

Appendix

E

E.1 | Landscape and Visual Impact Assessment Part 1



Dinawan Wind Farm

Landscape and Visual Impact Assessment

Dinawan Wind Farm

Landscape and Visual Impact Assessment

Prepared for
EMM

Issue
04

Date
xx.05.24

Project Number
2316

Revision	Date	Author	Checked	Comment
01	13.03.24	MED	AR	Draft for Review
02	16.04.24	MED	-	Final
03	07.05.24	MED	-	Final
04	27.05.24	ES	TB	Final For Submission



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Executive Summary

Moir Landscape Architecture (Moir LA) have been commissioned by EMM Consulting Pty Ltd on behalf of Spark Renewables to prepare this Landscape and Visual Impact Assessment (LVIA) for the Dinawan Wind Farm (the Project).

The Project is located in the Riverina region of New South Wales, approximately 50 kilometres (km) southwest of Darlington Point and 45 km north of Jerilderie. The Project includes the construction, operation and decommissioning of up to 200 turbines with a height of 280 metres (tip height) and with an estimated capacity of approximately 1.2 GW.

In addition to the wind turbines, ancillary infrastructure including access tracks, road upgrades, underground and overhead electricity cabling, high voltage transmission line, substations, control rooms, switching station, permanent meteorological masts, concrete batching plants, workers accommodation and operations and maintenance (O&M) infrastructure have been assessed in this LVIA. The point of connection into the grid is expected to be via the new 330 kV Dinawan Substation, part of 'Project EnergyConnect' and currently under construction by EnergyCo and Transgrid.

Moir LA have utilised a quantitative study methodology with regards to the guidelines of the *Wind Energy: Visual Assessment Bulletin* (the Bulletin). Relevant literature and guidelines relating to large scale energy projects and Moir LA's previous experience on large scale infrastructure projects has also been considered in the study method.

The LVIA includes a comprehensive assessment of the existing landscape character, scenic quality and visibility of the Project. Visual influence zones have been established from viewpoints and sensitive receptors and assessed against visual performance objectives outlined in the Bulletin.

Field work was undertaken by Moir LA to develop a visual baseline against which the Project has been assessed. The assessment determined that the regional landscape character, that is typical of the Southwest NSW and Riverina region, is defined by extensive flat, open landscapes utilised for grazing and dryland or irrigated cropping. The landscape was categorised into five (5) Landscape Character Units (LCUs). A quantitative frame of reference was applied to establish the Scenic Quality Rating of these LCUs which ranged from low to moderate.

The Scenic Quality Ratings are utilised in defining Visual Influence Zones which are assessed against objectives outlined in the Bulletin.

Landscape Character Assessment

The open and flat nature of the landscape will afford expansive, open views of the Project from most public locations. However, the existing landscape character is considered to be of low scenic quality due to it being modified and lacking any distinct landscape features. Surrounding settlements are scattered and large tracts of land are generally uninhabited. The assessment found the Project would change the character of the surrounding landscape, however, the landscape was not determined to be sensitive, rare or natural.

Preliminary Assessment Tools

In accordance with the Bulletin, Moir LA applied the Preliminary Assessment Tools to the Project Layout to determine dwelling receptors that require detailed assessment. The assessment identified a total of 22 non-associated dwellings within 8,000 m of the nearest turbine, of which: :

- *Four (4)* non-associated dwellings have been identified within 3,750 metres of a proposed wind turbine location (within the black line).
- *Nine (9)* non-associated dwellings are located between 3,750 - 5,500 metres of a proposed wind turbine (within the blue line).
- *Nine (9)* non-associated dwellings are located between 5,500 - 8,000 metres of a proposed wind turbine (within the purple line).

Dwelling Assessments

Site inspections and desktop assessment identified that:

- One (1) (R019) non-involved dwelling has the potential for a high visual impact.
- 10 non-involved dwellings were assessed as having a low visual impact rating.
- 11 non-involved dwellings were assessed as having a negligible visual impact rating.

Further detailed assessment also identified that vegetation and ancillary structures around the dwellings contain views from a number of dwellings and as a result, limit views of the Project.

Public Viewpoint Assessment

The Visual Influence Zone (VIZ) were determined for 25 key viewpoint locations within the Study Area and where required the landscape scenic integrity was assessed in accordance with the relevant visual performance objectives. The outcomes of this assessment found that of the 25 viewpoints:

- 23 were identified as VIZ3
- Two (2) were identified as VIZ2

Cumulative Assessment

A cumulative assessment was conducted using the Multiple Wind Turbine Tool (MWTT). The assessment of three (3) wind farm projects proposed within 8,000 of the Project (Bullawah Wind Farm, Yanco Delta Wind Farm and Argoon Wind Farm) were considered. The approach to the MWTT identifies those dwellings which are non-associated with the Project and those that are non-associated with the Project but associated with another surrounding wind farm. The sectors occupied by turbines which form part of the associated project were removed from the overall MWTT totals.

The assessment identified that nine (9) of the 22 non-associated dwellings within 8,000 m of the Project have the potential for views towards turbines associated with the Project and the surrounding wind farms in three (3) or above 60 degree sectors. The remaining 13 non-associated dwellings will have turbines within up to two (2) 60 degree sectors, which is deemed acceptable in accordance with the Bulletin. Of the nine (9) non-associated dwellings within 8,000 m of a turbine:

- Seven (7) non-associated dwellings have been identified as having up to three (3) 60 degree sectors visible (R049, R082, R008, R111, R144, R108 and R091); and
- Two (2) non-associated dwellings (R088 and R036) were identified as having views in up to four (4) 60 degree sectors.

An assessment using LIDAR wireframes, photomontages and aerials were undertaken as part of the assessment which considered the 60 degree sectors of the view impacted by the Project, YDWF, AWF and BWF. The assessment found that existing screen factors such as vegetation and farm buildings reduce the number of 60 degree sectors visible from all nine (9) of these non-associated dwellings.

As a result, the cumulative MWTT indicates that the number of sectors occupied by the Project are no greater than two (2) 60 degree sectors for all nine (9) non-associated dwellings which is deemed acceptable in line with Level 2 viewpoints. The greatest impacts are likely to be caused by the other proposed project turbines.

Mitigation

Practical and feasible mitigation measures have been proposed for the one (1) non-associated dwelling (R019) with a high visual impact rating. Once established, it is anticipated the proposed mitigation methods recommended will assist in reducing the visibility of the Project from a high to a low visual impact rating. The proposed mitigation measures are to be developed in consultation with the landowner and are to be in keeping with the existing landscape character

Shadow Flicker

A shadow flicker assessment was undertaken in line with the Bulletin. No non-associated dwellings were identified with potential shadow flicker hours.

However, it was identified that portions of Mabins Well Road, Fernbank Road, McLennons Bore Road, Wilson Road, Liddles Lane, Jerrys Lane, Carrathool Road to the west of the Project, Cadell Road to the east of the Project and Four Corners Road to the north of the Project are likely to experience shadow flicker. There are no guidelines in the Bulletin relating to the acceptable level of shadow flicker on road users.

On evaluation, the Project is compliant with the performance objectives as per the Bulletin.

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01

Introduction

1.0 Introduction

1.1 Introduction

Moir Landscape Architecture (Moir LA) have been commissioned by EMM Consulting Pty Ltd on behalf of Spark Renewables to prepare a Landscape and Visual Impact Assessment (LVIA) for the proposed Dinawan Wind Farm (referred to hereafter as 'the Project').

The Project includes the construction, operation and decommissioning of a wind farm and associated infrastructure with a targeted electricity generation capacity of approximately 1.2 GW. The Project Area covers 39,061 ha as shown on **Figure 02**. It is located 50 km southwest of Darlington Point and 45 km north of Jerilderie in south-western NSW, entirely within the South West Renewable Energy Zone (REZ).

This report supports a State Significant Development (SSD) Development Consent application under Part 4, Division 4.7 of the Environmental Planning and Assessment Act 1979 (SSD-50725708), as an appendix to the Environmental Impact Statement (EIS) for the Project.

The purpose of this report is to provide a comprehensive assessment of visibility and potential visual impacts associated with the Project on the landscape character, landscape values, landscape amenity and any scenic vistas. The report details the results of the field work, documents the assessment of the landscape character and visual setting, and makes recommendations to assist in the mitigation of any potential impacts resulting from the proposed development.

This LVIA has been prepared in accordance with the *Wind Energy: Visual Impact Assessment Bulletin* (2016) referred to hereafter as 'the Bulletin'. This LVIA forms a part of the EIS to be submitted to the Department of Planning, Housing and Infrastructure (DPHI). This information will assist the community and the DPHI to understand and assess the likely visual impacts.

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, architects, or other visual resource specialists), with demonstrated experience and capabilities in visual assessment to carry out a wind energy project visual assessment* (DPE, 2016).

Moir LA is a professional design practice and consultancy specialising in the areas of Landscape Architecture, Landscape Planning and LVIAs. Our team has extensive experience in undertaking LVIAs for large scale infrastructure projects, in particular renewable energy projects. Our capabilities include digital terrain modelling, viewshed assessment, photo montage development, landscape character assessment and community consultation.

In the context of our experience and with guidance from the Bulletin Moir LA have developed methodologies to ensure a comprehensive and qualitative assessment of the Project. Relevant experience includes the preparation of PVIAs and LVIAs for the following Wind Energy Projects:

- *Keri Keri Wind Farm PVIA (Keri Keri, New South Wales)*
- *Dinawan Energy Hub Wind Farm PVIA (Coleambally, New South Wales)*
- *Wilan Wind Farm PVIA (Keri Keri, New South Wales)*
- *Bullawah Wind Farm PVIA (Hay, New South Wales)*
- *Ungula Wind Farm LVIA (Wellington, New South Wales)*
- *Hills of Gold Wind Farm LVIA (Nundle, New South Wales)*
- *Jeremiah Wind Farm LVIA (Adjungbilly, New South Wales)*
- *Valley of the Winds Wind Farm LVIA (Coolah, New South Wales)*
- *Thunderbolt Wind Farm LVIA (Kentucky, New South Wales)*

02

Study Method

2.0 Study Method

2.1 Secretary’s Environmental Assessment Requirements (SEARs)

The Project is classified as a SSD and will be assessed and determined under the provisions of the Environmental Planning and Assessment Act 1979. SEARs issued on the 14th of December 2022 for the Project state the EIS must address the following specific issues for the Project:

“Landscape and Visual – including a detailed assessment of the visual impacts of all components of the project (including turbines, transmission lines, substations, battery energy storage system, and any other ancillary infrastructure in accordance with the NSW Wind Energy: Visual Assessment Bulletin (DPE, 2016), including detailed consideration of potential visual impacts on local residences (including approved developments, lodged development applications and dwelling entitlements), scenic or significant vistas and road corridors in the public domain.”

2.2 Wind Energy: Visual Assessment Bulletin

The Bulletin was adopted by the then Department of Planning and Environment in December 2016. The Bulletin was developed to guide the appropriate location of wind energy development in NSW and to establish a framework for the assessment of visual impacts associated with wind energy. Visual impacts are one of a range of issues considered in the assessment and determination of wind energy projects.

The objectives of the Bulletin are to:

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

The visual assessment process is broken into two main stages:

Stage 1: Preliminary Environmental Assessment and
Stage 2: EIS

This LVIA responds to the requirements of Stage 2 of the Bulletin. The Preliminary Visual Impact Assessment (PVIA) prepared for Stage 1 was undertaken by Moir LA in October 2022 and the findings of the assessment undertaken have been included in this report.

2.3 Overview of the Study Method

In accordance with the Bulletin, the visual assessment includes:

- *a baseline study that includes analysis of the landscape character, scenic quality and visibility from viewpoints of different sensitivity levels;*
- *establishment of visual influence zones from viewpoints using data collected in the baseline study;*
- *assessment of the proposed layout against visual performance objectives; and*
- *justification for the final proposed layout and identification of mitigation and management measures.*

Moir Landscape Architecture have formulated a quantitative study methodology with regards to the Visual Assessment Bulletin and with consideration of previous experience on large scale infrastructure projects and relevant literature and guidelines relating to large scale energy projects.

Extensive field work and photographic survey work for the study was undertaken in July and August 2023 as well as March 2024 from public and private properties.

2.4 Report Structure

The flow chart on the following page provides a high level overview of the process utilised to undertake the assessment. **Table 01** provides an outline of the report structure, a brief overview of the objectives of the Bulletin and a summary of how these have been addressed in the LVIA.

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

2.5 Landscape and Visual Impact Assessment (LVIA) Process

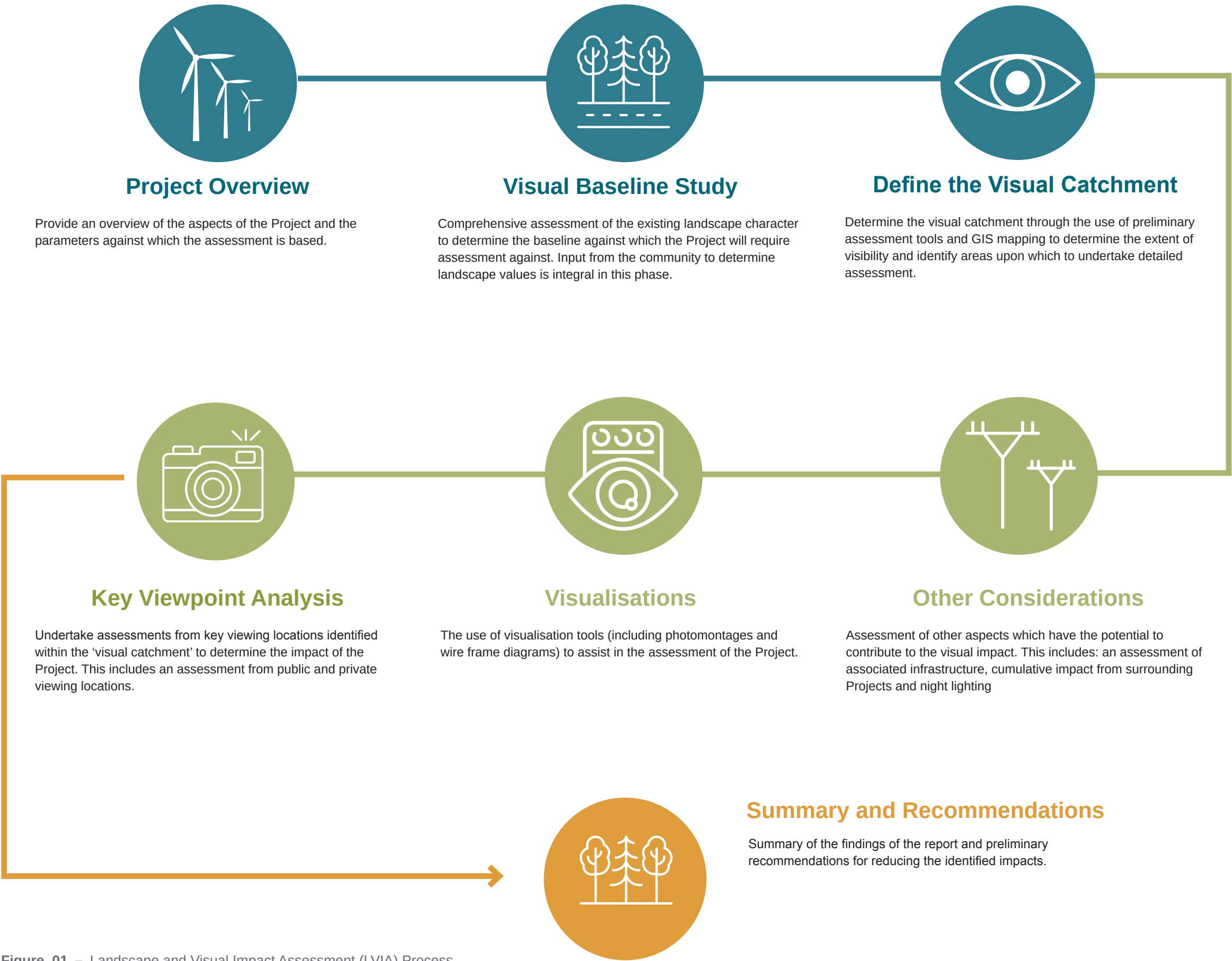


Figure 01 – Landscape and Visual Impact Assessment (LVIA) Process

Landscape and Visual Impact Assessment Report Structure:

PROJECT	Section 3.0: Project Overview	Bulletin Requirements Addressed:
	- Detailed Project Description - Wind Turbine Design - Associated Infrastructure	The VIA is to include a full description of the proposed wind energy project design, the layout, structural elements and scenarios being considered.
VISUAL BASELINE STUDY	Section 4.0: Community Consultation	Bulletin Requirements Addressed:
	- Community Consultation Process - Community Landscape Values - Community Perception	The proponent is to further consult with the community to verify the community consultation findings from the scoping and design stage.
	Section 5.0: Visual Baseline Study	Bulletin Requirements Addressed:
VISUAL CATCHMENT	- Detailed assessment of Landscape Character and Key Features of the Region - Landscape Character Unit Classification - Application of Scenic Quality Class Ratings	- A visual baseline study must be undertaken to establish the existing landscape and visual conditions. The baseline study is prepared and evaluated by the proponent prior to undertaking any visual analysis. - Describe, assess and map these factors in written and graphic forms supported by photographic representations of the area. - Identify Scenic Quality Classes
	Section 6.0: Preliminary Assessment Tools	Bulletin Requirements Addressed:
	Define the Visual Catchment of the Project: - Preliminary Assessment Tools: - Visual Magnitude - Multiple Wind Turbine Effect	- Visual Magnitude Assessment: Mapping the dwellings, key viewpoints and proposed turbines at scale to establish the potential visual magnitude. - Map into six sectors of 60° any proposed turbines and any existing or approved turbines within each dwelling or key public viewpoint.
KEY RECEPTOR ASSESSMENT	Section 7.0 - Zone of Visual Influence (ZVI)	Bulletin Requirements Addressed:
	Zone of Visual Influence (ZVI)	Establish the theoretical 'zone of visual influence' of the proposal (the area from which the proposal is theoretically visible or the 'visual catchment').
	Section 8.0: Public Viewpoint Analysis	Bulletin Requirements Addressed:
	Assessment of viewpoints from areas identified within the visual catchment.	- All key public viewpoints and individual dwellings within the 'visual catchment' should be identified and assessed. - The visual performance objectives form the principle framework and guide for assessing the proposed wind energy project when applied to individual viewpoints.
	Refer to Appendix B - Public Viewpoint Analysis	
	Section 9.0: Dwelling Assessment Overview	Bulletin Requirements Addressed:
	Summary of impact on Dwellings.	All key public viewpoints and individual dwellings within the 'visual catchment' should be identified and assessed.
	Refer to Appendix C - Dwelling Assessments	

Table 01 – Report Structure

VISUALISATIONS	Section 10.0: Photomontage & Wire Frame Diagrams	Bulletin Requirements Addressed:
	- Photomontage selection process - Photomontage development process Refer to Appendix D - Photomontages & Wire Frame Diagrams	- Photomontages shall be prepared in accordance with the Scottish Natural Heritage Visual Representation of Wind Farms. - The visual assessment needs to include a concise description of the complete methodology used to create any photomontages presented in the visual assessment.
OTHER ASPECTS	Section 11.0: Shadow Flicker & Blade Glint Assessment	Bulletin Requirements Addressed:
	- Shadow Flicker Assessment - Blade Glint Assessment	- An assessment of the number of hours of potential 'shadow flicker'. - Blade Glint.
	Section 12.0 Night Lighting	Bulletin Requirements Addressed:
	Night Lighting Assessment	Consider whether any obstacle lighting required is likely to result in any significant increase in visual impacts.
	Section 13.0 Cumulative Visual Impacts	Bulletin Requirements Addressed:
	Cumulative Visual Impacts	Address potential cumulative impacts of wind energy projects in the region (the wind energy project as well as existing and approved projects).
	Section 14.0 Associated Infrastructure	Bulletin Requirements Addressed:
	Overview of impact resulting from Associated infrastructure	The assessment of visual impacts from all ancillary facilities and infrastructure will be required.
	Section 15.0 Visual Impact on Landscape Character	Bulletin Requirements Addressed:
SUMMARY AND RECOMMENDATIONS	- Overview of LCUs with regards to Visual Performance Objectives - Summary of impact on Landscape Character	Assess the Project using visual performance objectives.
	Section 16.0 Mitigation Methods	Bulletin Requirements Addressed:
	- Wind Farm Design - Mitigation Methods for Residences	An outline of any mitigation and management options proposed, including consultation with affected property owners regarding the proposed mitigation works
	Section 17.0 Visual Performance Evaluation	Bulletin Requirements Addressed:
	Evaluation of Visual Performance Objectives	An assessment of the proposed wind energy project against each visual performance objective and demonstration of whether each objective is achieved and how the standard has been achieved.
	Section 18.0 Conclusion	

2.6 Additional Literature

In addition to the Bulletin, the following literature has assisted in the formulation of the study methodology and where relevant has been referenced in the report:

- *Scottish Natural Heritage, Visual Representation of Wind Farms - Good Practice Guidance (2017)*
- *Environment Protection and Heritage Council, Draft National Wind Farm Development Guidelines (2010)*
- *Landscape Institute and Institute of Environmental Management & Assessment, Guidelines for Landscape and Visual Impact Assessment Third edition (2013)*
- *Clean Energy Council, Best Practice Guidelines for Wind Energy Development (2018)*

2.7 Policy Considerations

2.7.1 Local Government Policies

The western part of the Project is located within the extents of the Edward River Council Local Government Area (LGA) and the eastern part is located in the Murrumbidgee Council LGA. 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. Therefore, policies and objectives of the Conargo LEP 2013, Murrumbidgee LEP 2013 and Jerilderie LEP 2012 will be applicable to the Project.

2.7.2 NSW Roads and Maritime Services

The assessment of shadow flicker, blade glint and reflectivity is to consider impacts on road users. This has been included in **Section 11.0** of this LVIA.

2.7.3 Civil Aviation Safety Authority

The LVIA includes an assessment of potential visual impact associated with night lighting in accordance with the Civil Aviation Safety Authority (CASA), refer to **Section 12.0..**

03

Project Overview

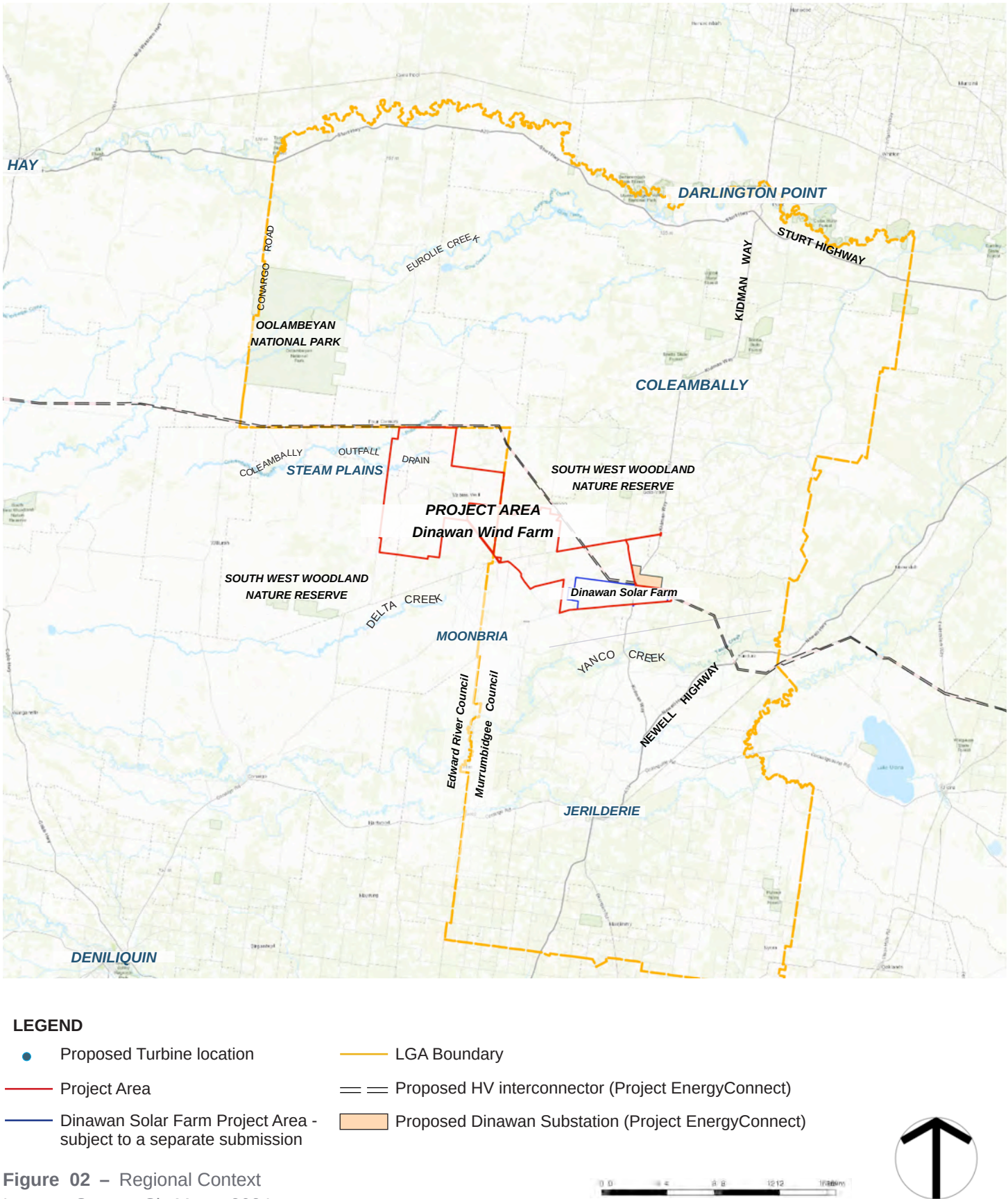
3.0 Project Overview

3.1 Regional Context

The Project is located approximately 50 km southwest of Darlington Point and 45 km north of Jerilderie, in south-west NSW. The western part of the Project sits within the Edward River Council Local Government Area (LGA) and the eastern part sits within the Murrumbidgee Council LGA (see **Figure 02**).

The Project is located within the South-West REZ. The NSW Government has determined 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 intended transmission capacity for this REZ is 2.5 GW (EnergyCo, 2022).

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 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 (EnergyCo, 2022).



3.2 The Study Area

The Study Area refers to the land associated with and surrounding the Project. For the purpose of this report, the Study Area is defined by an 8 km radius around the Project, however assessment of land outside of this radius will be undertaken as necessary. The closest landmarks include the town of Coleambally, Oolambeyan National Park and small rural properties such as Argoon, Steam Plains and Moonbria as shown in **Figure 03**.

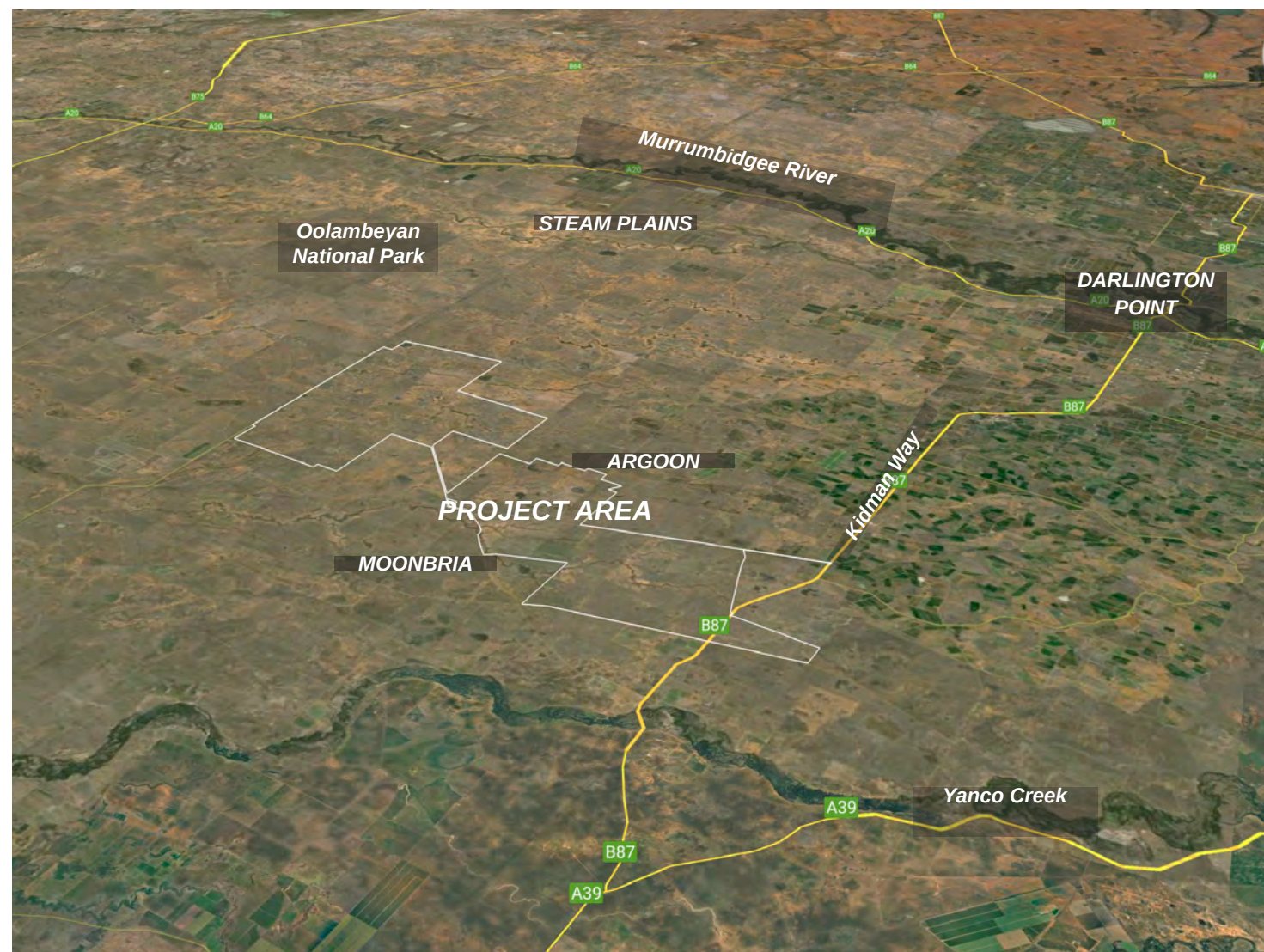


Figure 03 – Birds Eye View of the Site
Imagery Source: Google Earth, 2024

3.3 The Project Area

The Project is proposed to be situated within the Project Area. It is an area of 39,061 ha made up of a number of separate land holdings. The Project Area includes the flat and generally cleared native grasslands with scattered trees evident along the existing creeklines. The site elevation ranges from between 101 m and 116 m above sea level. The Project Area is currently used for agricultural purposes including sheep and cattle grazing and cropping.

The surrounding area is predominantly flat, open grasslands used for grazing. The Project can be accessed from McLennons Bore Road, Fernbank Road and Goolgumbra Road. The closest towns are Jerilderie and Coleambally which have populations of approximately 922 and 1,152 respectively (ABS, 2021).

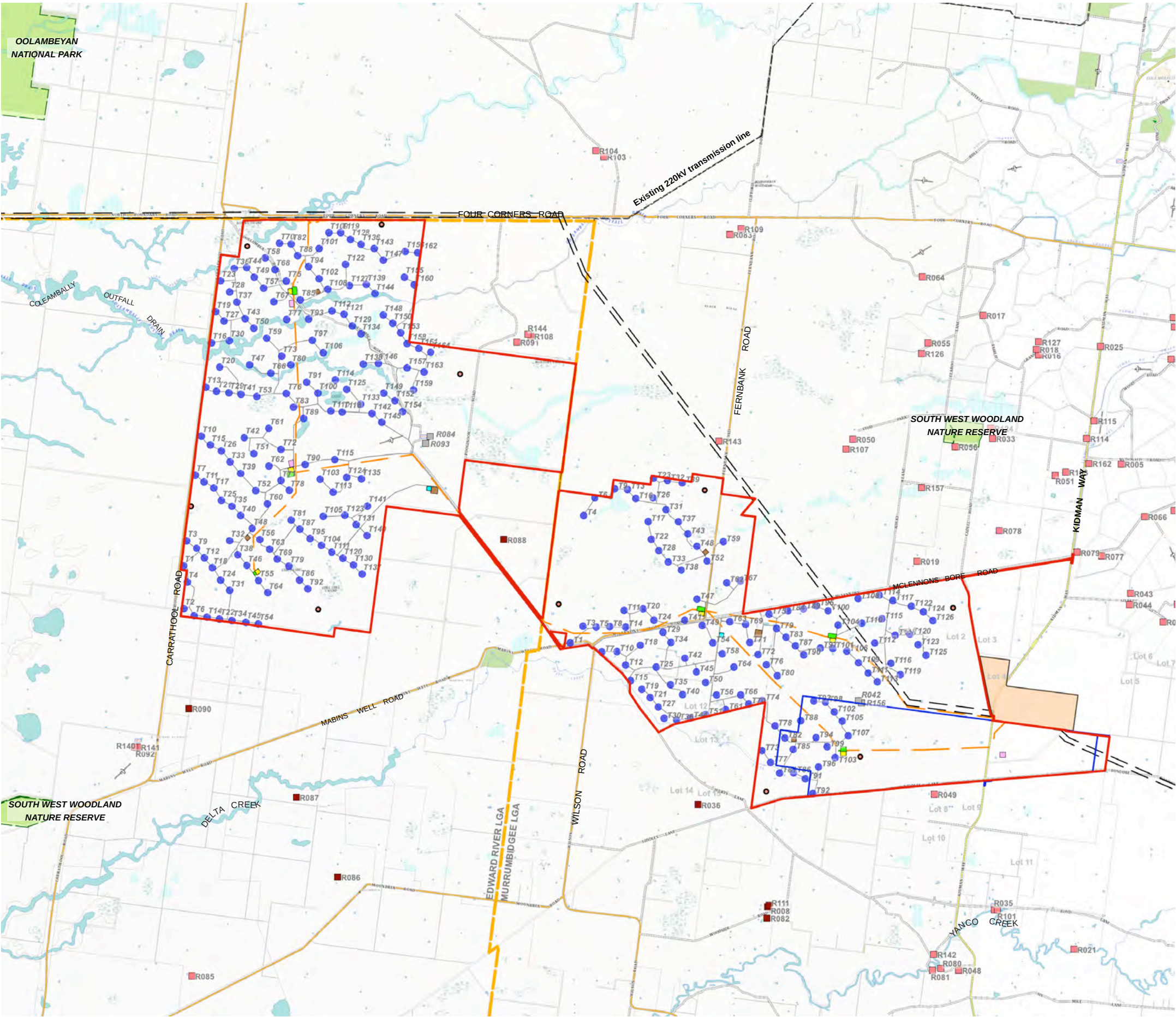
3.4 The Project

The Project includes the construction, operation and decommissioning of a wind farm and associated infrastructure with a targeted electricity generation capacity of 1.2 GW. It is noted the layout in **Figure 04** includes more than 200 turbines, however, approval is being sought for construction of up to approximately 200 turbines. It is assumed that during further design, some turbines will be removed due to identified constraints.

The Project is proposed adjacent to the Dinawan Substation, which is currently being constructed as part of Project EnergyConnect. The Dinawan Energy Hub Solar Farm is located to the south east of the Project Area and is subject to a separate SSD application and LVIA.

The proposed Dinawan Wind Farm comprises of the following:

- up to 200 turbines (up to 280 m tall, ground to maximum tip height)
- electrical collection system, substations and control rooms
- electricity transmission line infrastructure connecting the project substations to the Dinawan Substation
- operations and maintenance (O&M) infrastructure, including site offices and amenities, buildings, equipment and maintenance sheds and laydown, storage and parking areas
- temporary construction facilities, including worker accommodation facility, construction compounds, site offices and amenities, concrete batching plants, construction materials storage (including stockpiles), laydown areas, temporary meteorological masts, borrow pits, water tanks and storage and parking areas
- other permanent infrastructure, including hardstands, water tanks, permanent meteorological masts, new access tracks and upgrades to existing access tracks
- access points from the public road network and public road upgrades to facilitate the delivery of turbine components.



The Project

Proposed Dinawan Wind Farm

LEGEND

- Project Area
- Dinawan Solar Farm Boundary (Subject to separate SSD and LVIA)
- Proposed 280 m Turbine Location
- Associated Dwelling
- Non-associated Dwelling
- Non-associated Dwelling (Associated with other project)
- Main Road
- Minor Road
- LGA boundary
- National Park / Nature Reserve
- Creeks/Rivers
- Existing 220kV Transmission Line
- Internal Transmission Lines
- Proposed Temporary Construction Compound
- Proposed Substations
- Proposed Switchyard
- Proposed O&M Facility
- Proposed Temporary Workers Accommodation
- Proposed Permanent Met Mast
- Project EnergyConnect Dinawan Substation (Under Construction)
- Project EnergyConnect HV interconnector (Under Construction)



Figure 04 – The Project
Imagery Source: Sixmaps, 2023

3.5 Wind Turbine Design

The proposed turbines are yet to be selected and therefore this report considers a maximum blade tip height of 280 metres as a worst case scenario.

- a 4-7 part tubular steel tower holding the nacelle;
- three blades mounted to a rotor hub on a tubular steel tower, with a combined height of blade and tower limited to a maximum tip height of 280 m AGL;
- a gearbox and generator assembly housed in a nacelle; and
- adjacent hardstands for use as crane pads and assembly and laydown areas.

Table 02 provides an overview of dimensions of the turbine components that have been used for this assessment. To best represent a worst case scenario, the maximum hub height of 180 metres has been used for modelling and visualisation purposes in this report. **Figure 05** illustrates the turbine parameters utilised for this report. **Image 01** shows the appearance of a typical wind turbine.

Wind Turbine Components		
Project Component	Dimensions used in LVIA:	Quantity
Uppermost Blade Tip	280 metres AGL	200
Tower (hub) height	180 metres	
Blade length	100 metres (including nacelle)	
Swept Area	31,415 m ²	

Table 02 – Wind Turbine Parameters for Visual Assessment

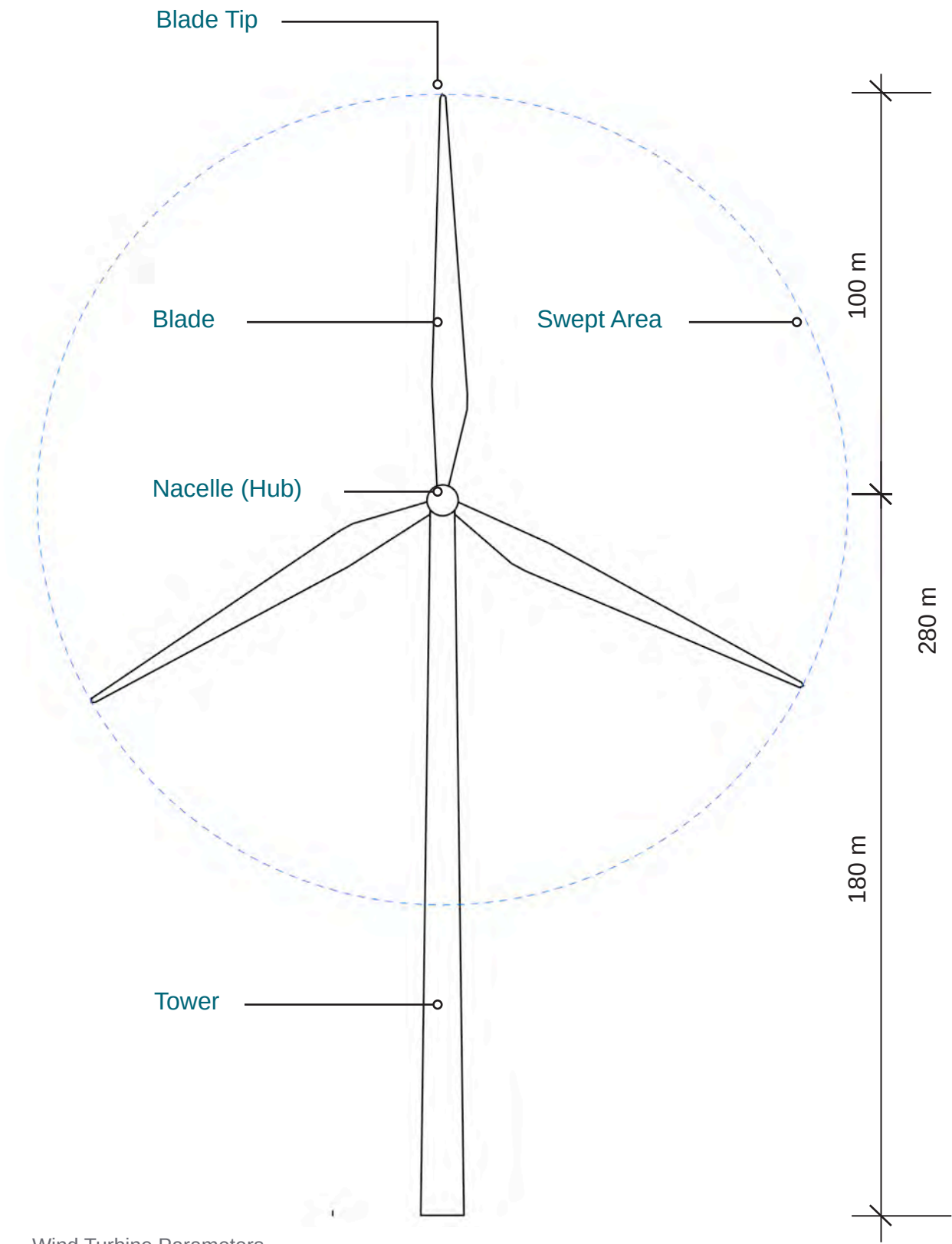


Figure 05 – Wind Turbine Parameters

3.6 Associated Infrastructure

In addition to the turbines, the following provides an overview of the permanent associated infrastructure components proposed for the Project which have been considered in this visual impact assessment. An overview of the assessment of the potential visual impacts resulting from the associated infrastructure has been provided in **Section 14.0** of this report.

Associated Infrastructure	
Project Component	Description
On-site substations	Construction of six (6) on-site electrical substations including three (3) within the eastern cluster and three (3) within the western cluster. The disturbance footprint for these elements are likely to measure approximately: - East: 250 m x 200 m; 250 m x 200 m; 250 m x 200 m - West: 100 m x 170 m; 200 m x 250 m; 200 m x 250 m
Switchyards	Construction of a total of six (6) switchyards (to be constructed adjacent to the on-site substations). The disturbance footprint for these elements are likely to measure approximately: - East: 350 m x 200 m; 350 m x 200 m; 250 m x 200 m - West: 200 m x 200 m; 350 m x 200 m; 350 m x 200 m
Transmission Lines	A combination of above-ground and underground transmission lines. The transmission towers are likely to be a maximum height of up to 80 m, with a minimum spacing of 200 m between towers.
Operational and Maintenance Building (O&M)	A total of two (2) O&M buildings. The disturbance footprint for these elements are likely to measure approximately 200 m x 200 m.
Meteorological monitoring masts	Up to 10 permanent wind monitoring masts of up to 200 m high.
Internal & External Roads	Upgrade to existing local road infrastructure and internal unsealed tracks. Access Road locations: - East: Point A (McLennons Bore Road); Point B (McLennons Bore Road); Point C (Fernbank Road); Point D (Fernbank Road); Point E (Fernbank Road); Point H (Kidman Way). - West: Point F (Goolgumbbla Road); Point G (Goolgumbbla Road).

Table 03 – Associated Infrastructure

The following temporary elements will be required during construction of the Project:

- construction compounds and control room;
- worker accommodation facility;
- site offices and amenities;
- temporary meteorological monitoring masts of up to 110 m high;
- laydown areas; and
- concrete batching plants.



