimise or eliminate the impacts of the project.*

Dwellings identified through the application of the Preliminary Assessment tools have been assessed in detail in **Appendix A** of this PVIA.

6.2 Preliminary Assessment Tool 1: Visual Magnitude

The Visual Magnitude Threshold is based on the height of the proposed wind turbines to the tip of the blade and distance from dwellings or key public viewpoints as shown in **Figure 11.**

In accordance with the Bulletin: *proposed turbines below the black line must be identified along with the dwellings or key public viewpoints as part of the request for SEARs.* The proposed wind turbines are based on a worst case scenario with a tip height of *280 metres*. The 'black line' intersects at a distance of *3,750 metres* and the 'blue line' intersects at *5,500 metres*.

For the purpose of the Preliminary Assessment, the Visual Magnitude thresholds are based on a 2D assessment of the Project alone. Further assessment indicates factors such as topography, relative distance and existing vegetation may minimise or eliminate the impacts of the Project from residences.

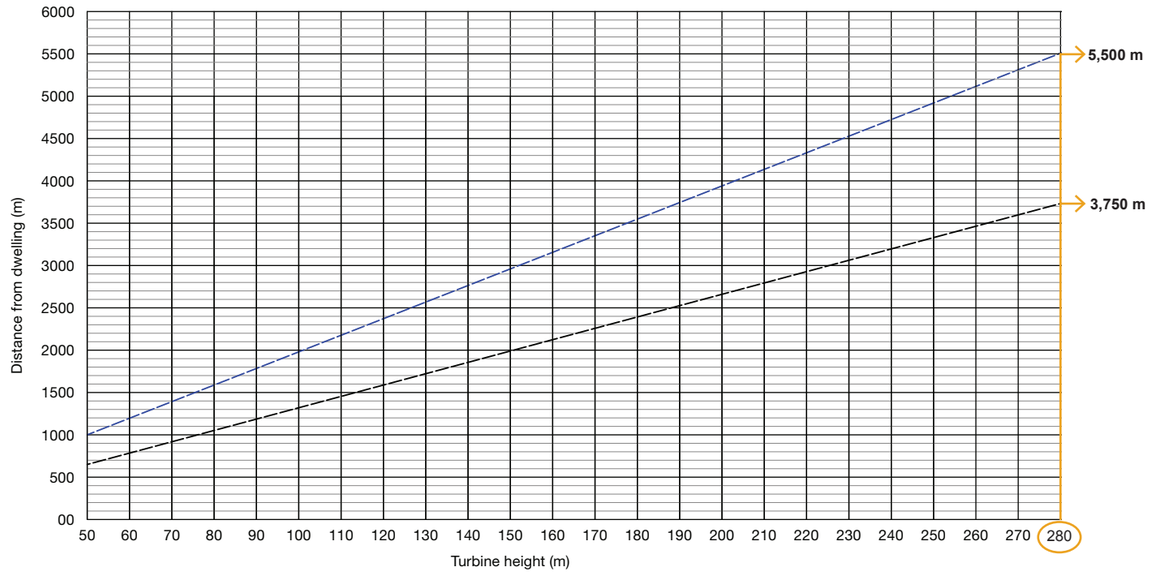


Figure 11 Visual Magnitude Thresholds for Dinawan Energy Hub Wind Farm
(Adapted from Visual Assessment Bulletin)

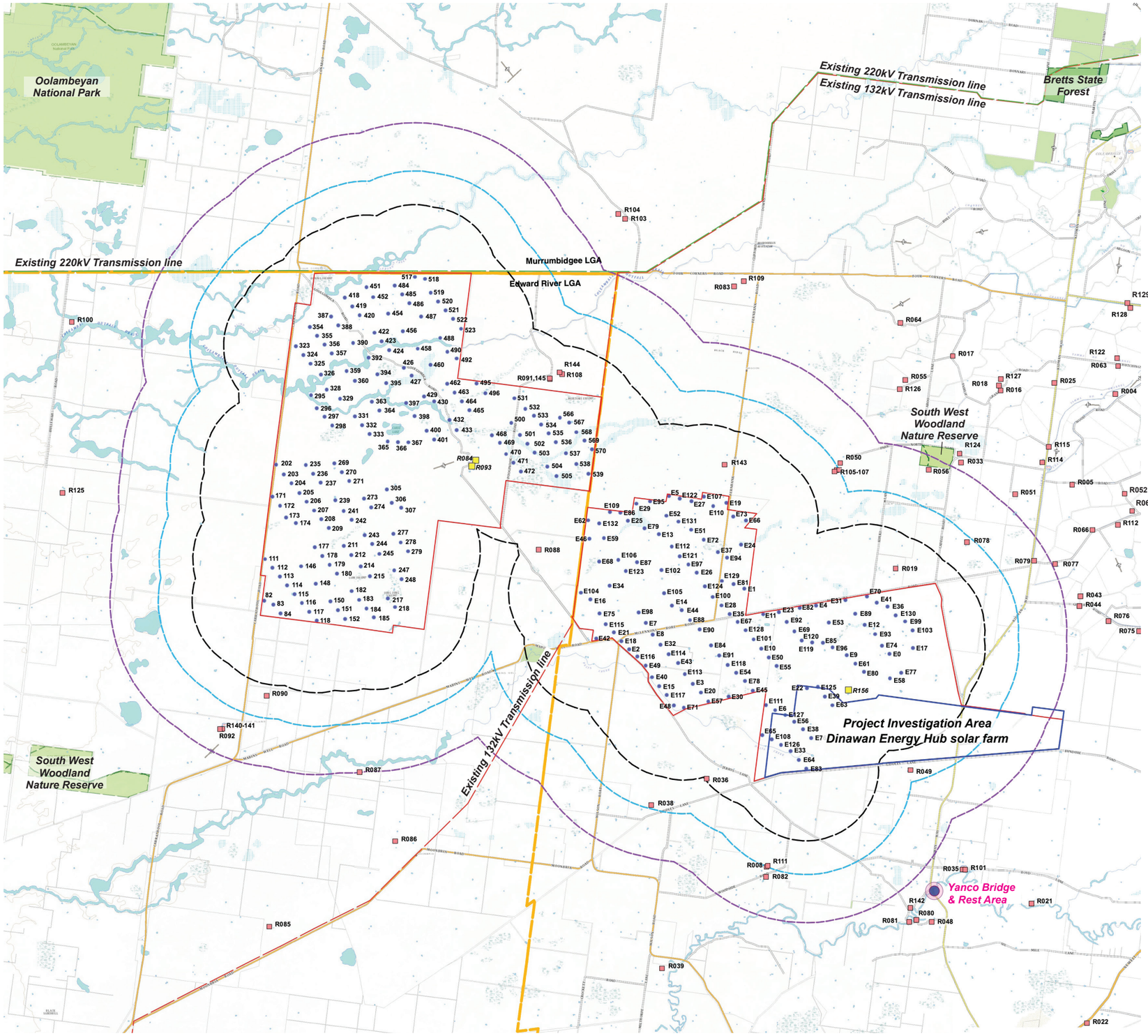
6.3 Results of Preliminary Assessment Tool 1: Visual Magnitude

Application of the Preliminary Assessment Tools to the Dinawan Energy Hub identified dwellings which require further assessment in accordance with the Bulletin. Non-associated residences identified within the Study Area are shown on **Figure 12.**

- Eight (8) non-associated residences have been identified within 3,750 metres of the proposed wind turbine locations (within black line of visual magnitude). These are R091, R145, R108, R144, R143, R019, R036 and R088.
- Eight (8) non-associated residences have been identified between 3,750 - 5,500 metres of the proposed wind turbine locations (within blue line of visual magnitude). These are R105, R107, R078, R049, R008, R111, R038 and R090.
- Preliminary site assessment identified that existing vegetation would reduce visibility from all dwellings within the black line (3,750 metres) and blue line (5,500 metres) of visual magnitude.
- Preliminary assessment of 13 representative sensitive receptors within 5,500 m of the proposed turbines have been included in **Appendix A**. These assessments illustrate that existing intervening vegetation that surrounds majority of these non-associated residences is likely to reduce views to the Project. Further detailed assessment and site inspections of sensitive receptors to ground-truth this analysis will be undertaken during the EIS phase.

Visual Magnitude

Proposed Dinawan Energy Hub Wind Farm



LEGEND

- Project Investigation Area
- Project Investigation Area (Dinawan Energy Hub Solar Farm)
- 84 Proposed 280 m Turbine Location
- R10 Non-associated residences
- *R4* Associated residences
- Key public viewpoint
- Main Road
- Minor Road
- 3,750 m from nearest turbine
- 5,500 m from nearest turbine
- 8,000 m from nearest turbine
- LGA Boundary
- Existing 132kV transmission line
- Existing 220kV transmission line
- National Park / Nature Reserves
- State Forest

Note:

Preliminary Assessment Tool 1: Visual Magnitude is based on a 2D Assessment alone and does not take into account topography, vegetation or other screening factors which may reduce the potential for viewing turbines.

N

0 2 4 6 8 10km

Figure 12 Preliminary Assessment Tool 1: Visual Magnitude (Map Source: Six Maps)

6.4 Preliminary Assessment Tool 2: Multiple Wind Turbine Tool

The Multiple Wind Turbine Tool provides a preliminary indication of potential cumulative impacts arising from the proposed Project. To establish whether the degree to which dwellings or key public viewpoints may be impacted by multiple wind turbines, the proponent must map into six sectors of 60° any proposed turbines, and any existing or approved turbines within eight (8) kilometres of each dwelling or key public viewpoint. No key public viewpoints were identified within 8,000 m of the nearest turbine. However, the Yanco Bridge and Rest Area which is located approximately 9 km south east of the proposed turbines is a key public viewpoint. **Figure 13** provides examples of where a dwelling or key public viewpoint may have views to turbines in multiple 60° sectors.

In accordance with the Bulletin: *Where wind turbines are visible within the horizontal views of the dwelling or key public viewpoints in three or more 60° sectors, the proponents must identify the turbines, relative dwelling and key public viewpoint, along with the relative distance and submit these to the Department as part of the request for SEARs.* These turbines will become a focus for assessment in the EIS.

Figure 12 provides an overview of the number of 60º sectors visible from each of the dwellings identified within eight (8) kilometres.

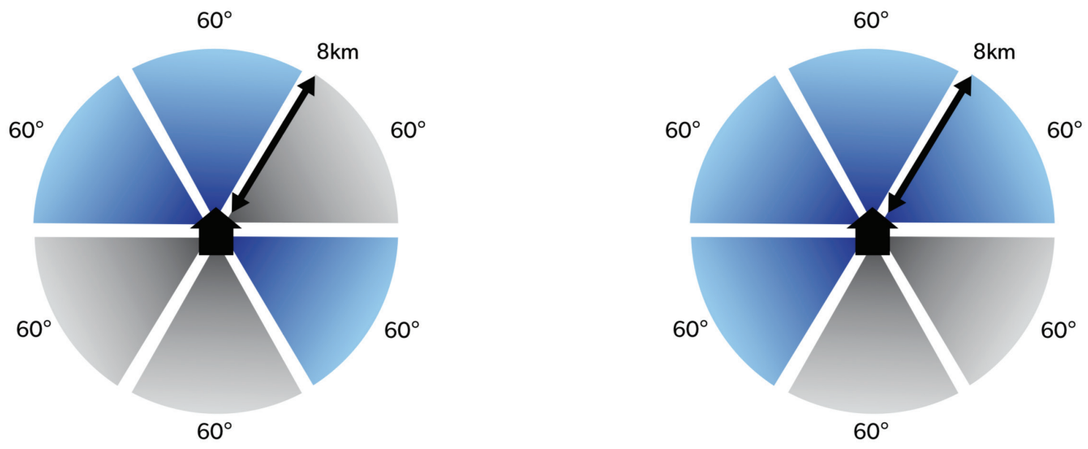


Figure 13 Multiple Wind Turbine Tool
(Source: Visual Assessment Bulletin)

6.5 Results of Preliminary Assessment Tool 2: Multiple Wind Turbine Tool

When applied to the Project, the 2D Multiple Wind Turbine Tool (see **Figure 14**) identified a total of 25 non-associated residences that will have views of turbines associated with the Project. Of these, 13 non-associated residences will have views of turbines in up to two (2) 60 degree sectors which is deemed acceptable in accordance with the Bulletin. The remaining 12 non-associated residences have views of turbines in more than two (2) 60 degree sectors.

No key public viewpoints were identified within 8,000 m of the proposed turbines. However, Yanco Bridge and Rest Area is located 9 km from the nearest Dinawan Energy Hub turbine and Oolambeyan Homestead Picnic Area is located approximately 23 km from the nearest Dinawan Energy Hub turbine. Theoretically, these viewpoints will not have views of the Project in any 60 degree sector. An assessment of the potential visual impacts on these viewpoints has been discussed in **Appendix B**.

Of the 12 non-associated residences that have views in multiple 60 degree sectors, five (5) non-associated residences have views of turbines associated only with the Project (DEH). These residences are R091, R108, R143, R144 and R145. The remaining seven (7) non-associated residences have views of turbines associated with DEH and YDWF. These residences are generally located in the central and southern parts of the Project Investigation Area (see **Figure 14**). The following summary is based on a 2D assessment and takes into account turbines associated with DEH and YDWF:

Non-associated residences with DEH and YDWF turbines in up to three (3) 60 degree sectors:

- One (1) non-associated residence [R087] has turbines located within up to three (3) 60 degree sectors.
- The turbine located nearest to R087 is associated with YDWF (Refer to ***Table 5***). The nearest DEH turbine is located 7,980 m from dwelling R087.

Non-associated residences with DEH and YDWF turbines in up to four (4) 60 degree sectors:

- Three (3) non-associated residences [R008, R082, R111] have turbines located within up to four (4) 60 degree sectors.
- Turbines located nearest to these residences are associated with YDWF (Refer to ***Table 5***). The nearest DEH turbine is located 5,500 m away from these residences.
- Preliminary assessment for R008 and R111 is included in **Appendix A**.

Non-associated residences with DEH and YDWF turbines in up to five (5) 60 degree sectors:

- One (1) non-associated residence [R036] has turbines located in up to five (5) 60 degree sectors.
- The turbine located nearest to R036 is associated with DEH (Refer to ***Table 5***). The nearest DEH turbine is located 3,680 m from R087.
- R036 is located within 3,750 m of the nearest turbine (black line of visual magnitude). Preliminary assessment of this dwelling is included in **Appendix A**.

Non-associated residences with DEH and YDWF turbines in up to six (6) 60 degree sectors:

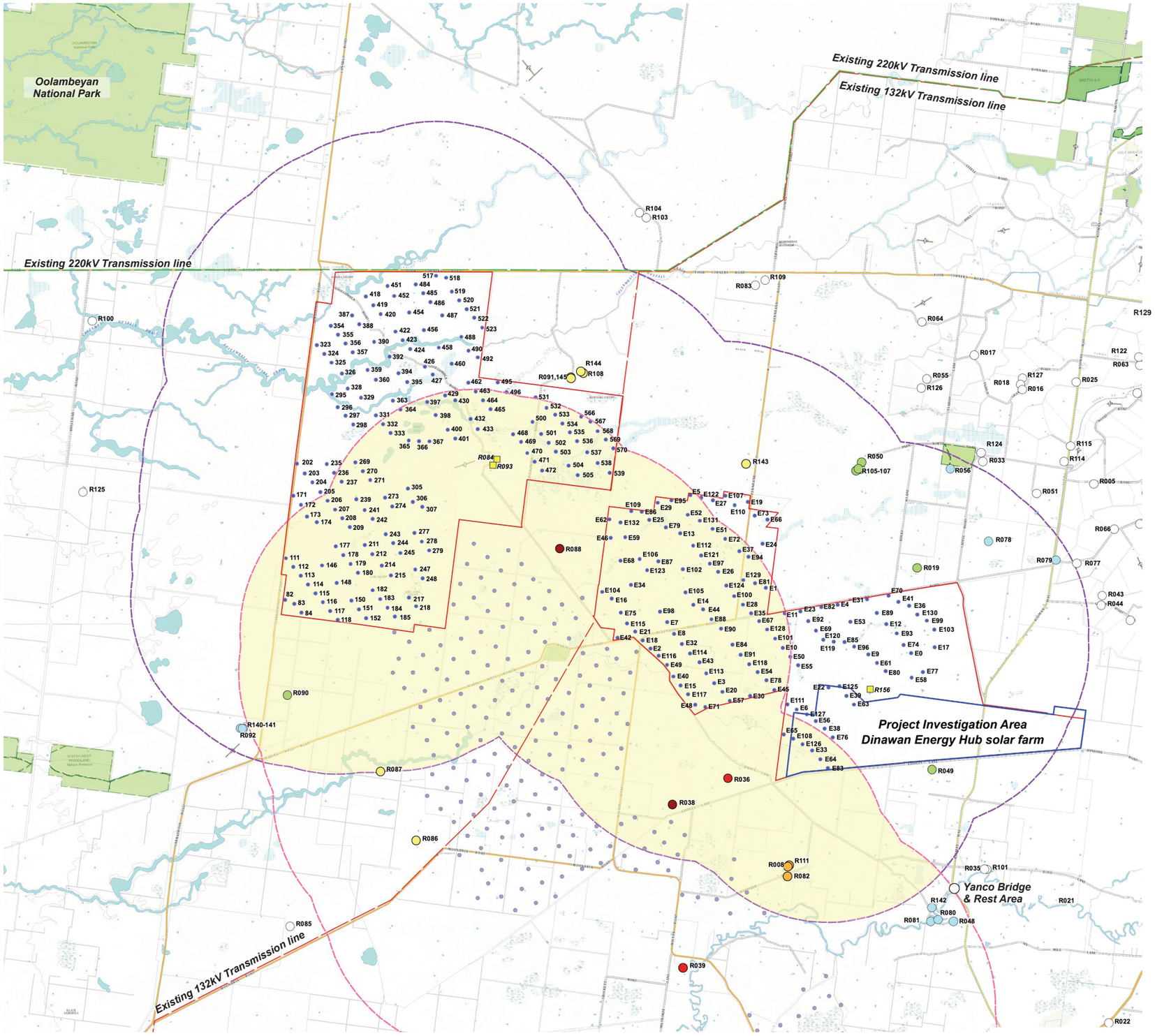
- Two (2) non-associated residences [R088 and R038] have turbines located within up to six (6) 60 degree sectors.
- Turbines located nearest to these residences are associated with YDWF (Refer to ***Table 5***). The nearest DEH turbine is located 5,300 m away from R088 and 5,290 m away from R038.
- R088 is located within 3,750 m (black line) and R038 is located within 5,500 m (blue line) of the nearest DEH turbine. A preliminary assessment of these residences is included in **Appendix A**.

Note the turbines utilised for the assessment of the YDWF are associated with the Preliminary Layout which is available (accessed via *NSW Planning Portal's Major Projects* website, accessed on 16th August 2022).

Further assessment of these residences using 3D topographic mapping has delivered the same results (refer to **Table 5**). Existing screening factors (including vegetation and structures) may reduce visibility of the turbines. This has been discussed further in **Appendix A**.

Multiple Wind Turbine Tool

Proposed Dinawan Energy Hub Wind Farm



LEGEND

- Project Investigation Area
- 84 — 280 m Dinawan Energy Hub (DEH) Turbine Location
- R34 — Associated residences
- Yanco Delta Wind Farm (YDWF) Turbine Location
- 8000 m from DEH turbines
- 8000 m from YDWF turbines
- Existing 330kV electrical transmission line
- Existing 220kV electrical transmission line
- National Park / Nature Reserves
- Area and dwellings within 8,000m of DEH and YDWF turbines

Cumulative MWTT Results for Non-associated residences & key viewpoints (considers both DEH & YDWF):

- Dwellings or viewpoints in excess of 8,000 m
- One (1) 60º Sector (60º)
- Up to two (2) 60º Sectors (120º)
- Up to three (3) 60º Sectors (180º)
- Up to four (4) 60º Sectors (240º)
- Up to five (5) 60º Sectors (300º)
- Up to six (6) 60º Sectors (360º)

Note:

Preliminary Assessment Tool 2: Multiple Wind Turbine Tool is based on a 2D Assessment alone and does not take into account topography, vegetation or other screening factors which may reduce the potential for viewing multiple turbines.

N

0 2 4 6 8 10km

Figure 14 Preliminary Assessment Tool: Multiple Wind Turbine Tool (Map Source: Six Maps)

Dwelling ID	Distance to nearest WTG:	Number of 60º Sectors (Based on a 2D Cumulative Assessment of DEH & YDWF):	Number of 60º Sectors associated with the Project (DEH) (based on 3D Assessment):	Screening Factors:
Non-associated residences with turbines in up to one (1) or two (2) 60º Sectors (up to 60º and 120º) [Not included in Appendix A]:				
R050	**5.80 km (DEH)**	Two (2) 60º Sectors (up to 120º)	Two (2) 60º Sectors (up to 120º)	*Existing intervening vegetation*
R105	**5.38 km (DEH)**	Two (2) 60º Sectors (up to 120º)	Two (2) 60º Sectors (up to 120º)	*Existing intervening vegetation*
R106	**5.49 km (DEH)**	Two (2) 60º Sectors (up to 120º)	Two (2) 60º Sectors (up to 120º)	*Existing intervening vegetation*
R107	**5.24 km (DEH)**	Two (2) 60º Sectors (up to 120º)	Two (2) 60º Sectors (up to 120º)	*Existing intervening vegetation*
R056	**7.38 km (DEH)**	One (1) 60º Sector (up to 60º)	One (1) 60º Sector (up to 60º)	*Existing scattered vegetation*
R078	**5.21 km (DEH)**	One (1) 60º Sector (up to 60º)	One (1) 60º Sector (up to 60º)	*Existing intervening vegetation*
R079	**7.31 km (DEH)**	One (1) 60º Sector (up to 60º)	One (1) 60º Sector (up to 60º)	*Lack of intervening vegetation.*
R090	**4.34 km (DEH)**	Two (2) 60º Sectors (up to 120º)	Two (2) 60º Sectors (up to 120º)	*Existing intervening vegetation*
R140	**6.66 km (DEH)**	One (1) 60º Sector (up to 60º)	One (1) 60º Sector (up to 60º)	*Existing intervening vegetation*
R141	**6.66 km (DEH)**	One (1) 60º Sector (up to 60º)	One (1) 60º Sector (up to 60º)	*Existing intervening vegetation*
R092	**6.70 km (DEH)**	One (1) 60º Sector (up to 60º)	One (1) 60º Sector (up to 60º)	*Existing intervening vegetation*
R019	**1.98 km (DEH)**	Two (2) 60º Sectors (up to 120º)	Two (2) 60º Sectors (up to 120º)	*Existing intervening vegetation*
R049	**4.86 km (DEH)**	Two (2) 60º Sectors (up to 120º)	Two (2) 60º Sectors (up to 120º)	*Existing intervening vegetation*
Non-associated residences with turbines in up to three (3) 60º Sectors (up to 180º):				
R091	**2.10 km**	Three (3) 60º Sectors (up to 180º)	Three (3) 60º Sectors (up to 180º)	*Existing intervening vegetation. Refer to Appendix A.1.*
R145	**2.10 km**	Three (3) 60º Sectors (up to 180º)	Three (3) 60º Sectors (up to 180º)	*Existing intervening vegetation. Refer to Appendix A.1.*
R144	**2.30 km**	Three (3) 60º Sectors (up to 180º)	Three (3) 60º Sectors (up to 180º)	*Existing intervening vegetation. Refer to Appendix A.2*
R108	**2.30 km**	Three (3) 60º Sectors (up to 180º)	Three (3) 60º Sectors (up to 180º)	*Existing intervening vegetation. Refer to Appendix A.2*
R143	**1.90 km**	Three (3) 60º Sectors (up to 180º)	Three (3) 60º Sectors (up to 180º)	*Scattered intervening vegetation. Refer to Appendix A.3*
R087	**2.69 km (YDWF)**	Three (3) 60º Sectors (up to 180º)	One (1) 60º Sectors (up to 180º)	*Existing intervening vegetation around dwelling and driveway.*
Non-associated residences with turbines in up to four (4) 60º Sectors (up to 240º):				
R008	**2.62 km (YDWF)**	Four (4) 60º Sectors (up to 240º)	One (1) 60º Sectors (up to 180º)	*Existing intervening vegetation. Refer to Appendix A.10*
R111	**2.62 km (YDWF)**	Four (4) 60º Sectors (up to 240º)	One (1) 60º Sectors (up to 180º)	*Existing intervening vegetation. Refer to Appendix A.10*
R082	**2.36 km (YDWF)**	Four (4) 60º Sectors (up to 240º)	One (1) 60º Sectors (up to 180º)	*Existing intervening vegetation.*
Non-associated residences with turbines in up to five (5) 60º Sectors (up to 300º):				
R036	**2.70 km**	Five (5) 60º Sectors (up to 300º)	Three (3) 60º Sectors (up to 180º)	*Existing intervening vegetation. Refer to Appendix A.5*
Non-associated residences with turbines in up to six (6) 60º Sectors (up to 360º):				
R088	**2.19 km (YDWF)**	Six (6) 60º Sectors (up to 360º)	Five (5) 60º Sectors (up to 300º)	*Existing intervening vegetation. Refer to Appendix A.6.*
R038	**1.00 km (YDWF)**	Six (6) 60º Sectors (up to 360º)	Two (2) 60º Sectors (up to 120º)	*Existing intervening vegetation. Refer to Appendix A.11*

Table 5 Non-associated residences within 8,000 m identified using Multiple Wind Turbine Tool

7.0 Preliminary Zone of Visual Influence

7.1 Overview of Preliminary Zone of Visual Influence

The Bulletin states *'the use of Geographic Information Systems (GIS) to facilitate the application of the tools will streamline the evaluation phase of a project during the pre-lodgement stage. This can also assist in refining the number of turbines and viewpoints that will ultimately need more detailed assessment.'*

A Zone of Visual Influence (ZVI) diagram has been prepared for the Project to illustrate the theoretical visibility of the proposed turbines from the blade tip height. **Figure 15** depicts the areas of land from which the proposed development may be visible and provides an indicative number of wind turbines based on the blade tip height of 280 metres.

The ZVI (also known as a Zone of Theoretical Influence Model) represents the area over which a development can theoretically be seen and is based on a Digital Terrain Model (DTM). The ZVI usually presents a bare ground scenario - ie. a landscape without screening, structures or vegetation, and is usually presented on a base map (Scottish Natural Heritage, 2017).

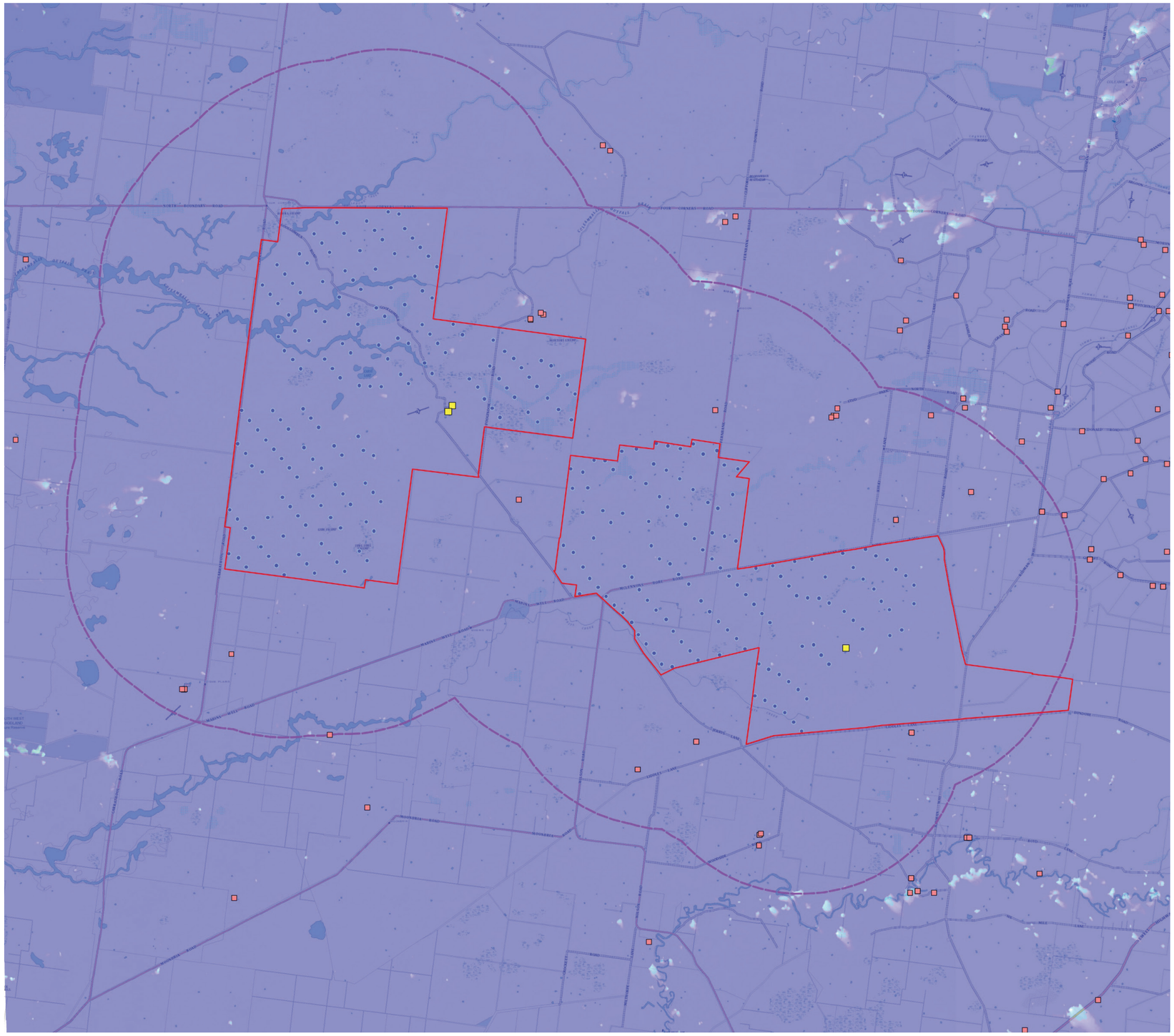
The ZVI has been determined through the use of digital topographic information and 3D modelling software *WindPro*. The ZVI has been assessed to approximately 30 km from the Project Area. Although it is possible for the development to be visible from further than 30 km away, it is generally accepted that beyond 10 km visibility is diminished.

7.2 Summary of Preliminary Zone of Visual Influence

The following provides a summary of the Zone of Visual Influence diagrams prepared for the Preliminary Layout of Dinawan Energy Hub.

- Due to the relatively flat topography that characterises this landscape, the majority of the turbines associated with the Project are likely to be visible from most areas around the Project Area.
- Certain areas located on the southern, eastern and western sides of the Project that are associated with creek corridors, swamps and floodplains have been identified in the ZVI to have relatively limited views due to topographical differences between them and the Project Area.
- Views to the majority of turbines associated with the Project are likely to be available for all dwellings within eight (8) kilometres of the wind turbines. This assessment is based on a consideration of topography alone and does not consider intervening elements such as vegetation and existing structures.
- Following the development of the ZVI, detailed site investigations (in the form of a viewpoint analysis inventory and dwelling assessments) have been undertaken to ground-truth the findings (see **Appendix B**). Preliminary viewpoint analysis (from 25 public locations) and assessment of 12 representative sensitive receptors have been included in **Appendix A** and **Appendix B**.
- Further detailed assessment from areas identified in the ZVI will be undertaken in the EIS Phase of the assessment.

- It is important to reiterate that this is a preliminary assessment based on worst case scenario that does not consider the impact of vegetation or structures. Ground-truthing during field work will ascertain potential visibility taking into account structures and vegetation, however, based on the preliminary assessments in **Appendix A** and **Appendix B**, it is likely that existing intervening vegetation surrounding non-associated residences is likely to reduce views of turbines from a number of locations.



Zone of Visual Influence
Blade Tip Height 280 m
Proposed Dinawan Energy Hub Wind Farm

LEGEND

- Project Investigation Area
- Proposed 280 m Turbine Location
- Associated residences
- Non-associated residences
- 8,000 m from nearest turbine

Number of visible turbines (at tip height)
(Based on topography alone):

- 0
- 1-96
- 97-195
- 196 and above

Note:

The ZVI is a preliminary assessment tool that represents a bare ground scenario - ie. a landscape without screening, structures or vegetation. As accurate information on the height and coverage of vegetation and buildings is unavailable, it is important to note the ZVI is based solely on topographic information. Therefore this form of mapping should be acknowledged as representing the worst case scenario.

N

0 2 4 6 8 10km

Figure 15 Zone of Visual Influence (Blade Tip 280 m)

8.0 Preliminary Dwelling & Viewpoint Assessment

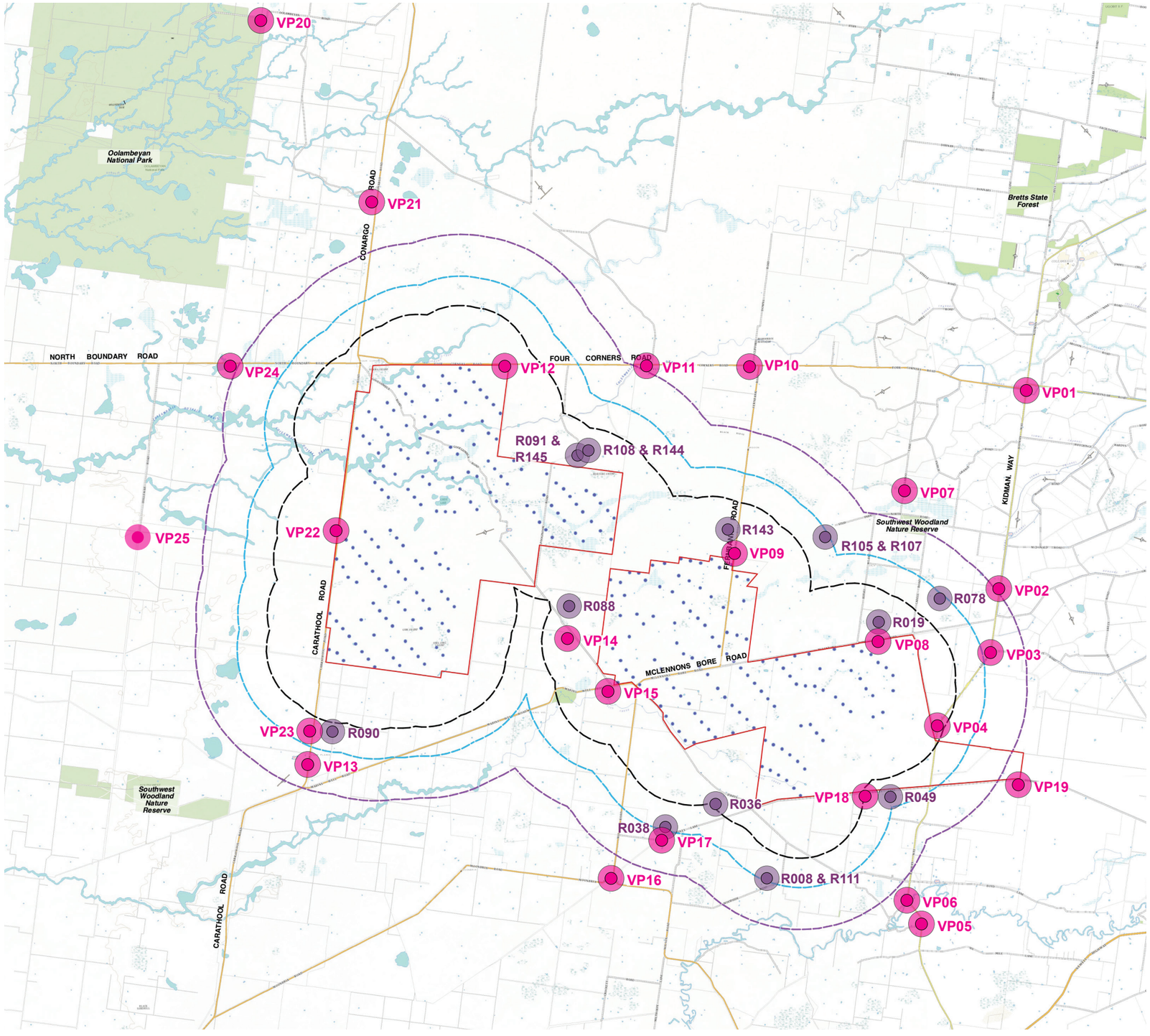
8.1 Preliminary Assessment of Dwellings

Examples of the preliminary assessment tools applied to 12 representative non-associated residences (considering 16 dwellings as shown on **Figure 16**) within 8,000 m of the nearest turbine have been included in **Appendix A.**

The preliminary assessment identifies existing scattered and dense vegetation surrounding majority of the dwellings which would reduce the potential visual impacts identified by the preliminary assessment tools and Zone of Visual Influence.

8.2 Preliminary Assessment of Public Viewpoints

Appendix B provides preliminary assessments from Public Viewpoints. A total of 25 preliminary viewpoints have been selected to illustrate the varying landscape character typologies throughout the Study Area and provide a preliminary assessment of the potential visibility of the Project (as shown on **Figure 16**).



Preliminary Dwelling Assessment Locations

Proposed Dinawan Energy Hub Wind Farm

LEGEND

- Project Investigation Area
- Proposed 280 m Turbine Location
- Main Road
- Minor Road
- 3,750 m from nearest turbine
- 5,500 m from nearest turbine
- 8,000 m from nearest turbine
- National Parks / Nature Reserves
- Preliminary Dwelling Assessment locations
  Refer to Appendix A.
- Preliminary Viewpoint Assessment locations
  Refer to Appendix B.

N

0 2 4 6 8 10km

Figure 16 Preliminary Dwelling and Viewpoint Assessment Locations (Map Source: Six Maps)

9.0 Cumulative Visual Impact Assessment

9.1 Overview of Cumulative Visual Impacts

The Project is located within the eastern region of the South West Renewable Energy Zone (REZ). The REZ has been identified by the NSW Governments Electricity Strategy (refer **Figure 17**). The REZ is expected to play a vital role in delivery of affordable energy to the community across NSW (Energy NSW, 2021).

The existing landscape character of the region allows for optimum harvest of wind energy due to the flat terrain and large expanses of uninhabited land with minimal obstructions in the landscape. These characteristics are beneficial to the output of wind energy and as such, it is highly likely that over time this will be utilised for the development of wind farm projects. **Figure 17** shows the wind farms that are currently proposed within the extents of the REZ. Majority of these projects are in the central and eastern parts of the REZ near the towns of Hay, Balranald and Coleambally.

Figure 17 South West Energy Zone (Source: Energy NSW, 2022)

9.2 Nearby Wind Farm Projects

Currently, six (6) other wind farm projects have been proposed in the area (refer **Figure 18**):

- Yanco Delta Wind Farm ((SEARs issued in May 2022)
- Burrawong Wind Farm (SEARs issued in December 2021)
- Baldon Wind Farm (SEARs issued July 2022)
- Keri Keri Wind Farm (SEARs issued in April 2022)
- Bullawah Wind Farm (Preliminary planning phase)
- The Plains Renewable Energy Park (Location currently unknown)

Of these, two (2) wind farm projects are in close proximity of Dinawan Energy Hub (DEH). Consideration of cumulative impacts of the Yanco Delta Wind Farm (YDWF) and Bullawah Wind Farm (BWF) is therefore, critical for the Project.

Yanco Delta Wind Farm (YDWF):

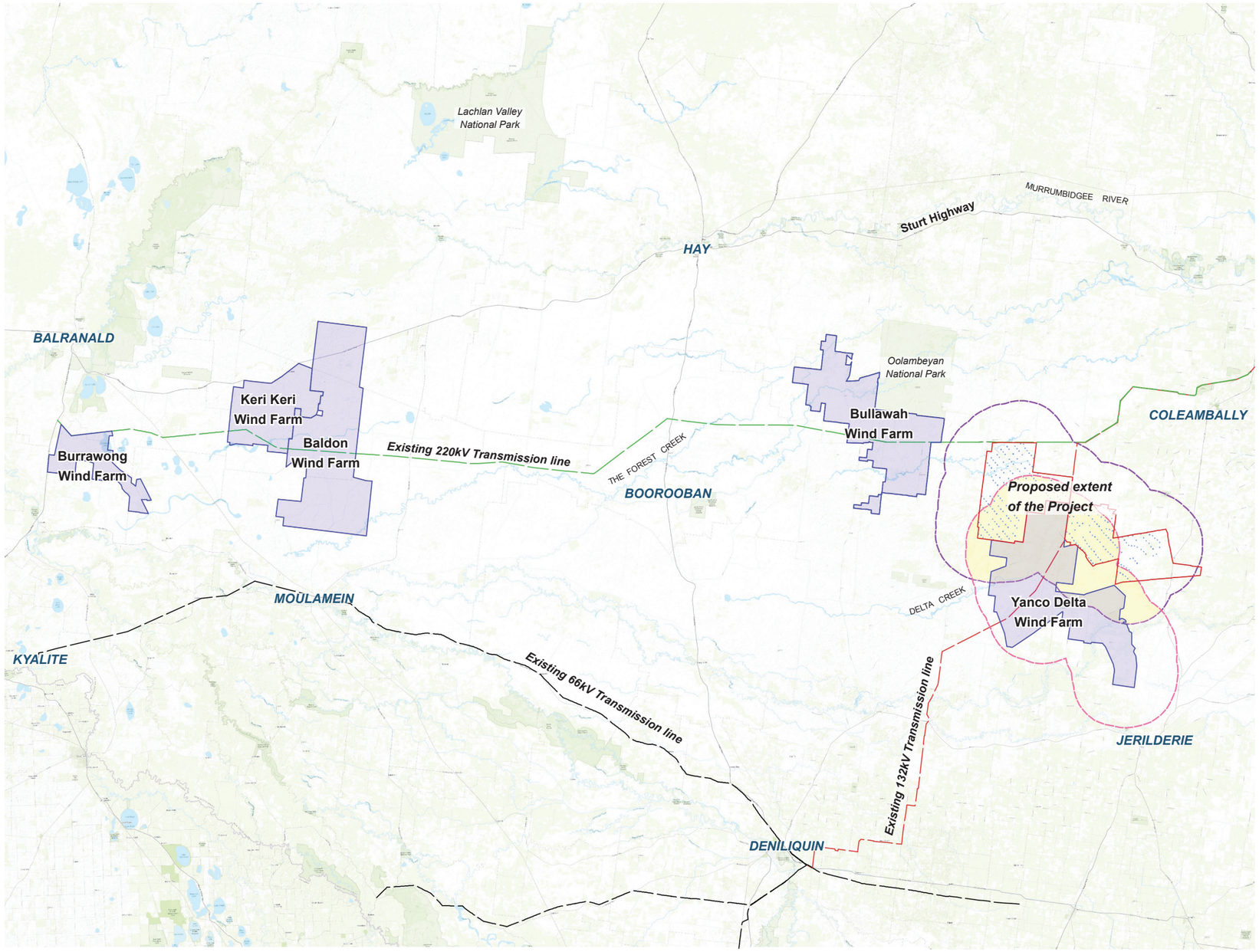
Yanco Delta Wind Farm's preliminary layout comprises of 216 turbines spread across an area of approximately 41,900 ha. The Project would be potentially located 12.5 km north of Jerilderie and 35 km southwest of Coleambally. SEARs were issued for the Yanco Delta Wind Farm Project in May 2022. YDWF is located on the southern side and adjacent to the Project. There is potential to view YDWF and the Project simultaneously and this will be assessed in detailed during the EIS Phase.

Bullawah Wind Farm (BWF):

BWF is in its preliminary planning stages and comprises of up to 170 turbines with a maximum blade-tip height of up to 300m (BayWa r.e., 2022). The Project would be potentially located 10 km west of DEH. Based on information on the project website (as of September 2022), the BWF Project is in the preliminary stages and no scoping report has been issued. The potential to view BWF and the Project simultaneously exists and will be assessed in detail during the EIS Phase.

Other wind farm projects:

Other wind farm projects in the area that are currently preparing EIS's include the Burrawong Wind Farm, Baldon Wind Farm and Keri Keri Wind Farm. These are located approximately 125 km west of the Project and therefore, the potential to view these projects simultaneously is limited.



Nearby Wind Farm Projects

Proposed Dinawan Energy Hub Wind Farm

LEGEND

- Project Investigation Area (Dinawan Energy Hub)
- Indicative Project Area of Proposed Wind Farm
- Proposed Dinawan Energy Hub Wind Turbine Location (280 m high)
- Roads
- 8000 m from Dinawan Energy Hub turbine
- 8000 m from Yanco Delta Wind Farm turbine
- Existing 220kV transmission line
- Area within 8,000 m of DEH & YDWF
- National Parks / Nature Reserves / SCA

N

Figure 18 Nearby Wind Farm Projects (Map Source: ESRI)

9.3 Cumulative Impact on Broader Landscape Character

The re-occurrence of wind farms within a region has the potential to alter the perception of the overall landscape character irrespective of being viewed in a single viewshed. It is important to determine whether the effect of multiple wind farms and other major infrastructure within the region would combine to become the dominant visual element, altering the perception of the general landscape character.

The Project is located on a flat terrain and is surrounded by scattered rural dwellings. Due to the flat topography of the region and lack of obtrusive elements, it is likely that there will be areas from which multiple Projects will be visible simultaneously. Further assessment of the cumulative visual impact will be detailed in the EIS, along with a description of the mitigation and management measures being employed to reduce impacts.

10.0 Summary and Recommendations

10.1 Summary of Preliminary Visual Impact Assessment

This PVIA report has been undertaken in accordance with the Visual Assessment Bulletin, and will be submitted with the Scoping Report in the request for SEARs. The following provides a brief summary of the PVIA and outlines the steps that will be undertaken in the Landscape and Visual Impact Assessment (LVIA) which will be undertaken during the EIS Phase of the Project.

10.1.1 Community Consultation

The report outlined the findings of community consultation to date which assisted in establishing the following:

- Key landscape features
- Defined areas of scenic quality and
- Identify key public viewpoints valued by that community.

Next Steps:

Community consultation will be ongoing through the Project. Ongoing input from the community will assist the preparation of the LVIA.

10.1.2 Existing Landscape Character

This PVIA provided a detailed assessment of the existing landscape character of the Study Area through the following:

- Identified land uses, key landscape features and key viewpoints,
- Categorisation of five (5) preliminary Landscape Character Units (LCUs),
- Application of preliminary scenic quality ratings to each of the LCUs ranging from Low - Moderate,
- A brief preliminary overview of the potential visual impacts has been provided for each LCU.

Next Steps:

- Utilise the landscape character assessment to prepare a detailed Visual Baseline Study.
- Identify any additional key features, key viewpoints valued by the community through ongoing consultation.
- Refine the Landscape Character Units and allow the community to provide feedback on the relative scenic quality ratings of LCUs.
- Determine the Visual Influence Zone of key viewpoints and assess against the objectives outlined in the Visual Assessment Bulletin.

10.1.3 Application of the Preliminary Assessment Tools

10.1.3.1 Application of Preliminary Assessment Tool 1 - Visual Magnitude

For the purpose of the Preliminary Assessment, the Visual Magnitude thresholds are based on a 2D assessment of the Project alone. The proposed wind turbines are based on a worst case scenario with a tip height of *280 metres*. The 'black line' intersects at a distance of *3,750 metres* and the 'blue line' intersects at *5,500 metres*. Application of this tool identified dwellings which require further assessment in accordance with the Bulletin. These include:

- Eight (8) non-associated residences within 3,750 metres of the proposed wind turbine locations (within black line of visual magnitude). These are R091, R145, R108, R144, R143, R019, R036 and R088.
- Eight (8) non-associated residences between 3,750 - 5,500 metres of the proposed wind turbine locations (within blue line of visual magnitude). These are R105, R107, R078, R049, R008, R111, R038 and R090.
- Preliminary site assessment identified that existing vegetation would reduce visibility from all dwellings within the black line (3,750 metres) and blue line (5,500 metres) of visual magnitude.
- Preliminary assessment of 13 representative sensitive receptors within 5,500 m of the proposed turbines have been included in **Appendix A**. These assessments illustrate that existing intervening vegetation that surrounds majority of these non-associated residences is likely to reduce views to the Project. Further detailed assessment and site inspections of sensitive receptors to ground-truth this analysis will be undertaken during the EIS phase.

10.1.3.2 Application of Preliminary Assessment Tool 2 - Multiple Wind Turbine Tool (MWTT)

The MWTT was applied to identify 'sensitive receptors' for further assessment in the EIS Phase of the Project.

- The MWTT was applied to all non-associated residences within 8000 m of the nearest proposed turbine. Since the Yanco Delta Wind Farm (YDWF) is located in proximity to the Project, the tool was applied to identify impacts of both wind farms.

- The MWTT identified a total of 25 non-associated residences that will view turbines associated with the Project. Of these, 13 non-associated residences will have views of turbines in up to two (2) 60 degree sectors which is deemed acceptable in accordance with the Bulletin. The remaining 12 non-associated residences have views of turbines in more than two (2) 60 degree sectors.

- Of the 12 non-associated residences that have views in more than two (2) 60 degree sectors, five (5) non-associated residences have views of turbines associated only with the Project (DEH). These residences are R091, R108, R143, R144 and R145. The remaining seven (7) non-associated residences have views of turbines associated with DEH and YDWF. The following provides a summary of findings for non-associated residences that have views of turbines associated with both DEH and YDWF:

  - One (1) non-associated residence [R087] has turbines located within up to three (3) 60 degree sectors. The turbine located nearest to R087 is associated with YDWF.

  - Three (3) non-associated residences [R008, R082, R111] have turbines located within up to four (4) 60 degree sectors. Turbines located nearest to these residences are associated with YDWF.

  - One (1) non-associated residence [R036] has turbines located in up to five (5) 60 degree sectors. The turbine located nearest to R036 is associated with DEH.

  - Two (2) non-associated residences [R088 and R038] have turbines located within up to six (6) 60 degree sectors. Turbines located nearest to these residences are associated with YDWF.

- Yanco Bridge and Rest Area and the Oolambeyan Homestead Picnic Area were identified as a key public viewpoints. Both viewpoints are located more than 8 km away from the Project. An assessment of the potential visual impact on representative viewpoints has been discussed in **Appendix B**.

Next Steps:

- Ground-truthing of all identified non-associated residences.
- Undertake site inspection and detailed dwelling assessment at sensitive non-associated residences.
- The LVIA will assess each ‘sensitive receptor’ in detail to take into account topography, vegetation and other screening factors.
- Determine the potential visual impact of each sensitive receptor and provide mitigation methods to reduce potential visual impacts.

10.1.4 Zone of Visual Influence

A Zone of Visual Influence (ZVI) has been prepared to illustrate the theoretical visibility of the Project and to assist in defining the visual catchment. A Preliminary ZVI have been prepared from the blade tip height of 280 m to illustrate areas which have potential visibility of the Project.

Next Steps:

- The LVIA will require further detailed assessment from areas identified as having potential visibility in the Preliminary ZVIs.
- Graphic representations of the Project using GIS technology including wire frame diagrams and photomontages will be provided in the EIS phase.

10.1.5 Cumulative Visual Impacts of Surrounding Wind Farms

The Project is located within the NSW South West REZ and is potentially located in close proximity of two (2) other wind farms (Yanco Delta Wind Farm and Bullawah Wind Farm). It is important that the Project considers potential cumulative effects on the immediate and broader regional context that it forms a part of.

Next Steps:

Further assessment and justification for placement of turbines in multiple sectors will need to be detailed in the EIS, along with a description of the mitigation and management measures being employed to reduce impacts. Such further assessment may identify that factors such as topography, relative distance and existing vegetation may minimise the impacts of the Project.

References

Australian Energy Market Operator Limited (2020). *2020 Integrated System Plan (ISP) Appendix 5 Renewable Energy Zones*. AEMO.

BayWa r.e. (2022). *Bullawah Wind Farm*. [online] www.baywa-re.com.au. Available at: https://www.baywa-re.com.au/en/wind/projects/bullawah-wind-farm#about-the-project [Accessed 16 Aug. 2022].

Doody, T. and Benyon, R. (2011). *Quantifying water savings from willow removal in Australian streams*. Journal of Environmental Management, 92(3), pp.926–935. doi:10.1016/j.jenvman.2010.10.061.

DPIE (2019). *eSPADE v2.0 | NSW Office of Environment & Heritage*. [online] Nsw.gov.au. Available at: https://www.environment.nsw.gov.au/eSpade2Webapp.

DPIE (2018). *Potential Energy Zones in NSW. AEMO's Integrated System Plan (ISP)*. NSW Department of Planning, Industry and Environment.

Energy NSW (2021). *Electricity Infrastructure Roadmap*. [online] Energy NSW. Available at: https://www.energy.nsw.gov.au/government-and-regulation/electricity-infrastructure-roadmap#-what-is-the-electricity-infrastructure-roadmap.

Energy NSW (2021). *South-West Renewable Energy Zone*. [online] Energy NSW. Available at: https://www.energy.nsw.gov.au/renewables/renewable-energy-zones.

Engie Group (2022). *The Plains Renewable Energy Park*. [online] ENGIE. Available at: https://engie.com.au/home/assets/wind/the-plains [Accessed 16 Aug. 2022].

Environment NSW (2011). *Land Systems of Western New South Wales - SEED*. [online] datasets.seed.nsw.gov.au.

GBD Landscape Architecture (2022). *Yanco Delta wind farm Stage 1 scoping report Preliminary landscape and visual assessment*. Major Projects NSW, pp.271–296.

NSW Office of Environment and Heritage and NPWS (2012). *South West Woodland Nature Reserve Kulki Precinct Fire Management Strategy 2012*. Sydney: NPWS.

NPWS (2000). *Natural Heritage Trust Project Application Form – Acquisition of "Oolambeyan" as a Riverina Bioregional Reserve*. NSW National Parks and Wildlife Services.

NPWS (2003). The Riverina Bioregion. In: *The Bioregions of New South Wales – their biodiversity, conservation and history*. NSW National Parks and Wildlife Service.

NPWS (2006). *Oolambeyan National Park Fire Management Strategy*. [online] Griffith: Western Rivers Region, NSW National Parks and Wildlife Service. Available at: https://www.environment.nsw.gov.au/research-and-publications/publications-search/oolambeyan-national-park-fire-management-strategy.

NPWS (2014a). *Oolambeyan National Park Plan of Management*. Sydney: NSW Office of Environment and Heritage.

NPWS (2014b). *South West Woodland Nature Reserve*. Sydney: NSW Office of Environment and Heritage.

NPWS (2020). *Developments adjacent to NPWS lands: Guidelines for consent and planning authorities*. Sydney: NSW National Parks and Wildlife Service, Department of Planning Industry and Environment.

NSW Planning and Environment (2016). *Wind Energy: Visual Assessment Bulletin For State significant wind energy development*. NSW Department of Planning and Environment.

NSW Department of Planning and Environment (2022). *Major Projects - Department of Planning and Environment. [online] www.planningportal.nsw.gov.au*. Available at: https://www.planningportal.nsw.gov.au/major-projects.

Tudor, C. (2019). *An approach to landscape sensitivity assessment – to inform spatial planning and land management*. UK: Natural England.

Walker, P. J. (1991). *Land System of Western NSW Technical Report No. 25*. Sydney: Soil Conservation Service of NSW.

Maps and Figures:

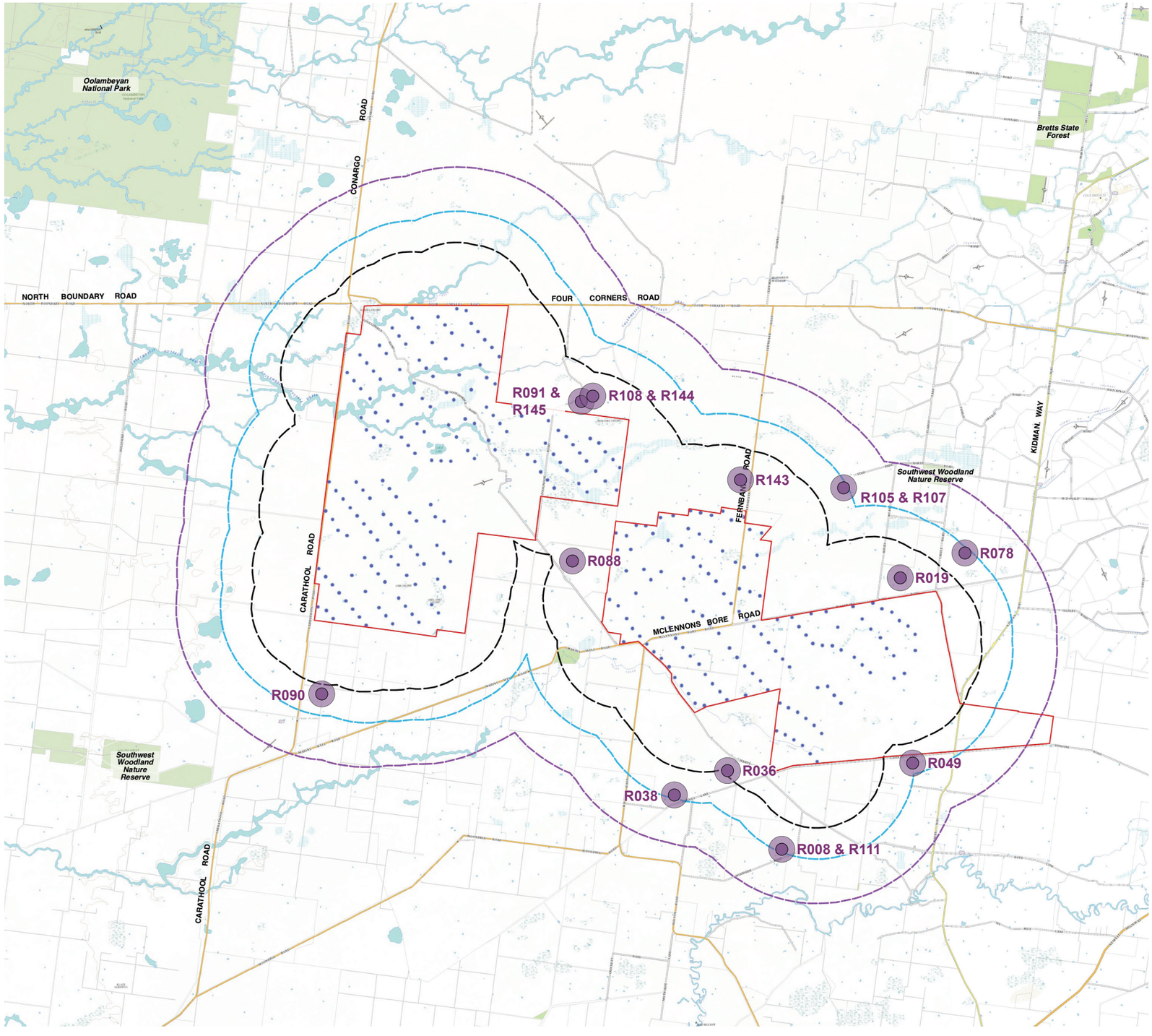
NSW Government Land and Property Information, Spatial Information Exchange SIX Maps, Accessed at: <http://maps.six.nsw.gov.au/> [Accessed between November 2021 – April 2022].

Google Earth Pro 2021 [Viewed November 2021 - April 2022] www.google.com/earth/index.html

Congargo Shire Council (2013). *Conargo Local Environmental Plan 2013* | Planning Portal - Department of Planning and Environment. [online] pp.planningportal.nsw.gov.au.

Appendix A

Preliminary Dwelling Assessments



Preliminary Dwelling Assessment Locations

Proposed Dinawan Energy Hub

LEGEND

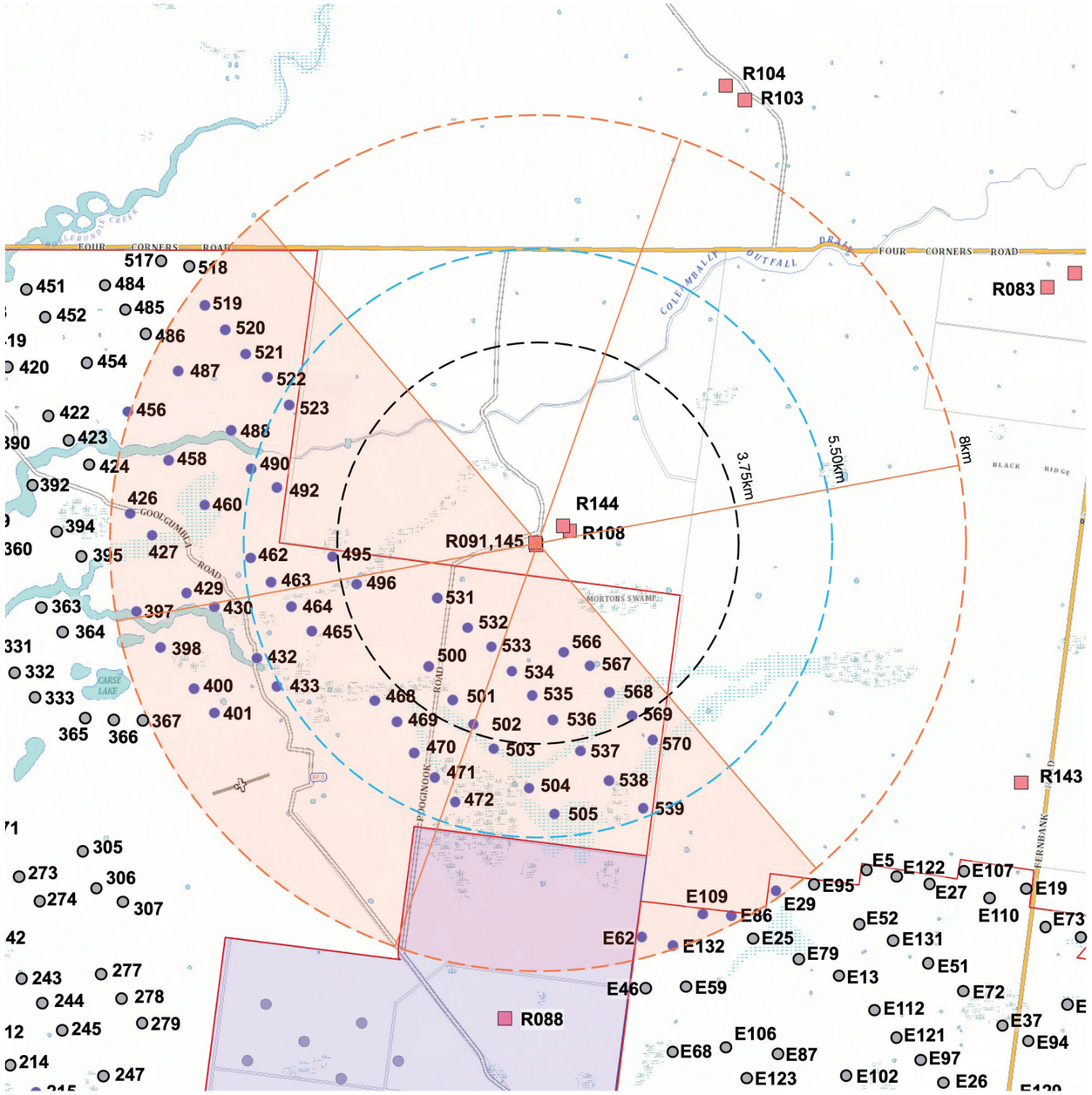
- Project Investigation Area
- Potential Wind Turbine Location (280 m high)
- Main Road
- Minor Road
- 3750 m from turbines
- 5500 m from turbines
- 8000 m from turbines
- National Parks / Nature Reserves
- Preliminary Dwelling Assessment locations

N

0 2 4 6 8 10km

***Appendix A** Preliminary Dwelling Assessment Locations (Map Source: Six Maps)*

A.1 Dwellings **R091 and R145**



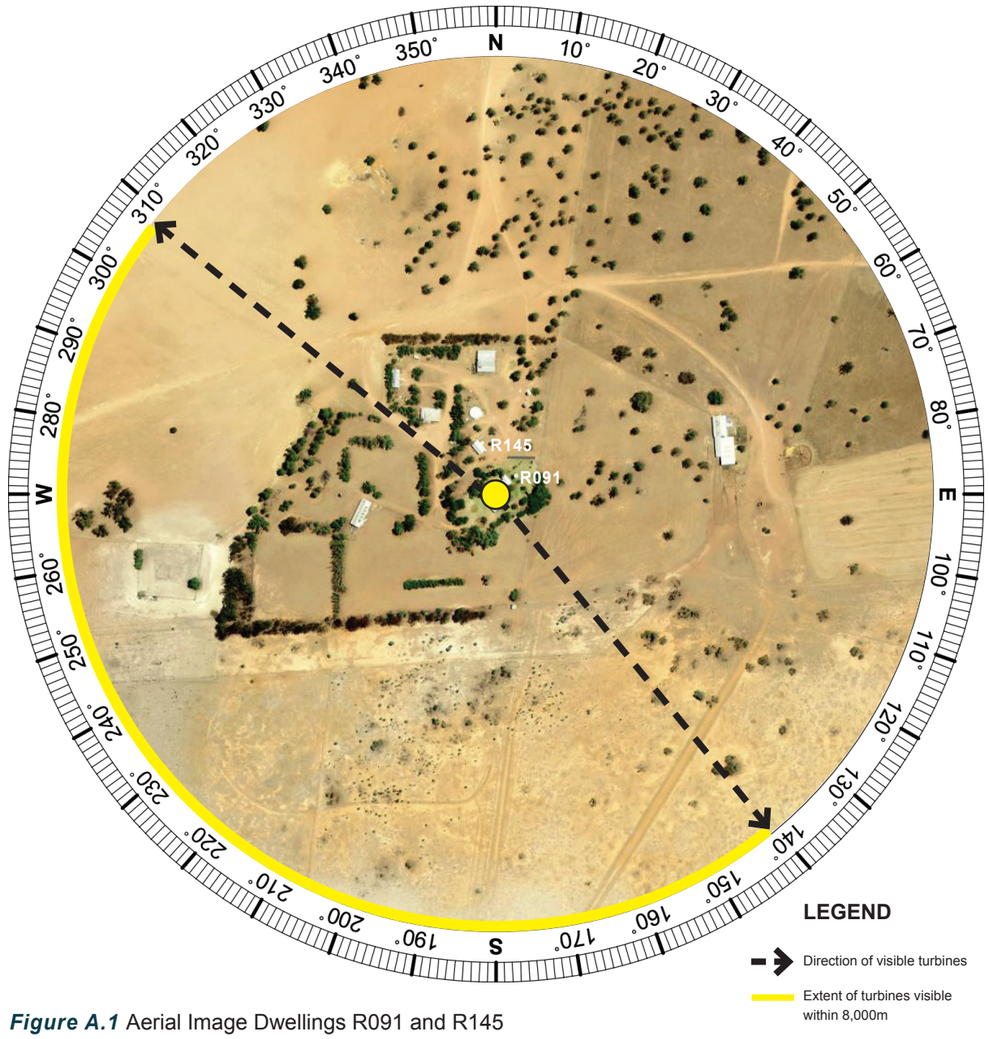
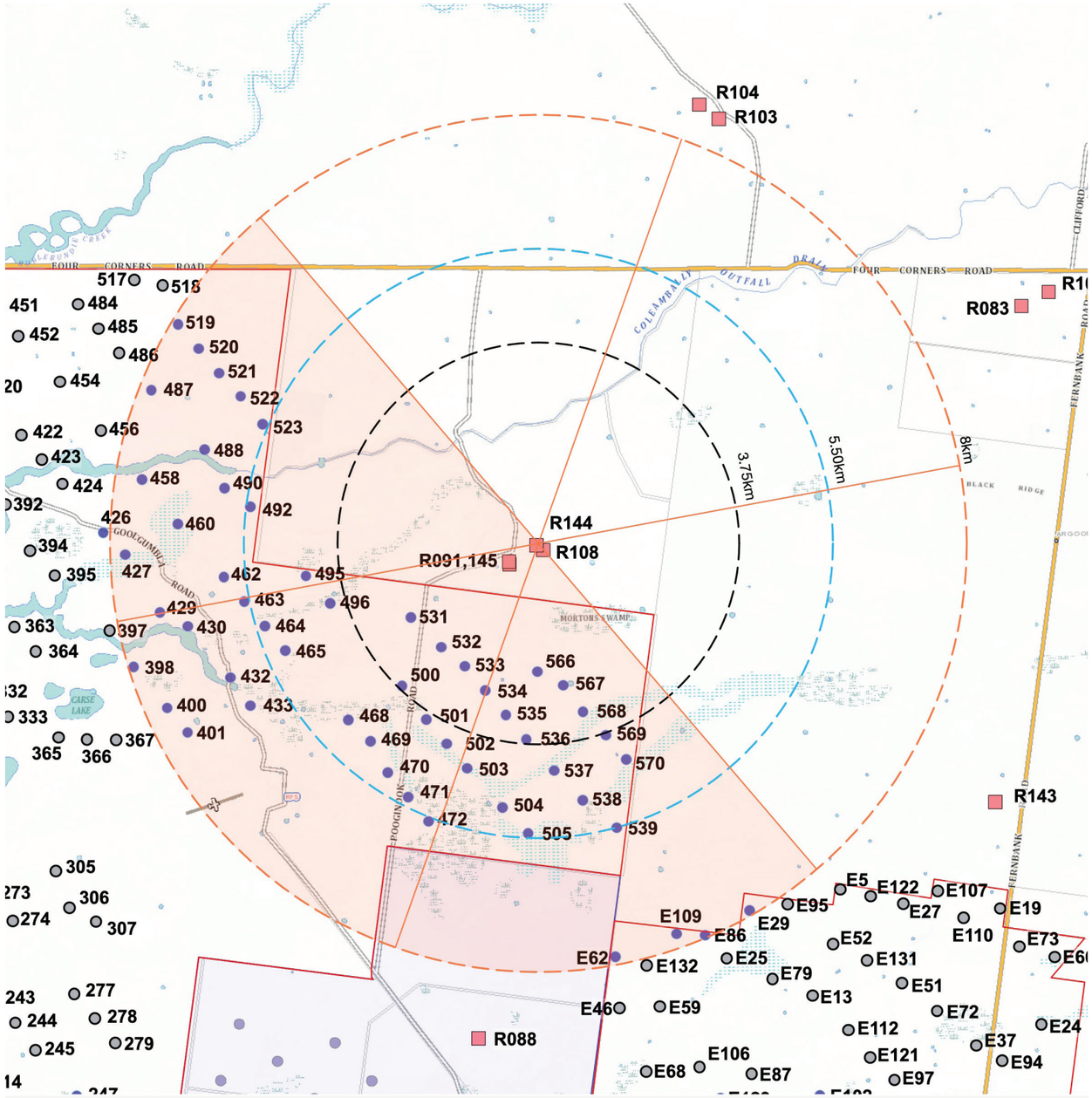


Figure A.1 Aerial Image Dwellings R091 and R145

(Aerial Image Source: SixMaps)

Summary of Preliminary Assessment Tools:	
Distance to Nearest Dinawan Energy Hub Turbine:	**2.02 km**
Number of proposed Dinawan Energy Hub turbines within the black line (3,750 m) of visual magnitude:	**14**
Number of theoretical 60º sectors within 8,000 m (Based on 2D assessment):	**Three (3) sectors [Dinawan Energy Hub]**
Number of potentially visible Dinawan Energy Hub turbines (based on topography alone):	**292 (all at hub height)**

A.2 Dwellings **R108 and R144**



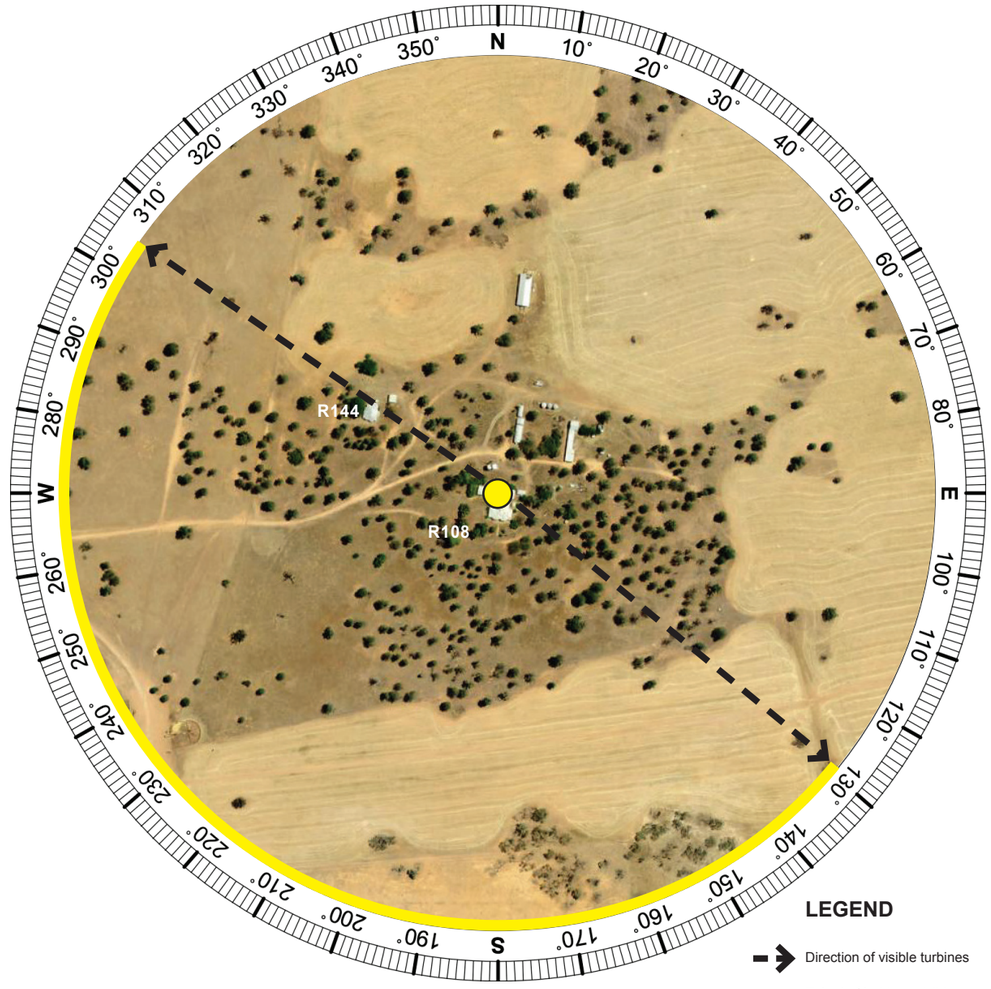
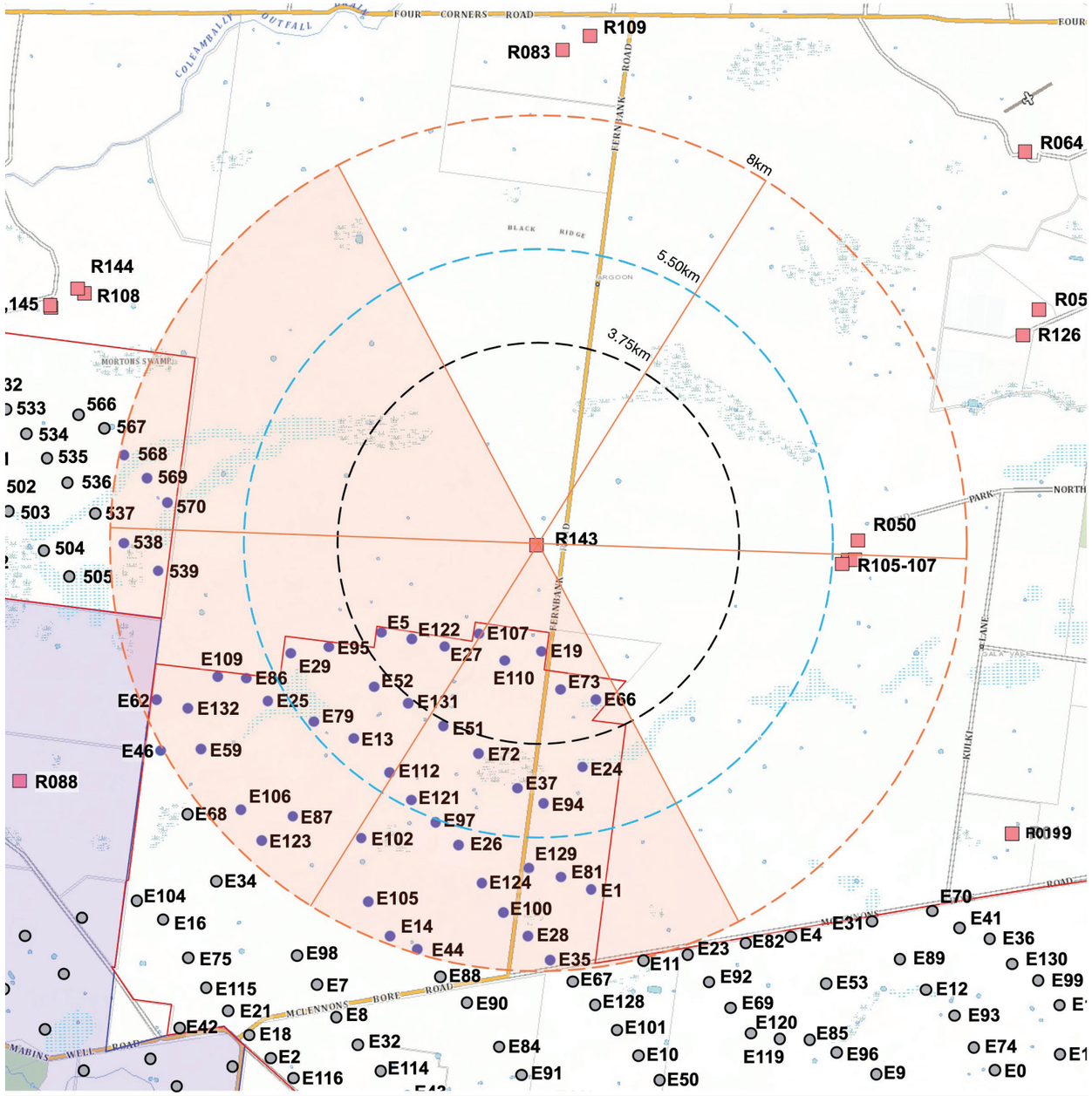


Figure A.2 Aerial Image Dwellings R108 and R144

(Aerial Image Source: SixMaps)

Summary of Preliminary Assessment Tools:	
Distance to Nearest Dinawan Energy Hub Turbine:	**2.35 km**
Number of proposed Dinawan Energy Hub turbines within the black line (3,750 m) of visual magnitude:	**10**
Number of theoretical 60º sectors within 8,000 m (Based on 2D assessment):	**Three (3) sectors [Dinawan Energy Hub]**
Number of potentially visible Dinawan Energy Hub turbines (based on topography alone):	**292 (all at hub height)**

A.3 Dwelling **R143**



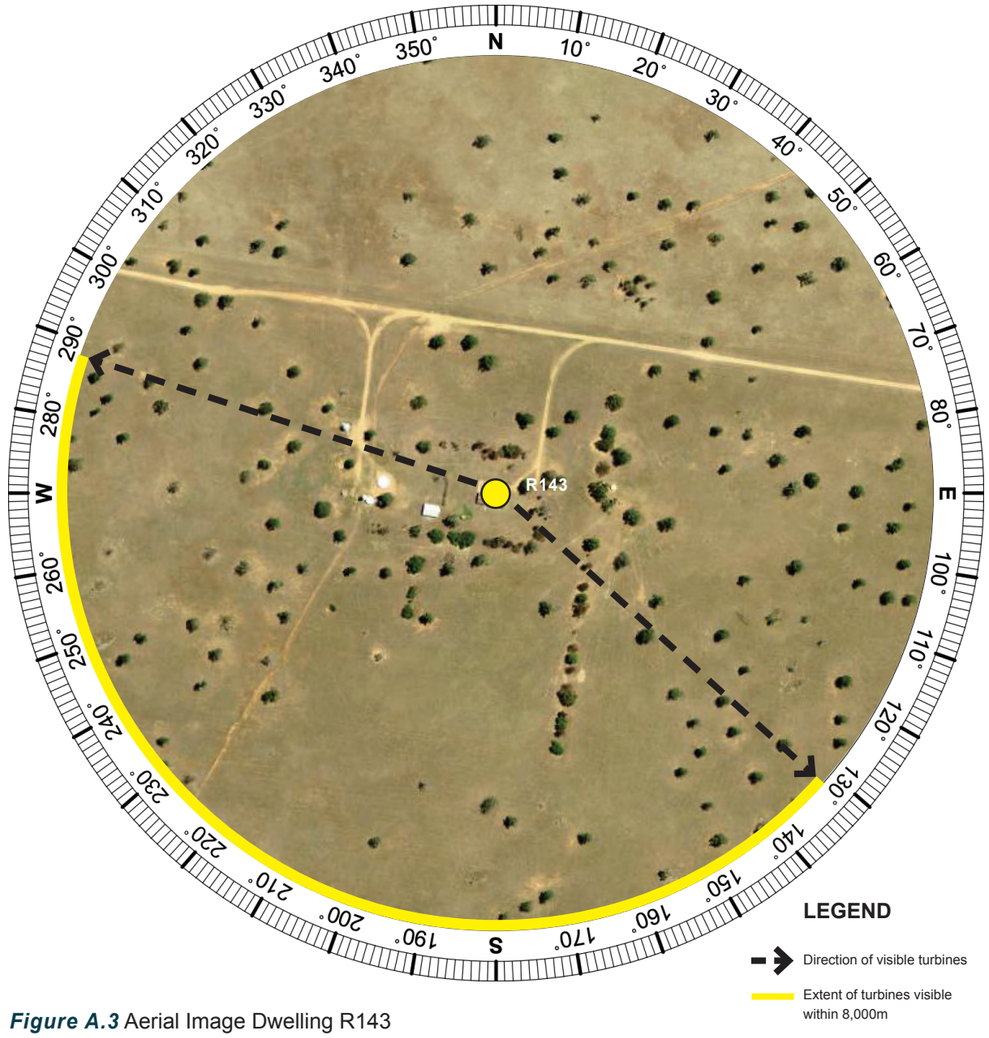
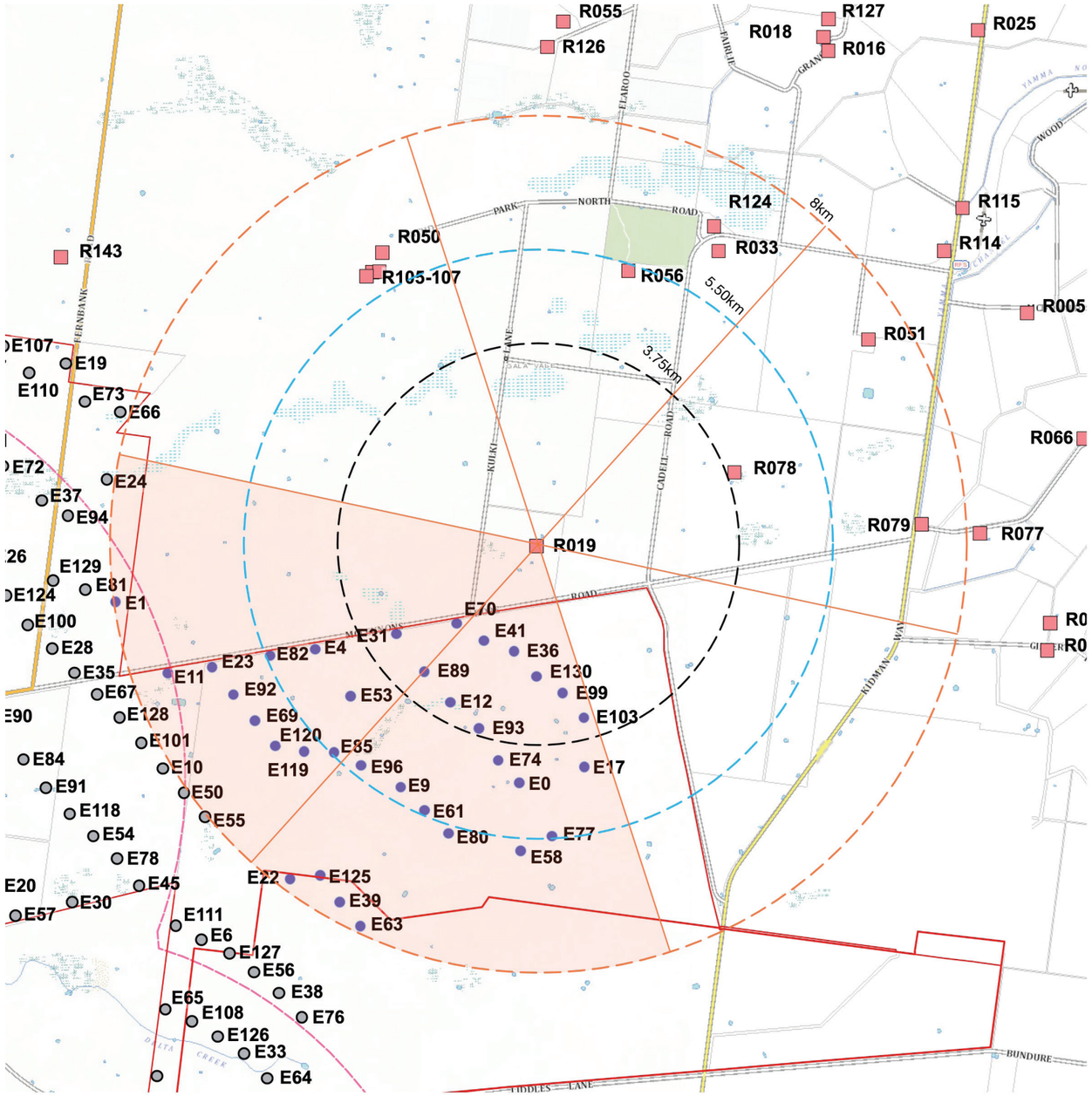


Figure A.3 Aerial Image Dwelling R143

(Aerial Image Source: SixMaps)

Summary of Preliminary Assessment Tools:	
Distance to Nearest Dinawan Energy Hub Turbine:	**1.96 km**
Number of proposed Dinawan Energy Hub turbines within the black line (3,750 m) of visual magnitude:	**8**
Number of theoretical 60º sectors within 8,000 m (Based on 2D assessment):	**Three (3) sectors [Dinawan Energy Hub]**
Number of potentially visible Dinawan Energy Hub turbines (based on topography alone):	**292 (all at hub height)**

A.4 Dwelling **R019**



LEGEND

- Project Area (Dinawan Energy Hub)
- Project Area (Yanco Delta Wind Farm)
- Proposed Dinawan Energy Hub Turbine Location
- Preliminary Yanco Delta Turbine Location
- Proposed Turbine in excess of 8000 m from dwelling
- Non-associated residence
- 60º sector
- 3,750 m from nearest turbine (Black Line)
- 5,500 m from nearest turbine (Blue Line)
- 8,000 m from nearest turbine
- 60º sector with Dinawan Energy Hub turbines within 8,000 m
- 60º sector with Yanco Delta Wind Farm turbines within 8,000 m
- 60º sector with Dinawan Energy Hub and Yanco Delta Wind Farm turbines within 8,000 m

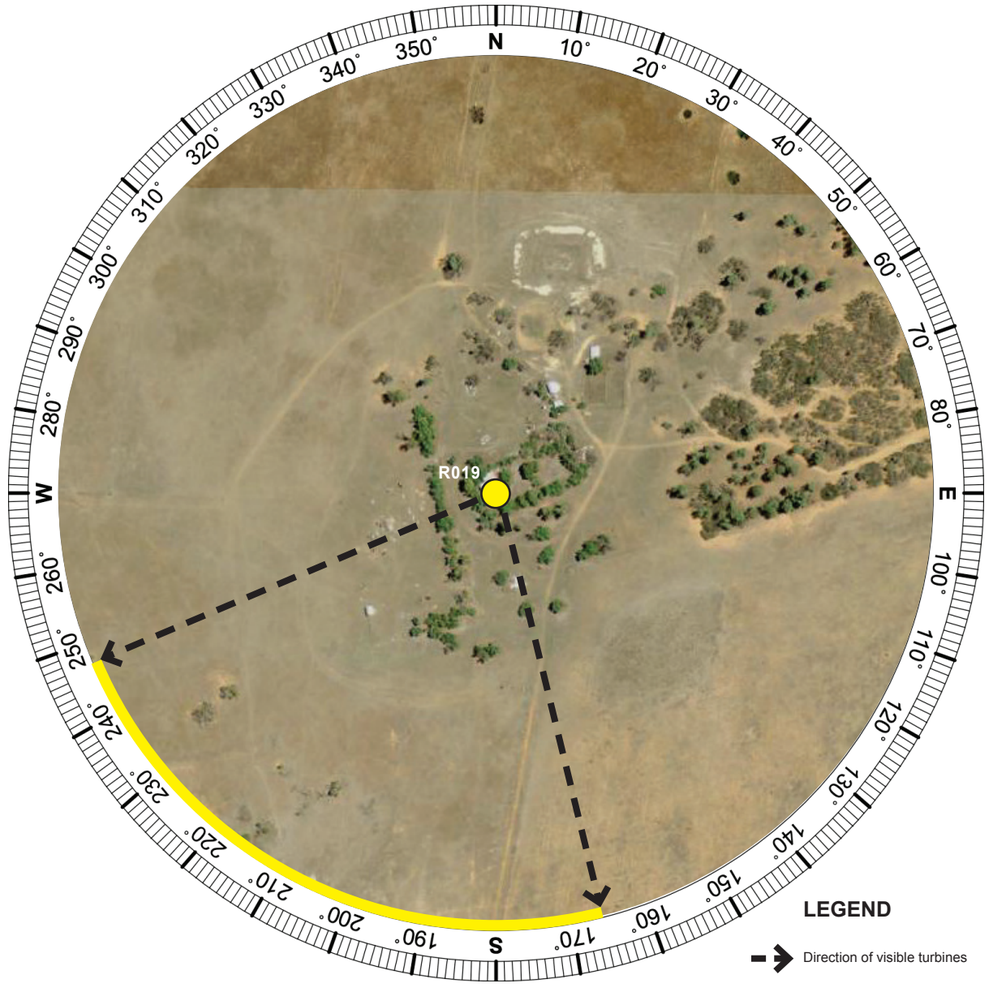
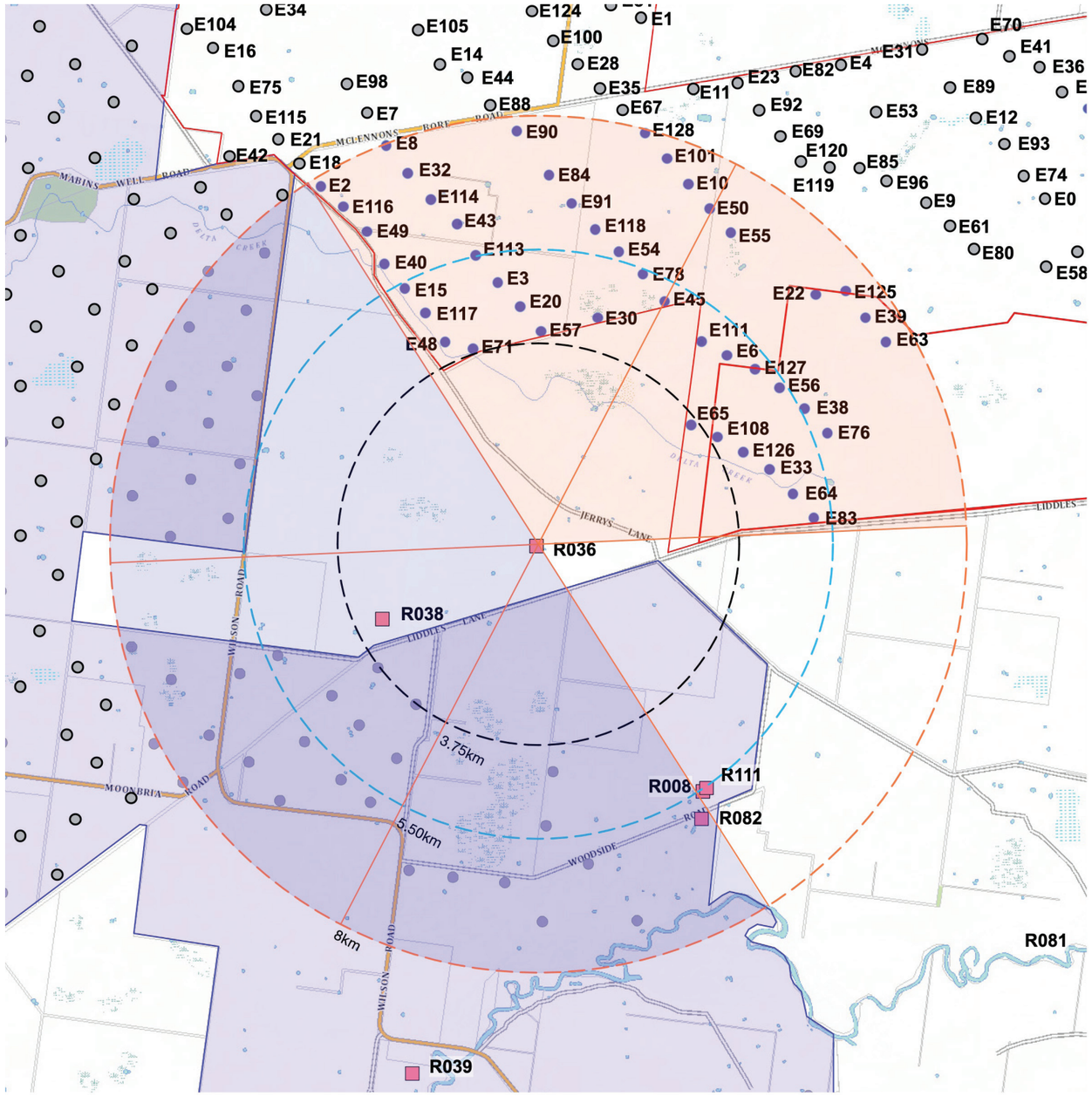