Image 01 – Typical Wind Turbine Design (Gullen Range Wind Farm)



Image 02 – Typical Substation (Source: EMM)



Image 03 – Crane Hardstand (Source: EMM)



Image 04 – Transmission Line (Source: EMM)



Image 05 – Operations of Maintenance Facility (Source:Spark Renewables)

04

Community Consultation

4.0 Community Consultation

4.1 Overview of Community Consultation

In accordance with the 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 is to:

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

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. A total of 14 surveys were completed.

Since then, Spark Renewables has established clear channels of communication and has engaged in targeted consultation with all residents within 8 km of a WTG and has made significant attempts to consult with residents regarding potential visual amenity impacts. Where available, draft photomontages have been shared with landowners within close proximity of a WTG, including R019.

4.3 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*

4.4 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 LVIA, where possible. .

4.5 Community Values

Community values are highly subjective and can differ depending on location, local context and place attachment. The results of specific questions assist in the identifying key areas of concern and ensuring the LVIA prepared with 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 06**).

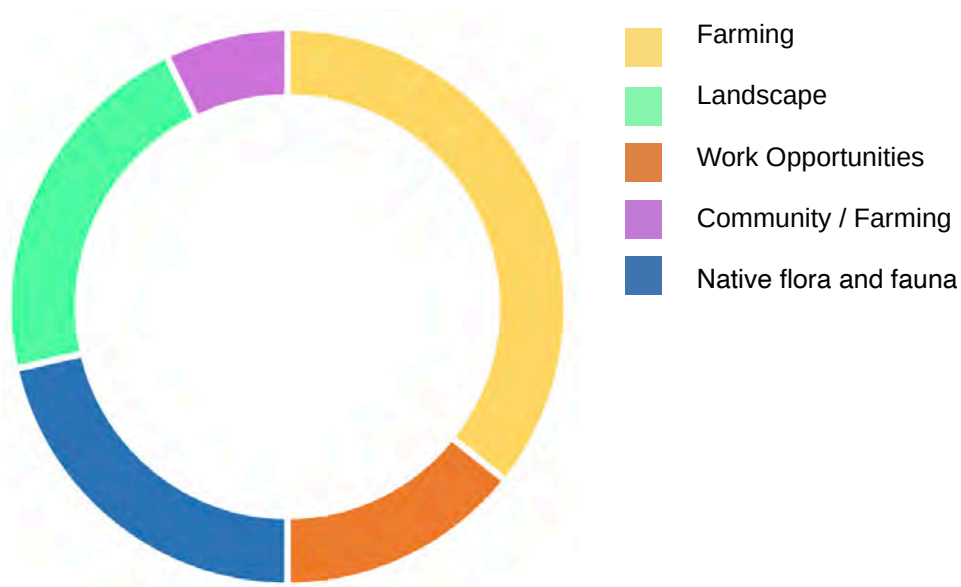


Figure 06 – Community Values

4.6 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 07**). These responses assist in informing the Scenic Quality Rating of Landscape Character Units.

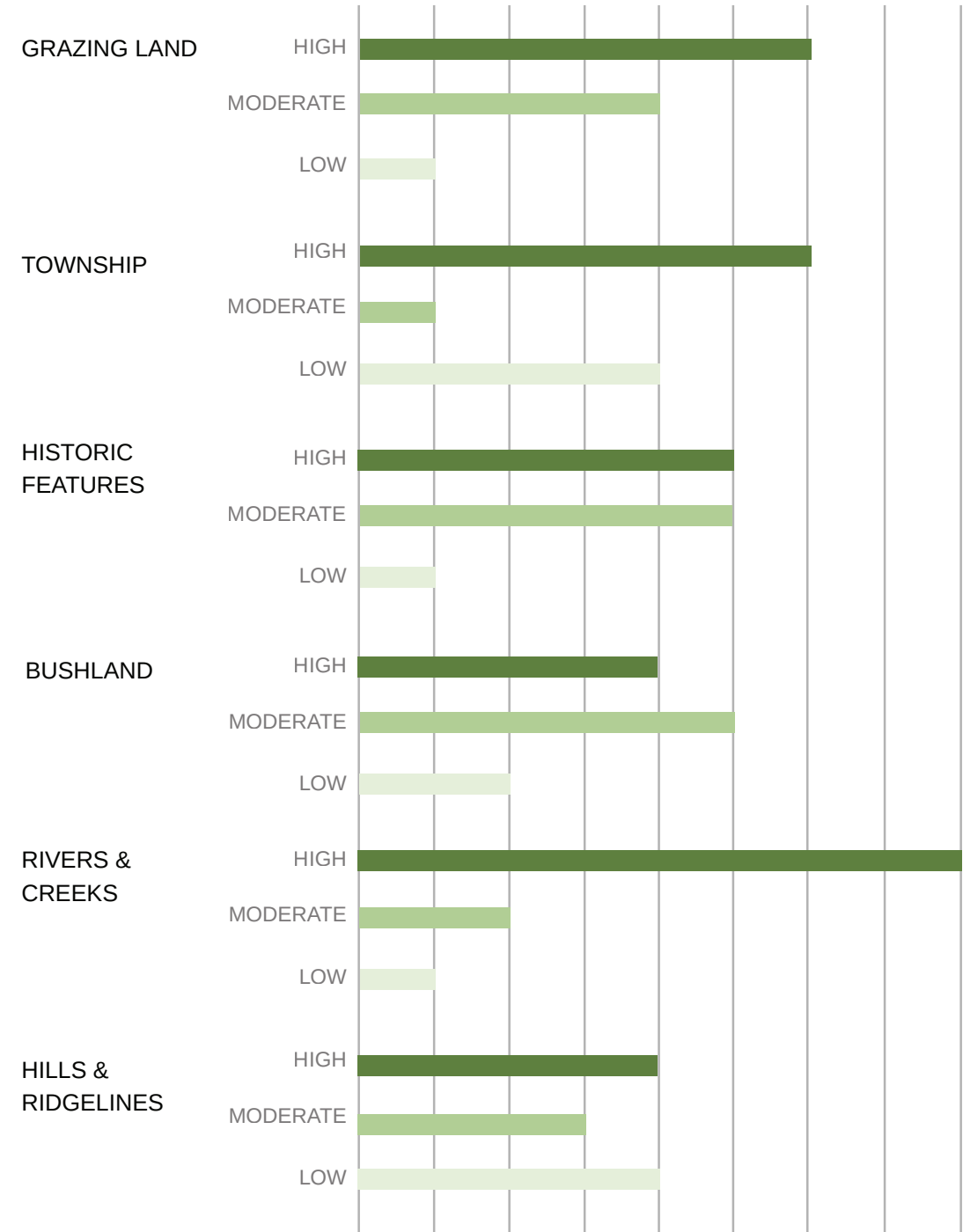


Figure 07 – Landscape Scenic Values

05

Visual Baseline Study

5.0 Visual Baseline Study

5.1 Visual Baseline Study

In accordance with the Bulletin:

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

A Preliminary Visual Impact Assessment (PVIA) was undertaken by Moir LA as part of Stage 1: Preliminary Environmental Assessment (pre-lodgement). Moir LA have developed upon the baseline study undertaken in the PVIA to provide a detailed baseline study for the LVIA.

In accordance with the Bulletin, *the baseline study should consider the following inputs in the ‘visual catchment’ for the project:*

- elements of the landscape important to the community, including public and private viewpoints;*
- the sensitivity of the viewers who use those viewpoints, and the distances at which they may view the landscape and potential wind turbines and other ancillary facilities;*
- the character of the landscape involved, its key features and the relative scenic quality of the area; and*
- the location of any existing operational or approved wind energy projects within both a regional and local context, including any nearby surrounding wind energy projects within eight kilometres which may have the potential to create direct or indirect visual impacts between the Project and any other operational, approved or proposed wind energy projects.*

The purpose of the Visual Baseline Study is to establish the existing landscape and visual conditions through descriptions, mapping and photographic representations. The study method for undertaking the Visual Baseline Study has been established in accordance with *Appendix A of the Bulletin* where relevant and in conjunction with previous experience on large scale wind energy projects.

Table 04 provides an overview of the methodology used to establish a quantitative approach to defining and assessing the landscape character.

Visual Baseline Study Inputs:		
Landscape Character Type		
Describe the broad area of land in which the wind energy project is located.		Refer to Section 5.2
Sensitive Land Use Designations		
Map Layer identifying National and State Sensitive Land use Designations and LEP Zones.		Refer to Section 5.3
Key Landscape Features		
Identify areas of visual interest or quality that stand out visually in the landscape.		Refer to Section 5.4
Landscape Character Unit Classification		
Landscape is categorised into Landscape Character Units (LCU) and Scenic Quality Ratings are applied to each LCU.		Refer to Section 5.5 and 5.6
Visibility Distance Zones		
Undertake visibility or view shed mapping when assessing what may be visible from a given viewpoint looking in all directions.		Refer to Section 7.0
Viewpoint Inventory and Sensitivity Levels		
Undertake a viewpoint inventory from public and private locations and establish the Visual Influence Zones for each.		Refer to Section 8.0

Table 04 – Visual Baseline Study Inputs

5.2 Bioregion Context

The Project sits within the Riverina Bioregion (see **Figure 08**) in southwest NSW. The area 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).

Image 06, 07 and 08 illustrate the typical character of the landscape within the Study Area.

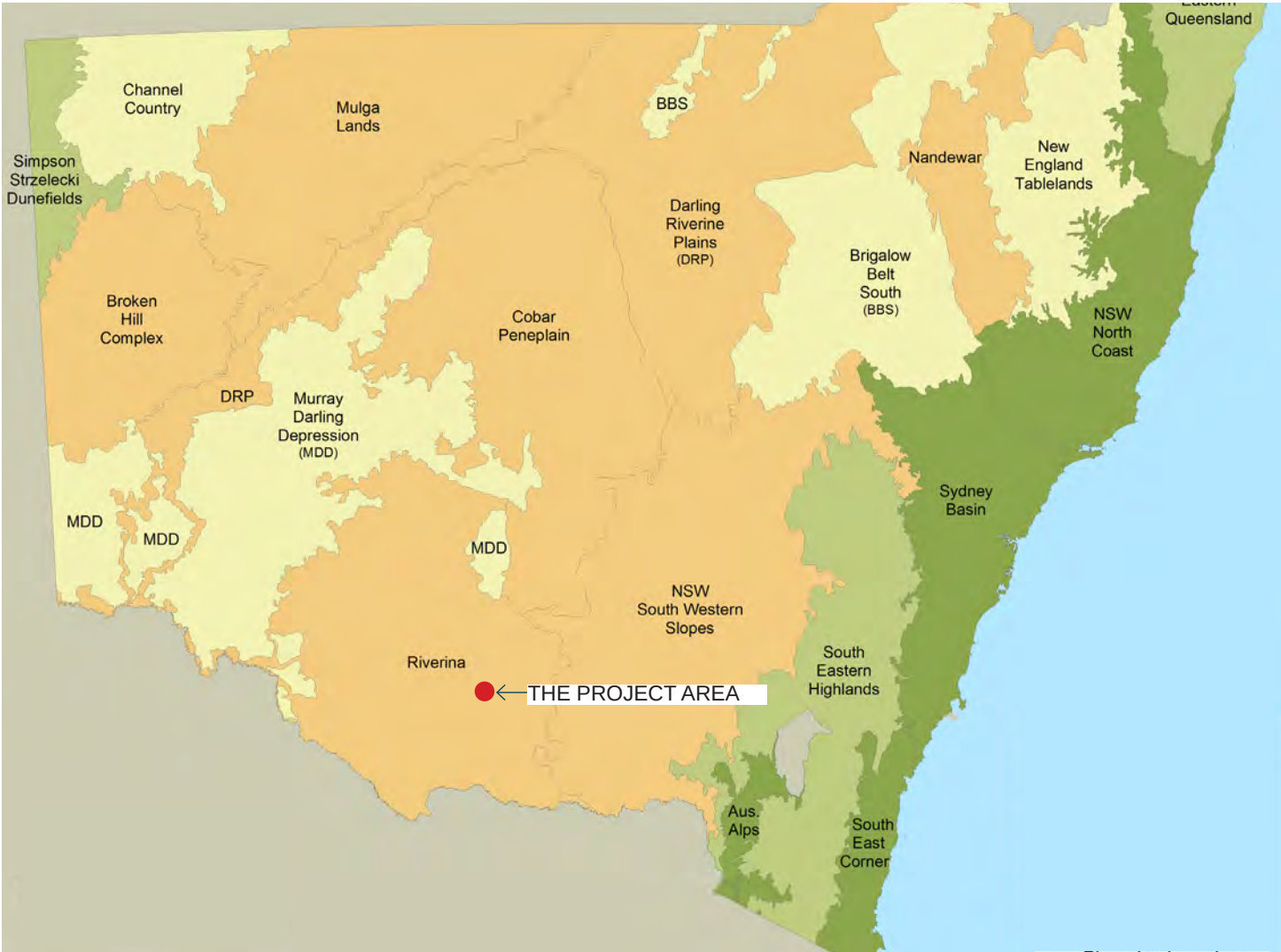


Figure 08 – Bioregions of New South Wales
Source: NSW DPHI, 2012



Image 06 – Typical vegetation of the Study Area defined by patchy to dense mid-storey and taller canopy species.
Image Source: Moir LA



Image 07 – Character of the southern portion of the Study Area defined by vast tracts of scrubby groundcovers and scattered trees. Image Source: Moir LA



Image 08 – Cleared cropping and grazing land typical of the Study Area. Image Source: Moir LA

5.3 Sensitive Land Use Designations

5.3.1 Land Use Zoning

The Project is located within the extents of the Edward River LGA and the Murrumbidgee Council LGA. Upper Lachlan Shire is located to the south of the Project Site. The following provides an overview of the land use zoning within the Study Area and its immediate surrounds as shown on **Figure 09**.

RU1 Primary Production

The Project Area and surrounding land is predominantly zoned RU1 - Primary Production. Generally, the objectives of all LEPs relevant to the Study 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.*
- *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 made up of two isolated reserves, with the nearest located approximately 8 km to northeast of the Project Area. They are categorised as *C1-National Parks and Nature Reserves*. The South West Woodland Nature Reserve Statement of Management Intent outlines that the reserves protects endangered ecological communities such as the Inland Grey Box Woodland and Sandhill Pine Woodlands (NPWS, 2014b).

5.3.2 Land Use

Land use within and around the Study Area is predominantly utilised for agricultural production activities. Lots within the Study Area are currently used as grazing pastures (native and modified vegetation), irrigated cropping and dryland cropping (see **Figure 10**). The largest land parcel dedicated to minimal use corresponds to the extents of Oolambeyan National Park to the northwest. Few tracts of lands to the west and northeast 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, Cooimbil Creek and Delta Creek are seasonal and exhibit vegetation characteristics that are unique to the Riverina region.

Land Zoning

Dinawan Wind Farm

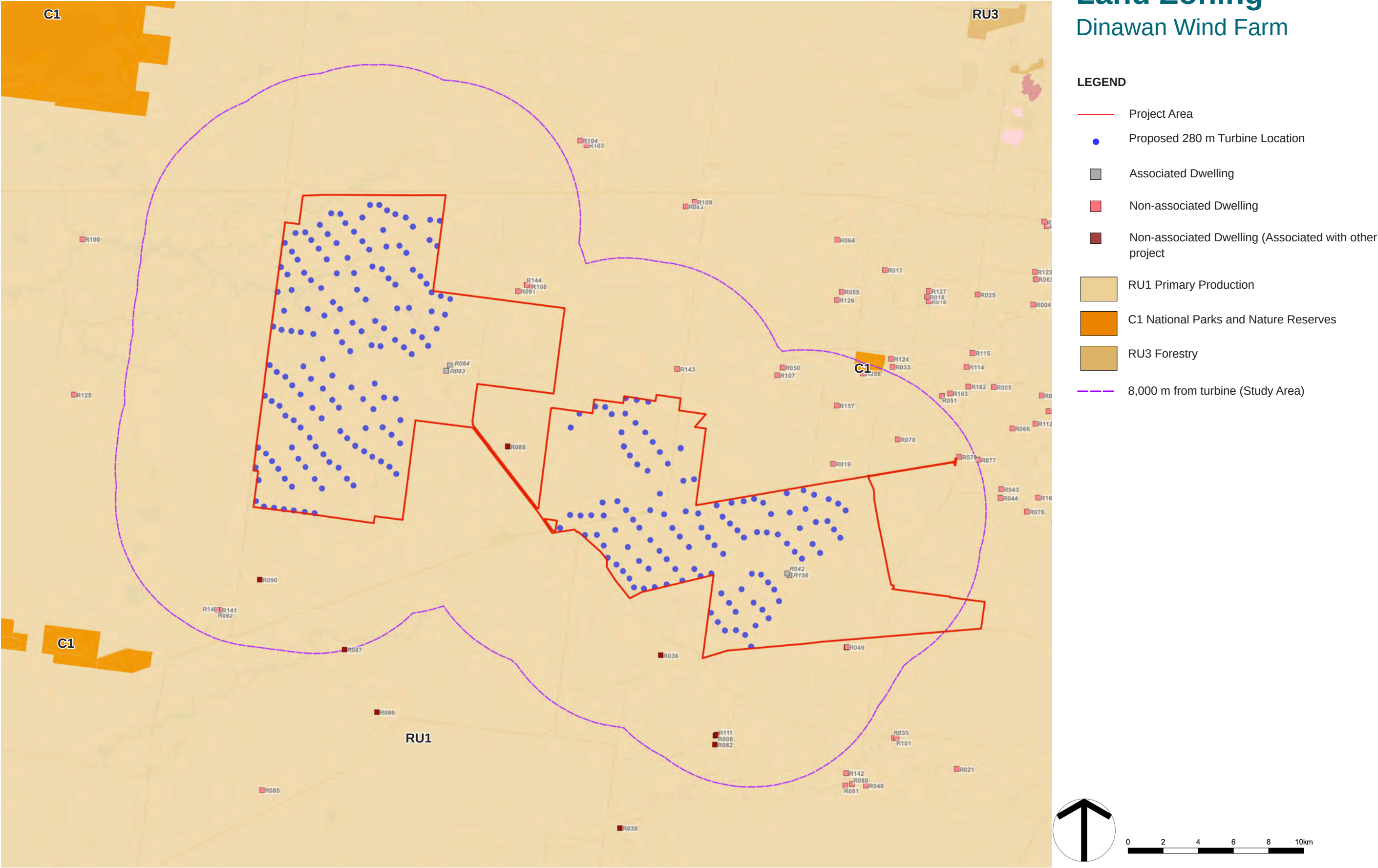
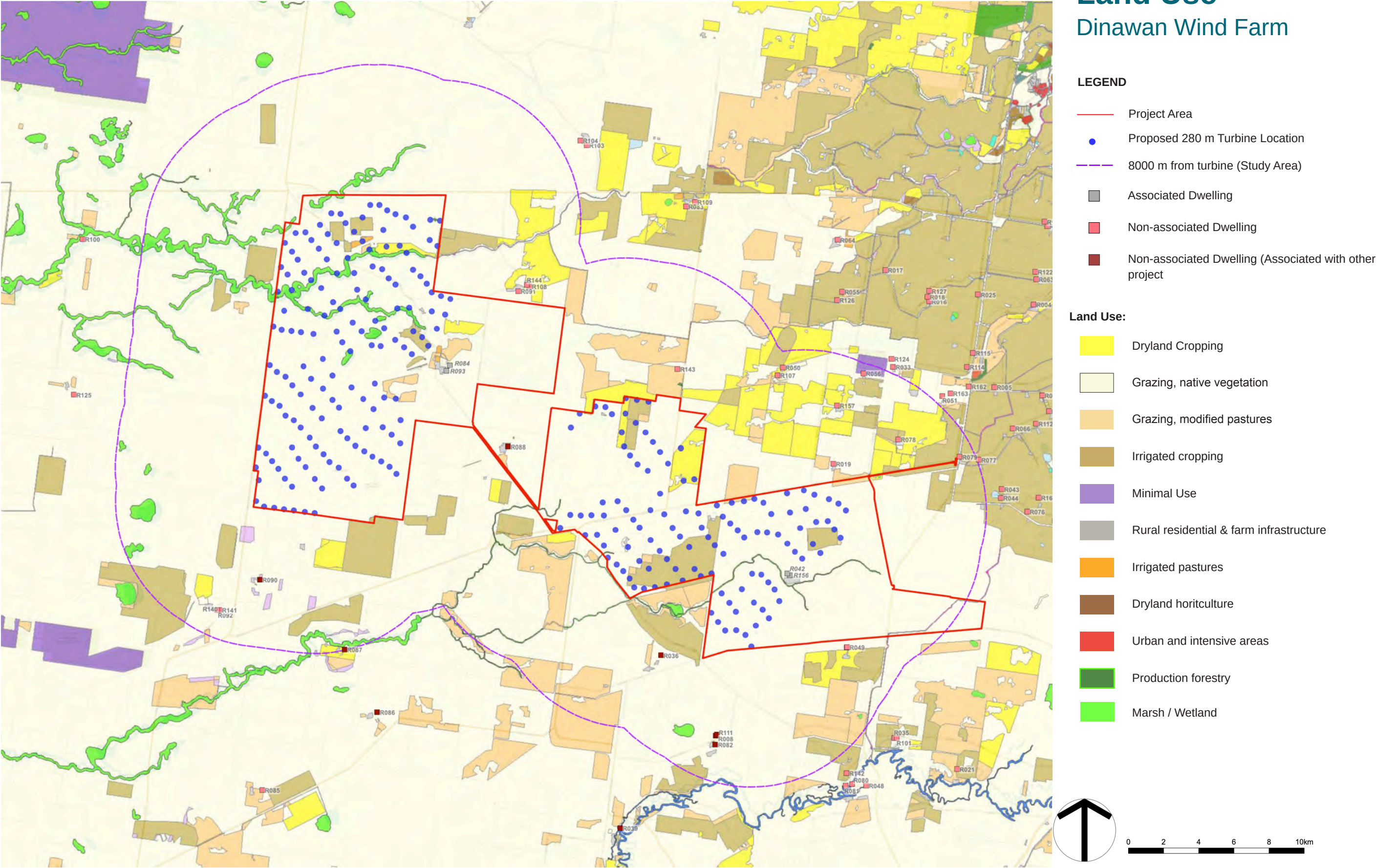


Figure 09 – Land Zoning
Data Source: NSW Department of Climate Change, Energy, the Environment and Water, 2019

Land Use

Dinawan Wind Farm



5.4 Key Landscape Features & Key Viewing Locations

The Bulletin states *proponents must identify key landscape features, dwelling locations and key public viewpoints* (refer to **Figure 11**). The following section provides an overview of the key features identified.

5.4.1 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 Study 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 (see **Image 10**). 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.

5.4.2 Vegetation

The Study Area is characterised by grassy and semi-arid woodlands of eucalypts and pines, 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 (*Sclerolaena* 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).



Image 09 – Topography Typical of the Study Area Image Source: Moir LA , 2023



Image 10 – Yanco Creek Image Source: Moir LA , 2023



Image 11 – Typical Native Vegetation within Study Area Image Source: Moir LA , 2023

5.4.3 National Parks and Nature Reserves

Significant ecological, cultural and historic associations have been identified for the Oolambeyan National Park which is located approximately 10 km northwest 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 particularly 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 characterised by fragmented parcels of woodlands that are spread across areas closer to Coleambally and Steam Plains, refer **Image 12**. 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). It is noted that no publicly accessible viewpoints, amenities or features have been identified within the Reserve.

5.4.4 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 and are 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).

5.4.5 Recreation Associations / Points of interest

A key viewpoint location within the Study Area includes an informal rest area near Yanco Bridge on Yanco Creek.

Another point of interest include the Oolambeyan Homestead Picnic Area which is located approximately 23 km northwest 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).



Image 12 – South West Woodland Reserve Image Source: Moir LA , 2023



Image 13 – Flat Plains typical of the Study Area Image Source: Moir LA , 2023

5.4.6 Access Roads

Kidman Way serves as an important commuting corridor, connecting to the Newell and Sturt Highways, and connects the towns of Colleambally and Darlington Point. Kidman Way is located within the eastern extent of the Project Area, running northsouth.

McLennons Bore Road, Goolgumbra Road, Fernbank Road and Pooginook Road are minor roads that intersect the Project Area, refer **Image 14**. Proposed turbines will be located for a stretch on either side of these roads.

Minor road connections are provided by Carrathool Road and Four Corners Road. These are unsealed roads that run adjacent to the northern and western boundaries of the Project and provide access to nearby isolated properties.

5.4.7 Nearby Towns

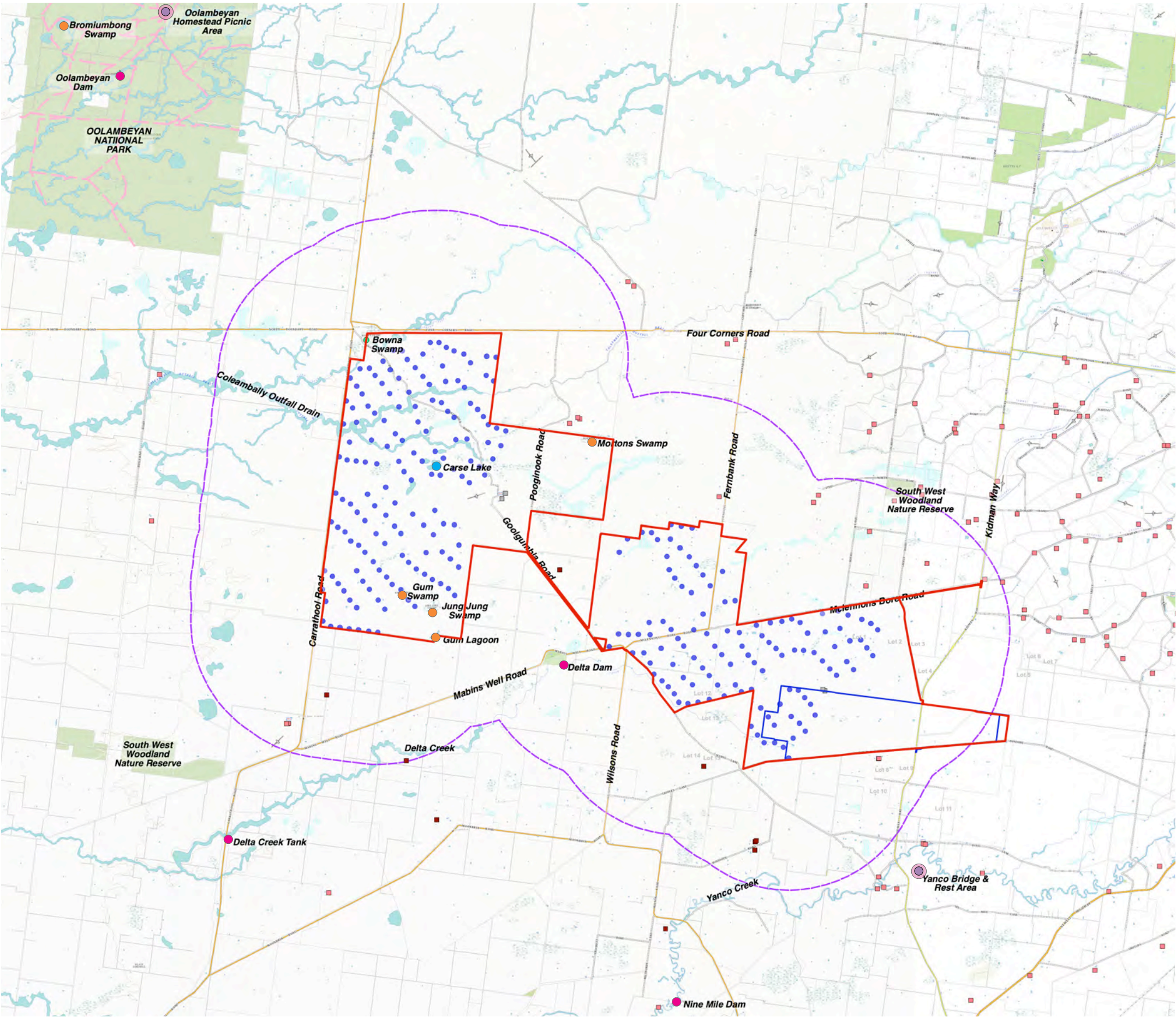
No towns or settlements were identified within the Study Area. The Project is located approximately 28 km northwest of Jerilderie, 24 km southwest of Coleambally and 50 km southwest of Darlington Point.



Image 14 – View over McLennons Bore Road Image Source: Moir LA , 2023



Image 15 – Typical Sealed Road within Study Area Image Source: Moir LA , 2023



Landscape Features & Key Viewpoints

Dinawan Wind Farm

LEGEND

- Project Area
- Proposed 280 m Turbine Location
- Associated Dwelling
- Non-associated Dwelling
- Non-associated Dwelling (Associated with other project)
- 8000 m from turbine (Study Area)

Landscape Features:

- Rivers
- Creeks and channels
- National Park

Key Viewing Locations

- Points of Interest
- Dams
- Swamps and lagoons
- Lakes

Figure 11 – Landscape Features and Key Viewpoints
Imagery Source: Six Maps, 2022

5.5 Landscape Character Unit Classification

Due to the large scale of the Study Area and varying landscape character, the Study Area has been categorised into five (5) Landscape Character Units (LCUs) to assist in the assessment.

The LCUs are classified by slight variations in the landscapes geology, topography, land use and vegetation which create distinct character areas within the Study Area. The LCUs have been informed by land use patterns, vegetation coverage, topographical maps, site images and site inspection.

The general extent of the LCUs are shown on **Figure 12**. The Scenic Quality ‘frame of reference’ has been applied to each LCU (refer to **Table 05**).

5.6 Scenic Quality Class Rating

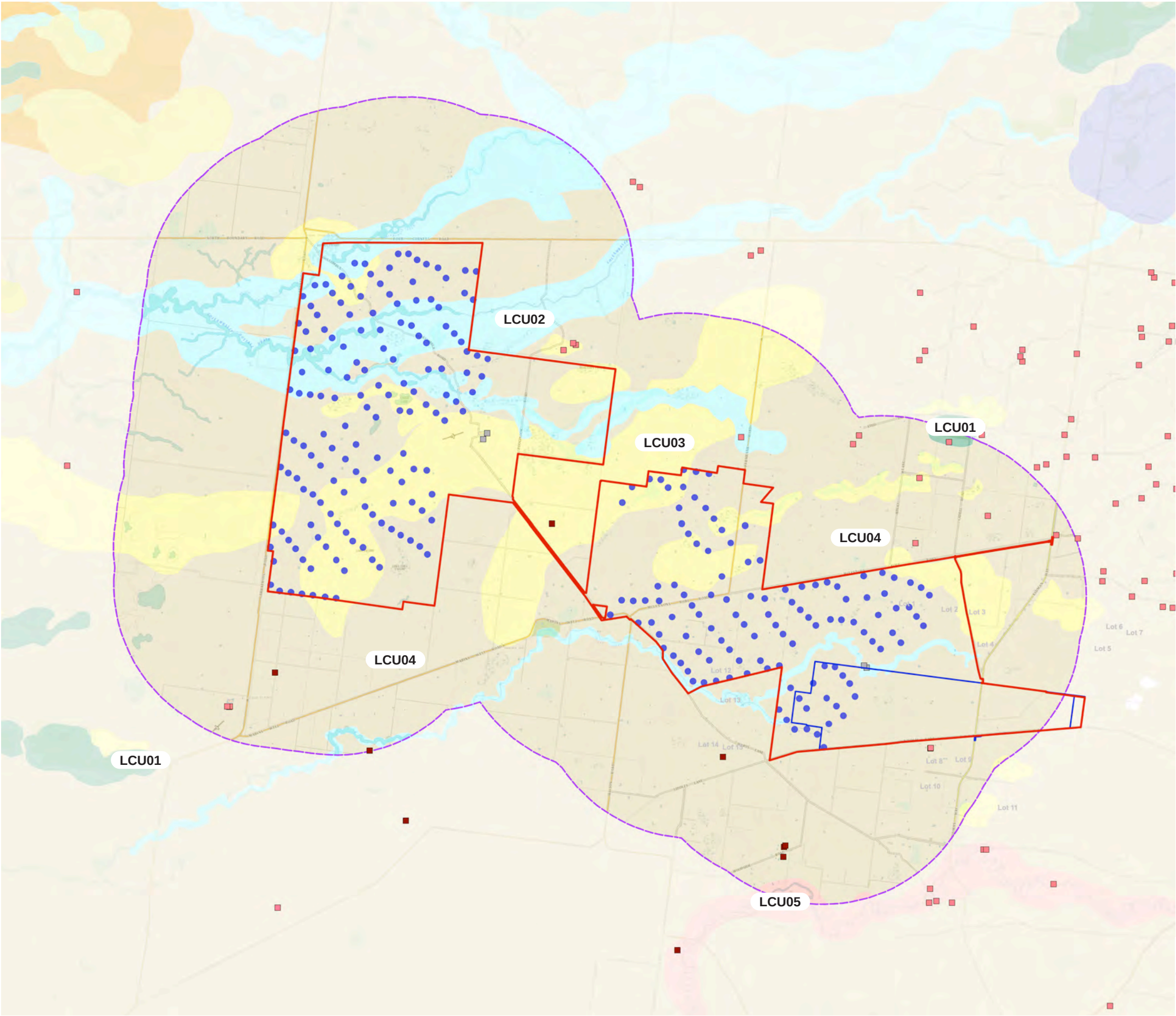
The Bulletin states: *the baseline study inputs, including key landscape features and sensitive land use designations, should lead to the identification of Scenic Quality Classes. Scenic quality refers to the relative scenic or aesthetic value of the landscape based on the relative presence or absence 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 LA (**Table 05**) utilising *An approach to landscape sensitivity assessment - to inform spatial planning and land management*, developed by Natural England. The 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 (summarised in **Table 06**) to determine a Scenic Quality Rating of **low**, **moderate** or **high**. The resulting Scenic Quality Rating is used to assist in defining the Visual Influence Zones in accordance with the Bulletin (refer to matrix in **Appendix A**).

SCENIC QUALITY RATING FRAME OF REFERENCE		
LOW	MODERATE	HIGH
		
LAND FORM		
- Flat topography - Absence of landscape features - Open, broad extents of spaces - Diversity in topographical range - Unique landscape features - Intimate spaces		
WATER FORMS		
- 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 05 – Scenic Quality Rating Frame of Reference



Landscape Character Units

Dinawan Wind Farm

LEGEND

- Project Area
- Proposed 280 m Turbine Location
- 8000 m from turbine (Study Area)
- Associated Dwelling
- Non-associated Dwelling
- Non-associated Dwelling (Associated with other project)

Landscape Character Units:

- LCU01. Grassy Woodlands
- LCU02. Seasonal Water Corridors
- LCU03. Swamps and Floodplains
- LCU04. Grassy Plains
- LCU05. Yanco Creek Environs



Figure 12 – Landscape Character Units
Image Source: ESRI, 2023



Image 16 – Southwest Woodland Nature Reserve



Image 17 – Typical view of the Coleambally Outfall Drain channel. Vegetation and topographic character are the predominant distinguishing factors. Image Source: Moir LA, 2022



Image 18 – Generally flat parcels with minor undulations. Characterised by red-brown earths and sparse to dense clumps of tree cover and grassy understorey. Image Source: Moir LA, 2022

LCU01: Grassy Woodlands

This LCU is characterised by dense woodlands of eucalypts and pines 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 Study Area. Grassy understorey generally comprises of saltbush and speargrass varieties.

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. Key seasonal waterbodies include Delta Creek and the Coleambally Outfall Drain.

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 occasionally white box communities. Key locations include Mortons Swamp, Gum Swamp, Jung Jung Swamp, Gum Lagoon, Bowna Swamp and Carse Lake. However, it is noted that these are not publicly accessible locations.



Image 19 – Large, open expanses of scrubby plant communities with isolated stands of trees over flat land parcels define the LCU's typical character. Image Source: Moir LA, 2022



Image 20 – Yanco Creek environs defined by dense tree cover and grey-brown cracking clays. Embankments are populated with willow trees and other native species for stabilisation. Image Source: Moir LA, 2022

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 is defined by the flat, cleared, open parcels used for sheep and cattle grazing. 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.

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 and acts as an important wildlife corridor. The Yanco Bridge Rest Area is located within this LCU.

Landscape Character Units											
LCU:	Name:	Key Landscape Features:	Key Viewpoints:	Application of Scenic Quality Rating Frame of Reference:							Scenic Quality Rating:
				Landform	Waterform	Vegetation	Human Influence	Activity	Rarity	Relationship with Adjoining Landscapes	
LCU01	Grassy Woodlands	Dense woodlands Grassy Understorey	South West Woodland Nature Reserve	H							LOW
				M							
				L							
LCU02	Seasonal Water Corridors	Gentle undulations Riparian vegetation	Coleambally Outfall Drain Delta Creek	H							MODERATE
				M							
				L							
LCU03	Swamps and Floodplains	Shallow depressions Riparian vegetation Minor undulations Rural lands	No public access Mortons Swamp Gum Lagoon Jung Jung Swamp Gum Swamp Bowna Swamp Carse Lake	H							LOW
				M							
				L							
LCU04	Grassy Plains	Open grasslands Flat topography Isolated stands of trees	No Public Access	H							LOW
				M							
				L							
LCU05	Yanco Creek Environs	Gently undulating embankments Dense clumps of willow trees	Yanco Creek Yanco Bridge Rest Area	H							MODERATE
				M							
				L							

Table 06 – Overview of Landscape Character Unit Scenic Quality Ratings

06

Preliminary Assessment Tools

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 C** of this LVIA.

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 13**.

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. The proponent must also map any existing or approved turbines within 8,000 m (purple line) of each dwelling or key public viewpoint.

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 reduce or eliminate the impacts of the Project from residences.

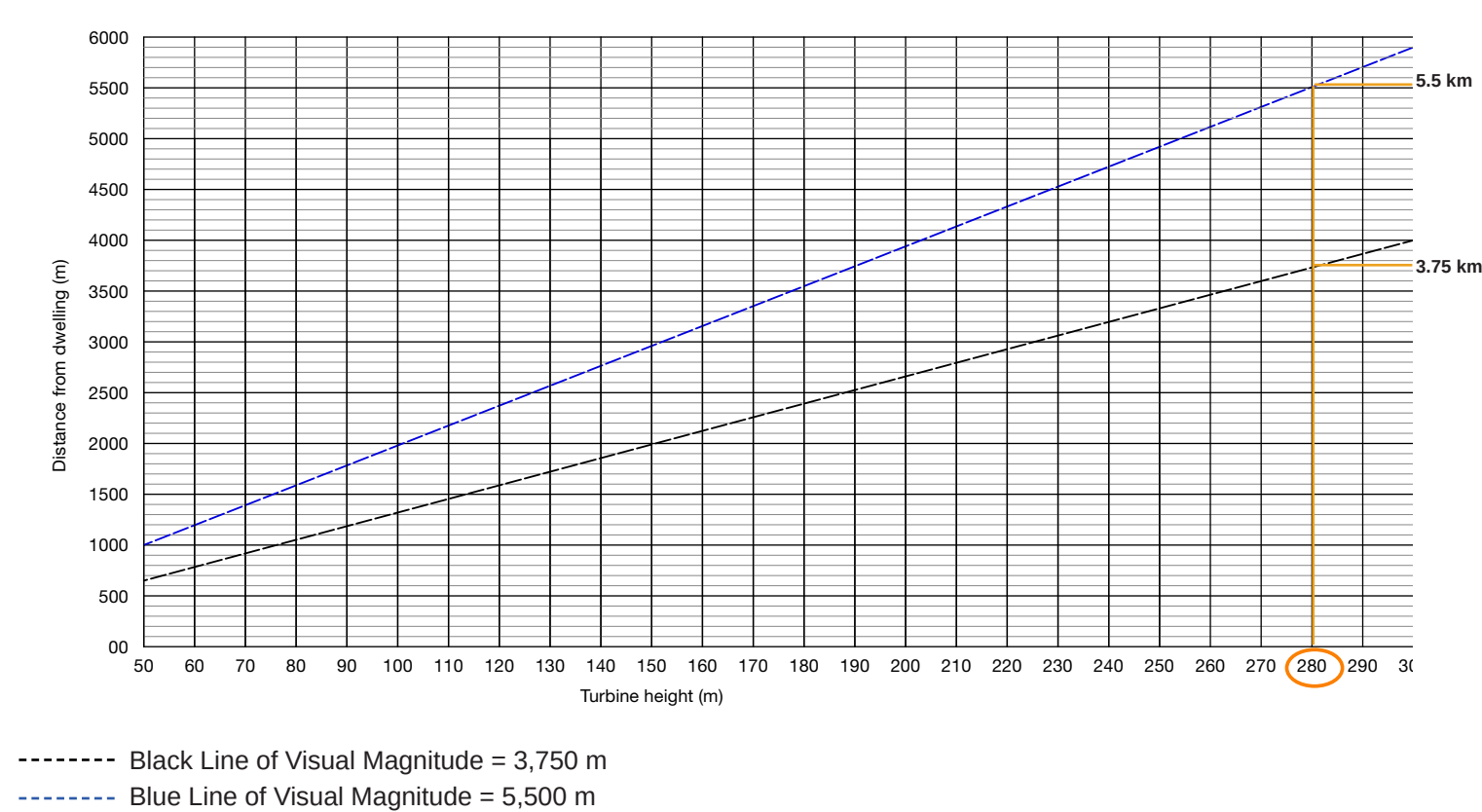
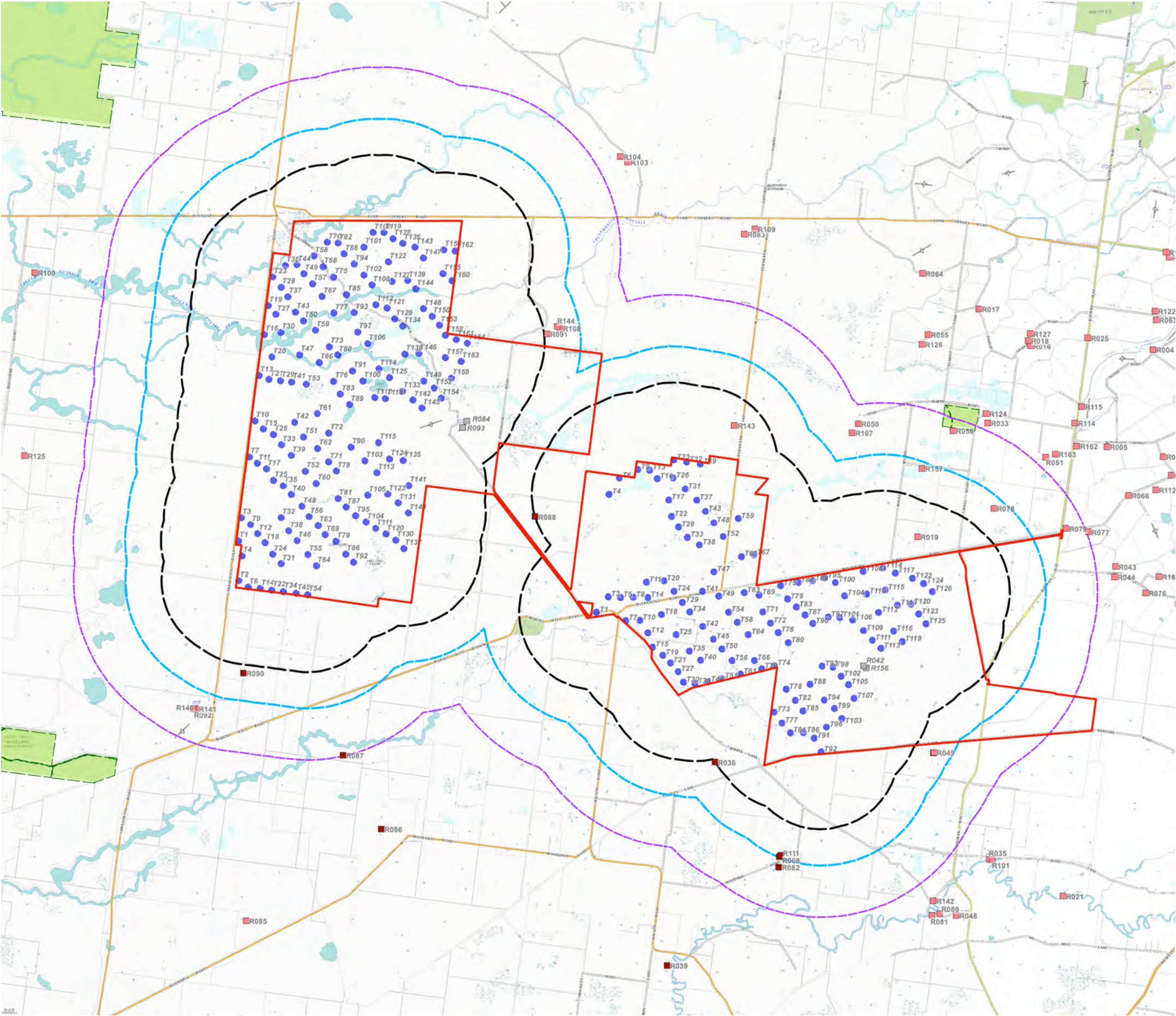


Figure 13 – Preliminary Assessment Tool 1: Visual Magnitude thresholds for Project Layout
Source: Visual Assessment Bulletin, 2016



Visual Magnitude

Dinawan Wind Farm

- LEGEND**
- Project Area
 - 3,750 m from turbine
 - 5,500 m from turbine
 - 8,000 m from turbine
 - Proposed 280 m Turbine Location
 - Associated Dwelling
 - Non-associated Dwelling
 - Non-associated Dwelling (Associated with other project)
 - Main Road
 - Minor Road
 - National Park / Nature Reserve
 - Creeks/Rivers

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.