Figure A.4 Aerial Image Dwelling R019

(Aerial Image Source: SixMaps)

Summary of Preliminary Assessment Tools:	
Distance to Nearest Dinawan Energy Hub Turbine:	**2.00 km**
Number of proposed Dinawan Energy Hub turbines within the black line (3,750 m) of visual magnitude:	**10**
Number of theoretical 60º sectors within 8,000 m (Based on 2D assessment):	**Two (2) sectors [Dinawan Energy Hub]**
Number of potentially visible Dinawan Energy Hub turbines (based on topography alone):	**292 (all at hub height)**

A.5 Dwelling **R036**



LEGEND

- Project Area (Dinawan Energy Hub)
- Project Area (Yanco Delta Wind Farm)
- Proposed Dinawan Energy Hub Turbine Location
- Preliminary Yanco Delta Turbine Location
- Proposed Turbine in excess of 8000 m from dwelling
- Non-associated residence
- 60º sector
- 3,750 m from nearest turbine (Black Line)
- 5,500 m from nearest turbine (Blue Line)
- 8,000 m from nearest turbine
- 60º sector with Dinawan Energy Hub turbines within 8,000 m
- 60º sector with Yanco Delta Wind Farm turbines within 8,000 m
- 60º sector with Dinawan Energy Hub and Yanco Delta Wind Farm turbines within 8,000 m

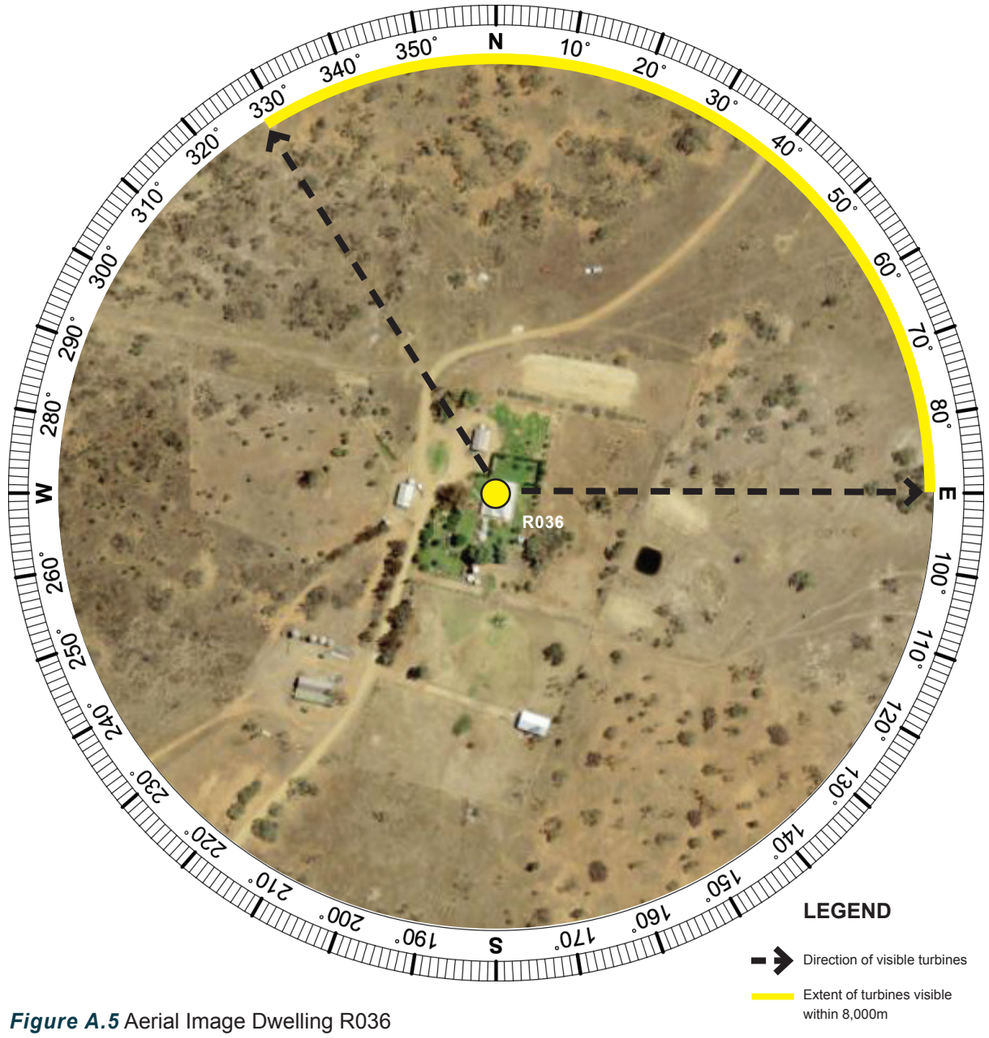
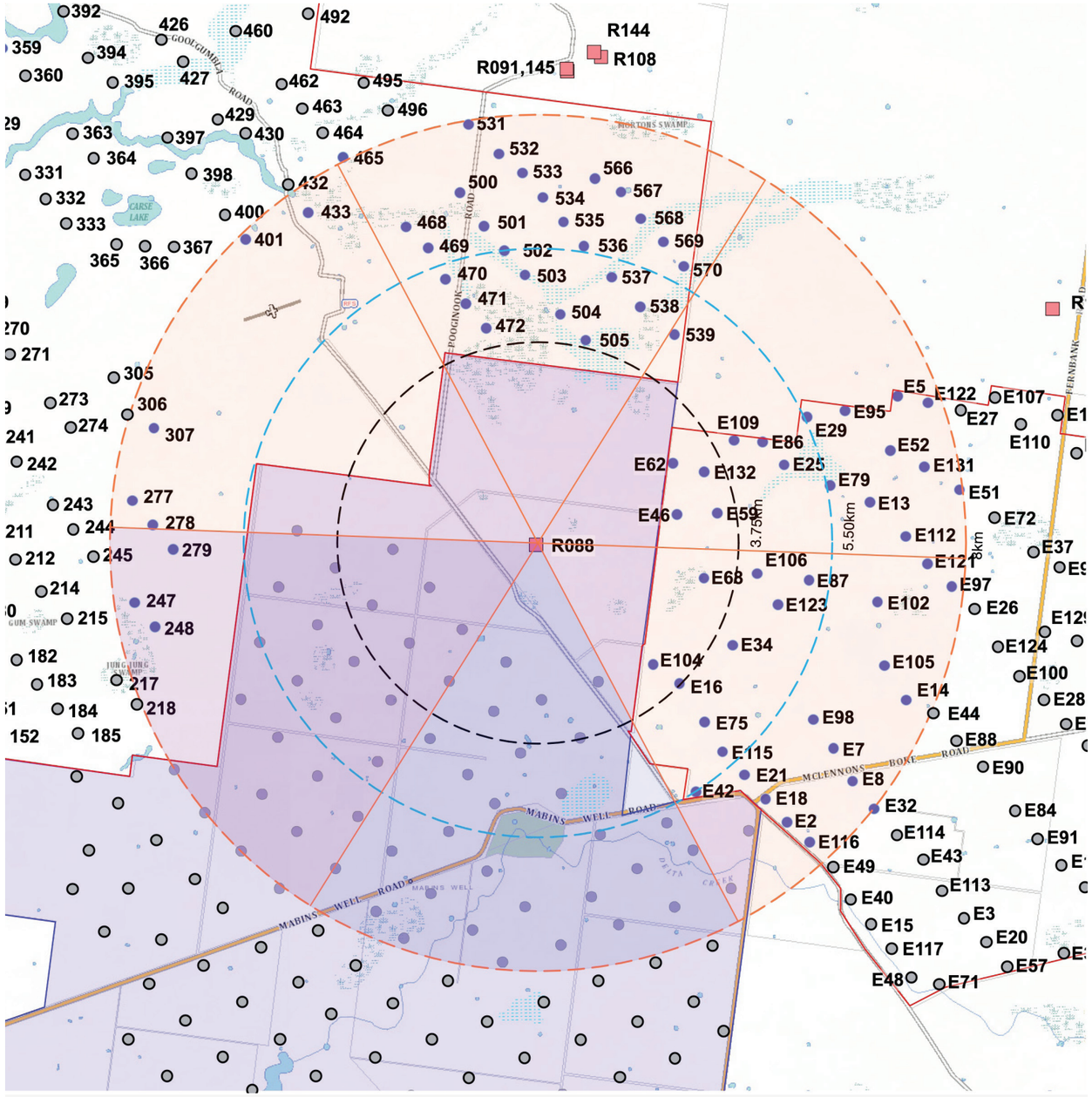


Figure A.5 Aerial Image Dwelling R036

(Aerial Image Source: SixMaps)

Summary of Preliminary Assessment Tools:	
Distance to Nearest Dinawan Energy Hub Turbine:	**3.67 km**
Number of proposed Dinawan Energy Hub turbines within the black line (3,750 m) of visual magnitude:	**1**
Number of theoretical 60º sectors within 8,000 m (Based on 2D assessment):	**Two (2) sectors [Dinawan Energy Hub]; three (3) sectors [Yanco Delta Wind Farm]**
Number of potentially visible Dinawan Energy Hub turbines (based on topography alone):	**292 (all at hub height)**

A.6 Dwelling **R088**



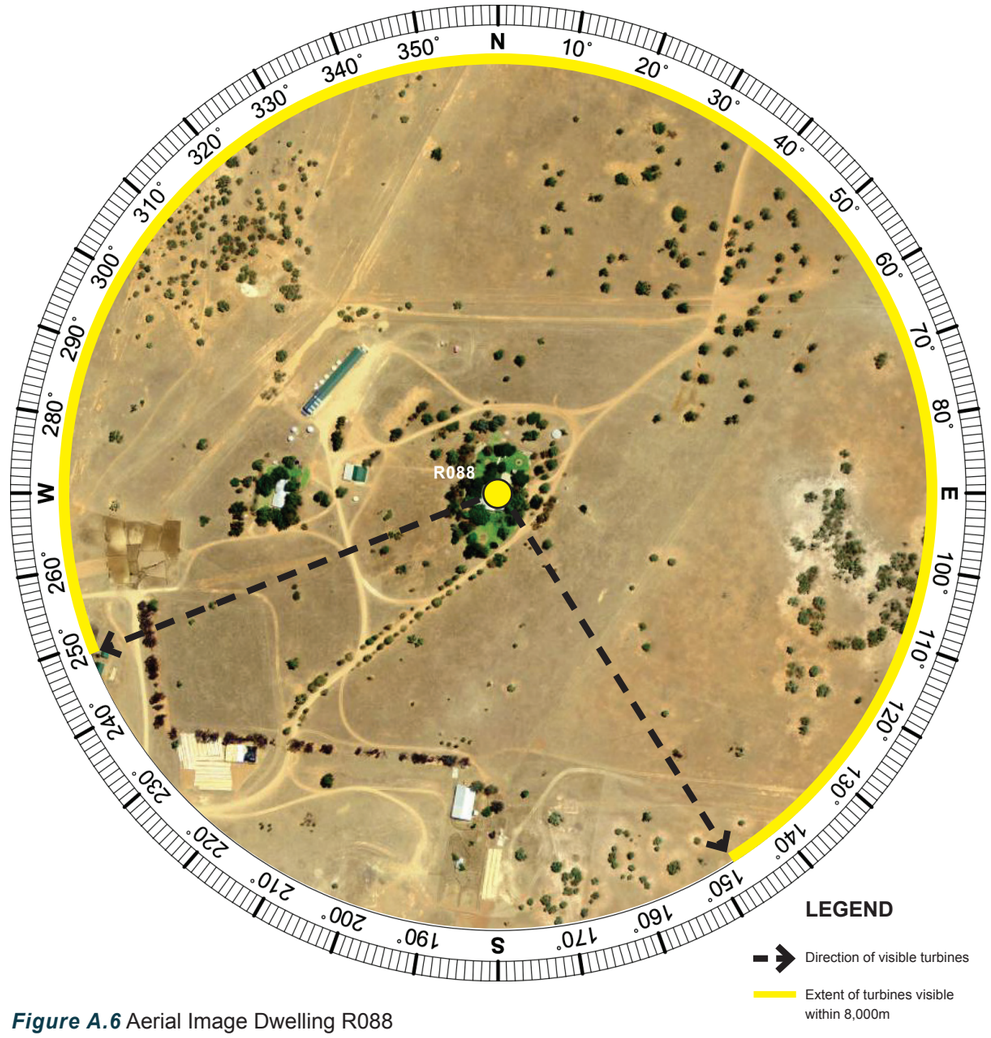
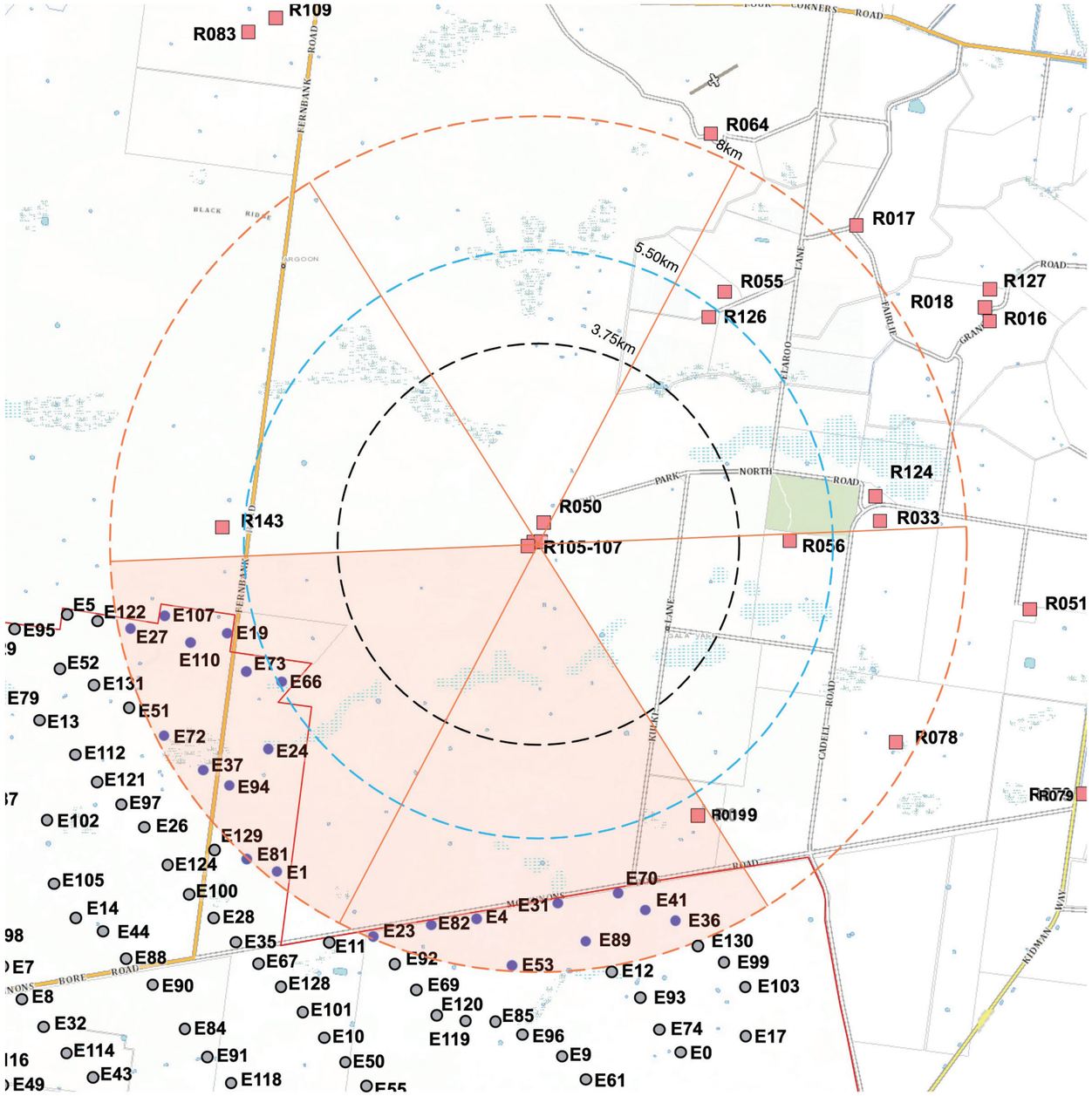


Figure A.6 Aerial Image Dwelling R088

(Aerial Image Source: SixMaps)

Summary of Preliminary Assessment Tools:	
Distance to Nearest Dinawan Energy Hub Turbine:	**2.70 km**
Number of proposed Dinawan Energy Hub turbines within the black line (3,750 m) of visual magnitude:	**7**
Number of theoretical 60º sectors within 8,000 m (Based on 2D assessment):	**Four (4) sectors [Dinawan Energy Hub]; one (1) sector [Yanco Delta Wind Farm]; one (1) sector [Dinawan Energy Hub and Yanco Delta Wind Farm]**
Number of potentially visible Dinawan Energy Hub turbines (based on topography alone):	**292 (all at hub height)**

A.7 Dwellings **R105 and107**



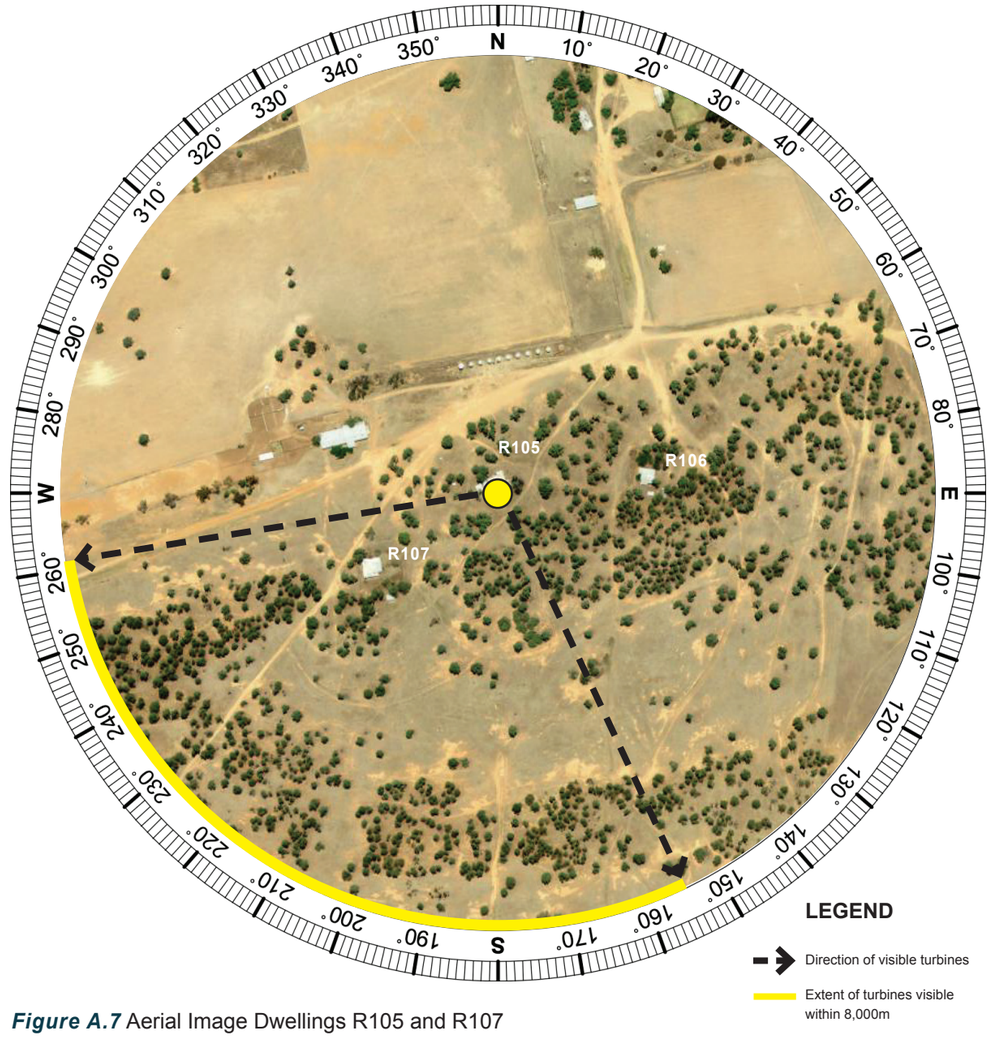
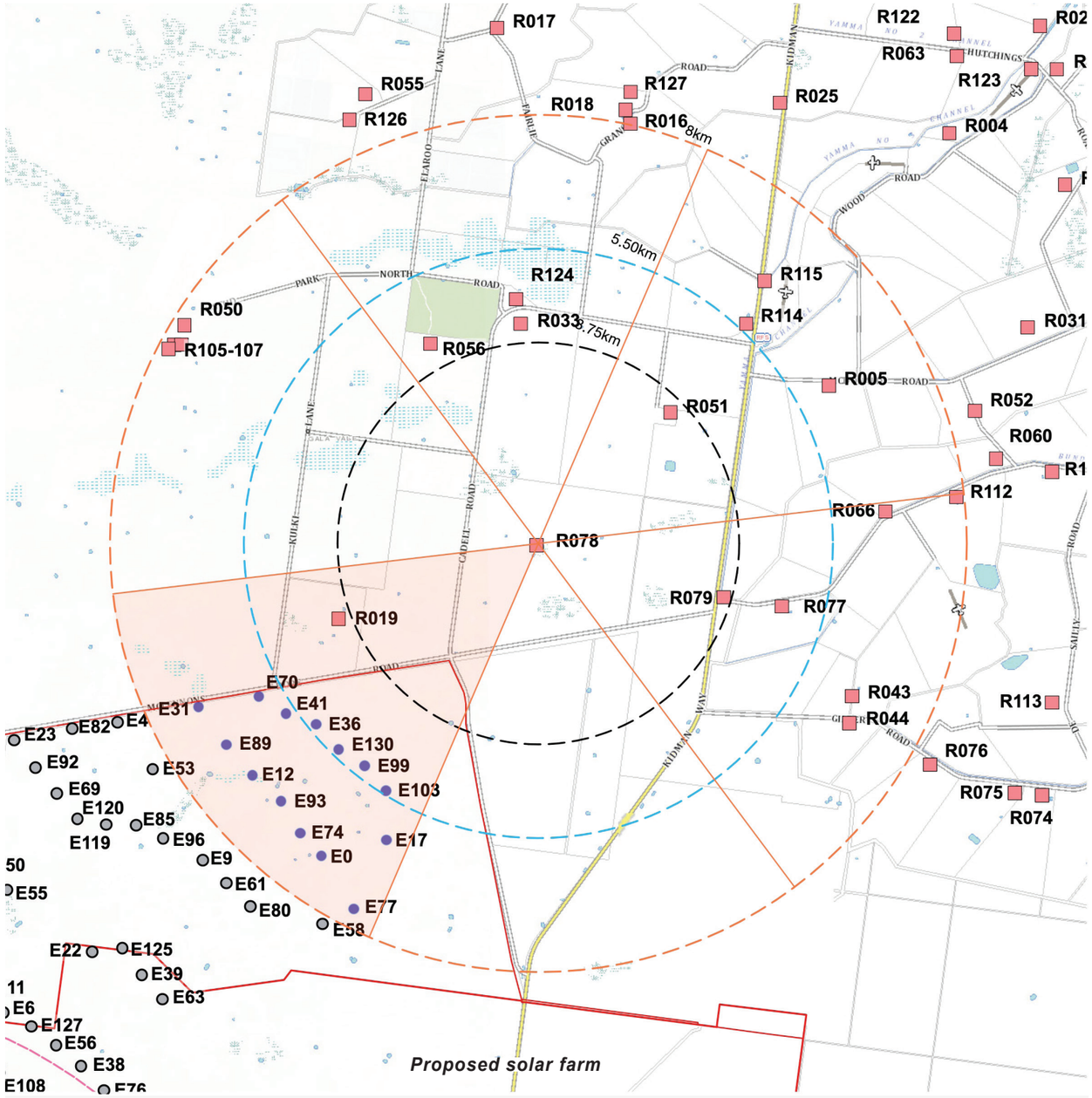


Figure A.7 Aerial Image Dwellings R105 and R107

(Aerial Image Source: SixMaps)

Summary of Preliminary Assessment Tools:	
Distance to Nearest Dinawan Energy Hub Turbine:	**5.49 km**
Number of proposed Dinawan Energy Hub turbines within the blue line (5,500 m) of visual magnitude:	**1**
Number of theoretical 60º sectors within 8,000 m (Based on 2D assessment):	**Two (2) sectors [Dinawan Energy Hub]**
Number of potentially visible Dinawan Energy Hub turbines (based on topography alone):	**292 (all at hub height)**

A.8 Dwelling **R078**



LEGEND

- Project Area (Dinawan Energy Hub)
- Project Area (Yanco Delta Wind Farm)
- Proposed Dinawan Energy Hub Turbine Location
- Preliminary Yanco Delta Turbine Location
- Proposed Turbine in excess of 8000 m from dwelling
- Non-associated residence
- 60º sector
- 3,750 m from nearest turbine (Black Line)
- 5,500 m from nearest turbine (Blue Line)
- 8,000 m from nearest turbine
- 60º sector with Dinawan Energy Hub turbines within 8,000 m
- 60º sector with Yanco Delta Wind Farm turbines within 8,000 m
- 60º sector with Dinawan Energy Hub and Yanco Delta Wind Farm turbines within 8,000 m

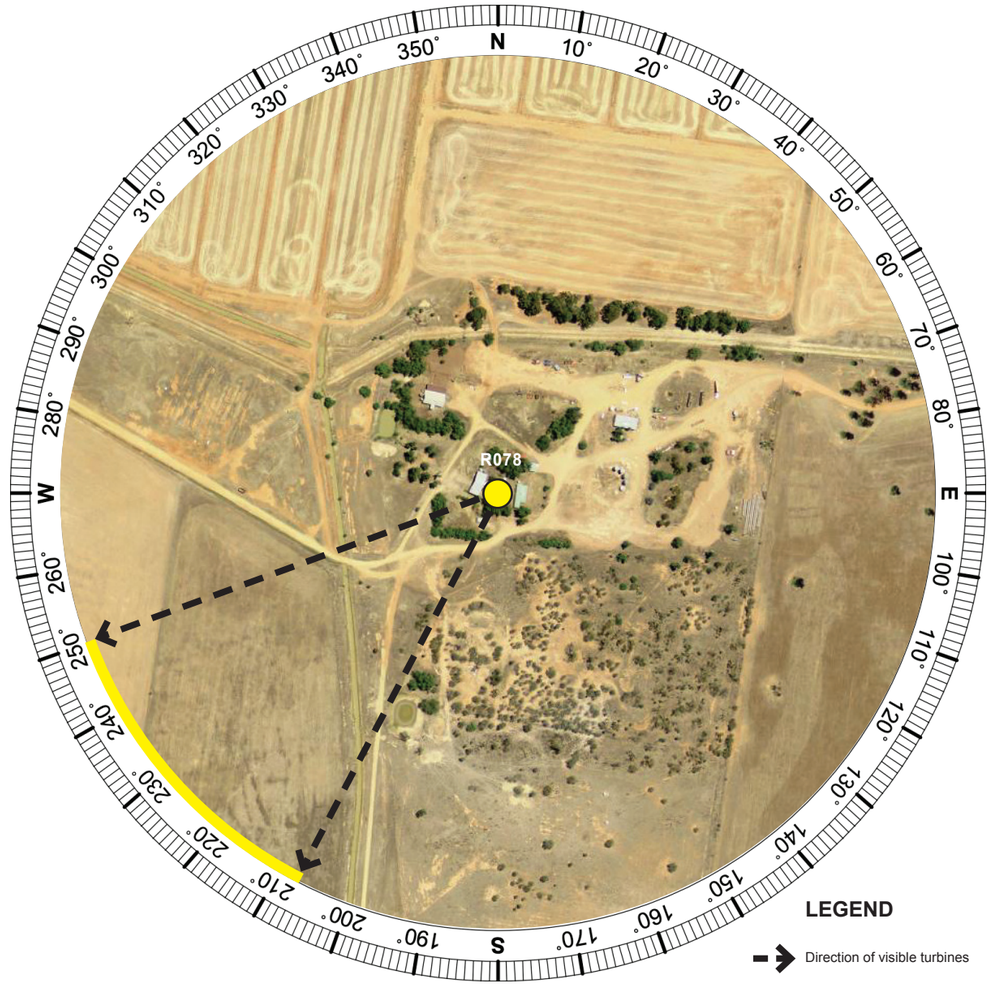
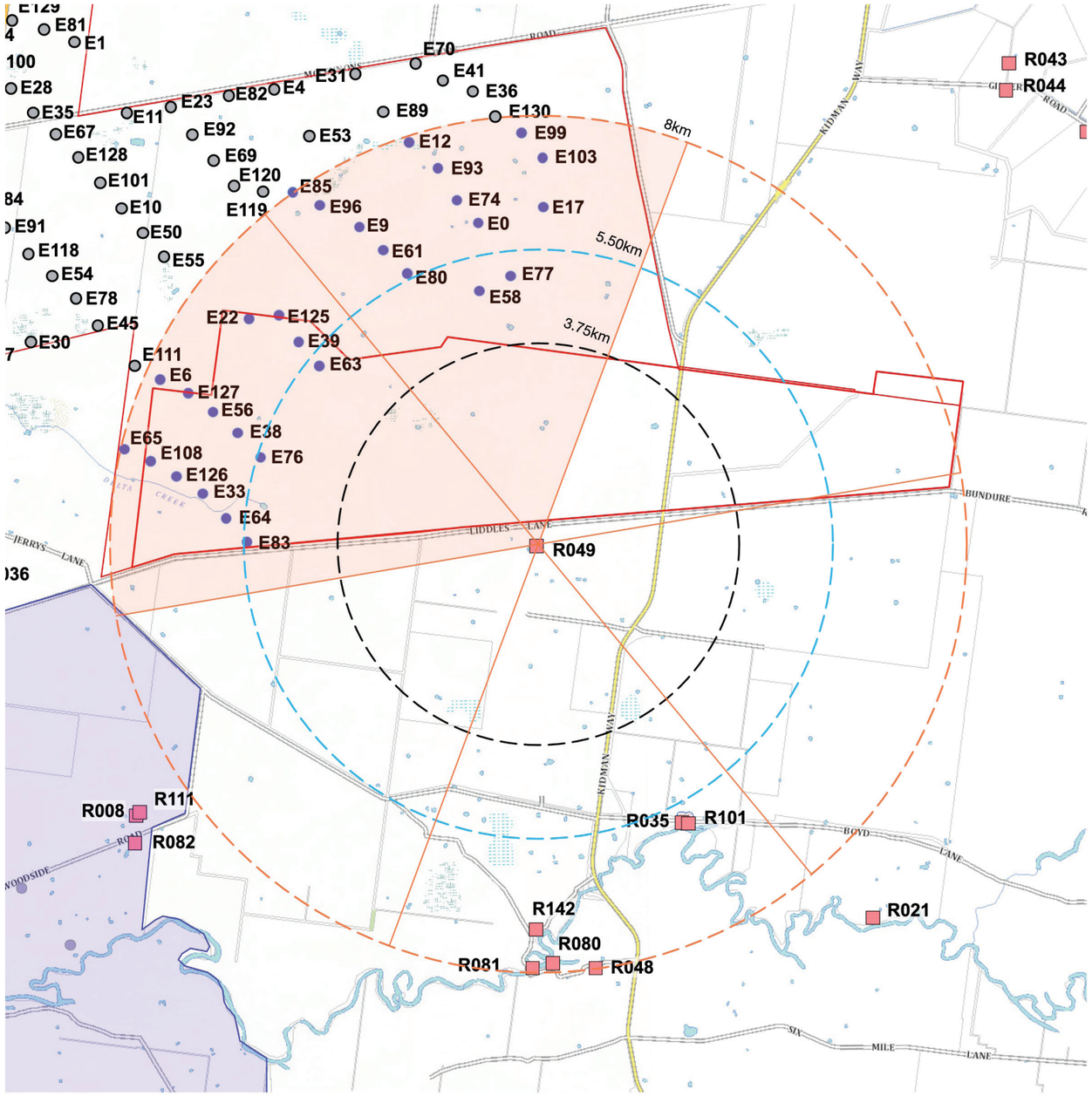


Figure A.8 Aerial Image Dwelling R078

(Aerial Image Source: SixMaps)

Summary of Preliminary Assessment Tools:	
Distance to Nearest Dinawan Energy Hub Turbine:	**5.21 km**
Number of proposed Dinawan Energy Hub turbines within the blue line (5,500 m) of visual magnitude:	**4**
Number of theoretical 60º sectors within 8,000 m (Based on 2D assessment):	**One (1) sector [Dinawan Energy Hub]**
Number of potentially visible Dinawan Energy Hub turbines (based on topography alone):	**292 (all at hub height)**

A.9 Dwelling **R049**



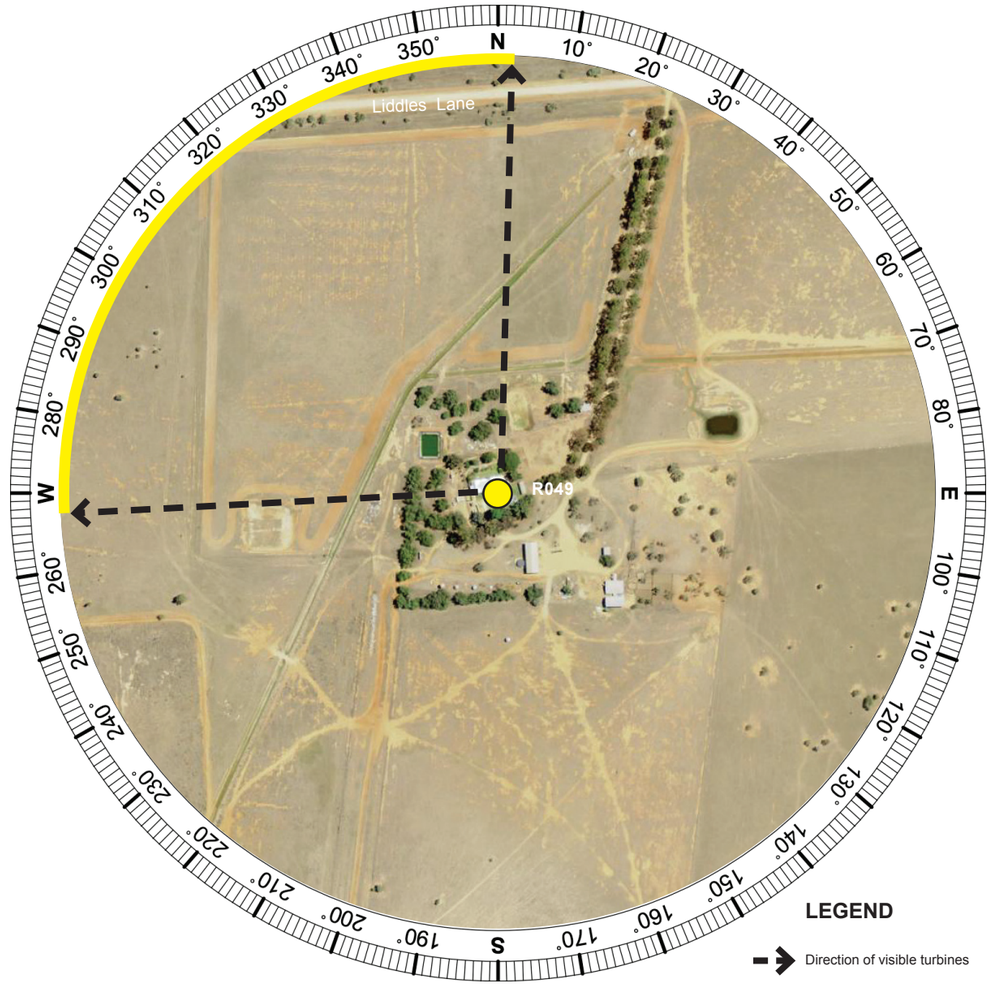
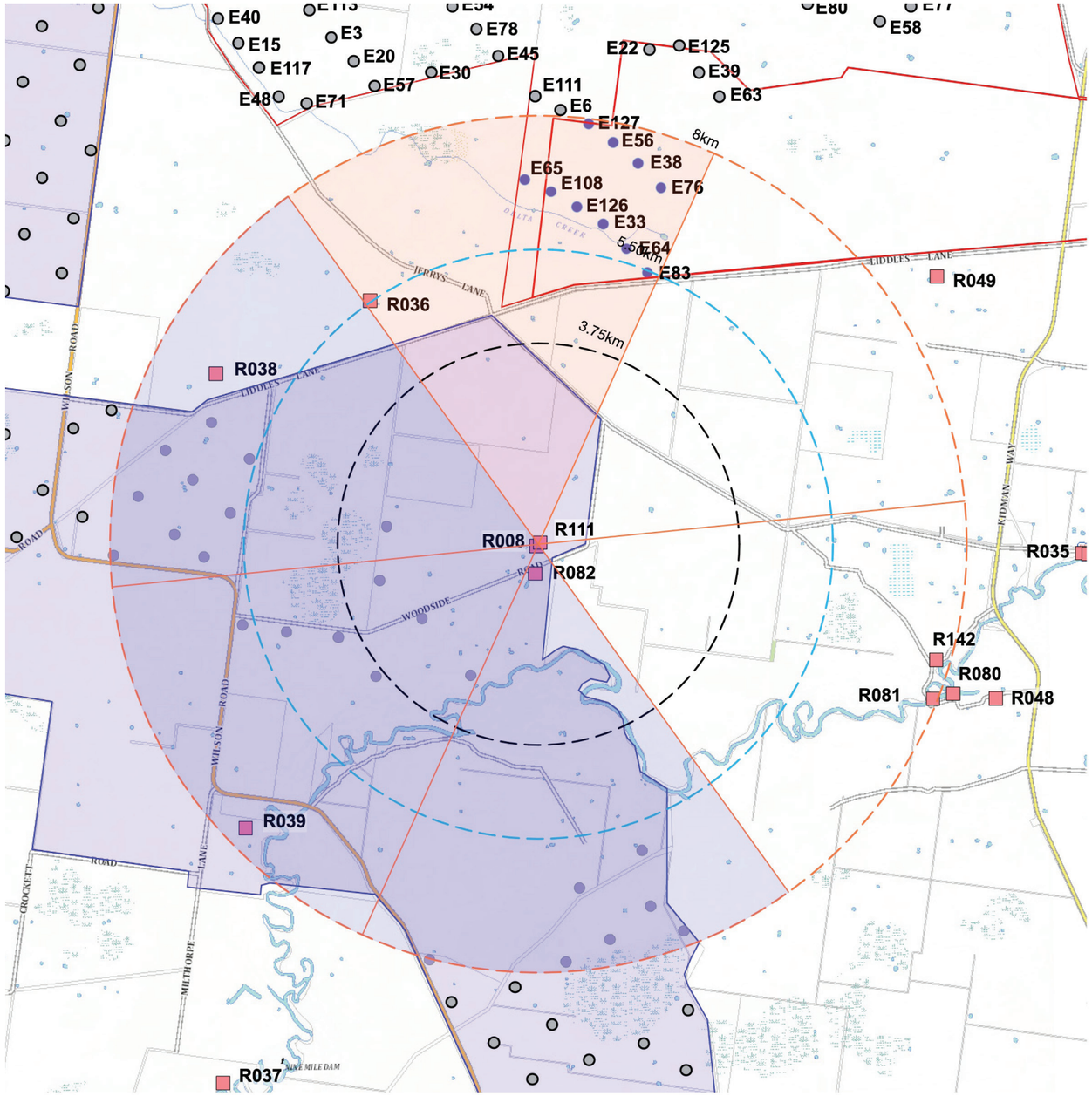


Figure A.9 Aerial Image Dwelling R049

(Aerial Image Source: SixMaps)

Summary of Preliminary Assessment Tools:	
Distance to Nearest Dinawan Energy Hub Turbine:	**4.88 km**
Number of proposed Dinawan Energy Hub turbines within the blue line (5,500 m) of visual magnitude:	**5**
Number of theoretical 60º sectors within 8,000 m (Based on 2D assessment):	**Two (2) sectors [Dinawan Energy Hub]**
Number of potentially visible Dinawan Energy Hub turbines (based on topography alone):	**292 (all at hub height)**

A.10 Dwellings **R008 and R111**



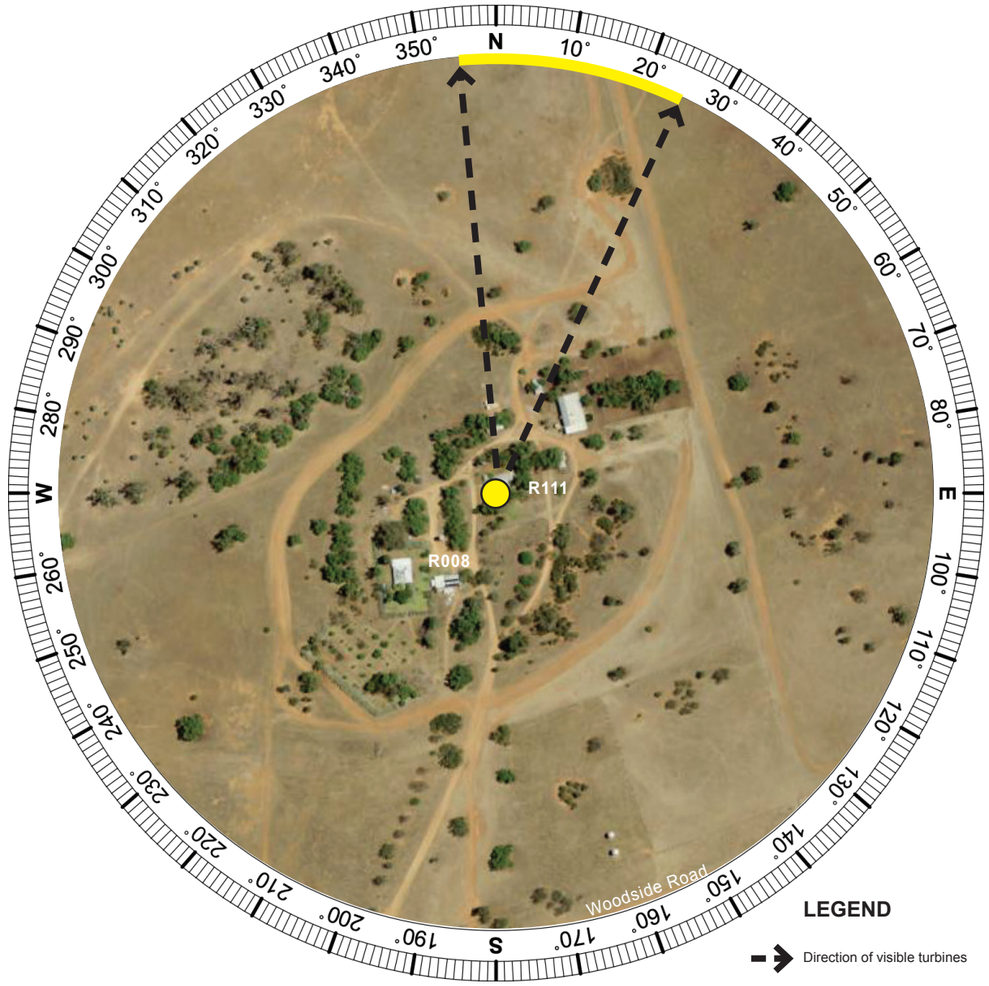
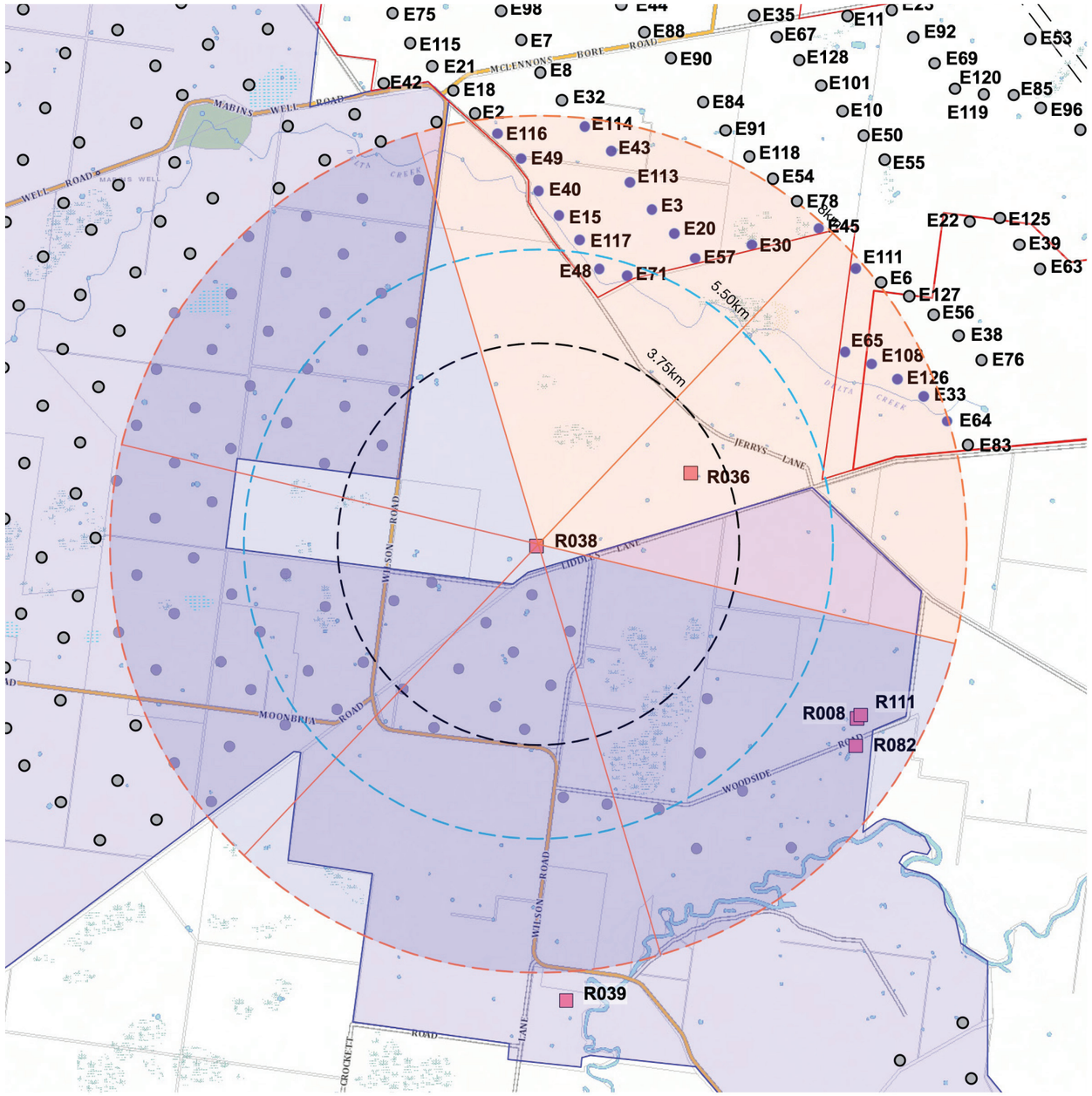


Figure A.10 Aerial Image Dwelling R008 and R011

(Aerial Image Source: SixMaps)

Summary of Preliminary Assessment Tools:	
Distance to Nearest Dinawan Energy Hub Turbine:	**5.43 km**
Number of proposed Dinawan Energy Hub turbines within the blue line (5,500 m) of visual magnitude:	**1**
Number of theoretical 60º sectors within 8,000 m (Based on 2D assessment):	**One (1) sector [Dinawan Energy Hub]; three (3) sectors [Yanco Delta Wind Farm]**
Number of potentially visible Dinawan Energy Hub turbines (based on topography alone):	**292 (all at hub height)**

A.11 Dwelling **R038**



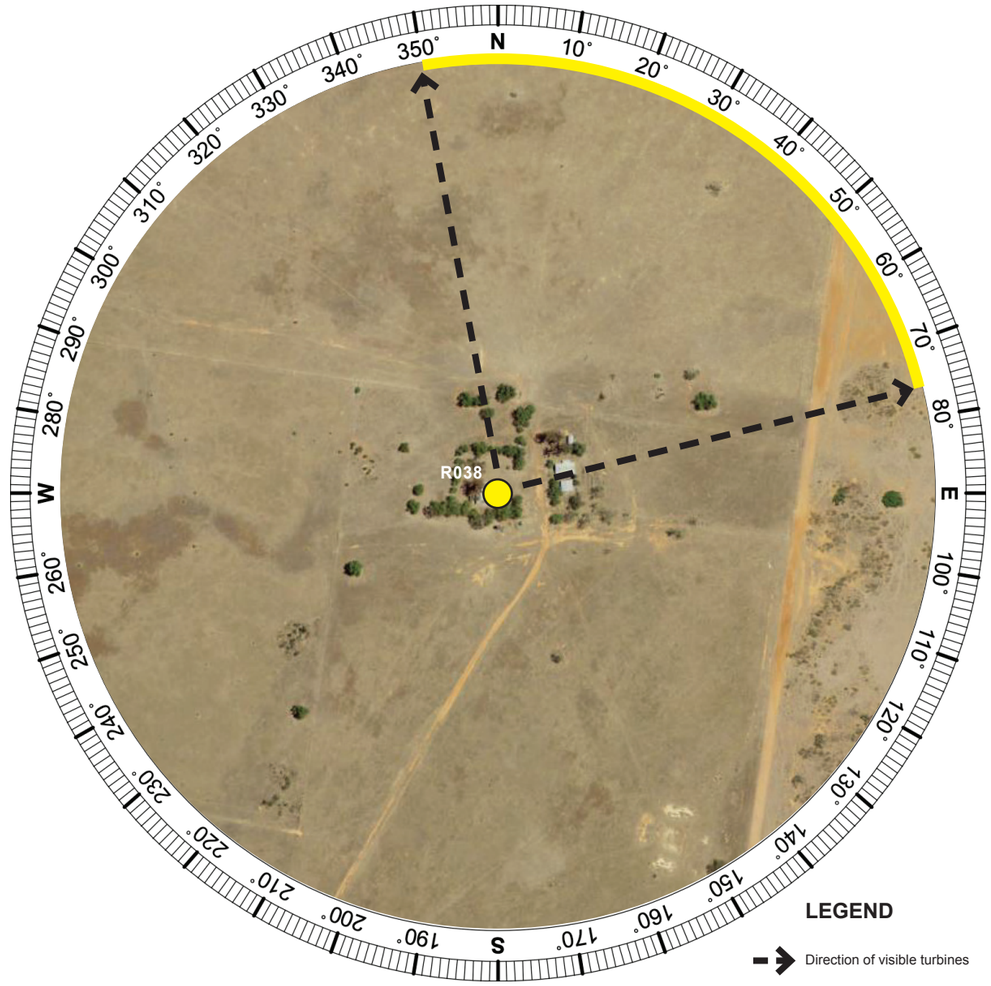
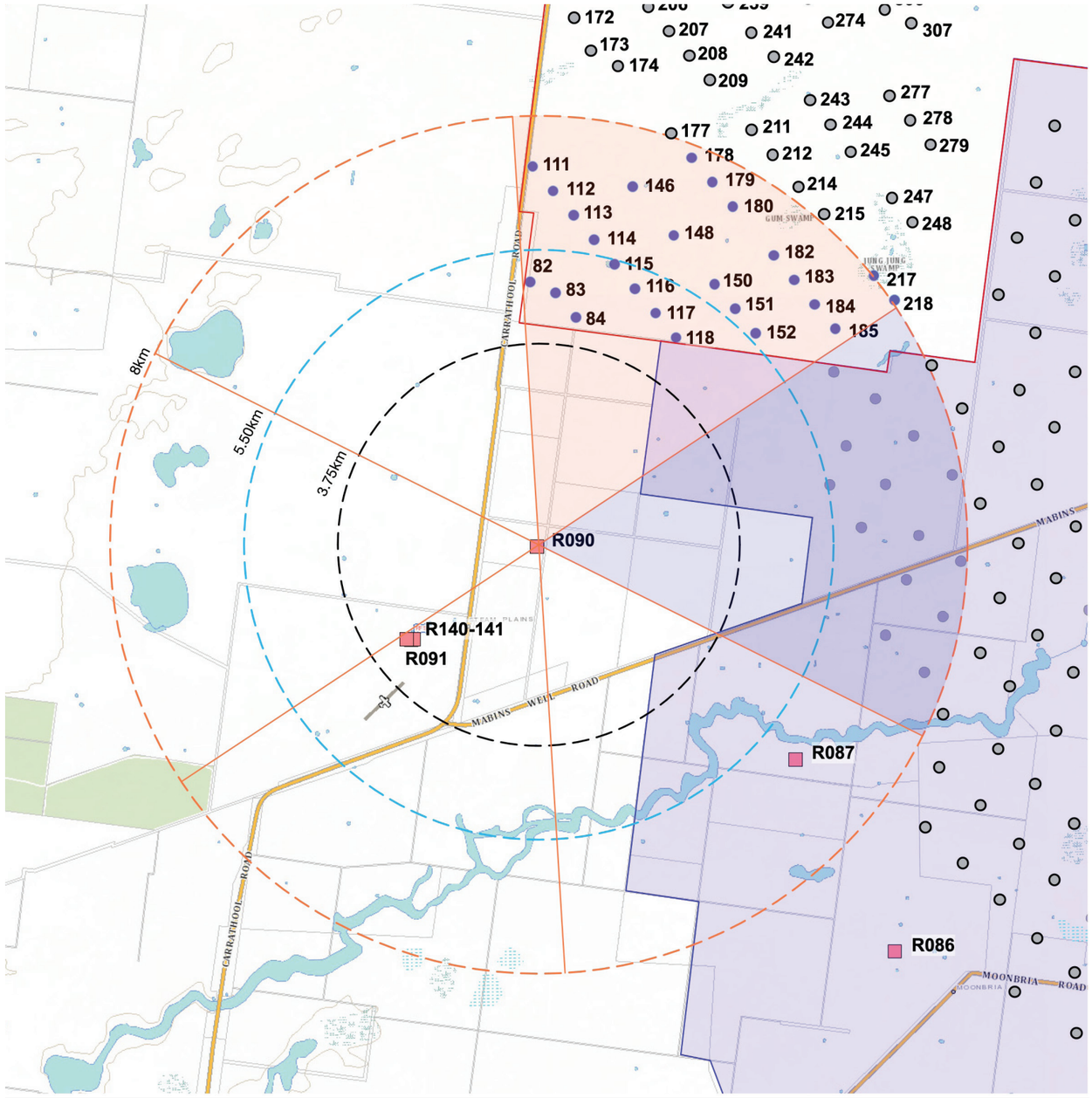


Figure A.11 Aerial Image Dwelling R038

(Aerial Image Source: SixMaps)

Summary of Preliminary Assessment Tools:	
Distance to Nearest Dinawan Energy Hub Turbine:	**5.31 km**
Number of proposed Dinawan Energy Hub turbines within the blue line (5,500 m) of visual magnitude:	**2**
Number of theoretical 60º sectors within 8,000 m (Based on 2D assessment):	**Two (2) sectors [Dinawan Energy Hub]; four (4) sectors [Yanco Delta Wind Farm]**
Number of potentially visible Dinawan Energy Hub turbines (based on topography alone):	**292 (all at hub height)**

A.12 Dwelling **R090**



LEGEND

- Project Area (Dinawan Energy Hub)
- Project Area (Yanco Delta Wind Farm)
- Proposed Dinawan Energy Hub Turbine Location
- Preliminary Yanco Delta Turbine Location
- Proposed Turbine in excess of 8000 m from dwelling
- Non-associated residence
- 60º sector
- 3,750 m from nearest turbine (Black Line)
- 5,500 m from nearest turbine (Blue Line)
- 8,000 m from nearest turbine
- 60º sector with Dinawan Energy Hub turbines within 8,000 m
- 60º sector with Yanco Delta Wind Farm turbines within 8,000 m
- 60º sector with Dinawan Energy Hub and Yanco Delta Wind Farm turbines within 8,000 m

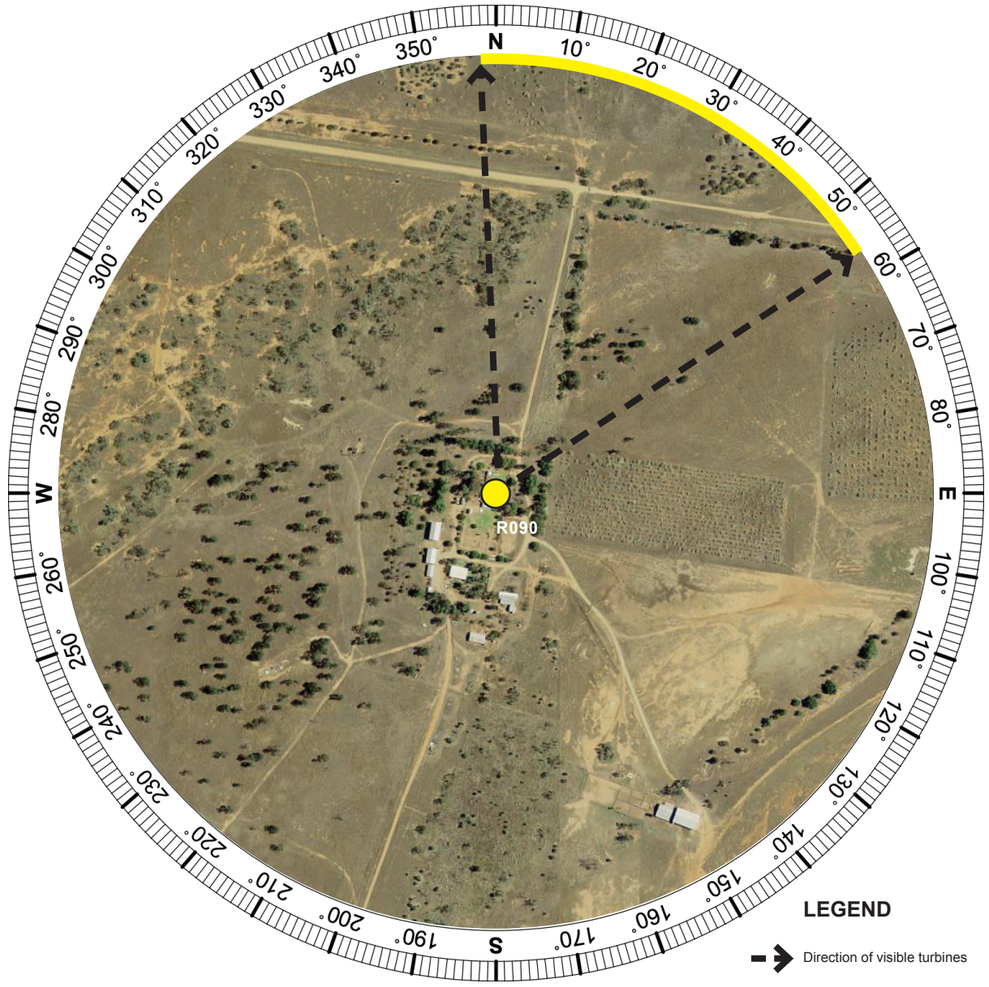


Figure A.12 Aerial Image Dwelling R090

(Aerial Image Source: SixMaps)

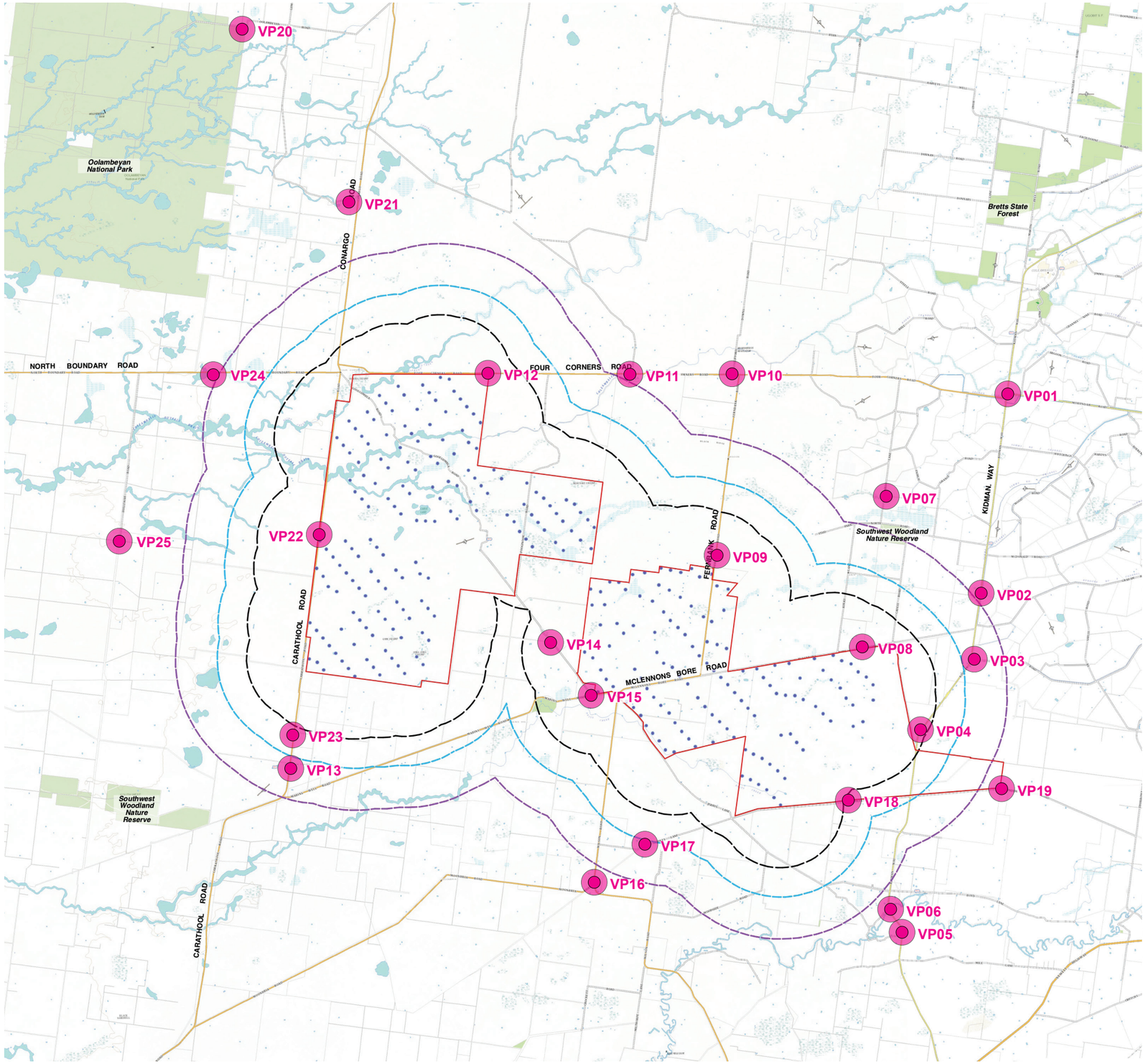
Summary of Preliminary Assessment Tools:	
Distance to Nearest Dinawan Energy Hub Turbine:	**4.34 km**
Number of proposed Dinawan Energy Hub turbines within the blue line (5,500 m) of visual magnitude:	**7**
Number of theoretical 60º sectors within 8,000 m (Based on 2D assessment):	**One (1) sector [Dinawan Energy Hub]; one (1) sector [Yanco Delta Wind Farm]**
Number of potentially visible Dinawan Energy Hub turbines (based on topography alone):	**292 (all at hub height)**

Appendix B

Preliminary Public Viewpoint Analysis

Preliminary Public Viewpoint Analysis

Proposed Dinawan Energy Hub Wind Farm



LEGEND

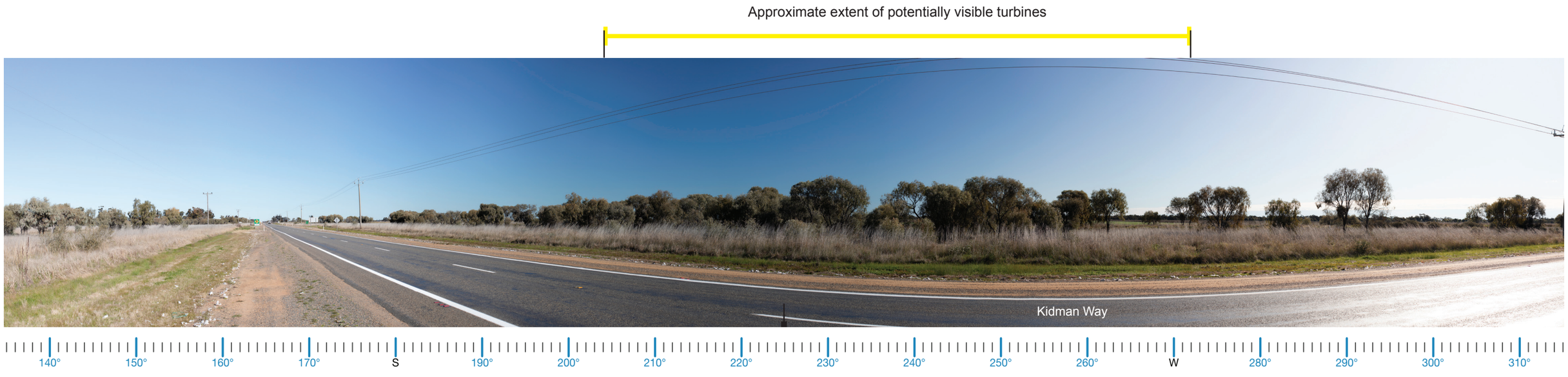
- Project Investigation Area
- Potential Wind Turbine Location (280 m high)
- Main Road
- Minor Road
- 3750 m from turbines
- 5500 m from turbines
- 8000 m from turbines
- National Parks / Nature Reserves
- VP01 Preliminary Viewpoint Locations

N

0 2 4 6 8 10km

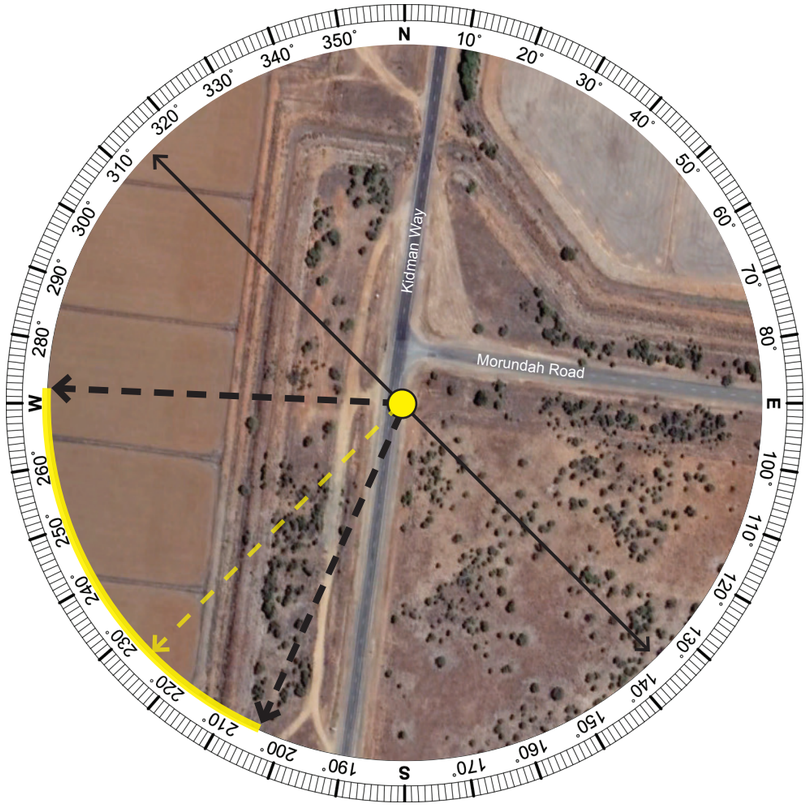
***Appendix B** Preliminary Viewpoint Locations (Map Source: Six Maps)*

VP01 Kidman Way, Coleambally



LEGEND

- Viewing direction and centre of panorama
- Direction of potentially visible turbines
- Extent of panorama
- Extent of potentially visible turbines



Aerial Image VP01 (Aerial Image Source: Six Maps)

VIEWPOINT VP01

Viewpoint Summary:	
Location:	Elevation:
Kidman Way, Coleambally	119 m
Coordinates:	Viewing Direction:
34°52'14.96"S 145°51'12.86"E	Southwest
Distance to nearest WTG:	Visibility Distance Zone:
18.59 km	Mid Background (MB)
Land Use:	Viewer Sensitivity Level:
Arterial Road Primary Production	Level 3 - Low
LCU:	Scenic Quality Rating:
LCU04: Saltbush & Grassy plains	Low
Multiple Wind Turbine Tool:	
No turbines visible within 8000 m.	

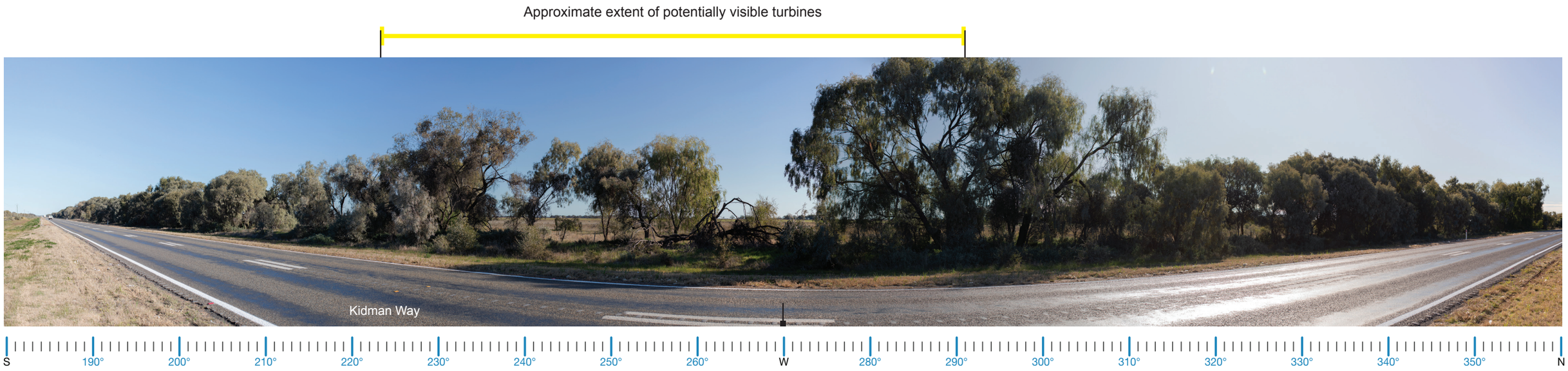
Existing Landscape Character Description:

This viewpoint was taken along Kidman Way outside Coleambally. The terrain is characterised as flat. Land is used to support agricultural activity outside the arterial road corridor. Vegetation character is defined by grasses and low lying shrubs with tree species along the road. Views are open yet filtered vegetation present in the middleground of the viewpoint aligning Kidman Way.

Potential Visual Impact:

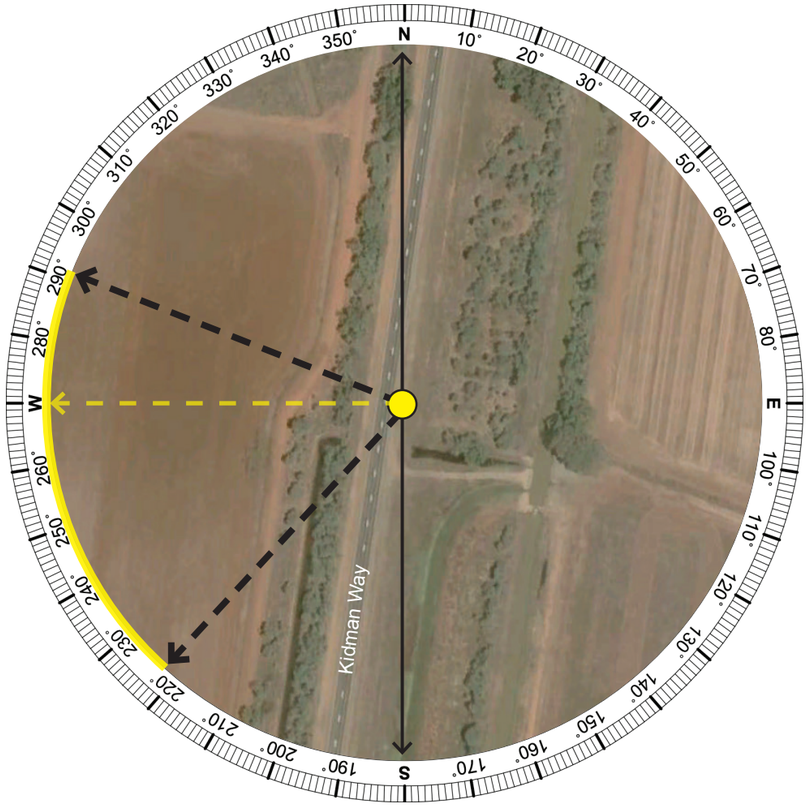
Due to the flat terrain, there will be views of the Project to the southwest. Views towards turbines may be filtered and screened by the scattered vegetation in the middleground because of the viewpoint distance from the turbines.

VP02 Kidman Way, Coleambally



LEGEND

- Viewing direction and centre of panorama
- Direction of potentially visible turbines
- Extent of panorama
- Extent of potentially visible turbines



Aerial Image VP02 (Aerial Image Source: Six Maps)

VIEWPOINT VP02

Viewpoint Summary:	
Location:	Elevation:
Kidman Way, Coleambally	117 m
Coordinates:	Viewing Direction:
34°58'37.23"S 145°50'4.87"E	West
Distance to nearest WTG:	Visibility Distance Zone:
8.48 km	Near Background (NB)
Land Use:	Viewer Sensitivity Level:
Arterial Road Primary Production	Level 3 - Low
LCU:	Scenic Quality Rating:
LCU04: Saltbush & Grassy plains	Low
Multiple Wind Turbine Tool:	
No turbines visible within 8000 m.	

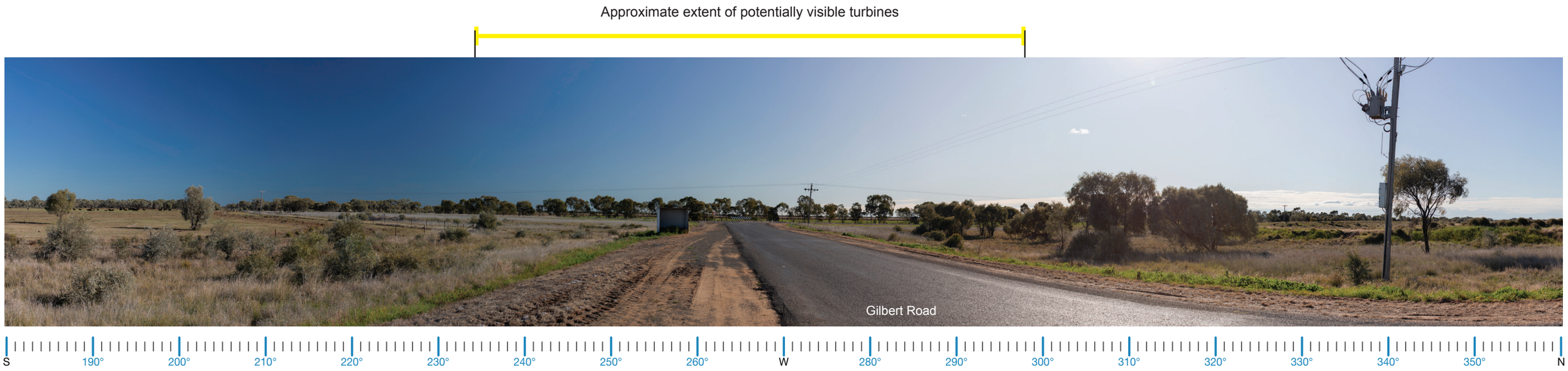
Existing Landscape Character Description:

This viewpoint was taken along Kidman Way towards Gala Vale. The terrain is characterised as flat. Vegetation character is defined by grasses and low lying shrubs with trees within the road corridor aligning the property boundary fencelines. Views are open yet filtered in this location by the dense vegetation aligning Kidman Way.

Potential Visual Impact:

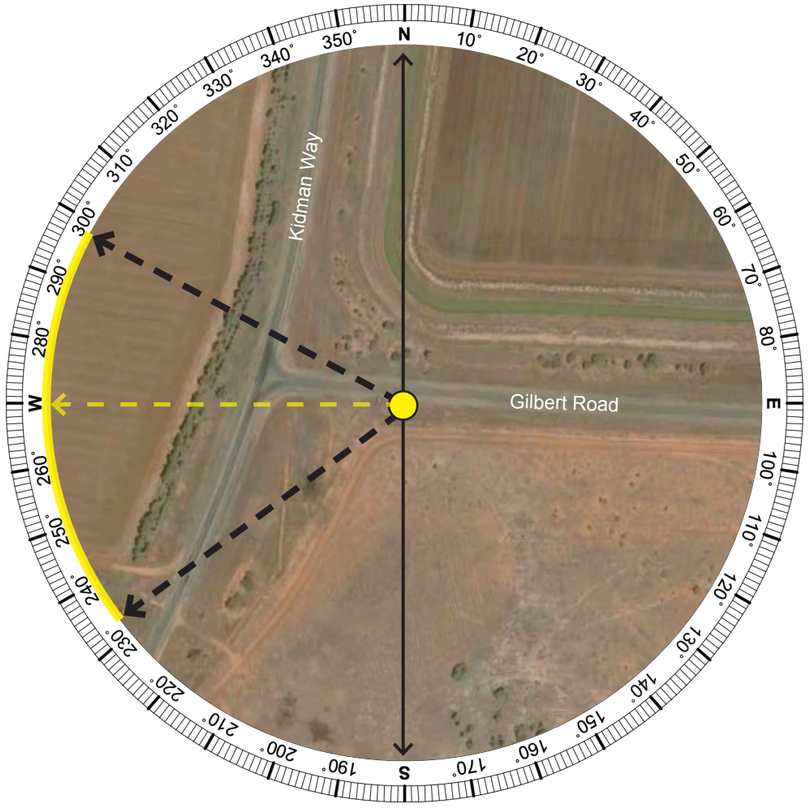
Due to the terrain, there will be views of the Project to the west. Views towards turbines may be filtered and screened by the dense vegetation alignining Kidman Way because of the viewpoint distance from the turbines.

VP03 Gilbert Road, Coleambally



LEGEND

- Viewing direction and centre of panorama
- Direction of potentially visible turbines
- Extent of panorama
- Extent of potentially visible turbines



Aerial Image VP03 (Aerial Image Source: Six Maps)

VIEWPOINT VP03

Viewpoint Summary:	
Location:	Elevation:
Gilbert Road, Coleambally	117 m
Coordinates:	Viewing Direction:
35° 0’48.11”S 145°49’44.63”E	West
Distance to nearest WTG:	Visibility Distance Zone:
6.18 km	Far Middleground (FM)
Land Use:	Viewer Sensitivity Level:
Low Use Road Primary Production	Level 3 - Low
LCU:	Scenic Quality Rating:
LCU04: Saltbush & Grassy plains	Low
Multiple Wind Turbine Tool:	
One (1) 60º Sector with turbines within 8000 m.	

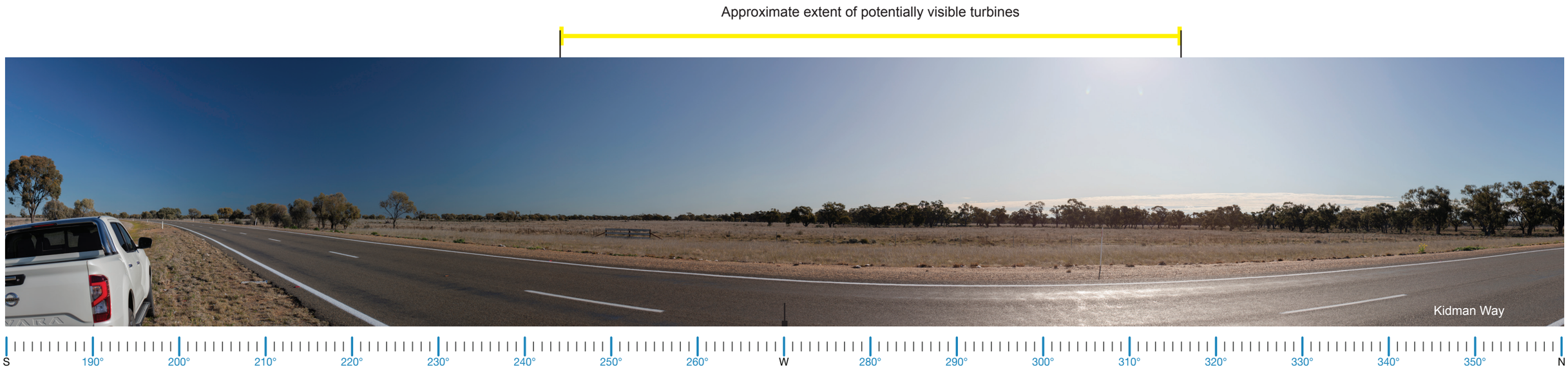
Existing Landscape Character Description:

This viewpoint was taken along Gilbert Road. The terrain is characterised as flat, gently undulating towards the south. Surrounding lands are used for grazing. Vegetation character is defined by native grasses with scattered low lying shrubs and tree species. Views are open, with scattered vegetation filtering views along the horizon.

Potential Visual Impact:

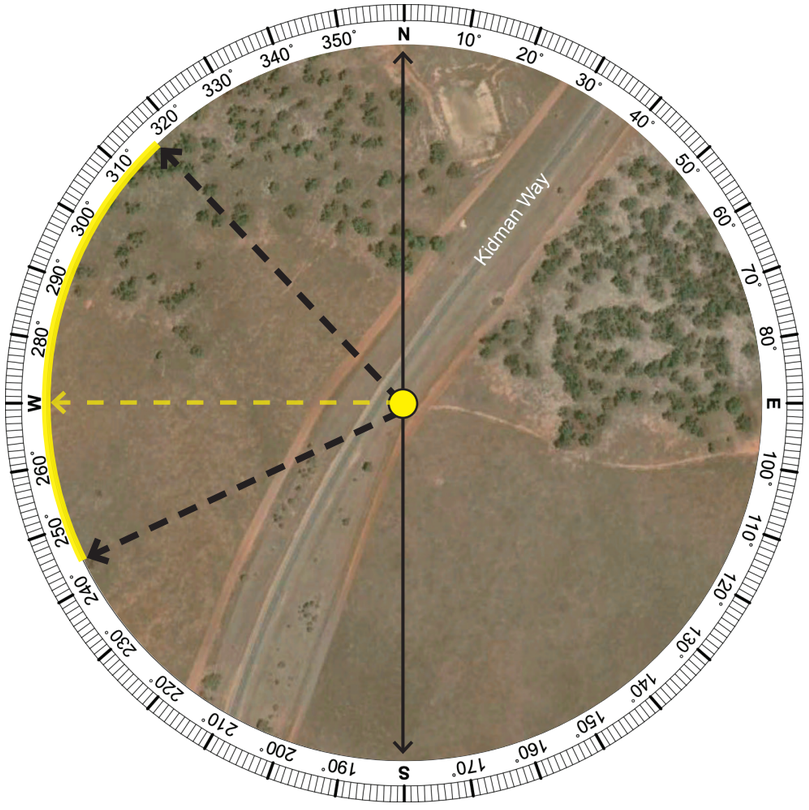
Due to the flat terrain, there will be views of the Project to the west. Views towards turbines may be filtered and screened by vegetation along the horizon, aligning Kidman Way, because of the viewpoint distance from the turbines.

VP04 Kidman Way, Bundure



LEGEND

- Viewing direction and centre of panorama
- Direction of potentially visible turbines
- Extent of panorama
- Extent of potentially visible turbines



Aerial Image VP04 (Aerial Image Source: Six Maps)

VIEWPOINT VP04

Viewpoint Summary:	
Location:	Elevation:
Kidman Way, Bundure	114 m
Coordinates:	Viewing Direction:
35° 3’3.81”S 145°47’38.52”E	West
Distance to nearest WTG:	Visibility Distance Zone:
3.36 km	Near Middleground (NM)
Land Use:	Viewer Sensitivity Level:
Arterial Road Primary Production	Level 3 - Low
LCU:	Scenic Quality Rating:
LCU02: Seasonal Water Corridors	Moderate
Multiple Wind Turbine Tool:	
One (1) 60º Sector with turbines within 8000 m.	

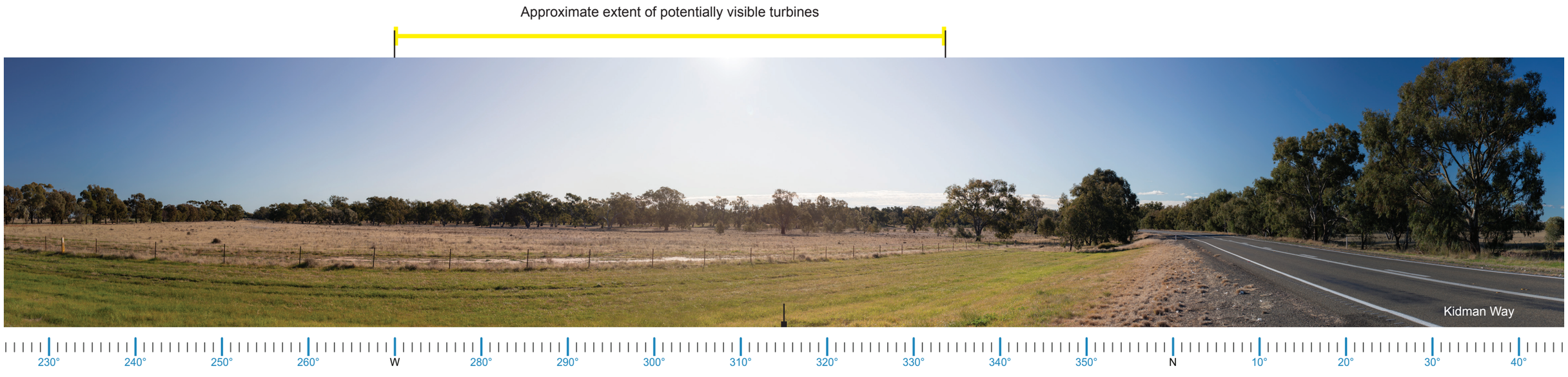
Existing Landscape Character Description:

This viewpoint was taken along Kidman Way. The terrain is characterised as flat, which has been modified to support agricultural activity and grazing. Vegetation character is defined by native grasses with rows of tree species visible in the middleground towards the northwest. Views are open and expansive, with dense vegetation along the horizon filtering views to the west. Scattered vegetation aligning Kidman Way present within the arterial road corridor.

Potential Visual Impact:

Due to the flat terrain, there will be views of the Project to the west because of the proximity of the viewpoint to the turbines. Views towards select turbines may been screened by the rows of established tree species within the paddocks to the northwest.

VP05 Kidman Way, Jerilderie



LEGEND

- Viewing direction and centre of panorama
- Direction of potentially visible turbines
- Extent of panorama
- Extent of potentially visible turbines

Aerial Image VP05 (Aerial Image Source: Six Maps)

VIEWPOINT VP05

Viewpoint Summary:	
Location:	Elevation:
Kidman Way, Jerilderie	110 m
Coordinates:	Viewing Direction:
35° 9’35.27”S 145°46’48.75”E	Northwest
Distance to nearest WTG:	Visibility Distance Zone:
10.53 km	Near Background (NB)
Land Use:	Viewer Sensitivity Level:
Arterial Road Primary Production	Level 3 - Low
LCU:	Scenic Quality Rating:
LCU04: Saltbush & Grassy plains	Low
Multiple Wind Turbine Tool:	
No turbines visible within 8000 m.	

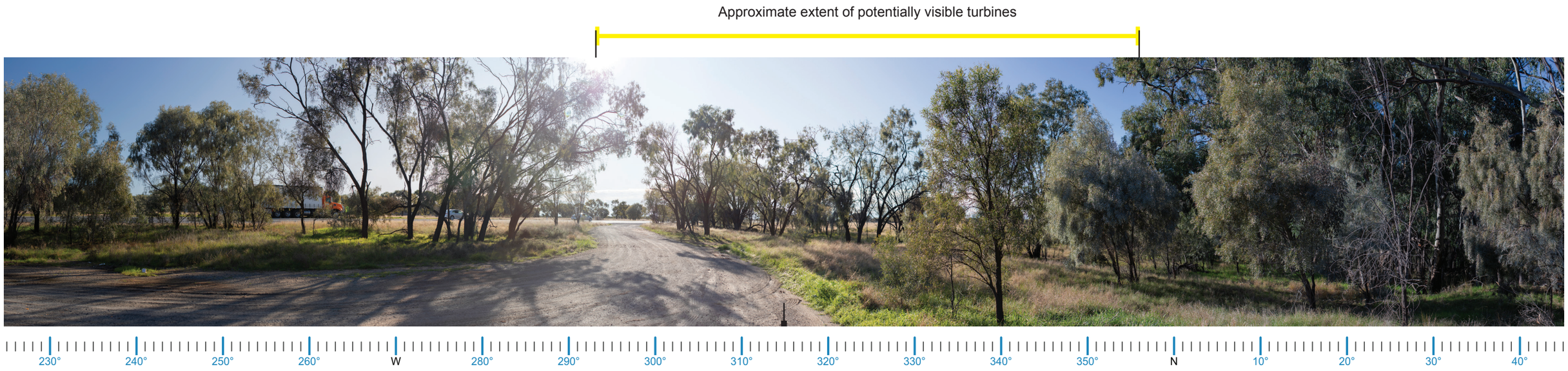
Existing Landscape Character Description:

This viewpoint was taken along Kidman Way looking north towards Yanco Creek. The terrain is characterised as flat and undulates closer to the banks of Yanco Creek. Surrounding land outside has been modified to support agricultural activity and grazing. Dense vegetation is visible within the middleground of the viewpoint and along Kidman Way to the northeast. Views are open yet filtered by the dense vegetation within paddocks to the northwest.