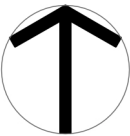


Figure 14 – Preliminary Assessment Tool 1: Visual Magnitude
Imagery Source: Six Maps, 2022

6.3 Results of Preliminary Assessment Tool 1: Visual Magnitude

Application of the Preliminary Assessment Tools to the Project identified dwellings which require further assessment in accordance with the Bulletin. A total of 22 non-associated dwellings have been identified within 8,000 m of the nearest turbine.

Non-associated dwellings identified within 8,000 metres of the nearest proposed turbine are shown on **Figure 14**.

Of the 22 non-associated dwellings identified within 8,000 m of the nearest turbine:

- *Four (4)* non-associated dwellings have been identified within 3,750 metres of a proposed wind turbine location (within the black line). Of these, *two (2)* are associated with another wind development.
- *Nine (9)* non-associated dwellings are located between 3,750 - 5,500 metres of a proposed wind turbine (within the blue line) . Of these, *three (3)* are associated with another wind development.
- *Nine (9)* non-associated dwellings are located between 5,500 - 8,000 metres of a proposed wind turbine (within the purple line). Of these, *two (2)* are associated with another wind development.

Refer to **Table 07** and **Table 08** for the findings of Preliminary Assessment Tool 1.

Detailed assessments of representative dwellings have been undertaken and are found in **Section 9.0** and detailed assessments have been provided in **Appendix C**.

Non-involved dwellings within 3,750 metres of nearest Turbine (Black Line of Visual Magnitude)				
Dwelling ID:	Distance to nearest Turbine:	Nearest turbine:	Number of turbines within 3,750 m:	Number of turbines within 5,500 m:
R019	2.03 km	T122	11	11
R036	3.75 km	T73	2	21
R143	2.49 km	T39	3	12
R088	3.75 km	T4	1	4

Table 07 – Dwellings within 3,750 m (Black Line of Visual Magnitude)

Non-involved dwellings between 3,750 - 5,500 metres of nearest Turbine (Blue Line of Visual Magnitude)			
Dwelling ID:	Distance to nearest Turbine:	Nearest turbine:	Number of turbines between 3750m - 5,500m:
R008	5.47 km	T92	1
R111	5.38 km	T92	1
R078	5.02 km	T124	3
R090	4.17 km	T14	7
R049	4.67 km	T107	6
R144	4.43 km	T164	4
R108	4.54 km	T164	3
R091	3.88 km	T164	8
R157	5.17 km	T114	3

Non-involved dwellings between 5,500 - 8,000 metres of nearest Turbine			
Dwelling ID:	Distance to nearest Turbine:	Nearest turbine:	Number of turbines between 5,900m - 8,000m :
R092	6.4 km	T6	8
R140	6.4 km	T6	8
R141	6.4 km	T6	8
R087	7.95 km	T54	1
R082	5.95 km	T92	9
R079	7.16 km	T126	3
R056	7.42 km	T122	5
R050	7.09 km	T114	9
R107	6.74 km	T114	15

Table 08 – Dwellings between 3,750 m - 5,500 m (Blue Line of Visual Magnitude) and between 5,500 m and 8,000 m of the nearest turbine

6.4 Preliminary Assessment Tool 2: Multiple Wind Turbine Tool

The Multiple Wind Turbine Tool (MWTT) provides a preliminary indication of potential cumulative impacts arising from the proposed wind energy project and surrounding Projects. The Bulletin states: *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 kilometres of each dwelling or key public viewpoint.* **Figure 15** provides examples of where a dwelling or key public viewpoint may have views to turbines in multiple 60° sectors.

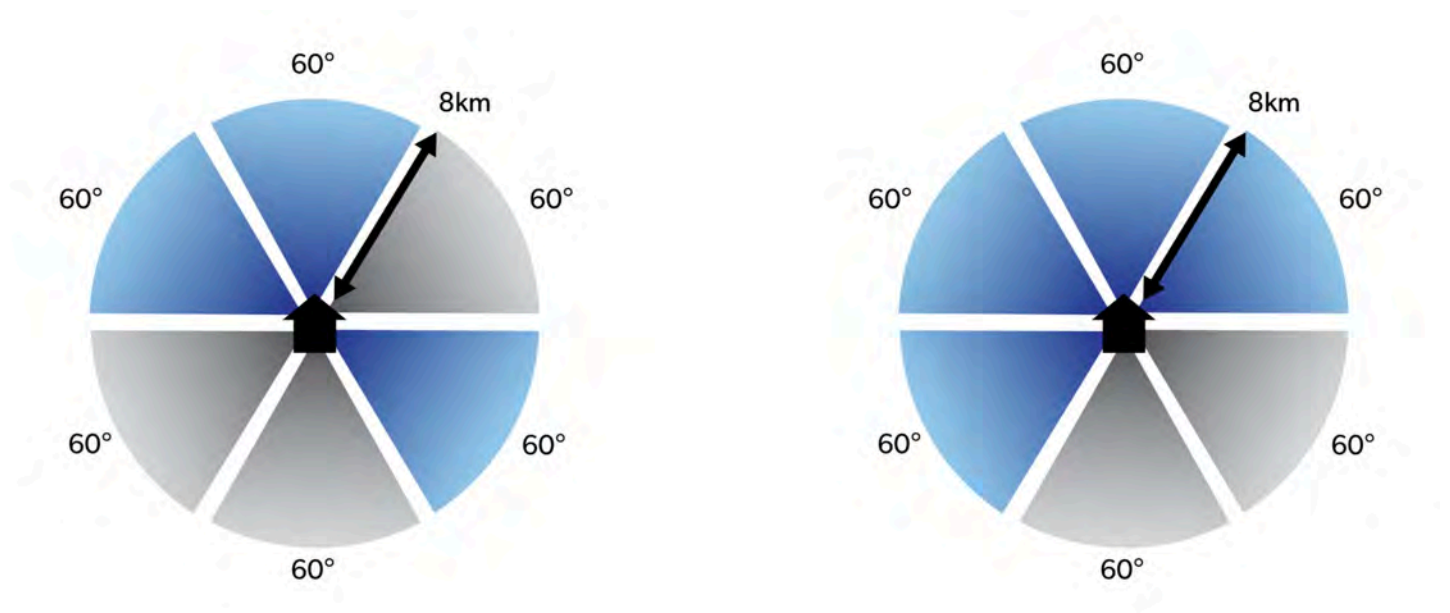


Figure 15 – Preliminary Assessment Tool 2: Multiple Wind Turbines
Source: Visual Assessment Bulletin, 2016

In accordance with the Bulletin where it states, *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 16 provides an overview of the number of 60° sectors visible from each of the dwellings identified within 8,000 m.

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

There are three (3) other proposed, approved, or operational wind farm projects within 8,000 m of the Project which require consideration when applying the MWTT. These include Yanco Delta Wind Farm (YDWF), Argoon Wind Farm (AWF) and Bullawah Wind Farm (BWF), refer to **Figure 16**.

The following summary is based on a 2D assessment and takes into account turbines associated with the Project, YDWF, AWF and BWF. The approach to the MWTT identifies those dwellings which are non-associated with the Project and those that are non-associated with the Project but associated with another surrounding project. The sectors occupied by turbines which form part of the associated project are then removed from the overall MWTT totals. Further details relating to the cumulative MWTT are shown in **Table 19** of **Section 13.0**.

When applied, the 2D MWTT identified that nine (9) of the 22 non-associated dwellings within 8,000 m of the Project will have views of turbines associated with the Project and the surrounding wind farms in three (3) or above 60 degree sectors. The remaining 13 non-associated dwellings will have turbines within up to two (2) 60 degree sectors, which is deemed acceptable in accordance with the Bulletin.

Of the nine (9) non associated dwellings with wind farms in three (3) or above 60 degree sectors:

- Seven (7) non-associated dwellings have been identified as having the potential for views in up to three (3) 60 degree sectors; and
- Two (2) non-associated dwellings (R088 and R036) were identified as having the potential for views in up to four (4) 60 degree sectors.

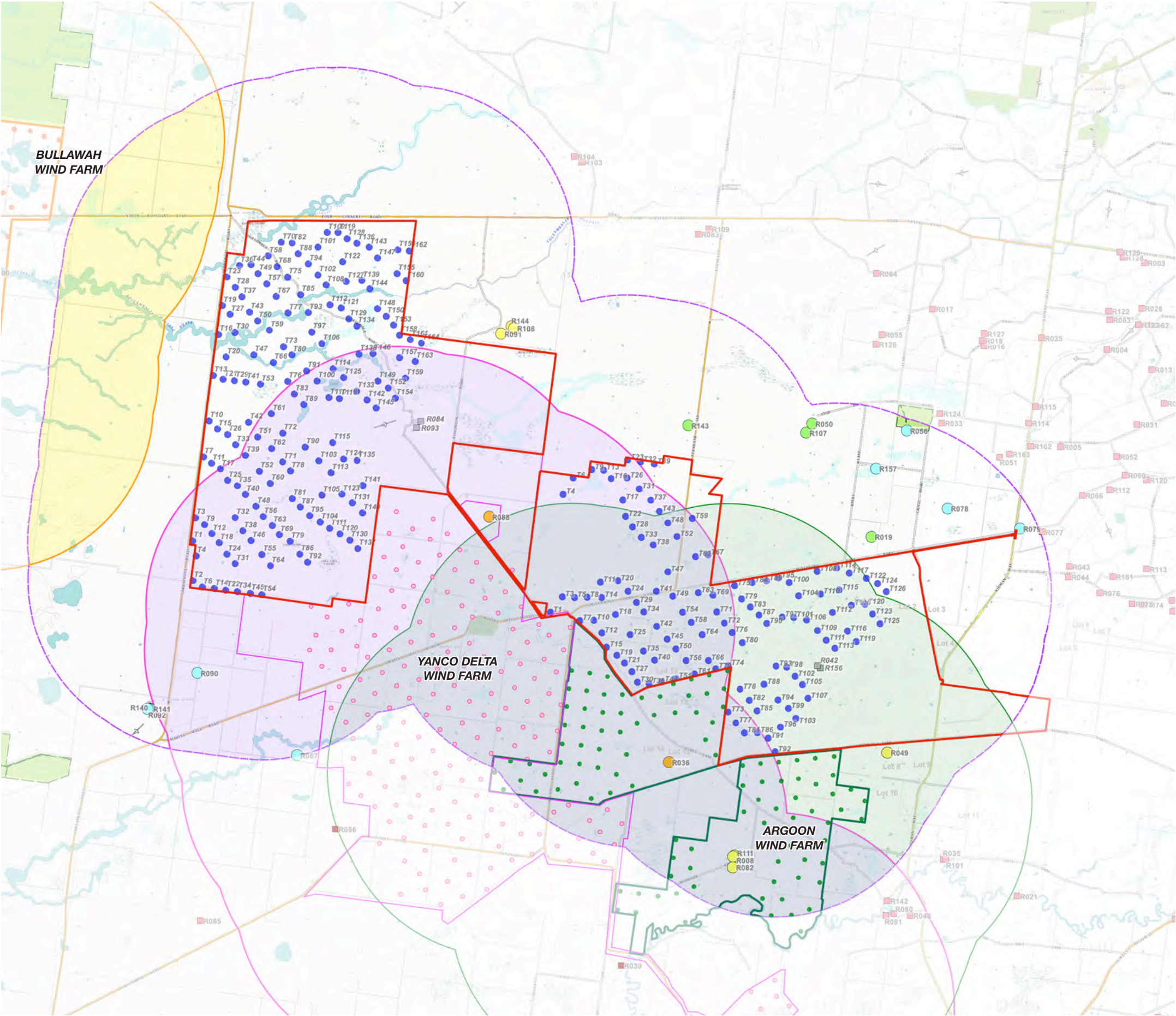
Dwellings with turbines in up to three (3) 60 degree sectors:

- Seven (7) non-associated dwellings have been identified as having the potential for views in up to three (3) 60 degree sectors visible (based on a 2D assessment alone), these include R049, R082, R008, R111, R144, R108 and R091).
- Of the three (3) 60° sectors, up to two (2) 60° sectors are occupied by the Project with the remaining occupied by either YDWF or AWF for R049, R082, R008 and R111. It is noted that R082, R008 and R111 are all associated with AWF, which occupies up five (5) 60° sectors (up to 300°) alone.
- All three (3) of the occupied 60° sectors are associated with the Project from R091, R144 and R108. Aerial imagery, and onsite photography suggests that existing vegetation and farm structures are likely to reduce the visibility of the Project from these three (3) dwellings.

Dwellings with turbines in up to four (4) 60 degree sectors:

- Two (2) non-associated dwellings (R088 and R036) were identified as having the potential for views in up to four (4) 60 degree sectors (based on a 2D assessment alone).
- R088 is associated with the YDWF which occupies up to two 60° sectors (up to 120°). Further assessment shows that existing vegetation will assist in reducing the number of sectors from this dwelling.
- R036 is associated with AWF which occupies up to six (6) 60° sectors (up to 360°) alone. The Project occupies up to two (2) 60° sectors and YDWF also occupies up to two (2) 60° sectors, these are all shared with AWF. Further assessment shows that existing vegetation and farm infrastructure surrounding the dwelling located to will reduce the number of sectors occupied.

In accordance with the Bulletin, non-associated dwellings within 8,000 m of the nearest turbine have been assessed in further detailed in **Appendix C** and **Section 9.0**. Further details relating to cumulative impacts have been addressed in **Section 13.0**.



Multiple Wind Turbine Tool

Dinawan Wind Farm

- LEGEND**
- Project Area
 - 8,000 m from nearest turbine
 - Proposed 280 m Turbine Location
 - BWF Turbine Location
 - YDWF Turbine Location
 - AWF Turbine Location
 - Area within 8,000 m of BWF and the Project
 - Area within 8,000 m of YDWF, AWF and the Project
 - Area within 8,000 m of YDWF and the Project
 - Area within 8,000 m of AWF and the Project
 - Main Road
 - Minor Road
 - Creeks/Rivers

- NON-INVOLVED DWELLINGS**
NUMBER OF 60° SECTORS:
- One (1) 60° Sector (60°)
 - Up to Two (2) 60° Sectors (120°)
 - Up to Three (3) 60° Sectors (180°)
 - Up to Four (4) 60° Sectors (240°)

Figure 16 – Preliminary Assessment Tool 2: Multiple Wind Turbine Tool
Imagery Source: Six Maps, 2022

07

Zone of Visual Influence

7.0 Zone of Visual Influence

7.1 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 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.'

Two (2) Zone of Visual Influence (ZVI) diagrams have been prepared for the Project to illustrate the theoretical visibility of the proposed turbines.

Figure 17 depicts the areas of land from which the proposed development may be visible at a blade tip height of 280 m and provides an indicative number of visible wind turbines.

Figure 18 depicts the areas of land from which the proposed turbines would theoretically be visible from a hub height of 180 m.

The ZVI Diagram 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. It is also referred to as a zone of theoretical visibility (The Landscape Institute and the institute of Environmental Management and Assessment, 2002).

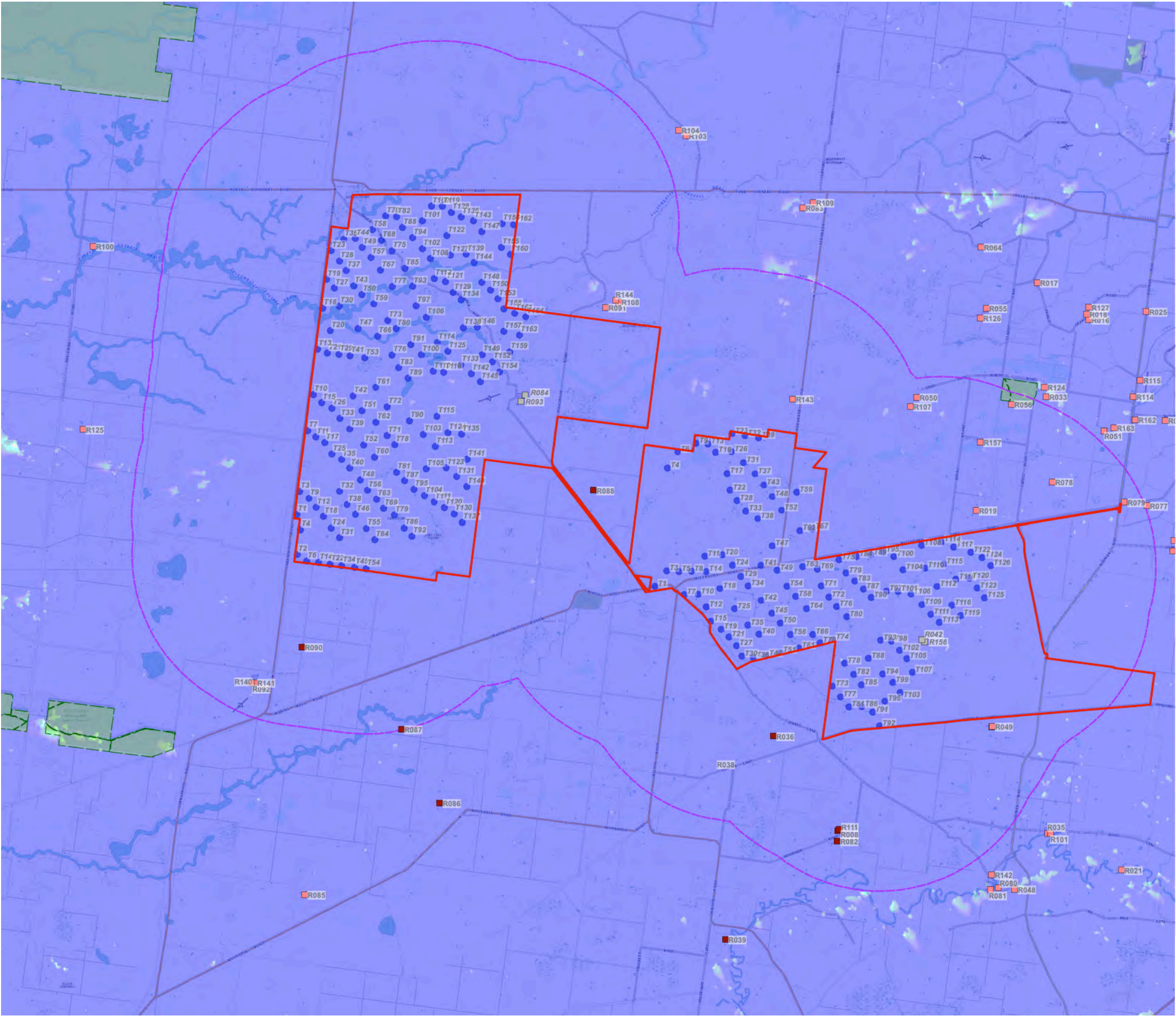
The ZVI has been determined through the use of digital topographic information and 3D modelling software WindPro. The ZVI has been assessed to approximately 10 km from the Project. Although it is possible for the development to be visible from further than 10 km away, it is generally accepted that beyond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

7.2 Summary of Zone of Visual Influence

The following provides a brief summary of the ZVI diagrams prepared for Project:

- Due to the flat topography that characterises the landscape, the Project will likely be visible from majority of locations within the Study Area.
- Yanco Creek to the Project's south and offers pockets of lower visibility as well as some areas along Four Corners Road to the Project's northeast.
- Pockets of low visibility are also identified directly west and in the Southwest Woodland Nature Reserve to the Project's southwest.

It is important to reiterate this is a preliminary ZVI is based on a worst case scenario assessment with no vegetation or structures. The ZVI figures have been utilised to identify areas which require additional analysis. Ground truthing has been undertaken from these locations during the field work analysis. Public viewpoint locations with potential to view the Project have been assessed and are presented in **Section 8.0**



Zone of Visual Influence

Blade Tip Height: 280 m

Dinawan Wind Farm

LEGEND

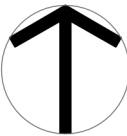
- Project Area
- 8,000 m from turbine
- Proposed 280 m Turbine Location
- Associated Dwelling
- Non-associated Dwelling
- Non-associated Dwelling (Associated with other project)
- Main Road
- National Park / Nature Reserve

ZVI Number of Visible Turbines (at tip height):

- 0
- 1 - 90
- 90 - 180
- 180 - 267

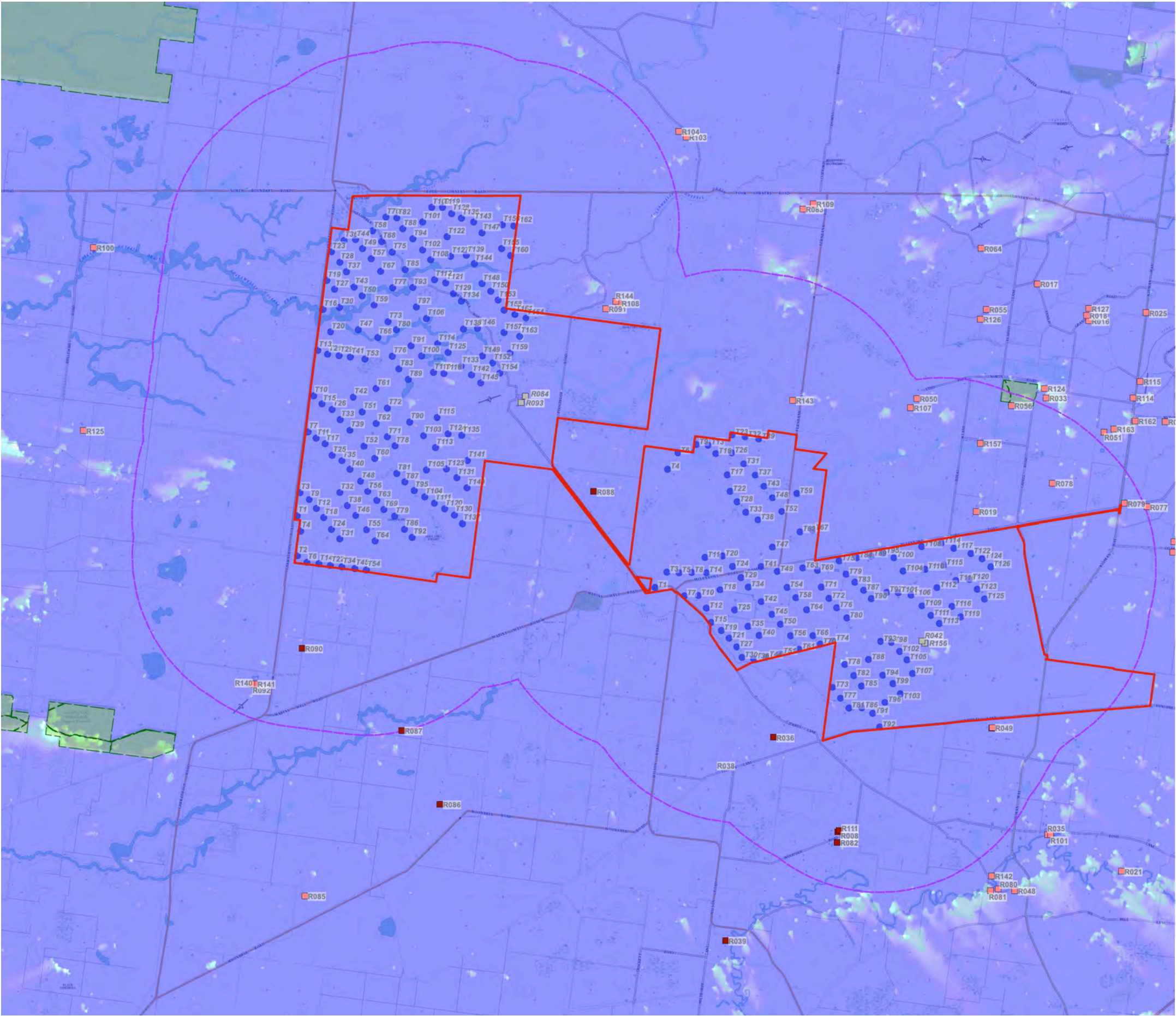
Note:

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.



0 2 4 6 8 10km

Figure 17 – Zone of Visual Influence (Blade Tip Height 280 m)



Zone of Visual Influence

Hub Height: 180 m

Dinawan Wind Farm

LEGEND

- Project Area
- 8,000 m from turbine
- Proposed 280 m Turbine Location
- Associated Dwelling
- Non-associated Dwelling
- Non-associated Dwelling (Associated with other project)
- Main Road
- National Park / Nature Reserve

ZVI Number of Visible Turbines (at hub height):

- 0
- 1 - 90
- 90 - 180
- 180 - 267

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.

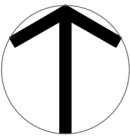


Figure 18 – Zone of Visual Influence (Hub Height 180 m)

08

Public Viewpoint Analysis



8.0 Public Viewpoint Analysis

8.1 Overview of Public Viewpoint Analysis

In accordance with the Bulletin ‘*all key public viewpoints and individual dwellings within the ‘visual catchment’ should be identified and assessed*’.

A total of 25 viewpoints were taken from public locations during the field work process. Viewpoints have been carefully selected to be representative of the range of views within the Study Area. The selection of viewpoints is generally informed by the topographical maps, field work observations and other relevant influences such as access, residences, landscape character and the popularity of vantage points. Viewpoints are selected to illustrate a combination of the following;

- viewpoints identified by the community in community consultation phase of scoping paper,
- present landscape character types,
- areas of potentially high landscape or scenic value,
- range of distances,
- varying aspects and elevations,
- varying extent of wind farm visibility (full and partial visibility), and
- sequential views along specific routes.

It is important to note that viewpoints for this LVIA study have been taken predominantly accessible public land (typically walking tracks, roads and lookouts) which were identified as having a potentially high visual impact through the desktop review process.

The viewpoint locations assessed for the Project have included key viewpoints identified through the extensive community engagement throughout the process. These include Yanco Bridge Rest Area, located approximately 9 km southeast of the Project, Oolambeyan Homestead Picnic Area located approximately 23 km northwest of the Project and South West Woodland Nature Reserve located approximately 8 km to northeast of the Project Area

Selected viewpoint assessment locations are shown on **Figure 20**.

8.2 Public Viewpoint Analysis Methodology

Once the viewpoints had been selected, panoramic photographs are taken in accordance with the standards outlined in the Scottish Natural Heritage Visual Representation of Wind Farms Guidance Version 2.2.

Photographs used for viewpoints are taken on a level tripod at a height of 150 cm (to represent eye level). Photographs were taken with a Canon EOS 5D Mark III Full Frame digital SLR through a 50mm fixed focal lens which closely represents the central field of vision of the human eye. Parameters for the photography are provided in **Table 09**.

The visual impact of the viewpoint was assessed both on site and through a desktop assessment utilising with the topographic and aerial information to ensure accuracy.

The locations of the viewpoints have been identified in **Figure 20** and the general viewing direction of each viewpoint is identified on the map on each viewpoint.

Viewpoint analysis prepared for the Project from public locations has been included as Appendix B.

Photography Specifications:	
Camera Make and Model:	Canon EOS 5D Mark IV Full Frame Digital SLR
Lens:	EF50mm f/1.2L USM
Focal Length:	50mm f/0
Aperture Setting:	f/6.3 - 10
Tripod Height:	150cm

Table 09 – Photography Specifications

8.3 Visual Influence Zone (VIZ)

Visual Influence Zones have been established from the Project Area from dwellings and key viewpoints. This establishes the relative landscape significance against which the potential impacts of wind turbines may be assessed. The Visibility Distance Zone, Viewer Sensitivity Level and Scenic Quality Class of each viewpoint have been assessed which, when combined, result in an overall Visual Influence Zone (see **Figure 19** below and refer to tables in **Section 17.0**). An evaluation using the corresponding visual performance objectives (Table 2 of the Visual Assessment Bulletin) has been included for each viewpoint.

For each viewpoint, the potential visual impact was analysed through the use of a combination of the 3D terrain modelling, topographic maps and on site analysis.

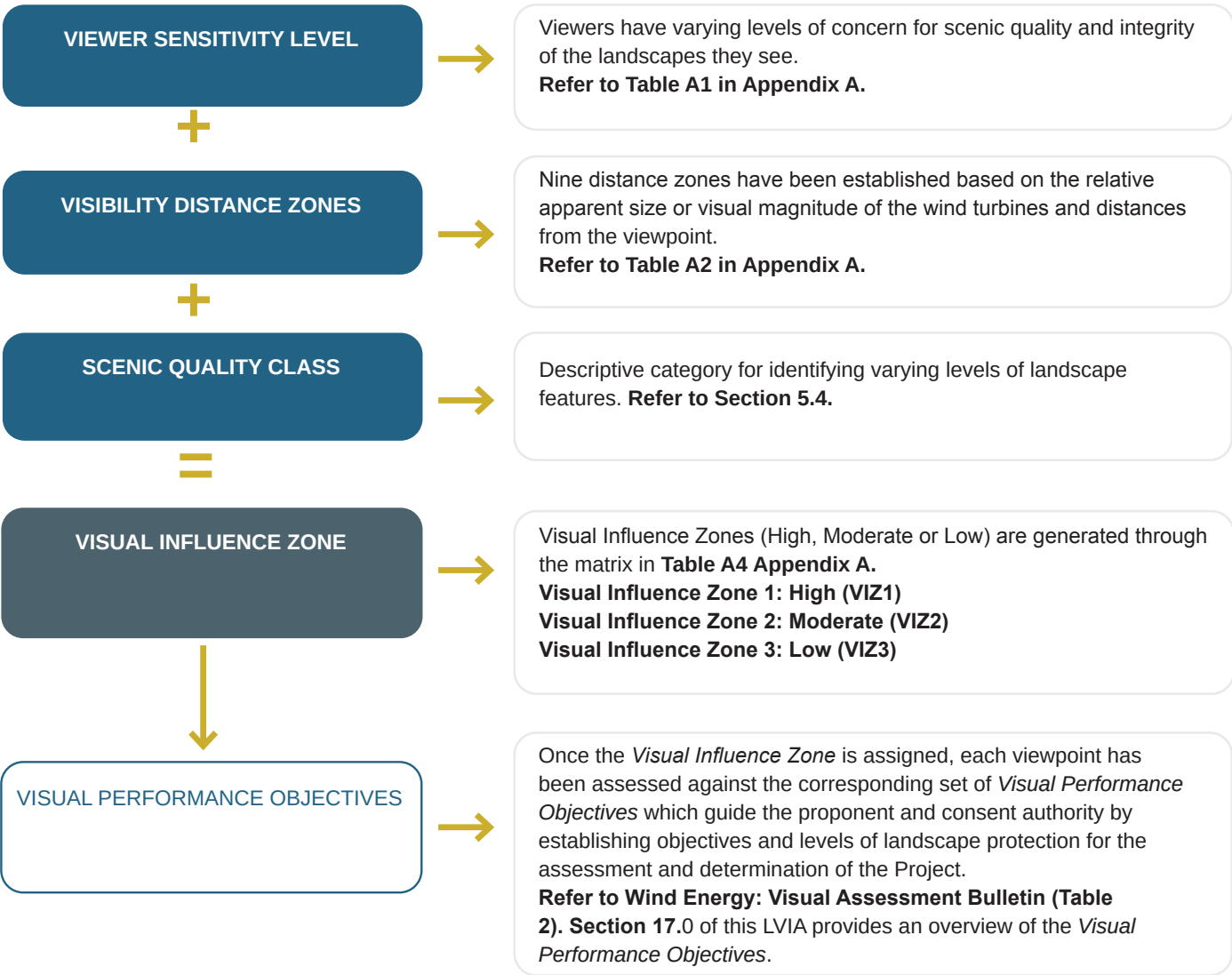
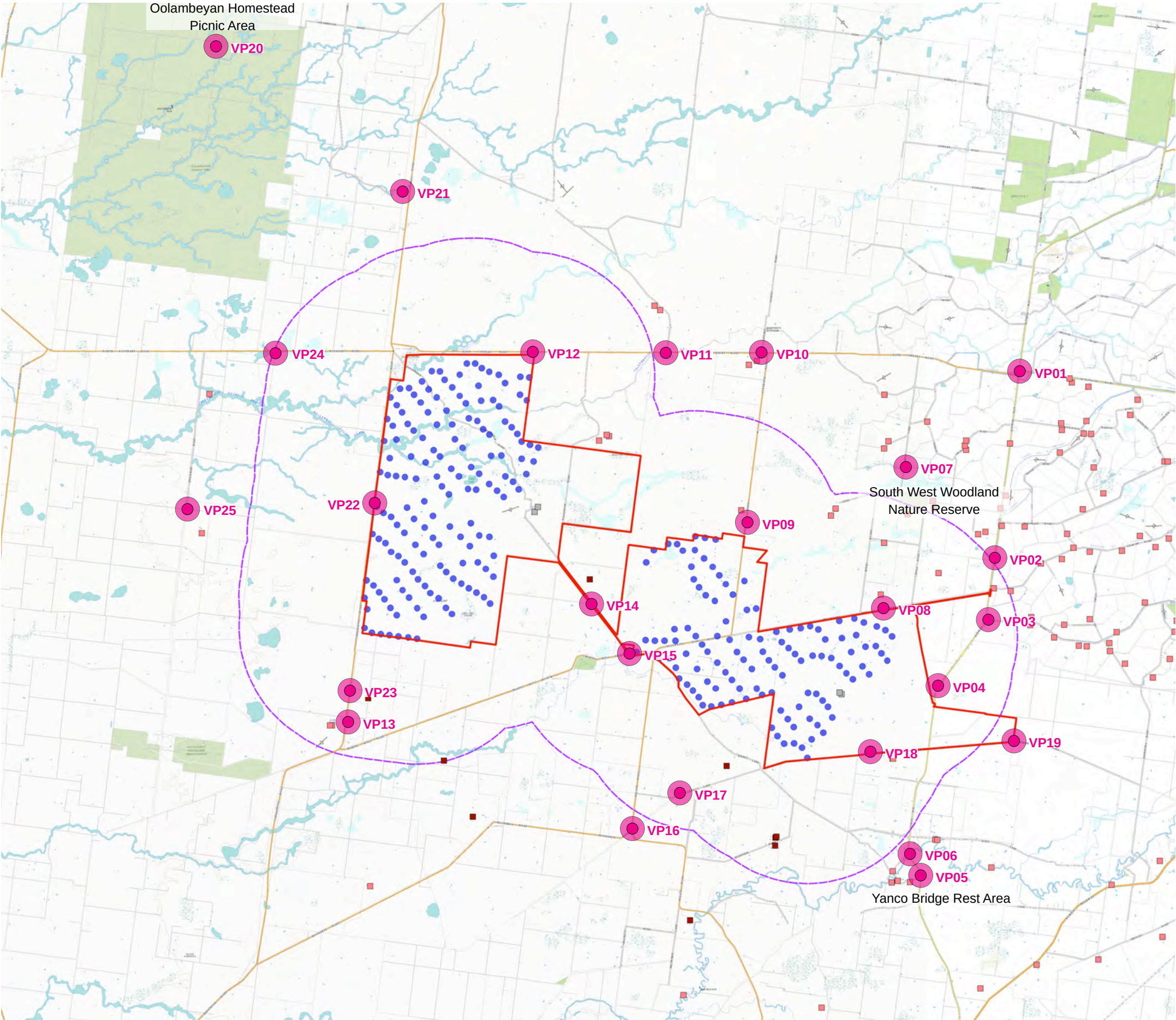


Figure 19 – Methodology for determining Visual Influence Zone (VIZ)



Public Viewpoint Analysis Locations

Dinawan Wind Farm

- LEGEND**
- Project Area
 - 8,000 m from turbine
 - Proposed 280 m Turbine Location
 - Main Road
 - Minor Road
 - National Park / Nature Reserve
 - Creeks/Rivers
 - Viewpoint Locations

Figure 20 – Public Viewpoint Analysis Locations
Imagery Source: Six Maps, 2022

8.4 Summary of Public Viewpoint Analysis

The 25 public viewpoints assessed for the purpose of this LVIA were taken from varying distances and locations surrounding the Project.

Each viewpoint was assigned a Visual Influence Zone (VIZ) based on its Viewer Sensitivity Level, Visibility Distance Zone and Scenic Quality Class combinations (refer to the methodology in **Section 17.0**). In accordance with the objectives of the Bulletin, each viewpoint was assessed against the objectives for the VIZ. The following provides a brief overview of the viewpoint analysis (refer to **Appendix B**).

The Visual Influence Zone (VIZ) was identified for 25 key viewpoint locations within the Study Area and where required the landscape scenic integrity was assessed in accordance with the relevant visual performance objectives. Of the 25 viewpoint locations assessed, 23 locations were rated as being Visual Influence Zone 3 (VIZ3).

Photomontages have been undertaken from three (3) public viewpoints (VP06, VP15 and VP22) to illustrate the potential visual impacts refer to **Section 9.0** and **Appendix D**.

Visual Influence Zone 2 (VIZ2):

Two (2) public viewpoints were assessed as being Visual Influence Zone 2 (VIZ2) due to the close proximity to the Project. These include VP15 and VP22. Both viewpoints are taken from a local road which has a low viewpoint sensitivity. The Project was assessed as being a dominant element in the landscape from both of the public viewpoint locations due to the close proximity, however no key landscape features are anticipated to be disrupted by the Project. It is also noted that views in up to two (2) 60 degree sectors (120 degrees) are likely to be available from VP15, which is deemed acceptable in accordance with the Bulletin. It is likely that views in up to three (3) 60 degree sectors (180 degrees) are will be available from VP22.

Photomontages have been prepared from these locations, refer to PM12 and PM14a and PM14b of **Appendix D Photomontages and Wireframes**.

Visual Influence Zone 3 (VIZ3):

23 public viewpoint locations were rated as VIZ3 in accordance with the methodology in the Bulletin. There are no performance objectives for VIZ3 rated viewpoints. This includes Oolambeyan Homestead Picnic Area (VP20), South West Nature Reserve (VP07) and Yanco Delta Rest Area (VP06). Existing vegetation is likely to screen views toward the Project from Oolambeyan Homestead Picnic Area and South West Nature Reserve. Existing vegetation in the foreground of the view from VP06 is likely to screen views from and Yanco Bridge Rest Area. A photomontage has been prepared from VP06, refer PM13 of **Appendix D Photomontages and Wireframes**.

In accordance with the Bulletin, no visual performance objectives apply to viewpoints rated VIZ3.



09

Dwelling Assessments

9.0 Dwelling Assessments

9.1 Overview of Dwelling Assessment

9.1.1 Dwelling Assessment Requirements

The Bulletin states: *all key public viewpoints and individual dwellings within the ‘visual catchment’ should be identified and assessed.*

The SEARs state the LVIA must include: *a detailed consideration of potential visual impacts on local residences (including approved developments, lodged development applications and dwelling entitlements).*

Non-involved Dwellings:

The Preliminary Assessment Tools (**Section 6.0**) defined the ‘visual catchment’ and identified non-involved residences within the Study Area which require further assessment. These include:

- *Four (4)* non-associated dwellings have been identified within 3,750 metres of a proposed wind turbine location (within the black line).
- *Nine (9)* non-associated dwellings are located between 3,750 - 5,500 metres of a proposed wind turbine (within the blue line).
- *Nine (9)* non-associated dwellings are located between 5,500 - 8,000 metres of a proposed wind turbine (within the purple line).

9.2 Study Method for Dwelling Assessments

In accordance with the Bulletin *‘sensitive receptors have been identified through the use of the preliminary assessment tools’*. As a result, Moir LA have undertaken detailed assessment for these sensitive dwelling receptors.

Moir LA offered on site dwelling assessments for all non-associated dwellings within 8,000 m of the nearest turbine. In the instances where access was not granted or communication difficulties occurred, an assessment using wireframes and aerial imagery was conducted.

The Visual Assessment Bulletin states: *where relatively close clustering of houses belonging to different landowners or occupants occur, representative viewpoints may be selected and assessed in lieu of every single dwelling in the following types of areas:*

- *rural residential clusters;*
- *rural villages; and*
- *urban residential and commercial areas.*

The Bulletin states: *The black and blue lines are not determinative of acceptability. Instead, they provide a basis for the assessment to be undertaken. There may be reasons why the proposed turbine will not have the impact as identified by (the visual magnitude thresholds) and detailed justification can be provided for proposed turbines... for example ground truthing may identify that existing vegetation or topography will screen views to a proposed turbine’.*

Dwelling assessment locations are shown on **Figure 21**.

Table 10 provides an overview of the study method for undertaking the dwelling assessment for each dwelling identified within the visual catchment.

Study Method	Process
Step 1: Application of Preliminary Assessment Tools	Preliminary Assessment Tools were applied in accordance with the Bulletin from each dwelling to assess the following two parameters: - Visual Magnitude (identify the number of turbines within blue and black lines) - Multiple 60° Sector Assessment (identify the number of 60° sectors based on a 2D assessment).
Step 2. 3D Assessment (based on topography alone)	Using 3D modelling, Moir LA identified turbines which will not be visible from the dwelling due to topography. As a result the extent of visibility is generally decreased when compared to the 2D assessment. The application of the Preliminary Assessment Tools are updated to account for 3D modelling.
Step 3. Aerial Imagery	Information on the extent of visibility extracted from the 3D model is then overlaid onto a recent aerial image of the dwelling and its surrounds. This provides a detailed assessment of the direction and extent of potentially visible turbines and identifies any intervening elements (such as structures, wind break planting or vegetation) which may reduce the potential visibility.
Step 4. Site Inspection	Where access was granted, Moir LA attended the property to undertake a site inspection to ground truth potential screening factors that were identified on aerial imagery. This included photographic assessment from the dwelling. During the site inspection Moir LA identified potential intervening elements including vegetation and structures.
Step 5: Photomontage / Wire Frame Diagrams	Where potential impacts were identified, photomontages or wire frame diagrams were prepared from dwellings to represent those with potential impacts or to best represent the appearance of the Project from clusters of dwellings.
Step 6. Evaluation of VIZ Objectives	In accordance with the Bulletin, the Visual Influence Zone was defined and the relevant objectives were evaluated for each dwelling based on the assessment.
Step 7. Visual Impact Rating	A visual impact rating is applied to each dwelling with regards to the parameters outlined in Section 9.3 (Table 11).
Step 8. Consideration of mitigation methods	For non-associated dwellings where by the Project has the potential to cause visual impact, mitigation methods have been suggested. Refer to Section 16.