Potential Visual Impact:

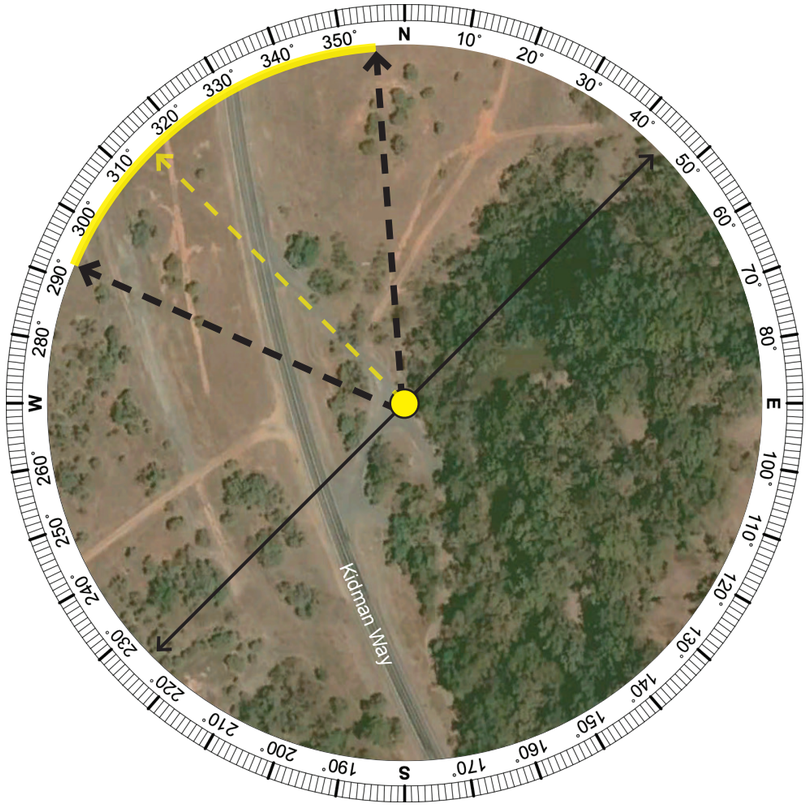
Due to the relatively flat terrain, there will be potential views of the Project to the northwest. Views towards turbines may be filtered and screened by the dense vegetation in the middleground because of the viewpoint distance from the turbines.

VP06 Kidman Way, Bundure



LEGEND

- Viewing direction and centre of panorama
- Direction of potentially visible turbines
- Extent of panorama
- Extent of potentially visible turbines



Aerial Image VP06 (Aerial Image Source: Six Maps)

VIEWPOINT VP06

Viewpoint Summary:	
Location:	Elevation:
Kidman Way, Bundure	114 m
Coordinates:	Viewing Direction:
35° 8’46.21”S 145°46’20.00”E	Northwest
Distance to nearest WTG:	Visibility Distance Zone:
8.94 km	Near Background (NB)
Land Use:	Viewer Sensitivity Level:
Rest Stop Arterial Road	Level 2 - Moderate
LCU:	Scenic Quality Rating:
LCU05: Yanco Creek Environs	Moderate
Multiple Wind Turbine Tool:	
No turbines visible within 8000 m.	

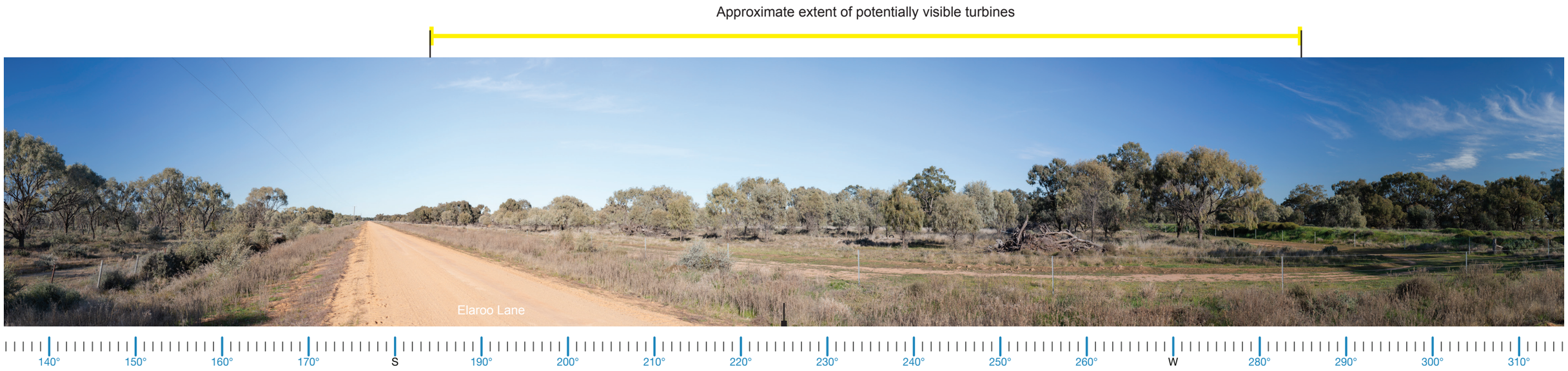
Existing Landscape Character Description:

This viewpoint was taken at a rest stop off Kidman Way near Yanco Creek. The terrain is characterised as relatively flat gently slopes to the east towards Yanco Creek. Vegetation character is defined by native grasses and dense planted vegetation, including Acacia and Eucalpytus varieties along the creek and scattered tree species aligning Kidman Way. Views are contained by established trees to the northwest.

Potential Visual Impact:

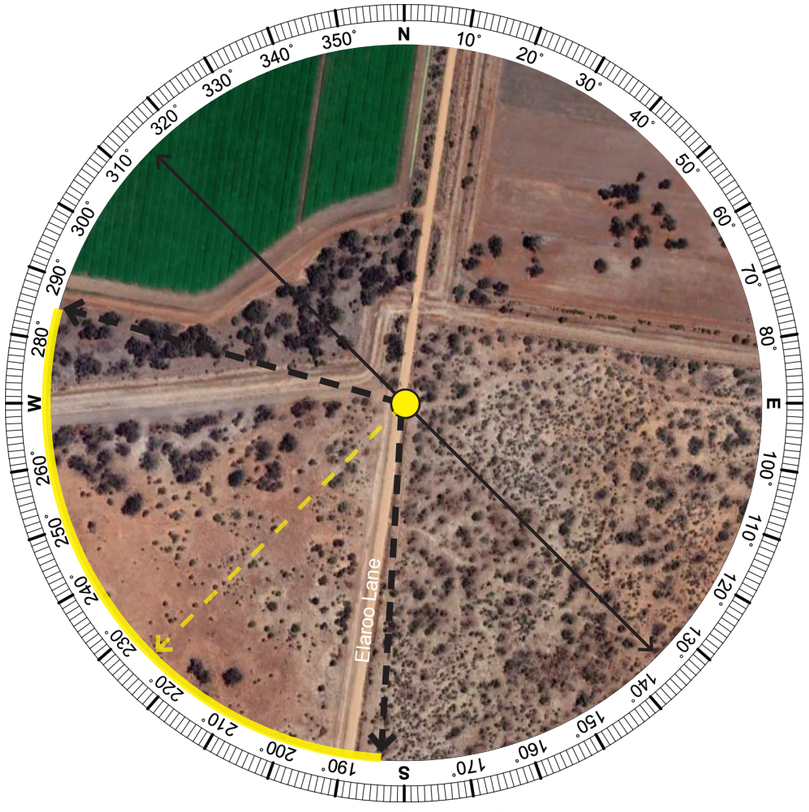
Due to the relatively flat terrain, there will be potential views of the Project to the northwest, with majority of the views filtered and screened by the established vegetation to the northwest.

VP07 Elaroo Lane, Gale Vale



LEGEND

- Viewing direction and centre of panorama
- Direction of potentially visible turbines
- Extent of panorama
- Extent of potentially visible turbines



Aerial Image VP07 (Aerial Image Source: Six Maps)

VIEWPOINT VP07

Viewpoint Summary:	
Location:	Elevation:
Elaroo Lane, Gale Vale	117 m
Coordinates:	Viewing Direction:
34°55'30.56"S 145°46'19.77"E	Southwest
Distance to nearest WTG:	Visibility Distance Zone:
9.91 km	Near Background (NB)
Land Use:	Viewer Sensitivity Level:
Low Use Road Primary Production	Level 3 - Low
LCU:	Scenic Quality Rating:
LCU04: Saltbush & Grassy plains	Low
Multiple Wind Turbine Tool:	
No turbines visible within 8000 m.	

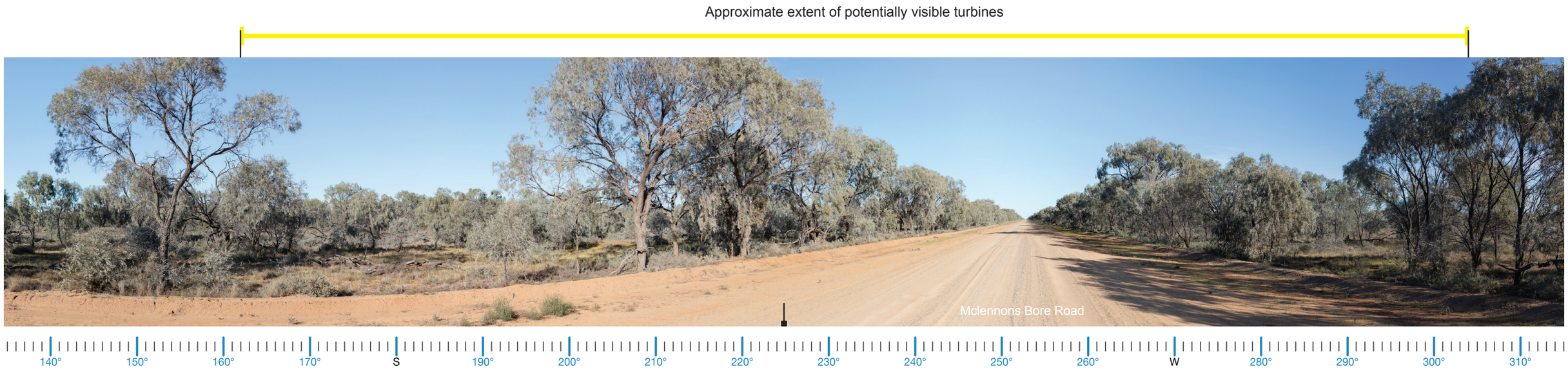
Existing Landscape Character Description:

This viewpoint was taken along unsealed Elaroo Lane. The terrain is characterised as relatively flat, with gentle undulations to the southwest. The land to the north of this viewpoint has been modified and cleared to support agricultural activity, compared to the south which is densely vegetated. Vegetation character is defined by native grasses, low lying shrub species including saltbush and densely planted tree species beyond in the middleground of this viewpoint. Views are open to the south and contained by dense vegetation to the southwest.

Potential Visual Impact:

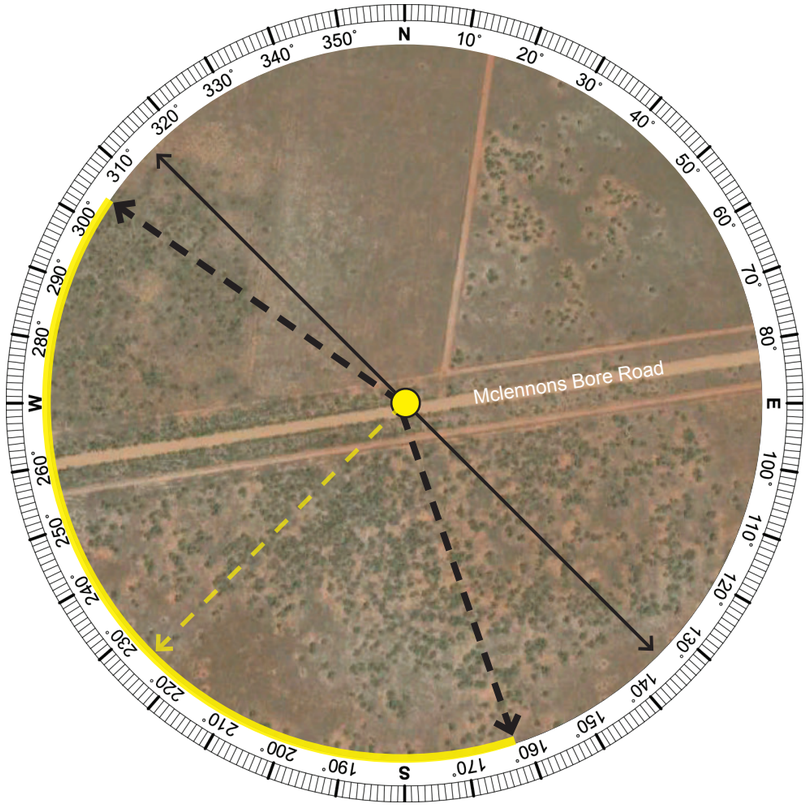
Due to the relatively flat terrain, there will be potential views of the Project to the southwest, with majority views towards select turbines filtered and screened by the established vegetation to the southwest.

VP08 Mclennons Bore Road, Gale Vale



LEGEND

- Viewing direction and centre of panorama
- Direction of potentially visible turbines
- Extent of panorama
- Extent of potentially visible turbines



Aerial Image VP08 (Aerial Image Source: Six Maps)

VIEWPOINT VP08

Viewpoint Summary:	
Location:	Elevation:
Mclennons Bore Road, Gale Vale	113 m
Coordinates:	Viewing Direction:
35° 0’21.00”S 145°45’22.43”E	Southwest
Distance to nearest WTG:	Visibility Distance Zone:
1.17 km	Mid Foreground (MF)
Land Use:	Viewer Sensitivity Level:
Low Use Road Primary Production	Level 3 - Low
LCU:	Scenic Quality Rating:
LCU03: Swamps and Floodplains	Low
Multiple Wind Turbine Tool:	
Two (2) 60º Sectors with turbines within 8000 m.	

Existing Landscape Character Description:

This viewpoint was taken along unsealed Mclennons Bore Road. The terrain is characterised as relatively flat. Views are contained by dense vegetation along both sides of road and throughout adjoining paddocks that are used predominantly for grazing.

Potential Visual Impact:

Due to close proximity of the viewpoint to the turbines, there will be clear views of the Project from this location. Views towards the turbines in the distance may be filtered and screened by established trees aligning Mclennons Bore Road.

VP09 Fernbank Road, Gale Vale

Approximate extent of potentially visible turbines

140° 150° 160° 170° S 190° 200° 210° 220° 230° 240° 250° 260° W 280° 290° 300° 310°

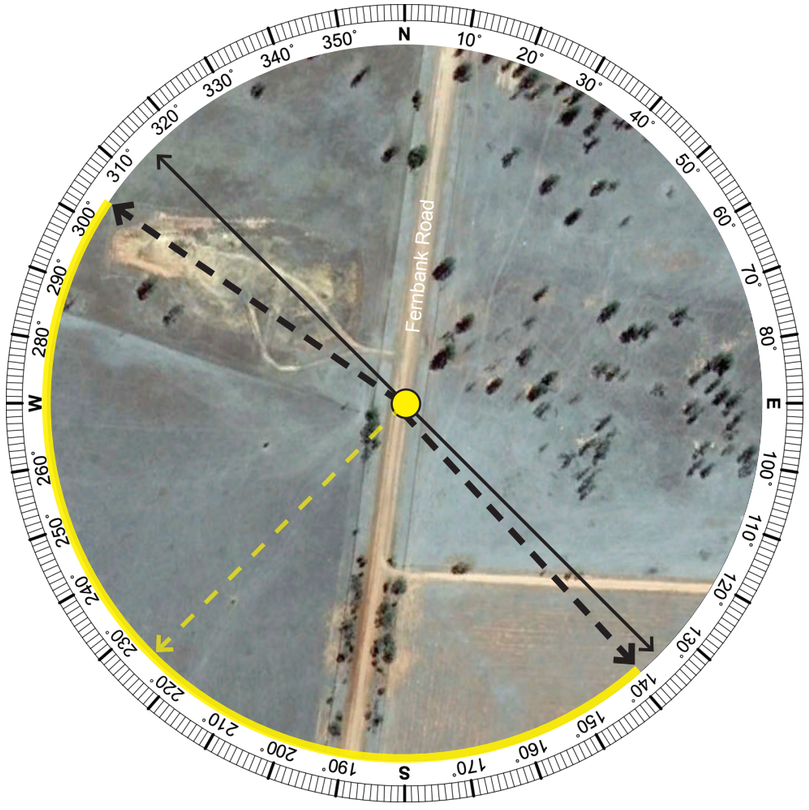
LEGEND

Viewing direction and centre of panorama

Direction of potentially visible turbines

Extent of panorama

Extent of potentially visible turbines



Aerial Image VP09 (Aerial Image Source: Six Maps)

VIEWPOINT VP09

Viewpoint Summary:	
Location:	Elevation:
Fernbark Road, Gale Vale	114 m
Coordinates:	Viewing Direction:
34°57'19.88"S 145°39'40.46"E	Southwest
Distance to nearest WTG:	Visibility Distance Zone:
1.16 km	Mid Foreground (MF)
Land Use:	Viewer Sensitivity Level:
Low Use Road Primary Production	Level 3 - Low
LCU:	Scenic Quality Rating:
LCU04: Saltbush & Grassy plains	Low
Multiple Wind Turbine Tool:	
Three (3) 60º Sectors with turbines within 8000 m.	

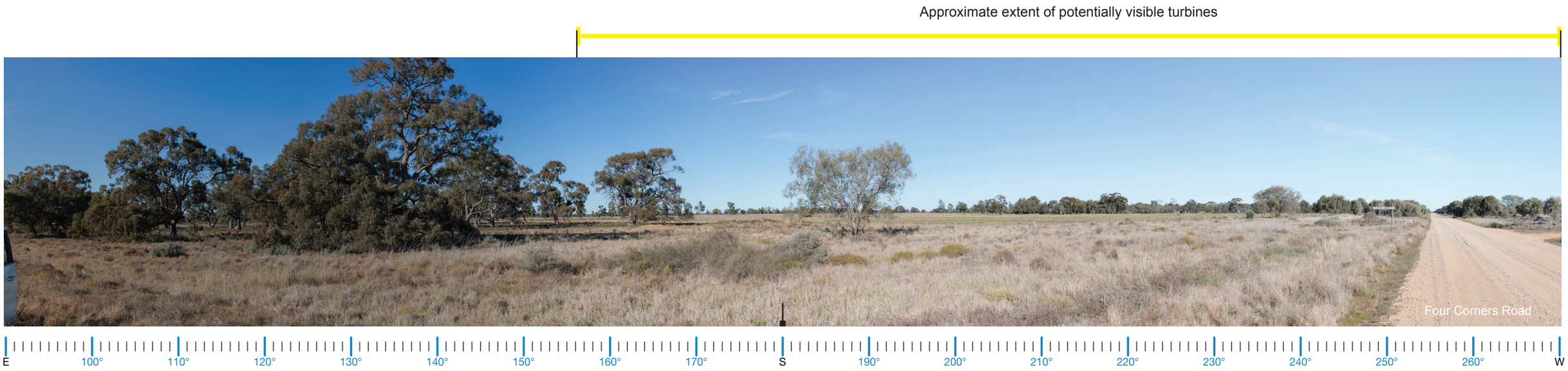
Existing Landscape Character Description:

This viewpoint was taken along unsealed Fernbank Road. The terrain is characterised as flat. Surrounding lands support agricultural activity. Vegetation character is defined by native grasses and low lying shrub varieties including saltbush, and scattered tree species aligning Fernbank Road. Views are open and expansive to the south with scattered vegetation filtering views to the west.

Potential Visual Impact:

Due to close proximity of the viewpoint to the turbines, there will be clear views of the Project from this location. Views towards select turbines in the distance may be filtered and screened by established trees to the west aligning Fernbank Road.

VP10 Four Corners Road, Argoon



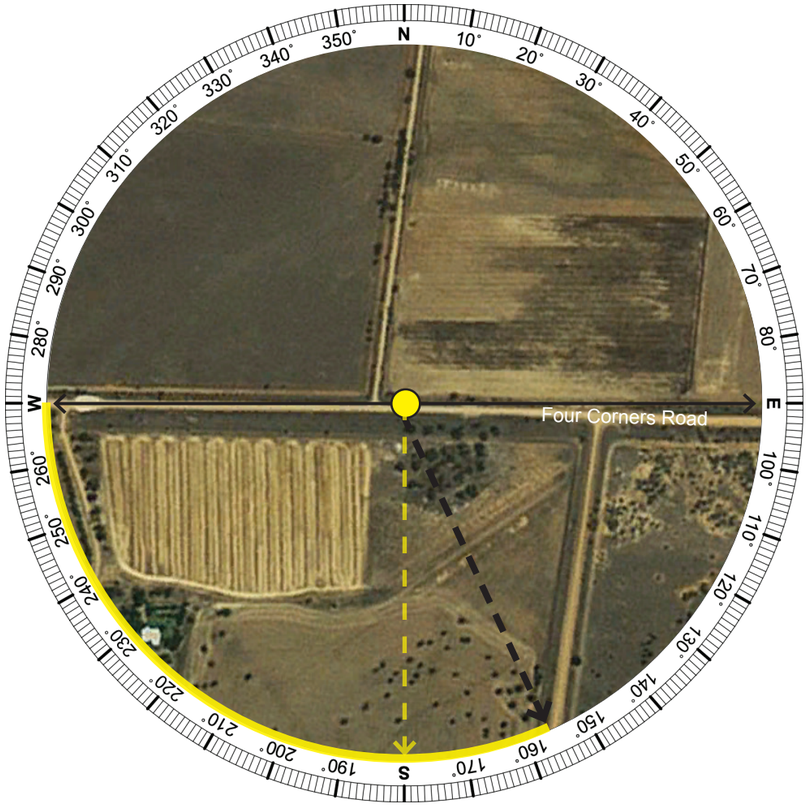
LEGEND

Viewing direction and centre of panorama

Direction of potentially visible turbines

Extent of panorama

Extent of potentially visible turbines



Aerial Image VP10 (Aerial Image Source: Six Maps)

VIEWPOINT VP10

Viewpoint Summary:	
Location:	Elevation:
Four Corners Road, Argoon	114 m
Coordinates:	Viewing Direction:
34°51'29.14"S 145°40'28.54"E	South
Distance to nearest WTG:	Visibility Distance Zone:
11.84 km	Near Background (NB)
Land Use:	Viewer Sensitivity Level:
Low Use Road Primary Production	Level 03 - Low
LCU:	Scenic Quality Rating:
LCU04: Saltbush & Grassy plains	Low
Multiple Wind Turbine Tool:	
No turbines visible within 8000 m.	

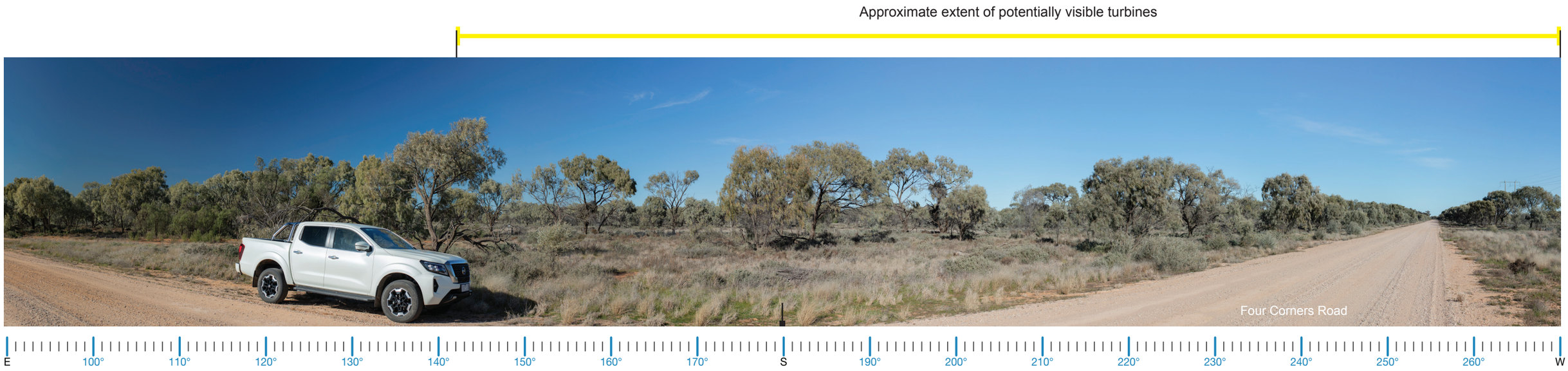
Existing Landscape Character Description:

This viewpoint was taken along unsealed Four Corners Road. The terrain is characterised as flat, and is used to support agricultural activity and grazing. Vegetation character is defined as native grasses, low lying shrub varieties including saltbush and established tree species along horizon to the southwest. Views are open to the south with scattered vegetation within paddocks on the eastern side of Four Corners Road.

Potential Visual Impact:

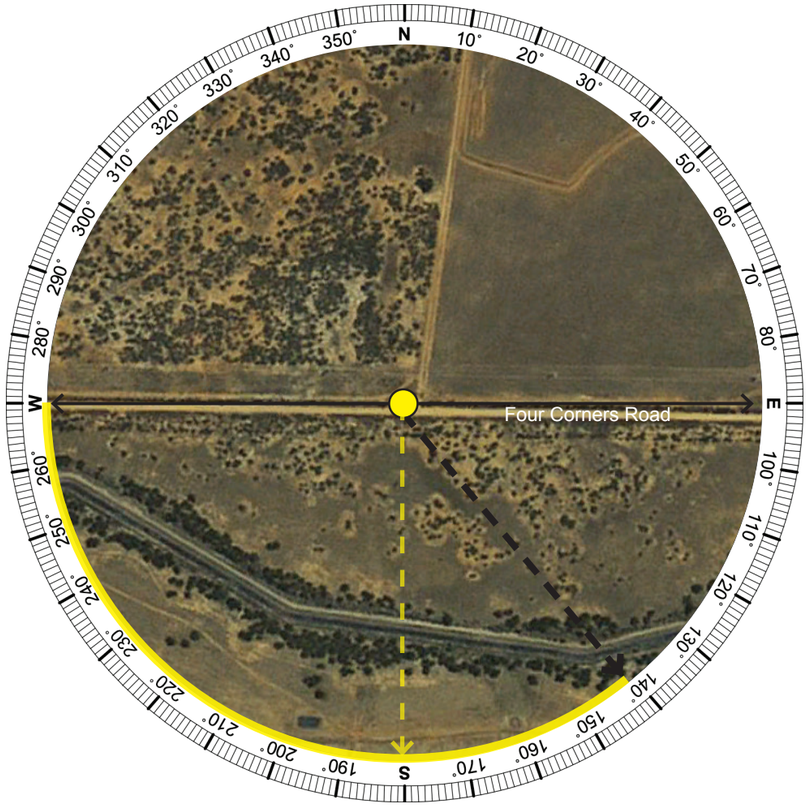
Due to the flat terrain, there will be views of the Project to the south. Views towards turbines may be filtered and screened by vegetation along the horizon.

VP11 Four Corners Road, Argoon



LEGEND

- Viewing direction and centre of panorama
- Direction of potentially visible turbines
- Extent of panorama
- Extent of potentially visible turbines



Aerial Image VP11 (Aerial Image Source: Six Maps)

VIEWPOINT VP11

Viewpoint Summary:	
Location:	Elevation:
Four Corners Road, Argoon	112 m
Coordinates:	Viewing Direction:
34°51'25.28"S 145°36'26.76"E	South
Distance to nearest WTG:	Visibility Distance Zone:
8.46 km	Near Background (NB)
Land Use:	Viewer Sensitivity Level:
Low Use Road Primary Production	Level 3 - Low
LCU:	Scenic Quality Rating:
LCU02: Seasonal Water Corridors	Moderate
Multiple Wind Turbine Tool:	
No turbines visible within 8000 m.	

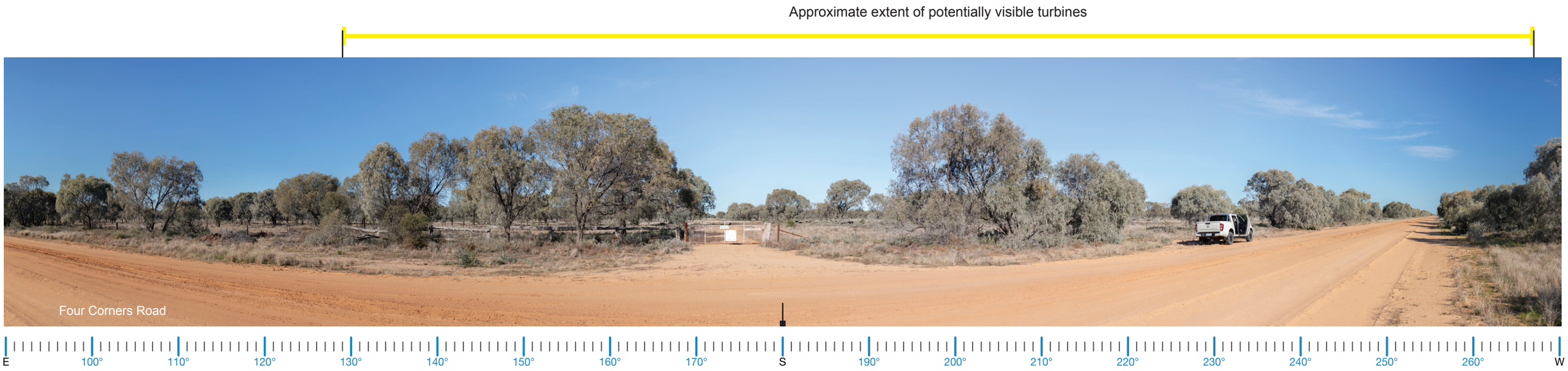
Existing Landscape Character Description:

This viewpoint was taken along unsealed Four Corners Road. The terrain is characterised as flat and is used for grazing. Scattered vegetation aligns the road edge, and the vegetation character is defined by native grasses, low lying shrub varieties including saltbush, and scattered tree species throughout paddocks. Views towards the Project are filtered by established trees aligning the road and to the south. Transmission line is visible in this location running east to west.

Potential Visual Impact:

Due to the flat terrain, there will be distant views of the Project to the south. Views towards some turbines may be filtered and screened by vegetation in the middleground.

VP12 Four Corners Road, Mabins Well



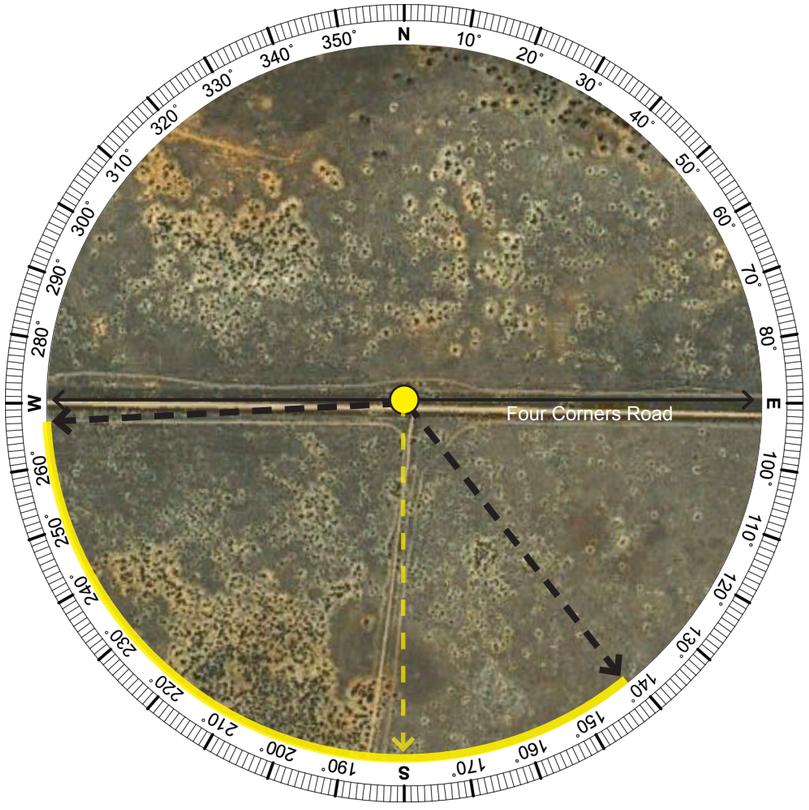
LEGEND

Viewing direction and centre of panorama

Direction of potentially visible turbines

Extent of panorama

Extent of potentially visible turbines



Aerial Image VP12 (Aerial Image Source: Six Maps)

VIEWPOINT VP12

Viewpoint Summary:	
Location:	Elevation:
Four Corners Road, Mabins Well	109 m
Coordinates:	Viewing Direction:
34°51'20.53"S 145°30'51.77"E	South
Distance to nearest WTG:	Visibility Distance Zone:
2.24 km	Near Middleground (NM)
Land Use:	Viewer Sensitivity Level:
Low Use Road Primary Production	Level 3 - Low
LCU:	Scenic Quality Rating:
LCU04: Saltbush & Grassy plains	Low
Multiple Wind Turbine Tool:	
Two (2) 60° Sectors with turbines within 8000 m.	

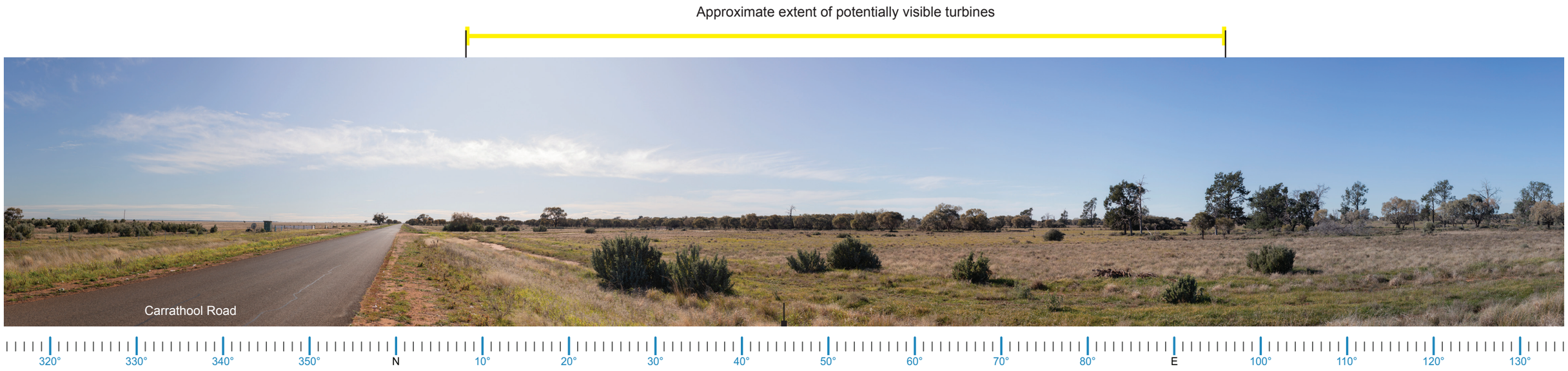
Existing Landscape Character Description:

This viewpoint was taken along unsealed Four Corners Road, close to a driveway to a rural property. The terrain is characterised as flat and is used for grazing. Vegetation character is defined as native grasses, low lying shrub varieties including saltbush, and scattered tree species aligning Four Corners Road and throughout adjoining paddocks. Views in this location are open yet filtered by scattered vegetation in the middleground of the viewpoint, containing views to the south.

Potential Visual Impact:

Due to close proximity of the viewpoint to the turbines, there will be clear views of the Project from this location. Views towards some turbines in the distance may be filtered and screened by scattered vegetation to the south.

VP13 Carrathool Road, Steam Plains



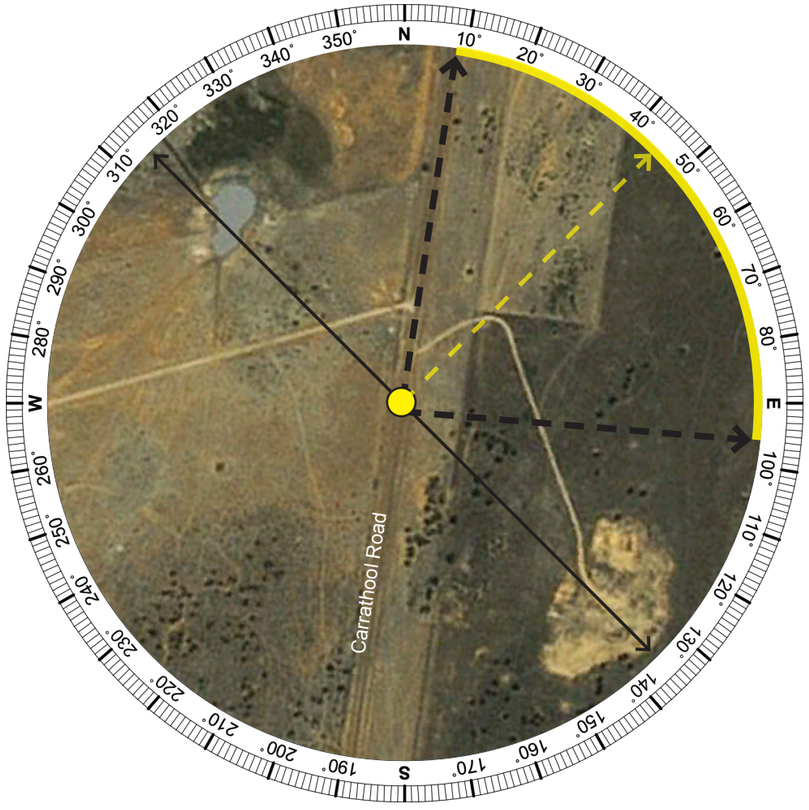
LEGEND

Viewing direction and centre of panorama

Direction of potentially visible turbines

Extent of panorama

Extent of potentially visible turbines



Aerial Image VP13 (Aerial Image Source: Six Maps)

VIEWPOINT VP13

Viewpoint Summary:	
Location:	Elevation:
Carrathool Road, Steam Plains	103 m
Coordinates:	Viewing Direction:
35° 4’0.04”S 145°22’47.50”E	Northeast
Distance to nearest WTG:	Visibility Distance Zone:
6.25 km	Far Middleground (FM)
Land Use:	Viewer Sensitivity Level:
Low Use Road Primary Production	Level 3 - Low
LCU:	Scenic Quality Rating:
LCU04: Saltbush & Grassy plains	Low
Multiple Wind Turbine Tool:	
One (1) 60º Sector with turbines within 8000 m.	

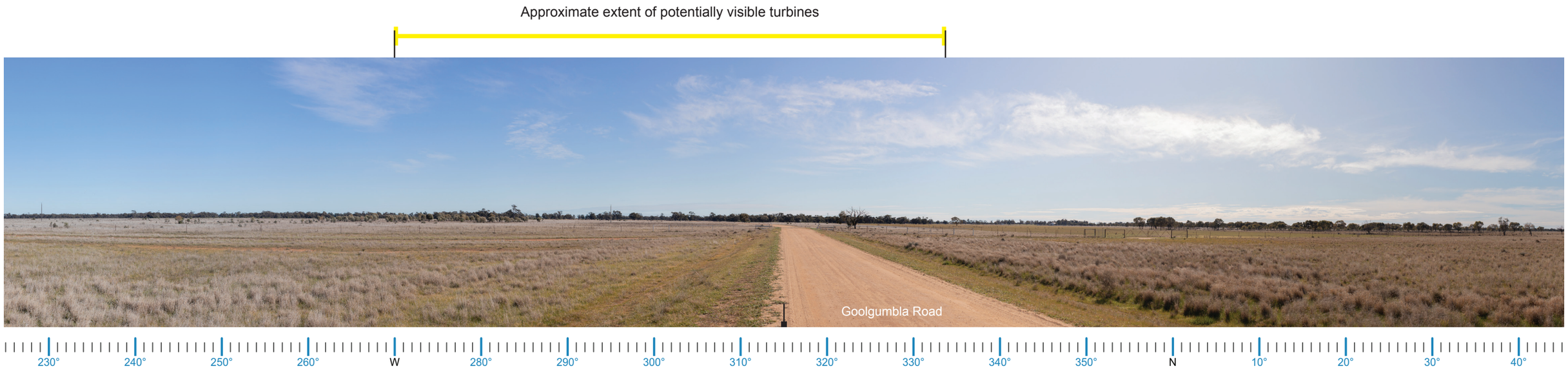
Existing Landscape Character Description:

This viewpoint was taken along Carrathool Road towards Oolambeyan National Park. The terrain is characterised as flat, which has been modified to support agricultural activity and grazing. Vegetation character is defined as native grasses, low lying shrub varieties and scattered tree species in the far middleground along horizon. Views are open and expansive in this location, with scattered vegetation limiting views to the east.

Potential Visual Impact:

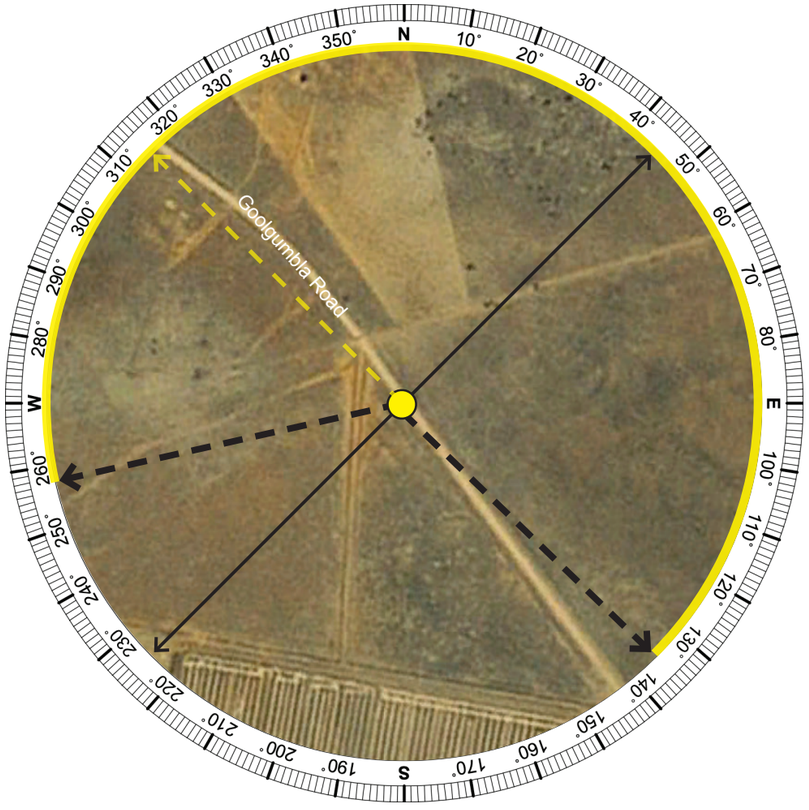
Due to the flat terrain in this location, there will be distant views of the Project to the northeast. Views towards some turbines in the distance may be filtered and screened by vegetation along the horizon.

VP14 Goolgumbla Road, Mabins Well



LEGEND

- Viewing direction and centre of panorama
- Direction of potentially visible turbines
- Extent of panorama
- Extent of potentially visible turbines



Aerial Image VP14 (Aerial Image Source: Six Maps)

VIEWPOINT VP14

Viewpoint Summary:	
Location:	Elevation:
Goolgumbla Road, Mabins Well	107 m
Coordinates:	Viewing Direction:
34°59'58.99"S 145°33'8.94"E	Northwest
Distance to nearest WTG:	Visibility Distance Zone:
2.16 km	Far Foreground (FF)
Land Use:	Viewer Sensitivity Level:
Low Use Road Primary Production	Level 3 - Low
LCU:	Scenic Quality Rating:
LCU03: Swamps and Floodplains	Low
Multiple Wind Turbine Tool:	
Four (4) 60° Sectors with turbines within 8000 m.	

Existing Landscape Character Description:

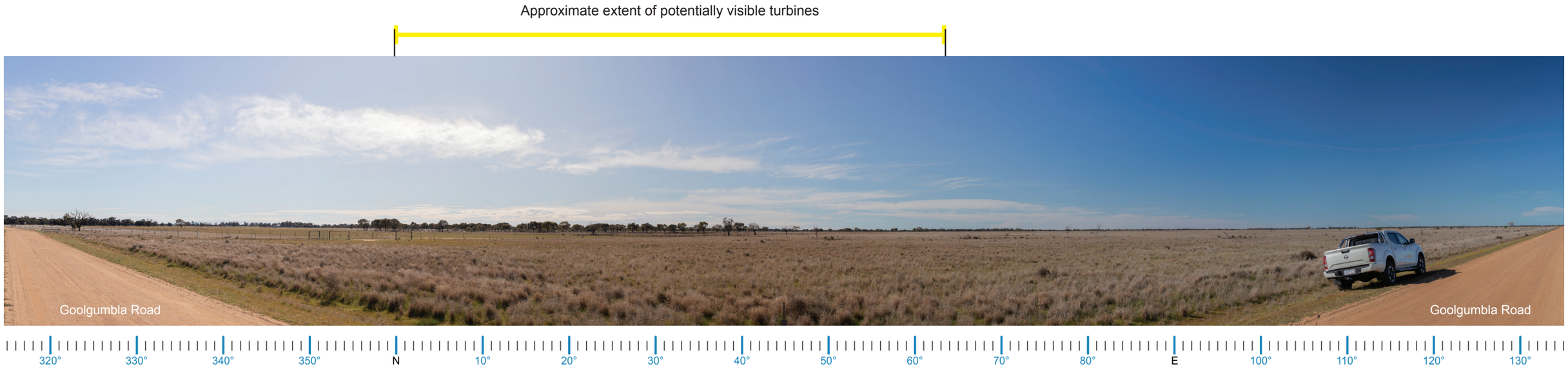
This viewpoint was taken along unsealed Goolgumbla Road towards Oolambeyan National Park.

The terrain is characterised as flat, with open and expansive views from this location. Surrounding land supports agricultural activity and grazing. Vegetation character is defined as grasses and scattered tree species in the distance along the horizon.

Potential Visual Impact:

Due to close proximity of the viewpoint to the turbines, there will be clear views of the Project from this location.

VP14 Goolgumbla Road, Mabins Well



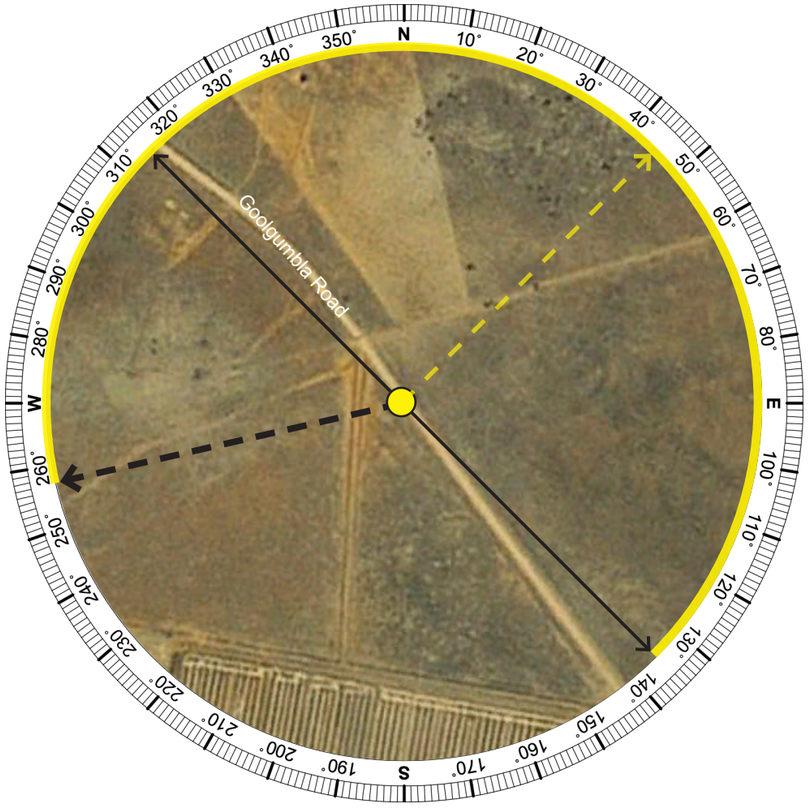
LEGEND

Viewing direction and centre of panorama

Direction of potentially visible turbines

Extent of panorama

Extent of potentially visible turbines



Aerial Image VP14 (Aerial Image Source: Six Maps)

VIEWPOINT VP14

Viewpoint Summary:	
Location:	Elevation:
Goolgumbla Road, Mabins Well	107 m
Coordinates:	Viewing Direction:
34°59'58.99"S 145°33'8.94"E	Northeast
Distance to nearest WTG:	Visibility Distance Zone:
2.16 km	Far Foreground (FF)
Land Use:	Viewer Sensitivity Level:
Low Use Road Primary Production	Level 3 - Low
LCU:	Scenic Quality Rating:
LCU03: Swamps and Floodplains	Low
Multiple Wind Turbine Tool:	
Four (4) 60° Sectors with turbines within 8000 m.	

Existing Landscape Character Description:

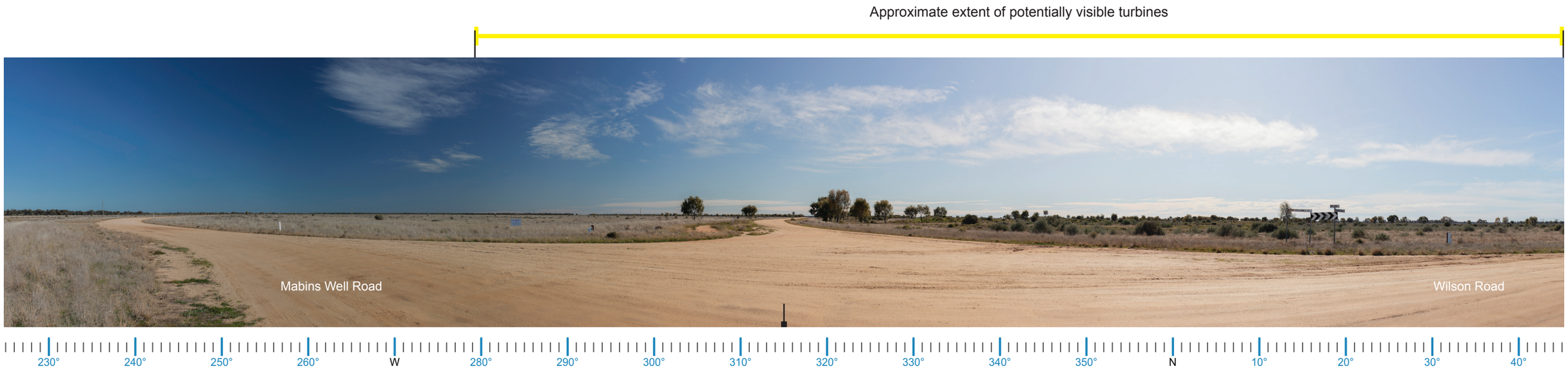
This viewpoint was taken along unsealed Goolgumbla Road towards Oolambeyan National Park.

The terrain is characterised as flat, with open and expansive views from this location. Surrounding land supports agricultural activity and grazing. Vegetation character is defined as grasses and scattered tree species in the distance along the horizon.

Potential Visual Impact:

Due to close proximity of the viewpoint to the turbines, there will be clear views of the Project from this location.

VP15 Corner Mabins Well Road & Wilson Road, Argoon



LEGEND

- Viewing direction and centre of panorama
- Direction of potentially visible turbines
- Extent of panorama
- Extent of potentially visible turbines

Aerial Image VP15 (Aerial Image Source: Six Maps)

VIEWPOINT VP15

Viewpoint Summary:	
Location:	Elevation:
Corner Mabins Well Road & Wilson Road, Argoon	107 m
Coordinates:	Viewing Direction:
35° 1’45.15”S 145°34’42.90”E	Northwest
Distance to nearest WTG:	Visibility Distance Zone:
0.43 km	Near Foreground (NF)
Land Use:	Viewer Sensitivity Level:
Low Use Road Primary Production	Level 3 - Low
LCU:	Scenic Quality Rating:
LCU02: Seasonal Water Corridors	Moderate
Multiple Wind Turbine Tool:	
Three (3) 60º Sectors with turbines within 8000 m.	

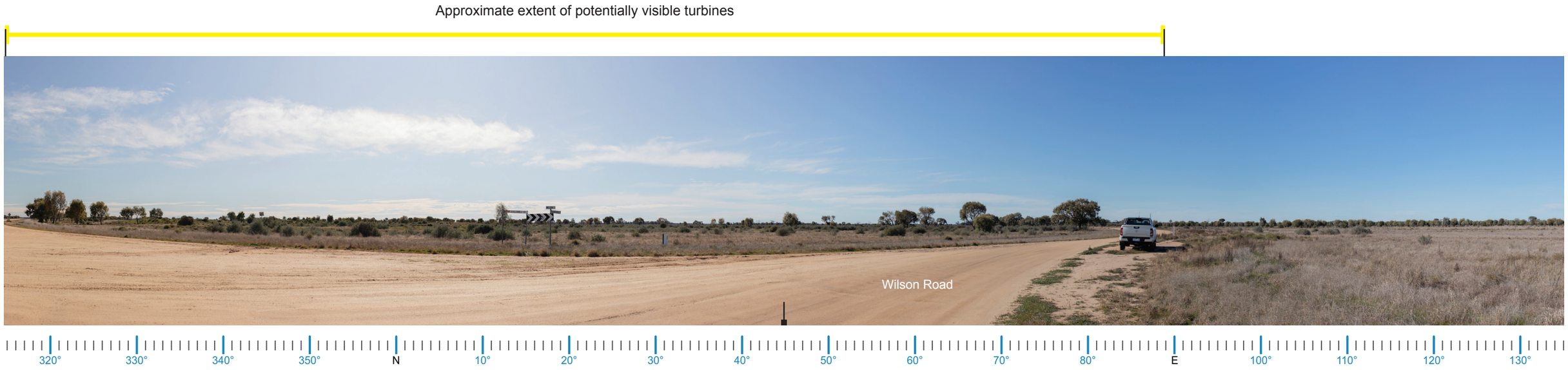
Existing Landscape Character Description:

This viewpoint was taken at the corner of Mabins Well Road and Wilson Road. The terrain is characterised as relatively flat and gently undulates towards the north. Surrounding land currently supports agricultural activity and grazing. Vegetation character is defined as native grasses and low lying shrubs including saltbush. Scattered tree species are visible to the northwest aligning the road edge. Views are open and expansive from this location.

Potential Visual Impact:

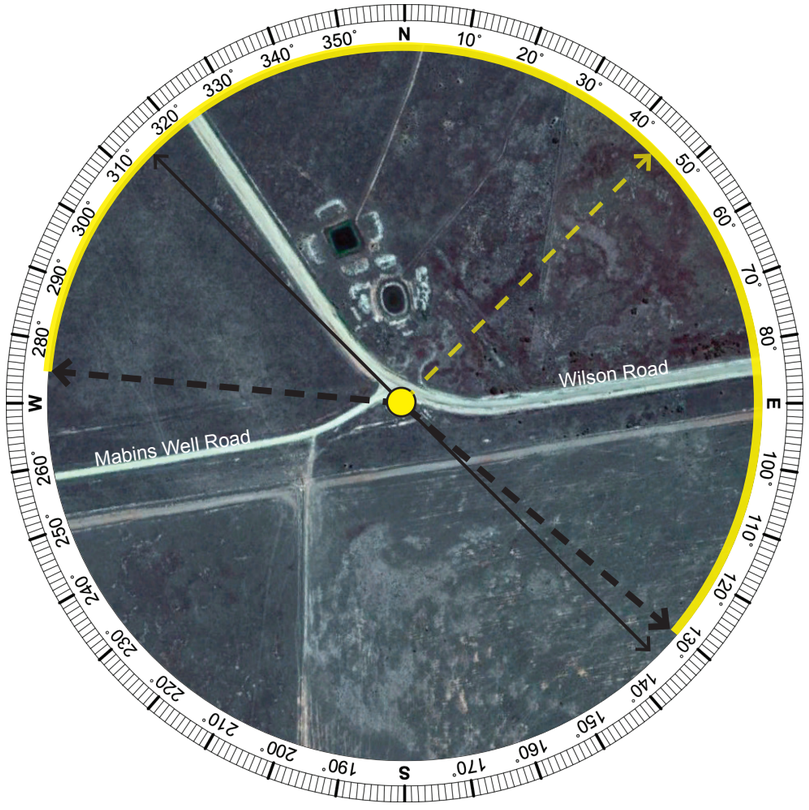
Due to close proximity of the viewpoint to the turbines, there will be clear views of the Project from this location.

VP15 Corner Mabins Well Road & Wilson Road, Argoon



LEGEND

Viewing direction and centre of panorama
Direction of potentially visible turbines
Extent of panorama
Extent of potentially visible turbines



Aerial Image VP15 (Aerial Image Source: Six Maps)

VIEWPOINT VP15

Viewpoint Summary:	
Location:	Elevation:
Corner Mabins Well Road & Wilson Road, Argoon	107 m
Coordinates:	Viewing Direction:
35° 1’45.15”S 145°34’42.90”E	Northeast
Distance to nearest WTG:	Visibility Distance Zone:
0.43 km	Near Foreground (NF)
Land Use:	Viewer Sensitivity Level:
Low Use Road Primary Production	Level 3 - Low
LCU:	Scenic Quality Rating:
LCU02: Seasonal Water Corridors	Moderate
Multiple Wind Turbine Tool:	
Three (3) 60º Sectors with turbines within 8000 m.	

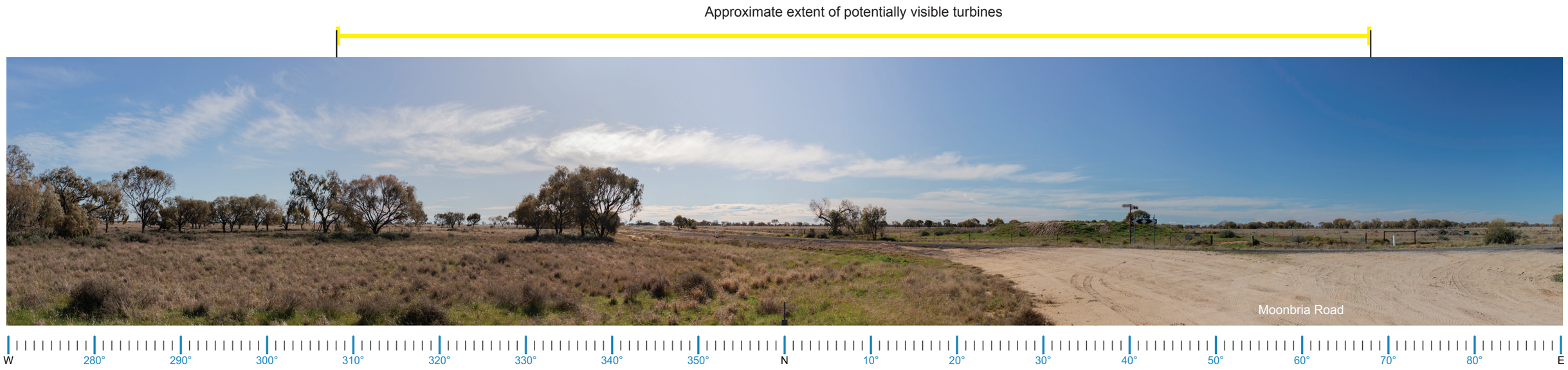
Existing Landscape Character Description:

This viewpoint was taken at the corner of Mabins Well Road and Wilson Road. The terrain is characterised as relatively flat and gently undulates towards to the north. Surrounding land currently supports agricultural activity and grazing. Vegetation character is defined as native grasses and low lying shrubs including saltbush. Scattered tree species are visible to the northwest aligning the road edge. Views are open and expansive from this location.

Potential Visual Impact:

Due to close proximity of the viewpoint to the turbines, there will be clear views of the Project from this location.

VP16 Corner Moonbria Road & Wilson Road, Jerilderie



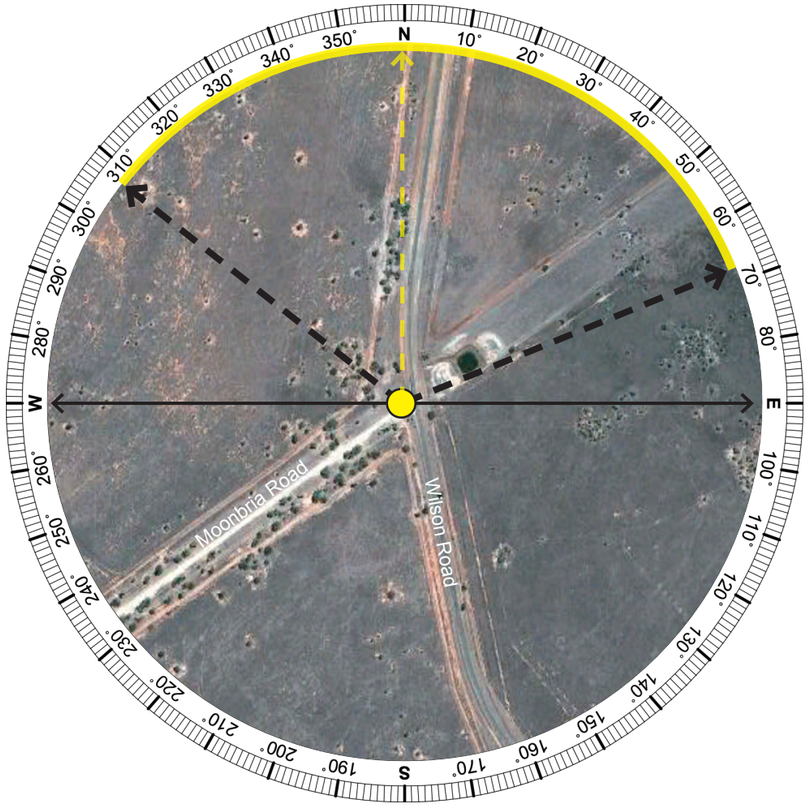
LEGEND

Viewing direction and centre of panorama

Direction of potentially visible turbines

Extent of panorama

Extent of potentially visible turbines



Aerial Image VP16 (Aerial Image Source: Six Maps)

VIEWPOINT VP16

Viewpoint Summary:	
Location:	Elevation:
Corner Moonbria Road & Wilson Road, Jerilderie	106 m
Coordinates:	Viewing Direction:
35° 7’49.80”S 145°34’42.21”E	North
Distance to nearest WTG:	Visibility Distance Zone:
9.00 km	Near Background (NB)
Land Use:	Viewer Sensitivity Level:
Low Use Road Primary Production	Level 3 - Low
LCU:	Scenic Quality Rating:
LCU04: Saltbush & Grassy plains	Low
Multiple Wind Turbine Tool:	
No turbines visible within 8000 m.	

Existing Landscape Character Description:

This viewpoint was taken at the intersection of Moonbria Road and Wilson Road. The terrain is characterised as flat, with open and expansive views from this location. Surrounding land supports agricultural activity and grazing. Vegetation character is defined as native grasses, low lying shrub varieties and scattered trees to the northwest and along horizon.

Potential Visual Impact:

Due to the relatively flat terrain in this location, there will be clear views of the Project to the north, with filtered views towards some turbines to the northwest.

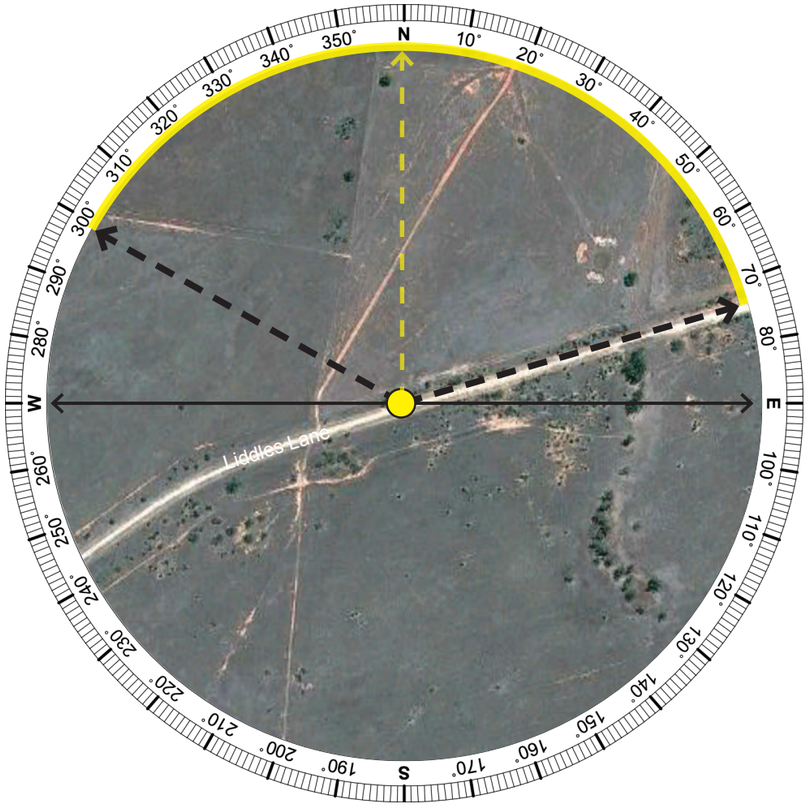
VP17 Liddles Lane, Jerilderie

Approximate extent of potentially visible turbines

W 280° 290° 300° 310° 320° 330° 340° 350° N 10° 20° 30° 40° 50° 60° 70° 80° E

LEGEND

- Viewing direction and centre of panorama
- Direction of potentially visible turbines
- Extent of panorama
- Extent of potentially visible turbines



Aerial Image VP17 (Aerial Image Source: Six Maps)

VIEWPOINT VP17

Viewpoint Summary:	
Location:	Elevation:
Liddles Lane, Jerilderie	107 m
Coordinates:	Viewing Direction:
35° 6'36.57"S 145°36'45.11"E	North
Distance to nearest WTG:	Visibility Distance Zone:
5.76 km	Far Middleground (FM)
Land Use:	Viewer Sensitivity Level:
Low Use Road Primary Production	Level 3 - Low
LCU:	Scenic Quality Rating:
LCU04: Saltbush & Grassy plains	Low
Multiple Wind Turbine Tool:	
Two (2) 60° Sectors with turbines within 8000 m.	

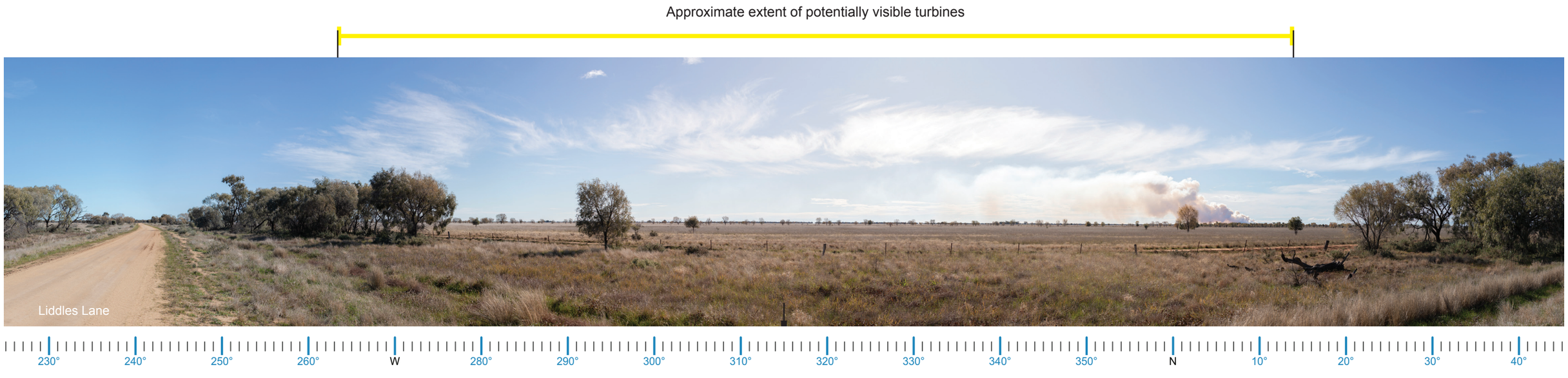
Existing Landscape Character Description:

This viewpoint was taken along unsealed Liddles Lane towards the Newell Highway. The terrain is characterised as flat and supports agricultural activity and grazing. Vegetation character is defined as grasses, low lying shrubs and scattered tree species aligning Liddles Lane within the road corridor. Views are open and expansive from this location. Scattered vegetation partially filters views to the northeast.

Potential Visual Impact:

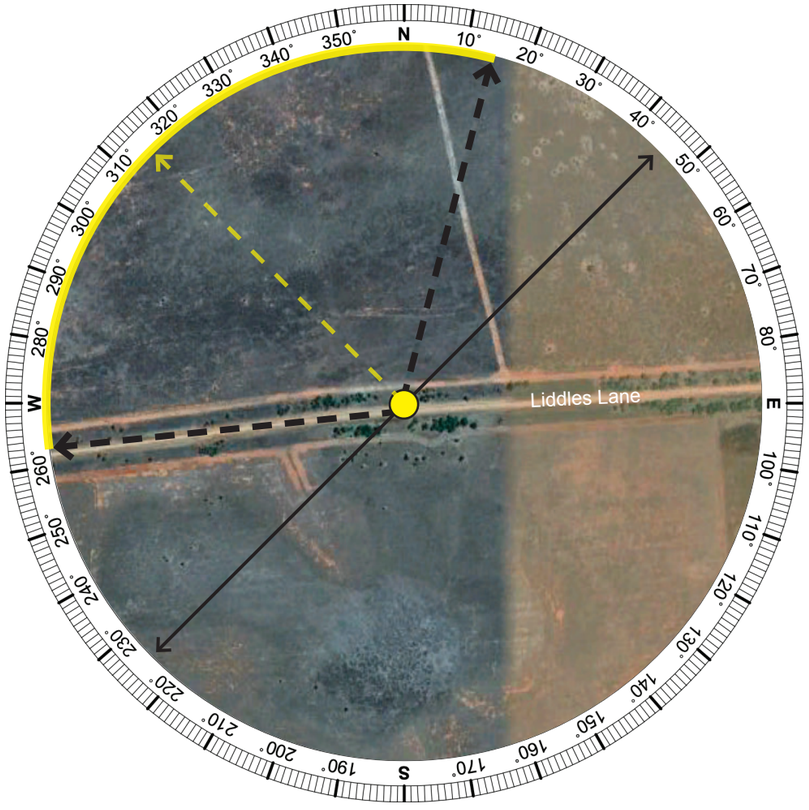
Due to the flat terrain in this location, there will be clear views of the Project to the north. Views towards some turbines may be filtered and screened by the scattered vegetation aligning Liddles Lane.

VP18 Liddles Lane, Jerilderie



LEGEND

- Viewing direction and centre of panorama
- Direction of potentially visible turbines
- Extent of panorama
- Extent of potentially visible turbines



Aerial Image VP18 (Aerial Image Source: Six Maps)

VIEWPOINT VP18

Viewpoint Summary:	
Location:	Elevation:
Liddles Lane, Jerilderie	113 m
Coordinates:	Viewing Direction:
35° 5’17.43”S 145°44’45.67”E	Northwest
Distance to nearest WTG:	Visibility Distance Zone:
4.04 km	Far Middleground (FM)
Land Use:	Viewer Sensitivity Level:
Low Use Road Primary Production	Level 3 - Low
LCU:	Scenic Quality Rating:
LCU04: Saltbush & Grassy plains	Low
Multiple Wind Turbine Tool:	
Two (2) 60º Sectors with turbines within 8000 m.	

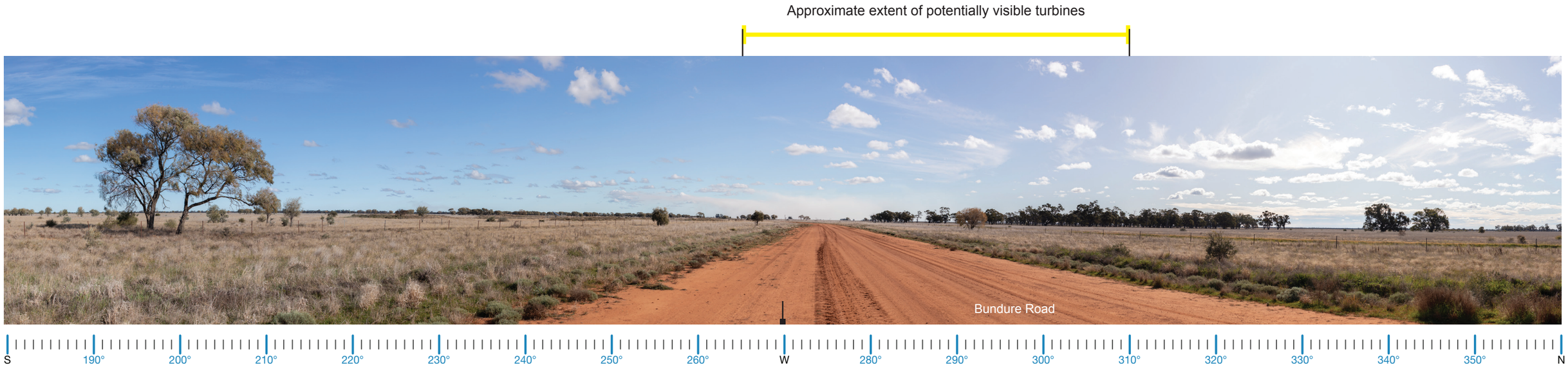
Existing Landscape Character Description:

This viewpoint was taken along Liddles Lane. The flat terrain supports agricultural activity and grazing. The surrounding views are characterised as open and expansive towards the northwest. Scattered trees dot the adjoining paddocks and vegetation within the road corrdior aligning the property fencelines.

Potential Visual Impact:

Due to the flat terrain, there will be clear views of the Project to the northwest. Views towards some turbines turbines in the distance may be filtered and screened by the vegetation aligning Liddles Lane to the west.

VP19 Bundure Road, Bundure



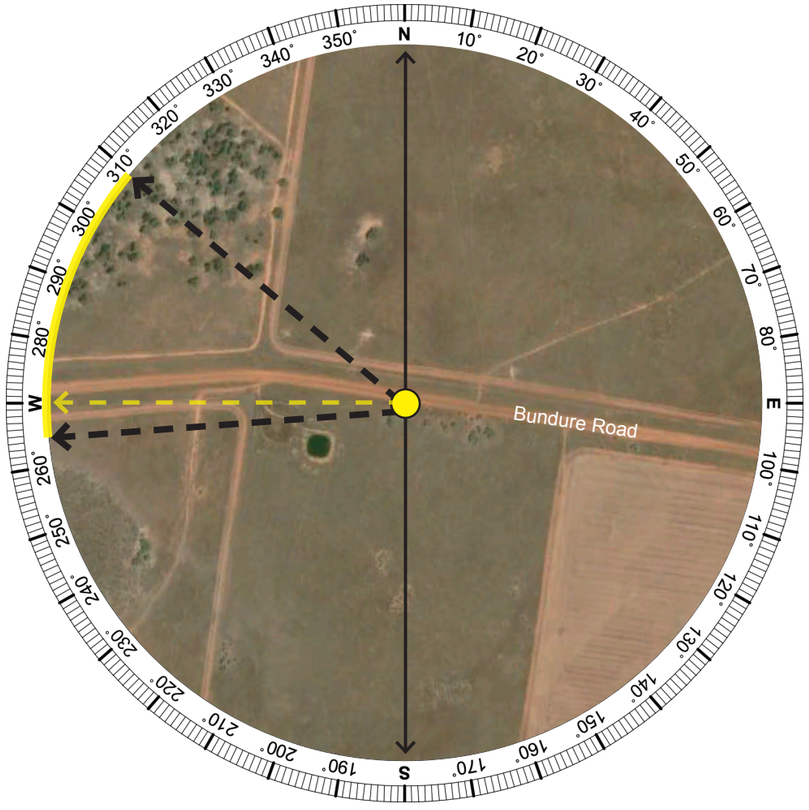
LEGEND

Viewing direction and centre of panorama

Direction of potentially visible turbines

Extent of panorama

Extent of potentially visible turbines



Aerial Image VP19 (Aerial Image Source: Six Maps)

VIEWPOINT VP19

Viewpoint Summary:	
Location:	Elevation:
Bundure Road, Bundure	116 m
Coordinates:	Viewing Direction:
35° 4’57.74”S 145°50’53.30”E	West
Distance to nearest WTG:	Visibility Distance Zone:
9.0 km	Near Background (NB)
Land Use:	Viewer Sensitivity Level:
Low Use Road Primary Production	Level 3 - Low
LCU:	Scenic Quality Rating:
LCU04: Saltbush & Grassy plains	Low
Multiple Wind Turbine Tool:	
No turbines visible within 8000 m.	

Existing Landscape Character Description:

This viewpoint was taken along unsealed Bundure Road towards Kidman Way. The terrain is flat. Supporting lands are used for agricultural activity and grazing. The surrounding views are characterised as open and expansive, with scattered vegetation throughout adjoining paddocks along the horizon.

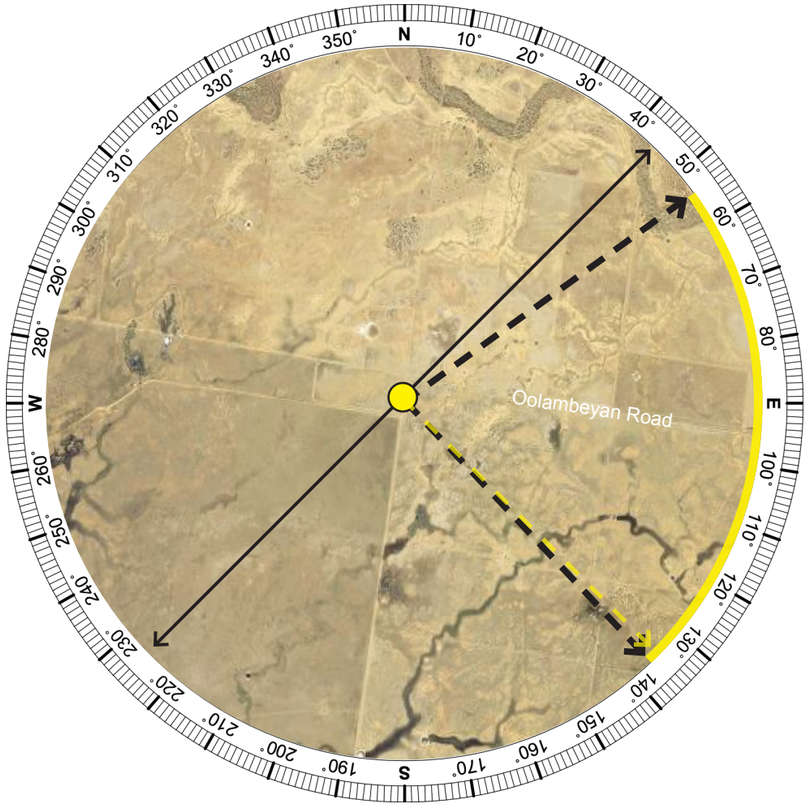
Potential Visual Impact:

Due to the flat terrain in this location, there will be clear views of the Project to the west. Because of the viewpoint distance from the turbines. Views towards some turbines may be filtered and screened by the vegetation to the northwest.

VP20 Oolambeyan Road, Entry Gate of Oolambeyan National Park

LEGEND

Viewing direction and centre of panorama
Direction of potentially visible turbines
Extent of panorama
Extent of potentially visible turbines



Aerial Image VP20 (Aerial Image Source: Six Maps)

VIEWPOINT VP20

Viewpoint Summary:	
Location:	Elevation:
Oolambeyan Road	105 m
Coordinates:	Viewing Direction:
34°40'4.33"S 145°21'28.16"E	Southeast
Distance to nearest WTG:	Visibility Distance Zone:
23.3 km	Far Background (FB)
Land Use:	Viewer Sensitivity Level:
Low Use Road Primary Production	Level 2 - Moderate
LCU:	Scenic Quality Rating:
Multiple Wind Turbine Tool:	
No turbines visible within 8000 m.	

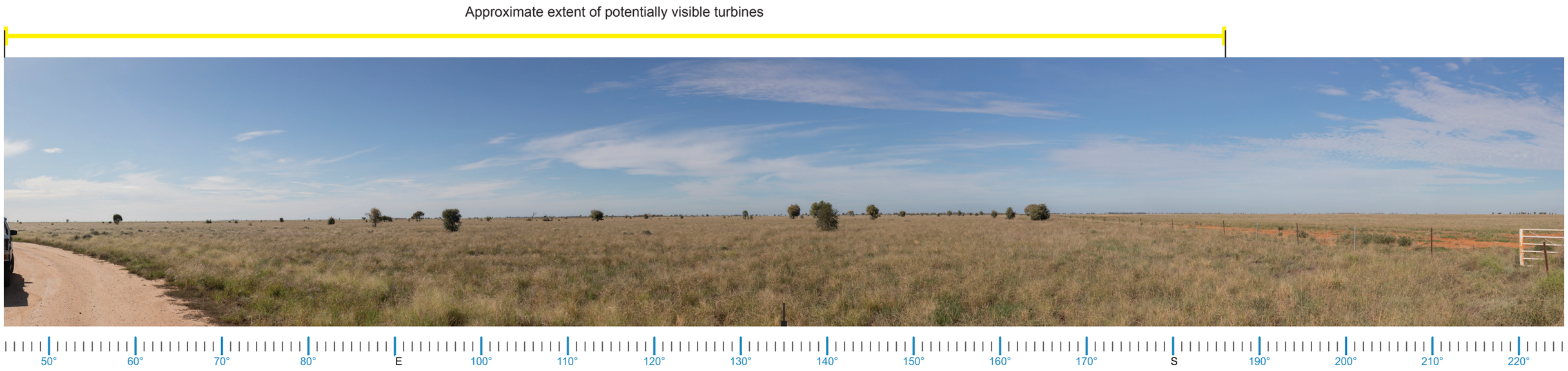
Existing Landscape Character Description:

This viewpoint was taken at the entry to Oolambeyan National Park along Oolambeyan Road. The terrain is flat and land parcels outside the fenceline are used for grazing. Land within the National Park is characterised as grassland with minimal tree cover. The surrounding views are characterised as open and expansive with minimal established vegetation visible in close proximity to the viewpoint location. Scattered trees are seen in the far distance to the east along the horizon.

Potential Visual Impact:

Due to the viewpoint distance from the Project, it is likely that the Project will not be visible at this location.

VP21 Off Conargo Road, Four Corners



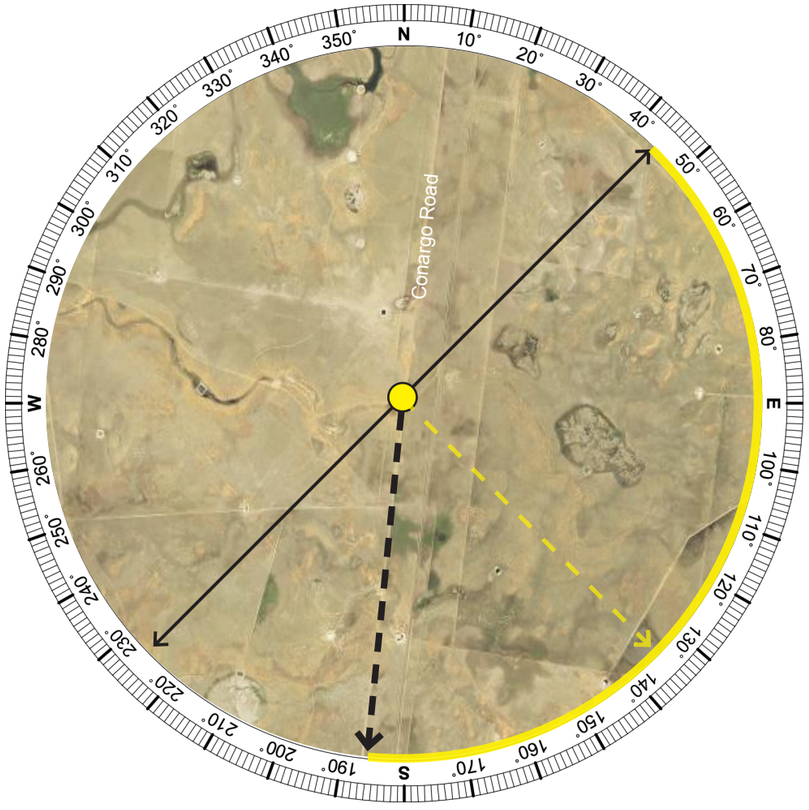
LEGEND

Viewing direction and centre of panorama

Direction of potentially visible turbines

Extent of panorama

Extent of potentially visible turbines



Aerial Image VP21 (Aerial Image Source: Six Maps)

VIEWPOINT VP21

Viewpoint Summary:	
Location:	Elevation:
Off Conargo Road, Four Corners	107 m
Coordinates:	Viewing Direction:
34°45'42.46"S 145°25'32.43"E	Southeast
Distance to nearest WTG:	Visibility Distance Zone:
11.4 km	Near Background (NB)
Land Use:	Viewer Sensitivity Level:
Low Use Road Primary Production	Level 3 - Low
LCU:	Scenic Quality Rating:
LCU02: Seasonal Water Corridors	Moderate
Multiple Wind Turbine Tool:	
No turbines visible within 8000 m.	

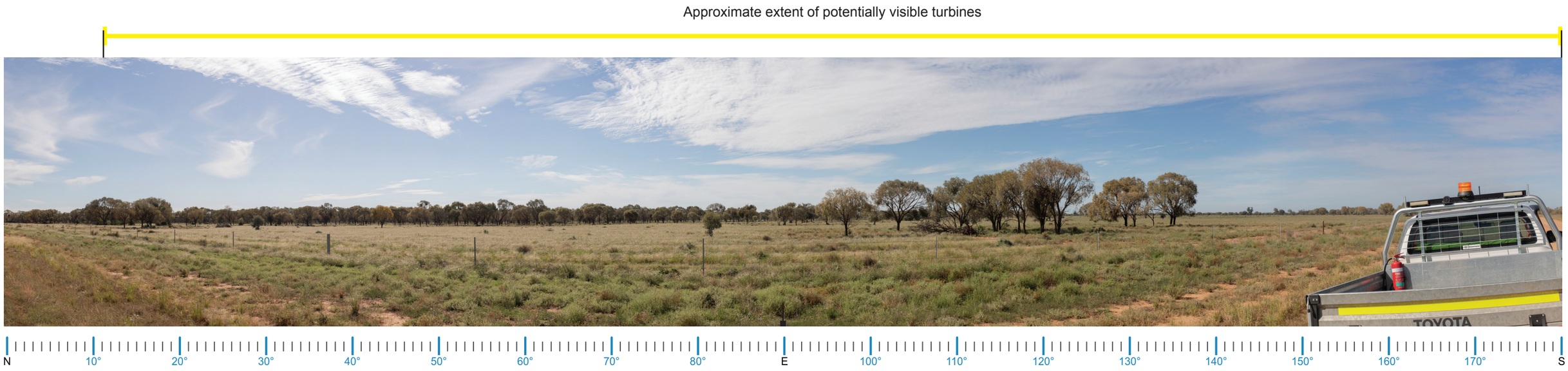
Existing Landscape Character Description:

This viewpoint was taken off Conargo Road. The terrain is flat and supports agricultural activity and grazing. The surrounding views are open and expansive, with scattered vegetation within grassland to the southeast.

Potential Visual Impact:

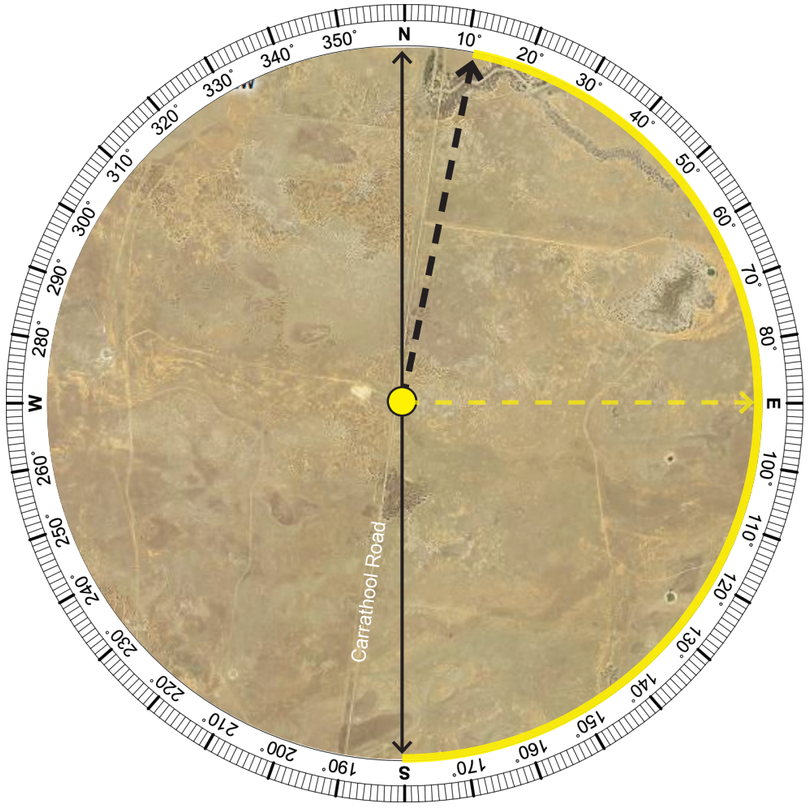
Due to the flat terrain in this location, there will be views of the Project to the southeast. Because of the viewpoint distance from the turbines, views towards some turbines in the distance may be filtered and screened by the scattered vegetation within paddocks.

VP22 Carrathool Road, Steam Plains



LEGEND

- Viewing direction and centre of panorama
- Direction of potentially visible turbines
- Extent of panorama
- Extent of potentially visible turbines



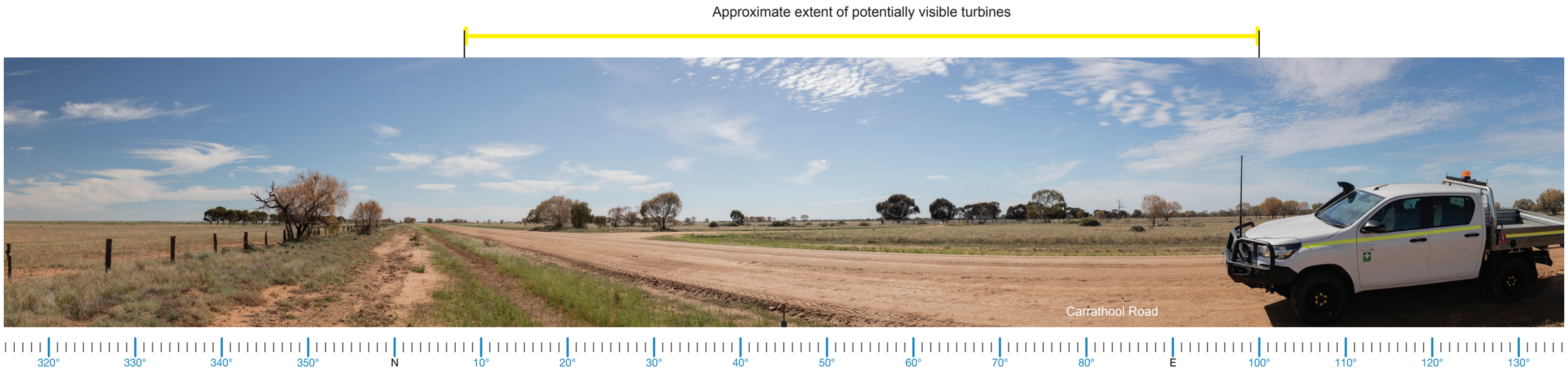
Aerial Image VP22 (Aerial Image Source: Six Maps)

VIEWPOINT VP22

Viewpoint Summary:	
Location:	Elevation:
Carrathool Road, Steam Plains	106 m
Coordinates:	Viewing Direction:
34°56'25.88"S 145°24'6.34"E	East
Distance to nearest WTG:	Visibility Distance Zone:
0.42 km	Near Foreground (NF)
Land Use:	Viewer Sensitivity Level:
Low Use Road Primary Production	Level 3 - Low
LCU:	Scenic Quality Rating:
LCU04: Saltbush & Grassy plains	Low
Multiple Wind Turbine Tool:	
Four (4) 60° Sectors with turbines within 8000 m.	

Existing Landscape Character Description:
This viewpoint was taken along Carrathool Road. The terrain is flat and supports agricultural activity and grazing outside the road corridor. The surrounding views are characterised as open and expansive, with dense vegetation containing views to the northeast. Scattered tree species are visible within the middleground in the adjoining paddocks to the east.
Potential Visual Impact:
Due to close proximity of the viewpoint to the turbines, there will be clear views of the Project from this location.