Table 10 – Dwelling Assessment Process

9.3 Visual Impact Rating Methodology

The Bulletin states: *The Department adopts the widely accepted and commonly utilised approach that visual impact can be determined from a combination of receiver sensitivity and the magnitude of visual effect. This approach is documented in numerous Australian and international guidelines, and is considered to be industry best practice.*

In addition to assessing against the visual performance objectives outlined in the Bulletin, Moir LA have developed a framework for defining and rating the level of visual impact from each dwelling.

The framework in **Table 11** has been prepared with regards to the third edition of the Guidelines for Landscape and Visual Impact Assessment (GLVIA3), Residential Visual Amenity Assessment (RVAA) and Moir LA’s extensive professional experience in undertaking LVIA’s for wind energy projects.

Published in 2013, the GLVIA3 is well established as providing ‘best practice guidance’ when undertaking LVIAs. RVAA is a stage beyond LVIA and focusses exclusively on private views and private visual amenity. Considerations outlined in the RVVA which provide a framework for describing and evaluating the predicted magnitude of visual change and related visual amenity effects include:

- Distance of property from the proposed development having regard to its size / scale and location relative to the property (e.g. on higher or lower ground);
 - Type and nature of the available views (e.g. panoramic, open, framed, enclosed, focused etc.) and how they may be affected, having regard to seasonal and diurnal variations;
 - Direction of view / aspect of property affected, having regard to both the main / primary and peripheral / secondary views from the property;
 - Extent to which development / landscape changes would be visible from the property (or parts of) having regard to views from principal rooms, the domestic curtilage (i.e. garden) and the private access route, taking into account seasonal and diurnal variations;
 - Scale of change in views having regard to such factors as the loss or addition of features and compositional changes including the proportion of view occupied by the development, taking account of seasonal and diurnal variations;
 - Degree of contrast or integration of new features or changes in the landscape compared to the existing situation in terms of form, scale and mass, line, height, colour and texture, having regard to seasonal and diurnal variations;
 - Duration and nature of the changes, whether temporary or permanent, intermittent or continuous, reversible or irreversible etc.; and
 - Mitigation opportunities – consider implications of both embedded and potential further mitigation.
- (Source: RVVA, 2019).

VISUAL IMPACT RATING - RESIDENCES				
	NEGLIGIBLE	LOW	MODERATE	HIGH
Distance	The project may be partially visible but very difficult to discern due to distance and / or intervening elements.	Turbines may be visible in distance or very partially visible in the foreground.	Turbines maybe visible in the middle ground or a small number may be visible in the near ground.	Turbines are highly visible in the foreground.
Type of views		Views from the dwelling are not focused on the Project.	Views from the dwelling are not focused entirely on the Project.	Views are focused directly towards the Project.
Direction of view		The Project may be visible in peripheral views or form a very minor element in primary views.	The Project may be visible from, yet will not dominate primary views.	The Project will be highly visible and has the potential to be a dominant element in primary views from the property.
Extent of visibility		The Project may be partially visible or fragmented.	The Project may be visible from the dwelling yet will not significantly alter the existing visual character.	The Project has the potential to significantly alter the existing visual character when viewed from the dwelling.
Scale of change		The Project may be visible yet will not change to the existing visual character.	The Project has the potential to become a noticeable element in the view, yet will not overly diminish the existing visual character.	The Project has the potential to alter the existing visual character.
Degree of contrast		The Project will have a low level of contrast with the existing landscape.	The Project will result in a moderate level of contrast with the existing landscape.	The scale of the Project will result in a high level of contrast with the existing landscape.
Duration of change		Changes are temporary.	Changes to the landscape have the potential to be reduced over time (with the employment of mitigation methods).	Changes to the landscape are continuous and / or irreversible.
Mitigation Options		Existing screening factors contribute to reducing the potential visibility.	Some existing screening factors may contribute to fragmenting the Project or there is opportunity to screen the Project.	Limited opportunities to screen the Project.

Table 11 – Visual Impact Rating Methodology - Residences

9.4 Summary of Dwelling Assessment

An overview of the visual assessment for each of the representative dwellings and detailed assessments have been included in **Appendix C**. The following provides a summary of the assessment and proposed recommendations in accordance with the Bulletin.

9.4.1 Dwellings within 3,750 metres of the nearest turbine

A total of four (4) non-associated dwellings were identified within 3,750 metres of a proposed turbine. Detailed dwelling assessment have been undertaken for all four (4) non-associated dwellings within 3,750m of the nearest turbine, refer **Table 12** and **Appendix C**.

Of the four (4) non-involved dwellings within 3,750 m the assessment found:

- One (1) were rated as having a negligible visual impact rating (R036)
- Two (2) were rated as having a low visual impact rating (R143 and R088)
- One (1) was assessed as having a high visual impact rating (R19)

All non-associated dwellings located within 3,750 m of the nearest turbine were assessed as being Visual Influence Zone 2 (VIZ2). In accordance with the Bulletin, objectives for VIZ2 receptors within the black line (3,750 m) of the nearest turbine are to: *Manage impacts as far as practicable, justify residual impacts*.

Practical and feasible mitigation measures have been recommended for R19 which has the potential for a high visual impact rating. The proposed mitigation measures would reduce the level of visual impact and once established, it is anticipated the residual impacts would be acceptable.

9.4.2 Dwellings between 3,750 - 5,500 metres of the nearest turbine

A total of nine (9) non-associated dwellings were identified within 3,750 - 5,500 metres of a proposed turbine. Detailed dwelling assessments have been undertaken for seven (7) non-associated dwellings within the 3,750- 5,500 metres of the nearest turbine, refer **Table 13** and **Appendix C**.

Of the nine (9) non-associated dwellings were identified within 3,750 - 5,500 metres the assessment found:

- Five (5) were assessed as having negligible visual impact rating
- Four (4) were assessed as having a low visual impact rating.

One (1) non-associated dwelling (R091) was identified as located between 3,750 m - 5,500 m of the nearest turbine and assessed as being Visual Influence Zone 2 (VIZ2). In accordance with the Bulletin, objectives for VIZ2 receptors between the black line (3,750 m) and blue line (5,500 m) of the nearest turbine are to: *Consider screening between the blue line and the black line*. Existing screen factors for dwellings between the blue and black line are considered to be sufficient in screening views toward the Project. As such, no visual impacts above a low rating were observed for dwellings between the blue and black line. As a result, no mitigation measures have been recommended in accordance with the Bulletin.

9.4.3 Dwellings between 5,500 metres and 8,000 metres of the nearest turbine

A total of nine (9) non-associated dwellings were identified between 5,500 m and 8,000 m of a proposed turbine.

Of the nine (9) non-associated dwellings between 5,500 m and 8,000 m, the assessment rated as the following, refer **Table 14** and **Appendix C**:

- Four (4) non-associated dwellings as having low visual impact rating
- Five (5) non-associated dwellings as having a negligible visual impact rating

All nine (9) non-associated dwellings located between 5,500 m and 8,000 m of the nearest turbine were assessed as being Visual Influence Zone 3 (VIZ3). Based on topography alone, all nine (9) of the dwellings had up to two (2) 60 sectors occupied by the Project, which is deemed acceptable in line with the Bulletin. As a result, no mitigation measures have been recommended in accordance with the Bulletin.

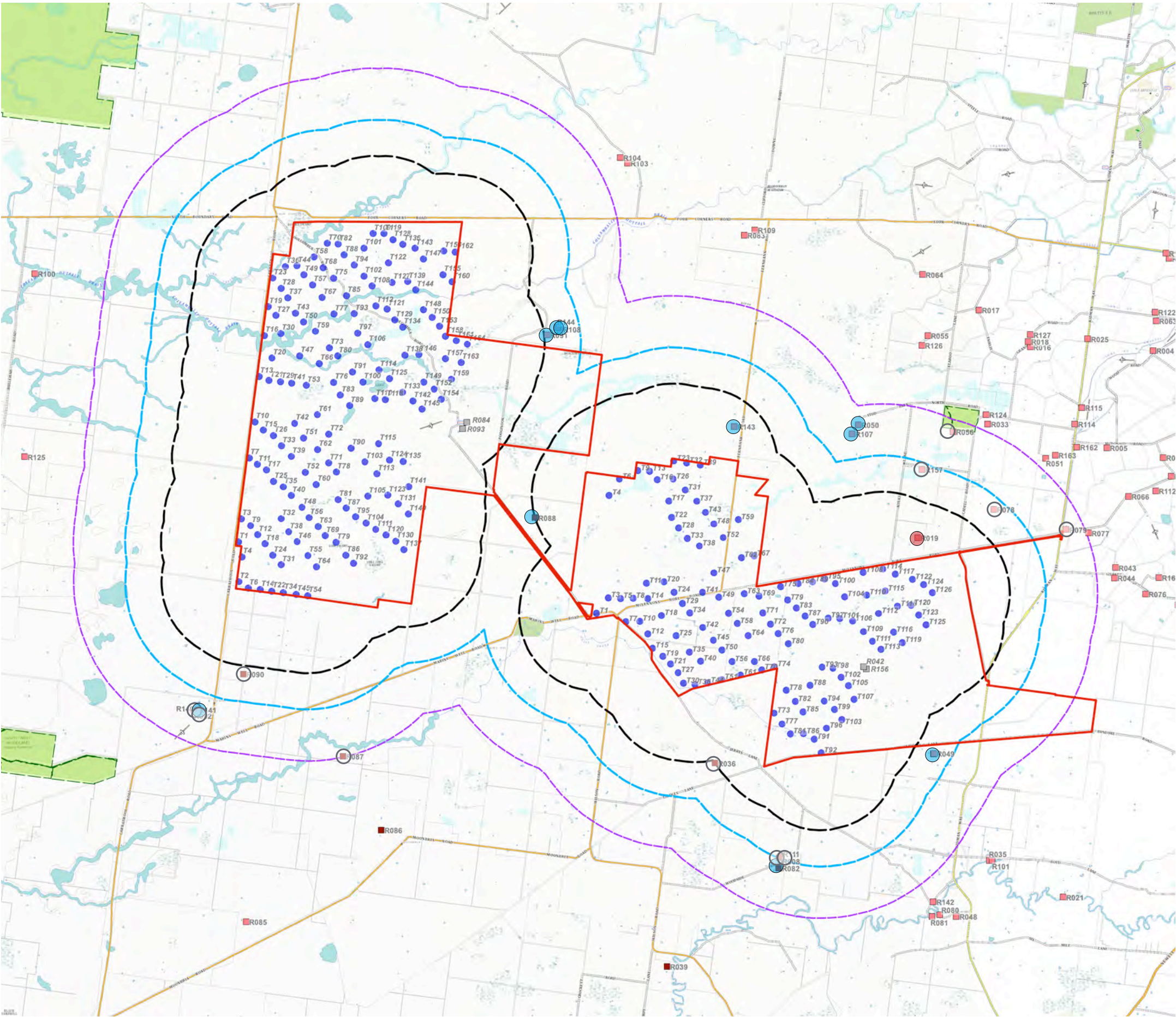
9.5.4 Lots with Dwelling Entitlements

The SEARs issued for the Project outlines the following assessment requirements for the LVIA: "a detailed assessment of the visual impacts (...) of all components of the project (including approved developments, lodged development applications and dwelling entitlements) (...)." (DPE, 2016).

An overview of the visual assessment for 29 lots with dwelling entitlements identified within 3,750 m of the nearest turbine has been included in this report. An assessment based on topography alone suggests that the majority of the Project will be visible on all lots with dwelling entitlements and are found in **Table 15** and **Figure 22**.

Detailed Dwelling Assessment Locations

Dinawan Wind Farm



- Project Area
- Proposed 280 m Turbine Location
- Associated Dwelling
- Non-associated Dwellings
- Non-associated Dwelling (Associated with other project)
- 3,750 m from turbine (black line of visual magnitude)
- 5,500 m from turbine (black line of visual magnitude)
- 8,000 m from turbine (extent of Study Area)
- Main Road
- Minor Road

DWELLING IMPACT RATINGS:

- Negligible Visual Impact Rating
- Low Visual Impact Rating
- High Visual Impact Rating



Figure 21 – Dwelling Assessment Locations
Imagery Source: Six Maps, 2022

Non-Associated dwellings within 3,750 metres of nearest Turbine (Black Line of Visual Magnitude)															
Dwelling ID:	Associated with other surrounding projects?:	Distance to nearest Project RelatedTurbine:	Nearest Turbine:	Number of turbines within 3,750m:	Turbines within 3,750m:	Number of turbines within 5,500m:	Turbines within 5,500 m:	Theoretical number of 60° sectors (Based on 2D Assessment):	Number of 60° sectors (Based on 3D Assessment):	Number of potentially visible turbines:	Shadow Flicker:	VIZ Rating:	Visual Impact Rating (without mitigation):	Visual Impact Rating (with mitigation):	Assessment Notes:
R143	N	2.49 km	T47	3	T23, T32, T39	12	T9, T13, T16, T17, T22,T26, T31, T37, T43, T48, T52, T59	Two (2)	Two (2)	267 All at hub height	N/A	VIZ2	LOW	-	Aerial imagery indicates existing scattered vegetation surrounding the dwelling, with dense vegetation to the south of the dwelling. A shed is located to the west of the dwelling, and screens views in this direction. The combination of these factors are likely to screen the majority of views toward turbines. There are no key landscape features impacted by the Project. Refer Appendix C.1.
R019	N	2.03 km	T34	11	T108, T110, T114, T115, T117, T118, T120, T122, T123, T124, T126	11	T95, T100, T101, T104, T106, T109, T111, T112, T116, T119, T125	Two (2)	Two (2)	267 All at hub height	N/A	VIZ2	HIGH	LOW	A representative viewpoint was selected in consultation with the landowner. The viewpoint demonstrates that there is existing low lying vegetation in the foreground to the west of the dwelling which fragments views toward turbines. However, due to the close proximity views toward portions of turbines are likely to be available. Supplementary planting has been recommended to the west of the dwelling to reduce the visibility of the Project from this location. Refer Appendix C.2. and Appendix E.1
R036	* Y - Argoon Wind Farm	3.75 km	T47	2	T73, T77	20	T21, T27, T30, T36, T35, T40, T44, T50, T51, T56, T61, T66, T70, T78, T81, T82, T85, T86, T91, T92	Four (4)	Four (4)	267 All at hub height	N/A	VIZ2	NEG	-	Aerial imagery indicates vegetation to the north, east and west of the dwelling. A number of farm buildings and sheds are located to the north of the dwelling. The nearest turbine is located approximately 3,750 m north east of the dwelling. The combination of these factors will screen views towards the Project. A photomontage has been prepared from this dwelling, refer Appendix C.3
R088	** Y - Yanco Delta Wind Farm	3.75 km	T47	1	T4	4	T1, T3, T6, T9	Four (4)	Four (4)	267 All at hub height	N/A	VIZ2	LOW	-	Aerial imagery indicates vegetation surrounding the dwelling. a number of farm buildings and sheds are located to the northwest and west of the dwelling. The nearest turbine is located approximately 3,750 m northwest of the dwelling. The combination of these factors is likely to screen the majority of views towards the Project. A LIDAR wireframe has been prepared from this dwelling, refer Appendix C.4a and C.4b.

*Note: Information as per Scoping Report, prepared by Umwelt. 2023, accessed via the Major Projects Website

** Note: Information as per Assessment Report, prepared by the DPHI 2023, accessed via the Major Projects Website

Table 12 – Summary of Non-involved Dwelling Assessment within 3,750 m of nearest turbine

Non-involved dwellings between 3,750 - 5,500 metres of nearest Turbine (Blue Line of Visual Magnitude)														
Dwelling ID:	Associated with other surrounding projects?:	Distance to nearest turbine:	Nearest Turbine:	Number of turbines between 3,750 - 5,500m	Turbines between 3,750 - 5,500m	Number of turbines between 5,500m - 8,000m :	Turbines between 5,500m - 8,000m :	Theoretical number of 60° sectors (Based on 2D Assessment)	Number of 60° sectors (Based on 3D Assessment)	Number of potentially visible turbines:	Shadow Flicker:	VIZ Rating:	Visual Impact Rating:	Assessment Notes:
R049	N	4.67 km	T107	6	T92, T96, T99, T103, T105, T107	26	T73, T77, T78, T81, T82, T85, T86, T88, T93, T94, T98, T101, T102, T106, T109, T91, T111, T112, T113, T116, T118, T119, T120, T123, T125, T126	Three (3)	Three (3)	267 All at hub height	N/A	VIZ3	LOW	Existing dense vegetation in the foreground to the northwest contains views in this direction. As a result, the majority of the Project is screened. Views towards portions of the turbines may be available through gaps in vegetation, however these are likely to be difficult to discern through the existing treeline. There are no key landscape features impacted by the Project. Refer Appendix C.5.
R008	* Y - Argoon Wind Farm	5.47 km	T92	1	T92	11	T73, T77, T81, T82, T85, T86, T91, T94, T96, T99, T103	Three (3)	Three (3)	267 All at hub height	N/A	VIZ3	NEG	Existing dense vegetation in the foreground to the north is likely to contain views towards the majority of the Project. There are no key landscape features impacted by the Project. Refer Appendix C.6.
R111	* Y - Argoon Wind Farm	5.38 km	T92	1	T92	12	T73, T77, T78, T81, T82, T85, T86, T91, T94, T96, T99, T103	Three (3)	Three (3)	267 All at hub height	N/A	VIZ3	NEG	Views from the dwelling are generally contained by existing vegetation. Existing dense vegetation in the foreground to the north is likely to contain views towards the majority of the Project. There are no key landscape features impacted by the Project. Refer Appendix C.7.
R090	** Y - Yanco Delta Wind Farm	4.16 km	T14	7	T2, T6, T14, T22, T34, T45, T54	18	T1, T3, T4, T9, T12, T18, T24, T31, T32, T38, T46, T55, T63, T64, T69, T79, T86, T92	One (1)	One (1)	267 All at hub height	N/A	VIZ3	NEG	Views from the dwelling are generally contained by existing vegetation. Existing dense vegetation in the foreground to the north is likely to contain views towards the Project from this dwelling. There are no key landscape features impacted by the Project. Refer Appendix C.8.
R078	N	4.98 km	T124	3	T122, T124, T126	12	T108, T110, T112, T114, T115, T116, T117, T118, T119, T120, T123, T1256	One (1)	One (1)	267 All at hub height	N/A	VIZ3	NEG	Existing dense vegetation to the south west of the dwelling will contain views toward the Project from this dwelling. There are no key landscape features impacted by the Project. Refer Appendix C.9.
R157	N	5.17 km	T114	3	T144, T117, T122	15	T124, T126, T125, T123, T120, T118, T112, 110, T104, T100, T95, T89, T84	One (1)	One (1)	267 All at hub height	N/A	VIZ3	NEG	An aerial suggests that there is vegetation to the south and southwest of the dwelling. A farm building are located to the south of the dwelling. The nearest Project related turbine is located approximately 5,170 m southwest of the dwelling. The combination of these factors will screen the Project from this dwelling. As a result of these factors, the visual impact from this location is NEGLIGIBLE. A photomontage has been prepared from R157, refer Appendix C.10.
R144	N	4.43 km	T164	4	T153, T157, T158, T159, T160, T161, T163, T164	20	T6, T9, T129, T134, T138, T139, T142, T143, T144, T145, T146, T147, T148, T149, T150, T152, T154, T155, T156, T162	Three (3)	Three (3)	267 All at hub height	N/A	VIZ3	LOW	An aerial suggests that there is existing vegetation to the south and west of the dwellings. The nearest Project related turbine is located in excess of 4,430m to the west. A combination of these factors is likely to assist in fragmenting the majority of views toward the Project from this location. A representative wireframe has been prepared from R091, refer Appendix C.11.
R108	N	4.54 km	T164	3	T161, T163, T164	25	T6, T9, T129, T134, T138, T139, T142, T143, T144, T145, T146, T147, T148, T149, T150, T152, T153, T154, T155, T156, T157, T158, T159, T160, T162	Three (3)	Three (3)	267 All at hub height	N/A	VIZ3	LOW	An aerial suggests that there is scattered vegetation surrounding the dwelling. The nearest Project related turbine is located approximately 4,540 m west of the dwelling. The combination of these factors is likely to fragment the majority of views towards the Project from this dwelling. A representative wireframe has been prepared from R091, refer Appendix C.11.
R091	N	3.88 km	T164	8	T153, T157, T158, T159, T160, T161, T163, T164	22	T6, T9, T121, T125, T127, T129, T133, T134, T138, T139, T142, T145, T146, T147, T148, T149, T150, T152, T154, T155, T156, T162	Three (3)	Three (3)	267 All at hub height	N/A	VIZ2	LOW	An aerial suggests that there is dense vegetation surrounding the dwelling. Farm buildings are located to the west and northwest of the dwelling. The nearest Project related turbine is located approximately 3,880 m west of the dwelling. The combination of these factors is likely to fragment the majority of views towards the Project from this dwelling. Refer Appendix C.11.

*Note: Information as per Scoping Report, prepared by Umwelt. 2023, accessed via the Major Projects Website

** Note: Information as per Assessment Report, prepared by the DPHI 2023, accessed via the Major Projects Website

Table 13 – Dwellings between 3,750 - 5,500 metres of nearest turbine

Non-involved dwellings between 5,500 - 8000 metres of nearest Turbine (Purple Line of Visual Magnitude)												
Dwelling ID:	Associated with other surrounding projects?:	Distance to nearest turbine:	Nearest Turbine:	Number of turbines between 5,500m - 8,000m	Turbines between 5,500m - 8,000m	Theoretical number of 60° sectors (Based on 2D Assessment)	Number of 60° sectors (Based on 3D Assessment)	Number of potentially visible turbines:	Shadow Flicker:	VIZ Rating:	Visual Impact Rating:	Assessment Notes:
R082	* Y - Argoon Wind Farm	5.95 km	T92	9	T73, T77, T81, T85, T86, T91, T92, T96, T103	Three (3)	Three (3)	267 All at hub height	N/A	VIZ3	LOW	Aerial imagery indicates existing dense vegetation surrounds the dwelling. Existing scattered vegetation in the middleground to the north is likely to limit views towards the Project, however some views towards turbines located in excess of 6 km of the dwelling are likely to be available. There are no key landscape features impacted by the Project. As a result of these factors, the visual impact from this location is LOW. Refer Appendix C.12.
R092	N	6.48 km	T6	8	T2, T4, T6, T14, T22, T34, T45, T54	One (1)	One (1)	267 All at hub height	N/A	VIZ3	NEG	Aerial imagery indicates existing dense vegetation surrounds the dwelling. Existing vegetation in the foreground to the north will screen views towards the Project from this dwelling. The nearest turbine is located in excess of 6.4 km northeast of the viewpoint. Moir LA attended the dwelling in March 2024 where the extent of existing vegetation was confirmed to be sufficient in screening views towards the Project. As a result of these factors, the visual impact from this location is NEGLIGIBLE. A representative photomontage has been prepared from R141, refer Appendix C.13.
R140	N	6.47 km	T6	8	T2, T4, T6, T14, T22, T34, T45, T54	One (1)	One (1)	267 All at hub height	N/A	VIZ3	NEG	Aerial imagery indicates existing dense vegetation to the north of the dwelling. A shed is also located northeast of the dwelling. The nearest turbine is located in excess of 6.4 km northeast of the viewpoint. Moir LA attended the dwelling in March 2024 where the extent of existing vegetation was confirmed to be sufficient in screening views towards the Project. As a result of these factors, the visual impact from this location is NEGLIGIBLE. A representative photomontage has been prepared from R141, refer Appendix C.13.
R141	N	6.43 km	T6	8	T2, T4, T6, T14, T22, T34, T45, T54	One (1)	One (1)	267 All at hub height	N/A	VIZ3	LOW	Aerial imagery indicates existing dense vegetation to the north and east of the dwelling. The nearest turbine is located in excess of 6.4 km north of the viewpoint. A combination of these factors are likely to assist in fragmenting views to some turbines, however views are likely to be available through a gap in vegetation to the north of the dwelling. It is noted that these turbines are located in excess of 6.4 km away, and will occupy a small portion of the view from this dwelling. There are no key landscape features impacted by the Project. As a result of these factors, the visual impact from this location is LOW. A photomontage has been prepared from this dwelling, refer Appendix C.13.
R087	** Y - Yanco Delta Wind Farm	7.95 km	T54	1	T54	One (1)	One (1)	267 All at hub height	N/A	VIZ3	NEG	Aerial imagery indicates existing dense vegetation to the north of the dwelling with scattered vegetation to the east. The nearest turbine is located in excess of 7.95 km north of the viewpoint. Existing vegetation to the north is likely to screen views towards turbines in this direction. Views towards turbines associated with the eastern portion of the Project may be available through gaps in vegetation, however it is noted that these turbines are located in excess of 16 km of the dwelling and will be difficult to discern. As a result of these factors, the visual impact from this location is NEGLIGIBLE. Refer Appendix C.14.
R079	N	7.16 km	T126	3	T122, T124, T126	One (1)	One (1)	267 All at hub height	N/A	VIZ3	NEG	Aerial imagery suggests that there is dense vegetation to the south and west (adjoining Kidman Way) of the dwelling. The nearest turbine is located in excess of 7 km to the southwest of the dwelling. A combination of these factors is likely to screen views of the Project from this dwelling. The visual impact from this location is NEGLIGIBLE. Refer Appendix C.15.
R056	N	7.42 km	T122	5	T114, T117, T122, T124, T126	One (1)	One (1)	267 All at hub height	N/A	VIZ3	NEG	Aerial imagery suggests that there is dense vegetation surrounding the dwelling. Farm buildings are also located to the southwest of the dwelling. The nearest turbine is located in excess of 7.4 km to the south of the dwelling. A combination of these factors is likely to screen views of the Project from this dwelling. The visual impact from this location is likely to be NEGLIGIBLE. Refer Appendix C.16.
R050	N	7.09 km	T114	9	T39, T59, T89, T95, T100, T108, T114, T117, T122	Two (2)	Two (2)	267 All at hub height	N/A	VIZ3	LOW	Aerial imagery suggests that there is scattered vegetation to the south and north of the dwelling. Farm buildings are also located to the west of the dwelling. The nearest turbine is located in excess of 7 km to the south of the dwelling. A combination of these factors is likely to screen the majority of views of the Project from this dwelling. It is noted that some views may be available through breaks in vegetation to the southwest, however these turbines will occupy a small portion of the view. As a result, the visual impact from this location is LOW. Refer Appendix C.17.
R107	N	6.74 km	T114	15	T39, T59, T67, T84, T89, T95, T100, T104, T108, T110, T114, T115, T117, T122, T124	Two (2)	Two (2)	267 All at hub height	N/A	VIZ3	LOW	Aerial imagery suggests that there is dense vegetation to the south and west of the dwelling. The nearest turbine is located in excess of 6.74 km to the west of the dwelling. A combination of these factors is likely to screen the majority of views of the Project from this dwelling. As a result, the visual impact from this location is LOW. A representative wireframe has been prepared from R050, refer Appendix C.17

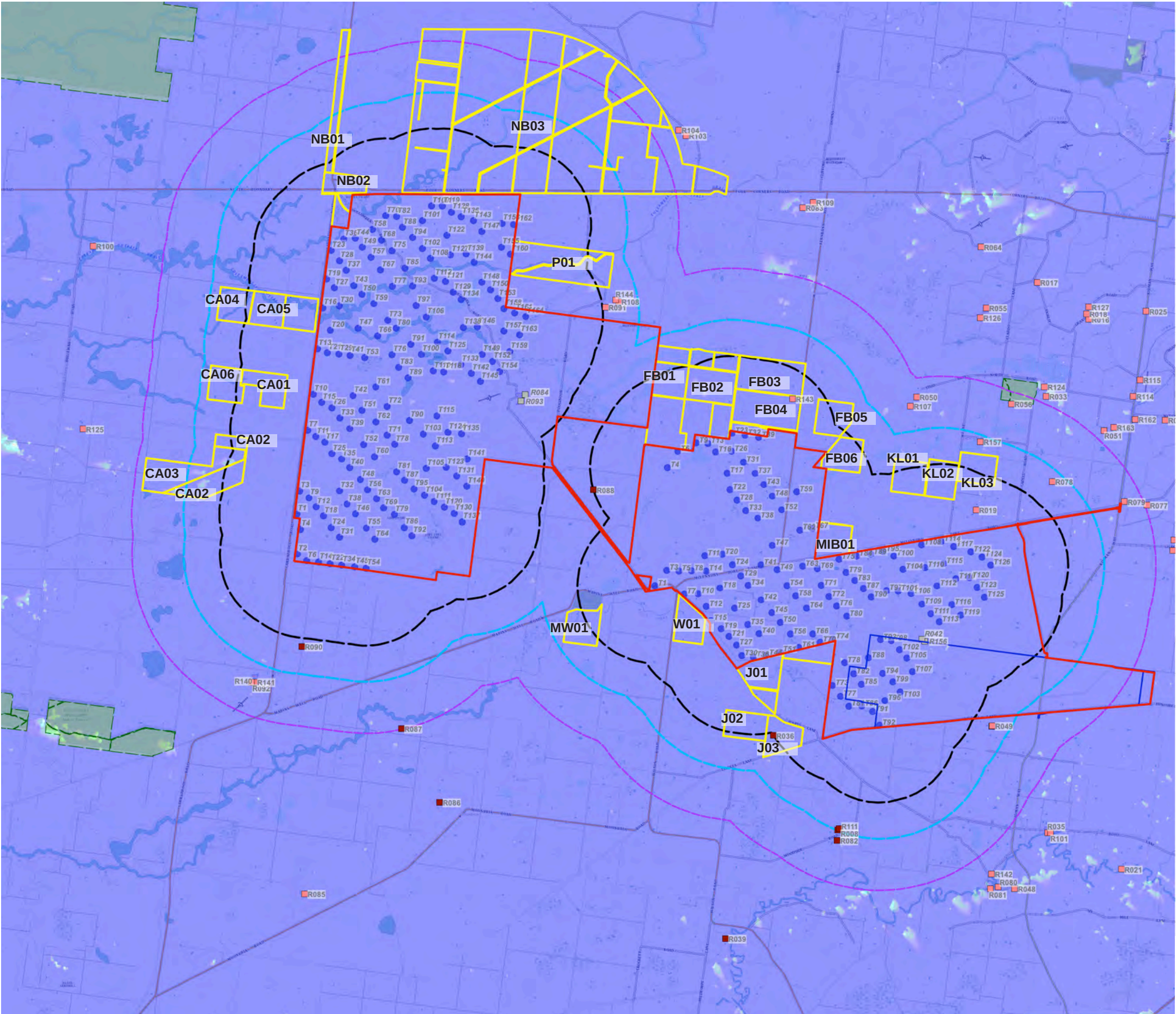
*Note: Information as per Scoping Report, prepared by Umwelt. 2023, accessed via the Major Projects Website

** Note: Information as per Assessment Report, prepared by the DPHI 2023, accessed via the Major Projects Website

Table 14 – Dwellings between 5,500- 8000 metres of nearest turbine

Dwelling Entitlement Assessment

Dinawan Wind Farm



LEGEND

- Project Area
- 3,750 m from turbine (black line of visual magnitude)
- 5,500 m from turbine (black line of visual magnitude)
- 8,000 m from turbine (extent of Study Area)
- Proposed 280 m Turbine Location
- Associated Dwelling
- Non-associated Dwelling
- Non-associated Dwelling (Associated with other project)
- Main Road
- Dwelling Entitlement Boundary
- National Park / Nature Reserve

ZVI Number of Visible Turbines (at tip height):

0
1 - 90
90 - 180
180 - 267

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.

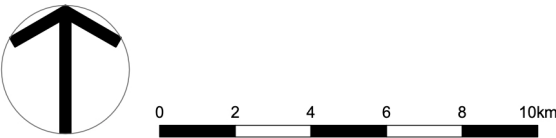


Figure 22 – Dwelling Entitlement Using the Zone of Visual Influence (Blade Tip Height 280 m)

MLA Reference	Lot / DP & Address:	LGA:	Lot Size:	Percentage of Lot Covered by 'ZVI Band':				Assessment Notes:
				Nil	1 - < 90 turbines	90 - < 180 turbines	180 - < =267turbines	
CA01	Lot 03 / DP756300	Edward River Council LGA	259 ha	0.0%	0.0%	0.0%	100%	This lot is sited within the black line (3750 m). It is recommended that structures on the property are sited to the property's southwest corner, where a combination of distance and existing vegetation to the east may reduce the visual impact.
CA02	Lot 55 / DP756300	Edward River Council LGA	407 ha	0.0%	0.0%	0.0%	100%	This lot is sited within the black (3750 m) and blue (5500 m) lines. It is advised that development on the property is sited to the property's southwest corner, where a combination of distance and existing vegetation to the east may reduce the visual impact.
CA03	Lot 53 / DP756300	Edward River Council LGA	499 ha	0.0%	0.0%	0.0%	100%	A portion of the lot is sited within the black (3750 m). It is advised that development on the property is sited to the property's southwest corner, where a combination of distance and existing vegetation to the east may reduce the visual impact. Further screening mitigation of vegetation may be implemented to the property's northeast.
CA04	Lot 29 / DP756300	Edward River Council LGA	253 ha	0.0%	0.0%	0.0%	100%	This lot is located within the blue line (5500 m). It is recommended that structures on the property are located to the western boundary, maximising distance between the Project, and that vegetation screening is implemented to the east.
CA05	Lot 30 / DP756300	Edward River Council LGA	256 ha	0.0%	0.0%	0.0%	100%	This lot is situated within the black line (3750 m). It is recommended that structures on the property are sited to the western boundary, maximising distance between the Project, and that vegetation screening is implemented to the east, reducing the visual impact.
CA06	Lot 01 / DP756300	Edward River Council LGA	264 ha	0.0%	0.0%	0.0%	100%	This lot is predominantly located within the blue line (5500 m). It is recommended that structures on the property are sited toward the western boundary, maximising distance between the Project, and that vegetation screening is implemented to the east.
NB01	Lot 7300 / DP1135838	Murrumbidgee Council LGA	264 ha	0.0%	0.0%	0.0%	100%	This lot is sited within the black (3750 m) to purple (8000m) lines. It is recommended that structures are situated to the far north of the property, maximising proximity from the Project. Existing vegetation to the south may reduce the visual impact, however further screening could be established along the property's eastern edge for further visual mitigation.
NB02	Lot 7303 / DP1159319	Murrumbidgee Council LGA	325 ha	0.0%	0.0%	0.0%	100%	This lot is located within the black line (3750 m) sharing its southern most boundary with the Project. It is recommended that development on the property is sited to the north and that vegetation screening is implemented along the south and eastern edges.

Table 15 – Dwellings Entitlements within 3,750 metres of nearest turbine

MLA Reference	Lot / DP & Address:	LGA:	Lot Size:	Percentage of Lot Covered by ‘ZVI Band’:				Assessment Notes:
				Nil	1 - < 90 turbines	90 - < 180 turbines	180 - < =267turbines	
NB03	Lot 01 / DP249338	Murrumbidgee Council LGA	9116 ha	0.0%	0.0%	0.0%	100%	A portion of this lot is sited within the black (3750 m), however due to the size of the lots, it is situation across to the 8,000 m of the nearest turbine. It is recommended that structures are sited to the north-east / eastern boundary of the lot, maximising proximity from the Project. Existing vegetation along the creekline and further pockets to the south may reduce the visual impact, however further screening could be established to the southwest any proposed dwelling to further reduce the potential impacts.
P01	Lot 08 / DP225796	Murrumbidgee Council LGA	773 ha	0.0%	0.0%	0.0%	100%	This lot is located within the black line (3750 m) sharing its western boundary with the Project. It is recommended that development on the property is sited to the eastern boundary where existing vegetation along the property's creeklines may offer some screening of the Project. Screening could be situated to the near west of the dwelling and additionally to the southeast to further reduce the potential visual impact.
FB01	Lot 101/ DP246957	Murrumbidgee Council LGA	798 ha	0.0%	0.0%	0.0%	100%	This lot is located predominantly within the black line (3750 m) sharing its south and eastern boundary with the Project. Existing vegetation west of the property and within the property to the south may offer some screening of the Project. It is recommended structures are sited to the northeastern corner of the lot where further implementation of vegetation to the near west and southeast of the dwelling will provide further screening.
FB02	Lot 01/ DP706781	Murrumbidgee Council LGA	794 ha	0.0%	0.0%	0.0%	100%	This lot is sited predominantly within the black line (3750 m) sharing its southern most boundary with the Project. Existing vegetation west of the property and within the property to the south may offer some screening of the Project. It is recommended structures are sited to the northeastern corner of the lot where implementation of vegetation to the near west and southeast of the proposed dwelling will further reduce the potential visual impacts.
FB03	Lot 02 / DP706781	Murrumbidgee Council LGA	517 ha	0.0%	0.0%	0.0%	100%	This lot is sited predominantly within the black line (3750 m). It is recommended development is considered to the northeast of the property, embedded within the pocket of existing vegetation on site. Alternatively, siting along the northern boundary of the property with vegetation mitigation employed to the near west, south and south-east of the said dwelling would reduce the potential visual impact.
FB04	Lot 03 / DP706781	Murrumbidgee Council LGA	526 ha	0.0%	0.0%	0.0%	100%	This lot is sited within the black line (3750 m) sharing its southern boundary with the Project. It is recommended that further development on the property is located to the property's northeast where existing structure (R143) and vegetation to the west will likely screen the Project. Vegetation screening could be implemented to the near south to further screen views toward the Project.
FB05	Lot 77 / DP756450	Murrumbidgee Council LGA	264 ha	0.0%	0.0%	0.0%	100%	This lot is sited within the black (3750 m) and blue (5500 m) lines. It is recommended that structures are sited toward the northwest of the property's northern boundary, where existing vegetation will likely reduce the potential visual impacts.
FB06	Lot 81 / DP756450	Murrumbidgee Council LGA	257 ha	0.0%	0.0%	0.0%	100%	This lot is sited within the black line (3750 m). It is advised that future development is located to the south. Existing vegetation may provide screening of the Project to the southeast. Further screen vegetation should be considered for any proposed dwelling to its west and northwest.

Table 15 (cont.) – Dwellings Entitlements within 3,750 metres of nearest turbine

MLA Reference	Lot / DP & Address:	LGA:	Lot Size:	Percentage of Lot Covered by ‘ZVI Band’:				Assessment Notes:
				Nil	1 - < 90 turbines	90 - < 180 turbines	180 - < =267turbines	
KL01	Lot 132 / DP756459	Murrumbidgee Council LGA	256 ha	0.0%	0.0%	0.0%	100%	This lot is situated predominantly within the black line (3750 m). Proposed dwellings are recommended to site structures to the northeast, maximising proximity to the Project. Screening measures such as the implementation of vegetation should be considered alongside any proposed dwelling to the south and western edges.
KL02	Lot 131 / DP756459	Murrumbidgee Council LGA	256 ha	0.0%	0.0%	0.0%	100%	This lot is sited predominantly within the black line (3750 m). It is recommended that the possibility of future structures are sited to the northeast, maximising proximity from the Project. Screening measures such as the implementation of vegetation should be considered alongside the dwelling to its south and western edges.
KL03	Lot 163 / DP756459	Murrumbidgee Council LGA	256 ha	0.0%	0.0%	0.0%	100%	This lot is sited within the black (3750 m) and blue (5500 m) lines. It is recommended that the possibility of future structures are sited to the northeast, maximising proximity from the Project. Existing vegetation may reduce visual impact of the Project to the northwest and southwest. Further implementation of vegetation should be considered alongside the development to its south and western edges for further effect.
MW01	Lot 64 / DP756304	Edward River Council LGA	266 ha	0.0%	0.0%	0.0%	100%	This lot is sited within the black (3750 m) and blue (5500 m) lines. It is recommended that future development on the property is sited toward the southern centre, where existing vegetation may provide screening to the structure's northwest in hand with further mitigation of implemented vegetation to the east and northeast. Alternatively, the centre of the western boundary could be considered for siting, with existing vegetation reducing visual impact to the northeast, and further screening vegetation employed surrounding the northwest of the structure.
W01	Lot 138 / DP756418	Murrumbidgee Council LGA	250 ha	0.0%	0.0%	0.0%	100%	This lot is sited within the black line (3750 m), sharing its northeastern boundary with the Project. It is recommended that the possibility of future structures are sited to the southwest, maximising proximity from the Project. Existing vegetation may reduce visual impact of the Project to the north and northeast. In addition, further screening should be implemented surrounding the dwelling's west, north and east for further reduction of visual impact.
MIB01	Lot 145 / DP756418	Murrumbidgee Council LGA	249 ha	0.0%	0.0%	0.0%	100%	This lot is located within the black line (3750 m) sharing its south and western boundary with the Project.any future proposed dwellings are recommended to be sited along the eastern boundary. The implementation of screening vegetation should be situated within the curtilage of the dwelling to ensure the potential views are screened.

Table 15 (cont.) – Dwellings Entitlements within 3,750 metres of nearest turbine

MLA Reference	Lot / DP & Address:	LGA:	Lot Size:	Percentage of Lot Covered by 'ZVI Band':				Assessment Notes:
				Nil	1 - < 90 turbines	90 - < 180 turbines	180 - < =267turbines	
J01	Lot 02 / DP733637	Murrumbidgee Council LGA	510 ha	0.0%	0.0%	0.0%	100%	This lot is located predominantly within the black line (3750 m) sharing its northern border with the Project. If future development is planned, it is recommended to be sited directly south of the existing creekline vegetation - reducing the level of visual impact to the north. Due to the close proximity to the project, further implementation of screening vegetation could be considered particularly to the structure's northwest, north, northeast and east.
J02	Lot 82 / DP756418	Murrumbidgee Council LGA	261 ha	0.0%	0.0%	0.0%	100%	This lot is located predominantly within the black line (3750 m). It is advised that the siting of any future development should occur along the property's southern boundary, maximising proximity from the Project. Due to the proximity to the Project, further implementation of screening vegetation should be considered to the northwest, north, northeast and east of proposed dwellings.
J03	Lot 84 / DP756418	Murrumbidgee Council LGA	254 ha	0.0%	0.0%	0.0%	100%	This lot is sited within the black (3750 m) and blue (5500 m) lines. If further development is to occur on the property, it is recommended to be sited to the southwest. Existing vegetation and structures may reduce the visual impact of the Project to the north. Further implementation of screening vegetation should be considered to the north of proposed dwellings.

Table 15 (cont.) – Dwellings Entitlements within 3,750 metres of nearest turbine

10

Photomontages and Wire Frame Diagrams

10.0 Photomontages and Wire Frame Diagrams

10.1 Overview of Photomontages and Wire Frame Diagrams

10.1.1 Photomontages

The Bulletin states: *'Photomontages shall be prepared in accordance with the Scottish Natural Heritage Visual Representation of Wind Farms, Version 2.1 December 2014 guidelines, noting they are generally consistent with the Land and Environment Court's Photomontage Policy. The visual assessment needs to include a concise description of the complete methodology used to create any photomontages presented in the visual assessment.'*

A photomontage combines a photograph of an existing view with a computer-rendered image of a proposed development. Photomontages are used to illustrate the likely view of a proposed development as it would be seen in a photograph (not as it would appear to the human eye in the field).

Although photomontages are based on a photograph of the existing landscape, it is important to stress that they are not a substitute to visiting a viewpoint in the field. They are only one tool to aid assessment. They provide a two-dimensional image that can be compared with an actual view of the landscape to provide information, such as the scale and potential appearance of a proposed development.

10.1.2 Wire Frame Diagrams

A wire frame is a computer generated image based on a digital terrain model, that indicate the 3D shape of the landscape in combination with additional elements. They are a valuable tool in the wind farm LVIA process as they allow the assessor to compare the position and scale of the turbines to the existing view of a landscape (Scottish Natural Heritage, 2017). Wire frame images can be seen as a worst case scenario as they do not take into account factors such as vegetation, building structures.

Wire frame diagrams have been utilised in this LVIA to assist in the assessment of the Project from inaccessible locations. In instances where access to a location was not available, wire frame diagrams have been utilised as an assessment tool to provide a worst case scenario view of the proposal.

Photomontages and Wireframes have been prepared for the Project have been included in Appendix D.

10.2 Photomontage and LIDAR Limitations

Visualisations in themselves can never provide the full picture in terms of potential impacts; they only inform the assessment process by which judgements are made. Visualisations of wind farms have a number of limitations which stakeholders should be aware of when using them to form a judgement on a wind farm proposal.

These include:

- A visualisation can never show exactly what the wind farm will look like in reality due to factors such as: different lighting, weather and seasonal conditions which vary through time and the resolution of the image;
- The images provided give a reasonable impression of the scale of the turbines and the distance to the turbines, but can never be 100% accurate; and
- A static image cannot convey turbine movement, or flicker or reflection from the sun on the turbine blades as they move.

LiDAR wireframe diagrams demonstrate the physical geometry, topography and general heights of existing vegetation. It is acknowledged that LiDAR wireframe diagrams have limitations in providing accurate details relating to texture, colour, heights and lighting which assist in demonstrating the existing conditions and the potential impacts from a viewpoint.

Source: Scottish Natural Heritage Visual Representation of Wind Farms, Version 2.2 February 2017.

10.3 Photomontage Selection Process

Indicative viewpoints have been selected for the preparation of photomontages from public locations and private dwelling locations to best illustrate the potential appearance of the proposed wind farm from varying distances and locations with differing views in public locations (refer to **Figure 24**).

Private Photomontage Locations:

11 photomontages have been prepared from private properties. The locations selected were based on those that granted access.

Public Photomontage Locations:

A total of **three (3) public viewpoint** locations selected for the preparation of visual photomontages are based on the findings of the Viewpoint Analysis and feedback received from the community. Exact photomontage locations were selected on site to represent a worst case scenario for the viewpoint location. Localised screening factors such as vegetation were avoided (where possible) to ensure maximum exposure to the Project.

LIDAR Wireframe Photomontage Locations:

One (1) LIDAR wireframe diagram was prepared from a private residence (R088) in leui of a site visit, as access was not granted. LIDAR information was overlayed onto a wireframe to provide an indication of the existing heights and locations of surrounding vegetation.

Private Photomontages		
Photomontage 01a and 1b	Dwelling R143	823 Fernbank Road, Argoon
Photomontage 02	Dwelling R019	Mclennons Bore Road, Gala Vale
Photomontage 03	Dwelling R049	211 Liddles Lane, Jerilderie
Photomontage 04	Dwelling R078	884 Cadell Road, Gala Vale
Photomontage 05	Dwelling R082	601 Woodside Road, Jerilderie
Photomontage 06	Dwelling R008	600 Woodside Road, Jerilderie
Photomontage 07	Dwelling R111	600 Woodside Road, Jerilderie
Photomontage 08	Dwelling R090	Carrathool Road, Steam Plains
Photomontage 09	Dwelling R036	1340 Liddles Lane, Jerilderie
Photomontage 10	Dwelling R141	Carrathool Road, Steam Plains
Photomontage 11	Dwelling R157	Gala Vale Road, Gala Vale
Public Photomontages		
Photomontage 12	VP22	Carrathool Road, Steam Plains
Photomontage 13	VP06	Yanco Bridge Rest Area, B87 Kidman Way, Bundure
Photomontage 14a and 14b	VP15a and 15b	Mabins Well Road and Wilson Road, Argoon
LIDAR Wire Frame Diagram		
LIDAR Wire Frame 01	Dwelling R088	Goolgumbla Road, Mabins Well

Table 16 – Overview of Photomontage and Wire Frame Locations

10.4 Photomontage Development Methodology

The process for generating the photomontages involves computer generation of a wire frame perspective view of the Wind Turbines and the topography from each viewpoint. As per the requirements of the Bulletin, photomontages have been prepared in accordance with the Scottish Natural Heritage Visual Representation of Wind Farms, Version 2.2 February 2017. The process for photomontage development is demonstrated in **Figure 23**.

The photomontages are based on a worst case scenario of a maximum turbine height dimension of 280 m with a hub height of 180 m and rotor diameter of 200 m, without the inclusion of the proposed mitigation methods.

Moir LA have prepared the photomontages using the most current available version of Wind Pro software using the following process:

Step 1: Develop 3D Model

Detailed 3D model of the Site is developed in Wind Pro. The wind turbines and associated infrastructure (substations, transmission lines, wind masts etc.) are modelled and sited in the 3D model to scale.

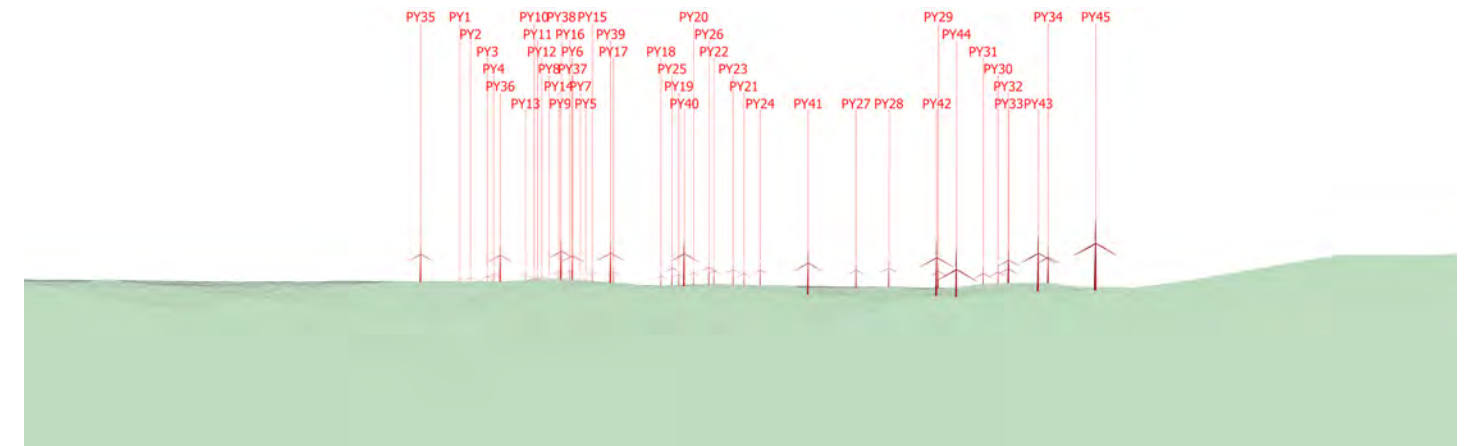
Step 2: Align Photograph and Model

The digital panorama is imported into Wind Pro and EXIF properties of the file are inserted automatically defining all relevant visualisation information as e.g. type of camera lens used, field of view for panoramas, the position and direction. Topography, control points, obstacle objects, existing wind masts can be used as reference to calibrate the camera model precisely.

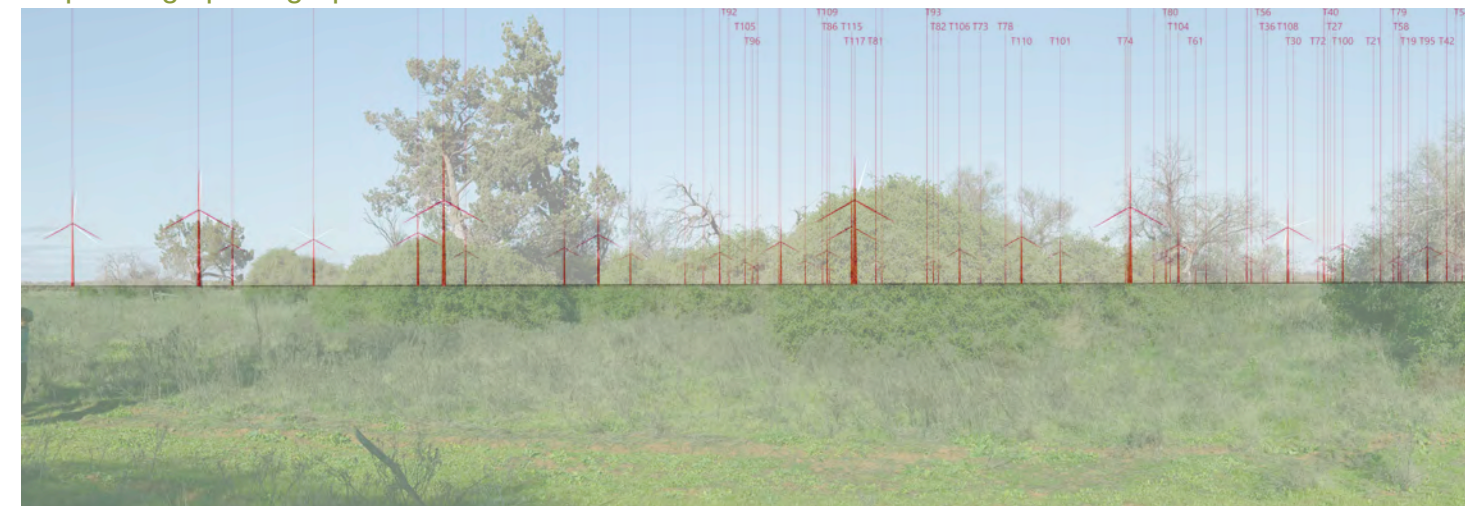
Step 3: Render Photomontage

The software calculates the position of the sun based on the time and date of photograph and renders the wind turbines in accordance with the specific weather conditions and position of the sun. Once rendered, detailed removal of intervening elements (such as vegetation) is undertaken to provide an accurate representation of the Project.

Step 1: Develop 3D Model (Wire Frame Diagram)



Step 2: Align photograph and model

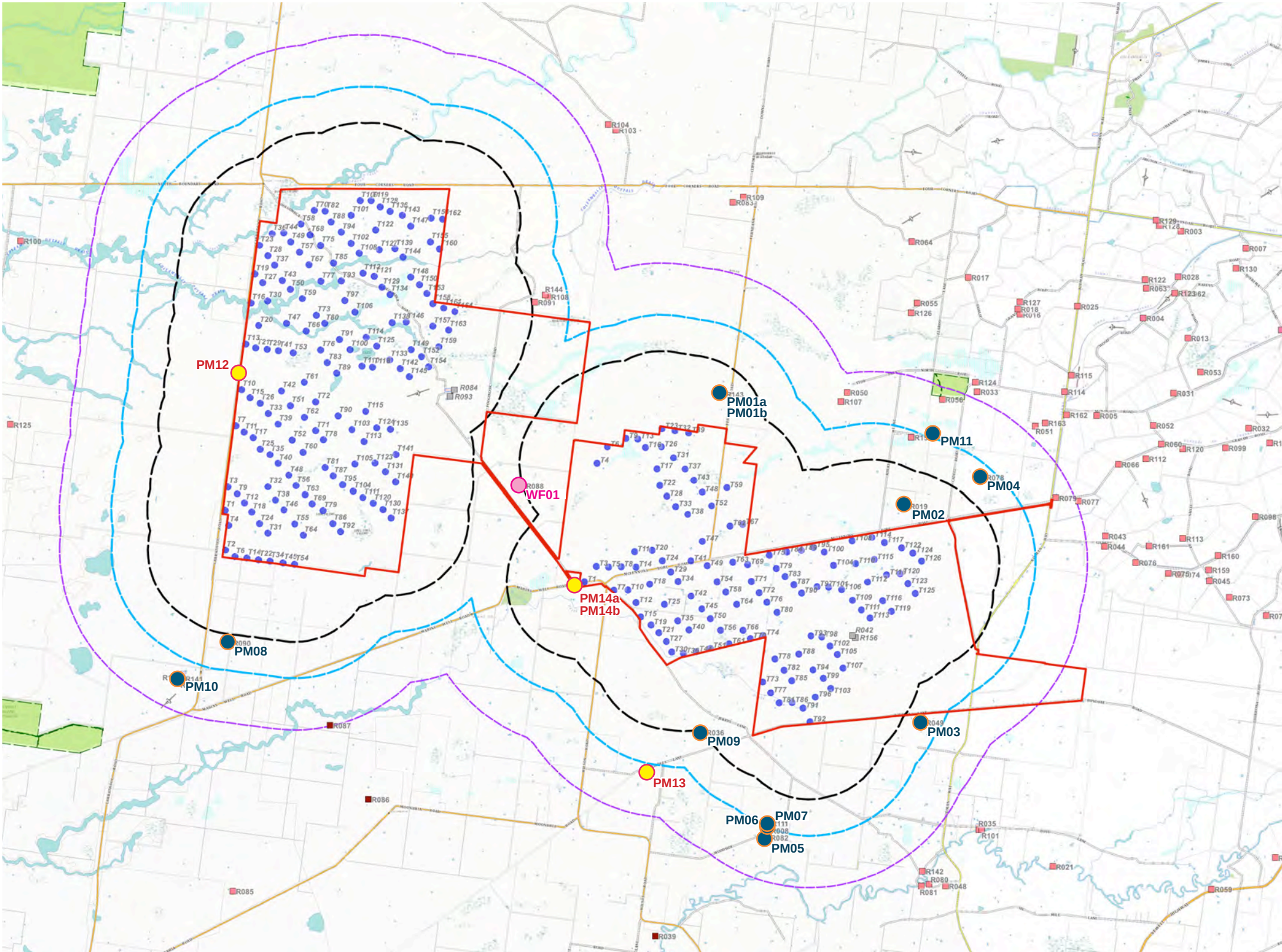


Step 3: Render Photomontage



Figure 23 – Photomontage Development Process

Photomontage and Wire Frame Diagram Locations Dinawan Wind Farm



LEGEND

- Project Area
- 3,750 m from turbine (black line of visual magnitude)
- 5,500 m from turbine (black line of visual magnitude)
- 8,000 m from turbine (extent of Study Area)
- Proposed 280 m Turbine Location
- Associated Dwelling
- Non-associated Dwelling
- Non-associated Dwelling (Associated with other project)
- Main Road
- Minor Road
- National Parks
- Private Photomontage Locations
- Public Photomontage Locations
- LIDAR Wireframe Diagram Location

Photomontages prepared for the Project have been included as Appendix D.

Figure 24 – Photomontages and Wire Frame Diagram Locations
Imagery Source: Six Maps, 2022

11

Shadow Flicker & Blade Glint Assessment

11.0 Shadow Flicker and Blade Glint Assessment

11.1 Overview of Shadow Flicker

Shadow flicker is defined as the visual effect that occurs when rotating turbines cause moving shadows as the blades pass in front of the sun. The effect will occur under circumstances where the turbine is located such that at certain times of day the sun’s rays pass through the swept area of the rotating blades, potentially affecting the viewpoint. The effect is diminished by the distance of the viewpoint from the turbine. Shadowing is also influenced by increased cloud cover, and is dependent on the angle of the sun’s rays (Draft National Wind Farm Development Guidelines, 2010).

The Bulletin states: *The shadow flicker caused by certain sun angles in relation to the rotation of wind turbine blades on dwellings will be limited to 30 hours per year, and may require mitigation measures such as amended siting and design of turbines to minimise the amount of shadow flicker.*

11.2 Shadow Flicker Assessment Methodology

As there is no methodology for the assessment of shadow flicker in the Bulletin, Moir LA have referred to the Draft National Wind Farm Development Guidelines (2010) to define the parameters for the assessment, refer **Table 17**.

Model Parameter	Setting Used:
Zone of Visual Influence of Shadows	265 x maximum blade chord
Minimum angle of sun	3 degrees
Shape of the sun	Disk
Time and duration of modelling	One full year
Orientation of the rotor	The rotor plane is always perpendicular to the line from the Turbine to the sun
Time step	1 minute
Effects of topography	Included
Receptor Height	1.5 meters
Grid size	1 meter

Table 17 – Shadow Flicker Assessment Parameters

Modelling of the shadow flicker was conducted using specialist industry software (Wind Pro), assessing the largest turbine (based on a 280 m maximum tip height) proposed for the Project to represent the worst case impact scenario. Refer to **Figure 25**.

It is important to note the shadow flicker modelling undertaken for the Project is based on topography alone and therefore the extent of impact may be decreased by a number of variables including:

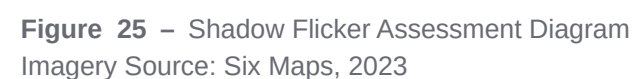
- The aspect of the residence relative to the turbine(s) (window locations, living area locations etc);
- The extent of natural or screening vegetation between the turbine(s) and the receptor;
- The existence of other screening elements (buildings, structures etc) between the turbine(s) and the receptor;
- The time of year;
- The proportion of daylight hours in which the turbines operate; and
- The frequency of bright sunshine and cloudless skies (particularly at low elevations above the horizon).



Image 21 – Example of shadow intensity variation with distance



Image 22 – Example of shadow flicker from base of turbine



11.3 Results of Shadow Flicker Assessment

11.3.1 Dwellings

As per the shadow flicker assessment, no non-associated dwellings were identified with potential shadow flicker hours.

11.3.2 Road Users

Although there are no guidelines in the Bulletin relating to the acceptable level of shadow flicker on road users, shadow flicker has the potential to cause annoyance to commuters. The shadow flicker assessment identified a number of roads with the potential for shadow flicker. These include Mabins Well Road, Fernbank Road, McLennons Bore Road, Wilson Road, Liddles Lane, Jerrys Lane, Carrathool Road to the west of the Project, Cadell Road to the east of the Project and Four Corners Road to the north of the Project.

The highest impacts from public roads are likely to be experienced from Carrathool Road to the west of the Project. Carrathool Road has the potential to experience shadow flicker for an 18 km section of road followed by McLennons Bore Road, traversing the Project's southeast, experiencing up to 16km. Fernbank Road may experience shadow flicker for up to 8 km whilst Jerrys and Liddles Lanes, Wilson, Four Corners and Mabins Well Roads may experience shadow flicker cumulatively for up to approximately 23 km of the road (See table below).

Road Name:	Total length of Shadow Flicker
Carrathool Road	18 km
McLennons Bore Road	16 km
Fernbank Road	8 km
Four Corners Road	7 km
Wilson Road	5 km
Jerrys Lane	5 km
Liddles Lane	4 km
Mabins Well Road	2 km

Table 18 – Extent of Shadow Flicker experienced on public roads

11.4 Overview of Blade Glint

Blade Glint (also referred to as blade reflectivity) refers to the regular reflection off one or more rotating blades. This can be a temporary effect at any particular location, though the vast bulk of any glint occurs where the viewer is located above the altitude of the turbine hub.

The Bulletin recommends: *turbine blades be finished with a low reflectivity surface treatment to ensure any actual or perceived blade glint impact is minimised.*

All major wind turbine blade manufacturers currently finish their blades with a low reflectivity treatment. This prevents potentially a reflective glint from the surface of the blades and the possibility of a strobing reflection when the turbine blades are spinning. Therefore, the risk of blade glint from a new development is considered to be very low in accordance with the Draft - National Wind Farm Development Guidelines (EPHC, 2010).

The turbines selected for the Project will be finished with a low reflectivity surface treatment in accordance with the requirements of the Bulletin.

12

Night Lighting Assessment



12.0 Night Lighting Assessment

12.1 Overview of Night Lighting

The following section of the report provides an assessment of the visual impacts of potential night lighting of the Project. Night lighting has the potential to result in the alteration of the night time landscape character of the region. Potential light sources include:

- Aviation Hazard Lighting (AHL) on nacelle of wind turbines (height of up to 180 metres AGL)
- Night lighting for safety and security on ancillary structures.

12.2 Aviation Hazard Lighting

The requirement of aviation hazard lighting (AHL) on wind turbines for the Project is subject to the advice of the Civil Aviation Safety Authority (CASA). It is noted that the turbines proposed for the Project will possibly be up to 280 m in height and CASA generally recommends night lighting if an obstacle exceeds 150 metres above ground level.

If determined to be required, potential CASA specifications for lighting could include:

- A visibility meter to reduce light intensity during high visibility conditions. A visibility meter intensity regulation system can reduce the intensity of hazard lights depending on the level of visibility determined by the sensors. Visibility meters should be mounted as near to the hazard lights as possible and in the case of wind farms, on turbines every 1.5 km.
- Two flashing red medium intensity obstacle lights should be provided per turbine where required.
- Medium intensity obstacle lighting must mark the highest point reached by the rotor blade and provided on a sufficient number of individual wind turbines to indicate the general extent of the wind farm.
- The interval between obstacle lighted turbines should not exceed 900m, and the most prominent (highest for the terrain) turbine(s) should be lit.
- Permanent light shielding is also an option to reduce impact on residences within six (6) kilometres of the installation. (CASA, 2022)

Representative images of aviation lighting (installed in August 2020) on turbines at Biala Wind Farm have been included to best illustrate the potential visual appearance of aviation lighting. Photographs of the aviation lighting at varying distances and times have been included in this report. **Images 23 - 29** illustrate the appearance of night lighting on a dark rural landscape at intervals after sunset.



Image 23 – View towards Biala Wind Farm - 2.0 km from turbine at 6:20pm (30 minutes after sunset)



Image 24 – View towards Biala Wind Farm - 1.75 km from turbine at 6:35pm (45 minutes after sunset)

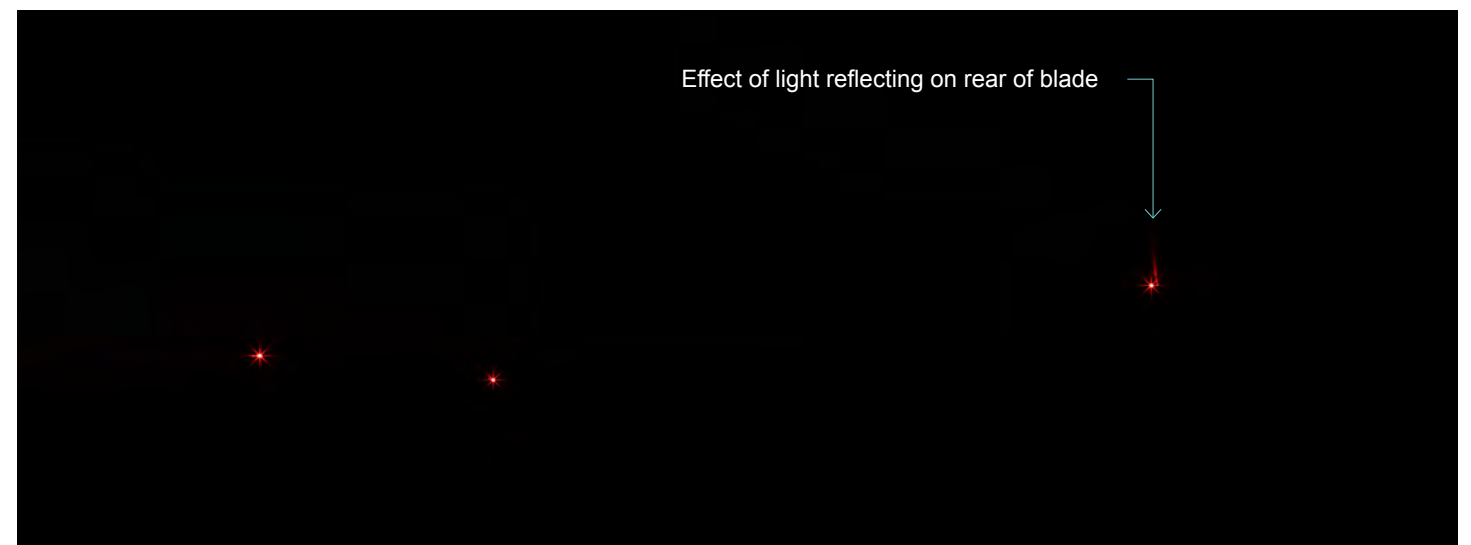


Image 25 – View towards Biala Wind Farm - 1.85 km from turbine at 6:50pm (60 minutes after sunset)



Image 26 – View towards Biala Wind Farm -3.5 km from turbine



Image 27 – View at night towards Biala Wind Farm - 8.5 km from turbine



Image 28 – View towards Biala Wind Farm - 3.5km from turbine



Image 29 – View at night towards Biala Wind Farm - 8.5 km from turbine

12.3 Overview of potential visual impacts from Night Lighting

Night lighting of turbines and associated infrastructure has the potential to extend the visual effect into the night time. Aviation hazard lighting has the potential to be visible from distances in excess of 20 km (Scottish Natural Heritage). However, the distance depends on a number of variables, including light intensity, topography, vegetation coverage and climatic conditions.

Due to the relatively isolated location of the Project, very little existing sources of lighting are present in the night time landscape of the Study Area. Some existing lighting associated with homesteads and motor vehicles is dispersed around the Study Area. Isolated receptors within the Study Area experience a dark night sky with minimal light sources. The impact of night lighting is unlikely to be experienced from inside of a dwelling as internal lights reflect on windows and limit views to the exterior at night time.

The highest visual impact is likely to be people who experience the night landscape outdoors. Dark sky is a valued quality of the rural landscape, due to the lack of light pollution. Aviation lighting has the potential to impact on receptors who view the landscape at night, in particular night-sky enthusiasts, photographers, star gazers, campers and some land owners with potential visibility of the turbines hub.

The visual impact of potential aviation lighting could be reduced by employing mitigation methods outlined in **Section 12.4** Considering the high elevation of the turbines and the implementation of shields, the source of visible light is likely to be reduced to ambient lighting as opposed to direct visibility of the light itself when viewed from a close proximity.

The Uungula Wind Farm (located to the east of Wellington in NSW) was approved in May 2021 with a recommendation to include low intensity aviation lighting (200 candela) which is considerably lower than the 2,000 candela required by international standards.

12.4 Recommendations to reduce the potential visual impacts from Night Lighting

The Bulletin states: *If such lighting is required, the CASA guidelines recommend that to minimise visual impacts “obstacle lights may be partially shielded, provided it does not compromise their operational effectiveness. Where obstacle lighting is provided, lights should operate at night, and at times of reduced visibility. All obstacle lights on a wind farm should be turned on simultaneously and off simultaneously.” The lights should be fully shielded from the view of any dwelling within 2km. As part of the assessment of visual impacts of wind energy projects, the Department will consider whether any obstacle lighting required is likely to result in any significant increase in visual impacts.*

To assist in the amelioration of the effect of Aviation Hazards Lighting on wind turbines the following should be applied:

- If used, air navigation lighting should be spaced around the outer edges of the wind farm. Lights are not required on every tower. Where possible, careful consideration should be given to the selection of turbines requiring lighting to avoid unnecessary impact upon residences.
- Treatment of the rear of blades with a non-reflective coating to reduce reflection off the rotating blade at night.
- Use of the lowest candela intensity allowed by CASA.
- According to the CASA requirements, shielding may be provided to restrict the downward spill of light to the ground plane by ensuring that no more than 5% of the nominal light intensity should be emitted at or below 5° below horizontal (Refer to **Figure 26**).
- No light should be emitted at or below 10° below horizontal.

Technology in both aviation and wind farm development is constantly evolving. One example of evolving technology is Air Detection Lighting System (ADLS). Although these haven't been utilised in New South Wales, an ADLS has recently been installed at the Lal Lal Wind Farm just east of Ballarat in Victoria. An ADLS is an effective measure to reduce visual impacts, save electricity and improve aviation safety. Aviation lighting is activated when an aircraft approaches within four (4) to six (6) km.

As this technology such as Air Detection Lighting Systems become more cost effective and readily available, it may become a viable option for the Project.

Over time as wind farm development has occurred throughout New South Wales, there are precedents for the review of the requirement of aviation lightings on a number of wind farms post-construction. In the Upper Lachlan Shire, on November 1, 2010 Cullerin Wind Farm, owned by Origin Energy, switched off turbine aviation lighting after guidelines set out by CASA were withdrawn. Requirement of aviation lighting for Crookwell 2 Wind Farm was reviewed by CASA in 2019 and allowed to be turned off (Crookwell Gazette, 2019).

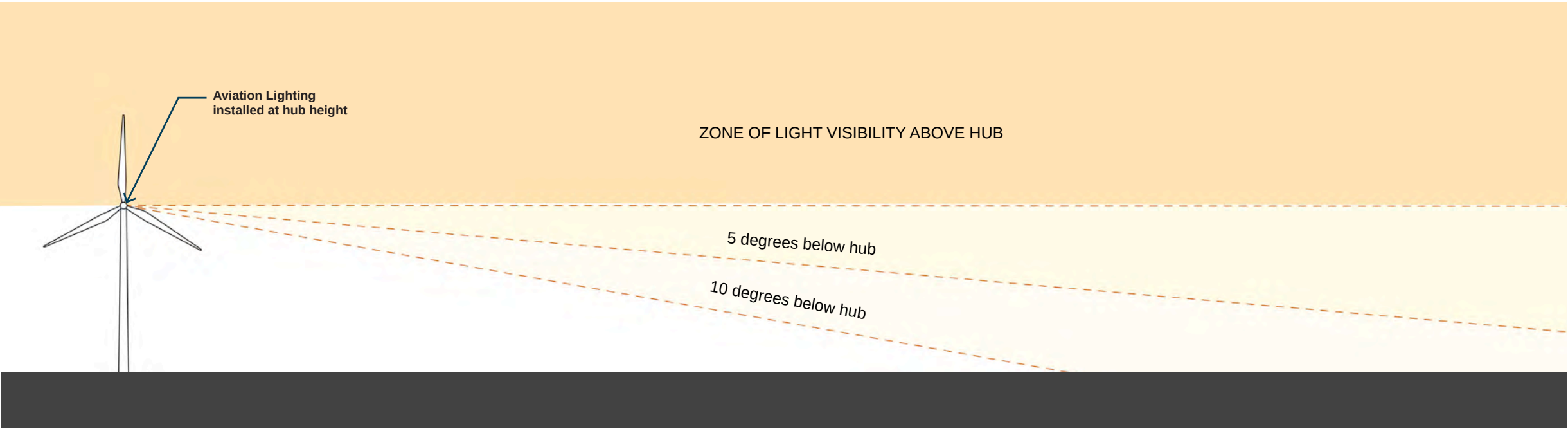


Figure 26 – Recommended Light Shielding to reduce lighting spread

12.5 Potential Impacts of Lighting Associated with Ancillary Infrastructure

In addition to aviation hazard lighting on wind turbines, night lighting is likely to be required on ancillary infrastructure including switching stations, collector substations and facilities buildings.

Maintenance lighting will be installed at the substations and at the O&M building for night work including emergency operations. All maintenance lighting will be designed to reduce disturbance to neighbouring properties and will be used only when there are staff onsite or during emergencies.

Continuously operating security lighting would be installed on posts up to 3.5 m high adjacent to the security fencing and O&M buildings.

It is unlikely the proposed night lighting associated with the ancillary infrastructure would create a noticeable impact on the existing night time landscape.

To assist in the amelioration of the effect of night lighting on ancillary structures the following should be applied:

- Security lighting throughout the wind farm, switching station and the substation should be minimised to decrease the contrast between the wind farm and the night time landscape of the area.
- Motion detectors should be used to activate night time security lighting when required.
- Lighting is to be designed to ensure it does not spill onto nearby roads or residences.

If design principles are incorporated into the night lighting for Ancillary Infrastructure, it is likely there will be no visual impacts resulting from night lighting of Ancillary Structures.

1. Control the level of lighting:

- Only use lighting for areas that require lighting ie. paths, building entry points.
- Reduce the duration of lighting:
- Switch off lighting when not required
- Consider the use of sensors to activate lighting and timers to switch off lighting

2. Lighting Design:

- Use the lowest intensity required for the job
- Use energy efficient bulbs and warm colours
- Direct light downwards
- Ensure lights are not directed at reflective surfaces
- Use non-reflective dark coloured surfaces to reduce reflection of lighting (**Figure 27**)
- Keep lights close to the ground and / or directed downwards (**Figure 28**)
- Use light shield fittings to avoid light spill (refer to **Figure 29**).

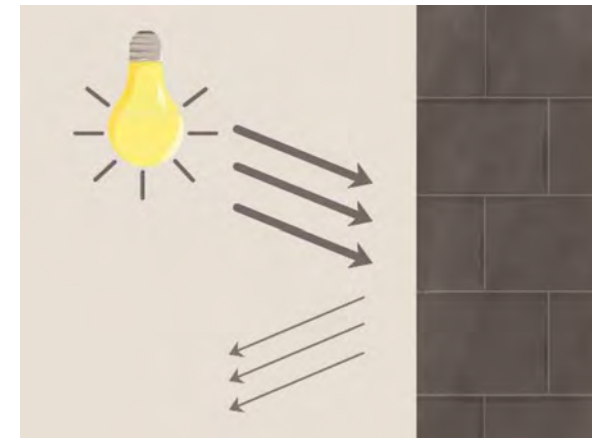


Figure 27 – Surface Reflectivity

Source: Department of Environment and Energy National Light Pollution Guidelines for Wildlife (2020)

In accordance with the recommendations of the LVIA, ancillary structures are to be painted in a dark non-reflective paint to reduce any potential reflectivity from light and remain sympathetic to the surrounding landscape.

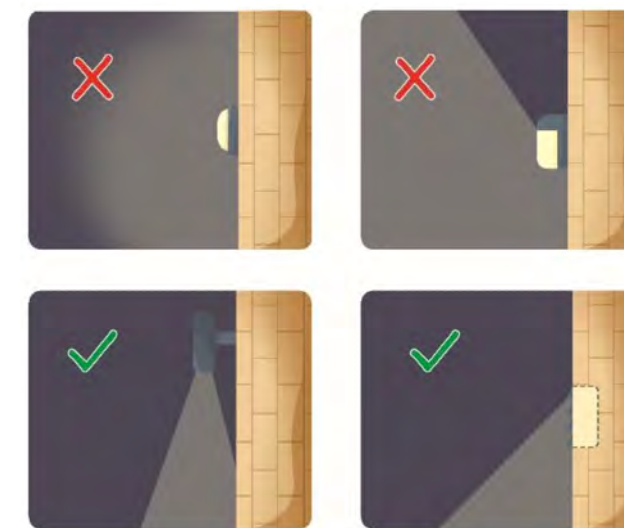


Figure 28 – Downward Lighting

Source: Department of Environment and Energy National Light Pollution Guidelines for Wildlife (2020)

Where possible, lighting is to be directed downwards.

Where possible, lighting should be fully or partially shielded to prevent spill into surrounding areas.

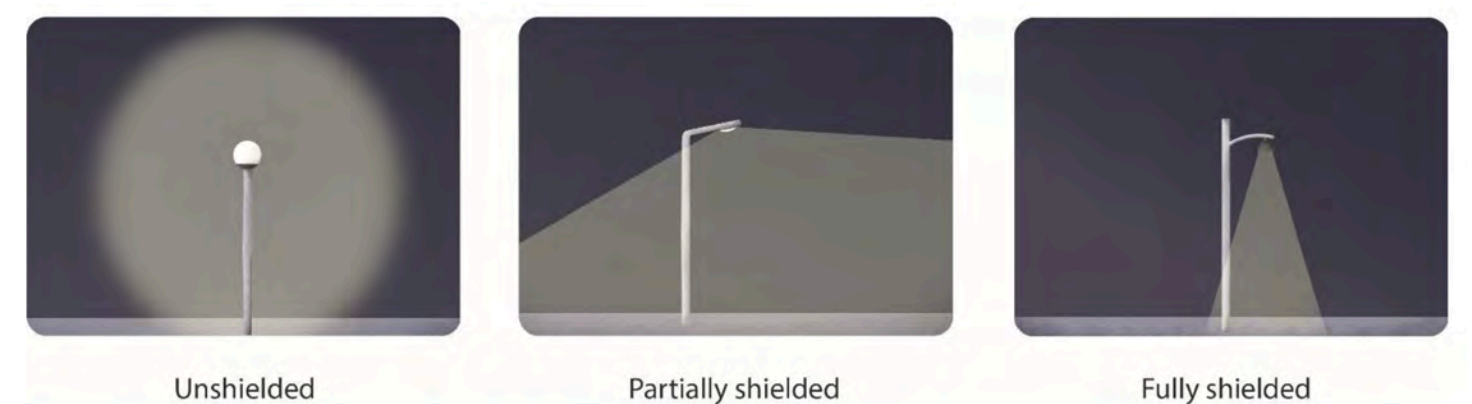


Figure 29 – Light Shielding

Source: Department of Environment and Energy National Light Pollution Guidelines for Wildlife (2020)

13

Cumulative Impact Assessment



13.0 Cumulative Impact Assessment

13.1 Overview of Cumulative Visual Impacts

The NSW Cumulative Impact Assessment Guidelines for SSD Projects state that “Cumulative impacts are a result of incremental, sustained and combined effects of human action and natural variations over time and can be both positive and negative. They can be caused by the compounding effects of a single project or multiple projects in an area, and by the accumulation of effects from past, current and future activities as they arise.” (DPHI, 2022a).

It is acknowledged that the existing landscape character will potentially be altered by nearby wind and solar farms which are expected to occur within renewable energy zones, and therefore, a cumulative impact assessment is required.

The Bulletin states:

The visual assessment must assess, in accordance with the SEARs, the overall and broader landscape impacts of the proposed wind energy project. It will also address potential cumulative impacts of wind energy projects in the region (the proposed wind energy project, as well as existing and approved projects).

Cumulative landscape and visual effects result from additional changes to the landscape or visual amenity caused by the proposed development in conjunction with other developments (associated with or separate to it) or actions that occurred in the past, present or are likely to occur in the foreseeable future (Landscape Institute et al, 2008). Cumulative effects may also affect the way a landscape is experienced and can be positive or negative.

It is important the Project considers the potential cumulative effects on the immediate and broader regional context it forms part of.

A cumulative impact assessment has several dimensions:

- The impact of the wind farm, when added to the combined impacts of all other existing developments and environmental characteristics of the area.
- The impact of this development in the context of the potential for development of wind energy. The impact of developments which are ancillary to or otherwise associated with the proposed wind farm eg. the development of transmission lines.
- The potential for future development of wind farms in the region.

Table 18 provides a summary of the nearby renewable energy projects.

Name of Project	Reference and Type of Project	Distance to the Project Area	Current Status
Yanco Delta Wind Farm	Wind Farm (SSD-41743746)	<1km (Adjoining Project to the south)	Approved - December 2023
Argoon Wind Farm	Wind Farm (SSD-64935522)	<1km (Adjoining Project to the south)	Proposed – EIS in preparation. SEARs issued 12/2023.
Dinawan Solar Farm	Solar Farm (SSD-50725959)	<1km (Adjoining Project to the east)	Proposed – Response to submissions following public exhibition in 11-12/2023.
Project EnergyConnect – includes construction and operation of 330-kV and 500-kV transmission line and Dinawan Substation.	Electricity transmission (SSI-9172452)		Western Section approved. Second stage to be approved
Bullawah Wind Farm	Wind Farm (SSD-50505215)	Approximately 9 km to the west	Proposed – EIS in preparation. SEARs issued 12/12/2022.
Pottinger Wind Farm	Wind Farm (SSD-59235464)	Approximately 26 km to the west	Proposed – EIS in preparation SEARS issued 10/06/2023
Pottinger Solar Farm	Solar Farm (SSD-59254709)	Approximately 31 km to the northwest	Proposed – EIS in preparation SEARS issued 10/06/2023
The Plains Wind Farm	Wind Farm (SSD-50629707)	Approximately 37 km to the west	Proposed – EIS in preparation. SEARs issued 16/12/2022.
Currawarra Solar Farm		Approximately 42 km to the southwest	Determined
Yarrabee Solar Farm		Approximately 42 km to the northeast	Proposed
The Plains Solar Farm	Solar Farm (SSD-51219280)	Approximately 62 km to the northwest	Proposed – EIS in preparation. SEARs issued 23/12/2022.
Keri Keri Wind Farm	Wind Farm (SSD-38358962)	Approximately 124 km to the west	Proposed – EIS in preparation. SEARs issued 05/22
Keri Keri Solar Farm	Solar Farm (SSD-40121957)	Approximately 139 km to the west	Proposed – EIS in preparation. SEARs issued 10/22
Wilan Wind Farm	Wind Farm (SSD-51306206)	Approximately 130 km to the northwest	Proposed - EIS in preparation. SEARs issued 12/22
Junction Rivers (formerly Burrawong) Wind Farm	Wind Farm (SSD-30448824)	Approximately 154 km to the west	Proposed – EIS in preparation
Limondale Solar Farm		Approximately 173 km to the west	Operational
Sunraysia Solar Farm		Approximately 173 km to the west	Operational

*Note: Information available on NSW Major Projects Database accessed February 2024

Table 19 – Summary of nearby renewable energy projects

13.2 Cumulative Impact Assessment of Nearby Renewable Energy Projects

The Bulletin states: “The application of the cumulative tools to a distance of eight kilometres from a dwelling or public viewpoint is based on visibility research conducted by Sullivan et. al. (2012), Bishop (2002), Shang and Bishop (1999) and others. At eight kilometres, turbines and objects recede into the background in terms of visibility” (DPE, 2016).

Figure 31 shows that the proposed renewable energy projects that are located in proximity of the Project. Therefore, the potential cumulative visual impact considers a total of four (4) proposed renewable energy projects that are located within 8 km of the Project. These include: YDWF, AWF, BWF and Dinawan Solar Farm (DSF). The MWTT can help identify dwellings and public viewpoint locations that are likely to have cumulative impacts with wind farms located within 8 km of the viewpoint (refer to **Section 13.2.1**, **Section 13.2.2** and **Table 19**).

The following provides a brief overview of the proposed layouts (as per Major Projects, accessed February 2024) for the surrounding renewable energy projects:

Yanco Delta Wind Farm

YDWF adjoins to Project to the south. The nearest YDWF turbine is located approximately 500 m west of the Project's T_ 77E. YDWF was approved in December 2023 according to the Major Projects website, visited in February 2024. YDWF proposes to construct up to 208 turbines, with a max. tip height of 270 m.

Due to the flat terrain, there is potential to view YDWF and the Project simultaneously, particularly along Four Corners Road, Mabins Well Road, Mclennons Bore Road, Wilson Road and Carrathool Road. Based on topography alone, a number of dwellings also have the potential for cumulative impacts. **Table 19** details the findings of the potential cumulative impacts from non-associated dwellings.

Argoon Wind Farm

AWF adjoins to Project to the south. The nearest AWF turbine is located approximately 270 m south of the Project's T44_E. SEARS was issued for AWF in December 2023 according to the Major Projects website, visited in February 2024. AWF proposes to construct up to 106 turbines, with a max. tip height of 280 m.

Due to the flat terrain, there is potential to view AWF and the Project simultaneously, particularly along Wilson Road, Jerrys Lane, Liddles Lane, Mabins Well Road and Mclennons Bore Road. Based on topography alone, a number of dwellings also have the potential for cumulative impacts. **Table 22** details the findings of the potential cumulative impacts from non-associated dwellings.

Bullawah Wind Farm

BWF is located to the north west of the Project. The nearest BWF turbine is located approximately 9.4 km west of the Project's T23_W. SEARS was issued for BWF in December 2022 according to the Major Projects website, visited in February 2024. BWF proposes to construct up to 170 turbines, with a max. tip height of 280 m.

Due to the flat terrain, there is potential to view BWF and the Project simultaneously, particularly along North Boundary Road, Four Corners Road and Carrathool Road. There were no dwellings identified within 8 km of the Project and BWF.