VP23 Carrathool Road, Steam Plains



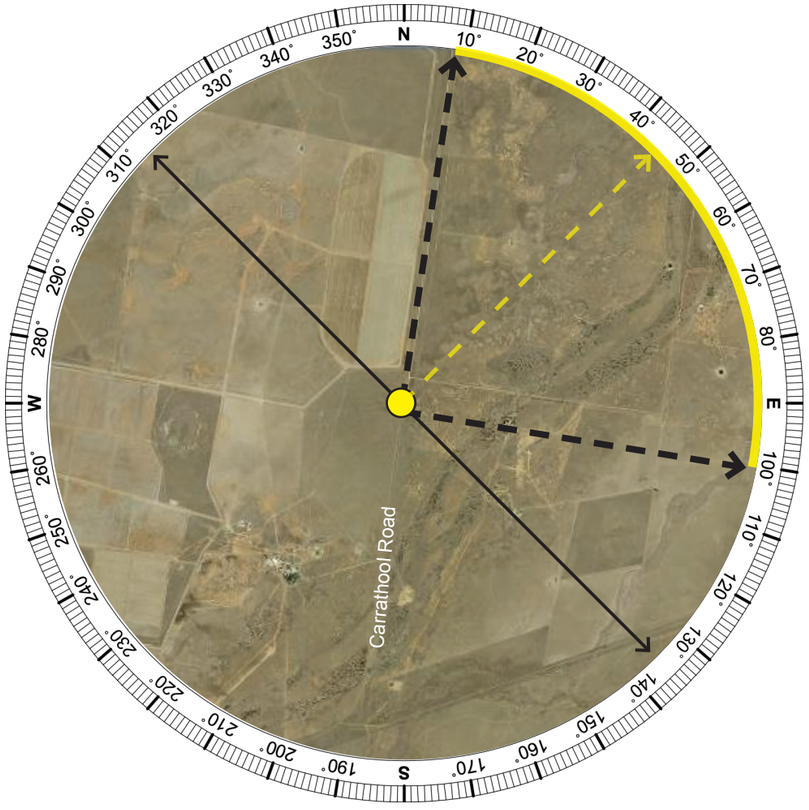
LEGEND

Viewing direction and centre of panorama

Direction of potentially visible turbines

Extent of panorama

Extent of potentially visible turbines



Aerial Image VP23 (Aerial Image Source: Six Maps)

VIEWPOINT VP23

Viewpoint Summary:	
Location:	Elevation:
Carrathool Road, Steam Plains	102 m
Coordinates:	Viewing Direction:
35°2’52.60”S 145°22’59.03”E	Northeast
Distance to nearest WTG:	Visibility Distance Zone:
4.22 km	Far Middleground (FM)
Land Use:	Viewer Sensitivity Level:
Low Use Road Primary Production	Level 3 - Low
LCU:	Scenic Quality Rating:
LCU04: Saltbush & Grassy plains	Low
Multiple Wind Turbine Tool:	
One (1) 60º Sector with turbines within 8000 m.	

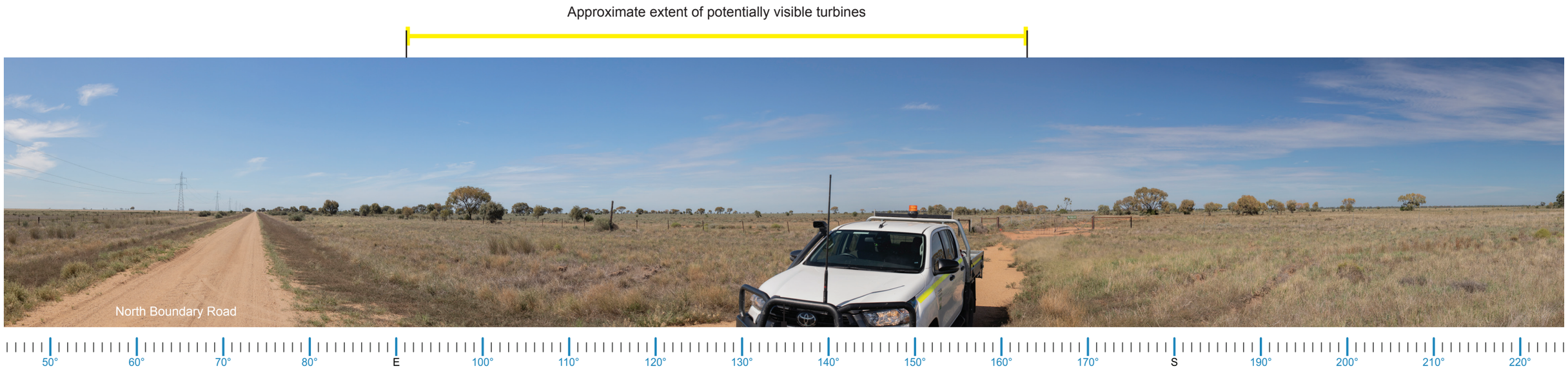
Existing Landscape Character Description:

This viewpoint was taken along unsealed Carrathool Road. The terrain is flat in this location, with parcels supporting agricultural activity and grazing outside the road corridor. The surrounding views are characterised as open and expansive. Scattered vegetation limits some views to the northeast.

Potential Visual Impact:

Due to the flat terrain in this location, there will be views of the Project to the northeast. Views towards some turbines may be filtered and screened by the scattered vegetation in the middleground to the northeast.

VP24 North Boundary Road, Steam Plains



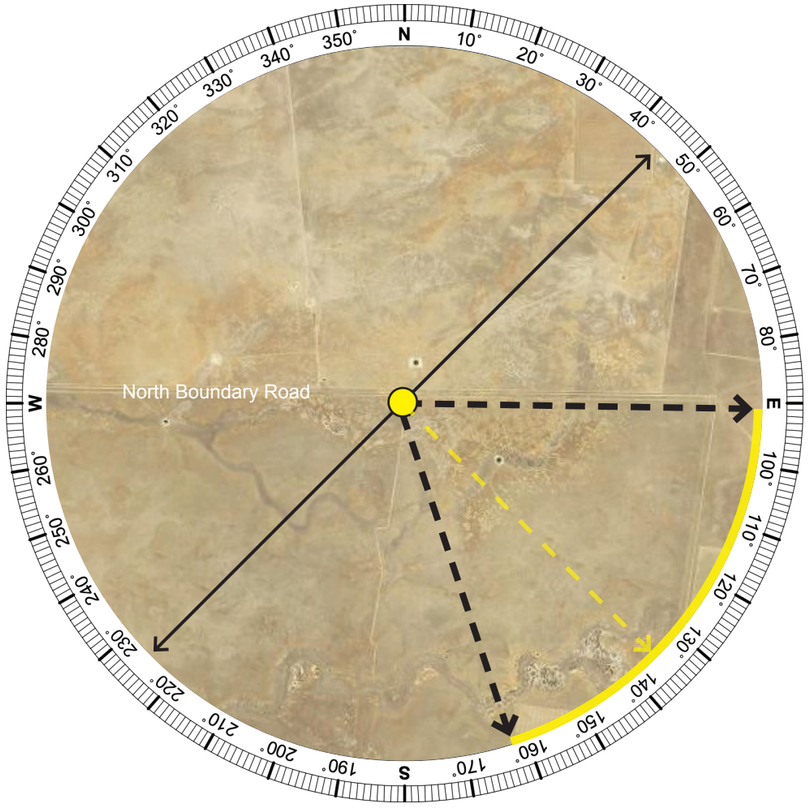
LEGEND

Viewing direction and centre of panorama

Direction of potentially visible turbines

Extent of panorama

Extent of potentially visible turbines



Aerial Image VP24 (Aerial Image Source: Six Maps)

VIEWPOINT VP24

Viewpoint Summary:	
Location:	Elevation:
North Boundary Road, Steam Plains	104 m
Coordinates:	Viewing Direction:
34°51'11.98"S 145°20'1.64"E	Southeast
Distance to nearest WTG:	Visibility Distance Zone:
8.4 km	Far Middleground (FM)
Land Use:	Viewer Sensitivity Level:
Low Use Road Primary Production	Level 3 - Low
LCU:	Scenic Quality Rating:
LCU04: Saltbush & Grassy plains	Low
Multiple Wind Turbine Tool:	
No turbines visible within 8000 m.	

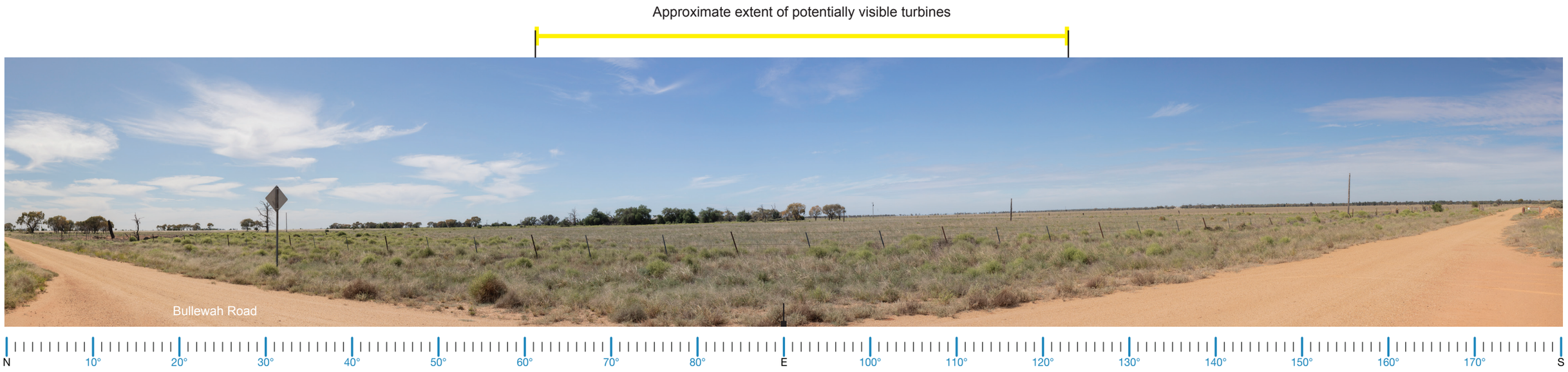
Existing Landscape Character Description:

This viewpoint was taken along unsealed Carrathool Road. The terrain is flat with parcels supporting agricultural activity and grazing outside the road corridor. The surrounding views are characterised as open and expansive with scattered vegetation within adjoining paddocks. Transmission line that run along North Boundary Road is visible towards the east.

Potential Visual Impact:

Due to the flat terrain in this location, there will be views of the Project to the northeast. Views towards some turbines may be filtered and screened by the scattered vegetation in the middleground to the east.

VP25 Bullewah Road, Steam Plains



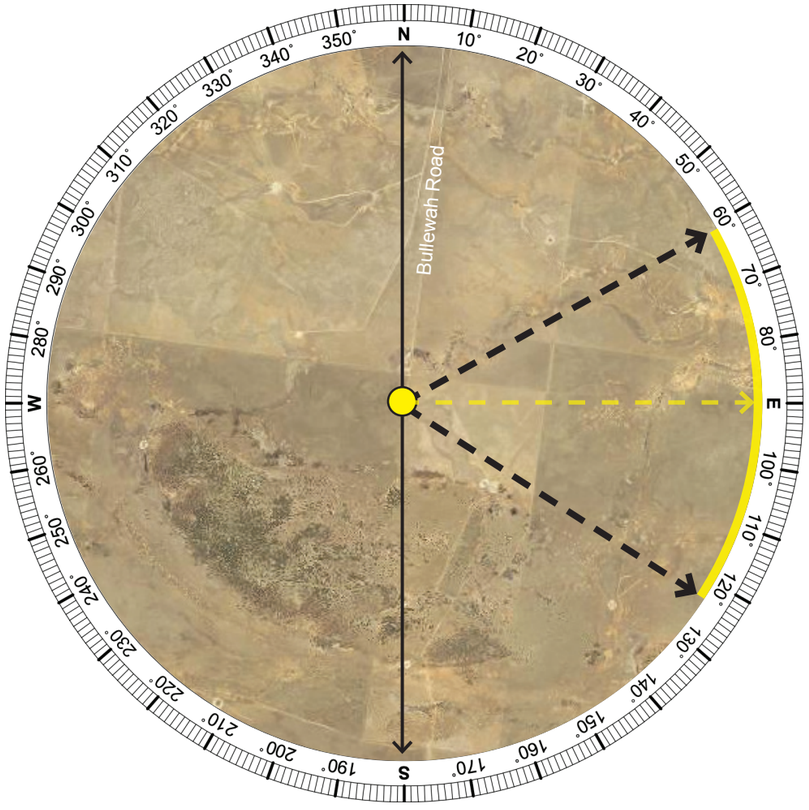
LEGEND

Viewing direction and centre of panorama

Direction of potentially visible turbines

Extent of panorama

Extent of potentially visible turbines



Aerial Image VP25 (Aerial Image Source: Six Maps)

VIEWPOINT VP25

Viewpoint Summary:	
Location:	Elevation:
Bullewah Road, Steam Plains	102 m
Coordinates:	Viewing Direction:
34°56'33.38"S 145°16'14.16"E	East
Distance to nearest WTG:	Visibility Distance Zone:
11.97 km	Near Background (NB)
Land Use:	Viewer Sensitivity Level:
Low Use Road Primary Production	Level 3 - Low
LCU:	Scenic Quality Rating:
LCU04: Saltbush & Grassy plains	Low
Multiple Wind Turbine Tool:	
No turbines visible within 8000 m.	

Existing Landscape Character Description:

This viewpoint was taken along unsealed Bullewah Road. The terrain is flat, with parcels being used to support agricultural activity outside road corridor. Powerline are visible to the southeast. Dense vegetation is visible from this location surrounding a rural dwelling to the east. The surrounding views are characterised as open and expansive with dense vegetation visible in the far distance along horizon to the southeast.

Potential Visual Impact:

Due to the flat terrain in this location, there will be clear views of the Project to the east. Views towards some of the turbines in the distance may be filtered and screened by the dense vegetation surrounding the rural dwelling to the east.

Appendix D

Social impact assessment – Scoping report

EMM
creating opportunities

Dinawan Energy Hub - Wind Farm

Social Impact Assessment - Scoping Report

Prepared for Spark Renewables Pty Limited

October 2022

Dinawan Energy Hub - Wind Farm

Social Impact Assessment - Scoping Report

E220305 RP1

October 2022

Version	Date	Prepared by	Approved by	Comments
1	2 September 2022	Candace Lim	Chris Mahoney	
2	29 September 2022	Candace Lim	Chris Mahoney	
3	14 October 2022	Candace Lim	Chris Mahoney	

Approved by

Chris Mahoney
Associate Director
14 October 2022

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1 Introduction

1.1 Purpose

The purpose of this social impact assessment (SIA) scoping report is to accompany the main Scoping Report that requests and informs the content of the Secretary's Environmental Assessment Requirements (SEARs) for the Dinawan Energy Hub Wind Farm (the project). This SIA scoping study is an evaluation procedure, and its primary objective is to define the scope of the SIA for the project in accordance with the *Social Impact Assessment guideline for State Significant Projects* (DPIE 2021). This will be achieved through:

- identifying potentially affected stakeholders;
- identifying and understanding the area of social influence (SIA study area);
- identifying the potential, negative and positive, social impacts for further investigation; and
- determining the level of assessment required for each potential social impact.

1.2 Project description

Spark Renewables Pty Limited (Spark Renewables) proposes to develop the Dinawan Energy Hub, which comprises a hybrid wind and solar farm and battery energy storage system (BESS). Dinawan Energy Hub will be delivered through two separate, but related, State significant development (SSD) applications to the NSW Department of Planning and Environment (DPE). This report relates to the Dinawan Energy Hub Wind Farm.

The project investigation area is between the towns of Coleambally and Jerilderie and lies within the Murrumbidgee and Edward River local government areas (LGAs) in NSW. The project will be developed within the South-West Renewable Energy Zone (REZ) and will connect to the Dinawan Substation, proposed to be built by Transgrid as part of Project EnergyConnect.

The project investigation area is immediately adjacent to Kidman Way at its eastern extent which will provide direct access to the project. Kidman Way connects the project to the Sturt Highway to the north and the Newell Highway to the south. The project will also have alternative site access points from Goolgumbla Road and McLennons Bore Road.

The project includes the installation, operation, maintenance and decommissioning of approximately 250 wind turbine generators (WTGs), as well as a BESS and associated infrastructure. The project will have a generation capacity of up to approximately 1.5 GW(AC). The BESS will have a capacity of up to approximately 300 MW (AC or DC coupled) and will have provision for up to four hours of storage (1,200 MWh).

1.3 SIA study area

The SIA study area identifies surrounding stakeholders who could potentially be directly or indirectly affected by the project. This includes landholders, community members, businesses and service providers who may have an interest in the project and who could be impacted. The SIA study area identifies the social and geographical boundaries for the SIA, and takes into account the following:

- the nature and scale of the proposed project, including associated infrastructure;
- the scope of the potential social impacts throughout the project lifecycle;
- the location and characteristics of potentially affected communities; and
- land use patterns, infrastructure and urban/rural centres.

The project is spread across a large, sparsely populated area which encompasses the localities of Coleambally, Gala Vale, Mabins Well and Bundure. The local study area for the SIA includes all land within the project investigation area along with a 5 km buffer area around the periphery, recognising that direct project-related impacts may also be experienced by those living in close proximity to the project investigation area. Social baseline characterisation utilised data generated by the Australian Bureau of Statistics (ABS) at the Statistical Area 1 (SA1) geographical classification. Four SA1 areas have been included in the local study area. The local study area is defined on Figure 1.1.

Surrounding townships are likely to be primary sources of labour, goods and services which will support the project and subsequently experience social impacts and benefits. Nearby regional communities considered relevant to the SIA are identified on Figure 1.1 and include:

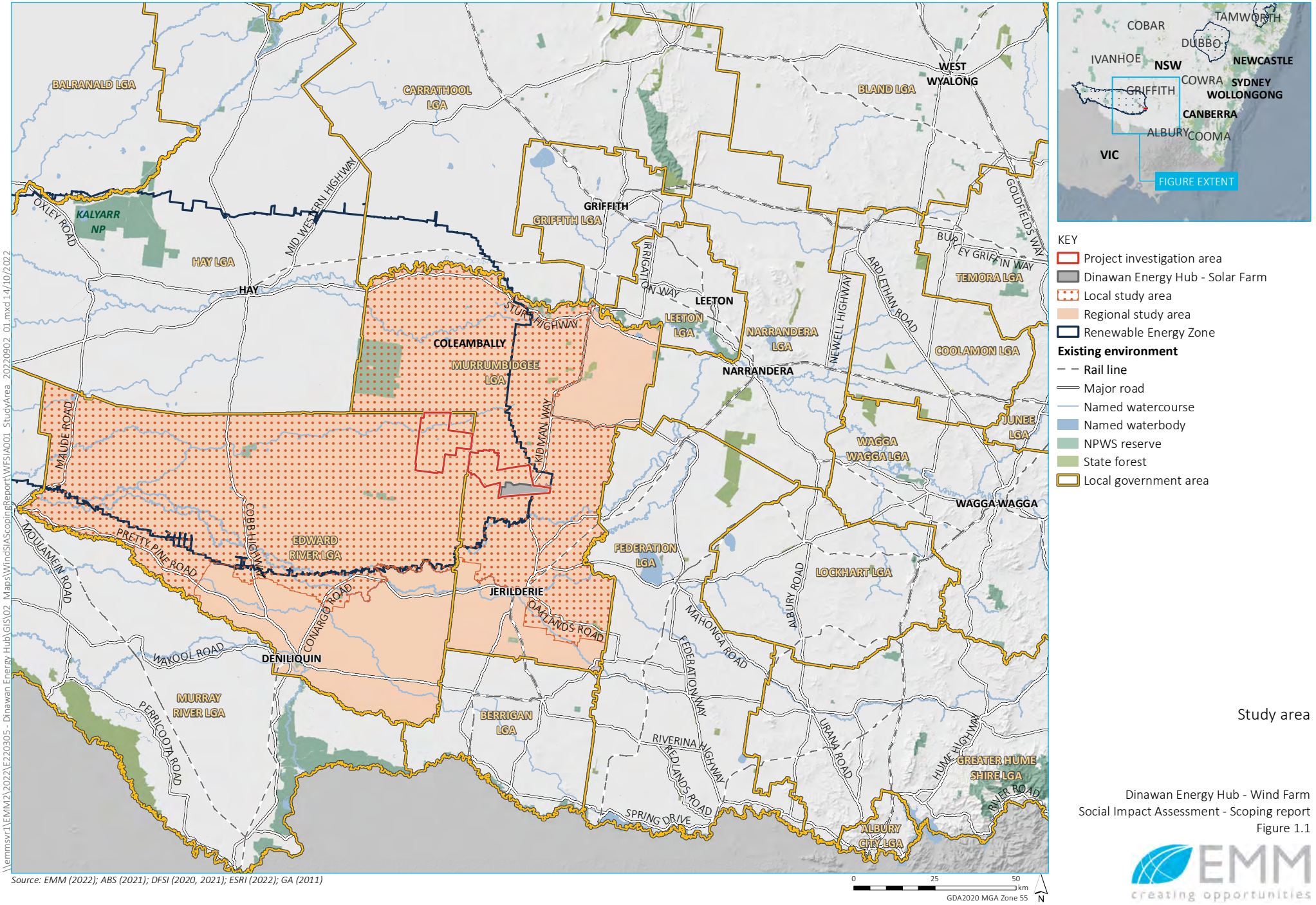
- Griffith;
- Deniliquin;
- Wagga Wagga;
- Jerilderie;
- Coleambally; and
- Hay.

The regional study area is defined on Figure 1.1 and encompasses the two LGAs within which the project is located: Edward River LGA and Murrumbidgee LGA. Both LGAs will experience some direct and indirect impacts, mostly related to workforce accommodation, local procurement opportunities and employment.

The SIA study area is summarised in Table 1.1.

Table 1.1 Locations within the SIA study area mapped to ABS categories

Indicative location	ABS statistical locality	SIA study area
Gala Vale and Argoon	10903118529[1] SA1	Local area
West of Coleambally	11301125742[1] SA1	
South of Coleambally	11301125715[1] SA1	
Mabins Well (also includes Conargo and Four Corners)	10903118311[1] SA1	
Jerilderie	Suburbs and localities	Nearby regional communities
Hay	Suburbs and localities	
Coleambally	11301125713 SA1 and 11301125734 SA1	
Wagga Wagga	SA2	
Griffith	SA2	
Deniliquin	SA2	
Murrumbidgee Region	Murrumbidgee LGA	Regional area
Edward River Region	Edward River LGA	



KEY

- Project investigation area
- Dinawan Energy Hub - Solar Farm
- Local study area
- Regional study area
- Renewable Energy Zone

Existing environment

- Rail line
- Major road
- Named watercourse
- Named waterbody
- NPWS reserve
- State forest
- Local government area

Study area

Dinawan Energy Hub - Wind Farm
Social Impact Assessment - Scoping report
Figure 1.1

EMM creating opportunities

Source: EMM (2022); ABS (2021); DFSI (2020, 2021); ESRI (2022); GA (2011)

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2 Community profile

2.1 Overview

This section provides a brief overview of the social conditions of the suburbs and broader region in which the project will operate. Collectively, the study area includes a 5 km buffer around the project, four SA1, six nearby regional communities, Edward River LGA and Murrumbidgee LGA.

Data used to profile nearby regional communities are different for Wagga Wagga, Griffith and Deniliquin than Hay, Coleambally and Jerilderie. This is because the metadata for each of these areas are based on population size. Hay and Jerilderie have a much smaller population, therefore, to isolate the appropriate study area based on the ABS geography, the data category of 'Suburbs and localities' has been used. For Coleambally, two SA1 areas have been identified (11301125734 and 11301125713), whilst for Wagga Wagga, Griffith and Deniliquin the data category of SA2 has been utilised.

2.2 Demographic profile

In 2021, the four SA1s identified for the local study area had a combined total population of 886 (Table 2.1). SA1 Mabins Well had the highest population with 280 persons, whilst SA1 Gala Vale and Argoon had the lowest population (165). The percentage of males to females was higher across the local study area compared to the NSW average.

Wagga Wagga is the largest centre in the surrounding area with a population of 56,974. This is followed by Griffith, with a population of 20,569. The other nearby regional communities of Deniliquin (7,038), Hay (1,132) Jerilderie (922) and Coleambally (566) have considerably smaller populations. Coleambally had the highest percentage of males (52.1%) to females (48.0%) whilst Deniliquin, Griffith and Hay were comparable to the NSW average.

Relatively low population density is a key characteristic of the regional study area. With a combined population of 11,809, the Murrumbidgee LGA has a substantially smaller population (3,353) than that of Edward River LGA (8,456). The Murrumbidgee LGA had a higher male (52.2%) to female (47.8%) population. Edward River LGA was opposite to the Murrumbidgee LGA which was comparable to NSW and had more females (49.3%) than males (50.65%).

Table 2.1 Population summary (2021)

Area	Population	Male (%)	Female (%)
Local study area			
Mabins Well	280	55.5	43.5
Gala Vale and Argoon	165	56.2	43.8
West of Coleambally	207	54.1	45.9
South of Coleambally	234	50.8	49.2
Nearby regional communities			
Wagga Wagga (SA2)	56,974	47.9	52.1
Deniliquin (SA2)	7,038	48.3	51.7
Griffith (SA2)	20,569	49.6	50.4

Table 2.1 Population summary (2021)

Area	Population	Male (%)	Female (%)
Coleambally (SA1 11301125713 and 11301125734)	566	52.0	48.0
Hay (suburbs and localities)	1132	49.0	51.0
Jerilderie (suburbs and localities)	922	51.3	48.7
Regional study area			
Murrumbidgee LGA	3,353	52.2	47.8
Edward River LGA	8,456	49.3	50.7
NSW	**8,072,163**	**49.4%**	**50.6%**

Source: ABS (2021).

The median age in SA1 Mabins Well was notably higher (47) than the average for NSW (39); whilst across the other SA1 areas, the average age was comparable to NSW. The population aged between 5 and 19 across all SA1 areas was relatively low compared to the NSW percentile range. However, ages between 45 and 74 were higher than the NSW percentile range, before declining at 75+ with no population aged above 85 in the local study area. This represented communities with a large middle age population compared to NSW before the population drops by 10% at 75 years.

The regional study area demonstrates an age distribution which differs from that of NSW. Both LGAs had a lower population between the ages of 19 and 44 and a higher population between the ages of 55 and 74 compared to NSW. Between the age of 0 and 19 both LGAs were comparable to NSW. This indicated both LGAs have an aging population with a much higher median age (Murrumbidgee LGA 54, Edward River LGA 46) compared to NSW (39).

The age group distribution for the local and regional study area is summarised in Table 2.2.

Table 2.2 Age group distribution (2021)

Area	0–4 years	5–14 years	15–19 years	20–24 years	25–34 years	35–44 years	45–54 years	55–64 years	65–74 years	75–84 years	85 years and older	Median age
Local study area												
Mabins Well	4.5%	16.1%	3.4%	3.8%	7.6%	11.6%	15.1%	16.5%	15.8%	5.5%	0.0%	47
Gala Vale and Argoon	9.4%	10.7%	3.8%	3.8%	17.5%	6.3%	17.4%	16.3%	11.3%	3.8%	0.0%	38
West of Coleambally	5.0%	19.6%	1.5%	6.1%	14%	14.6%	17%	12%	5.5%	4.5%	0.0%	40
South of Coleambally	8.8%	8.4%	3.3%	6.7%	11.7%	13.8%	8.4%	15.1%	11.3%	4.2%	0.0%	37
Regional study area												
Murrumbidgee LGA	5.5%	11.4%	5.0%	5.1%	12.2%	10.4%	12.3%	16.5%	12.9%	6.5%	2.3%	45
Edward River LGA	5.2%	12.2%	5.7%	4.7%	10.2%	10%	12.1%	14.9%	13.5%	8%	3.4%	46
NSW	**5.8%**	**12.4%**	**5.7%**	**6.1%**	**14.2%**	**13.7%**	**12.6%**	**11.9%**	**9.8%**	**5.6%**	**2.3%**	**39**

Source: ABS (2021).

2.3 Aboriginal and/or Torres Strait Islander peoples

There is significant variation throughout the study areas in the proportion of persons who identify as Aboriginal and/or Torres Strait Islander (Table 2.3). SA1 Gala Vale and Argoon has a significantly higher proportion of people who identify as Aboriginal and/or Torres Strait Islander (9.1%) compared to NSW (3.4%), whilst SA1 Mabins Well was significantly lower (1.8%), as shown in Table 2.3. The identified SA1 areas have a low female to male ratio in the Aboriginal and/or Torres Strait Islander population compared to NSW which has a higher female ratio of 53.7%.

The proportion of the population who identify as Aboriginal and/or Torres Strait Islander in Murrumbidgee LGA (8.6%) and Edward River LGA (4.8%) was higher than the NSW average (3.4%).

Table 2.3 Aboriginal and/or Torres Strait Islander population

Area	Aboriginal and/or Torres Strait Islander population	Aboriginal and/or Torres Strait Islander population (% of total population)	Male (%)	Female (%)	Median age
Local study area					
Mabins Well	5	1.8%	66.7%	33.3%	23
Gala Vale and Argoon	15	9.1%	70.0%	30.0%	9
West of Coleambally	9	4.3%	75.0%	25.0%	18
South of Coleambally	6	2.6%	60.0%	40.0%	41
Regional study area					
Murrumbidgee LGA	290	8.6%	50.3%	49.7%	32
Edward River LGA	410	4.8%	46.3%	53.7%	23
NSW	**278,043**	**3.4%**	**49.7%**	**50.3%**	**23**

Source: ABS (2021).

2.4 Employment

Across the local study area, the overall rate of unemployment was relatively low at 3.7%. (Table 2.4). The unemployment rate in SA1 West of Coleambally (7.8%) was comparatively high, whilst SA1 Mabins Well (2.6%) and SA1 South of Coleambally (0.0%) were both significantly lower.

Unemployment in Edward River LGA was higher (5.0%) than in the Murrumbidgee LGA (4.5%). When compared to NSW, both LGAs had lower than average rates of unemployment.

Table 2.4 Unemployment rate (2016)

Study area	Area	Unemployment rate
Local study area	Mabins Well	2.6%
	Gala Vale and Argoon	4.3%
	West of Coleambally	7.8%
	South of Coleambally	0%
Nearby regional communities	Wagga Wagga	5.8%
	Coleambally	4.5%
	Deniliquin	5.6%
	Griffith	5.3%
	Hay	4.9%
	Jerilderie	4.7%
Regional area	Murrumbidgee LGA	4.5%
	Edward River LGA	5.0%
NSW		6.3%

Source: ABS (2016).

Agriculture was the primary industry of employment across the local study area. The most common industry of employment was 'other grain growing', followed by 'grain-sheep or grain-beef cattle farming' and 'sheep farming (specialised)' (Table 2.5). 'Grain-sheep or grain-beef cattle farming' was also in the top three industries of employment in the Murrumbidgee LGA.

In the nearby regional communities, 'local government administration' employs 8.2% of Jerilderie's population and 5.0% of the population in Hay. 'Poultry processing' in Griffith employs 7.8% of its population which was also the second highest industry of employment across the Murrumbidgee LGA.

In Wagga Wagga, Deniliquin, Griffith and Hay a key industry of employment was 'supermarket and grocery store' along with 'hospitals' in Wagga Wagga and Griffith.

Table 2.5 Primary industries of employment (2016)

Area	First		Second		Third	
Local study area						
Mabins Well	Sheep farming (specialised)	27.4%	Beef cattle farming (Specialised)	13.3%	Sheep-beef cattle farming	8.8%
Gala Vale and Argoon	Grain-sheep or grain-beef cattle farming	15.4%	Other grain growing	15.4%	Sheep farming (specialised)	10.3%
West of Coleambally	Other grain growing	15.3%	Cotton growing	13.7%	Sheep farming (specialised)	8.1%

Table 2.5 Primary industries of employment (2016)

Area	First		Second		Third	
South of Coleambally	Other grain growing	53.3%	Grain-sheep or grain-beef cattle farming	11.4%	Other allied health services	4.8%
Nearby regional communities						
Wagga Wagga	Hospitals (except psychiatric hospitals)	4.9%	Defence	3.9%	Higher education	3.3%
Deniliquin	Other social assistance services	4.0%	Supermarket grocery store	3.4%	Meat processing	3.2%
Griffith	Poultry processing	7.8%	Wine and other alcoholic beverage manufacturing	5.6%	Hospitals (except psychiatric hospitals)	3.0%
Hay	Supermarket grocery store	5.0%	Local government administration	4.9%	Accommodation	3.8%
Jerilderie	Local government administration	8.2%	Other grain growing	7.7%	Grain-sheep or grain-beef cattle farming	5.5%
Coleambally	Technicians and Trades Workers	4.4%	Managers	4.2%	Labourers	4.2%
Regional study area						
Murrumbidgee LGA	Other grain growing	11.1%	Poultry Processing	4.1%	Grain-sheep or grain-beef cattle farming	3.9%%
Edward River LGA	Other social assistance services	3.5%	Supermarket grocery store	3.0%	Primary Education	2.9%
NSW	**Hospitals (except psychiatric hospitals)**	**3.3%**	**Café and Restaurants**	**2.4%**	**Supermarket and grocery Stores**	**2.2%**

Source ABS (2016).

2.5 Local businesses

In 2021, there were a total of 930 businesses registered in the Edward River LGA, of which the most prevalent were 'agriculture, forestry and fishing' accounted for 36% (334 businesses) and 'construction' accounted for 13% (117 businesses). The majority of the 'construction' businesses are in Deniliquin while 'agriculture, forestry and fishing' related businesses are throughout the Edward River LGA (ABS 2016).

In the Murrumbidgee LGA, there were a total of 656 businesses registered in 2021. Of these, 'agriculture, forestry and fishing' accounted for 59% (386 businesses) distributed throughout the LGA, 'rental, hiring and real estate services' accounted for 8% (51 businesses) and 'construction' accounted for 7% (43 businesses) of which majority were in Coleambally and Jerilderie (ABS 2021).

2.6 Socio-economic advantage and disadvantage

To assess the welfare and determine the social and economic wellbeing of Australian communities, the ABS has developed the Socio-Economic Indexes for Areas (SEIFA). The indexes are based on information from a five-yearly census of population and housing. The index provides a measure of socio-economic status based on low-income earners, relatively lower education attainment, high unemployment, people's access to material and social resources and their ability to participate in society. Indexes are provided as a score and decile. Low index values represent areas of most disadvantage and high values represent areas of least disadvantage.

Across the local study area there was considerable variation in terms of the index of disadvantage. Two of the SA1 areas (SA1 Gala Vale and Argoon and SA1 South of Coleambally) recorded a decile ranking of nine (9) which indicates relatively low levels of disadvantage. This was in contrast to the other two SA1s, which both recorded a decile ranking of five (5) which indicates a population with moderate levels of disadvantage.

Of the nearby regional communities, Wagga Wagga (6) and Coleambally (5) recorded the lowest level of relative disadvantage whilst the incidence of relative disadvantage was high in the towns of Jerilderie (3), Griffith (3), Deniliquin (2) and Hay (2).

Across the regional study area the SEIFA Disadvantage Index indicates moderate levels of disadvantage with Murrumbidgee LGA recording a decile score of five (5) and Edward River LGA a decile score of four (4).

2.7 Health

The Murrumbidgee LGA and Edward River LGA are serviced by the Murrumbidgee Local Health District (LHD), which measures health outcomes against the indicators outlined in Table 2.6. The Murrumbidgee LHD recorded a relatively higher proportion of people exhibiting behaviours which pose a health risk including alcohol consumption, smoking, obesity and mental health than those across NSW. Asthma prevalence in adults in the Murrumbidgee LHD was 9.6% compared with 11.5% in NSW.

Table 2.6 Health indicator summary (2020)

Health indicator	Murrumbidgee LHD	NSW
Alcohol drinking, long-term risk in adults	38.7%	33.5%
Daily smoking in adults	10.5%	8.2%
Overweight and obesity in adults	68.2%	57.8%
Asthma prevalence in adults	9.6%	11.5%
High or very high psychological distress in adults	23.4%	16.7%

Source: NSW Health (2021).

3 Community and stakeholder engagement

A core element of SIA is engagement with the community and other stakeholders. This is undertaken to validate baseline data, build an appreciation of community values, interests and aspirations and to inform the identification of project-related social impacts and benefits.

Spark Renewables has undertaken a range of engagement activities to date, including:

- Briefing letters and meetings – project overviews to various stakeholders (including Council, NSW Department of Planning and Environment, State MP, Federal MP, NSW Energy Minister, Australian Energy Market Operator (AEMO) and business leaders) and updates on community consultation.
- Development of a project website and social media presence – providing project updates.
- Media releases and community newsletters – announcing the project and providing information to the community and businesses.
- Phone calls, emails, letterbox drops and advertisements – to promote the community drop-in session to affected residents and the local community.
- Community drop-in session –to gather feedback from the local community and businesses.

In addition to the above, community feedback and community values surveys have been promoted through the drop-in session and social media channels and made available via the web portal.

A total of 29 responses to the community feedback survey were received. Of the responses received:

- fourteen (48%) had a general interest in renewable energy projects;
- ten (34%) had an interest in employment and procurement opportunities; and
- eight (28%) had an interest because they either live or own land near the project.

Fourteen respondents answered the community values questionnaire and their responses are outlined in Table 3.1 (project benefits) and Table 3.2 (project concerns).

Table 3.1 Community values questionnaire– project benefits

Potential project benefit	Responses (%)	Total responses
Employment opportunities	46.15%	6
Investment in the local community	71.43	10
Road upgrades/better access to Rural Fire Services	61.54%	8
Land use diversification	23.08%	3
Community sponsorships	30.77%	4
Access to cheaper electricity	38.46%	5
Partnerships with Local Aboriginal Land Councils	7.69%	1
Increased tourism	7.69%	1
Clean energy	53.85%	7

Table 3.2 Community values questionnaire – project concerns

Project concern	Responses (%)	Total responses
Visual	23.08%	3
Traffic and road safety	23.08%	3
Potential impacts on flora and fauna	46.15%	6
Increased workforce in the area	7.69%	1
Land use	23.08%	3
Water	7.69%	1
Noise	15.38%	2
Fire	57.14%	8
No concerns	15.38%	2

The feedback generated through community and stakeholder engagement has been used to inform the preliminary identification of social impacts and benefits.

Detailed community and stakeholder engagement will be undertaken specifically to inform key elements of the SIA including baseline conditions and social trends occurring in different communities, identification and assessment of potential impacts and benefits and how these may most effectively be mitigated and managed. The objectives of SIA engagement are to:

- provide local stakeholders with the opportunity to define local values and the characteristics of potentially affected communities;
- provide stakeholders with the opportunity to identify and assess potential social impacts and applicable mitigation and management strategies;
- ensure the SIA considers the interests and perspectives of stakeholders who may be affected by project-related impacts; and
- integrate with broader environmental impact statement (EIS) and project engagement activities so as to provide a range of opportunities for community members and key stakeholders to provide feedback.

Stakeholder engagement will be iterative throughout the SIA with the stakeholder groups to be engaged including:

- local communities;
- local and state government agencies;
- local and regional employment and training providers;
- public and private housing providers;
- local and regional commerce and community development groups;
- social and public service providers;

- emergency services; and
- public health providers.

4 Proposed assessment scope

4.1 Potential social impacts

A preliminary set of potential impacts and benefits of the project has been identified based on the scoping assessment, including the outcomes of the community survey, community and stakeholder engagement and observations of the local community and project investigation area. The purpose of identifying potential impacts and benefits at this preliminary stage is to ensure the EIS preparation focuses on:

- the potential social impacts identified by, and of greatest concern, to the community; and
- an appropriate range of stakeholders (ie affected groups or individuals are included in the SIA field study activities).

Potential negative impacts requiring further assessment and likelihood of potential positive social impacts are detailed in Table 4.1. Additional details are provided in the SIA Scoping Worksheet (Appendix A).

There are a variety of potential social impacts which may arise from the project, both during construction and throughout operation. Without mitigation, these social impacts could contribute to negative changes to the existing community (such as to their way of life or livelihood through the disruption of farming and agricultural practices).

Changes to accessibility (such as to one's property or to adequate social infrastructure) and/or surroundings (including visual amenity and noise disruption) may also have material impacts on the way of life and health and wellbeing of community members. However, with proper mitigation measures, many of these social impacts can be effectively managed, and closely monitored throughout construction and operations.

The project also has the potential to generate positive social impacts, such as increased opportunities for employment and occupational training, economic in-flows to the local community, and diversification of landholder income. The project will look to initiate measures to maximise these benefits (such as utilising the local workforce and supplies), in addition to other mitigation measures.

Table 4.1 Identified potential social impact mapped to issues (positive and negative)

Project activity	Potential social impacts	Issue - negative related to:	Issue - positive related to:	Level of assessment	Mitigation
Construction and operations	**Livelihoods**	• Disruption to farming activity may lead to lowered agricultural productivity. • Potential farm biosecurity and weed incursions due to vehicle access during construction. • Increased employment opportunity may lead to skills and labour shortages which affects the profitability of local businesses.	• Diversification of landholder incomes. • Increased opportunity for local employment and occupational training. • Diversification of local economy through direct and indirect economic benefits (including local spending). • Potential to develop new industries and employment opportunities in the region to service and maintain the project.	• Detailed	• Consideration of economic impacts as part of the EIS. • Implementation of community and stakeholder engagement program. • Completion of SIA inclusive of tailored mitigation and enhancement measures.
	Health and wellbeing	• Increased noise during construction and operation. • Public safety due to truck and other vehicle movements along roads (during construction). • Decreased air quality due to dust from newly formed roads and increased traffic (during construction). • Stress and anxiety for landowners caused by lease agreement negotiations or community pressures. • Increased demand on health services due to presence of construction workers.	• Injection of wealth into the local economy improves real wages and enhanced access to health services.	• Detailed	• Completion of a noise and vibration impact assessment as part of the EIS. • Consideration of air quality impacts as part of the EIS. • Completion of SIA inclusive of tailored mitigation and enhancement measures.
	Way of life	• Construction may disrupt farming activity or cause a reduction in the availability of agricultural land. • Broad regional shift towards prioritising land use for renewable energy projects may impact the agricultural way of life and cohesion of the community.	• Stabilisation of local populations due to the economic stimulus provided by the project.	• Detailed	• Consideration of economic impacts as part of the EIS. • Completion of SIA inclusive of tailored mitigation and enhancement measures.

Table 4.1 Identified potential social impact mapped to issues (positive and negative)

Project activity	Potential social impacts	Issue - negative related to:	Issue - positive related to:	Level of assessment	Mitigation
	Access	• Increased traffic may cause perceived road safety risks. • Construction workers may place increased pressure on social infrastructure. • Construction workers moving to the area could constrain access to housing and accommodation.	• Increased traffic may require road upgrades which could benefit the local users. • Upgraded road infrastructure may improve access to other areas and their services.	• Detailed	• Completion of a traffic assessment as part of the EIS. • Completion of SIA inclusive of tailored mitigation and enhancement measures.
	Surroundings	• Changes to the landscape and visual amenity due to the presence of the wind turbines. • Reduced ability to practice fire management due to aerial access restrictions. • Changes to the landscape can impact the visual amenity of the area.	• Vegetation offsets could result in plantings and rehabilitation undertaken on landholder property.	• Detailed	• Completion of a visual impact assessment as part of the EIS • Completion of SIA inclusive of tailored mitigation and enhancement measures.
	Culture	• Potential impacts related to ability to practice culture from potential loss of heritage sites. • Loss of rural heritage values due to re-purposing of land. • Potential effects on items and areas of cultural significance to Aboriginal people.	• Employment opportunities for Aboriginal stakeholders during the assessment and approval process	• Detailed	• Completion of an Aboriginal cultural heritage assessment and historic heritage assessment as part of the EIS. • Completion of SIA inclusive of tailored mitigation and enhancement measures.
	Community	• New workers may affect the composition of the local community and the community identity and cohesion. • Potential for polarisation of community sentiment regarding the project (and wind farms in general) could affect community cohesion.	• New workers may integrate and add value to the local community. • Diversification of the economy opportunity may have a positive effect on community capital and resilience.	• Detailed	• Implementation of community and stakeholder engagement program • Completion of SIA inclusive of tailored mitigation and enhancement measures.

4.2 Proposed methodology

The SIA will be led by a suitably qualified Social Scientist who will adopt the methodology outlined in Plate 4.1 and employ social science methods and tools for the collection of qualitative and quantitative data.

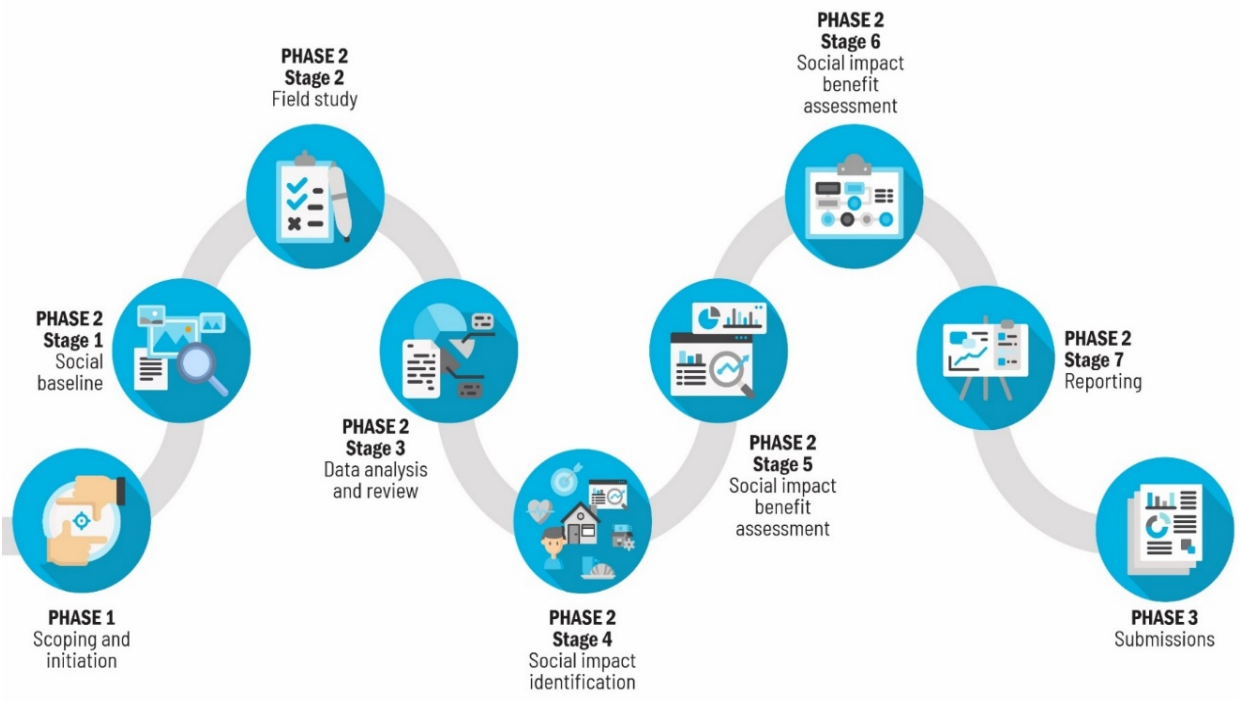

Plate 4.1 Social impact assessment methodology

The identification of social impacts will be informed by community and stakeholder engagement activities, as well as SIA field study activities, and will be conducted in an integrated manner to ensure consistency, reduce duplication, and allow for management of consultation fatigue. In addition, findings from the technical assessments will be considered to understand the consequences to the community and existing research and previous SIAs will inform the identification of the social impacts.

Potential social impacts and benefits will then be assessed in accordance with the requirements of the *Social Impact Assessment Guideline for State Significant Projects* (DPIE 2021a) and will utilise the risk assessment matrix presented in the *Technical Supplement Social Impact Assessment Guideline for State Significant Projects* (DPIE 2021b).

References

ABS 2016, *Census of Population and Housing: Quickstats.*

- 2018, *Socio-Economic Indexes for Australia* (SIEFA).
- 2021a, *Census of Population and Housing: Quickstats*.
- 2021b, *Counts of Australian Businesses*.

DPIE 2021a, *Social Impact Assessment Guideline for State Significant Projects*.

- 2021b, *Technical Supplement: Social Impact Assessment Guideline for State Significant Projects*.

NSW Health 2021, *Healthstats NSW*.

Appendix A
Scoping worksheet

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Social Impact Assessment (SIA) Worksheet

Project name: Dinawan Energy Hub - Wind Farm

Date: 25-Aug-22

CATEGORIES OF SOCIAL IMPACTS	POTENTIAL IMPACTS ON PEOPLE		PREVIOUS INVESTIGATION OF IMPACT		CUMULATIVE IMPACTS		ELEMENTS OF IMPACTS - Based on preliminary investigation					ASSESSMENT LEVEL FOR EACH IMPACT				PROJECT REFINEMENT	MITIGATION / ENHANCEMENT MEASURES
what **social impact categories** could be affected by the project activities	What impacts are likely, and what concerns/aspirations have people expressed about the impact? Summarise how each relevant stakeholder group might experience the impact. NB. Where there are multiple stakeholder groups affected differently by an impact, or more than one impact from the activity, please add an additional row.	Is the impact expected to be **positive or negative**	Has this impact previously been investigated (on this or other project/s)?	If "yes - this project," briefly describe the previous investigation. If "yes - other project," identify the other project and investigation	Will this impact combine with others from this project (think about when and where), and/or with impacts from other projects (cumulative)?	If yes, identify which other impacts and/or projects	Will the project activity (without mitigation or enhancement) cause a material social impact in terms of its: You can also consider the various magnitudes of these characteristics					Level of assessment for each social impact	What methods and data sources will be used to investigate this impact?			Has the project been refined in response to preliminary impact evaluation or stakeholder feedback?	What **mitigation / enhancement measures** are being considered?
							extent i.e. number of people potentially affected?	**duration** of expected impacts? (**i.e.** construction vs operational phase)	**intensity** of expected impacts i.e. scale or degree of change?	**sensitivity** or vulnerability of people potentially affected?	**level of concern/interest** of people potentially affected?		Secondary data	Primary Data - Consultation	Primary Data - Research		
community	Proposed development projects can be grounds for contestation within local communities, which can negatively impact on community cohesion.	Negative	Yes - other project	Bowmans Creek Wind Farm Hills of Gold Wind Farm	Yes	Wind and other solar farms being developed	Unknown	Unknown	Unknown	Unknown	Unknown	Detailed assessment of the impact	Required	Broad consultation	Targeted research	No	Robust community and stakeholder engagement to be determined and delivered as part of the EIS community and stakeholder engagement program and social impact assessment. In consultation with a diverse range of key local stakeholders, a community partnership or benefit sharing program may be established.
health and wellbeing	Stress and anxiety caused by lease agreement negotiations or community pressures	Negative	Unknown	-	No	-	Unknown	Unknown	Unknown	Unknown	Unknown	Detailed assessment of the impact	Required		Targeted research	No	High levels of engagement with landholders along with transparent and respectful lease negotiation process.
decision-making systems	Real or perceived lack of knowledge and inclusion in the planning, assessment and consultation process. Translates into real or perceived inability to make informed decisions, and/or inability to influence project decisions, including elements of project design.	Negative	Yes - other project	Bowmans Creek Wind Farm Hills of Gold Wind Farm	Yes	Wind and other solar farms being developed	Unknown	No	Unknown	Unknown	Unknown	Detailed assessment of the impact	Required	Broad consultation	Targeted research	Yes	Robust community and stakeholder engagement to be determined and delivered as part of the EIS community and stakeholder engagement program and social impact assessment.
surroundings	Potential air quality impacts for landholders/neighbours near to the Project site as well as along proposed haulage routes due to dust from construction activities and ground disturbance from traffic on unsealed roads within the Project area.	Negative	Yes - other project	MacIntyre Wind Farm	Unknown	-	Unknown	No	Unknown	Unknown	Unknown	Detailed assessment of the impact	Required	Broad consultation	Targeted research	No	To be informed by an air quality assessment and investigated through community and stakeholder engagement undertaken as part of the social impact assessment and EIS engagement program.
surroundings	Vegetation offsets could result in plantings and rehabilitation undertaken on landholder property	Positive	Yes - other project	MacIntyre Wind Farm	No	-	Unknown	Unknown	Unknown	Unknown	Unknown	Detailed assessment of the impact	Required		Targeted research	No	High levels of engagement with landholders along with transparent and respectful negotiation processes.
surroundings	Potential for adverse noise impacts for landholders/neighbours near to the Project site as well as along proposed haulage routes.	Negative	Yes - other project	Rye Park Wind Farm	Yes	Existing agricultural uses Other projects being developed in the area	Yes	Unknown	Unknown	Unknown	Unknown	Detailed assessment of the impact	Required	Broad consultation	Targeted research	No	To be informed by the noise assessment and investigated through community and stakeholder engagement undertaken as part of the social impact assessment and EIS engagement program.
way of life	Loss of community character from increased traffic due to trucks and construction vehicles in the local area	Negative	Yes - other project	Rye Park Wind Farm	Unknown	-	Unknown	No	Unknown	Unknown	Unknown	Detailed assessment of the impact	Required	Broad consultation	Targeted research	No	To be informed by the traffic assessment and investigated through community and stakeholder engagement undertaken as part of the social impact assessment and EIS engagement program.
culture	Potential for impacts to unknown items or sites of Aboriginal heritage	Negative	Yes - other project	Robbins Island Renewable Energy Park	Yes	Existing agricultural uses Other projects being developed in the area	Unknown	Unknown	Unknown	Yes	Unknown	Detailed assessment of the impact	Required	Broad consultation	Targeted research	No	To be addressed through an Aboriginal heritage assessment and cultural heritage management agreements
livelihoods	Potential farm bio-security and weed incursions due to vehicle access during construction	Negative	Yes - other project	MacIntyre Wind Farm	Unknown	-	Yes	Unknown	Unknown	Unknown	Unknown	Detailed assessment of the impact	Required		Targeted research	No	High levels of engagement with landholders along with transparent and respectful negotiation processes.
livelihoods	Employment opportunities for local and regional workforce. Project may provide alternate employment for those in the agricultural sector	Positive	Yes - other project	MacIntyre Wind Farm	Yes	Other projects being constructed in the area	Unknown	Unknown	Unknown	Unknown	Unknown	Detailed assessment of the impact	Required	Broad consultation	Targeted research	No	A strategy will be put in place to prioritise the skills and capabilities of the workforce in the local area and further investigated through the social impact assessment.
livelihoods	Diversification of local economy through direct and indirect economic benefits (including local spending)	Positive	Yes - other project	Rye Park Wind Farm	Yes	Other projects being constructed in the area	Unknown	Unknown	Unknown	Unknown	Unknown	Detailed assessment of the impact	Required	Broad consultation	Targeted research	No	Development of a local procurement strategy and process for the construction phase. To be further investigated through the social impact assessment.
access	Construction workers moving to the area could decrease availability of housing and accommodation as well as lead to an increase in rental housing prices. An influx of construction workers may also constrain the availability of accommodation for tourism.	Negative	Yes - other project	Silverton Wind Farm	Yes	Other projects being constructed in the area	Unknown	Unknown	Unknown	Unknown	Unknown	Detailed assessment of the impact	Required	Broad consultation	Targeted research	No	Development of a Workforce Accommodation Strategy. To be further investigated through the social impact assessment.
health and wellbeing	Increased traffic may also cause perceived road safety risks	Negative	Yes - other project	Rye Park Wind Farm	Yes	Other projects being constructed in the area	Unknown	No	Unknown	Unknown	Unknown	Detailed assessment of the impact	Required	Broad consultation	Targeted research	No	To be informed by the traffic assessment and investigated through community and stakeholder engagement undertaken as part of the social impact assessment and EIS engagement program.
access	An influx of construction workers staying the nearby township may increase demand for local social and community infrastructure (eg health and community services)	Negative	Yes - other project	Rye Park Wind Farm	Yes	Other projects being constructed in the area	Unknown	No	Unknown	Unknown	Unknown	Detailed assessment of the impact	Required	Broad consultation	Targeted research	No	Development of a Workforce Accommodation Strategy. To be further investigated through the social impact assessment.
surroundings	Changed sense of place (character) due to changed visual amenity	Negative	Yes - other project	Bowmans Creek Windfarm	No	-	Yes	Yes	Unknown	Unknown	Unknown	Detailed assessment of the impact	Required	Broad consultation	Targeted research	No	To be informed by the visual impact assessment and investigated through community and stakeholder engagement undertaken as part of the social impact assessment and EIS engagement program.

CATEGORIES OF SOCIAL IMPACTS	POTENTIAL IMPACTS ON PEOPLE		PREVIOUS INVESTIGATION OF IMPACT		CUMULATIVE IMPACTS		ELEMENTS OF IMPACTS - Based on preliminary investigation					ASSESSMENT LEVEL FOR EACH IMPACT				PROJECT REFINEMENT	MITIGATION / ENHANCEMENT MEASURES
what **social impact categories** could be affected by the project activities	What impacts are likely, and what concerns/aspirations have people expressed about the impact? Summarise how each relevant stakeholder group might experience the impact. NB. Where there are multiple stakeholder groups affected differently by an impact, or more than one impact from the activity, please add an additional row.	Is the impact expected to be **positive or negative**	Has this impact previously been investigated (on this or other project/s)?	If "yes - this project," briefly describe the previous investigation. If "yes - other project," identify the other project and investigation	Will this impact combine with others from this project (think about when and where), and/or with impacts from other projects (cumulative)?	If yes, identify which other impacts and/or projects	Will the project activity (without mitigation or enhancement) cause a material social impact in terms of its: You can also consider the various magnitudes of these characteristics					Level of assessment for each social impact	What methods and data sources will be used to investigate this impact?			Has the project been refined in response to preliminary impact evaluation or stakeholder feedback?	What **mitigation / enhancement measures** are being considered?
							extent i.e. number of people potentially affected?	**duration** of expected impacts? (**i.e.** construction vs operational phase)	**intensity** of expected impacts i.e. scale or degree of change?	**sensitivity** or vulnerability of people potentially affected?	**level of concern/interest** of people potentially affected?		Secondary data	Primary Data - Consultation	Primary Data - Research		
community	Social cohesion and resilience arising from community benefit and investment	Positive	Unknown	-	Unknown	-	Unknown		Yes	Unknown	Unknown	Detailed assessment of the impact	Required	Broad consultation	Targeted research	Yes	In consultation with a diverse range of key local stakeholders, a community partnership or benefit sharing program may be established.
livelihoods	Diversification of landholder income through lease arrangements	Positive	Yes - other project	New England Solar Farm	Yes	Use of land for agricultural purposes	Yes	Yes	Yes	Unknown	Unknown	Detailed assessment of the impact	Required		Targeted research	Yes	High levels of engagement with landholders along with transparent and respectful negotiation processes.
livelihoods	Potential to develop new industries and employment opportunities in the region to service and maintain the project	Positive	Unknown	-	Unknown	-	Unknown	Unknown	Yes	Unknown	Unknown	Detailed assessment of the impact	Required		Targeted research	Yes	To be further investigated through the economic and social impact assessments
surroundings	Reduced ability to practice fire management due to aerial access restrictions	Negative	Unknown	-	Unknown	-	Yes	Yes	Yes	Unknown	Unknown	Detailed assessment of the impact	Required		Targeted research	Yes	Completion of hazard and risk assessment. High levels of engagement with landholders.
health and wellbeing	Potential concerns for health and wellbeing due to exposure to noise and vibration ('wind turbine syndrome')	Negative	Unknown	-	No	-	Yes	Unknown	Unknown	Unknown	Unknown	Detailed assessment of the impact	Required	Broad consultation	Targeted research	No	To be informed by the noise assessment.
livelihoods	Improved productivity of farms due to access improvements created by roads to turbines	Positive	Unknown	-	No	-	Yes	Unknown	Unknown	Unknown	Unknown	Detailed assessment of the impact	Required		Targeted research	Yes	To be further investigated through the economic and social impact assessments
access	Multiple developments being constructed in the area could further decrease availability of housing and accommodation as well as lead to an increase in rental housing prices.	Negative	Unknown	-	Yes	Wind, solar and other projects being developed in the area	Yes	Unknown	Unknown	Unknown	Unknown	Detailed assessment of the impact	Required		Targeted research	Yes	Completion of a Workforce Accommodation Assessment. To be further investigated through the social impact assessment.
community	New workers moving to the local area due to multiple developments in the area may change the composition of the local population, and cause impacts to community identity/character	Negative	Unknown	-	Yes	Wind, solar and other projects being developed in the area	Yes	Unknown	Unknown	Unknown	Unknown	Detailed assessment of the impact	Required	Broad consultation	Targeted research	No	To be further investigated through the social impact assessment.
access	Increased traffic arising from the construction of multiple developments in the area may require upgrades to local roads, which would also benefit local users	Positive	Unknown	-	Yes	Wind, solar and other projects being developed in the area	Yes	Unknown	Unknown	Unknown	Unknown	Detailed assessment of the impact	Required	Broad consultation	Targeted research	No	To be determined from the social assessment and be informed by a traffic impact assessment
access	Increased workforce in the regional area may increase demand for social and community infrastructure beyond capacity (eg health and community services)	Negative	Unknown	-	Yes	Wind, solar and other projects being developed in the area	Yes	Unknown	Unknown	Unknown	Unknown	Detailed assessment of the impact	Required	Broad consultation	Targeted research	No	To be further investigated through the social impact assessment.
way of life	Way of life related to land use tensions. A broad regional shift towards prioritising land use for renewable energy projects may impact the agricultural way of life in these areas as well as how communities use land for agricultural activities.	Negative	Unknown	-	Yes	Wind, solar and other projects being developed in the area	Yes	Unknown	Unknown	Unknown	Unknown	Detailed assessment of the impact	Required	Broad consultation	Targeted research	No	To be further investigated through the social impact assessment.

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Appendix E

Preliminary noise impact assessment

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Dinawan Energy Hub Wind Farm

Preliminary Noise Impact Assessment

5 October 2022
Reference ID: 54-3

Contents

Figures

Tables

Abbreviations

BESS	Battery Energy Storage System
Bulletin	*NSW Wind Energy: Noise Assessment Bulletin (EPA, 2016)*
dB(A)	Noise level in A-weighted decibels
DPE	NSW Department of Planning and Environment
EIS	Environmental Impact Statement
EPA	Environment Protection Authority
ISO 9613-2	*ISO 9613-2:1996 Acoustics – Attenuation of sound during propagation outdoors – Part 2: General method of calculation*
L_{Aeq}	A-weighted equivalent time-averaged noise level
L_{A90}	A-weighted noise level exceeded for 90 percent of the measurement period
LGA	Local government area
NSW	New South Wales
Project	Dinawan Energy Hub Wind Farm
REZ	Renewable Energy Zone
SEARs	Secretary's Environmental Assessment Requirements
Spark Renewables	Spark Renewables Pty Limited
WTG	Wind Turbine Generator

Glossary

A-weighting	A mathematical adjustment to the measured noise levels to represent the human response to sound. An *A-weighted noise level* is presented as dB(A)
Ambient noise level	The noise level in the environment in the absence of the WTGs
Associated Dwellings	A dwelling whose owners have a landholder agreement with Spark Renewables for the Dinawan Energy Hub
Background noise level	Minimum ambient noise level, evaluated as the level exceeded for 90 per cent of 10-minute sample periods ($L_{A90,10\ minute}$)
Baseline noise criterion	The lowest noise level criterion which applies at any WTG operational wind speed as established in the Bulletin. The Bulletin will enable an increase above the baseline noise criterion subject to high background noise levels
Candidate WTG	A candidate WTG is used as an example in an assessment process to indicate the ability of the wind farm to comply with legislative requirements. Candidate WTGs are indicative of WTGs which might be procured at a future stage
Decibels	The logarithmic unit of measurement to define the magnitude of a fluctuating air pressure wave. Used as the unit for *sound* or *noise level*

Dinawan Energy Hub	Proposed hybrid wind and solar farm and battery energy storage system located within the South-West Renewable Energy Zone (REZ) of NSW
Dinawan Energy Hub Wind Farm	The wind farm component of the Dinawan Energy Hub
Equivalent noise level	The A-weighted noise level which is equivalent to a noise level which varies over time
Frequency	Frequency is the number of pressure fluctuation cycles per second of a sound wave. Measured in units of Hertz (Hz)
Low frequency	Noise containing excessive low frequency content as objectively identified using the test described in the Bulletin
Noise	An interchangeable term with sound but which is most often described as *unwanted sound*.
Non-Associated Dwellings	A dwelling that is not associated with the Dinawan Energy Hub, with no landholder agreement with Spark Renewables
Octave Band	The segregation of sound into discrete frequency components. For example, the 63 Hz *octave band* is a low frequency component of sound/noise, and the 2000 Hz *octave band* is a high frequency component of sound/noise. The one-third (or 1/3) octave is more finite segregation (1/3rd) of each octave band
Sound	An activity or operation which generates a fluctuating air pressure wave. The ear drum can perceive both the frequency (pitch) and the magnitude (loudness) of the fluctuations to convert those waves to sound
Sound pressure level	The magnitude of sound (or noise) at a position. The sound pressure level can vary according to location relative to the noise source, and operational, meteorological and topographical influences
Sound power level	The amount of sound energy an activity produces for a given operation. The sound power level is a constant value for a given activity. The sound power level is analogous to the power rating on a light globe (which remains constant), whereas the lighting level in a space (sound pressure level in this analogy) will be influenced by the distance from the globe, shielding and different locations within the space
Tonality	Noise containing a perceptible pitch component as objectively identified using a one-third octave band test described in *ISO 1996.2: 2007 Acoustics - Description, measurement and assessment of environmental noise –Determination of environmental noise levels (Annex D – Objective method for assessing the audibility of tones in noise – Simplified method).*
Warranted sound power level	The sound power level which the WTG supplier guarantees can be achieved inclusive of uncertainties

Introduction

Spark Renewables Pty Limited (Spark Renewables) proposes to develop the Dinawan Energy Hub, comprised of a hybrid wind and solar farm and battery energy storage system (BESS). Dinawan Energy Hub is located about halfway between the towns of Coleambally and Jerilderie and lies within the Murrumbidgee and Edwards River local government areas (LGAs) in NSW. Dinawan Energy Hub is within the South-West Renewable Energy Zone (REZ).

This preliminary noise impact assessment addresses the Dinawan Energy Hub Wind Farm (the project). The project will have capacity to generate up to 1.5 GW, which would require up to approximately 250 wind turbine generators (WTGs).

The project will be subject to assessment and determination by the NSW Minister for Planning and Public Spaces or the Independent Planning Commission, which requires an Environmental Impact Statement (EIS) prepared in accordance with the Secretary's Environmental Assessment Requirements (SEARs) issued by the NSW Department of Planning and Environment (DPE).

The SEARs are informed by a Scoping Report which provides preliminary information on a project and its potential impacts. Separate scoping reports will be prepared for the project and the Dinawan Energy Hub Solar Farm.

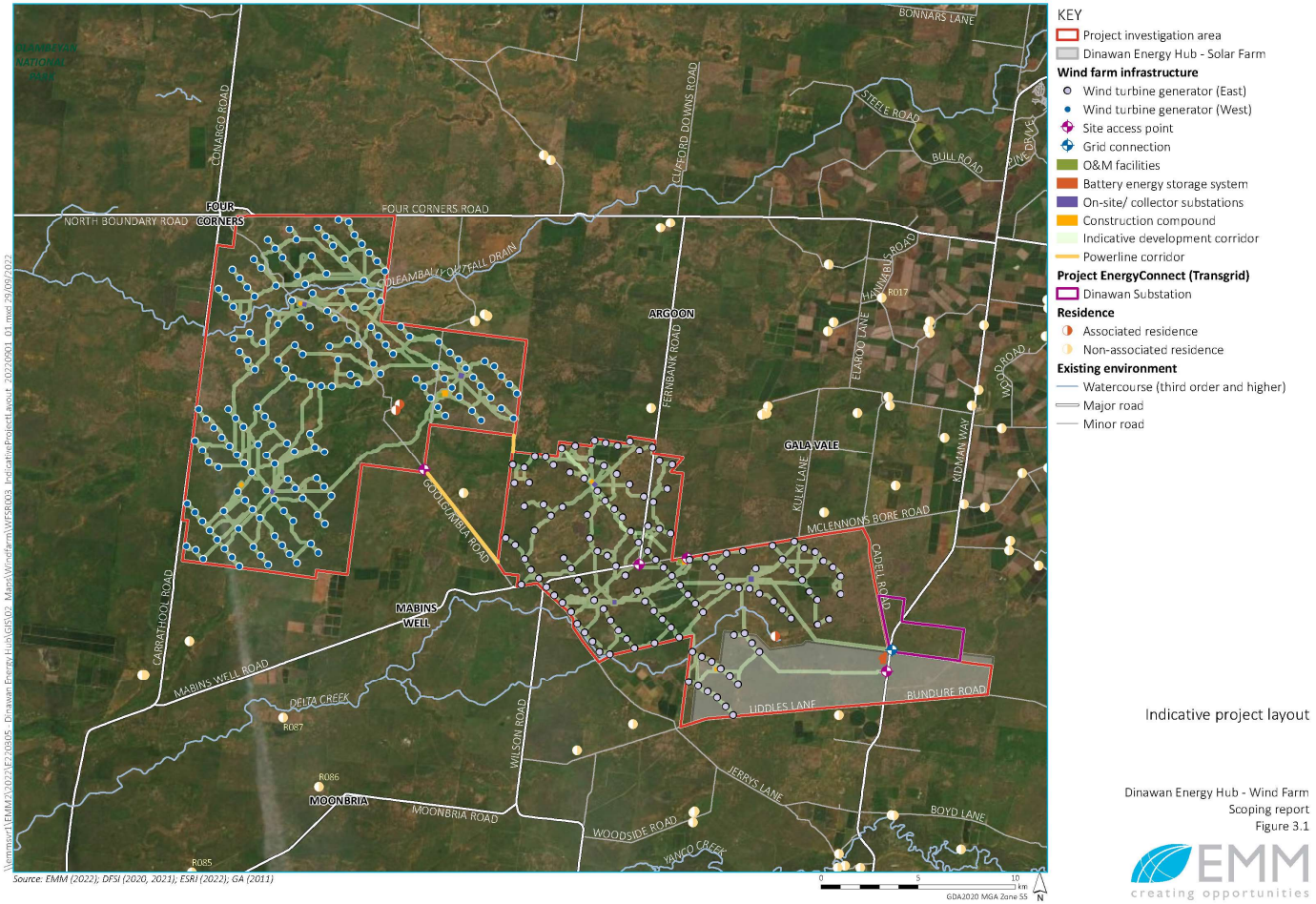
The noise levels generated by renewable energy projects are well understood and can be predicted with accuracy. Environmental noise impact assessments compare predicted noise levels against the relevant noise requirements (in this case, being those provided by the *NSW Wind Energy: Noise Assessment Bulletin (EPA, 2016))*. Where the requirements cannot be achieved, the assessments determine whether Wind Turbine Generators (WTGs) can be relocated, reduced in operational mode, or removed to achieve compliance. The assessments also identify areas where further investigations need to be made.

This assessment predicts the noise associated with 292 preliminary WTG locations (considered at the scoping stage) at all dwellings identified within 10kms of the nearest WTG. It is noted that that a larger number of WTGs were assessed to provide a conservative basis for the prediction of impacts.

This assessment considers the use of the *Siemens Gamesa SG170-6.6MW* (in *Application Mode 0)* as a candidate WTG for the project.

An indicative layout for the project, including the preliminary WTG locations utilised for the assessment is shown in Figure 1 below.

Figure 1 Indicative project Layout



Source EMM Consulting

Assessment Criteria

The SEARs for wind farms typically require that the EIS assess WTG noise in accordance with the NSW *Wind Energy: Noise Assessment Bulletin* (the Bulletin).

The Bulletin

The Bulletin provides a *baseline noise criterion* of 35 dB(A) at non-associated dwellings.

At associated dwellings, the Bulletin enables an increase above the baseline noise criterion of 35 dB(A), subject to a formal agreement and ensuring that the landowner is appropriately informed and understands the agreed noise levels.

Background noise level monitoring may also be conducted as part of the EIS process (or prior to construction), which can justify an increase in the noise assessment criteria above the baseline noise criterion of 35 dB(A) in the circumstance where the measured ambient noise levels are sufficiently high (which can occur at higher hub height wind speeds).

This assessment utilises the baseline criterion of 35 dB(A) as a conservative and indicative approach.

Assessment

Wind Turbine Generators

Noise Model

A three-dimensional model for the preliminary WTG layout has been developed based on the algorithm provided by *ISO 9613-2:1996 Acoustics – Attenuation of sound during propagation outdoors – Part 2: General method of calculation* (ISO 9613-2).

ISO 9613-2 specifies a method for predicting noise levels at a distance from a noise source under meteorological conditions favourable to noise propagation. The algorithm also conservatively assumes that these favourable propagation conditions (which include wind blowing from the WTG to the dwelling) occur simultaneously between all WTGs and all dwellings.

The model incorporates the following:

- dwellings identified within 10kms of the nearest WTG, with locations as detailed in Table 1
- the cumulative effect of all 292 WTGs operating concurrently, with preliminary WTG locations as detailed in Appendix A for the eastern and western clusters of WTGs
- topographical ground contours
- inputs detailed in accordance with the modelling recommendations of the *Institute of Acoustics* (UK) *"A Good Practice Guide to the Application of ETSU-R-97 for the Assessment and Rating of Wind Turbine Noise"*:
    - Warranted sound power level data for the candidate WTG
    - 10°C temperature
    - 70% relative humidity
    - 50% acoustically hard ground and 50% acoustically soft ground
    - barrier attenuation of no greater than 2 dB(A)
    - 4m receiver height at each dwelling
    - application of a 3 dB(A) correction where a "concave" ground profile exists.

Table 1 Dwelling Locations (within 10km) and Status

Dwelling ID	Associated	Co-ordinates (MGA Zone 55)	
		Easting	Northing
R042 (Dilapidated)	Yes	383788	6120422
R084	Yes	364488	6132200
R093	Yes	364289	6131894
R156	Yes	383839	6120278
R008	No	379621	6111127
R019	No	386328	6126615
R033	No	389726	6132123
R035	No	389811	6110996
R036	No	376514	6115707
R038	No	373635	6114344
R043	No	395918	6125174
R044	No	395865	6124669
R049	No	387096	6116160
R050	No	383448	6132094
R051	No	392526	6130471
R056	No	388044	6131752
R077	No	394606	6126850
R078	No	390024	6127989
R079	No	393521	6127021
R080	No	387403	6108372
R081	No	387025	6108279
R082	No	379598	6110614
R087	No	358496	6116044
R088	No	367794	6127599
R090	No	353668	6120017
R091	No	368376	6136446
R092	No	351325	6118277
R101	No	389933	6110984
R105	No	383261	6131729
R106	No	383396	6131736
R107	No	383154	6131653
R108	No	369007	6136713
R111	No	379690	6111191
R124	No	389644	6132583
R140	No	351239	6118289
R141	No	351366	6118291
R142	No	387086	6109000
R143	No	377446	6132006
R144	No	368878	6136800
R145	No	368365	6136494

Candidate WTG

This assessment has been based on the *Siemens Gamesa SG6.6 170* WTG with a hub height of up to 180m and a rotor diameter of 170m.

Sound Power Levels

Noise data has been provided by the WTG manufacturer for integer wind speeds (at hub height) from wind turbine cut-in wind speed to the wind speed associated with rated power.

This assessment has been based on the maximum equivalent noise level produced by the WTG in *Application Mode 0* at any wind speed (comprising a sound power level of 106.5 dB(A) at a hub height wind speed of 9 m/s[1]) and the available noise data in "octave bands" and "one-third octave bands" between the frequencies of 10 Hz and 8 kHz.

The sound power level data have been utilised on the basis that they will be the warranted sound power levels (without further adjustment for uncertainty margins) for the project, which ultimately will be subject to a future contractual and procurement procedure which can introduce specific guarantee / warranty and/or uncertainty requirements.

In addition, the final WTG selection can be different to the candidate WTGs due to advancements in technologies and the commercial market which exists at the time of procurement.

The noise assessment during the EIS will reflect any changes to the candidate WTG, the warranted sound power level data, the need for adjustment for uncertainty margins, and/or the layout that arise during the design stage of the project.

Special Noise Characteristics

The Bulletin defines the presence of excessive low frequency noise and tonality as special noise characteristics. The presence of these characteristics means that the noise experienced from the wind farm at a dwelling is noticeably different to that associated with a typical wind farm.

The assessment has been made on the basis that the WTG selection will not exhibit tonal characteristics or excessive low frequency content. The one-third octave band and low frequency data available for the *Siemens Gamesa SG6.6 170* WTGs correlate with this assumption.

Notwithstanding the above, the contractual arrangement with the manufacturer of the final WTG should include a guarantee that the WTG will not exhibit tonal characteristics or excessive low frequency content. If the final WTGs do exhibit special noise characteristics, then predicted noise levels should be adjusted in accordance with the Bulletin.

[1] The noise generated from a WTG increases with wind speed and then plateaus. This occurs at a hub height wind speed of 9m/s for the candidate WTG.

Predicted Noise Levels

Noise level predictions have been made using the noise model, inputs and assumptions detailed above.

The predicted noise level at the identified dwellings for the operation of the *Siemens Gamesa SG6.6 170* (in *Application Mode 0)* at its maximum equivalent noise level (corresponding to hub height wind speeds of 9m/s or greater) is provided in Table 2. The distance to the closest WTG from each dwelling is also provided in Table 2.

The predicted noise levels indicate the 35 dB(A) baseline criterion applicable to non-associated dwellings can be achieved at all locations.

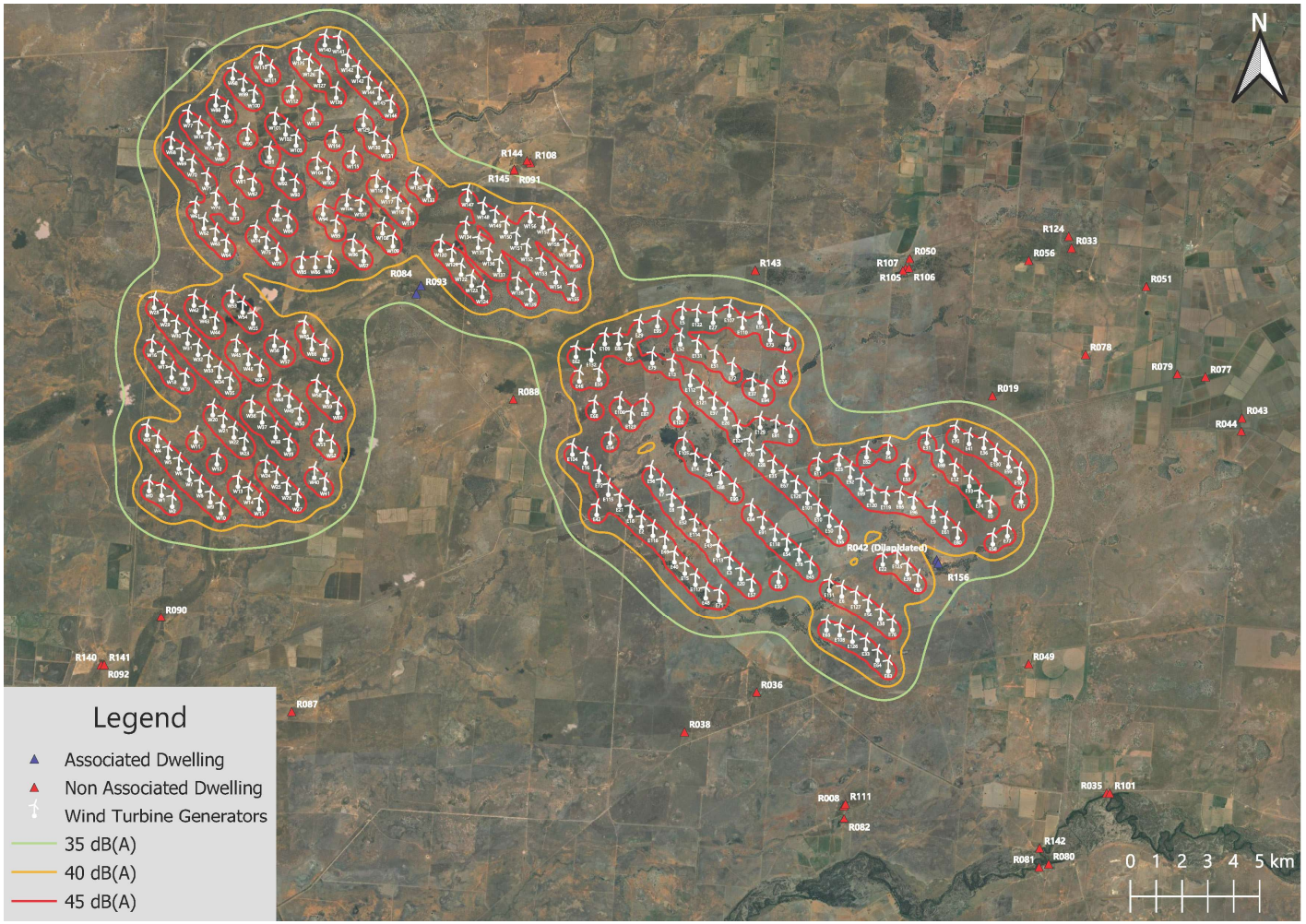
The associated dwellings can establish a noise criterion higher than the 35 dB(A) baseline value under the Bulletin, which will be the subject of a formal agreement between the project and each associated landowner.

The noise prediction contours for the operation of the *Siemens Gamesa SG6.6 170* candidate WTGs at their maximum equivalent noise level output are provided in Figure 2. The noise prediction contours indicate that all non-associated dwellings are outside (or subject to lower noise levels than) the baseline noise criterion contour of 35 dB(A) established under the Bulletin.

Table 2 Predicted Noise Levels

Dwelling Name	Associated Dwelling	Closest WTG (m)	Criterion (dB(A))	Maximum Equivalent Noise Level (dB(A))
R042 (Dilapidated)	Yes	1170	-	39
R084	Yes	1548	-	37
R093	Yes	1884	-	36
R156	Yes	1153	-	39
R008	No	4646	35	<25
R019	No	2052	35	33
R033	No	8440	35	<25
R035	No	9674	35	<25
R036	No	2745	35	30
R038	No	5262	35	26
R043	No	8925	35	<25
R044	No	8785	35	<25
R049	No	4855	35	26
R050	No	5774	35	26
R051	No	8777	35	<25
R056	No	7368	35	<25
R077	No	8203	35	<25
R078	No	5269	35	<25
R079	No	7318	35	<25
R080	No	9710	35	<25
R081	No	9568	35	<25
R082	No	5156	35	<25
R087	No	7957	35	<25
R088	No	2651	35	33
R090	No	4295	35	27
R091	No	2054	35	34
R092	No	6706	35	<25
R101	No	9783	35	<25
R105	No	5429	35	26
R106	No	5550	35	26
R107	No	5298	35	26
R108	No	2311	35	33
R111	No	4588	35	<25
R124	No	8816	35	<25
R140	No	6735	35	<25
R141	No	6675	35	<25
R142	No	9017	35	<25
R143	No	2020	35	33
R144	No	2393	35	33
R145	No	2084	35	34

Figure 2 Noise Prediction Contours



Conclusion

Environmental noise assessments predict the noise levels based on established input data and compares those noise levels against specific requirements.

This preliminary noise impact assessment (the assessment) addresses the Dinawan Energy Hub Wind Farm (the project) and considers 292 preliminary WTG locations and the use of the *Siemens Gamesa SG170-6.6MW* as a candidate WTG.

The assessment determines the project can achieve the allowable noise levels of the NSW *Wind Energy: Noise Assessment Bulletin* at all non-associated dwellings.

The assessment (for inclusion in the Scoping Report) considers the noise generated by WTGs only. The EIS will consider a range of other noise sources associated with the project in accordance with the SEARs, which is likely to include:

1. ancillary infrastructure, such as transformers in the collector sub-station, assessed in accordance with the *NSW Noise Policy for Industry* (EPA, 2017)
2. construction activity assessed in accordance with the *Interim Construction Noise Guideline* (DECC, 2009) and *Assessing Vibration: A Technical Guideline* (DECC, 2006)
3. traffic movements assessed in accordance with the *NSW Road Noise Policy* (DECCW, 2011).

The EIS will also reflect any changes to the candidate WTG, the warranted sound power levels, the need for adjustment for uncertainty margins, and/or the layout that arise during the design stage of the project, and will consider the presence of excessive low frequency noise and tonality as special noise characteristics in accordance with the Bulletin.

Appendix A

Table A1 Preliminary WTG Locations – Eastern Cluster

WTG ID	Co-ordinates (MGA Zone 55)		WTG ID	Co-ordinates (MGA Zone 55)		WTG ID	Co-ordinates (MGA Zone 55)	
	Easting	Northing		Easting	Northing		Easting	Northing
E0	385972	6122158	E44	375186	6124419	E90	376111	6123419
E1	378431	6125536	E45	378870	6120239	E91	377133	6122068
E2	372451	6122384	E46	370391	6128131	E92	380633	6123805
E3	375755	6120588	E48	374771	6119482	E93	385218	6123177
E4	382163	6124652	E49	373310	6121542	E94	377541	6127145
E5	374516	6130342	E50	379710	6121972	E95	373535	6130069
E6	380035	6119231	E51	375670	6128593	E96	383015	6122486
E7	373315	6123760	E52	374382	6129324	E97	375528	6126787
E8	373671	6123148	E53	382821	6123776	E98	372941	6124301
E9	383755	6122080	E54	378016	6121166	E99	386780	6123837
E10	379315	6122427	E55	380105	6121524	E100	376794	6125106
E11	379410	6124208	E56	381019	6118625	E101	378915	6122906
E12	384684	6123661	E57	376563	6119682	E102	374137	6126497
E13	374001	6128361	E58	385993	6120888	E103	387176	6123374
E14	374674	6124665	E59	371145	6128158	E104	369948	6125327
E15	374020	6120479	E61	384199	6121649	E105	374267	6125308
E16	370437	6124973	E62	370316	6129085	E106	371888	6127026
E17	387186	6122455	E63	383003	6119483	E107	376337	6130315
E18	372048	6122814	E64	381265	6116642	E108	379858	6117708
E19	377501	6129987	E65	379363	6117932	E109	371458	6129514
E20	376175	6120144	E66	378522	6129081	E110	376817	6129816
E21	371655	6123266	E67	378086	6123814	E111	379558	6119491
E22	381691	6120365	E68	370894	6126941	E112	374667	6127720
E23	380233	6124318	E69	381033	6123321	E113	375343	6121100
E24	378271	6127826	E70	384803	6125135	E114	374503	6122140
E25	372395	6129057	E71	375294	6119356	E115	371242	6123698
E26	375955	6126366	E72	376324	6128074	E116	372874	6122010
E27	375695	6130078	E73	377860	6129275	E117	374404	6120022
E28	377248	6124666	E74	385575	6122580	E118	377575	6121579
E29	372823	6129951	E75	370910	6124255	E119	381953	6122742
E30	377620	6119935	E76	381909	6117781	E120	381414	6122848
E31	383678	6124941	E77	386577	6121166	E121	375075	6127208
E32	374075	6122632	E78	378463	6120746	E122	375081	6130217
E33	380832	6117103	E79	373251	6128673	E123	372279	6126448
E34	371434	6125690	E80	384648	6121215	E124	376391	6125657
E35	377665	6124214	E81	377868	6125769	E125	382253	6120435
E36	385873	6124614	E82	381316	6124534	E126	380338	6117424
E37	377056	6127430	E83	381655	6116199	E127	380559	6118976
E38	381483	6118236	E84	376712	6122595	E128	378507	6123379
E39	382620	6119934	E85	382511	6122727	E129	377268	6125937
E40	373639	6120940	E86	371992	6129487	E130	386292	6124145
E41	385311	6124814	E87	372860	6126903	E131	375015	6129018
E42	370747	6122948	E88	375616	6123903	E132	370898	6128925
E43	374995	6121684	E89	384197	6124232			

Table A2 Preliminary WTG Locations – Western Cluster

WTG ID	Co-ordinates (MGA Zone 55)		WTG ID	Co-ordinates (MGA Zone 55)		WTG ID	Co-ordinates (MGA Zone 55)	
	Easting	Northing		Easting	Northing		Easting	Northing
W0	353506	6124916	W45	357198	6130132	W90	358123	6138286
W1	353979	6124712	W46	357632	6129565	W91	358930	6137530
W2	354361	6124256	W47	358051	6129116	W92	359386	6136662
W3	353552	6127072	W48	358728	6128309	W93	359846	6136201
W4	353934	6126616	W49	359110	6127853	W94	360872	6135171
W5	354316	6126161	W50	359487	6127342	W95	361320	6134496
W6	354699	6125705	W51	360258	6126485	W96	361947	6133729
W7	355081	6125249	W52	360640	6126030	W97	362330	6133273
W8	355464	6124793	W53	357153	6132036	W98	357696	6140647
W9	355846	6124337	W54	357536	6131580	W99	358078	6140191
W10	356229	6123882	W55	357918	6131125	W100	358460	6139735
W11	355419	6126698	W56	358683	6130213	W101	359225	6138824
W12	356184	6125786	W57	359066	6129757	W102	359608	6138368
W13	356949	6124874	W58	360213	6128390	W103	359990	6137912
W14	357332	6124419	W59	360596	6127934	W104	360755	6137000
W15	357714	6123963	W60	360978	6127478	W105	361164	6136591
W16	353938	6130320	W61	355937	6135578	W106	361811	6135511
W17	354329	6129845	W62	356235	6134899	W107	362331	6135253
W18	354639	6129233	W63	356647	6134461	W108	363128	6134297
W19	355144	6128942	W64	357040	6134001	W109	363499	6133771
W20	356140	6127690	W65	359869	6130686	W110	358816	6141188
W21	356522	6127235	W66	360123	6129998	W111	359168	6140668
W22	356905	6126779	W67	360619	6129743	W112	359946	6139816
W23	357287	6126323	W68	355152	6138124	W113	360711	6138905
W24	358052	6125411	W69	355534	6137668	W114	361476	6137993
W25	358434	6124956	W70	355917	6137212	W115	362147	6137161
W26	358817	6124500	W71	356449	6136651	W116	363005	6136170
W27	359199	6124044	W72	356751	6135872	W117	363388	6135714
W28	354125	6131967	W73	357447	6135389	W118	363770	6135258
W29	354523	6131461	W74	358212	6134478	W119	364153	6134803
W30	354923	6131004	W75	358594	6134022	W120	365329	6133503
W31	355330	6130506	W76	358977	6133566	W121	365743	6133107
W32	355713	6130051	W77	355872	6139117	W122	366065	6132524
W33	356095	6129595	W78	356255	6138661	W123	366448	6132068
W34	356478	6129139	W79	356637	6138205	W124	366830	6131612
W35	356860	6128683	W80	357020	6137749	W125	360284	6141265
W36	357635	6127753	W81	357785	6136838	W126	360666	6140809
W37	358031	6127287	W82	358216	6136327	W127	361049	6140353
W38	358514	6126691	W83	359095	6135243	W128	361651	6139662
W39	358994	6126182	W84	359492	6134786	W129	362644	6138552
W40	359920	6125037	W85	359918	6133178	W130	363017	6137833
W41	360302	6124581	W86	360450	6133143	W131	363499	6137485
W42	355668	6131955	W87	360994	6133132	W132	364537	6136194
W43	356051	6131499	W88	356975	6139654	W133	364990	6135679
W44	356433	6131043	W89	357358	6139198	W134	366335	6134142

Table A2 Preliminary WTG Locations – Western Cluster (continued)

WTG ID	Co-ordinates (MGA Zone 55)		WTG ID	Co-ordinates (MGA Zone 55)		WTG ID	Co-ordinates (MGA Zone 55)	
	Easting	Northing		Easting	Northing		Easting	Northing
W135	366785	6133516	W144	362916	6139979	W153	369171	6132562
W136	367168	6133061	W145	363319	6139546	W154	369707	6132008
W137	367550	6132605	W146	363728	6139025	W155	370344	6131494
W138	368211	6131869	W147	366497	6135418	W156	368858	6134407
W139	368686	6131387	W148	367065	6134865	W157	369345	6134155
W140	361335	6141718	W149	367506	6134509	W158	369712	6133657
W141	361861	6141616	W150	367888	6134053	W159	370138	6133223
W142	362151	6140890	W151	368271	6133598	W160	370521	6132767
W143	362534	6140435	W152	368653	6133142			

References

Institute of Acoustics (UK) *"A Good Practice Guide to the Application of ETSU-R-97 for the Assessment and Rating of Wind Turbine Noise", 2013*

ISO 9613-2:1996 Acoustics – Attenuation of sound during propagation outdoors – Part 2: General method of calculation

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