Dinawan Solar Farm

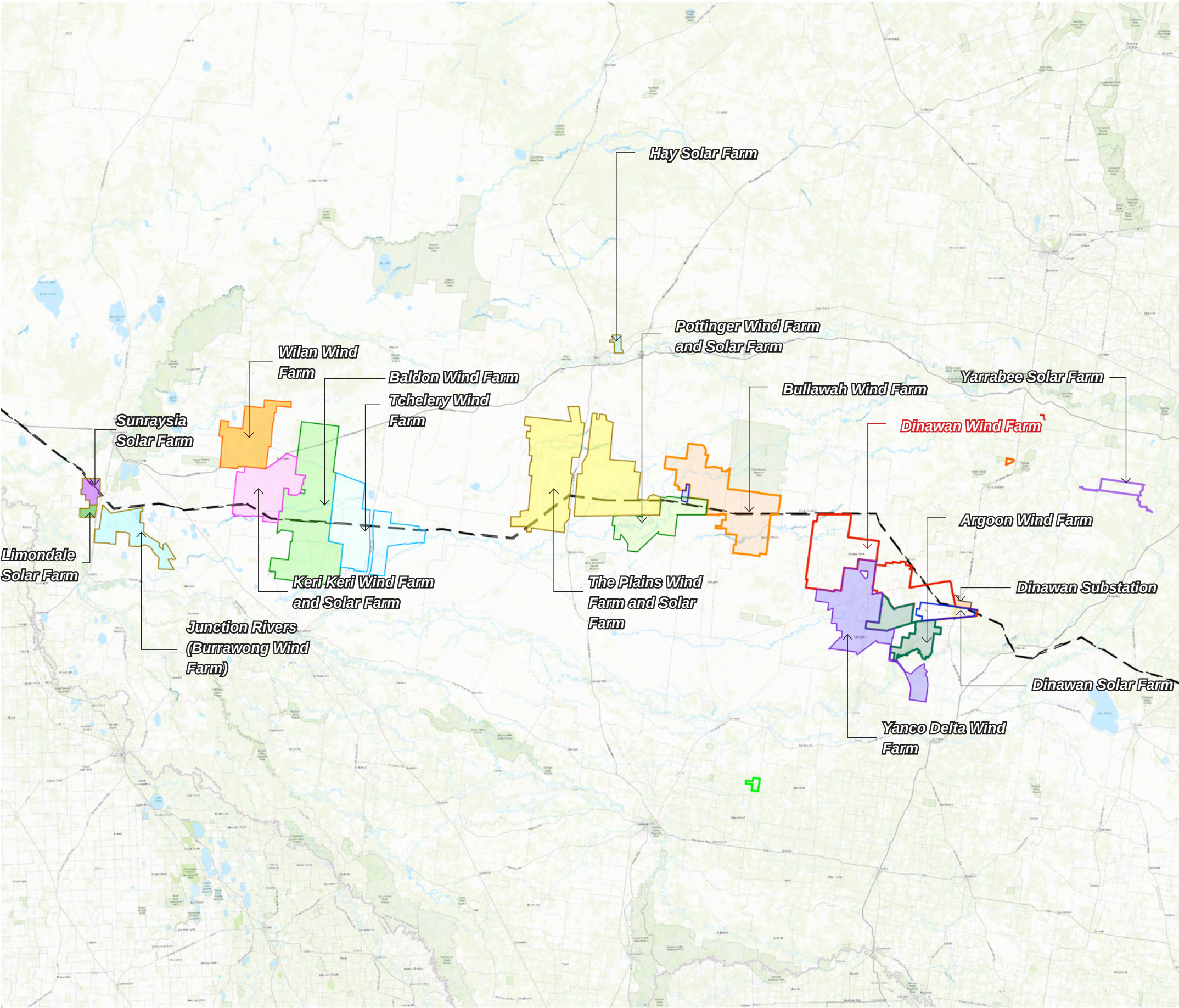
DSF is part of the Dinawan Energy Hub Project, however it forms part of a separate submission. DSF is proposed within the Project Area, to the southeast. As of March 2024, DSF is currently in Response to Submission phase. Due to the flat terrain, there is potential to view DSF and the Project simultaneously, particularly along Kidman Way, Mclennons Bore Road, Liddles Lane and Jerrys Lane.

Transmission Lines and Dinawan Substation (Project EnergyConnect)

The Project will connect to the NEM via the Dinawan Substation (DS), a new substation being built as part of Project EnergyConnect. Project EnergyConnect is a new 330 kV interconnector between NSW and South Australia. The Dinawan Substation adjoins the Project to the north. The transmission lines associated Project EnergyConnect are predominantly to the north of the Project Area . Due to the flat terrain, there is potential to view the DS, Project EnergyConnect and the Project simultaneously, particularly along Kidman Way, Mclennons Bore Road, Fernbank Road and Four Corners Road.

Nearby Renewable Energy Projects

Dinawan Wind Farm



LEGEND

- Project Area
- Sunraysia Solar Farm Project Area
- Limondale Solar Farm Project Area
- Junction Rivers Wind Farm Project Area
- Wilan Wind Farm Project Area
- Tchelery Wind Farm Project Area
- The Plains Wind and Solar Farm Project Area
- Pottinger Wind and Solar Farm Project Area
- Bullawah Wind Farm Project Area
- Baldon Wind Farm Project Area
- Argoon Wind Farm Project Area
- Hay Solar Farm Project Area
- Keri Keri Wind and Solar Farm Project Area
- Yanco Delta Wind Farm Project Area
- Dinawan Solar Farm Project Area
- Yarrabee Solar Farm Project Area
- Main Road
- Proposed Transmission Line Upgrade (PEC)

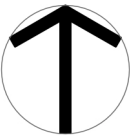
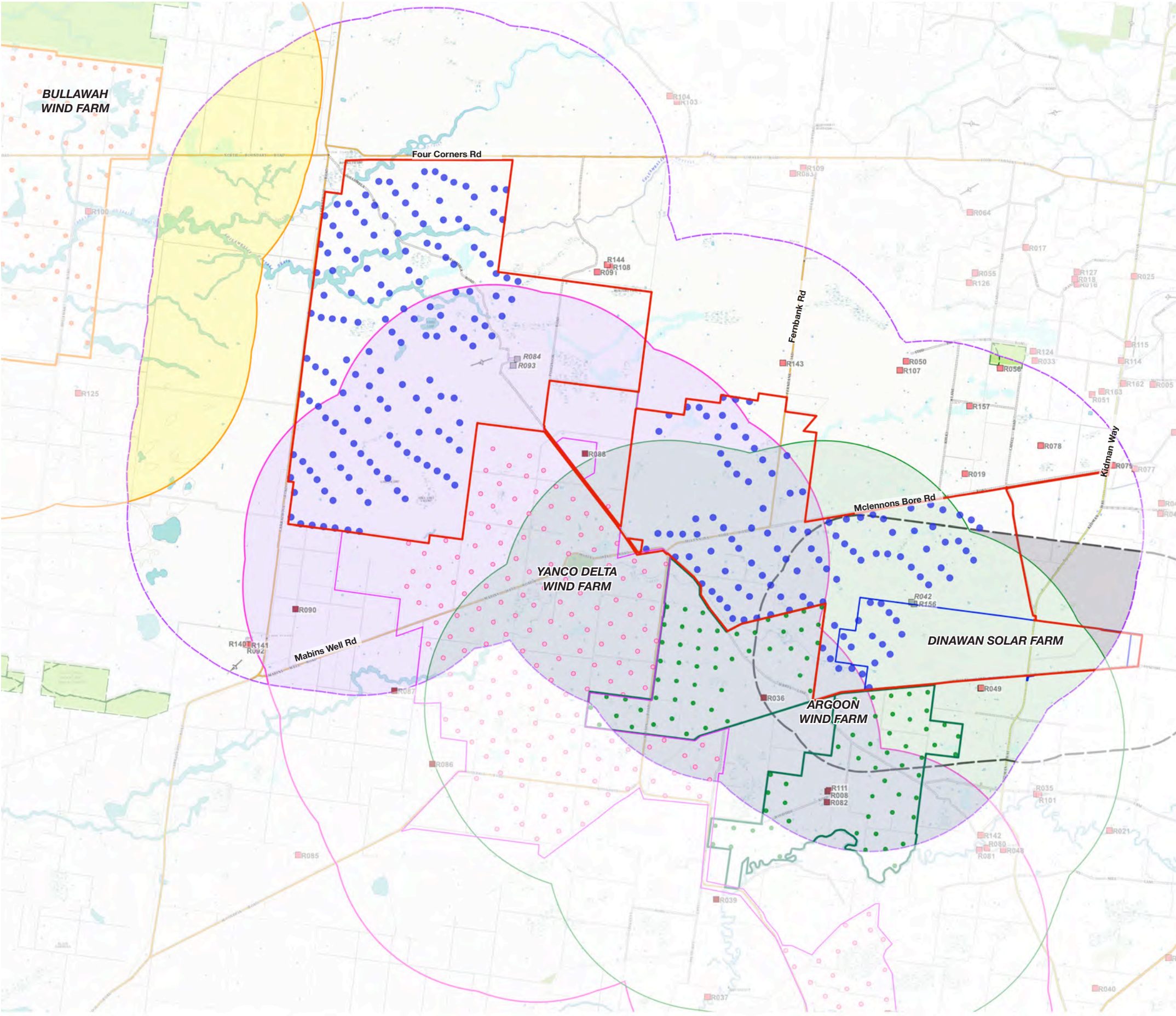


Figure 30 – SW REZ (Map Source: Energy NSW, 2022)

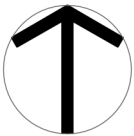


Cumulative Assessment

Dinawan Wind Farm

LEGEND

- Project Area
- Proposed 280 m Turbine Location
- BWF Turbine Location
- YDWF Turbine Location
- AWF Turbine Location
- 8,000 m from Project Turbine
- 8,000 m from YDWF Project Turbine
- 8,000 m from BWF Project Turbine
- 8,000 m from AWF Project Turbine
- 4,000 m from DSF Development Footprint
- YDWF Project Area
- BWF Project Area
- AWF Project Area
- DSF Project Area
- Area within 8,000 m of BWF and the Project
- Area within 8,000 m of YDWF, DSF, AWF and the Project
- Area within 8,000 m of AWF, DSF and the Project
- Area within 8,000 m of YDWF and the Project
- Area within 4,000 m of DSF and the Project
- Main Road
- Minor Road



0 2 4 6 8 10km

Figure 31 – Renewable energy projects within 8,000m of the Project
Image Source: ESRI, 2024

13.2.1 Cumulative Impact Assessment of Nearby Wind Farm Projects

Figure 32 represents the ZVI of the Project and the surrounding three (3) wind farm projects located within 8,000 m of the nearest turbine. The ZVI is based on topography alone and does not consider vegetation. Due to the flat terrain, views towards the majority of turbines are likely for the most Study Area.

As per **Figure 32**, the existing topographic character of the region allows clear, open views of surrounds. It is likely cumulative views toward the Project in conjunction with AWF, YDWF and BWF will be available when traversing the nearby roads, particularly from Kidman Way, McLennons Bore Road, Fernbank Road, North Boundary Road, Four Corners Road and Carrathool Road.

The MWTT was applied to the eight (8) identified non-associated dwellings within 8,000 m of a proposed or approved turbine associated with the Project, YDWF, AWF and BWF to assist in identifying the cumulative visual impacts. **Table 19** provides an overview of the dwellings and details the existing screening factors. The approach to the cumulative assessment identifies those dwellings which are non-associated with the Project and those that are non-associated with the Project but associated with another surrounding wind farm. The sectors occupied by turbines which form part of the associated project are then removed from the overall MWTT totals. The number of sectors occupied by the associated projects are noted in **Table 19**.

Wireframe diagrams were prepared to demonstrate the potential visibility of the four (4) wind farm projects based on topography alone from the eight (8) non-associated dwellings identified within the 8,000 m of the Project, YDWF, AWF and BWF. Application of the MWTT suggest that of the eight (8) dwellings, and based on topography alone:

- Two (2) non-associated dwellings have the potential for views in up to one (1) 60° sector (R087 and R090). Both dwellings are non-associated with the Project but associated with YDWF.
- Four (4) non-associated dwellings have the potential for views in up three (3) 60° sectors (180°) (R049, R082, R008 and R111). Of the three (3) 60° sectors, up to two (2) 60° sectors are occupied by the Project with the remaining occupied by either YDWF or AWF. It is noted that R082, R008 and R111 are all associated with AWF, which occupies up five (5) 60° sectors (up to 300°) alone.
- Two (2) non-associated dwellings have the potential for views in up to four (4) 60° sectors (up to 240°) (R088 and R036).

R088 is associated with the YDWF which occupies up to two 60° sectors (up to 120°). Whilst the Project occupies up to four (4) 60° sectors, two (2) of these are shared with YDWF. As a result, the Project poses an additional two (2) sectors. Further assessment using LIDAR wireframes show that existing

vegetation located to the northwest and southeast of the dwelling will reduce views towards the Project therefore reducing the number of sectors visible to up to two 60° sectors (up to 120°) which is deemed acceptable in accordance with the Bulletin.

R036 is associated with AWF which occupies up to six (6) 60° sectors (up to 360°). The Project occupies up to two (2) 60° sectors and YDWF also occupies up to two (2) 60° sectors, these are all shared with AWF. Further assessment using photomontage demonstrates that existing vegetation and farm infrastructure will screen views toward the Project from this dwelling.

13.2.2 Cumulative Impact Assessment of Nearby Solar Farm Project

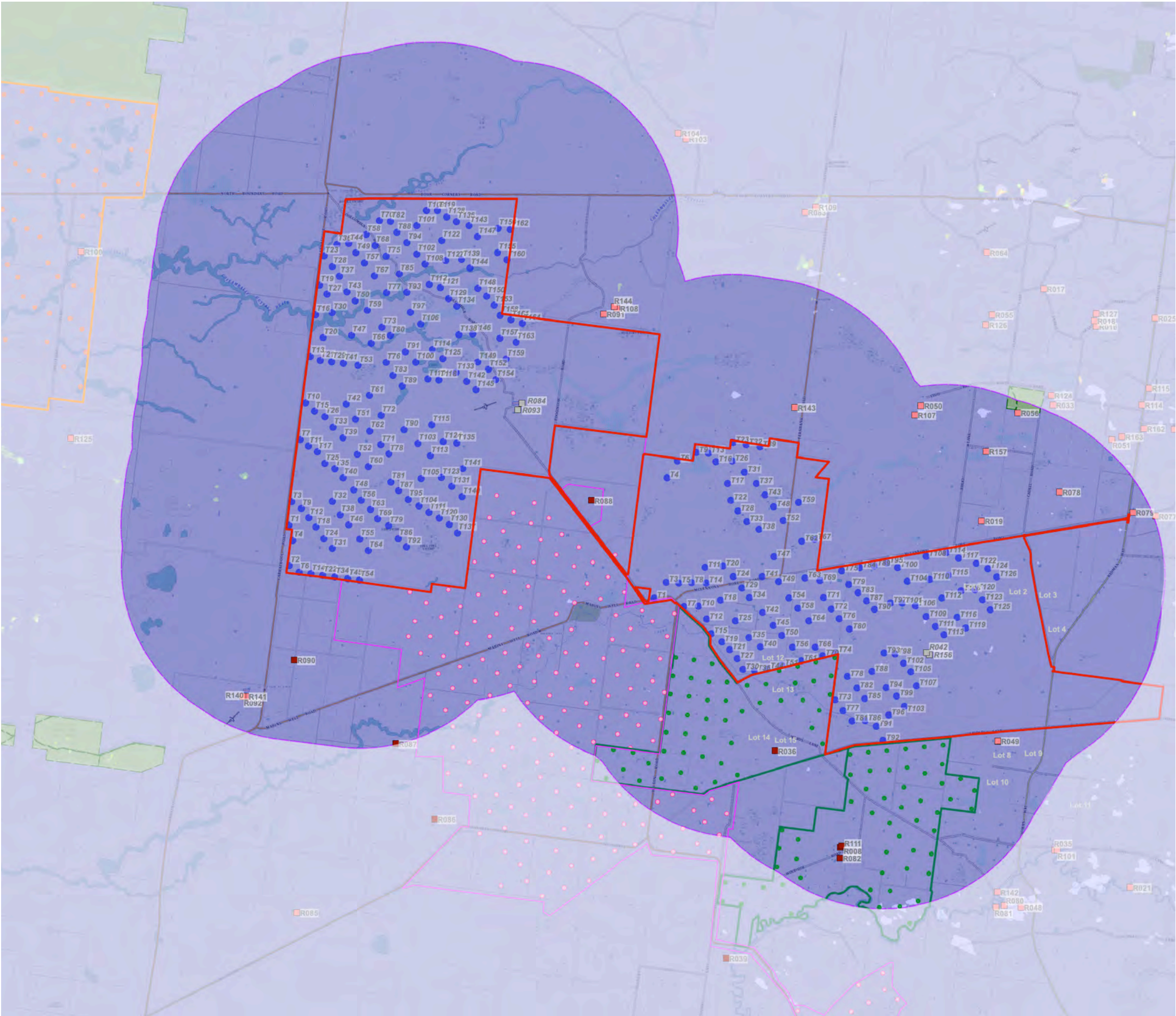
The potential for cumulative impacts have been identified from R049, due to the proximity to the Project and DSF. Further assessment using photomontages demonstrate that dense vegetation to the north will screen the majority of views from this dwelling.

Potential for cumulative impacts have been identified from along Kidman Way, Jerrys Lane and Liddles Lane due to the lack of vegetation surrounding the road reserve, in conjunction with the vertical scale of the Project. Liddles Lane and Jerrys Lane are a publicly accessible low use rural road that are utilised predominantly by residents and farm workers to access the surrounding farmlands. The road has a low viewpoint sensitivity level. Kidman Way is a main connection within the area, however it has a low viewpoint sensitivity.

13.2.3 Cumulative Impact Assessment of Transmission Lines and Dinawan Substation (Project EnergyConnect)

The *Draft Renewable Energy Zone (South West) Access Scheme Order 2023* has been established by the NSW Office of Energy and Climate Change to coordinate the development and delivery of electricity in the SW REZ. The existing 220 kV electrical transmission line is proposed to be upgraded to 330 kV electrical transmission line as part of 'Project EnergyConnect' that is being undertaken by ElectraNet and TransGrid.

Relevant to the Project, the proposed 330 kV interconnector runs generally north south to the east of the Project, with the Dinawan Substation proposed to the south east of the Project. Due to the flat terrain, there is potential to view DS and transmission lines and the Project simultaneously, particularly along Kidman Way, McLennons Bore Road, Fernbank Road and Four Corners Road.



Cumulative ZVI

Dinawan Wind Farm,
Yanco Delta Wind Farm,
Argoon Wind Farm, and
Bullawah Wind Farm

LEGEND

- Project Area
- Proposed Project Turbine Location
- 8,000 m from Project Turbine
- YDWF Turbine Location
- 8,000 m from YDWF Turbine
- YDWF Project Area
- BWF Turbine Location
- 8,000 m from BWF turbine
- BWF Project Area
- AWF Turbine Location
- 8,000 m from AWF Turbine
- AWF Project Area
- Associated Dwelling
- Non-associated Dwelling
- Non-associated Dwelling (Associated with other Project)

ZVI LEGEND:

- The Project, AWF, BWF, YDWF Visible
(Based on topography alone)

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.

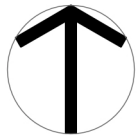


Figure 32 – Cumulative Zone of Visual Influence - the Project, YDWF, AWF and BWF
Imagery Source: Six Maps, 2023

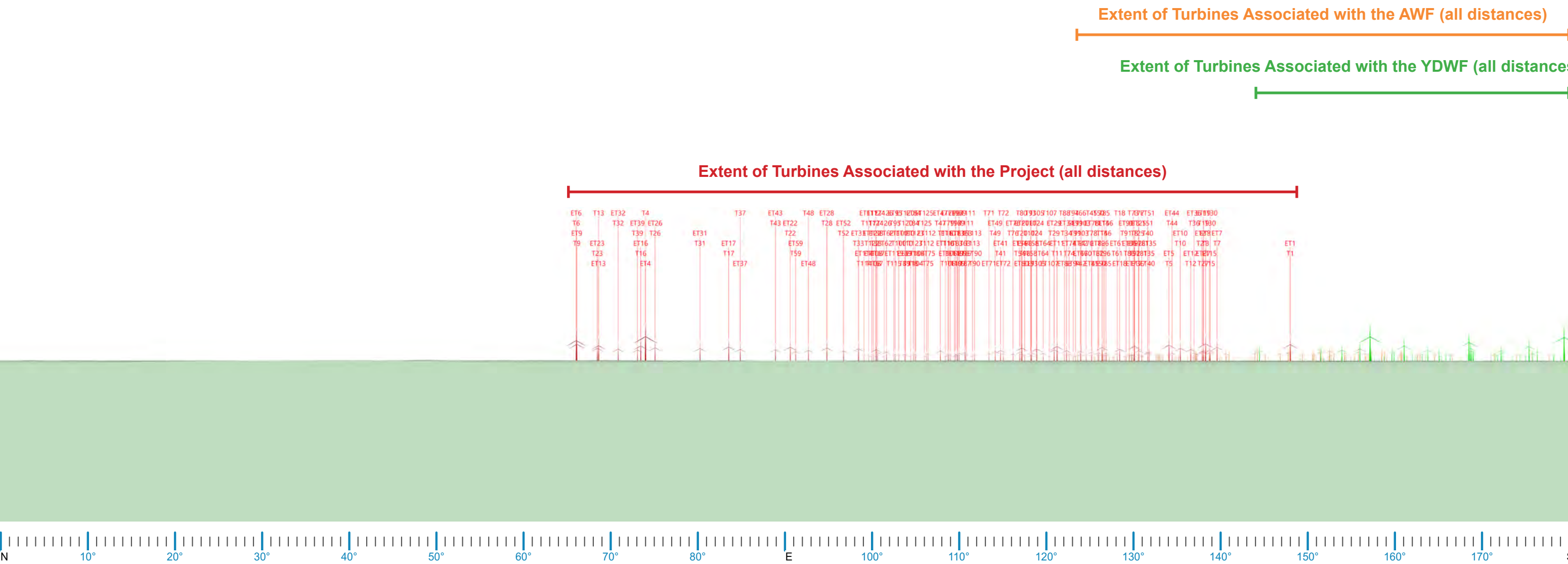
Dwelling ID	Associ-ated with other Project?	Distance to nearest Pro-ject Related Turbine:	Number of 60° Sectors (Based on a 2D Cumulative Assessment):	Number of 60° Sectors associated with the Project (based on 3D Assessment):	Number of 60° Sectors associated with surrounding wind farm (BWF, AWF, YDWF or the Project) (based on 3D Assessment):	Notes:
Non-associated receptors with turbines in up to one (1) 60° Sector (up to 60°):						
R087	Y - YDWF	7.95 km	One (1) 60° Sector (up to 60°)	One (1) 60° Sector (up to 60°)	One (1) 60° Sector (up to 60°) (The Project)	This dwelling is associated with YDWF. Based on topography alone, up to one (1) 60° sector has the potential to be occupied by the Project alone. It is noted that based on topography alone up to three (3) 60° Sectors (180°) are occupied by the YDWF, one (1) of which is shared with the Project. Therefore, from this dwelling the greatest impacts are likely to be from YDWF. Aerial imagery indicates existing vegetation to the north which is likely to screen views towards turbines in this direction. Views towards turbines associated with the eastern portion of the Project may be available through gaps in vegetation, however it is noted that these turbines are located in excess of 16 km of the dwelling and will occupy a small portion of the view. Views in up to two (2) 60 degree sectors is deemed acceptable in accordance with the Bulletin.
R090	Y - YDWF	4.16 km	One (1) 60° Sectors (up to 120°)	One (1) 60° Sectors (up to 120°)	One (1) 60° Sector (up to 60°) (The Project)	This dwelling is associated with YDWF. Based on topography alone, up to one (1) 60° sector has the potential to be occupied by the Project alone. It is noted that based on topography alone up to (1) 60° sector is occupied by the YDWF. Further detailed assessment using a photomontage demonstrates that views from the dwelling are generally contained by existing vegetation. Existing dense vegetation in the foreground to the north is likely to contain views towards the Project from this dwelling. Views in up to two (2) 60 degree sectors is deemed acceptable in accordance with the Bulletin.
Non-associated receptors with turbines in up to three (3) 60° Sectors (up to 180°):						
R049	N	4.67 km	Three (3) 60° Sectors (Up to 180°)	Three (3) 60° Sectors (Up to 180°)	Two (2) 60° Sectors (up to 120°) (The Project) Two (2) 60° Sectors (up to 120°) (AWF)	Based on topography alone, up to three (3) 60° sectors have the potential to be occupied by the Project alone. Of these, up to two (2) 60° sectors (up to 120°) are occupied by the AWF and two (2) 60° sectors (up to 120°) are occupied by the Project. One (1) 60° sector is shared between the Project and AWF. Further detailed assessment using photomontage indicates that existing dense vegetation in the foreground to the northwest contains the majority of views toward the Project. As a result, the number of sectors occupied will reduce to up to one (1) 60° sector due to the existing vegetation surrounding the dwelling which is deemed acceptable in accordance with the Bulletin.
R082	Y - AWF	5.95 km	Three (3) 60° Sectors (Up to 180°)	Three (3) 60° Sectors (Up to 180°)	One (1) 60° Sector (up to 60°) (The Project) Two (2) 60° Sectors (up to 120°) (YDWF)	This dwelling is associated with AWF. Based on topography alone, up to three (3) 60° sectors have the potential to be occupied by the Project alone. Of these, up to two (2) 60° sectors (up to 120°) are occupied by the YDWF and one (1) 60° sector has the potential to be occupied by the Project. It is noted that up to five (5) 60° sectors (up to 300°) are occupied by AWF. Aerial imagery indicates existing dense vegetation surrounds the dwelling. Existing scattered vegetation in the middleground to the north is likely to limit views towards the Project, however some views towards turbines located in excess of 6 km of the dwelling are likely to be available. The number of sectors occupied by the Project up to one (1) 60° sector is deemed acceptable in accordance with the Bulletin.
R008	Y - AWF	5.47 km	Three (3) 60° Sectors (Up to 180°)	Three (3) 60° Sectors (Up to 180°)	One (1) 60° Sector (up to 60°) (The Project) Two (2) 60° Sectors (up to 120°) (YDWF)	This dwelling is associated with AWF. Based on topography alone, up to three (3) 60° sectors have the potential to be occupied by the Project alone. Of these, up to two (2) 60° sectors (up to 120°) are occupied by the YDWF and one (1) 60° sector is occupied by the Project. It is noted that up to five (5) 60° sectors (up to 300°) are occupied by AWF. Further detailed assessment using a photomontage demonstrates that existing dense vegetation in the foreground to the north is likely to contain views towards the Project. Views in up to two (2) 60 degree sectors is deemed acceptable as per the Bulletin, and it is noted that the number of sectors occupied will reduce due to the existing vegetation surrounding the dwelling.
R111	Y - AWF	5.38 km	Three (3) 60° Sectors (Up to 180°)	Three (3) 60° Sectors (Up to 180°)	One (1) 60° Sector (up to 60°) (The Project) Two (2) 60° Sectors (up to 120°) (YDWF)	This dwelling is associated with AWF. Based on topography alone, up to three (3) 60° sectors have the potential to be occupied by the Project alone. Of these, up to two (2) 60° sectors (up to 120°) are occupied by the YDWF and one (1) 60° sector is occupied by the Project. It is noted that up to five (5) 60° sectors (up to 300°) are occupied by AWF. Further detailed assessment using a photomontage demonstrates existing dense vegetation in the foreground to the north of the dwelling is likely to contain views towards the Project. Views in up to two (2) 60 degree sectors is deemed acceptable as per the Bulletin, and it is noted that the number of sectors occupied will reduce due to the existing vegetation surrounding the dwelling.
Non-associated receptors with turbines in up to four (4) 60° Sectors (up to 240°):						
R088	Y - YDWF	3.75 km	Four (4) 60° Sectors (up to 300°)	Four (4) 60° Sectors (up to 240°)	Four (4) 60° Sectors (up to 240°) (The Project)	This dwelling is associated with YDWF. Based on topography alone, up to four (4) 60° sectors have the potential to be occupied by the Project alone. It is noted that based on topography alone up to three (3) 60° sectors (up to 180°) are occupied by the YDWF (two of which are shared with the Project). Therefore, from this dwelling the greatest impacts are likely to be from YDWF. Based on topography alone, the Project will occupy a total of two (2) 60 degree additional sectors, in addition to what was already posed by the YDWF. The additional sectors are located to the northwest and southeast of the dwelling. Further assessment using LIDAR wireframes indicates that existing vegetation will screen the majority of views towards the Project from this location, reducing the number of sectors to an acceptable level.
R036	Y - AWF	3.75 km	Four (4) 60° Sectors (up to 30 0°)	Four (4) 60° Sectors (up to 300°)	Two (2) 60° Sectors (up to 120°) (The Project) Two (2) 60° Sectors (up to 120°) (YDWF)	This dwelling is associated with AWF. Based on topography alone, up to four (4) 60° sectors (up to 300°) have the potential to be occupied. Of these, up to two (2) 60° sectors (up to 120°) are occupied by the YDWF and two (2) 60° sectors (up to 120°) are occupied by the Project. It is noted that up to six (6) 60° sectors (up to 360°) are occupied by AWF. Aerial imagery indicates vegetation to the north, east and west of the dwelling. A number of farm buildings and sheds are located to the north of the dwelling. The combination of these factors will screen views towards the Project, reducing the number of sectors to zero.

*Note: Information as per Scoping Report, prepared by Umwelt. 2023, accessed via the Major Projects Website

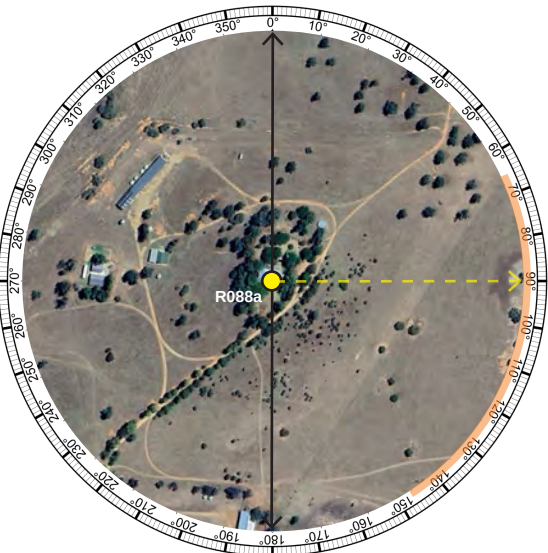
** Note: Information as per Assessment Report, prepared by the DPHI 2023, accessed via the Major Projects Website

Table 20 – Non-associated dwellings within 8,000 m of surrounding wind farm projects identified using MWTT

Dwelling R088a: 560 Goolgumbbla Road, Mabins Well NSW



Proposed Cumulative Wire Frame Diagram - 180 degree field of view



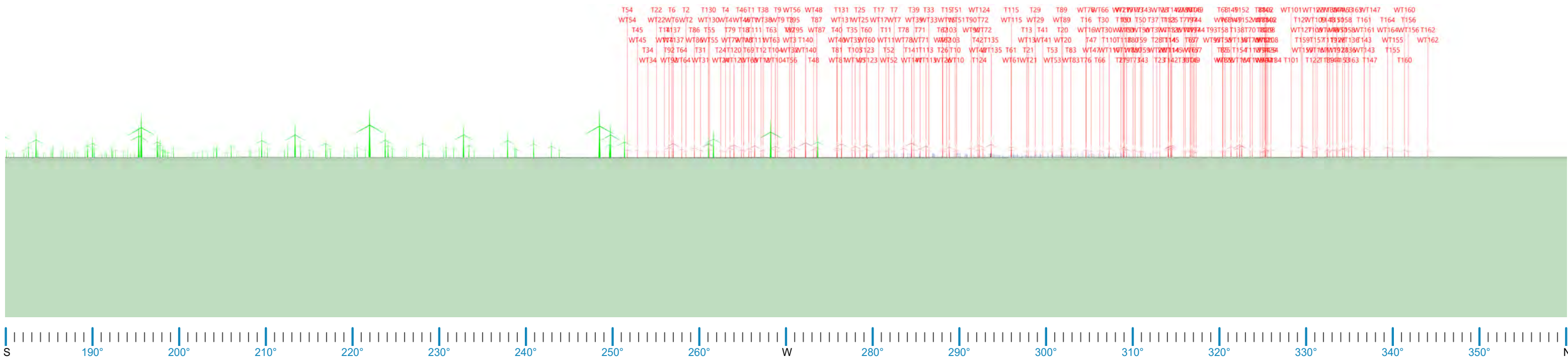
- LEGEND**
- Direction of the Wireframe
 - Extent of Panorama
 - Additional extent to that posed by YDWF (based on topography alone)
 - Wind Turbine associated with the Project
 - Wind Turbine associated with YDWF
 - Wind Turbine associated with BWF
 - Wind Turbine associated with AWF

NOTES
Turbine Layout for Yanco Delta Wind Farm, Bullawah Windfarm and Argoon Wind Farm is as per the Major Projects Website.

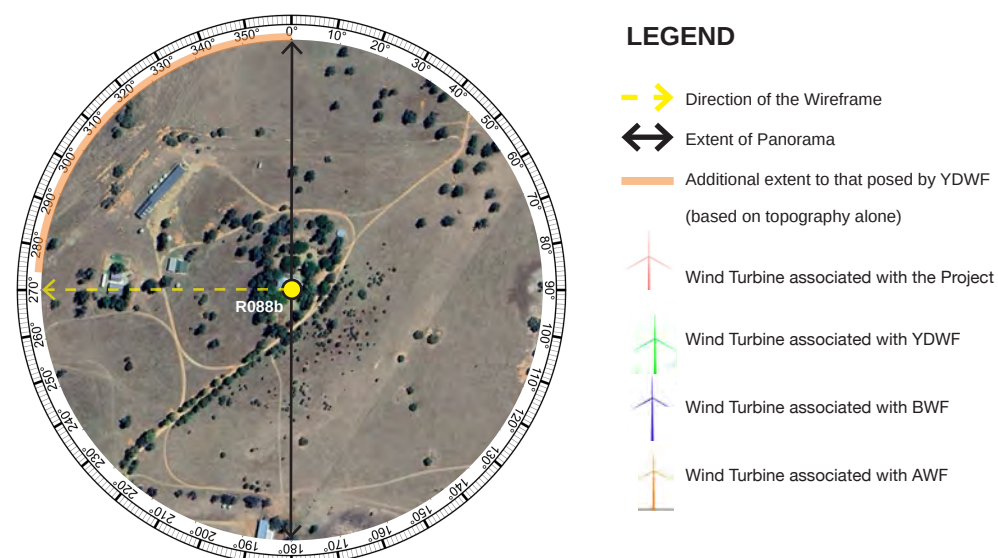
OVERVIEW OF CUMULATIVE VISUAL IMPACTS ON DWELLINGS:			
DWELLING ASSOCIATED WITH YDWF			
Distance to YDWF:	Distance to BWF:	Distance to the AWF:	Distance to the Project:
2.81km	N/A	8.38km	3.75km

Aerial Image - Wireframe Location (Aerial Image Source: Google Earth 2024)

Dwelling R088b: 560 Goolgumbbla Road, Mabins Well NSW



Proposed Cumulative Wire Frame Diagram - 180 degree field of view



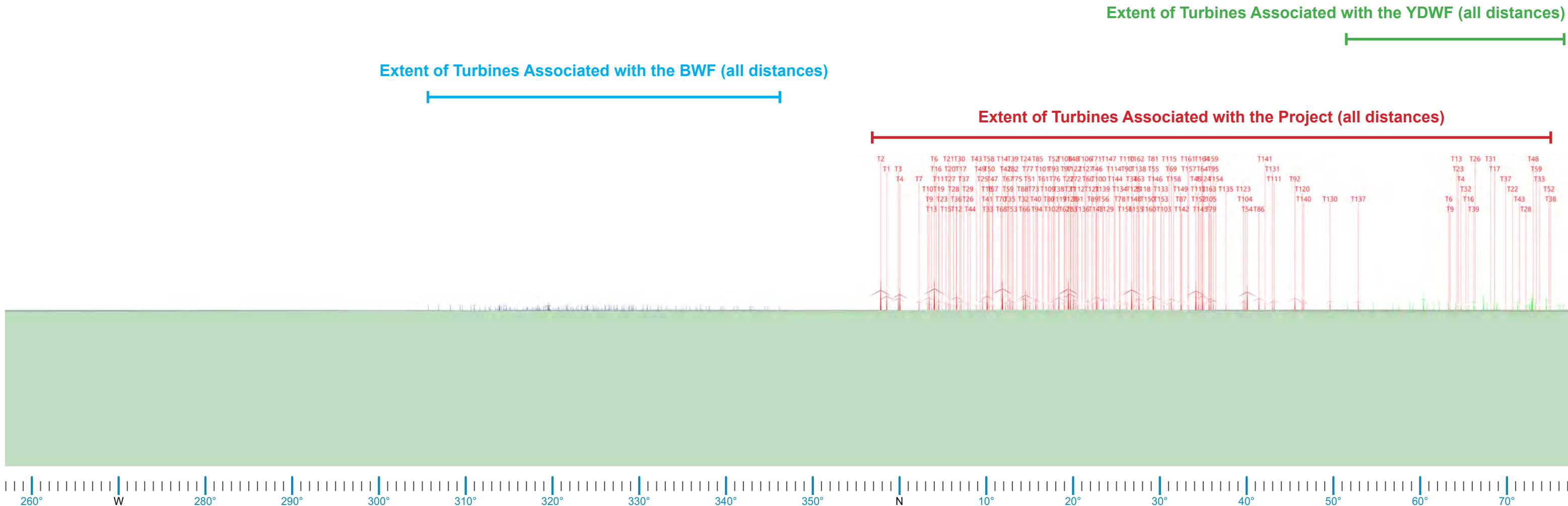
NOTES

Turbine Layout for Yanco Delta Wind Farm, Bullawah Windfarm and Argoon Wind Farm is as per the Major Projects Website.

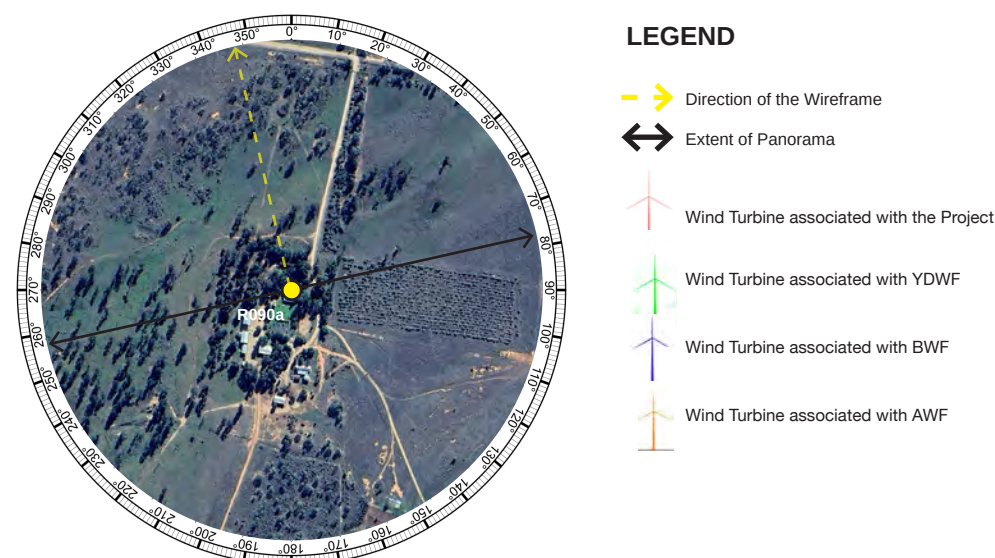
OVERVIEW OF CUMULATIVE VISUAL IMPACTS ON DWELLINGS:			
DWELLING ASSOCIATED WITH YDWF			
Distance to YDWF:	Distance to BWF:	Distance to the AWF:	Distance to the Project:
2.13km	25.41km	N/A	6.14km

Aerial Image - Wireframe Location (Aerial Image Source: Google Earth 2024)

Dwelling R090a: Carrathool Road, Steam Plains NSW



Proposed Cumulative Wire Frame Diagram - 180 degree field of view



NOTES

Turbine Layout for Yanco Delta Wind Farm, Bullawah Windfarm and Argoon Wind Farm is as per the Major Projects Website.

OVERVIEW OF CUMULATIVE VISUAL IMPACTS ON DWELLINGS:			
DWELLING ASSOCIATED WITH YDWF			
Distance to YDWF:	Distance to BWF:	Distance to the AWF:	Distance to the Project:
6.03km	17.08km	N/A	4.18km

Aerial Image - Wireframe Location (Aerial Image Source: Google Earth 2024)

Dwelling R090b: Carrathool Road, Steam Plains NSW

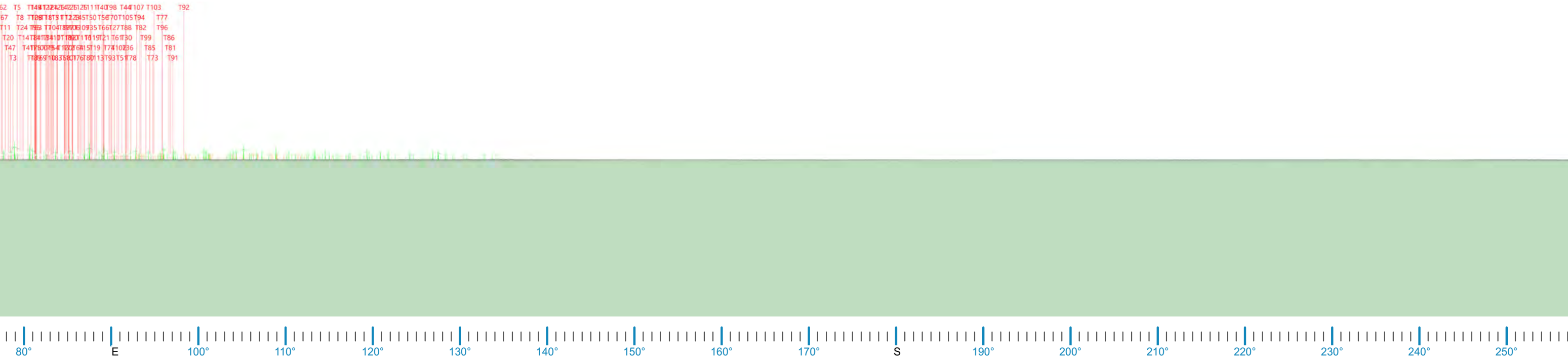
Extent of Turbines Associated with the AWF (all distances)



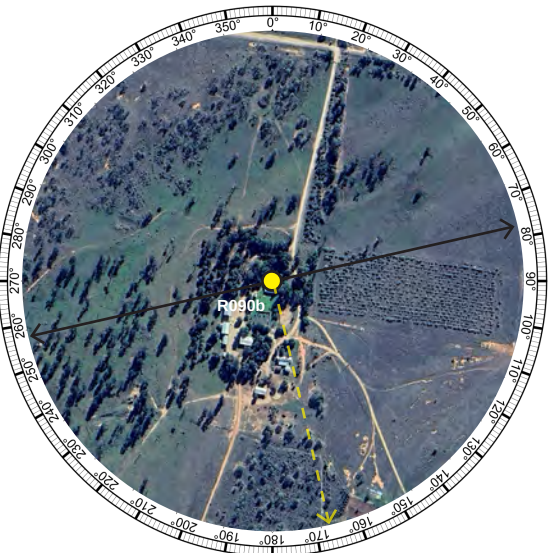
Extent of Turbines Associated with the YDWF (all distances)



Extent of Turbines Associated with the Project (all distances)



Proposed Cumulative Wire Frame Diagram - 180 degree field of view



LEGEND

- Direction of the Wireframe
- Extent of Panorama
- Wind Turbine associated with the Project
- Wind Turbine associated with YDWF
- Wind Turbine associated with BWF
- Wind Turbine associated with AWF

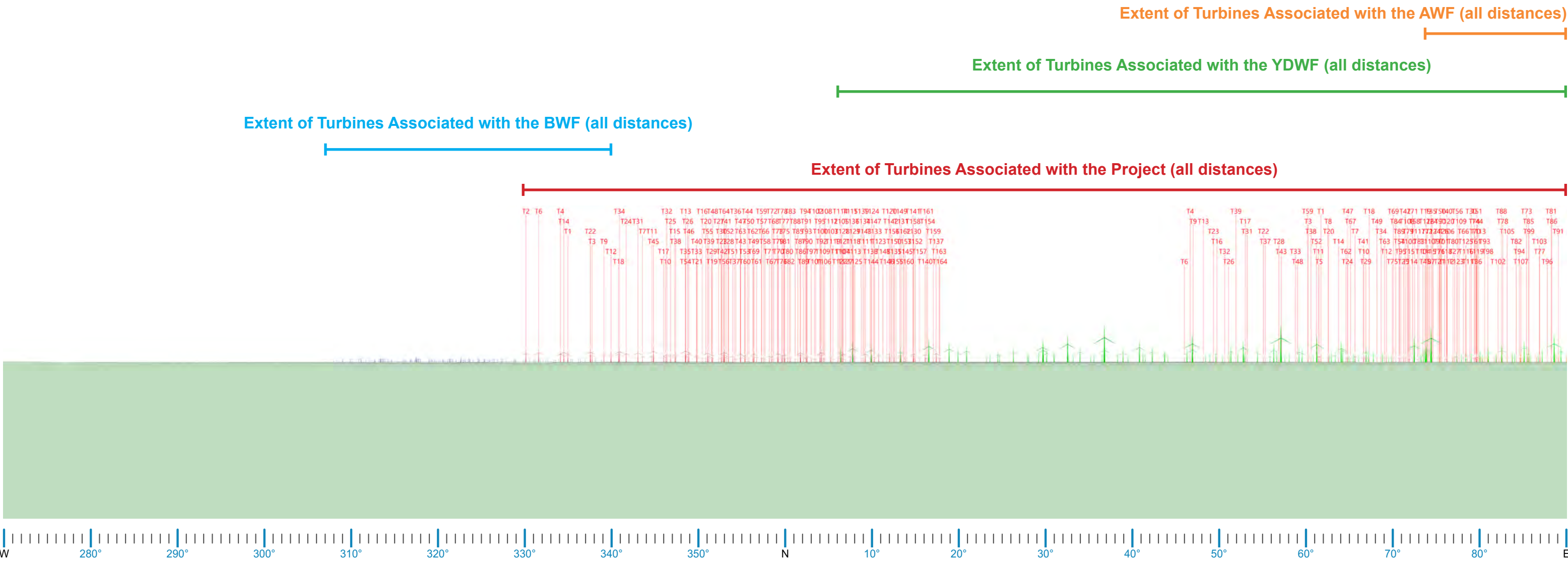
NOTES

Turbine Layout for Yanco Delta Wind Farm, Bullawah Windfarm and Argoon Wind Farm is as per the Major Projects Website.

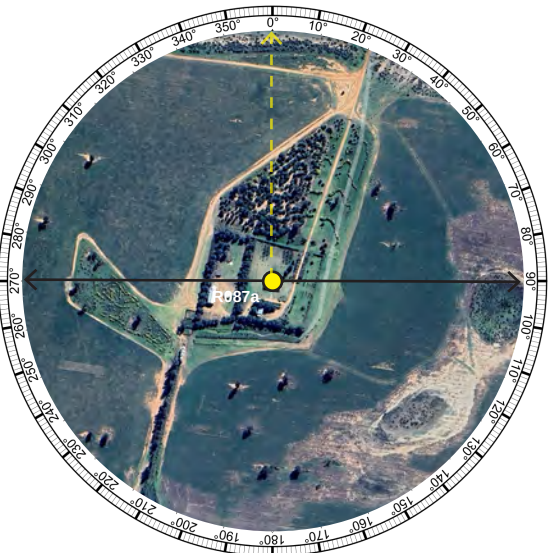
OVERVIEW OF CUMULATIVE VISUAL IMPACTS ON DWELLINGS:			
DWELLING ASSOCIATED WITH YDWF			
Distance to YDWF:	Distance to BWF:	Distance to the AWF:	Distance to the Project:
5.55km	N/A	15.85km	17.34km

Aerial Image - Wireframe Location (Aerial Image Source: Google Earth 2024)

Dwelling R087a: 676 Mabins Well Road, Moonbria NSW



Proposed Cumulative Wire Frame Diagram - 180 degree field of view



- LEGEND**
- Direction of the Wireframe
 - Extent of Panorama
 - Wind Turbine associated with the Project
 - Wind Turbine associated with YDWF
 - Wind Turbine associated with BWF
 - Wind Turbine associated with AWF

NOTES
Turbine Layout for Yanco Delta Wind Farm, Bullawah Windfarm and Argoon Wind Farm is as per the Major Projects Website.

OVERVIEW OF CUMULATIVE VISUAL IMPACTS ON DWELLINGS:			
DWELLING ASSOCIATED WITH YDWF			
Distance to YDWF:	Distance to BWF:	Distance to the AWF:	Distance to the Project:
2.82km	23.21km	12.84km	7.98km

Aerial Image - Wireframe Location (Aerial Image Source: Google Earth 2024)

Dwelling R087b: 676 Mabins Well Road, Moonbria NSW

Extent of Turbines Associated with the AWF (all distances)

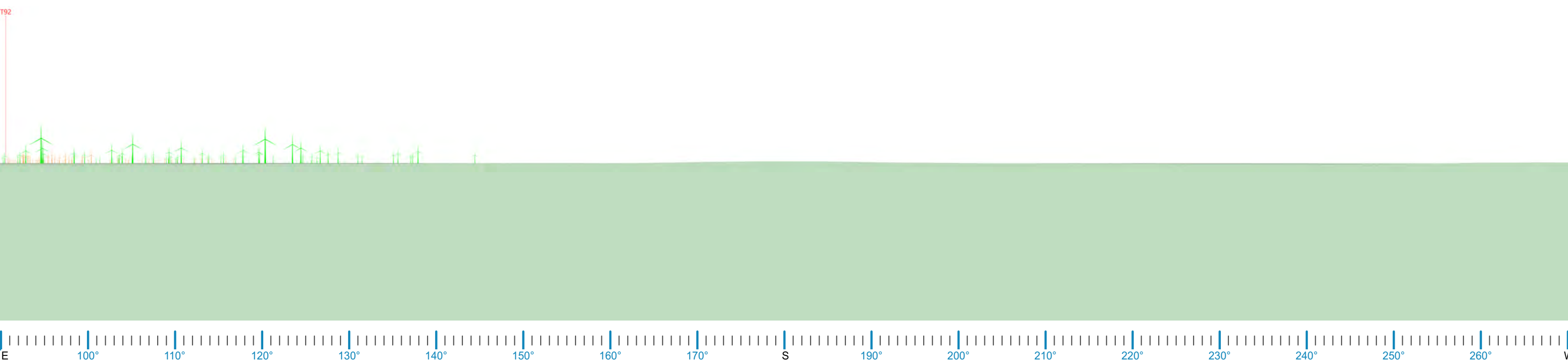


Extent of Turbines Associated with the YDWF (all distances)



Extent of Turbines Associated with the Project (all distances)

H



Proposed Cumulative Wire Frame Diagram - 180 degree field of view



LEGEND

- Direction of the Wireframe
- Extent of Panorama
- Wind Turbine associated with the Project
- Wind Turbine associated with YDWF
- Wind Turbine associated with BWF
- Wind Turbine associated with AWF

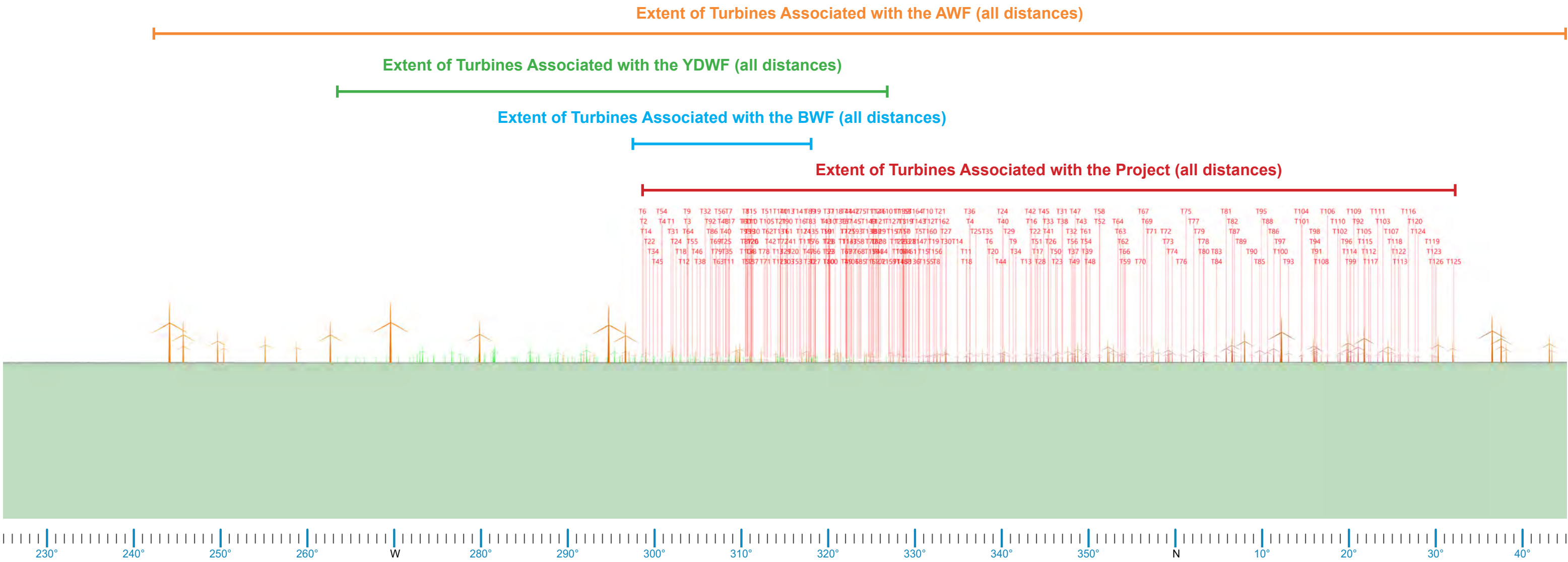
NOTES

Turbine Layout for Yanco Delta Wind Farm, Bullawah Windfarm and Argoon Wind Farm is as per the Major Projects Website.

OVERVIEW OF CUMULATIVE VISUAL IMPACTS ON DWELLINGS:			
DWELLING ASSOCIATED WITH YDWF			
Distance to YDWF:	Distance to BWF:	Distance to the AWF:	Distance to the Project:
2.77km	N/A	9.64km	23.14km

Aerial Image - Wireframe Location (Aerial Image Source: Google Earth 2024)

Dwelling R082a: 600 Woodside Road, Jerilderie NSW



Proposed Cumulative Wire Frame Diagram - 180 degree field of view



- LEGEND**
- Direction of the Wireframe
 - Extent of Panorama
 - Wind Turbine associated with the Project
 - Wind Turbine associated with YDWF
 - Wind Turbine associated with BWF
 - Wind Turbine associated with AWF

NOTES
Turbine Layout for Yanco Delta Wind Farm, Bullawah Windfarm and Argoon Wind Farm is as per the Major Projects Website.

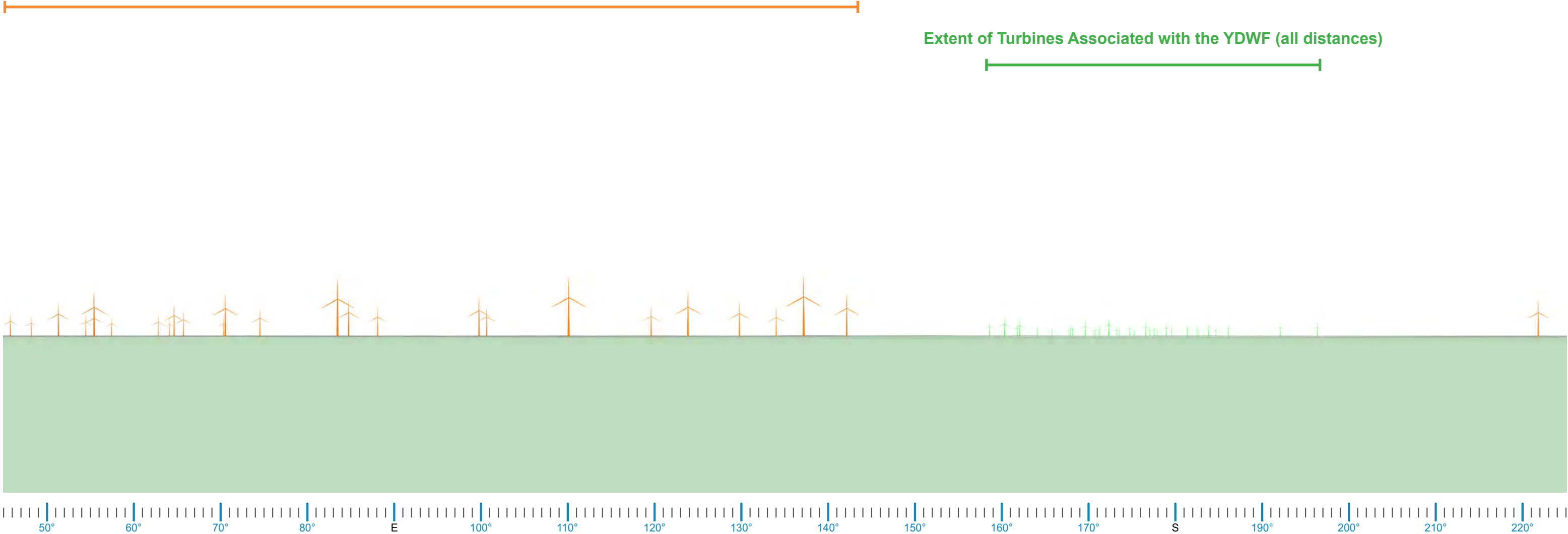
OVERVIEW OF CUMULATIVE VISUAL IMPACTS ON DWELLINGS:			
DWELLING ASSOCIATED WITH AWF			
Distance to YDWF:	Distance to BWF:	Distance to the AWF:	Distance to the Project:
5.77km	43.05km	2.06km	5.97km

Aerial Image - Wireframe Location (Aerial Image Source: Google Earth 2024)

Dwelling R082b: 600 Woodside Road, Jerilderie NSW

Extent of Turbines Associated with the AWF (all distances)

Extent of Turbines Associated with the YDWF (all distances)



Proposed Cumulative Wire Frame Diagram - 180 degree field of view



- LEGEND**
- Direction of the Wireframe
 - Extent of Panorama
 - Wind Turbine associated with the Project
 - Wind Turbine associated with YDWF
 - Wind Turbine associated with BWF
 - Wind Turbine associated with AWF

NOTES
Turbine Layout for Yanco Delta Wind Farm, Bullawah Windfarm and Argoon Wind Farm is as per the Major Projects Website.

OVERVIEW OF CUMULATIVE VISUAL IMPACTS ON DWELLINGS:			
DWELLING ASSOCIATED WITH AWF			
Distance to YDWF:	Distance to BWF:	Distance to the AWF:	Distance to the Project:
5.82km	N/A	2.09km	N/A

Aerial Image - Wireframe Location (Aerial Image Source: Google Earth 2024)

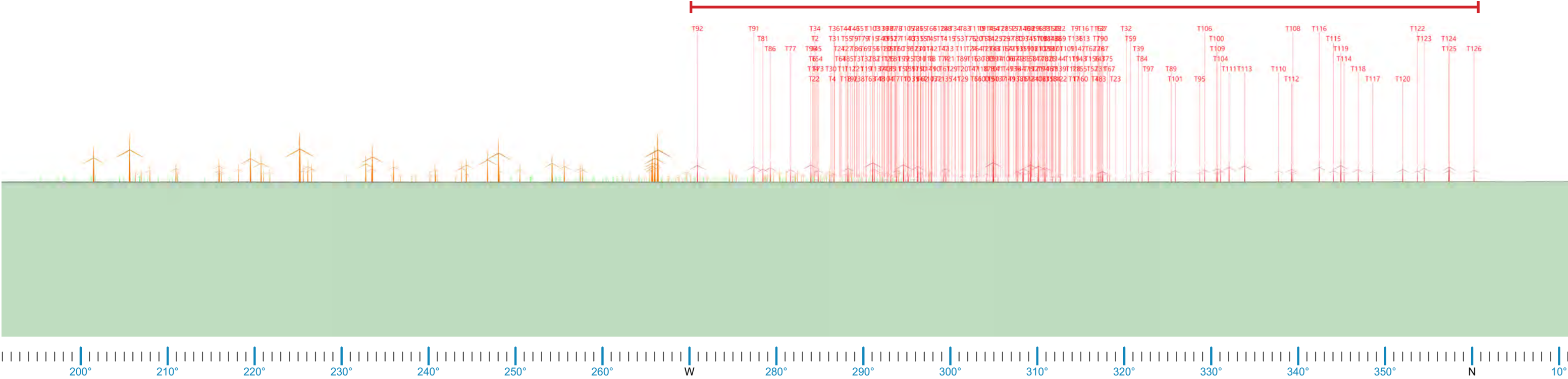
Dwelling R049a: 211 Liddles Lane, Jerilderie NSW

Extent of Turbines Associated with the AWF (all distances)

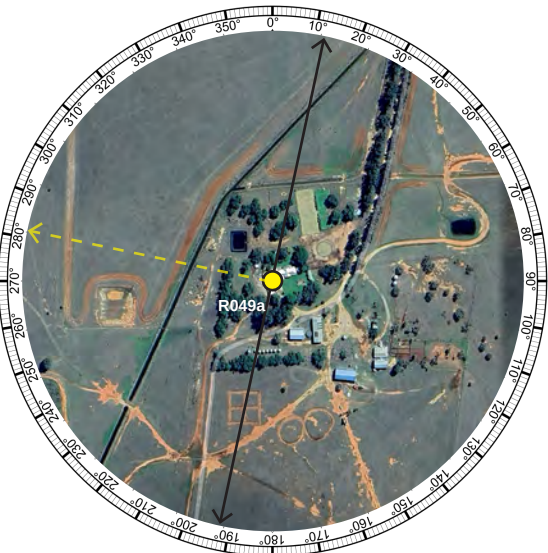
Extent of Turbines Associated with the YDWF (all distances)

Extent of Turbines Associated with the BWF (all distances)

Extent of Turbines Associated with the Project (all distances)



Proposed Cumulative Wire Frame Diagram - 180 degree field of view



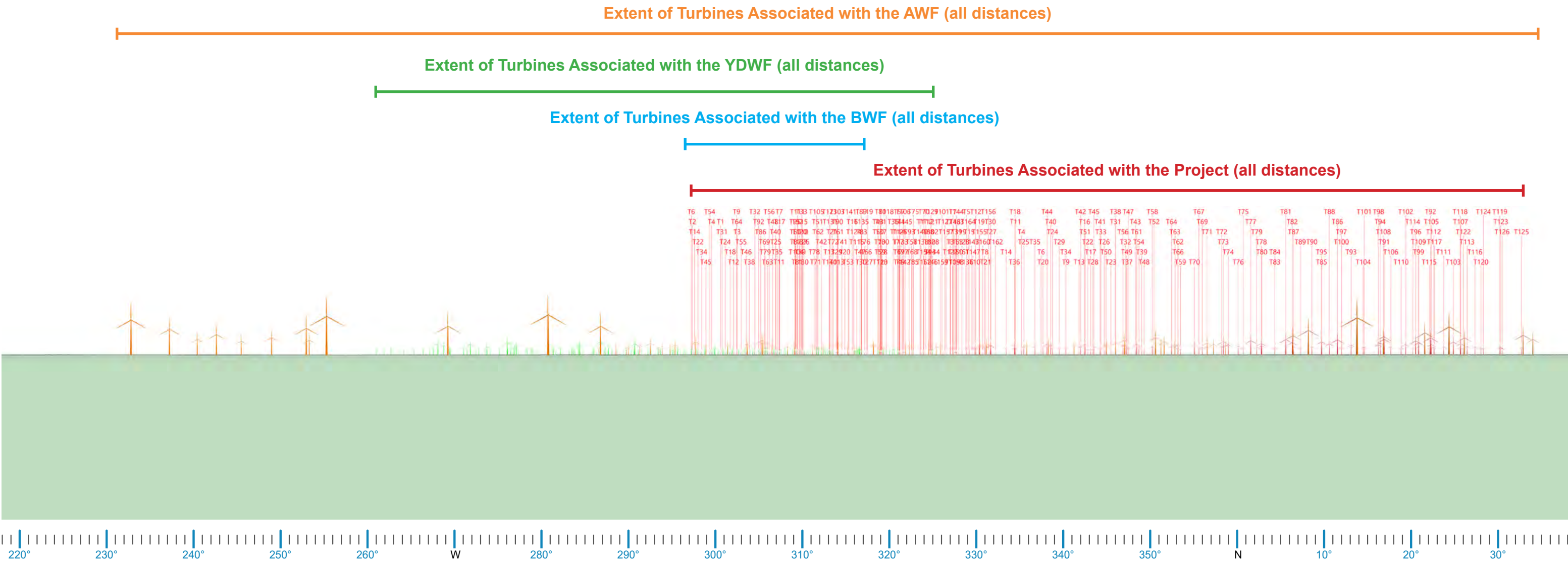
- LEGEND**
- Direction of the Wireframe
 - Extent of Panorama
 - Wind Turbine associated with the Project
 - Wind Turbine associated with YDWF
 - Wind Turbine associated with BWF
 - Wind Turbine associated with AWF

NOTES
Turbine Layout for Yanco Delta Wind Farm, Bullawah Windfarm and Argoon Wind Farm is as per the Major Projects Website.

OVERVIEW OF CUMULATIVE VISUAL IMPACTS ON DWELLINGS:			
Distance to YDWF:	Distance to BWF:	Distance to the AWF:	Distance to the Project:
12.27km	47.31km	2.51km	4.67km

Aerial Image - Wireframe Location (Aerial Image Source: Google Earth 2024)

Dwelling R008a: 600 Woodside Road, Jerilderie NSW



Proposed Cumulative Wire Frame Diagram - 180 degree field of view



- LEGEND**
- Direction of the Wireframe
 - Extent of Panorama
 - Wind Turbine associated with the Project
 - Wind Turbine associated with YDWF
 - Wind Turbine associated with BWF
 - Wind Turbine associated with AWF

NOTES
Turbine Layout for Yanco Delta Wind Farm, Bullawah Windfarm and Argoon Wind Farm is as per the Major Projects Website.

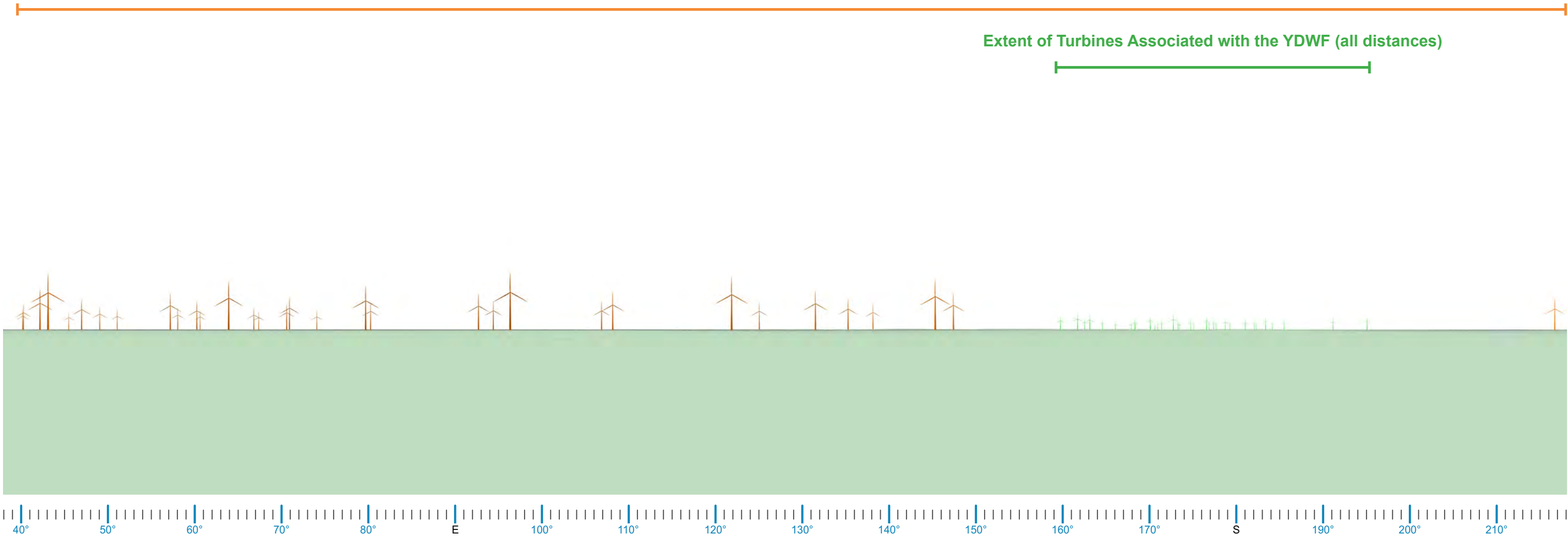
OVERVIEW OF CUMULATIVE VISUAL IMPACTS ON DWELLINGS:			
DWELLING ASSOCIATED WITH AWF			
Distance to YDWF:	Distance to BWF:	Distance to the AWF:	Distance to the Project:
5.63km	42.8km	2.05km	5.48km

Aerial Image - Wireframe Location (Aerial Image Source: Google Earth 2024)

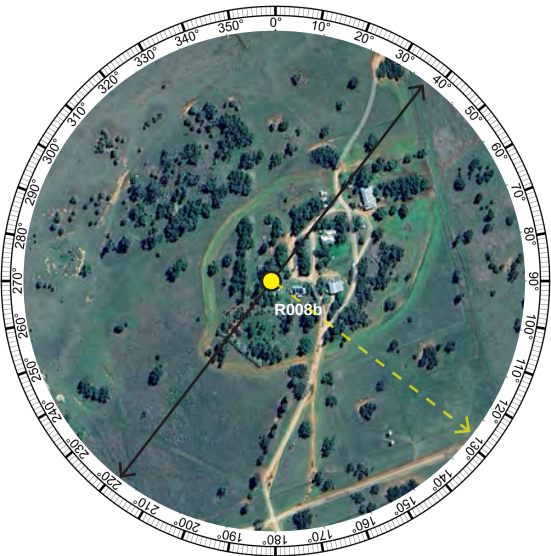
Dwelling R008b: 600 Woodside Road, Jerilderie NSW

Extent of Turbines Associated with the AWF (all distances)

Extent of Turbines Associated with the YDWF (all distances)



Proposed Cumulative Wire Frame Diagram - 180 degree field of view



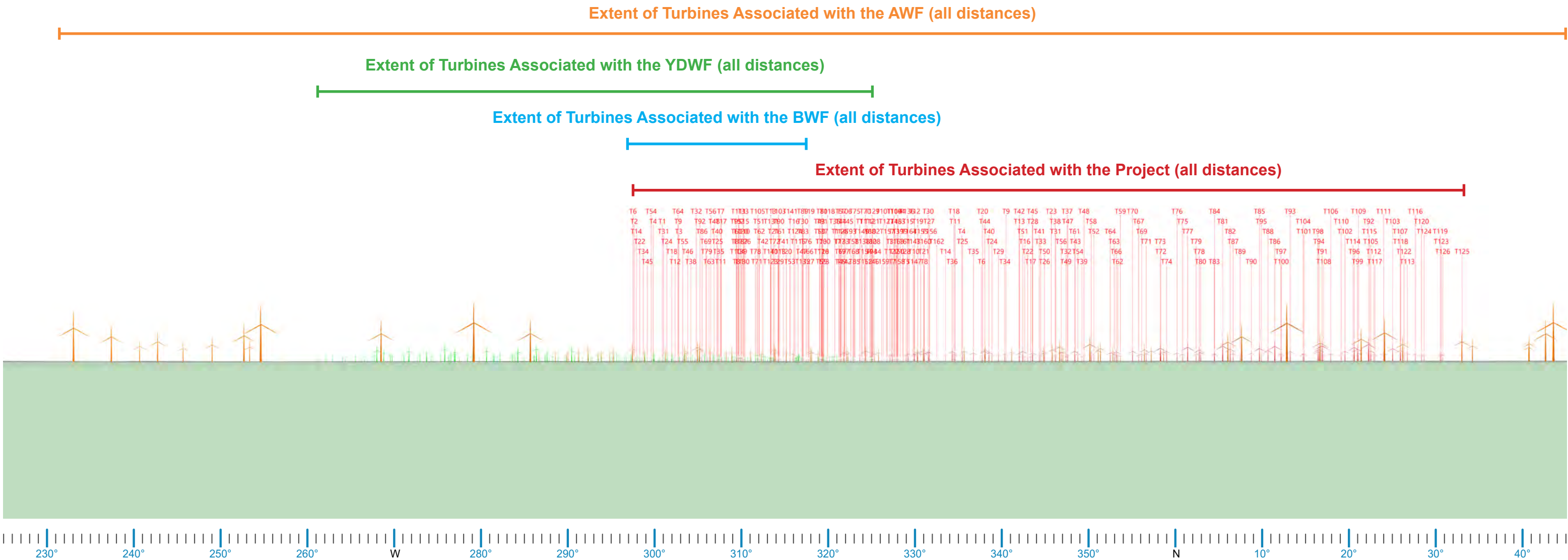
- LEGEND**
- Direction of the Wireframe
 - Extent of Panorama
 - Wind Turbine associated with the Project
 - Wind Turbine associated with YDWF
 - Wind Turbine associated with BWF
 - Wind Turbine associated with AWF

NOTES
TTurbine Layout for Yanco Delta Wind Farm, Bullawah Windfarm and Argoon Wind Farm is as per the Major Projects Website.

OVERVIEW OF CUMULATIVE VISUAL IMPACTS ON DWELLINGS:			
DWELLING ASSOCIATED WITH AWF			
Distance to YDWF:	Distance to BWF:	Distance to the AWF:	Distance to the Project:
6.31km	N/A	2.19km	N/A

Aerial Image - Wireframe Location (Aerial Image Source: Google Earth 2024)

Dwelling R111a: 600 Woodside Road, Jerilderie NSW



Proposed Cumulative Wire Frame Diagram - 180 degree field of view



- LEGEND**
- Direction of the Wireframe
 - Extent of Panorama
 - Wind Turbine associated with the Project
 - Wind Turbine associated with YDWF
 - Wind Turbine associated with BWF
 - Wind Turbine associated with AWF

NOTES
Turbine Layout for Yanco Delta Wind Farm, Bullawah Windfarm and Argoon Wind Farm is as per the Major Projects Website.

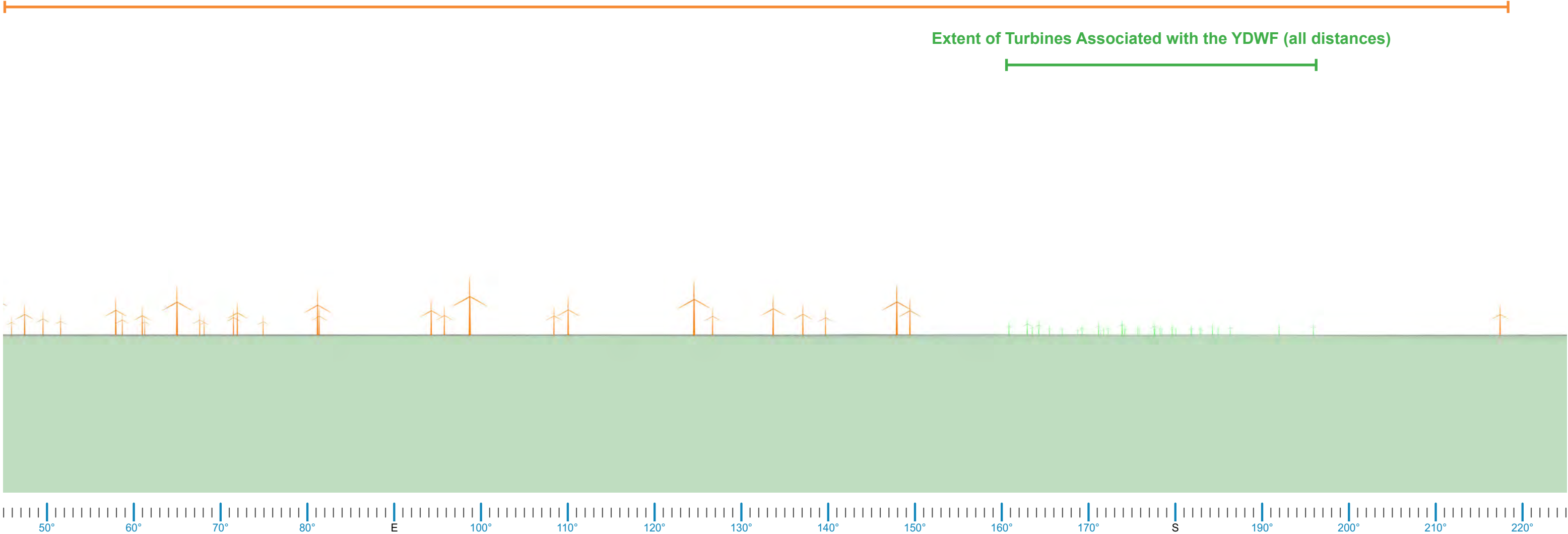
OVERVIEW OF CUMULATIVE VISUAL IMPACTS ON DWELLINGS:			
DWELLING ASSOCIATED WITH AWF			
Distance to YDWF:	Distance to BWF:	Distance to the AWF:	Distance to the Project:
5.68km	42.82km	2.11km	5.40km

Aerial Image - Wireframe Location (Aerial Image Source: Google Earth 2024)

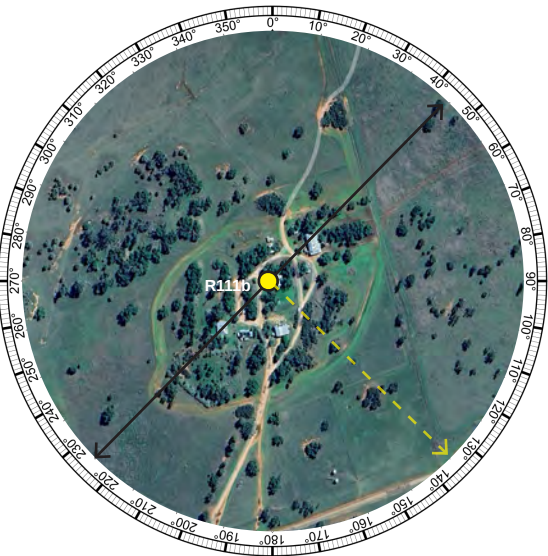
Dwelling R111b: 600 Woodside Road, Jerilderie NSW

Extent of Turbines Associated with the AWF (all distances)

Extent of Turbines Associated with the YDWF (all distances)



Proposed Cumulative Wire Frame Diagram - 180 degree field of view



LEGEND

- Direction of the Wireframe
- Extent of Panorama
- Wind Turbine associated with the Project
- Wind Turbine associated with YDWF
- Wind Turbine associated with BWF
- Wind Turbine associated with AWF

NOTES

TTurbine Layout for Yanco Delta Wind Farm, Bullawah Windfarm and Argoon Wind Farm is as per the Major Projects Website.

OVERVIEW OF CUMULATIVE VISUAL IMPACTS ON DWELLINGS:			
DWELLING ASSOCIATED WITH AWF			
Distance to YDWF:	Distance to BWF:	Distance to the AWF:	Distance to the Project:
6.35km	N/A	2.14km	N/A

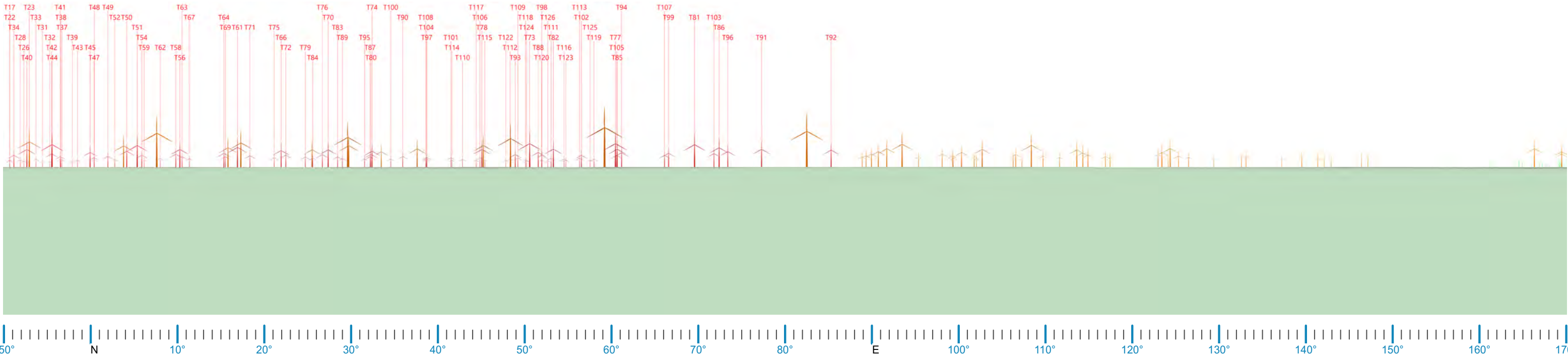
Aerial Image - Wireframe Location (Aerial Image Source: Google Earth 2024)

Dwelling R036a: 1340 Liddles Lane, Jerilderie NSW

Extent of Turbines Associated with the AWF (all distances)

Extent of Turbines Associated with the YDWF (all distances)

Extent of Turbines Associated with the Project (all distances)



Proposed Cumulative Wire Frame Diagram - 180 degree field of view



LEGEND

- Direction of the Wireframe
- Extent of Panorama
- Wind Turbine associated with the Project
- Wind Turbine associated with YDWF
- Wind Turbine associated with BWF
- Wind Turbine associated with AWF

NOTES

Turbine Layout for Yanco Delta Wind Farm, Bullawah Windfarm and Argoon Wind Farm is as per the Major Projects Website.

OVERVIEW OF CUMULATIVE VISUAL IMPACTS ON DWELLINGS:			
DWELLING ASSOCIATED WITH AWF			
Distance to YDWF:	Distance to BWF:	Distance to the AWF:	Distance to the Project:
11.72km	N/A	2.08km	3.75km

Aerial Image - Wireframe Location (Aerial Image Source: Google Earth 2024)

Dwelling R036b: 1340 Liddles Lane, Jerilderie NSW

Extent of Turbines Associated with the AWF (all distances)

Extent of Turbines Associated with the YDWF (all distances)

Extent of Turbines Associated with the BWF (all distances)

Extent of Turbines Associated with the Project (all distances)

T6 T54 T4 T12 T92 T56 T17 T120 T33 T71 T123 T90 T53 T47 T19 T80 T18 T130 T185 T70 T29 T10 T145 T164 T15 T19 T21 T14 T20 T16
T2 T31 T55 T86 T48 T7 T89 T15 T62 T136 T124 T83 T158 T38 T45 T75 T102 T127 T88 T143 T10 T27 T22 T9 T29
T14 T1 T9 T32 T40 T180 T10 T51 T7229 T16 T30 T480 T105 T93 T149 T802 T15 T1509 T147 T156 T4 T36 T29
T22 T24 T3 T79 T25 T108 T26 T42 T113 T41 T115 T76 T597 T104 T58 T38 T88 T128 T528 T5 T12 T30 T24
T34 T18 T46 T69 T35 T1 T52 T78 T140 T2 T141 T139 T66 T728 T1242 T11 T154 T164 T109 T461 T155 T162 T11
T45 T64 T38 T63 T11 T8 T139 T105 T13 T103 T20 T89 T27 T923 T897 T68 T152 T4 T159 T35 T8136 T160 T8 T18 T6 T25 T13

Proposed Cumulative Wire Frame Diagram - 180 degree field of view



LEGEND

- Direction of the Wireframe
- Extent of Panorama
- Wind Turbine associated with the Project
- Wind Turbine associated with YDWF
- Wind Turbine associated with BWF
- Wind Turbine associated with AWF

NOTES

TTurbine Layout for Yanco Delta Wind Farm, Bullawah Windfarm and Argoon Wind Farm is as per the Major Projects Website.

OVERVIEW OF CUMULATIVE VISUAL IMPACTS ON DWELLINGS:			
DWELLING ASSOCIATED WITH AWF			
Distance to YDWF:	Distance to BWF:	Distance to the AWF:	Distance to the Project:
3.74km	37.88km	2.12km	3.93km

Aerial Image - Wireframe Location (Aerial Image Source: Google Earth 2024)

13.3 Cumulative Visual Impact on the Broader Landscape Character

The New South Wales Government has identified five (5) REZs in regional areas of NSW. The Project is located within the SW REZ. The proposed land use associated with the Project is consistent with the NSW Government Policy for this area, however, visual impacts are to be reduced where possible. The existing landscape character of the region allows for optimum harvest of wind energy due to the large expanse of flat, treeless land parcels that are mostly uninhabited and cause minimal obstructions in the landscape.

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. As wind farm developments prevail it is important to determine whether the cumulative effect of wind farms and other major infrastructure within the region would combine to become the dominant visual element, altering the perception of the regions landscape character.

The MWTT and wireframe diagrams prepared illustrate the extent of theoretical visibility of the Project combined with nearby major wind farm projects. These suggest that simultaneous views of all four (4) wind farm projects are likely to occur along the Kidman Way and other surrounding low use local roads.

The assessment found that all eight (8) of the non-associated dwellings located within 8,000 m of the four (4) wind farm projects are likely to have views of turbines in multiple 60 degree sectors (refer to **Section 13.2.1**). Wireframe diagrams demonstrate that Project will appear within a small proportion of the view, which is generally shared with views toward turbines associated with other surrounding wind farms. **Table 19** identifies that existing vegetation identified in photomontages will further reduce the number of sectors visible from these dwellings.

The potential cumulative visual impact must also be assessed in relation to the potential visual impact when viewed sequentially. If a number of wind farms are viewed in succession as a traveller moves through the landscape (eg. motorist travel routes such as Kidman Way), this may result in a change in the overall perception of the broader landscape character. The viewer may only see one wind farm at a time, but if each successive stretch of the road is dominated by views of a wind farm, then that can be argued to be a cumulative visual impact (EPHC, 2010).

The existing landscape is associated with commercial agricultural activity and is a highly modified landscape with low scenic quality. When travelling north-south along Kidman Way, and east-west along local roads the existing visual character is defined by flat, generally treeless, expansive lands used for grazing and cropping. As a result there is the potential for simultaneous distant views of all four (4) wind farm projects whilst travelling through the area. Due to the lack of any significant landscape features, the wind farms have the potential to become a defining character element along this route. It is noted that no scenic or key landscape features will be impacted by the projects.

14

Associated Infrastructure



14.0 Assessment of Associated Infrastructure

14.1 Overview of Associated Infrastructure

The Bulletin states: *“the assessment of visual impacts from all ancillary facilities and infrastructure will be required”*.

In addition to the proposed wind turbines, the associated infrastructure (as described in **Section 3.6** of this report) is likely to contrast with the existing visual landscape. Due to the large scale of the proposed wind farm and the flat existing landscape character, access roads, transmission lines and other ancillary structures have the potential to alter the existing visual landscape. An overview of the potential visual impact resulting from associated infrastructure and project components is provided in this section of the report.

14.2 Transmission Lines

Overhead transmission lines with towers and underground reticulation will be installed to connect the turbines to the project substations and point of connection.

The Project electrical network is expected to comprise predominantly of underground 33-kV circuits between the proposed turbines. An aboveground transmission line is proposed between the collector substations and Dinawan Substation.

The transmission towers proposed as part of the aboveground portion are estimated to have a maximum height 80 m. The distance between transmission towers will be dependent on the type used, however, they are anticipated to be a minimum of 200 m apart. The proposed transmission towers are likely to be lattice towers, which will appear similar to the lattice tower arrangement of the existing 220kV and Project EnergyConnect's 330kV transmission line, refer **image 30**. The design and precise location of the overhead transmission lines will be determined as part of detailed design, however, they will remain within the development corridor.

It is noted that Project EnergyConnect's transmission line is being constructed within close vicinity, and in a portion of the Project Area to the southeast. The Project EnergyConnect is an approved transmission line with elements of the Project EnergyConnect currently under construction. Dinawan Wind Farm has been designed with the assumption that the transmission line for Project EnergyConnect will be built as per the approved alignment. The towers associated with the Project EnergyConnect are 330kV transmission lines, with portions built adjacent to the existing 220 kV line. The Project EnergyConnect transmission towers are proposed to be up to 65 m in height.

It is acknowledged that the proposed transmission towers will be a visible element in the landscape from the surrounding area due to the flat terrain. However, as the approved/under construction Project EnergyConnect transmission lines are of a similar scale and the transmission towers will not contrast with the existing landscape character or features and the visual impacts of the proposed transmission towers are expected to be low.



Image 30 – Existing 220 kV transmission towers within Study Area

Proposed mitigation methods to be considered during detailed design phase include:

- *Where possible underground cabling is to be used to connect wind turbines to the electricity grid.*
- *Utilise existing transmission lines where possible.*
- *The route for any proposed overhead transmission lines should be chosen to reduce visibility from surrounding areas.*
- *Plan route to minimise vegetation loss.*
- *Use of subtle colours and a low reflectivity surface treatment on power poles to ensure that glint is minimised.*

Associated Infrastructure

Proposed Dinawan Wind Farm

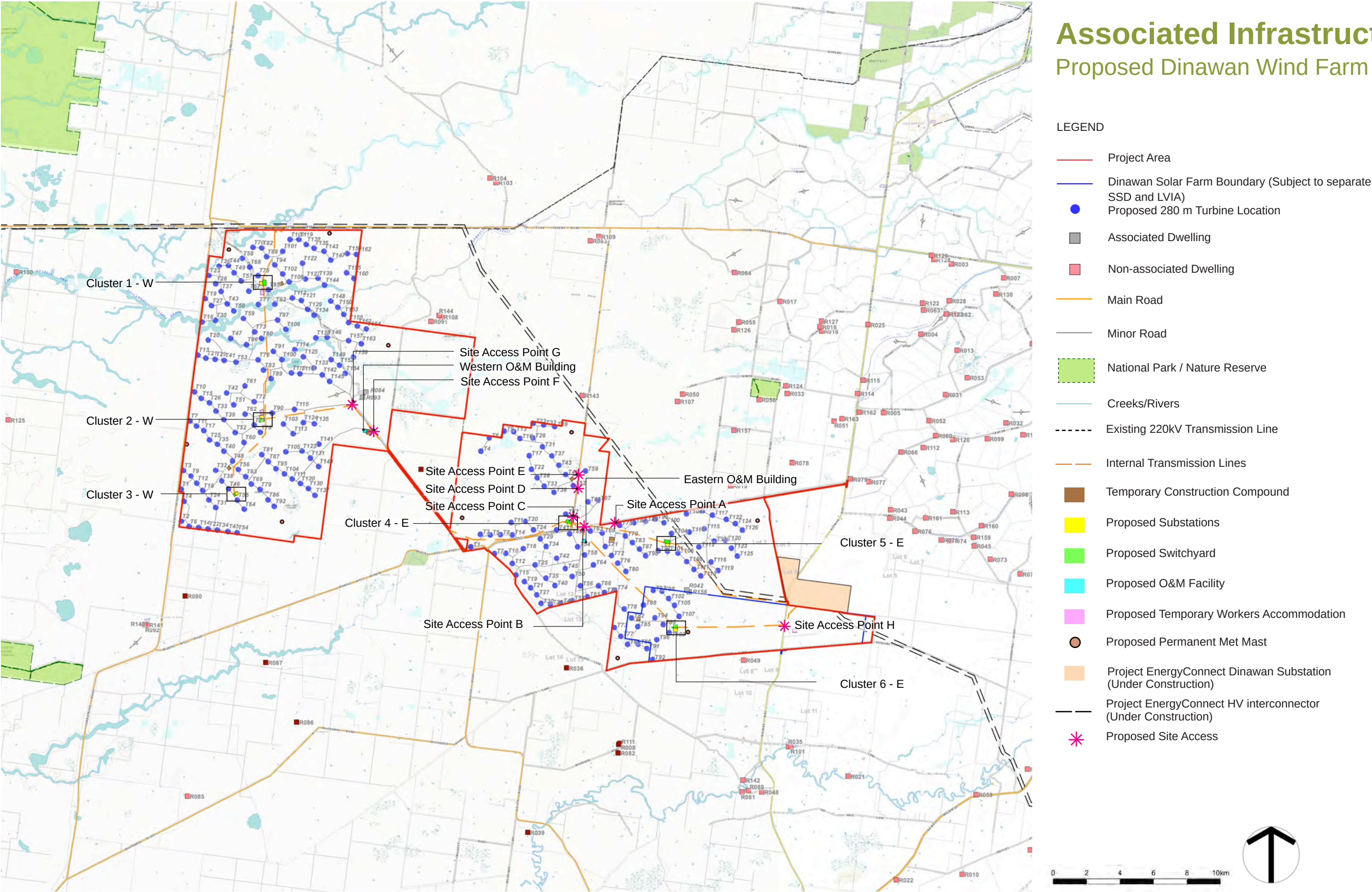


Figure 33 – Associated Infrastructure
Imagery Source: Six Maps, 2023

14.3 Internal Access Roads

There are eight (8) access points into the Project Area. These include two (2) along McLennons Bore Road, three (3) along Fernbank Road, one (1) along Kidman Way and two (2) along Goolgumbra Road.

An internal network of unsealed access tracks will be established consisting of upgraded existing tracks and new tracks. Subject to detailed design, internal access tracks will be between 2 and 6 m wide. Some track sections may be wider to allow RAV and crane movements.

Generally, the internal roads have been sited to reduce potential vegetation loss. Due to the existing agricultural land use of the Study Area, farm roads traversing the landscape form a significant part of the existing landscape character. The proposed access roads are likely to be viewed as part of the existing character of the landscape and therefore visual impact would be low.

Mitigation measures for reducing residual visual impact resulting from the construction of access roads include:

- *Where possible utilise or upgrade existing roads, trails or tracks to provide access to the proposed turbines to reduce the need for new roads.*
- *Allow for the provision for down sizing roads or restoring roads to existing condition following construction where possible.*
- *Any new roads must minimise cut and fill and avoid the loss of vegetation.*
- *Utilise local materials where possible and practical.*

14.4 Meteorological Monitoring Masts

Up to 10 permanent meteorological monitoring mast of up to 200 m in height are proposed to be located within the Project Area to record wind speed and other meteorological data. The wind monitoring masts will be fitted with various instruments such as anemometers, wind vanes, temperature gauges and other electrical equipment.

Due to the existing flat terrain, views towards the meteorological masts are likely to be available and have the potential to be a feature from public viewing locations surrounding the Project. However, it is noted that no key landscape features are likely to be impacted.

14.5 On-site Substations and Switchyards

The Project will include the construction of up to six (6) on-site electrical substations. This includes three (3) within the eastern cluster and three (3) within the western cluster. The disturbance footprint for these elements are likely to measure approximately:

- West: 200 m x 250 m (C1-W); 200 m x 250 m (C2-W); 100 m x 170 m (C3-W)
- East: 250 m x 200 m (C4-E); 250 m x 200 m (C5-E); 250 m x 200 m (C6-E)

A total of six (6) switching stations are proposed adjacent to the substations. This includes three (3) within the eastern cluster and three (3) within the western cluster. The disturbance footprint for these elements are likely to measure approximately:

- West: 350 m x 200 m (C1-W); 350 m x 200 m (C2-W); 200 m x 200 m (C3-W)
- East: 350 m x 200 m (C4-E); 350 m x 200 m (C5-E); 250 m x 200 m (C6-E)

It is noted that the final dimensions for the substations and switchyards are likely to occupy a portion of the disturbance footprint of approximately 150 m x 150 m for the substations and 150 m x 100 m for the switchyards.

Due to the close proximity, the potential impacts of the switchyards are likely to be similar to those posed by the adjacent substations, therefore the substations and switchyards have been assessed per cluster.

Cluster C1-W is located approximately 3 km south of Four Corners Road and 4 km east of Carrathool Road. Due to a combination of the low horizontal scale of the elements, intervening screen vegetation, distance and the speed of travel, views toward C1-W from both roads will be limited. R088 is the closest non-associated dwelling, located approximately 9 km south east of C1-W. Due to distance and intervening vegetation, C1-W is not likely to be visible from this dwelling.

Cluster C2-W is located approximately 4.2 km east of Carrathool Road. Due to a combination of the low horizontal scale of the elements, intervening screen vegetation and distance, views toward C2-W will be limited. R093 is the nearest non-associated dwelling, located approximately 6 km east of the C2-W. Due to distance and intervening vegetation, C2-W is not likely to be visible from this dwelling.

Cluster C3-W is located approximately 3.3 km east of Carrathool Road and 7.8 km north of Mabins Well Road. Due to a combination of the low horizontal scale of the elements, intervening screen vegetation, distance, and the speed of travel, views toward C3-W from both roads will be limited. R090 is the closest non-associated dwelling, located approximately 6.5 km south of the C3-W. Due to distance and intervening vegetation C3-W is not likely to be visible from this dwelling.

Cluster C4-E is located approximately 100 m west of Fernbank Road and 200 m north of Mclennons Bore Road. Due to the close proximity, views from Fernbank Road and Mclennons Bore Road are likely for a short portion of the roads. Existing scattered vegetation along Mclennons Bore Road will assist in reducing some views. It is noted that both Mclennons Bore Road and Fernbank Road are low use, local roads and the viewer sensitivity levels are low.

Cluster C5-E is located approximately 1.5 km south of Mclennons Bore Road. Views towards C5-E may be available from Mclennons Bore Road for a short portion of the road. Existing scattered vegetation along Mclennons Bore Road will assist in reducing some views. It is noted that both Mclennons Bore Road is a low use, local road with a low viewer sensitivity level. R019 is located approximately 5.5 km northeast of the cluster. Due to the existing intervening vegetation, views from R019 will not be available.

Cluster C6-E is located approximately 1.7 km north of Liddles Lane and 6.4 km west of Kidman Way. Existing roadside vegetation along Liddles Lane is likely to reduce views towards C6-E. When combined with speed of travel, opportunities for views are likely to be fleeting. Due to a combination of the low horizontal scale of the elements, speed of travel and distance opportunities for views toward C6-E are likely to be limited from Kidman Way. R049 is located approximately 4.3 km southeast of C6-E. Views towards C6-E are not likely to be available from the dwelling due to the surrounding vegetation.

14.6 Operational and Maintenance Building (O&M)

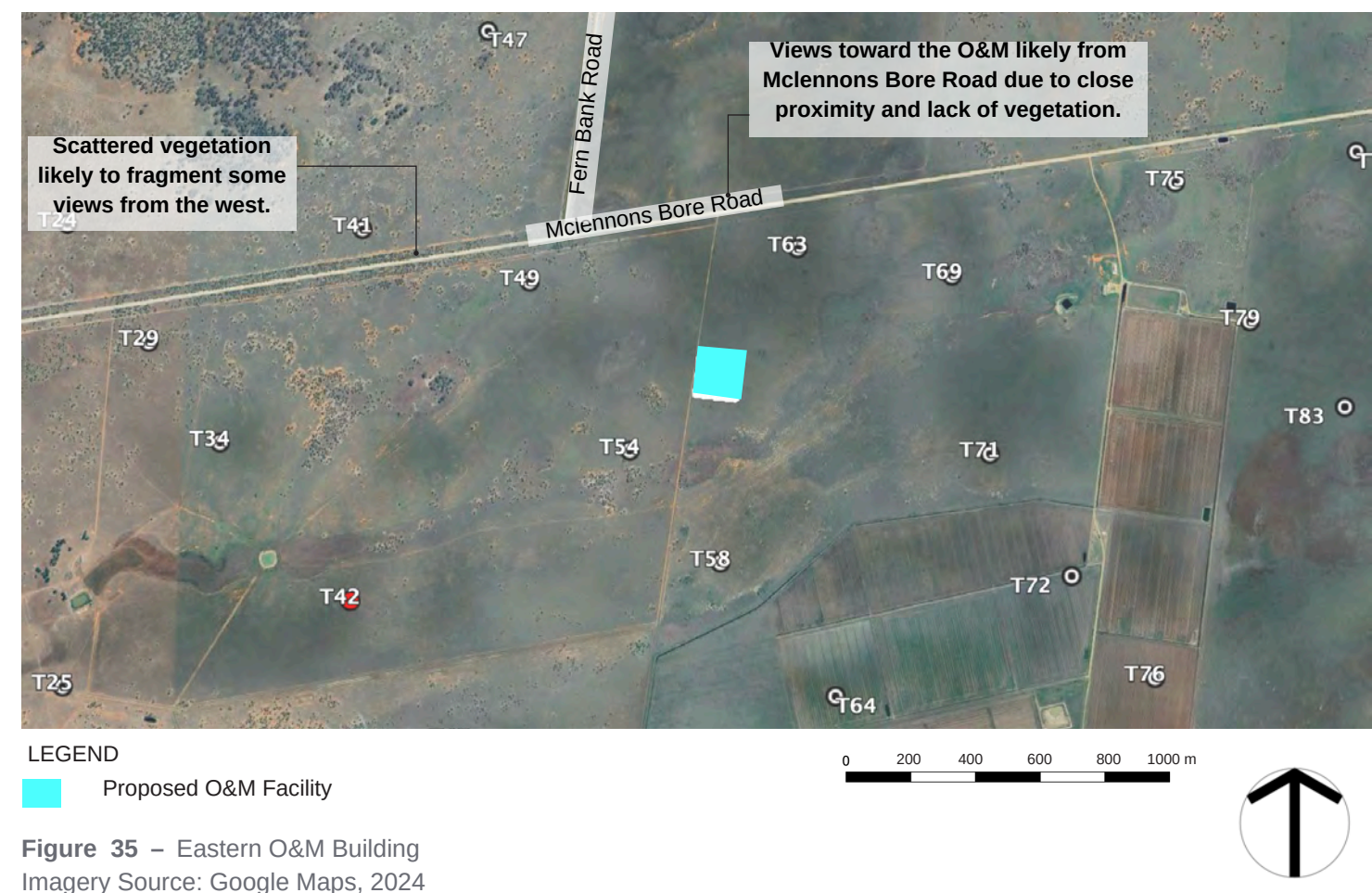
A total of two (2) permanent O&M buildings will be constructed as part of the Project. These are likely to measure approximately 200 m x 200 m and are located approximately 700 m south of Mclennons Bore Road (eastern O&M) and 200 m west of Goolgumbla Road (western O&M).

Views toward the western O&M building are likely to be available from Goolgumbla Road and Pooginook Road, refer **Figure 34**. However, due to existing surrounding vegetation, views are likely to be contained from the surrounding area. It is noted that Goolgumbla Road is a low use, local road and the viewer sensitivity level is low.

Views toward the eastern O&M building are likely to be available from Mclennons Bore Road and Fernbank Road, refer **Figure 35**. However, due to existing surrounding vegetation, views are likely to be contained from the west of Mclennons Bore Road. It is noted that both Mclennons Bore Road and Fernbank Road are low use, local roads and the viewer sensitivity levels are low.

The following mitigation measures would assist in reducing any residual visual impacts:

- *Siting to ensure minimal vegetation loss.*
- *Consideration should be given to controlling the type and colour of building materials used. Where possible a recessive colour palette is to be used which blends into the existing landscape.*
- *Avoidance of unnecessary lighting, signage on fences, logos etc.*
- *Any proposed buildings to be sympathetic to existing architectural elements in the landscape.*



14.7 Other Temporary Infrastructure

In addition, temporary infrastructure elements such as:

- construction compounds (however, it is noted that some laydown or parking areas would remain, future reuse of the construction compound area by the O&M building will be likely);
- worker accommodation facilities;
- construction control room
- site offices and amenities for construction purposes ;
- temporary meteorological monitoring masts;
- laydown areas; and
- concrete batching plants.

The visual impacts associated with these facilities will be temporary and will occur during the construction phase. No scenic views will be impacted by the construction activity.

15

Overview of Impact on Landscape Character



15.0 Overview of Impact on Landscape Character

15.1 Overview of Visual Impacts on Landscape Character

The proposed development is to be located within a flat rural landscape that has not been identified as significant or rare. The broad landscape character is dominated by established rural land which consists of modified vast plains with little topographical variation. Generally, the Scenic Quality Classes of the Landscape Character Units (LCU) within the Study Area have been rated as moderate or low (refer to **Section 5.0**).

Shallow depressions forming dry swamps, floodplains and creek corridors provide slight variations in topography and vegetation height, but these hydrological features do not occupy a large percentage of the Study Area and are, in most cases, ephemeral.

The assessment has determined that the proposed wind farm would become a feature of the visual landscape due to the addition of vertical turbines in a landscape offering unencumbered views across large flat expanses.

Regionally significant landscape features and recreational sites such as Yanco Bridge Rest Area, Southwest Woodland Nature Reserve, and Oolambeyan National Park (as identified in **Section 5.0** and **Appendix B** of this report) would remain intact as key landscape features of the area and it is unlikely the Project would interrupt the scenic value of these landscape features.

15.2 Overview of Visual Impact to LCUs

Table 20 provides an overview of the assessment of the potential visual impacts on the existing landscape character of the local area for each LCU as defined in **Section 5.5** of this report. An evaluation of the potential visual impacts has been undertaken using the visual performance objectives as outlined in the Bulletin.

Of the five (5) LCU's identified and assessed, the Project is likely to be visible from all character areas to varying degrees. Due to the flat topography surrounding the Project Area, low vegetation typical of the region and the lack of built structures, there is little in the current landscape to impede views of the Project Area. However, due to the existing dense areas of vegetation associated with the existing watercourses, views from these areas are generally screened or partially screened.

Overview of Impacts on Landscape Character Units:						
LCU:	Name:	Key Landscape Features:	Scenic Quality Rating:	Sensitivity:	Magnitude:	Landscape Character Impact:
LCU01	Grassy Woodlands	Dense Woodland Grassy Under Storey Flat topography South West Woodland Nature Reserve	Low	Low The LCU consists of flat open woodlands and plains including the extents of the South West Woodland Nature Reserve. Vegetation includes dense woodland species with a grassy under storey. Some parts of the LCU have been subjected to human intervention. Due to the existing dense vegetation character and distance to the Project, the LCU has the ability to retain its existing visual quality.	Low The Project is sited to avoid areas located within this LCU. The Project is not expected to compete visually with the existing character of this LCU. The visual character of the landscape within this LCU will remain unaltered as a result of the Project.	Low
LCU02	Seasonal Water Corridors	Flat to gently undulating vegetation corridors that carry seasonal water flows. Coleambally Outfall Drain Delta Creek	Moderate	Moderate The LCU includes the waterbodies of Delta Creek and Coleambally Outfall Drain Vegetation along these watercourses varies and includes speargrass, forbs and saltbush, and clumps of nitre goosefoot, rosewood, belahs and myall communities Although it is rated as a moderate scenic quality, there are no specific planning controls which attribute special value to this landscape.	Moderate The Project is proposed within this LCU. As a result, views towards the Project will be available within this LCU. Patches of vegetation along creek corridors, however, may help screen views in certain areas within the Project Area. No key viewpoints were identified within the LCU. It is likely that where open views towards the Project are available, the Project will be the dominant element of the view.	Moderate
LCU03	Swamps and Floodplains	Shallow depressions Flat topography Riparian vegetation of grasses	Low	Low The LCU acts as a refuge for excess water that would seasonally flow within the extents of the creek corridors and constructed canals. The LCU is defined by dry, red-brown earths and grassy understorey vegetation. Some areas are modified to allow for agricultural activities. As such, it is considered to have some capacity to absorb the type of change envisaged by the Project.	Moderate Portions of the Project are located within this LCU. Views of the Project are likely to be available within the LCU at locations in close range. From these areas, the Project is likely to be the dominant feature within the LCU. Scattered mid-storey shrubs may help reduce the visual impact in certain areas. It is likely that the Project will have a moderate to low impact on the landscape scenic integrity of this LCU. No key publicly accessible viewpoints were identified within the LCU.	Low-Moderate
LCU04	Grassy Plains	Modified rural land Flat and open Expansive Scattered Vegetation	Low	Low The landscape within this LCU is modified from its natural state and used for grazing and other agricultural uses. The elements that contribute to the quality will remain unchanged as a result of the Project. As a result the LCU has the capability to absorb the change envisaged by the Project.	Low The Project is located within this LCU. Views are generally open with minimal obtrusive elements. Due to the flat and treeless nature to the LCU, the Project is likely to be the dominant feature within the LCU. However, the surrounding landscape is a heavily modified landscape. As such, the impacts to the scenic integrity of this LCU are anticipated to be low.	Low
LCU05	Yanco Creek Environs	Yanco Bridge Rest Area Yanco Creek	Moderate	Moderate The LCU is defined by the waterbody of Yanco Creek and associated vegetation. Vegetation along the watercourse includes dense clumps of willow trees and other native species that populate gently undulating embankments Although it is rated as a moderate scenic quality, there are no specific planning controls which attribute special value to this landscape.	Low Due to distance and existing vegetation, views are likely to be limited from this LCU. As a result, the scenic integrity of this LCU are anticipated to be low.	Low-Moderate

Table 21 – Overview of Impact on Landscape Character Units

16

Mitigation Measures



16.0 Mitigation Measures

16.1 Overview of Mitigation Measures

This section of the report provides recommendations which seek to achieve a better visual integration of the proposal and the existing visual character at both local and regional scales. The mitigation measures attempt to lessen the visual impact of the proposed wind farm whilst enhancing the visual character of the surrounding environment.

Mitigation measures are best considered as two separate phases. These include:

- Primary measures that form part of the development of the wind farm design through an interactive process;
- Secondary measures designed to specifically address the remaining (residual) negative (adverse) effects of the final development proposals (The Landscape Institute et al 2008).

It is important to note that the mitigation methods proposed in this report are made notwithstanding issues raised by other consultants (eg. engineering, ecology, geology etc.). During the planning and design phase of a wind farm mitigation strategies should also be considered to lessen the visual impact of the proposal. This is by no means an exhaustive list, however the adoption of these recommendations will assist considerably in ensuring the proposal contributes positively to the visual quality and character of the area.

Mitigation methods considered for associated infrastructure has been included in **Section 14.0**.

16.2 Project Layout and Design

The design of the proposed wind farm is a primary measure of mitigation. The general principles employed through the project design phase can significantly reduce the visual impact. These include siting, access, layout and other principles which directly impact the appearance of the proposed development. General guidelines for the design development of the Project have been outlined in the following section.

16.3 Wind Farm Layout and Size

The layout and size of the wind farm is a significant factor in the visual impact on the landscape. According to Stanton (1995) the intrusiveness of a wind farm is not directly proportional to the number of turbines in an array, and instead, more a factor of design feature. For example, large wind farms may appear less dominating than a smaller project when the large wind farm is subdivided into several visually comprehensible units.

It is suggested that fewer and more widely spaced turbines present a more pleasing appearance than tightly packed arrays (URBIS, 2009). The following principles should guide the design process of the wind farm:

- Controlling the location of different turbine types, densities and layout geometry to minimise the visual impacts.
- Ensure the turbines are evenly spaced to give a regular pattern creating a better balance within the landscape.

16.4 Wind Turbine Design and Colouring

Turbine design and colouring are an important factor. The turbines will have a matte white finish and consist of three blades which is consistent with the current turbine models being considered.

The important factors to achieving a visual consistency through the landscape include:

- Uniformity in the colour, design, rotational speed, height and rotor diameter.
- The use of simple muted colours and non-reflective materials to reduce distant visibility and avoid drawing the eye.
- Blades, nacelle and tower to appear as the same colour.
- Avoidance of unnecessary lighting, signage, logos etc.

16.5 Mitigation Measures - Residences

In accordance with the Bulletin, *a detailed assessment of dwellings identified within the visual catchment has been undertaken and (where possible) mitigation methods have been recommended to assist in reducing any residual impacts.*

Of the 13 non-associated dwellings assessed within the blue line of visual magnitude (5,500 m from the nearest turbine) a total of one (1) non-associated dwelling (R019) was identified through the visual assessment as having the potential for a moderate or high visual impact. Mitigation measures have been suggested for the (1) non-associated dwelling and are included in **Appendix E**. Mitigation will be undertaken in consultation with the associated landowners. Principles for screen planting and supplementary planting have been included as follows.

16.5.1 Residence Screen Planting

In circumstances where residences are subject to visual impact, screen planting is an option proposed to assist in mitigating views of turbines from residential properties. As the viewing location of the proposal would be generally fixed there is opportunity to significantly reduce potential visual impact from the proposal.

In order to achieve visual screening planting between the intrusive element and the homestead, tree planting could be undertaken in consultation with the relevant landowners to ensure that desirable views are not inadvertently eroded or lost in the effort to mitigate views of the turbines.

16.5.2 Residence Supplementary Planting

Where turbines are located close to the dwelling or existing intervening vegetation is thin, supplementary planting is a mitigation method that has been identified. Supplementary planting in keeping with the existing landscape character would further reduce potential visibility and ensure longevity of the intervening vegetation.

16.6 Landscaping Principles

The existing character of the landscape allows for a variety of methods of landscaping and visual screening which will remain in keeping with the landscape character. General guidelines to adhere to when planning for landscaping and visual screening include:

- Planting is recommended post construction in consultation with the landowner.
- Planting should remain in keeping with existing landscape character.
- Species selection is to be typical of the area.
- Planting layout should avoid screening views of the broader landscape.
- Avoid the clearing of existing vegetation. Where appropriate reinstate any lost vegetation.
- Allow natural vegetation to regrow over any areas of disturbance.

Locally native plant species are preferred, as they help to preserve the landscape character and scenic quality of the area as well as building habitat for local fauna. Native species are also well-suited to local conditions (ie. soil, climate, etc.) and will build on the existing vegetation assemblages in the area.

17

Evaluation of Visual Performance Objectives

17.0 Evaluation of Visual Performance Objectives

17.1 Overview of Visual Performance Objectives

In accordance with the Bulletin, “the visual assessment requires an evaluation of the proposed wind energy project and its various components, turbines and ancillary facilities against the visual performance objectives of the Project (refer to Table 2 of the Bulletin), using a combination of desktop and field evaluations. The visual performance objectives are used as a framework for evaluation that enables potential impacts and management options to be considered objectively, against the varying levels of landscape significance established by the baseline study. Application of the visual performance objectives will allow for a transparent and robust assessment process.”

The following tables provides a brief summary of the evaluation of each of the visual performance objectives and identifies the relevant sections of the LVIA where visual performance objectives are addressed.

Visual Magnitude - Visual Performance Objectives		
Visual Influence Zone 1 Objectives:	Visual Influence Zone 2 Objectives:	Visual Influence Zone 3 Objectives:
Avoid turbines or provide detailed justification of turbines below the blue line (5,500 m for Dinawan WF)	Manage impacts as far as practicable, justify residual impacts, and describe proposed mitigation measures below the black line (3,750 m for Dinawan WF). Consider screening between the blue line and the black line.	Consider screening below the black line (within 3,750 m).
Summary of LVIA Evaluation		

Dwellings within 3,750 m (below the black line):

- A total of four (4) non-associated dwellings were identified within 3,750 metres of a proposed turbine
- Of these, all four (4) non-associated dwellings were assessed as being Visual Influence Zone 2 (VIZ2).
- The objectives for VIZ2 receptors within 3,750 m of the nearest turbine are to: *Manage impacts as far as practicable, justify residual impacts.*
- Three (3) non-associated dwellings were assessed as having a negligible or low visual impact rating due to existing surrounding vegetation which screens views from all three (3) of the non-associated dwellings. One (1) non-associated dwelling was assessed as having a high visual impact rating (R019).
- Practical and feasible mitigation measures have been recommended for R19 which once established, are anticipated to reduce impacts to an acceptable level.

Dwellings within 3,750 m - 5,500 m (between the blue and black line):

- A total of nine (9) non-associated dwellings were identified between 3,750 - 5,500 metres of a proposed turbine
- Of these, one (1) non-associated dwelling (R091) was identified as being Visual Influence Zone 2 (VIZ2).
- The objectives for VIZ2 receptors between the black line (3,750 m) and blue line (5,500 m) of the nearest turbine are to: *Consider screening between the blue line and the black line.*
- All nine (9) were assessed as having a nil-low visual impact rating.
- Existing screen factors for dwellings between the blue and black line are considered to be sufficient in screening views toward the Project. As a result, no mitigation measures have been recommended in accordance with the Bulletin.

Refer to Section 6.0: Preliminary Assessment Tools

Table 22 – Evaluation of Visual Performance Objectives - Visual Magnitude

Landscape Scenic Integrity		
Visual Influence Zone 1 Objectives:	Visual Influence Zone 2 Objectives:	Visual Influence Zone 3 Objectives:
Wind turbines should not cause more than a low level modification of the visual catchment. Turbines are seen as either very small and/ or faint, or as of a size and colour contrast (under clear, haze-free atmospheric conditions) that they would not compete with major elements of the existing visual catchment.	Wind turbines should not cause significant modification of the visual catchment. Turbines may be visually apparent and could become a major element in the landscape but should not dominate the existing visual catchment.	No Visual Performance objective applies.
Summary of LVIA Evaluation		

The landscape scenic integrity was assessed throughout various sections of the report. The following provides a summary of the findings:

Public Viewpoint Analysis:

- The Visual Influence Zone (VIZ) was identified for 25 key viewpoint locations within the Study Area and where required the landscape scenic integrity was assessed in accordance with the relevant visual performance objectives. Of the 25 viewpoint locations assessed, 23 locations were rated as being Visual Influence Zone 3 (VIZ3) and in accordance with the Bulletin, no visual performance objectives apply.
- Two (2) public viewpoints were assessed as being Visual Influence Zone 2 (VIZ2), the Project was assessed as being a visible element in the landscape from the (2) public viewpoint locations (VP15 and VP22). Photomontages have been prepared from these locations demonstrating the turbines have the potential to become a major element in the existing visual catchment for two (2) viewpoints due to the close proximity of the Project. It is noted that both locations are from low use, unsealed roads, which have a low visual sensitivity. No landscape features were identified at these locations.
- Photomontages were prepared from these locations in addition to one (1) public viewpoint location from Yanco Bridge Rest Area to assist the assessment of impacts to the scenic integrity.

Refer to Section 8.0 and Appendix B: Public Viewpoint Analysis

Dwelling Assessments:

- A total of four (4) non-associated dwellings were identified within 3,750 metres of a proposed turbine with all four (4) non-associated dwellings were assessed as being Visual Influence Zone 2 (VIZ2).
- A total of one (1) non-associated dwelling (R091) was identified between 3,750 - 5,500 metres as being Visual Influence Zone 2 (VIZ2).
- The potential impacts on the scenic integrity from each of the dwellings was assessed in accordance with the objectives of the Bulletin (as outlined above).
- The assessment found the scenic integrity of the landscape will not be impacted by the Project from R036, R143, R088 and R091 due to the existing screen vegetation.
- The assessment found the Project would impact on the scenic integrity of the landscape character from R019.
- Mitigation in the form of supplementary planting has been proposed in accordance with the Visual Assessment Bulletin to reduce the potential visual impacts from R019.

Refer to Section 9.0 and Appendix C: Detailed Dwelling Assessment

Landscape Character:

The potential for the Project to affect the scenic integrity of the existing landscape character was summarised for each Landscape Character Unit in Section 15.0 of the LVIA. The existing character of the region is predominantly defined by vast tracts of open, flat agricultural land that is generally treeless and the land use is driven by commercial agricultural operations.

The Project has the ability to become a feature in the existing visual character of the Study Area since the turbines will be a visually prominent element in the flat, open landscape. However, it should be noted that once constructed, the Project will allow the continuation of the existing character of agricultural production with the addition of a new productive land use, ie., energy production.

Refer to Section 14.0: Overview of Impact on Landscape Character.

Table 23 – Landscape Scenic Integrity - Evaluation of Visual Performance Objectives

Key Feature Disruption		
Visual Influence Zone 1 Objectives:	Visual Influence Zone 2 Objectives:	Visual Influence Zone 3 Objectives:
Avoid wind turbines or ancillary facilities that result in the removal or visual alteration/disruption of identified key landscape features. This includes any major or visually significant landform, waterform, vegetation or cultural features that have visual prominence or are focal points.	Minimise impact of wind turbines or ancillary facilities that result in the removal or visual alteration/disruption of identified key landscape features. This includes any major or visually significant landform, waterform, vegetation or cultural features that have visual prominence or are focal points.	No Visual Performance objective applies.
Summary of LVIA Evaluation		

Key landscape features are identified in **Section 5.0**. The key features were identified through a combination of community consultation and landscape character assessment. The LVIA has assessed the key features of the area and it has been concluded that whilst the Project may impact views from some areas, key features identified through the landscape baseline study will remain the dominant features of the landscape. The potential impact on key landscape features was assessed throughout various sections of the report. The following provides a summary of the findings:

Public Viewpoint Analysis:

- The Visual Influence Zone (VIZ) was identified for 25 key viewpoint locations within the Study Area and where required the landscape scenic integrity was assessed in accordance with the relevant visual performance objectives. Of the 25 viewpoint locations assessed, 23 locations were rated as being Visual Influence Zone 3 (VIZ3) and in accordance with the Bulletin, no visual performance objectives apply.
- Two (2) public viewpoints were assessed as being Visual Influence Zone 2 (VIZ2), the Project was assessed as being a visible element in the landscape from the (2) public viewpoint locations (VP15 and VP22). Photomontages were prepared from these locations demonstrating the turbines have the potential to become a dominant feature in the existing visual catchment for two (2) viewpoints due to the close proximity of the Project. It is noted that both locations are from low use, unsealed roads, which have a low visual sensitivity. No landscape features were identified at these locations, therefore although the Project is likely to be dominate views from these viewpoints, no key landscape features will be disrupted by the Project.
- Photomontages were prepared from these locations in addition to one (1) public viewpoint location from Yanco Bridge Rest Area to assist in the assessment.

Refer to Section 8.0 and Appendix B: Public Viewpoint Analysis

Dwelling Assessments:

- A total of four (4) non-associated dwellings were identified within 3,750 metres of a proposed turbine with all four (4) non-associated dwellings assessed as being Visual Influence Zone 2 (VIZ2).
- A total of one (1) non-associated dwelling (R091) was identified between 3,750 - 5,500 metres of a proposed turbine and identified as being Visual Influence Zone 2 (VIZ2).
- The potential impacts on the key landscape features for each of the dwellings were assessed in accordance with the objectives of the Bulletin.
- The Project has the potential to be a major element from one (1) of the five (5) non-associated dwellings identified as being Visual Influence Zone 2 (VIZ2), however, no key features were identified within the Study Area and as a result the Project will not disrupt views to any key features.

Refer to Section 9.0 and Appendix C: Detailed Dwelling Assessment

Landscape Character:

The potential for the Project to affect key landscape features of the existing landscape character was summarised for each Landscape Character Unit. The LVIA concluded that the Project has the potential to become a feature of the landscape due to the existing flat terrain. However, it is noted that due to the flat terrain, generally there were no key features identified within the Study Area.

Refer to Section 14.0: Overview of Impact on Landscape Character.

Table 24 – Key Feature Disruption - Evaluation of Visual Performance Objectives

Multiple Wind Turbine Effects
Objectives (Applies to all Visual Influence Zones)
• Avoid views to the proposed, existing and approved turbines within eight kilometres from Level 1 and Level 2 viewpoints, exceeding the following thresholds, or provide detailed justification: • Level 1: (High Sensitivity) - Wind Turbines visible within the effective horizontal views of two or more 60° sectors. • Level 2: (Moderate Sensitivity) - Wind Turbines visible within the effective horizontal views in three or more 60° sectors.
Summary of LVIA Evaluation

- All viewers identified using the MWTT (based on 2D plan assessment) are Level 2 Sensitivity (Rural Dwelling). The Bulletin recommends further assessment to Rural Dwellings (Level 2 Sensitivity) identified as having the potential to view more than two (2) 60° sectors when using the Multiple Effect Tool.
- The approach to the MWTT identifies those dwellings which are non-associated with the Project and those that are non-associated with the Project but associated with another surrounding wind farm. The sectors occupied by turbines which form part of the associated project have been removed from the overall MWTT totals.
- The assessment identified that nine (9) of the 22 non-associated dwellings within 8,000 m of the Project will have views of turbines associated with the Project and the surrounding wind farms in three (3) or above 60 degree sectors. The remaining 13 non-associated dwellings will have turbines within up to two (2) 60 degree sectors, which is deemed acceptable in accordance with the Bulletin.
- Seven (7) non-associated dwellings have been identified as having up to three (3) 60 degree sectors visible (R049, R082, R008, R111, R144, R108 and R091); and
- Two (2) non-associated dwellings (R088 and R036) were identified as having views in up to four (4) 60 degree sectors.
- An assessment using LIDAR wireframes, photomontages and aerials were undertaken as part of the assessment which considered the 60 degree sectors of the view impacted by the Project, YDWF, AWF and BWF. The assessment found that existing screen factors such as vegetation and farm buildings were found to reduce the number of 60 degree sectors visible from all nine (9) of these non-associated dwellings.
- As a result, the cumulative MWTT indicates that the number of sectors occupied by the Project are no greater than two (2) 60 degree sectors for all which is deemed acceptable in line with Level 2 viewpoints. The greatest impacts are likely to be caused by the other proposed project turbines.

Refer to Section 6.0: Preliminary Assessment Tools

Table 25 – Multiple Wind Turbine Effects - Evaluation of Visual Performance Objectives

Shadow Flicker and Blade Glint - Visual Performance Objectives
Objectives (Applies to all Visual Influence Zones)
• Minimise shadow flicker to not more than 30 hours per year and utilise available mitigation options to minimise shadow flicker. • Finish turbine blades with a low reflectivity surface treatment to ensure that blade glint is minimised.
Summary of LVIA Evaluation

A Shadow Flicker Assessment was undertaken for the Project.

The Report concluded no non-associated dwellings will be subject to shadow flicker exceeding 30 hours per year.

Refer to Section 11.0: Shadow Flicker and Blade Glint

Table 26 – Shadow Flicker & Blade Glint - Evaluation of Visual Performance Objectives

Aviation Hazard Lighting

Objectives (Applies to all Visual Influence Zones)

Objective Applies to all Visual Influence Zones

- Aviation Hazard Lighting (AHL) must meet the requirements of Australian Standard AS 4282 - 1997 and any prescribed or notified CASA requirement. Shield all AHL within 2 kilometres of any dwellings. Avoid strobe lighting.

Summary of LVIA Evaluation

No non-associated dwellings were identified within 2 km of the nearest turbine, therefore no mitigation is required.

Refer to Section 12.0 Night Lighting Assessment.

Table 27 – Aviation Hazard Lighting - Evaluation of Visual Performance Objectives

18.0 Conclusion

The NSW Government has identified five (5) Renewable Energy Zones (REZ) in regional areas of NSW and the Project is located within the South West Renewable Energy Zones (SW REZ). The Project contrasts with the existing landscape character of the region which is typically rural, grazing land which is highly modified and lacks key landscape and scenic features. It is inevitable that the placement of large scale wind turbines in a rural landscape will dramatically alter the existing landscape character of the area.

With all visual impact assessments the objective is not to determine whether the Project is visible or not visible, but to determine how the Project will impact on the existing visual amenity, landscape character and scenic quality. It has been identified that although the Project will be a visually prominent element in the landscape, views to key scenic or landscape features will not be impacted because the predominant character of the region is defined by highly modified lands of low scenic quality. Once operational, the Project will allow the continuation of existing agricultural activity and add another land use, i.e., wind energy production.

Although this LVIA quantifies the visual impact of the turbines and ancillary infrastructure, the overall visual impact of the Project will vary greatly depending on the individual viewer's sensitivity to and acceptance of change. The sensitivity towards change varies greatly depending on the user's connection with the landscape. For example, visitors to the area may perceive the wind farm as an interesting feature of the landscape which is otherwise defined by flat, large expanses that lack key features. This may contrast with a resident who passes the wind farm daily who may have a more critical perception of the visual presence of the wind farm.

The visual impact of the turbines are reduced as the distance of the vantage point from the Project is increased. This has been established through the preparation of photomontages from locations at varying distances. Although the area is characterised by large, flat tracts of land that are generally treeless, it is understood that the visibility decreases as one move further away from the turbines.

The LVIA concludes there are some opportunities to view the Project from non-associated dwellings within 8,000 m of the Project. The greatest visual effect is most likely to be felt by residents in the immediate vicinity of the Project. Of the 22 non-associated dwellings within 8,000 m of the Project that were assessed, 21 are likely to have a negligible - low visual impact and one (1) non-associated dwelling (R019) is likely to have a high visual impact.

Mitigation methods in the form of supplementary planting will potentially reduce visual impacts at the non-associated dwelling (R019) identified as having a high visual impacts rating. However, it should be noted that the provision of mitigation measures should be integrated in consultation with the landowner.

No key public viewpoint locations were located within 8 km of the nearest turbine. However, Yanco Bridge Rest Area, located off Kidman Way, was identified as a key public viewpoint located in excess of 8 km of the nearest turbine. Another point of interest identified in the area was the Oolambeyan Homestead Picnic Area, located in excess of 24 km northwest of the Project. The assessment identified that views towards the Project will be screened by existing vegetation from both public viewpoint locations.

It was also identified that the Project will impact the overall and broader landscape character. Although the Project will be visually prominent in the landscape, the landscape has been determined to be of low scenic quality and devoid of significant landscape features. The modification and clearing of the plains for agricultural use combined with the flat topography results in the landscape being essentially a blank canvas where any contrasting addition, particularly one of the scale of a wind farm, is likely to become a defining character element. This however will not diminish the existing agricultural character.

The potential cumulative visual impact assessment of proposed renewable energy projects in the area concluded that it is likely that the re-occurrence of wind farms within this region has the potential to alter the perception of the overall landscape character irrespective of being viewed in a single viewshed. Since the Project is located in the SW REZ, it is likely that the region will be developed for wind energy production due to largely uninhabited lands and conditions that favour wind energy harvest. The Project is located in an area of low scenic quality that offers no key features in the landscape. It should also be noted that the development of wind farms will allow the continuation of the existing primary production activities, as well as provide opportunity for energy production.

Wind turbines can be considered a temporary installation in the landscape due to their modular construction and relatively low impact during the construction phase. When implemented with appropriate environmental management, the development of wind farms can be undertaken with low impact on the surrounding environment whilst providing positive local, regional and national benefits.

On evaluation, it is the opinion of Moir LA that with mitigation measures implemented, the Project is compliant with the performance objectives of the Bulletin.

